

FELLOWS FINAL REPORT ForSEAdiscovery

ER1. José Luis Gasch Tomás

Department: Instituto de Historia (IH), Consejo Superior de Investigaciones Científicas (CSIC) Contract: 1 December 2014 - 31 August 2016

1. Goals achieved

1.1. Major accomplishments

One of the main accomplishments has been the building of a conceptual model for a relational database which holds data on Iberian shipwrecks coming from historical, archaeological and environmental sources. The model is already finished and, in coordination with the other two Experienced Researchers of the project – Sara Rich (ER2) and Peter Groenendijk (ER3)–, I have started to enter data. This model and database is already serving as a basis for a GIS model for Iberian shipwrecks and timber provenance. Most data come from the DynCoopNet database, the Associated Partner Filipe Castro's database and samples collected in archeological campaigns carried out in Ribadeo (Spain), Belinho (Portugal) and Yarmouth Roads (UK). Planning and coordination work has entailed the elaboration of several questionnaires to be filled by the fellows of ForSeaDiscovery. Questionnaires collect the scientific information which fellows expected to produce and use for his/her research in ForSeaDiscovery. We have already entered data of more than 200 Iberian shipwrecks located in different areas of the world. Firstly, data are organized into several tables which holds information about the dimensions, type, architectural features and additional characteristics of shipwrecks. Secondly, the database hold information from the archaeological campaigns of ForSEAdiscovery, including a dive log and a register of visuals. Thirdly, the database contains data of timber and wood samples taken from shipwrecks, living trees and historical buildings, including results of dendro-analysis. I, with Sara Rich and Peter Groenendijk, have elaborated a guide of the database –instructions with descriptions of all the tables and fields –, which might be helpful for researchers who plan to use the database. Although the database already has browsers to find information, I would recommend creating more perfect browsers in the future, which might be done with the assistance of computer programmers and/or software devlopers.

Furthermore, I have collaboratively worked on the main scientific goals of the project. I, with Ana Rita Trindade (ESR1) and Koldo Trápaga Monchet (ESR 8), have written an article about

Spanish shipbuilding in the early seventeenth century, which is currently under review at the *International Journal of Maritime History*. Furthermore, I have started a research whose main goal is to historically identify the Ribadeo Shipwreck – this shipwreck is a late sixteenth– or early-seventeenth galleon, which sank off the estuary of the Eo River, in Ribadeo (Galicia, Spain). I have developed an interdisciplinary methodology with other members of the project which entails the combination of techniques from history – archival work –, underwater archaeology –analysis of the main features of the shipwreck –, and wood sciences – lab analysis destined to infer the geographical origins and species of timber from the wreck. The results of this collective work will be presented at the *The Sixth International Congress on Underwater Archaeology* (IKUWA), which will take place at the Australian Institute for Maritime Archaeology in Fremantle (Western Australia) in November, 2016.

Finally, I have started an own research line, within the framework of ForSeaDiscovery, which deals with archaeological material culture, shipbuilding, and timber trade during the seventeenth and eighteenth centuries. This research line addresses shipbuilding in the Spanish Empire and the use of Baltic and American timber in Hispanic shipbuilding during the late seventeenth and eighteenth centuries. One of the main parts of the research aims to answering the question why American and Baltic timbers were massively used in Hispanic shipyards on both sides of the Atlantic. Furthermore, as a result of a research on material culture present in shipwrecks, I have published a work about Chinese porcelain in shipwrecks located in Spanish waters (see publications below).

1.2. Training

- Intensive Training Course: "History of Wooden Shipbuilding & Books and treatises on Shipbuilding", CSIC (Madrid, Spain), 14/01/2015-16/01/2015.
- Intensive Training Course: "Historiography and Archive Research", University of Groningen (The Netherlands), 06/05/2015-08/05/2015.
- Intensive Training Course: "Application of Geographical Information System (GIS) to Maritime History and Archaeology", CSIC (Madrid, Spain), 13/10/2015–16/10/2015.
- Intensive Training Course: "Dendrochronology & Wood Anatomy", Wageningen University (The Netherlands), 9/12/2015-11/12/2015.
- Intensive Training Course: "Dendroarchaeology of Ships: Prospect and Practice", University of Wales Trinity Saint David (Lampeter, Wales, United Kingdom), 23/05/2016-27/05/2016.

1.3. Conferences

• Attended the conference *La Economía política de los imperios. Una visión global sobre la introducción e impacto de nuevos productos,* organized by Universidad Pablo de Olavide and Escuela de Estudios Hispano-Americanos, Seville (Spain), 15/12/2014-

16/12/2014. In the conference I presented the paper "El consumo de artículos orientales en México y Sevilla durante la época moderna".

- Attended International Conference Connected Oceans 2015 New Avenues of Research in Maritime and Oceans History, University of Porto (Portugal), 08/06/2015– 12/06/2015. In the conference I presented the paper, with Koldo Trápaga and Ana Rita Trindade, "The ForSEADiscovery project".
- Attended *International Symposium on Boat and Ship Archaeology. Baltic and Beyond (ISBSA14)*, organized by National Maritime Museum in Gdansk (Poland), 21/09/2015-25/09/2015. In the conference I presented, with Ana Crespo Solana and María José García-Rodríguez, the poster "Development of a GIS for Iberian ships in the Age of Discovery in ForSeaDisvoery project".
- Attended International Conference *Cultura Marítima en México: espacios marítimos y proyecciones culturales,* organized by Instituto Nacional de Antropología e Historia (INAH) in Campeche (Mexico), 22/10/2015-23/10/2015.
- Public lecture "Bosques flotantes para los imperios ibéricos: Ecología y Globalización en la Edad Moderna", organized by Instituto Nacional de Antropología e Historia (INAH) in Mexico City (Mexico), 27/10/2015.
- Public lecture "Shipbuilding and Globalization. Tar trade from the Baltic to the Iberian Peninsula in the 18th century", organized by the Department of History at the University of Groningen (The Netherlands), 21/03/2016.

Participation in these conferences, alongside my secondments (see below), have been the main way to networking with colleagues and experts.

1.4. Teaching

- Lecture on "The GIS-Oriented ForSeaDiscovery database design" (1.5 hours) in the Intensive Training Course "Historiography and Archive Research", University of Groningen (The Netherlands), 08/05/2015.
- Guest chair to coordinate the debate "Fellow meeting and plenary discussion" (1.5 hours) in the Intensive Training Course "Historiography and Archive Research", University of Groningen (The Netherlands), 08/05/2015.
- Lecture on "Practical lessons Database and GIS" (1.5 hours) in the Intensive Training Course: "Application of Geographical Information System (GIS) to Maritime History and Archaeology", CSIC (Madrid, Spain), 16/010/2015.
- Lecture, with Sara Rich and Peter Groenendijk, on "Dissemination of the Underwater Cultural Heritage" (2 hours) in the Intensive Training Course: "Application of Geographical Information System (GIS) to Maritime History and Archaeology", CSIC (Madrid, Spain), 16/010/2015.

1.5. Secondments

A. Research secondment at Maritime Archaeology Limited in collaboration with the Maritime Archaeology Trust and the University of Southampton in Southampton, UK (06/04/2015-02/05/2015).

Research secondment at the University of Groningen (01/02/2016-31/03/2016).

1.6. Work in archives

- Work in *Archivo General Militar of Madrid* (General Military Archive of Madrid) and *Archivo del Museo Naval de Madrid* (Archive of the Naval Museum of Madrid).
- Work in the *Archivo Municipal de Ribadeo* (Municipal Archive of Ribadeo, Spain) and *Archivo Municipal de Mondoñedo* (Municipal Aarchive of Mondoñedo, Spain).
- Work in the Archivo General de Simancas (General Archive of Simancas).

1.7. Dissemination

- José Luis Gasch-Tomás: "Historia trans-"nacional" y conflicto en mundo hispánico (siglos XVI-XVIII)", *Revista Jerónimo Zurita*, 90, 2015, pp. 13-19.
- José Luis Gasch-Tomás: "Mecanismos de funcionamiento institucional en el imperio hispánico. El Comercio de los Galeones de Manila y el Consulado de Comerciantes de México en la década de 1630·", *Revista Jerónimo Zurita*, 90, 2015, pp. 56–74.
- José Luis Gasch-Tomás: "Spanish Empire (from 1580)", in *Encyclopedia of Empire*, edited by John MacKenzie, London: Wiley-Blackwell, 2016.
- José Luis Gasch-Tomás, "La porcelana china azul y blanca. Una historia de naturaleza global", in Autoridad Portuaria Balear, ed., *El control arqueológico del dragado del puerto de Maó*, Palma de Mallorca. Ports de Balears, 2016, pp. 52–60.
- Academic book manuscript under review in *Brill*.
- One article in peer review process: José L. Gasch-Tomás (with Koldo Trápaga and Ana Rita Trindade), "Shipbuilding in Times of War. Contracts for the Construction of Ships and Provision of Supplies in the Spanish Empire (c. 1580 to 1650)", currently under review in *International Journal of Maritime History*.
- José Luis Gasch-Tomás, "Agents of globalisation: An approximation to Santi Federighi's commercial network, c. 1620-1643", in Manuel Herrero Sánchez and Klemens Kaps, eds., *Merchants and Trade Networks in the Atlantic and the Mediterranean, 1550-1800: Connectors of Commercial Maritime Systems, London: Pickering and Chatto, forthcoming.*

Furthermore, I have participated in the blog coordinated by Sara Rich (ER2) entitled *Research fellows of ForSEAdiscovery. Reporting live from archives, forests, labs and shipwrecks.* I have published two entries in this blog – one entitled "Has archival research provided a name for

the Ribadeo galleon?" and another entitled "Shipbuilding in the Early Modern Era: A national or global approach?"

ER2. Sara Rich

Host Institution: Maritime Archaeology Ltd Contract Start Date: 08/12/2014 Contract End Date: 08/12/2016

ForSEAdiscovery activities.

Personal Research Project: *Shipwrecks and Provenance: in-situ timber sampling protocols, with a focus on wrecks of the Iberian shipbuilding tradition*

Personal Research Project Abstract:

Two of the questions most frequently asked by archaeologists of sites and the objects that populate them are "How old are you?" and "Where are you from?" These questions can often be answered through archaeometric dating and provenance analyses. As both archaeological sites and objects, shipwrecks pose a special problem in archaeometric dating and provenance because when they sailed, they often accumulated new construction material as timbers were repaired and replaced. Additionally, during periods of globalization, such as the so-called Age of Discovery, the provenance of construction materials may not reflect where the ship was built. Accepting these special challenges, nautical archaeologists must piece together the nuanced relationship between the ship, its timbers, and the shipwreck, and to do so, wood samples must be removed from the assemblage. This book is the first set of protocols to guide archaeologists in the removal of wood samples for a suite of archaeometric techniques currently available to provenance the timbers used to construct sailing ships. Because Iberian ships of the 16th to 18th centuries pose a unique challenge in nautical archaeology, they are used as the case study; however, the book's protocols apply to archaeologists working on shipwreck assemblages from any time period and in any place.

Personal Research Project Progress Report: 2017/07/18

Proposal accepted by Archaeopress for open-access publication of the Protocols; full manuscript submission date: 15 August 2017

Secondments:

1st Secondment: Archeonauta, S.L., A Coruña (Spain), 3 June 2015 - 1 July 2015

Aims and achievements: Working with ForSEAdiscovery partner Miguel San Claudio, and with the assistance of partner Garry Momber (Maritime Archaeology Ltd.) and WP2 Coordinator Nigel Nayling, I developed the project design, archaeological plan, and dive plan for WP2's first season of underwater fieldwork. These plans and other preparatory documents were modeled on those currently in use in Great Britain and required by Historic England and the Health and Safety Executive (HSE). We worked together to establish a best-practice methodology for archaeological diving in Spain, which was also modeled on HSE standards. Our aims were to remove sufficient timber samples from selected shipwrecks off the Galician coast (the Bayonnaise (Finisterre), La Magdalena (Viveiro), and the Ribadeo (Ribadeo)) to supply WP3 with material for dendroprovenance. From these shipwrecks, we removed a total of nearly 80 wood samples. Each of these samples was recorded archaeologically according to Historic England guidelines before being handed over to WP3 for scientific analyses. The insitu timber sampling protocols, one of my deliverables, has benefited tremendously from the experience gained during this secondment.

2nd Secondment: University of Wales, Trinity Sain David, Lampeter (Wales, UK), 22-27 November 2015

Aims and achievements. Working with WP2 coordinator Nigel Nayling, I was able to confirm changes to the WP2 tables in the project database. Furthermore, because three WP2 fellows were also there at that time, we were able to make plans for the 2016 sampling campaign at Yarmouth Roads (England, UK). These fellows have as a deliverable a multilingual/multimedia glossary of shipbuilding and ships' timbers, and I was able to provide some feedback on this and contribute to surrounding conversations, as well as receive input from the fellows and Prof. Nayling on the draft of the in-situ timber sampling protocols. Finally, I was able to start conversations with Prof. Nayling on project ideas for the future.

3rd Secondment. CSIC, Madrid (Spain), 13-18 December 2015

<u>Aims and achievements</u>: Working with Dr. José Luis Gasch-Tomás (ER1, CSIC), we consolidated the multiple datasets for WP2 and worked to integrate them into the project database. When Dr. Peter Groenendijk arrived, our discussionsons on the database continued, but we also began to make arrangements and share ideas regarding ForSEAdiscovery's pending application for European Researchers' Night 2016. We were able to confirm task allocation, possible venues and locations for events, and the distribution of the fellows. The application was submitted in January, but it was unsuccessful. Regardless, going through the process of making an EU application was an extremely beneficial experience.

<u>4th Secondment</u>: University of Wales, Trinity Saint David, Lampeter (Wales, UK), 15-21 May 2016

Aims and achievements: Working with Drs. Marta Domingo Delmás and Peter Groenendijk (Universidad de Santiago de Compostela, Lugo, Spain), we worked through the 25 samples removed during the 2016 Yarmouth Roads Shipwreck campaign, noting which samples were most suitable for which type of dendroprovenance analysis, as well as walking through the new digital recording method that I had developed for the archaeological recording of the samples. I also received training from Prof. Nigel Nayling (WP2 Coordinator), Dr. Rod Bale (University of Wales, Trinity Saint David) and Dr. Aoife Daly (ForSEAdiscovery partner) on performing species identification on archaeological wood samples, which had been provided by a project conducted by the University of Exeter.

Scientific Activities.

Summary

- HSE SCUBA certification;
- Member of Martitime Archaeology Ltd./Maritime Archaeology Trust dive team;
- Project Plan for the 2015 timber sampling campaign in Galicia, Spain;
- Project Plans and Licensee Reports for the 2015 and 2016 timber sampling campaigns at the Yarmouth Roads Protected Shipwreck, UK;
- Acted as Project Manager for timber 2016 sampling campaign at Yarmouth Roads;
- Timber sampling campaigns (2015-2016) at Yarmouth Roads and Galicia completed, with a total of 89 shipwreck timber samples removed from five shipwreck sites, each sample recorded and delivered to WP3;
- Reported the 28 samples from the Yarmouth Roads Protected Shipwreck to the Receiver of Wreck;
- Maintained bi-weekly meetings with WP2 fellows to ensure communication and progress;
- Performed taxonomical identifications on archaeological wood samples for the University of Exeter (four samples from the Ashlett Fish Weir, Southampton Waters) and the Southsea Sub-Aqua Club (seven samples removed *in situ* from the Selsey Stone Barge wreck, English Channel);
- Presented research at conferences and invited lectures in Brussels, Jerusalem, Madrid, Glasgow, Stuttgart, Nuremberg, Kristinenberg, Lampeter, Southampton, and Freemantle;
- Attended two semesters of courses in Spanish language and have reached an upper intermediate level of proficiency;
- One book, two book reviews, and five research papers published, one book and one paper have been accepted for publication, and two other papers have been submitted;
- Developed and maintained a Wordpress site and a YouTube channel for the project fellows to disseminate their research publicly;
- Contributed four posts to the fellows' Wordpress site;

- Received 300 GBP to present research at the 1st European Conference on Scientific Diving (Stuttgart, April 2015);
- Participated in fundraising efforts for maritime archaeological projects through DigVentures;
- ER2's major deliverable has been accepted for publication with Archaeopress (Oxford) through their Access Archaeology program; the PDF will be open access, with a print-on-demand option for a hard copy;
- Contributed to the design and furnished WP2 data for the project database;
- On-site experience in flying a drone and using a drone for photogrammetry;
- Attended workshops in Iberian shipbuilding, historical research, wood anatomy, Rhino3D, 3Digify, photogrammetry, AgiSoft, RTI, FARO laser scanning, ArcGIS, QGIS, and SonarWiz, and have undergone training in interpreting sonar and seismic data using SonarWiz and OctoCoda;
- Trained off-shore wind farm developers on the treatment of artefacts;
- Designed a public outreach project and submitted an application for European Researchers' Night 2016;
- Funding application to support further work on the Yarmouth Roads Protected Shipwreck submitted to the Royal Archaeological Institute;
- Designed a research project and submitted an application to the Warburg Institute, University of London;
- Designed a research project, Shipwreck Hauntography, and submitted an application to the University of Cyprus;
- Reformatted Shipwreck Hauntography project design and submitted an application for a Mellon Grant at the University of Pennsylvania;
- Developed, received funding for (1000 GBP), and executed side project in experimental and public archaeology, having conducted 3 public workshops in relation to this project's aims;
- Supervised a master's student in maritime archaeology at Bournemouth University, whose thesis is a continuation of the side project listed above;
- The public outreach aspect of this side project was written into a new application for financial support from the Heritage Lottery Fund.

Training Activities.

Presented: "3D Imaging for Wood-Loving Luddites," Beyond the 3rd Dimension. 3D Imaging Workshop, Maritime Archaeology Trust and the University of Alexandria (Egypt)

(Southampton, UK, 20-23 June 2016)

- Attended: Beyond the 3rd Dimension: 3D Imaging Workshop, Maritime Archaeology Trust and the University of Alexandria (Egypt) (Southampton, UK, 20–23 June 2016)
- Attended: Nautical Archaeology Workshop, ForSEAdiscovery Intensive Training Course, University of Wales Trinity Saint David (Lampeter, UK, 23–26 May 2016)
- Attended: Dendrochronology & Wood Anatomy Workshop, ForSEAdiscovery Intensive Training Course, Wageningen University (Wageningen, The Netherlands, 9-11 December 2015)
- Attended: Application of Geographical Information Systems (GIS) to Maritime History and Archaeology, ForSEAdiscovery Intensive Training Course, Centro de Ciencias Humanas y Sociales, CSIC (13-16 October 2015)
- Attended: Historiography and Archive Research, ForSEAdiscovery Intensive Training Course, Rijksuniversiteit Groningen (Groningen, The Netherlands, 6–8 May 2015)
- Attended: SonarWiz Workshop, National Oceanography Centre (Southampton, 16 April 2015)
- Attended: HSE SCUBA Training Course, Andark Diving & Watersports (Lower Swanick, UK, 30 March 10 April 2015)
- Attended: Chamber Familiarisation Course, London Diving Centre (London, UK, 23–27 March 2015)
- Attended: First Aid at Work Course, London Diving Centre (London, UK, 23-27 March 2015)
- Attended: Oxygen Providers Course, London Diving Centre (London, UK, 23-27 March 2015)
- Attended: A.E.D. Providers Course, London Diving Centre (London, UK, 23-27 March 2015)
- Attended: History of Wooden Shipbuilding & Books and Treatises on Shipbuilding, ForSEAdiscovery Intensive Training Course, Centro de Ciencias Humanas y Sociales, CSIC (Madrid, Spain, 14-16 January 2015)

Dissemination Activities.

Oral Dissemination. Conferences, Seminars, and Guest Lectures

- Presented: "Among the Tentative Haunters: Nautical Archaeology & Other Non-Senses," Theoretical Archaeology Group (Southampton, UK, 19–21 December 2016).
- Presented: "Maritime Archaeological Timber Sampling: Methods and Results from the Silty Solent," with Garry Momber and Nigel Nayling. IKUWA: 6th International

Congress on Underwater Archaeology (Freemantle, Australia, 28 November – 2 December 2016)

- Abstract accepted; paper withdrawn: "The Heterotopian, Holobiontic Shipwreck: Engaging Eco-Narratives in Maritime Archaeology," Roots & Legacies, 1st Global Meeting (Oxford, UK, 13-14 September 2016)
- Presented: "In Situ Timber Sampling in the Solent... and Other Dirty Research," ForSEAdiscovery Network Meeting, University of Wales Trinity St. David (Lampeter, UK, 27 May 2016)
- Presented: "The Ship/wreck of Theseus: Provenance & Mereology in the East Mediterranean," Humanities Research Seminar, University of Wales Trinity St. David (Lampeter, UK, 18 May 2016)
- Presented: "Sampling Shipwreck Timbers *in situ* for Dendroprovenance," 2nd European Conference on Scientific Diving (Kristineberg, Sweden, 4–6 May 2016)
- Presented: "Developing Scientific Methodologies for the Sampling of Submerged Landscape Ecological and Archaeological Deposits," 2nd European Conference on Scientific Diving (Kristineberg, Sweden, 4–6 May 2016)
- Presented: Midterm Review, ForSEAdiscovery Network Meeting, Consejo Superior de Investigaciones Científicas (CSIC) (Madrid, Spain, 17–18 December 2015)
- Attended: EuroDendro: International Scientific Conference on Dendrochronology, Climate, and Human History in the Mediterranean Basin (Antalya, Turkey, 18-23 October 2015)
- Presented: "Underwater is Esoteric: Dissemination and Public Outreach in Nautical Archaeology," ForSEAdiscovery Network Meeting, Consejo Superior de Investigaciones Científicas (CSIC) (Madrid, Spain, 16 October 2015)
- Presented: "Nautical Archaeology and the Hermeneutics of the Anti-Social," 21st Annual Meeting of the European Association of Archaeologists (Glasgow, UK, 2-5 September 2015)
- Presented: "Wood' there Be Context? Dendroprovenance and Double Entendres," Archaeology & Texts: Toward Establishing a Meaningful Dialogue between Written Sources and Material Finds (Jerusalem and Ariel, Israel, 10-12 May 2015)
- Presented: "Wood Provenance Methods and Applications in Near Eastern Archaeology," Department of Art History and Archaeology, Vrije Universiteit (Brussels, Belgium, 29 April 2015)
- Attended: In Poseidon's Reich XX: Land unter! DEGUWA Internationale Tagung zur Unterwasserarchäeologie (Nuremburg, Germany, 16–22 March 2015)
- Presented: "Ecofact or Artefact? Assessing Timbers from the Submerged Mesolithic Landscape at Bouldnor Cliff (UK)," 1st European Conference on Scientific Diving

(Stuttgart, Germany, 1-3 March 2015)

- Attended: 33rd International Shipwreck Conference (Plymouth, UK, 7 February 2015)
- Presented: ForSEAdiscovery Network Meeting, Consejo Superior de Investigaciones Científicas (CSIC) (Madrid, Spain, 12 January 2015)

Written Dissemination

Published

- Book: *Cedar Forests, Cedar Ships: Allure, Lore, and Metaphor*: Oxford: Archaeopress, 2017.
- Book review: Ralph Pedersen (ed.), On Sea and Ocean: New Research in Phoenician Seafaring. Marburg: Eigenverlag des Archäeologischen Seminars der Philipps-Universität, 2015. American Journal of Archaeology 121 (2017): web only.
- Book review: Alice Beck Kehoe, *Travelling Prehistoric Seas: Critical Thinking on Ancient Transoceanic Voyages.* Walnut Creek, CA: Left Coast Press, 2016. *Mesolithic Miscellany* 25.1
- Paper: "To Put an Ancient Cedar Ship in a Bottle: Dendroprovenancing with the 87Sr/86Sr Strontium Isotope Ratio." Co-authors: S. W. Manning, P. Degryse, F. Vanhaecke, K. Latruwe & K. Van Lerberghe. *Journal of Archaeological Science: Reports* 9 (2016): 514–521.
- Paper: "Mesolithic Woodworking, Experimental Archaeology & Underwater Heritage in Hampshire and the Isle of Wight (UK)." Co-authors: Garry Momber & Ryan Watts. *Mesolithic Miscellany* 24.1 (2016): 3–12.
- Paper: "Shiver Me Timbers! No Cedar Ships in the Medieval Mediterranean?" Pp. 71– 82 in *Interoceanic Canals and World Seaborne Trade: Past, Present and Future*, Royal Academy for Overseas Sciences International Colloquium, Brussels, 7–9 June 2012. Koninklijke Academie voor Overzeese Wetenschappen, Brussels, 2016.
- Paper: "Provenancing East Mediterranean Cedar Wood with the 87Sr/86Sr Strontium Isotope Ratio." Co-authors: S. W. Manning, P. Degryse, F. Vanhaecke & K. Van Lerberghe. *Journal of Archaeological and Anthropological Sciences* 8 (2015): 467-476.
- Paper; second author with Garry Momber: "Post-glacial Human Dispersal across the North-western European Landscape," *Skyllis* 15 (2015): 4–13.

Accepted

 Book: *Shipwrecks and Provenance:* In–Situ *Timber Sampling Protocols, with a Focus on Wrecks of the Iberian Shipbuilding Tradition.* Co-authors: Nigel Nayling, Garry Momber & Ana Crespo Solana. Oxford: Archaeopress. • Paper: "Ontography of an Ordinary Shipwreck: Paradox, Appellation, Provenance, Apparition." *Coriolis: Interdisciplinary Journal of Maritime Studies.*

Submitted

- Paper: "Maritime Archaeological Timber Sampling: Methods and Results from the Silty Solent." Co-authors: Garry Momber & Nigel Nayling. IKUWA6 International Conference Proceedings, Freemantle, Australia.
- Paper; last author with Ana Rita Trindade, Mohamed Traore, Nathan Gallagher & Adolfo Miguel Martins: "From Forests to the Sea, from the Sea to the Laboratory: the Timbers of the Frigate *Santa Maria Magdalena* (18th century)." IKUWA6 International Conference Proceedings, Freemantle, Australia.

In preparation

• Book: *Shipwreck Hauntography: A Manifesto of the Uncanny.*

Outreach Activities.

- "Chopping up Shipwrecks: The Science of the Saw," ForSEAdiscovery fellows' blog
- "What's in a Name? The Yarmouth Roads Wreck and the Iberian Connection," ForSEAdiscovery fellows' blog
- "Annual Dive Medicals vs. Scientific Waistlines," ForSEAdiscovery fellows' blog
- "'Hay árboles en esta ciudad': Maritime Metaphor and Irony in the Letter of Eugenio de Salazar (1573)," ForSEAdiscovery fellows' blog
- "How to Dig Underwater in the Dark with SHARKS!" DigVentures blog
- European Researchers' Night 2016: €98,000 for WreckNIGHTdiscovery: Experiencing the Creative Science of Shipwreck Archaeology seeing the ship in the wreck and the trees in the ship (application rejected)
- Maritime Archaeology Discovery Bus planning committee to bring bus to Cyprus (with Maritime Archaeology Trust and the University of Cyprus, supported by the Honor Frost Foundation)
- Management (design, editor) of ForSEAdiscovery fellows' blog: www.forseadiscovery.wordpress.com
- Mesolithic Woodworking: initiated and raised funding from the Council for British Archaeology for a series of three public workshops (held at Butser Ancient Farm, Exbury Gardens, and Sunken Secrets Museum) in Hampshire and the Isle of Wight (UK)

Contributions towards Project Milestones / Deliverables:

Timber sampling protocols (see above) will be published by Archaeopress (Oxford) in late 2017 or early 2018.

Career Development Plan Updated: 2016/08/08

Others (Please include here other aspects you consider relevant, e.g., current position, application to other research grants, participation in other research projects...):

- I am currently a visiting professor at Appalachian State University, Boone, North Carolina, USA.
- I was invited to present the following public lecture on 21 April 2017: "Ship in a Vial: Sampling Shipwreck Timbers in situ for Dendroprovenance," Anthropology Lecture Series, University of North Georgia, Dahlonega, Georgia (USA).
- I was invited to present the following public lecture on 26 April 2017: "Ancient Forests and Dearly Departed Ships (or, How to Summon Answers from Dead Wood)," Anthropology Lecture Series, Appalachian State University, Boone, North Carolina (USA).
- My new project, started during my tenure with ForSEAdiscovery, called Shipwreck Hauntography, was presented at the meeting of the North American Theoretical Archaeology Group in Toronto (Canada) on 20 May 2017. In the coming months, I will be seeking funding from the US National Endowment for the Arts and the National Endowment for the Humanities for this project.
- I have been appointed director of the underwater survey for the Tremithos Valley Neolithic Survey Project (Cyprus), funded by the Social Sciences and Humanities Research Council of Canada (SSHRC). I will be seeking additional funding from the Honor Frost Foundation to further support my work on this project.

ER3. Peter Groenendijk

Host Institution: University of Santiago de Compostela Contract Start Date: 18/05/2015 Contract End Date: 12/01/2017

Personal Research Project:

The ER3 position focused on integrating different techniques for dating and provenancing of timbers: tree-ring measurements, quantitative wood anatomy, and the analyses of biomarkers and geo/dendrochemical signals. A protocol to attempt to date and provenance (archaeological) timbers will ultimately be developed (in the form of two publications) that

can be applied to extant and historical timbers (oaks and pines). These results will provide an empirical tool to provenance wood and cross-validate archaeological findings and information from historical records. The position also included the co-supervision of ESRs in WP3, training them in the selection and sampling of living trees and building structures for dendrochronological research, as well as in tree-ring research methods and statistical techniques. Dissemination of results is also an indispensable part of this position and two publications in peer-reviewed journals are expected. Several progress reports, technical reports on dendrochronological results on shipwrecks and forests, and the presentation of results at international conferences (and publication in proceedings) have already been produced. The fellow has also used digital media to disseminate the work and results to the general public, having published in the project blog, a popular science journal and recorded video interviews with the fellows of WP3.

Personal Research Project Abstract.

The ER3 position is embedded in the ForSEAdiscovery project, that aims to extend the current understanding of forest resource availability and of timber trade in the Iberian empires during the Age of discovery. The main task of the ER3 is integrating different techniques for dating and provenancing of timbers: tree-ring measurements, quantitative wood anatomy, and the analyses of biomarkers and geo/dendrochemical signals. The resulting tree-ring and wood-anatomy database for Iberian oak and pine species will reach back to at least the 15th century and will form an important basis for improved dating of Iberian shipwreck material. Biochemical and geochemical markers in the wood will allow for a more accurate provenancing of the oak and pine wood used in ship building. Ultimately, a protocol for an integrated approach (tree rings, biomarkers, isotopes) will be developed to maximise the precision of wood provenancing.

Personal Research Project Progress Report: 2017/10/25

Advances. I have coordinated all fieldwork in forests and historical buildings. By the end of my contract nearly all fieldwork for the project was finished (except for Muniellos, an additional area sampled briefly after the end of my contract). We have sampled all areas foreseen in the project and included additional areas not intended initially (e.g., Muniellos and the Central System, near Segovia). I have helped intensively with the measurements of tree rings. The results are very promising, with oak and pine chronologies reaching the 14th century, thus covering and even surpassing the periods foreseen in the project. Additionally, I have been closely involved in the measuring of xylem vessels areas (quantitative anatomy). This has been a very important experience for me, as these were new methods for me which I intend to use in future research with wood.

I have not yet finished the analyses for the integration of the different provenancing methods as the final results of all fellows became available only towards the very end of my appointment, and also as I agreed with the WP3 fellows that the integration of their results would take place only after they have published their main results using the same data, to avoid publication conflicts. I am currently working in Brazil as a professor at the State University of Campinas UNICAMP, one of Brazil's top institutes, where I am establishing my wood biology laboratory. In spite of the busy schedule of starting a new research line in a new institute and country, I maintain a close contact with the WP3 fellows and supervisors and have a continued involvement in their planned analyses. My experiences in multidisciplinary research, the planned publications and the data generated in this project will surely form an important basis to consolidate my future position as a wood researcher.

Secondments:

Consejo Superior de Investigaciones Científicas (CSIC), (Dates: 12 October – 7 November 2015). Supervisor: Prof. Dr. Ana Crespo Solana. Activities carried out during secondment:

- Working with José Luis Gasch Tomás and Sara Rich to improve the ForSEAdiscovery database: established a database guide with descriptions of all tables and fields to help future users (ESRs and researchers).
- Planning and sharing ideas regarding ForSEAdiscovery's application for European Researchers' Night 2016. We confirmed task allocation (including of the fellows), and possible event venues and locations. The application was unsuccessful, but the process of making an EU application was a great learning experience.

University of Wales Trinity Saint David (UWTSD), (Dates: 2-28 May 2016). Supervisor: Prof. Nigel Nayling. Activities carried out during secondment:

- GIS course by Jemma Bezant, learning ArcGIS ("Basics of Map Projections" and "Learning ArcGIS Desktop") and exploring the potential of QGIS
- Assisted Nigel Nayling during sampling of an historic building
- Designed and implemented the 'One Tree Project' in collaboration with Nigel Nayling, Roderick Bale, and the fellows Adolfo Miguel Martins (ESR6), Antonio Santos (ESR7), and Marta Domínguez Delmás (ESR9). The intent was to explore the strength of the inner-tree correlations (i.e., between ring series of the same tree).
- Assisted fellows Marta Dominguez-Delmás and Sara Rich to select dendrochronological samples from 25 samples retrieved in the 2016 Yarmouth Roads' Shipwreck campaign.
- Intensive Training Course (C3) ITN project ForSEAdiscovery (23-27 May): Dendroarchaeology of Ships: Prospect and Practice
- Seminar: 'Workshop: Dealing with stress'. Interactive workshop about stress in an academic setting, what it is, and how to avoid it. A great experience and to my feeling quite timely, considering all fellows were reaching the final stages of their projects and with that, entering a period of imminent stress.
- Presentation of preliminary results of ongoing individual project at ForSEAdiscovery Project Conference UWTSD: 'Integrating different methods for provenancing ship timbers'

Université de Lorraine (UdL), (Dates: 14–25 November 2016). Supervisor: Prof. Anne Poszwa. Nancy – France. Activities carried out during secondment:

- Learned to work in a clean room and with the methods of wood mineralization to extract strontium for isotopic analyses. Steps included: the removal of sea-water influence, extraction of chemical elements with acidic solutions and strontium recuperation using Sr-specific resin columns.
- I presented the wood-sciences work package (WP3) of ForSEAdiscovery project to the lab in Nancy (title: "*A potpourri of wood: tree-rings, isotopes, ecology and provenancing*"), explaining the methods implemented for dendroprovenancing and their potential.
- During the secondment, I had the opportunity to discuss with ESR Fadi Hajj and Anne Pszwa about the application of strontium for provenancing (including discussing their review paper). Moreover, I had interesting discussions with the colleagues of the lab about possible future collaborations, how to integrate wood in their research lines, and vice-versa.
- This secondment was crucial to get a better understanding of the Strontium isotopic analyses and how these can be used for the provenancing of wood samples.

Scientific Activities:

- Attendance to the network meetings and training courses and presentation of research advances following the planned activities of the ITN ForSEAdiscovery:
 - Historiography and Archive Research training course, 6th-8th May 2015, Rijksuniversiteit Groningen, Groningen, The Netherlands;
 - GIS course, 13-16 October 2015, CSIC, Madrid Spain;
 - Dendroprovenance and Wood Anatomy course, 9-11 December 2015, Universiteit Wageningen;
 - Dendroarchaeology of Ships: Prospect and Practice Training Course (C3) 23-27 May 2016, Lampeter, Wales
- Co-organizer, project manager and dendrochronologist for the sampling campaigns.
 - Guipúzcoa oaks, May 18th till May 21st 2015
 - Cazorla pines and Ubeda historic buildings, June 5th till June 12th 2015
 - Visits to the WP2 shipwreck sampling campaign in Galicia, June 2015
 - Belinho shipwreck, Sampling campaign and archaeology summer school "Escola de Verão Internacional de Arqueologia 2015" in the Municipality of Esposende, in Portugal in weeks of August 3rd till 8th and August 17th till 23rd 2015
 - Alava living oaks scouting, September 15th till 18th 2015
 - Alava living oaks sampling, October 6th till 12th 2015
 - Segovia living trees and buildings sampling, Segvia, July 11th-15th 2016

- Scouting historic buildings Vilar do Frade, Portugal, July 26th 2016
- Alava, buildings sampling + scouting forests Cantabria, September 19th-24rd 2016
- Cantabria living trees sampling, October $10^{\text{th}} 15^{\text{th}} 2016$
- Central system living trees sampling, October 17th 2016
- Cantabria historic buildings + forests sampling, November $5^{th} 8^{th} 2016$

Training Activities.

- Historiography and Archive Research training course, 6th-8th May 2015, Rijksuniversiteit Groningen, Groningen, The Netherlands
- Belinho shipwreck, Sampling campaign and archaeology summer school "Escola de Verão Internacional de Arqueologia 2015" in the Municipality of Esposende, in Portugal in weeks of August 3rd till 8th and August 17th till 23rd 2015
- GIS course, 13-16 October 2015, CSIC, Madrid Spain
- Dendroprovenance and Wood Anatomy course, 9-11 December 2015, Universiteit Wageningen
- Dendroarchaeology of Ships: Prospect and Practice Training Course (C3) 23-27 May 2016, Lampeter, Wales
- Training in FTIR and Py-GCMS techniques with the ESR Mohamed Traoré in Santiago de Compostela, 18th 22nd April 2016.
- Training in Strontium isotope extractions, with ESR Fadi Haff, Université de Lorraine, Nancy, 14-25 November 2016
- All the sampling campaigns in historical buildings, with Nigel Nayling, Tomasz Wazny and Marta Dominguez–Delmás, have been excellent training activities as well, as the techniques applied in buildings to choose which timbers to sample and sampling them were all new for me.

Dissemination Activities.

- Participated in ForSEAdiscovery presentation and proceeding publications in different congresses:
 - Presentation: Domínguez Delmás, M. et al. Unravelling timber supply for shipbuilding in Atlantic Iberia in the Early Modern Period by dendrochronology. April 1st 2016, Ameridendro 2016, Mendoza Argentina
 - Presentation: Martins et al. 2016 Reconstructing trees from ship timber assemblages using 3D modelling technologies. Evidence from Belinho in Northern Portugal. IKUWA VI, 29 Nov 2016, Freemantle – Australia
 - Paper: Martins et al. 2016 Reconstructing trees from ship timber assemblages using 3D modelling technologies: Evidence from Belinho in

Northern Portugal. Proceedings of the 6th International Congress on Underwater Archaeology (IKUWA6). *In Review*

- Presentation: Akhmetzyanov L., García-González I., Groenendijk P., Sass-Klaassen U., What do vessels hide? Potential of oak earlywood vessels for dendroprovenancing. TRACE Meeting, 16-21 May 2017, Svetlogorsk, Kaliningrad region – Russia
- Report: Groenendijk P., García-González I., Domínguez Delmás, M. 2017 Muestreo Dendrocronológico de robles in Álava. Universidade de Santiago de Compostela
- Participated in congress presentations and publications of works from previous projects
 - Presentation: Zuidema, P. et al. 2016, Reconstructing growth trends from treering data: can we account for biases? Association of tropical Biology and Conservation ATBC 2016, Montpellier – France
 - Publication: Shiel et al. 2016, Does biomass growth increase in the largest trees? Flaws, fallacies and alternative analyses, Functional Ecology. doi: 10.1111/1365-2435.12775
 - Presentation: Zuidema, P. et al. 2017 Long-term increases in photosynthetic efficiency and water-use efficiency due to CO2 rise did not stimulate diameter growth of tropical trees. IUFRO 2017, Freiburg Germany
 - Publication: Groenendijk et al. 2017 Using tree-ring data to improve timberyield projections for African wet tropical forest tree species, Forest Ecology and Management 400. Doi: 10.1016/j.foreco.2017.05.054
 - Publication: Vlam et al. 2017 Tree Age Distributions Reveal Large-Scale Disturbance-Recovery Cycles in Three Tropical Forests, Trends in Plant Science 7. doi: 10.3389/fpls.2016.01984
 - Publication: Sleen et al. 2017 Trends in tropical tree growth: re-analyses confirm earlier findings. Global Change Biology 23. doi: 10.1111/gcb.13572
 - Publication: Bongers et al. Frankincense in peril: collapse of an iconic forest product. *Currently under review in Nature*

Outreach Activities:

- Published a short article in Climacom, a Brazilian journal for scientific outreach. Madeira à vista: o xilema me chama. Climacom ANO 03 N06 "Territórios" ISSN 2359–4705.
- http://climacom.mudancasclimaticas.net.br/?p=5586
- Blog entry: Dendroprovenancing shipwreck timbers: on overlaps and pizzas... Peter Groenendijk,

- https://forseadiscovery.wordpress.com/dendroprovenancing_shipwreck_ timbers/
- Blog entry: Gallery: Basque country fieldwork. Peter Groenendijk https://forseadiscovery.wordpress.com/fieldwork-basque-country/

Contributions towards Project Milestones / Deliverables:

- I've closely involved in the development and structuring of the database of the entire ForSEAdiscovery project, but with a concentrated focus on the WP3 part of the database (Deliverable D3.1). This included keeping track of every tree and timber elements sampled, the location and analyses to be performed on each sample, results and storage place of data. The database is currently still being updated with the latest results.
- I coordinated nearly all sampling campaigns to provide the samples for the dendrochronological works, and for the analyses of biomarkers (Deliverable D3.2) and geochemical markers (Deliverable D3.3) to be used for provenancing of oak and pine species used in ship building.
- I am currently working on Deliverable D3.4 the integration of the different methods to develop a protocol for an integrated provenancing approach (tree rings, biomarkers, isotopes). These analyses are dependent on all the data of the specific ESRs in WP3 being collected and available for integration. All data have been collected and the ESRs are busy finishing their PhD thesis chapters. I have agreed with the WP3 fellows that the integration of their results would take place after they have published their main results using the same data, to avoid conflicts of publication.

Career Development Plan Updated: 2017/10/27

BRIEF OVERVIEW OF RESEARCH PROJECT AND MAJOR ACCOMPLISHMENTS EXPECTED:

The ER3 position is embedded in the ForSEAdiscovery project, that aims to extend the current understanding of forest resource availability and of timber trade in the Iberian empires during the Age of discovery. For this purpose, historical research, maritime archaeology, and dendroprovenancing will be integrated. Additionally, the ForSEAdiscovery project foresees training of the fellows to do research in a multidisciplinary context, as well as training in scientific communication and project management.

The ER3 position will focus on integrating different techniques for dating and provenancing of timbers, including: tree-ring measurements, determination of wood anatomical markers, and the analyses of biomarkers and geo/dendrochemical signals. Ultimately, a protocol will be developed to date and provenance (archaeological) timbers. This protocol will be applied to all ship timbers collected by the fellows of WP2 and will allow to date the archaeological timbers and to pinpoint source areas of timber for the 16th and 17th-century Iberian shipbuilding

industries. These results will provide an empirical tool to cross-validate archaeological findings and information from historical records.

The position will also include the co-supervision of ESRs in WP3, training them in the selection and sampling of living trees and building structures for dendrochronological research, as well as in tree-ring research methods and statistical techniques. Dissemination of results is also an indispensable part of this position and the fellow will publish results in peer-reviewed journals and progress reports and present results at international conferences and meetings. Additionally, the fellow will whenever possible participate in educational activities at universities or schools, and will use digital media (e.g., blogs, informative videos, etc.) to disseminate the work and results to the general public.

LONG-TERM CAREER OBJECTIVES (over 5 years):

1. Goals:

My long-term objectives are to become more equipped to set up and coordinate multidisciplinary research projects focused on the implementation of tree-ring analysis in a context of climatological, historical, ecological and forest management research. Ultimately, I would like to contribute to the understanding of tree growth and its importance for human kind, both in the present and in the past.

Within the ForSEAdiscovery I intend to:

- set up an integrative protocol that can be applied to identify, date, and provenance wood samples. This approach will have an application in archaeological studies as well as in other fields, such as identifying and provenancing illegally logged timbers.
- improve my knowledge on dendrochronology, on quantitative wood anatomy, and on isotope analysis.
- become better equipped in organising and leading large-scale and multi-disciplinary research projects.
- learn the techniques for chemical analysis of wood samples to identify (bio)markers and geochemical tracers for the provenancing and species identification of wood samples. This will include pyrolysis coupled to gas chromatography and mass spectrometry (Py-GC/MS) and Fourier-transform infrared (FTIR) spectroscopy, the measurement of Strontium isotopes (Sr), and of major and trace elements in the wood.
- learn to work with Geographic Information Systems (GIS) to integrate and visualise the different provenancing methods
- extend my knowledge beyond the areas foreseen in my Work Package and learn about historical and archaeological research and techniques
- 2. What further research activity or other training is needed to attain these goals?
- Training in GIS techniques to integrate the provenance areas obtained with the different analysis techniques

- Secondments to acquire new expertise in the biogeochemical analysis (Strontium isotopes) techniques at the Université de Lorraine (UdL)
- Field campaign in Spain and Portugal (forests and buildings) to establish long-term chronologies in relevant timber producing areas in the XVI to XVIII centuries, combined with a secondment at the University of Wales Trinity Saint David (UWTSD) for measurement and analysis of data
- Enhance my leadership and communication skills by following courses and by (helping in) organising fieldwork campaigns and workshops
- Participation in workshops and intensive courses in, among others, historiography, archaeology and early-modern shipbuilding techniques, GIS, etc. within the ForSEAdiscovery project

SHORT-TERM OBJECTIVES (1-2 years):

- 1. Research results
- Anticipated publications
 - Writing and participating in publications about dating and provenancing the individual shipwrecks in the ForSEAdiscovery project. Finisterre, Magdalena (Viveiro), Ribadeo, Belinho, Yarmouth Roads, etc.
 - Paper on the comparison of different methods (dendrochronology, wood anatomy, bio(geo)chemical analyses) to distinguish wood coming from different oak species (*Quercus robur*, *Q. pyrenaica*, *Q. petraea*, *Q. faginea*, *Q. pubescens*) and from two pine species (*Pinus sylvestris*, *P. nigra*) that cannot be distinguished anatomically from one another
 - Methodological paper including a protocol to integrate different dendroprovenancing techniques for ship timbers
 - Publications related to the construction and analyses of reference chronologies on ring widths, vessel features, and wood density throughout the Iberian Peninsula
 - Continued publication of results from prior research project complementary to the project. more specifically one chapter of the PhD thesis and an ongoing manuscript
- Anticipated conference, workshop attendance, courses, and /or similar presentations:
 - Participation in all academic events, annual Network Meetings, workshops, and intensive courses organised within ForSEAdiscovery. For instance, participation in the workshop "Application of Geographic Information System (GIS) to Maritime History and Archaeology", organising and participating in the workshop Dendrochronology & Wood Anatomy, from 9-11 December 2015 in Wageningen.
 - Presenting at international conferences related to tree-ring studies and to archaeology, such as: International Congress on Underwater Archaeology (IKUWA6) from 28 November till 2 December 2016, in Fremantle Australia;

TRACE – Tree Rings in Archaeology, Climatology and Ecology in 2016; EuroDendro conference; etc.

- Where possible, participation as speaker at university courses and symposia, pending invitations
- 2. Research results Research skills and techniques:
- Training in specific new areas, or technical expertise etc..
 - o programming and working with GIS environments (QGIS or ArcGIS)
 - training in database management
 - become more familiar with shipbuilding and nautical archaeology techniques and terminology
 - o learn about historical research, techniques and terminology
 - o improve knowledge of isotope and bio(geo)chemical analyses of wood samples
- 3. Research management:
- Fellowship or other funding applications planned (indicate name of award if known; include fellowships with entire funding periods, grants written/applied for/received, professional society presentation awards or travel awards, etc.):
 - o I applied to a permanent position as professor at the State University of Campinas UNICAMP and got the position (started in February 2017). I have already participated in the writing of grants for two joint calls, between the NERC and the Brazilian FAPESP, and of the Portuguese FCT with the FAPESP, and for a call of the Serrapilheira Institute (https://serrapilheira.org/). Currently I am involved in writing proposals for another joint NERC-FAPESP call. а Young Investigators in Emerging Institutions Grants (http://www.fapesp.br/en/4479), as well as individual Phd-project grant applications for the CNPq and FAPESP.
- 4. Communication skills:
 - I have greatly improved my Spanish language skills by interacting in Spanish in an academic environment for almost two years
 - By presenting at Network Meetings I have improved my presentation skills
 - I have worked on my public dissemination skills, by participating in the setting up of the project's blog, and writing an article for a scientific outreach journal. Additionally I have filmed and interviewed the WP3 fellows on their research and am editing these videos for online publication as a short documentary.
- 5. Other professional training (course work, teaching activity):

- Help organising ForSEAdiscovery workshops to improve my skills herein
- I will look for teaching opportunities within and outside the University of Santiago de Compostela.
- 6. Anticipated networking opportunities:
 - I expect to profit strongly from the networking opportunities within the ForSEAdiscovery project, not only within my work package / discipline but also with the other disciplines involved.
 - At international conferences I also anticipate many networking opportunities, which are enhanced by the exposure inherent to working on a large research project such as the ForSEAdiscovery
- 7. Other activities (community, etc.) with professional relevance.

Others (Please include here other aspects you consider relevant, e.g., current position, application to other research grants, participation in other research projects...):

In February 2016 I have applied to a permanent position as professor at the State University of Campinas UNICAMP – one of Brazil's top ranking universities. I got the position and started in February 2017, and I am sure that my participation in the ForSEA discovery project and my experience with working in this multi-disciplinary setting were a key part of my successful application. In Campinas, I will be setting up a multidisciplinary wood biology research lab, integrating dendrochronology, wood anatomy and isotopic analyses to better understand tropical forest growth. In other words, I will be continuing to use the techniques I have acquired or improved during the ForSEAdiscovery project. I am currently preparing an application for the São Paulo Research Foundation - FAPESP's Young Investigators in Emerging Institutions grant (http://www.fapesp.br/en/4479), one of Brazil's most prestigious grants for setting up new research lines in state institutes. From my current position I have also already participated in the writing of grants for two joint calls, between the UK's NERC and the FAPESP, and between the Portuguese FCT and FAPESP. Together with Brazilian researchers we have also applied for a call of the Serrapilheira Institute (https://serrapilheira.org/). Finally, I am currently also involved in writing proposals for another joint NERC-FAPESP call, as well as for individual Phd-project grant applications (CNPq and FAPESP) for students whom will do their doctoral thesis with me.

Early Stage Researchers (ESR)

ESR1. Ana Rita Rodrigues Baptista Palma Trindade

Host Institution: Centro de Ciencias Humanas y Sociales, Consejo Superior de Investigaciones Científicas

Contract Start Date: 01/10/2014

Contract End Date: 30/09/2017

Ph.D. Activities

Registered for PhD: \boxtimes

Date of defense: 2019

Institution: Universidade Pablo de Olavide / Centro de Ciencias Humanas y Sociales, Consejo Superior de Investigaciones Científicas

Supervisors: Ana Crespo Solana, Manuel Herrero Sánchez

Title: Timber supply for shipbuilding in Cadiz in the Early Bourbon period. from regional forestry to importations (1717-1759)

Objectives:

-identification of the provenance, species, quantities and costs of timber used in the Arsenal of La Carraca (Cadiz) during in the period of 1717–1759, according to the parts of the vessels and specific necessities of shipbuilding, caulking or maintenance;

- general statistical study of these aspects and interpretation, according technical, economical and political factors;

-characterization of the forestry management, organization and trade of this supply;

- depiction of the operative chain of Andalusian timber from the woods to shipyards;

- identification of different types of agents involved in these process;
- diachronic analysis of these aspects;

Research outcomes/chapters:

- Compilation and analysis of literature on naval history and of history and archaeology of shipbuilding, history of forestry policy in Europe during the early modern period, focusing particularly in the 18th century Spain, which support this research and are presented at the state of the art as part chapter 1 "Origin and development of the research project"
- Compilation and creation of a data base of Spanish archival sources from the Archivo General de Simancas (General Archive of Simancas) and Archivo General de Marina Alvaro de Bazán (General Navy Archive Alvaro de Bazán) about shipbuilding and timber supply in Cadiz in the period of 1717–1759;
- Creation of data base about the Andalusian timber supplied to Cadiz in the same period, identifying the species, types of ship parts and quantities, as well as the more or less specific location of the assessed and exploited woodlands by the Navy, associated shipping

hubs, means of transport and agents; this data base will serve the data analysis and the creation of GIS about the Andalusian timber supply which will be at the core of chapter 5, the main part of the dissertation ("Forestry and wood supply in the Maritime Department of Cadiz");

Creation of data base and information process about Caribbean timber, focused on species
 , types of ship parts, quantities, agents and transport in preparation of chapter 7 of the dissertation ("Wood supply from the Caribbean region").

Contribution to deliverables of ForSEAdiscovery.

- Data base of Spanish archival sources from the Archivo General de Simancas (General Archive of Simancas) and Archivo General de Marina Alvaro de Bazán (General Navy Archive Alvaro de Bazán) about shipbuilding and timber supply in Cadiz in the period of 1717-1759;
- Data base about ships built and repaired in Cadiz in the same period;
- Data base about the Andalusian timber supplied to Cadiz in the same period, identifying the species, types of ship parts and quantities, as well as the more or less specific location of the assessed and exploited woodlands by the Navy, associated shipping hubs, means of transport and agents; this data base will be converted into a GIS project
- Data base about Northern Spain timber supplied to Cadiz in the same period, focused on species, types of ship parts, quantities, agents and transport;
- Data base about Baltic and Northern American timber supplied to Cadiz in the same period, focused on species, types of ship parts, quantities, agents and transport;
- Data base about Caribbean timber supplied to Cadiz in the same period, focused on species, types of ship parts, quantities, agents and transport;

ForSEAdiscovery activities:

Personal Research Project : Timber supply for shipbuilding in Cadiz in the Early Bourbon period: from regional forestry to importations (1717–1759)

Personal Research Project Abstract:

Following the objectives of WP1 and the key questions of the project concerning management, trade, provenance, species and sustainability, this dissertation aims to explore it in a further way by the particularization in the case study of Cadiz in the period of 1717 and 1759. This period corresponds to the beginning of the Bourbon dynasty, with the reins of Felipe V (1700–1746) and Fernando VI (1746–1759) and is characterized by a deep reorganization at political, military, administrative and economical levels, the so-called *Bourbon Reforms*. These included the naval and maritime sectors, in which process takes part the fostering of a state

controlled shipbuilding activity to serve the Navy, with an institutional reformation and creation of infrastructures such as the arsenals.

Although this is a very well know period of Spanish naval history and shipbuilding that has been widely discussed by the historiography, this dissertation intends to reintroduce and develop the subject of timber supply with a renewed approach, by having it as the main focus, following the key questions and methodological framework of the ForSEAdiscovery project.

In general terms, the objectives of this dissertation are: the identification of the provenance, species and quantities of timber used in Cádiz, according to the parts of the vessels and specific necessities of shipbuilding, caulking or maintenance; characterization of the forestry management, organization and trade of this supply; depiction of the operative chain from the woods to shipyards; identification of different types of agents involved in this process; general calculation of costs; assessment of the sustainability of regional resources; diachronic analyses of these aspects.

The main focus of the research questions of this project are the Andalusian forest resources. In the first place, this option is justified by the strong hypothesis that the primary source of timber supply corresponds to the regional woodlands under the jurisdiction of the Cadiz Maritime Department, according to the bibliography and the volume of the documentation already identified. Besides, practical and methodological reasons such as the immediate availability of Andalusia related archival sources, when compared to other provenances such as the Baltic or the Caribbean region, contributed to the same option, in order to accomplish the project goals in a feasible time. Therefore, the other provenances of timber (Baltic, Caribbean an Norther Spain)will be object of a less detailed study and its results will serve as support information to understand this reality in a comparative perspective.

Archival research constitutes the central base of this project. The main documental collections which are currently being analyzed belong to the General Archive of Simancas, Valladolid (*Archivo General de Simancas* – AGS) and General Navy Archive Álvaro de Bazán, Viso del Marqués, Ciudad Real (*Archivo General de Marina Álvaro de Bazán* – AGMAB).

Personal Research Project Progress Report: 2017/04/03

Secondments:

Secondment 1

Date: from 1 September 2015 to 18 September 2015

Place: Leiden University, Leiden, The Netherlands

Supervisor: Cátia Antunes

Tasks: bibliographical research about environmental history, early modern European timber trade, early modern trading networks

Secondment 2

Date: from 20 April 2016 to 15 June 2016 Place: University of Wales Trinity Saint David , Lampeter, Wales, United Kingdom Supervisor: Nigel Nayling Tasks: attendance and participation in seminars; Learning ArcGIS Desktop (for ArcGIS 10.0). Basic notions of use of ArcGIS Desktop ; study of documents related with timber supply for shipbuilding by the British Navy in the 17th century (Pepy's Library, Magdalene College, University of Cambridge); processing of data related with the case study of the Santa Maria Magdalena Frigate

Scientific Activities:

Research in ForSEAdicovery case studies

- The timbers of the Frigate Santa Maria Madalena : archival research in Archivo General de Simancas (construction and timber supply in Ferrol 1770-1773) ; document analysis; paper writing (with co-authors ER2 Sara Rich, ER6 Adolfo Martins, ER9 Marta Domínguez Delmás, ESR11 Mohamed Traoré, ESR13 Nathan Gallagher)
- Contracts for the construction of ships and provision of supplies in the Spanish Empire in the early seventeenth century. document document analysis; paper writing (co-author of ER1 José Luis Gasch Tomás and ESR8 Koldo Trápaga Monchet)
- GIS of Andalusian forests assessment and exploitation (1717–1759): creation of database (with Maria José Rodríguez)

Training Activities.

- Training courses C1 and C2 (Madrid - Spain, January 2015): History of wooden shipbuilding

Books and treatises on shipbuilding

- Workshop W1 (Madrid Spain, January 2015): Communication and Presentation Skills
- Training course C3 (Groningen The Netherlands, May 2015): Historiography and archive research (with presentation of the paper "The 1748 Woodland Ordinances")
- Training course C4 (Madrid Spain, October 2015): Geographic Information Systems
- Training course C5 (Wageningen The Netherlands, December 2015): Dendrochronology and wood anatomy
- Workshop W2 (Wageningen The Netherlands, December 2015): Scientific communication and multidisciplinary team-work
- Training course C6 (Lampeter Wales, May 2016): Dendroarchaeology of ships practice and prospect (with presentation of the paper "Timber supply for shipbuilding in Cadiz: 1717-1759")
- Workshop W3 (Lampeter Wales, Mai 2016): Advanced team and project management

Dissemination Activities.

Participation in congresses and workshops.

- November 2014: A gestão dos recursos florestais ibéricos na construção naval da Idade Moderna: História e Arqueologia. Faculdade de Ciências Sociais e Humanas, Universidade Nova de Lisboa, Portugal. Attendance and presentation of the paper: "Timber supply for shipbuilding in Andalusia (18th century): brief research notes"
- July 2015: *Connected Oceans New Avenues of Research in Oceans and Maritime History*. University of Porto, Portugal. Presentation of paper : "The ForSEAdiscovery project" with ER1 José Luis Gasch Tomás and ESR8 Koldo Trápaga Monchet
- September 2015: ISBSA 14, International Symposium of Boat and Ship Archaeology, Baltic and beyond. Change and continuity in shipbuilding. National Maritime Museum, Gdansk, Poland. Presentation of poster : "Written sources in the study of wood supply for shipbuilding: the Andalusian 18th century case"
- April 2016 : XX congreso del AMEC, El caribe en el mundo dinámicas y reconfiguraciones. Veracruz, Mexico. Presentation of paper: "Maderas de Occidente: El empleo de maderas del Caribe en la construcción naval en Cadiz (1717-1759)", with Project Coordinator Ana Crespo Solana
- November 2016 : *IKUWA6*. Australian Institute for Maritime Archaeology, Freemantle, Australia. Presentation of paper: "From the forest to the sea, from the sea to the laboratory: the Santa Maria Magdalena Frigate", with ER2 Sara Rich, ER6 Adolfo Martins, ER9 Marta Domínguez Delmás, ESR11 Mohamed Traoré, ESR13 Nathan Gallagher
- January 2017: Árvores, barcos e homens na Península Ibérica (século XVI –XVIII).
 Faculdade de Ciências Sociais e Humanas, Universidade Nova de Lisboa, Portugal.
 Presentation of the paper: "Os bosques da ira: conflito e resistência entre comunidades locais e a Marinha pelo uso dos recursos florestais andaluzes no século XVIII"
- September 2017: *The 17 provinces of the Low Countries and the Iberian Peninsula: New perspectives and methodologies.* Faculty of Arts (University of Groningen), N.W. Posthumus Institute. Presentation of the paper. "Dutch merchants and shipmasters in the trade of timber to Cadiz in the early Bourbon period".

Publications:

Issued:

- TRINDADE, Ana Rita (2016), "Wood supply for the Andalusian shipbuilding during the reins of Felipe V and Fernando VI. brief introductory notes". The Managemet of Iberian Forest Resources in the Early Modern Shipbuilding. History and Archaeology (Coord. Rosa Varela Gomes, Mário Varela Gomes), Lisbon, Instituto de Arqueologia e Paleociências da Universidade Nova de Lisboa, 57-63
- GASCH TOMÁS, José Luís; TRÁPAGA MONCHET, Koldo; TRINDADE, Ana Rita (2016),
 "Shipbuilding in times of war and change", International Journal of Maritime History, Vol. 29 (1), Maritime Economic History Association, Sage Publications, 187–192

Submitted:

- "From the forest to the sea, from the sea to the laboratory: the Santa Maria Magdalena Frigate", with ER2 Sara Rich, ER6 Adolfo Martins, ER9 Marta Domínguez Delmás, ESR11 Mohamed Traoré, ESR13 Nathan Gallagher (submission to IKUWA 6 proceedings)

Outreach Activities:

May 2016: Heritage & Environment Research Cluster Seminar Series, Building Boats and Bridges. University of Wales Trinity Saint David, Lampeter Campus. Presentation of the paper: "The use of tropical timber in shipbuilding in Cadiz (1717–1759)"

October 2017: De Provincia Marítima a Parque Natural: pasado, presente y futuro de la Sierra de Segura, Cazorla y Las Villas. Instituto de Estudios Giennenses, Jaén (Spain). Presentation of the paper: "El suministro de maderas de la Sierra de Segura al Arsenal de La Carraca (Cádiz) en el tiempo de Felipe V y Fernando VI: 1733-1759"

Contributions towards Project Milestones / Deliverables:

- Data base of Spanish archival sources from the Archivo General de Simancas (General Archive of Simancas) and Archivo General de Marina Alvaro de Bazán (General Navy Archive Alvaro de Bazán) about shipbuilding and timber supply in Cadiz in the period of 1717-1759;
- Data base about the Andalusian timber supplied to Cadiz in the same period, identifying the species, types of ship parts and quantities, as well as the more or less specific location of the assessed and exploited woodlands by the Navy, associated shipping hubs, means of transport and agents; this data base will be converted into a GIS project;
- Data base about Caribbean timber supplied to Cadiz in the same period, focused on species, types of ship parts, quantities, agents and transport;
- Glossary of shipbuilding terms.

Career Development Plan Updated: 2017/07/31

ESR2 Maria Bastião

Universiteit Leiden

1 December - 30 November 2015

Contract not renewed on November 30 2015/

Objectives: Individual Research Project: Portuguese forest resources and timber supply in the Age of Discovery and expansion (AD 1500-1800)

1. To compile data on timber supply of Portuguese shipyards (16th to 18th centuries) from the historiography and archival sources and identify sources of timber supply of the main Atlantic Portuguese shipyards.

2. To study the process of timber selection, acquisition, mechanisms of trading networks and transport.

3. Work in the archives of Lisbon and research secondment in Groningen.

4. Database on trade between the Netherlands and Portugal and the agency of traders, which her supervisor, Catia Antunes, have been producing in the last 10 or 12 years.

5. Result: file containing information about merchant networks, volume of timber trade and transport, and areas supplying timber for shipbuilding to Atlantic Iberia, especially Portugal, from northern Europe. (Including a Guide for Excell Document)

The Procedure and Selection of Data.

We have looked at my database with notarial contracts from the city of Amsterdam (sample of 25.038 contracts) and at the Simon Hart Collection of the archive self. Within these collections we have selected all the contracts that related to **shipbuilding** (so not only wood), so that we may perhaps in the future appreciate trends more generally. We have also included specific woods that we know were not used for shipbuilding *per se*, but that we used in specific art objects that were set in buildings and ships. These contracts reflect the business contracted in Amsterdam for the trade in shipbuilding materials. In most of the cases that meant picking up products from the Baltic and export them worldwide (not only to Iberia). We have left this global information in so that the Iberian routes may provide a source of comparison for future publications.

The terminology has been left in Dutch not for reasons of laziness, but accuracy, especially on what concerns the typology of woods, measures and weights, currencies etc. I would suggest that uniformization should only take place when the data from the Sound Toll and other registers come in.

The excel document reflects the freight contracts. I think that for the time being this is the most important. The word document contains all other contracts that cannot, at this point, be systematized, before it becomes clear from the leadership of the work package and the project the type of 'research questions' that will be developed.

Advice. In order to have a clearer picture and a proper context for this data, it would be great to bring it into a dialogue with Jan Willem's findings and Sound Toll inputs, so that we can have 'the big picture' of the northern trade.

The information contained in these documents regards shipbuilding materials to build ships and/or fleets. But as stated in earlier workshops and meetings, I strongly advise the leadership to consider the large amount of fleets that were bought or offered by northern European powers to the Iberians. You find examples of this in the book that resulted from my PhD, as well as in the publications of Joao Paulo Salvado and Susana Munch Miranda. I would also feel more comfortable if when Jan Willem brings his data to the table that we can perhaps sit together to talk about the uniformization of the 'language'/terminology (if that is at all possible because of the diversity of languages and systems we are talking about.

Methodology based on two points: a) Firstly, she has collected information concerning timber trade related to the Atlantic Iberia (1500–1800) shipbuilding industry in the literature; b) Secondly, she has compiled information from archives and existing databases about navigation and timber trade

- Work in Archives: Lisbon and Groningen.

- Results: a file containing information about merchant networks, volume of timber trade and

transport, and areas supplying timber for shipbuilding to Atlantic Iberia, especially Portugal,

from northern Europe.

Guide for Excel Document. short guide for the items in the column. All these documents should be quoted as: SAA (Stadsarchief Amsterdam), NA (Notarieel Archief), number of volume, folio (see columns in excel sheet). The total number of entries is of 1959 documents and they represent the Portuguese and Spanish trade from late 16th to 18th century. It is and remains a sample

Column Content

А	Volume and folio of document within the notarial collection
В	Name of the notary (particularly important if Jan Willem's team want to dig further)
С	Date of the document
D	Freighter 1
E	Place of provenance of freighter 1
F	Freighter 2
G	Place of provenance of freighter 2
Н	Freighter 3
Ι	Place of provenance of freighter 3
J	Represented party (by power of attorney)
K	Place of provenance of represented party
L	Ship owner
М	Place of provenance of ship owner
Ν	Skipper/captain of the ship
0	Place of provenance of skipper/captain of the ship
Р	Name of the ship

Q	Size/volume of the ship
R	Weapons on board
S	First leg of the journey
Т	Goods transported in the first leg of the journey
U	Second leg of the journey
V	Goods transported in the second leg of the journey
W	Third leg of the journey
Х	Goods transported in the third leg of the journey
Y	Fourth leg of the journey
Z	Goods transported in the fourth leg of the journey
AA	Fifth leg of the journey
AB	Goods transported in the fifth leg of the journey
AC	Sixth leg of the journey
AD	Goods transported in the sixth leg of the journey
AE	Time to call at port
AF	Freight price
AG	Premia for crew
AH	Deposit/security
AI	Foodstuffs

AJ Specific clauses and exemptions

DATA: Most data come from a very precise type of notarial document, which are freight contracts. More specifically, from freight contracts Maria has collected information on the date of the freight; the name and origin of the freighters, and of his representatives in case they had; the name and origin of the captain or skipper of the ship; the name of the ship; the size or volume of the ship and whether there were weapons aboard; the different routes that followed the ship and the goods that it transported along those routes; the freight price; the premia for the crew; the existence of deposits; foodstuffs; and the existence of any specific clause in the document.

Regarding the process and selection of documents, Maria selected almost 2.000 freight contracts from a sample 25.000 notarial documents, some of them coming from Lisbon and most of them coming from Catia Antunes' database of notarial documents from the city of Amsterdam and the Simon Hart Collection of the archive itself.

- Within these collections, Maria selected all the contracts related to shipbuilding (not only wood). Moreover, she also included specific woods that were not used for shipbuilding as

such, but in specific art objects that were set in buildings and ships, which eventually might be useful for the fellows of the WP3 to identify sources of sampling.

- However, Maria has not only produced data on freight contracts. She has also transcribed all those notarial records (around 300) which were not freight contracts and are difficult to be systematized, but hold information about transactions or commercial relations between merchants who traded with timber and other shipbuilding products. Maria left the terminology in Dutch for reasons accuracy, especially on what concerns the typology of woods, measures and weights, currencies, and so forth. To sum up, the ESR2 has produced plenty of serial data on timber trade between the north and the south of Europe. The potential of these data, which I have already started to organize, will be realized when we start to cross them with the data from Sound Registers and the work that other fellows are doing in their own research, as I have already mentioned.

ESR3. Manish Kumar

Department: Faculty of Arts, Early Modern History – Research Centre for Historical Studies, University of Groningen, the Netherlands

Contract: 1 September 2015 – 1 March 2017, Extended until 1 September 2017 BRIEF OVERVIEW OF RESEARCH PROJECT

I joined the ForSEAdiscovery project in September 2015 and my contract ended in September 2017. My article titled 'A method for estimating the volume of the Baltic timber products exported through the Sound and its application to Portugal, 1669–1815' has been accepted for publication in *Scandinavian Economic History Review*.

My second article titled 'In defence of Bang and Korst's Sound Toll Tables' has been accepted for publication in *International Journal of Maritime History*. I am working on my third article which is tentatively titled 'A Comparison of Portuguese Customs Accounts and Sound Toll Registers.'

CONFERENCE/WORKSHOP ATTENDANCE, COURSES, PRESENTATIONS:

- Attended a private course by Elly Jannink on MS Access (September 23 and October 7, 2015).

- Attended a training course on "Application of Geographical Information System (GIS) to Maritime History and Nautical Archaeology" in Madrid, Spain (13–16 October, 2015)

- Attended 6th Sound Toll Registers Online Conference in Antwerp, Belgium (22-23 October, 2015)

- Attended a private course by Arne Solli on Sound Toll Registers and MS Access (17-20 November, 2015)

- Participated in workshop on "Dendrochronology and Wood Anatomy" in Wageningen, the Netherlands (9-11 December, 2015)

- Presented a tentative plan of my paper at the mid-term report of the ForSEAdiscovery Project in Madrid, Spain (17-18 December, 2015)

- Attended an intensive training course on "Dendroarchaeology of Ships: Prospect and Practice" at University of Wales Trinity Saint David, Lampeter, Wales, United Kingdom

(23-27 May 2016). I also presented a part of my research work at Lampeter.

- Secondment in Lisbon for 2 months (June 1 – July 30, 2016)

- Attended an international conference on "Transport statistics in pre- and early industrial economic history. The challenges and opportunities of Sound Toll Registers Online" at Leipzig, Germany (26-28 October, 2016)

- Presented my paper at an international conference on "Trees, ships and human beings in Iberian Peninsula ($16^{th} - 18^{th}$ centuries)" in Lisbon, Portugal (26 - 27 January, 2017)

- Visited the Danish Sound, the strait where the Sound toll was levied (20 - 23 August, 2017).

- Paper titled *Therian timber imports from the Baltic, 1669-1857: A study based on Sound Toll Registers Online*' accepted for presentation at the World Economic History Congress to be held at Boston (July-August 2018).

SECONDMENT DETAILS

I spent two months (June 1 – July 30, 2016) in Lisbon for my secondment. I was based at *Faculdade de Ciências Sociais e Humanas, Universidade Nova de Lisboa*, and was provided excellent support by Rosa Varela Gomes. I consulted archival material at *Arquivo Nacional da Torre do Tombo, Arquivo Historico do Ministerio das Obras Publicos* and *Instituto Nacional de Estatistica* in Lisbon. I collected material related to Portuguese foreign trade from 1775 to 1815, and will be put into use for my second article.

FEEDBACK FOR THE PROJECT

The ForSEAdiscovery project provided me with an opportunity to understand the nuances of the Baltic trade in the early modern period. I have decided to pursue this theme for my doctoral research as well. My supervisor at the Groningen University, dr. Jan Willem Veluwenkamp, provided an invaluable guidance throughout my research.

I have made some PhD applications and the results are awaited.

ESR4. Germán Jiménez Montes

Host Institution: University of Groningen Contract Start Date: 1st January 2015

Contract End Date: 31st December 2017

Ph.D. Activities

Registered for PhD:

Date of defense: December 2018

Institution: University of Groningen

Supervisors: Jan Willem Veluwenkamp, Raingard M. Esser

Title: Supplying the enemy? North-European providers of timber in Seville from 1570 to 1598 **Objectives**.

- To compile information from archives and literature about merchant networks involved in timber trade between the Scandinavian-Baltic area to the Iberian Peninsula.
- To study the European trade of timber (mechanisms and transport) during the sixteenth century.
- To study how northern merchants in Seville supplied timber to the Iberian fleets.
- To understand how these norther merchants were integrated in the institutional organization of the Hispanic Monarchy.
- To understand why Spanish and local institutions relied on northern merchants for providing such a strategic resource.
- To study how these merchants participated in the social life of Seville and how they organized their commercial activity there.

Research outcomes/chapters.

- Paper published in a peer-reviewed journal: "Sevilla, puerto y puerta de Europa: La actividad de una compañía comercial flamenca en la segunda mitad del siglo XVI", *Studia historica. Historia moderna*, Vol. 38, Nº 2, 2016, pp. 353-386.
- Chapter in a collective book: "Los inicios de una nación: mercaderes flamencos en Sevilla durante el reinado de Felipe II", in Juan J. IGLESIAS RODRÍGUEZ, Jaime GARCÍA BERNAL, Andalucía en el mundo atlántico moderno: agentes y escenarios, Madrid, Silex, 2017
- Book review in journal. Eberhard Crailsheim, *The Spanish Connection. French and Flemish Merchant Networks in Seville, 1570–1650.* (Köln. Böhlau, 2016). Review published in *Tijdschrift voor sociale en economische geschiedenis*, vol. 14, n. 3, 2017
- Several conference presentations
- The thesis will consist of six/seven chapters. So far, I have written four of them.

Contribution to deliverables of ForSEAdiscovery.

- Collection of notarial documents in Seville related to North European timber trade from 1570 to 1600.
- Development of Microsoft Access database with those documents.
- Collection of other primary sources in Spanish archives related to timber trade and supply during the reign of Philip II. *Archivo General de Indias, Archivo General de Simancas, Archivo de Reales Alcázares de Sevilla, Archivo Ducal de Medina Sidonia.*

ForSEAdiscovery activities:

Personal Research Project : Trading Networks involved in Timber Trade: mechanisms and routes

Personal Research Project Abstract.

My PhD thesis studies a group of North-European entrepreneurs residing in Seville that traded with Baltic commodities in the last three decades of Philip II's reign (1570-1598). The research is based on the hypothesis that, due to the maritime expansion of the Hispanic Monarchy and the growing military competition in the North Atlantic, the volume of naval provisions that was imported from the North and the Baltic Seas to the Iberian Peninsula increased. Paradoxically, Dutch commercial networks dominated this European trade, which coincided with the rise of Eighty Years' War and the emergence of Amsterdam *entrepôt*. While historians have always accepted this contradictory dependence of the Spanish navy on importations by rebel agents, we still lack an explanation on how this trade was conducted. Thus, the research question for this dissertation is. how did North-European commercial networks supply timber for the Spanish seaborne empire?

Personal Research Project Progress Report. 2018/02/28

Secondments.

CSIC (Madrid, Spain), 1st September – 30th November 2015

- To develop a Microsoft Access database for my collection of notarial sources.
- To learn Geographic Information System (GIS) and Social Network Analysis techniques and methods.
- To collect primary sources in State archive of Archivo General de Simancas.
- To meet and discuss with other colleagues from other work package whose secondment coincided with mine.

UWTSD (Lampeter, Wales), 23rd May – 10th June 2016

- To learn the use of GIS software.
- To learn from the approaches and insights of the Work Package 2.

Scientific Activities.
- 12 January 2015, Madrid (Spain), ForSEAdiscovery and CCSH-CSIC: Presentation on *1st ForSEAdiscovery Network Meeting*, "Trading Networks involved in the Timber Trade: mechanisms and routes"
- 20 April 2015, Groningen (The Netherlands), University of Groningen: Presentation at *Early Modern History Seminar* "Supplying the Enemy: Dutch Commercial Networks providing Timber to the Spanish Seaborne Empire, 1581–1621"
- 8 May 2015, Groningen (The Netherlands), ForSEAdiscovery and University of Groningen. Presentation at *ForSEAdiscovery intensive course*. Historiography and archive research "Data and sources. Dutch Commercial Networks providing Timber to the Spanish Seaborne Empire
- 2-3 July 2015, Valladolid (Spain) Fundación Española Historia Moderna and University of Valladolid: Presentation at *III Encuentro de Jóvenes Investigadores en Historia Moderna* "El papel de las redes comerciales del Norte de Europa en el suministro de madera a Andalucía de 1581 a 1621"
- 26-28 October 2015, Seville (Spain), University of Seville: Presentation at conference *Andalucía en el mundo atlántico moderno: agentes y escenarios* "Los inicios de una nación: mercaderes flamencos en Sevilla durante el reinado de Felipe II"
- 8-9 December 2015, Brussels (Belgium), N.W. Posthumus Institute and Vrije Universiteit Brussel: Presentation at *Posthumus seminar: My project in a nutshell* "My Project in a Nutshell. Northern Commercial Networks providing Timber to the Spanish Seaborne Empire, 1580–1598"
- 17 December 2015, Madrid (Spain), ForSEAdiscovery CCSH-CSIC: Presentation at ForSEAdiscovery Mid Term Review *ESR4 Germán Jiménez Montes individual project*
- 14-15 April 2016, Utrecht (The Netherlands), N.W. Posthumus Institute and University of Utrecht. Presentation at *Posthumus first seminar: Work in progress* "Supplying the enemy? North-European suppliers of timber in Seville from 1580 to 1598"
- June 2016 Lampeter (Wales), University of Wales Trinity Saint David: Presentation at *Postgraduate Research Group Seminar* "Transnational Networks involved in Timber Trade during the reign of Philip II"
- 30 September 2016, Groningen (The Netherlands), University of Groningen. Presentation at *Groningen Joint Economic History seminar* "Supplying the enemy? North-European suppliers of timber in Seville from 1580 to 1598"
- 19–21 October 2016, Pisa (Italy), ESTER, Scuola Normale Superiore Pisa and Scuola Universitaria Superiore Pisa. Presentation at *ESTER Research Design Course* "Supplying the enemy? North-European suppliers of timber in Seville from 1580 to 1598"

- 3-4 November 2016, Helsinki (Finland), University of Helsinki: Presentation at *11th Sound Economic History Workshop* "The socioeconomic organization of North-European entrepreneurs residing in Seville 1580–1598"
- 26-27 January 2017, Lisbon (Portugal), ForSEAdiscovery and Instituto de Arqueologia e Paleociéncias (Universidade Nova de Lisboa): Presentation at *Árvores, barcos e homens na Península Ibérica (séculos XVI-XVIII)* "Provision of naval stores for the Iberian fleets in times of Philip II"
- 27 April 2017, Seville (Spain), University of Seville: Presentation at *Flandes y la Monarquía Hispánica en el comercio y la guerra: nuevas perspectivas de investigación* "Extranjeros al servicio del rey... y de Sevilla: El suministro de madera del Báltico en el siglo XVI"
- 1-2 June 2017, Nijmegen (The Netherlands), N.W. Posthumus Institute and Radboud University: Presentation at Annual Posthumus Conference 2017. Global connections across time and space "The North European merchant community in Seville, 1570– 1600"
- 9 June 2017, Groningen (The Netherlands), University of Groningen: Presentation at *Traders, Transport & Tolls: Farewell Conference in honour of Jan Willem Veluwenkamp* "Project ForSeaDiscovery: Provisioning 16th Century Hispanic fleets with North European Timber"
- 6 July 2017, Barcelona (Spain), University of Barcelona, Autonomous University of Barcelona and Fundación Española de Historia Moderna. Presentation at III *Encuentro de Jóvenes Investigadores en Historia Moderna* "El reflejo de la diáspora flamenca en Sevilla"
- 28-29 September 2017, Groningen (The Netherlands), University of Groningen, ForSeaDiscovery and NW Posthumus Insitute: Presentation at the conference *The 17 provinces of the Low Countries and the Iberian Peninsula*. *New perspectives and methodologies* "Casa y servicio': household and network strategies of North European contractors in Seville".
- 19-20 October 2017, Marennes-Oléron (France), University of West Brittany, University of Poitiers, and TRESOAR. Presentation at the *7th conference Sound Toll Registers Online* "Notarial documents as a complementary perspective to the Sound Toll Registers . Baltic trade in Andalusia from 1570 to 1600"

Training Activities.

- January 2015, Madrid (Spain) ForSeaDiscovery: Network Meeting and Intensive Training Course: History of Wooden Shipbuilding & Books and Treatises on Shipbuilding
- April-May 2015, Groningen (The Netherlands), Graduate School of Humanities (University of Groningen): Workshop *Presenting in academic English*

- 28 April, 2015 Groningen (The Netherlands), Graduate School of Humanities (University of Groningen): Workshop *Cross-sections in the Humanities*
- May 2015, Groningen (The Netherlands) ForSeaDiscovery: Intensive Training Course: Historiography and Archive Research
- October 2015 Madrid (Spain), ForSeaDiscovery: Geographic Information Systems and Social Network Analysis
- December 2015, Wageningen (The Netherlands), ForSeaDiscovery. Intensive Training Course: Dendrochronology & Wood Anatomy
- January 2016 Groningen (The Netherlands), Graduate School of Humanities (University of Groningen): Workshop *Didactic Skill*
- May 2016, Lampeter (Wales) ForSeaDiscovery: Network Meeting and Dendroarchaeology of Ships Practice and Prospect
- May 2016, Lampeter (Wales): ForSeaDiscovery Webcourse of 25 hours of training on Learning ArcGIS Desktop (for ArcGIS 10.0)
- October 2016 Groningen (The Netherlands), Graduate School of Humanities (University of Groningen): Workshop *Publishing in English*
- 31 January, 2017, Groningen (The Netherlands), Graduate School of Humanities (University of Groningen): Workshop *Your Next Step inside Academia*
- 27 June, 2017 Groningen (The Netherlands), Graduate School of Humanities (University of Groningen): Workshop *Practical Research Skills Workshop: How to be a great guest lecturer?*
- 2015-2017, N.W. Posthumus Institute: PhD Basic Training Program, including three sessions of presentations and discussions

Dissemination Activities.

- Paper published in a peer-reviewed journal: "Sevilla, puerto y puerta de Europa: La actividad de una compañía comercial flamenca en la segunda mitad del siglo XVI", *Studia historica. Historia moderna*, Vol. 38, N° 2, 2016, pp. 353-386.
- Chapter in a collective book: "Los inicios de una nación: mercaderes flamencos en Sevilla durante el reinado de Felipe II", in Juan J. IGLESIAS RODRÍGUEZ, Jaime GARCÍA BERNAL, Andalucía en el mundo atlántico moderno: agentes y escenarios, Madrid, Silex, 2017
- Several conference and seminar presentations (see Scientific Activities)

Outreach Activities.

Organisation of the conference *The 17 provinces of the Low Countries and the Iberian Peninsula: New perspectives and methodologies* at the University of Groningen (28–29 September 2017) which gathered senior scholars and early stage researchers who study the political, cultural and commercial networks that connected the two European regions in the sixteenth and seventeenth century.

Contributions towards Project Milestones / Deliverables.

- To collect notarial documents in Seville (1570-1598)
- To develop a Microsoft Access database with traders and naval products traded in Seville and supplied to the Hispanic fleets from 1570 to 1598.
- To collect complementing primary sources in Spanish archives: Archivo General de Indias, Archivo General de Simancas, Archivo de Reales Alcázares de Sevilla, Archivo Parroquial del Sagrario

Career Development Plan Updated: 2018/02/28

LONG-TERM CAREER OBJECTIVES (over 5 years):

1. Goals:

- To publish the dissertation as a monography.
- To develop a new research project in the framework of a postdoctoral program.
- To continue my research career in Academia while also developing a professional career as University lecturer.

2. What further research activity or other training is needed to attain these goals?

- To participate in conference and seminars to present my research and discuss it.
- To participate in courses on grant applications and on building a profile in Academia.
- To gain teaching experience within the department of History of the University of Groningen.

SHORT-TERM OBJECTIVES (1-2 years).

1. Research results

Anticipated publications.

- Publication of a paper written in English in a peer-reviewed journal.
- Publication of the monography with a high-impact publisher.

Anticipated conference, workshop attendance, courses, and /or seminar presentations:

- Participation in the Datini ESTER Advanced Seminar 2018 (Prato, Italy, May 2018)
- Participation in the biannual conference of the Fundación Española Historia Moderna in Santander (September 2018)
- Presentation and discussion of my research in several seminars.

2. Research Skills and techniques.

I have already collected most of the sources, and have completed as well different training programs within the framework of the ForSEADiscovery project, the Graduate School for Humanities of the University of Groningen and the N.W. Posthumus Institute. Therefore, in the following year I will focus on the management of the data and the writing of the dissertation. I will also participate in workshops that can help me to improve my academic profile and to learn professional skills such as how to apply to research grants.

I will maintain the academic and personal contacts that I have acquired during these three years doing my PhD in ForSEAdiscovery and the University of Groningen. And I will expand this network of contacts in the following seminars and conferences.

Others (Please include here other aspects you consider relevant, e.g., current position, application to other research grants, participation in other research projects...):

My PhD position was extended one more year by the Faculty of Arts in the University of Groningen from January 2018 to December 2018. During this time I will have the opportunity of gaining experience as lecturer supporting the department of History in several of its BA courses.

In the following year I expect to collaborate in new research project that contribute to my PhD thesis and that will allow me to gain new experience and contacts within Academia.

ESR5. Beñat Eguiluz Miranda

Host Institution: University of Wales Trinity Saint David Contract Start Date: 01/09/2014 Contract End Date: 31/08/2017 *Ph.D. Activities* Registered for PhD: ⊠ Date of defense: 01/02/2018 Institution: University of Wales Trinity Saint David Supervisors: Nigel Nayling, Roderick Bale and Ana Crespo Solana Title:

Beyond Iberian Bizcayan Shipbuilding: The Transition of a Transnational Network. 1550-1650

Objectives:

-To find Iberian shipbuilding features from known or suspected Spanish wrecks and study how these ships were built and changed during the 16th and 17th centuries and the reasons behind these changes.

-To discover new documents related to forestry practices and shipbuilding techniques from Spanish Archives.

-To point future research lines, regarding potential shipwreck sites for future studies on Atlantic ships and Iberian dendrochronological studies.

-To propose a list of relevant construction features related to Atlantic shipwrecks presumably built in the Iberian Peninsula.

-To survey and sample archaeological timbers for wood analysis and supply to other working packages with subsequent samples.

-To resume the experience and advise on good archaeological practice for future studies.

Research outcomes/chapters:

Chapter 1:

Atlantic Iberian shipbuilding: An introduction to Archaeological and Historical perspectives. In this chapter the topic is introduced, the main research questions are presented, together with the objectives, as well as the spatial and chronological framework, sources used, hypothesis and proposed methodology.

Chapter 2:

National and Transnational Narratives: A State of the Art.

In this chapter, the beginnings of the Spanish shipbuilding history and the posterior influence of these during the 20th and 21st century is analysed. An overall view is presented over the most relevant contributions related to the study of the so called "Iberian" or "Atlantic" vessels. Therefore, the main trends are exposed in historical, dendrochronological and the archaeological field. After this presentation, the contribution of this research is clarified in order to fill a gap in the field. The justification of the research is also presented, as well as other future research lines, potential future shipwrecks to be intervened and other gaps left in the field are pointed out as well.

Chapter 3:

What is an Iberian ship? Some Reflections on Ship Typology.

Following the previous chapter, a specific part is dedicated to ship typology, which is at the heart of this study. Previous archaeological streams and their views are presented from a theoretical viewpoint. The concept of ship types and their methodology is explained as well. In this chapter, the backbone of ship archaeology is uncovered and presented, in order to find the roots of the methods and main questions in the field. This chapter is directly pointing towards the question of what is an Iberian ship? In fact, alternative viewpoints are suggested in order to bring the attention towards the tradition or tendencies in ship archaeology that have been the groundings of the discipline.

Chapter 4:

Adapting to a Period of Crisis: A Historical Overview 1550–1618. In this chapter the historical contribution of this research will be presented related to an alternative view towards the crisis in shipbuilding. The mainstream views related to the timber shortage, the shipbuilding crisis and decline will be presented as well as an alternative viewpoint to the historiographic narrative. This chapter summarizes the changes at the end of the 16th century that triggered the intervention of the Spanish Monarchy over the Northern shipyards in the Basque and Cantabric area.

Chapter 5.

The Iberian Bizcayan Shipbuilding Network. An Archaeological Vision (c. 1550–1588). This is one of the analysis chapters focused in the archaeological remains, particularly in the ship features of particular case studies that will are presented in an overview in order to see whether there is an Iberian ship culture or it is not but a constructed tradition.

Chapter 6:

An Experimental Archaeological View Through the Shipbuilding of the San Juan Vessel. In this chapter the experience and data gathered during the visit to Albaola faktoria, a traditional wooden shipyard and the contribution towards understanding shipbuilding and the relationship between concepts and practices will be shown. From this viewpoint, a different angle is introduced into the study of shipbuilding, an empirical one.

Chapter 7:

From Naos to Galleons? The influence of Basque Nao's, the Spanish Armada's and India's routes in Iberian Shipbuilding. 1550–1588. After presenting the overall changes in the historical context, the implications of the Spanish intervention and the agenda are presented, that deeply affected both the forest management and the traditional construction of vessels. From a historical viewpoint, the use of ratios, measurements and proportions of ships will be analysed, in order to see the changes that implied the intervention of the Spanish agents, such as the Superintendent Cristobal de Barros. Also, the forestry regulations and changes towards the preservation of trees, forest types related to the charcoal and shipbuilding industry, and new plantations will be explained, in order to inform both the archaeological and dendrochronological field of the potential use of the historical sources.

Chapter 8:

What is the Right Ship for the Spanish Monarchy? In Search of the Ideal Features for the Empire. 1550–1588. This chapter will deal with the treatises of the 16th century on shipbuilding and the proportions of ships from the end of the 16th century, but specially the ones that went to the Spanish Armada. In here, the contradictions between ideals and the historical evidence will be explained.

Chapter 9.

The Iberian Bizcayan Transition: The Influence of Northern and Southern Galleons. 1588– 1618. In this chapter the consequences of the shipbuilding decline in the Spanish side of the Basque area will be analysed. Particularly, the new influences from Northern and Southern shipbuilding traditions such as England, Ragusa and Dutch will be overviewed through historical sources. The way these ships were built to follow those northern ships is a clear evidence of the interests of the Monarchy, that was fighting in Flanders and the English, and wanted to apply those northern ratios to the vessels built in the North.

Epilogue.

The End of Iberian Ships? 1618-1650

In this last epilogue, the results of the imposition of the royal ordinances and the events and changes that happened in the first half of the 17th century will be analysed. The implications

of the historical context and the adaptations of the Monarchy to the war, and subsequent peace will be seen in order to relate it to the political weakness of the Spanish kingdom.

Final conclusions

In this chapter, the most relevant discoveries will be summarized. Best practice for analising ship measurements, ship proportions and ratios will be explained, as well as to study archaeological remains. The implications of the study for the dendrochronological field will be explained as well as the potential of the experimental archaeology. Overall, the key elements of the thesis will be reminded to conclude.

Contribution to deliverables of ForSEAdiscovery.

- Glossary on shipbuilding
- 3D model for the glossary on shipbuilding
- GIS layer on Iberian Shipwreck sites

Site specific reports for dissemination and archive deposition for selected shipwreck sites To collate historical and archaeological information regarding construction features of specific ships in Atlantic Iberian shipyards and contemporary timber usage at a time of significant technological developments

ForSEAdiscovery activities.

Personal Research Project:

Our paramount objective is to understand the Iberian Atlantic shipbuilding through timbers that they shed light to a conflict of interests behind ships, that shaped the shipbuilding industries of the Cantabric Iberian shores and changed the Iberian Atlantic tradition.

This project tries to achieve other objectives to contribute to develop a wider database for future research based on different samples and collected data from sources, such as documents, archaeological sites, dendrochronological records and key construction features. It is a major objective to combine perspectives into a proposal that includes different disciplines, and therefore different angles to observe the Iberian shipbuilding and its characteristics during this period. By the end of this project we will define a summary of the evolution in shipbuilding, as part of our main objectives.

One aims as well to asses and select a number of shipwrecks for potential survey, but also for dendrochronological analysis. Furthermore, one aims to provide sub samples to WP3 members for analysis in order to promote the interdisciplinary relationship that can be very promising for a creative exchange of ideas.

We have chosen deliberately the Cantabric area within the Iberian shipbuilding context in order to take advantage of some characteristics from this cultural space. First, it is one of the

industrial cores from the Spanish peninsula where many of its ocean going vessels are imagined, designed, drew, carved and joint together. It is also a very particular area related to specific economical activities into the Spanish Empire, such as trade, fishing and transporting cargoes. These features have a result in a very large amount of produced documents and ships in this northern area. Specially the Basque area is a very active core in the Iberian shipbuilding tradition, regarding to its position in a vast hinterland of artisans, forests and supplies networks. Furthermore, these activities sometimes connected such distant places as England, Scandinavia and Portugal with the Basque shipbuilding industry. This might be one of the reasons why the original frame might need to be expanded, regarding the sources.

Our main question is related to the differences between ships that were influenced by the treatises and previous Iberian ships. This question is related to the theoretical transition from the transatlantic *Nao* and the *Galeon*.

For this purpose, complementary comparisons of dendrochronological, archaeological and historical sources will provide a potential approach to the topic, specially, with some exceptions, regarding the lack of records for the Iberian tree ring sequence for the modern period.

A combination of land and underwater wood sampling campaigns will cover and contribute to fill the gap left in the Iberian dendrochronology for the modern period.

The creation of a database for Iberian Atlantic ships will provide a potential tool for future research related to Iberian wooden shipbuilding tradition.

As the last aspect of the justification for this project, it is important to remark the impact of this research into the society and how this can be understood as a benefit for it. Coinciding with one of the main purposes of ForSEAdiscovery project, our concern in this research is to contribute to the archaeological field, and society as well.

As part of an international context, this project is focused on a communication that can reach as many people as possible, but it is important to notice that in order to get closer to people, we will deal with different cultures and therefore languages that will touch deeper into people's understanding and awareness on this topic. In this sense, communications, conferences, documentaries, papers such as articles, and journals would provide a wide scenery for this project to spread the image and participate in preserving a legacy that has survived through centuries and will last many more.

Now we will describe how we will bring through a specific methodology this theoretical concepts to reality, through different sources and approaches.

In this sense we will undertake different approaches to the topic to understand a variety of levels of information. From an archaeological perspective, we are going to be looking at shipwrecks both dendrochronologicaly, as well as regarding to its shipbuilding processes. Dendrochronology will bring light to the trade and supplies networks behind these ships, as well as to the forest resources and the pattern of use. From this perspective, we will understand the patterns related to forest practices and we will define more precisely this particular northern Iberian area's practices. We will this way help to open the horizon for tree ring studies in the Iberian northern space and will be able to supply samples for the members of WP3. The identification of the origin of timbers will help our colleagues from WP1 to provide them more accurate information about the timber origins and sources involved in a particular moment and place.

We will mainly focus on analysing Iberian shipwrecks and historical documents such as treatises, to identify the traces left by each group of interests. Shipbuilding features can potentially be interpreted as local shipbuilding features and centralized ones, but the difficulty relies in how we define these. As a paradox, local features were also part of an interconnected Atlantic façade, as a result of a long cultural relationship through the shores of this Ocean, so one can here understand why is so important to build up a proper coherent methodology with the correct approach.

Our main task is to combine both documents and timbers. From there on, it is related to the perspective that we will be able to interpret the apparently confusing marrow of the Iberian Atlantic shipbuilding. It is not clear that during the age of discoveries there was a homogeneous Iberian Atlantic maritime culture. From an archaeological perspective, the problem is that it is difficult to reconstruct spaces of cultural convergence of Iberian Atlantic areas, e.g. the Cantabric one, the Portuguese or Mediterranean ones. There are not enough ships from the whole amount of them that have survived and preserved a considerable level of information that brings us to the present this knowledge for reconstructing ships. Furthermore, there are very few examples of each vessel type from that period, which makes it more difficult. However, one could think it would be naive to attempt to reconstruct a whole shipbuilding tradition, just from a few ships. Of course, we cannot even pretend to do so, since it would be a research full of generalising topical examples. But this is exactly the situation regarding to the problems with archaeological sources. In order to avoid this ideal of being able to create a generalising theory, we have to learn to reconstruct the past tradition from the limits of these scarce remains. We can only know as far as we can discover from the past, and there relays the balance of this research. We will start from a local perspective, but always comparing to identify similarities with different shipbuilding areas. This similarities and differences can be shown on GIS map in order to help us to define the spaces of convergence we call "Portuguese", "Basque" or "Cantabric", "Andalusian", "Mediterranean", and so on.

This is why we have the objective to gather as much information as possible for Iberian shipwrecks. From this data, in order to generate a summary of key construction features, a

theoretical frame would be always opened to changes, and will help to develop an academical frame from which the Iberian tradition will be analysed. Nevertheless, the problem of developing a dogma could become a limit for a tool that could suit researches and be complementary to understand deeper and be adaptable for new discoveries.

In this sense, the legacy left would not be a dogmatic belief, with a static established knowledge, but an open tool, ready to be used and improved by future generations of historians and archaeologists. We need to keep developing an academical frame that provides opportunities for research and does not limit or create hierarchical studies. That is how creative ideas will just broaden a dynamic panorama and through this opened methodology new generations will be able to critically approach the topic on a creative way.

From a historical point of view, we are going to be looking at documents in Spanish archives. From this purpose contracts, lawsuits and shipbuilding seats ("Asientos") will bring a combination of different information, related to timber sizes and types of ships, network timber supplies, shipbuilding practices, forest practices related to wood shaping techniques and all main sources that provide us data on how ship's timbers are thought to be created on the master carpenter's mind. We hope to have the opportunity to help our colleagues from WP1 and provide them more information about the trading routes and origin of the wood provided by our documents.

More precisely, we have foreseeing to work in different archives with a potential interest for our research. We know this archives we have deliberately selected have a vast amount of sources related to shipbuilding practices and maritime issues from the previous research that other historians have done, such as Shelma Huxley Barkham, Michael Barkham, Jose Luís Casado Soto, Lourdes Odriozola Oyarbide, Alvaro Aragón Ruano and many others we have not mentioned here. We will list the archives we have trageted as follows: Archivo de Protocolos Notariales de Guipúzcoa, Archivo de la Real Chancillería de Valladolid, Archivo General de Simancas, Archivo General de la Marina Álvaro de Bazán, Archivo del Museo Naval de Madrid (Colección Vargas Ponce), Archivo General de Guipuzcoa and Archivo General de Indias. It is possible that after having researched in this archives, we find that it is necessary to search in other ones. So this list should be read as a temporary one, not definitive.

From an archaeological perspective, our main interest is wooden remains from Iberian ships. For this reason some Galician shipwrecks have been selected already for sampling dendrochronologically and surveying, as part of the research related to timber use and patterns of timbers, such as timber growing average year, timber species used for different parts of the ship and origins of the timbers are one of the major objectives of this research to be undertaken. As well as dendrochronological analysis, we would like to look at timbers just from a shipbuilding perspective, to understand the relationship between timbers, the joints and proportions of the ship. 3D reconstruction through software will provide a frame to compare this type of information, with the historical one.

Our main approach is going to be cultural, not nationalist, in order to avoid some cultural misunderstandings created from limited modern views of new nations and nationalist perspectives that did not exist yet as we know them in the 16th-17th centuries. A secondary question that has not being proved is the fact that the Cantabric Iberian shipbuilding influenced spaces beyond the borders of the Spanish nation. Specially for the French Basque side, there are many clues that point to this statement, but has not yet being proved. We are putting forward this idea, because we believe that there is "Iberian" shipbuilding, beyond the geographical space of the peninsula, more precisely, in Labort or south France. The Basque reality of the modern age developed a cross-boarder community that was very opportunistic and did not refuse to take advantage from their language and communicate with people that, sometimes, were at war with the Spanish king. This is one of the paradoxes of the Iberian shipbuilding we would like to contrast during this project.

To sum up with, our methodology is based on a complementary comparative study of different sources. After we have gathered all sources, we would reconstruct according to the sources, the ships we are researching. This way, we will develop 3D model explanations to compare the data from archaeological and historical sources. Archaeologically we will show the data in models created from the collected information, such as measures, dendrochronological samples and results, timber species, timber origins and 3D ship reconstruction. Historically we will show measures and all collected data in explanatory boxes. Once we show the data from both sides, we aim to synthesise the results and show a combined last explanation as a conclusion of the research.

Personal Research Project Abstract:

This research is focused in the shipbuilding transition that occurred in the Iberian transnational network, particularly in the provinces of Biscay and Guipuzcoa, but also what nowadays is Cantabria, inside the Early Modern Spanish Monarchy during the 1550s to 1650s. One will analyse the changes that happened after the mid 16th century, since they affected the shipbuilding, trading activities and forestry practices that considerably changed over the last decades of the 16th century. These changes, such as the collapse of the Basque whaling and cod fishing voyages to Newfoundland, the war of Flanders blocking the Northern trading route that became forbidden for Spanish Merchants, but also the expansion of the Ottoman influence in the Mediterranean, obstructed the exchange with those areas creating a quantitative decline in the Spanish area of the construction of ships, but also an increasing migration of ships that went to the French harbours in the Labourd to continue with the trading and fishing voyages. This historical context gave an idea of a shipbuilding crisis and wood shortage, based on a quantitative decline of the numbers of ships built in the Spanish Basque area. However, this view of a shipbuilding crisis will be reviewed from a transnational

perspective of the economy and shipbuilding. This research shows an alternative view, evidencing interrelated processes that happened beyond the frames of national borders, in this case how the Basque economy was an example of a transnational network that also developed in the south of France. During this period of changes some opportunities appeared for the investors in the Northern Iberian area, some of them in serving the Spanish King in the Indias trading routes and armadas, whereas other investors saw them under the French flag and trade that settled on the French Basque side, in order to continue with the traditional fishing and trading routes. All of these historical processes were mirrored by the shipbuilding culture of the Basque area during the early modern age, as an example of an relational network of contact and influence. The Basque area, together with what nowadays would be Cantabria, was influenced by other areas of Europe. In this network of influences, technological similarities and differences were found in the construction of ships. This research will originally show how concepts of coherent ship cultures have been spatially framed by nationalist narratives of identity and do not represent the reality of a diverse and coexistent multiplicity of forms that were the reality of these vessels. The results will be shown from a variety of viewpoints, combining mainly Historical, Archaeological, Experimental Archaeological and Dendrochronological views, in order to contribute from different angles to the study of shipbuilding studies, particularly in the Iberian case study. In particular, this research shows the effect and influence from historical disciplines into the archaeological studies, particularly with the idea of ship types, that was adopted by archaeologists into a method of classification by ship typologies. This concept is contradictory to the historical and archaeological data from individual ship measurements and proportions, but also construction features, that combined wood sciences, show the multiplicity and inconsistent variability of ships built, all unique, and different, but related and interconnected to each other.

Personal Research Project Progress Report. Click or tap to enter a date.

The last year of studies has been by far the hardest, but also the most creative and inspiring one. The first two years have been difficult in terms of getting to know the topic, finding the gaps in which the student can contribute and to get the skills to find methods and apply creatively future research lines and contribute to the general discussions on the academic field. This last year has been a year of maturation of the previous two, with an incredible outcome in terms of the topic itself as well as the research starting to flourish on its own. By this one does not mean to say there are no errors, or nothing else to learn, but the fact that the work has come together, that the talks and presentations in seminars, but also in other Universities and International conferences have given the opportunity to bring ideas to public spaces where experts can debate and engage with one's own research, and generally it has been a positive experience, with many mistakes, of course.

The outcomes, although they have matured and improve in the last months, is has brought clearer conclusions on the PhD, than at the beginning. The thesis, or synthesis has been clearer every day, as in the previous two years it was a constant worry to find out what was the way we could explain these shipbuilding cultures in a coherent way. The study of the resources,

reading about what other experts in the field have done and the vision to find potential alternative contributions to the academic field is making a small contribution, in a vast and well researched field, but with original work.

It has been a year of many challenges to undertake, such as editing an article as a coordinator, giving papers in many seminars, and international conferences for the first time and mainly it has been a year to clarify the research direction with more confidence and to believe in what one has been working for a long time now. In this confidence, the contribution of teachers, supervisors, colleagues and the support of friends and family has been essential to carry on.

Overall this research experience has shown clearly that the more one knows about a research topic, the more one realises how clearly you don't know much, and there is so much more to know than what you have experienced, which is just a little fraction. But at the same time, it has encouraged oneself to carry on with passion in working in what one enjoys doing, researching. Although the writing is always hard work and difficult to do.

Secondments:

Maritime archaeology Trust 13–19 April 2016 CSIC 01 September 2015–16 November 2015 Archeonauta 3–30 June 2015

Scientific Activities: Archives in Madrid: Museo Naval de Madrid

Archives in Spain: Simancas. Paleography

Scientific Activities:

Experimental Archaeology, Iberian shipbuilding in Albaola in a 16th century ship. 3-7 August and 17-28 August 2015 Diving in a fish survey in Skomer Island 8-9th July 2017 Pembrokshire, Wales

Training Activities: ForSEAdiscovery teamwork diving Galicia 11–18 September 2014 Dendrochronology course by the NAS III in Lampeter 29–30 November 2014 Course on Books and treatises on Shipbuilding Madrid January 15–16 2015 Rescue diving course 13–15 March 2015 Cardiff and Chepstow First aid course 23–26 March 2015 London Hyperbaric Chamber course 27 March 2015 HSE Commercial SCUBA course 30 March– 10 April 2015 GIS course 19th May 2015 in Madrid, CSIC Course on Dendrochronology and wood anatomy Wageningen 8–11 December 2015

Course on 3D techniques and photogrammetry 26th-27th November 2016 Freemantle, Australia Course in Historiography and timber trade in the Netherlands 6-8 May 2015 Underwater Sampling and archaeological campaign 3-30 June 2015 Galicia Diving in the Yarmouth roads April-May 2016 with MAT Isle of Wight ARS NAUTICA Course on Mediterranean boatbuilding and history 3rd-11th June 2017 Dubrovnik, Croatia Diving in the Solent June-July 2017 with MAT Isle of Wight Dissemination Activities. UWTSD research seminar series 4 March 2015 Lampeter Presentation in Colloquium on Timber trade and Iberian ships, 26-27 November, 2014 Lisbon Presentation Madrid 12-16 January 2015 Presentation Madrid Mid-term report 18 December 2015 Poster ISBSA 14, Gdansk, 20-26 September 2015 "Atlantic Shipbuilding and the Iberian Bizcayan transition, 1550-1633" Article "Atlantic shipbuilding and the Iberian Cantabric transition, 1560-1680" November 2014-February 2015 Research Students Conference 27 January 2016 Presentation on ForSEAdiscovery in meeting from SIAS 12 March 2016 Zaragoza Research seminars 20th April 2016 Lampeter ForSEAdiscovery Meeting in Lampeter 27th May 2016 Ikuwa 6 presentation Freemantle, Australia 28 November- 2 December 2016 Research seminars, Postgraduate seminar 22nd February 2017 Postgraduate talk 2nd March 2017 Swansea Nexus conference 4th May 2017 Swansea, Lloyd Thomas building

Talk in ARS NAUTICA 3-11 June 2017 Dubrovnik

Outreach Activities.

Eurodendro September 8–11 2014 Lugo (Attendant) Ikuwa 5 16–19 October 2014 Cartagena (Attendant) Post in the ForSEAdiscovery Blog 3 September 2015 Marie Curie Actions meeting in London 28 February 2015

Contributions towards Project Milestones / Deliverables: Glossary of Shipbuilding Deliver wooden samples for WP3

Career Development Plan Updated: Click or tap to enter a date.

Formation skills and reading (1rst year)2014-2015

UWTSD seminars to spread the project and research(4th march) (Accomplished)
Writing Project proposal (2 months) (Accomplished)
Reading Bibliography(2-4 months) (Accomplished)
Course in history of wooden shipbuilding. (Accomplished)
Course on Books and treatises on Shipbuilding (Accomplished)
Workshop on Communication and Presentation skills(Accomplished)
Empirical shipbuilding (carpenters intensive empirical course in Albaola Faktoria), (1 month) (Accomplished)
Archaeological commercial diving qualifications, Rescue diver qualification (1 month) (Accomplished)
Writing skills, academic writing in English (Accomplished)
ISBSA – Poland October 2015(Accomplished)

Research (2nd year) 2015-2016

Underwater archaeological campaign (2 months) (Accomplished)

Archives in Madrid (Planned one month) (Only one week)

Archives in Spain Planned (4-5 months) (Only 2 weeks)

Analisis of dendrochronological samples (Accomplished)

Course on Historiography and archive research (Accomplished)

Course on Geographic Information Systems (Accomplished)

Empirical sailing and shipbuilding (Albaola faktoria) (Not accomplished)

GIS Layer on Iberian Shipwreck sites, Software skills: GIS. (Not accomplished by oneself, but by other members of the project)

Rhinoceros Software for 3D ship reconstruction (Required skill) (Accomplished, but not mastered)

Method statements for guidance on best practice and protocols for dendro-archaeological fieldwork, timber characterization and data collation and presentation (Accomplished by other members of the group)

Course on Dendroarchaeology of ships, Practice and Prospect (Accomplished)

Workshop in Advanced team and Project management(Accomplished)

Empirical sailing and shipbuilding (Albaola faktoria) (Not accomplished)

Proof reading Phd (4 months) (Less than expected)

Corrections and grammar (2 months) (Less than expected)

Last minor corrections (2 months) (Less than expected)

Site specific reports for dissemination and archive deposition for selected shipwreck sites (Accomplished)

Synthetic reports on efficacy of different scientific approaches to timber characterization of Iberian Ships of the 16th and 17th century (Accomplished) This point needs reviewing

ESR6 Adolfo Miguel Borges Pinheiro da Silveira Martins

University of Wales Trinity Saint David

Contract Start Date: 01/09/2014

Contract End Date: 01/08/2017

Ph.D. Activities

Registered for PhD:

Date of defence: TBA

Institution: University of Wales Trinity Saint David

Supervisors: Professor Nigel Nayling, Professor Rosa Varela Gomes

Title: Reconstructing Trees from Ship Timber Assemblages Using 3D Modelling Technologies

Objectives:

To contribute to an inventory of key-construction features found in previously researched Spanish shipwrecks.

To assess and analyse excavated Spanish ship timber assemblages.

To select a limited number of demonstration Spanish shipwreck sites for potential survey and dendrochronology analysis.

To survey and sample selected sites, carry out ring-width analysis and and supply subsamples to others.

To synthesise results and assess best practice.

Research outcomes/chapters:

Chapter 1 – Interpreting shipbuilding technology, forest management and timber converting evidence.

Chapter 2 – The anatomy and morphology of trees and ships.

Chapter 3 – Ship Timber analysis and digital tree reconstruction techniques.

Chapter 4 – Three-dimensional tree reconstruction based on archaeological evidence.

Chapter 5 – Conclusions.

Contribution to deliverables of ForSEAdiscovery:

Research studies focus on the ForSEAdiscovery Project aims and objectives.

Participation in archaeological investigation by undertaking studies focus on the ForSEAdiscovery Project aims and objectives.

Archaeological fieldwork to undertake wood sampling to provide WP3 with suitable samples for DNA and isotopes studies.

Project dissemination in the form of conference presentations, published paper and public outreach.

Studies and 3D reconstructions for the 3D digital glossary.

Participation on the development of method statements for guidance on best practice and protocols for dendro-archaeological fieldwork, timber characterisation and data collation and presentation.

Participation on the site-specific reports for dissemination and archive deposition for selected shipwreck sites

Participation on the synthetic reports on efficacy of different scientific approaches to timber characterisation of Iberian Ships of the 16th and 18th century.

ForSEAdiscovery activities.

Personal Research Project: Reconstructing Trees from Ship Timber Assemblages Using 3D Modelling Technologies.

Personal Research Project Abstract:

Archaeology is the interpretation of evidence based on objects produced by humans in the past. Research is not the search for inventions or the development of unsupported conclusions but the recreation of aspects of human life – this is what archaeologists do with artefacts (Foucault: 1972, 144). Scientists observe and analyse the facts to form theories and explanations of how people faced challenges, established innovative technologies, lived and died (Bernard: 2006, 9).

Three-quarters of the planet surface are covered by water (Bass: 1974, 9). It was imperative for people to developed new tools to cross those barriers. Boats helped humans to live (Greenhill and Morrison: 1995, 15), they became more than lifeless structures (Steffy: 1994, 5). To carry people and commodities throughout distant places time and effort were invested in developing proper structures. Water-lines, rivers and oceans turn out to be the new routes for trading and communication. Ships assumed the uppermost role in the economy of societies (Greenhill and Morrison: 1995, 9). When the need arose, shepherds and farmers turned into sailors to transport their production abroad (Bass: 1974, 9). This mutation triggered the development of complex timber assemblage the "floating containers" (Steffy: 1994,3). Studies focusing on these vessels involve using different sources of information are enduringly being analysed by researchers. Examining shipbuilding techniques, timber supply and forest management are increasingly relevant in a wider archaeological and historical investigation. Carpenters built watercraft vessels from trees which research suspect had distinct mature

stages and growth patterns. What methods or techniques these people use to choose a tree from a variety of them in woodlands? What methods were used to identify suitable shapes and dimensions for shipbuilding? Which methods do they use to convert trees into timbers? Which processes were establish and what were their levels of understanding about preparing forests for shipbuilding? What triggered the shifts in technology and when did they occur? All these questions have a place in this research. Investigating the remains of a ship means examining which processes humans undertook to build a vessel and the relation they had with the woodlands.

Interrogating ship timbers to understand ships, shipbuilding technology and carpenters comprises innovatively integrated studies. This approach will allow combining three major areas of science and technology: archaeology, archive research and computing to reconstruct the parent trees from ships` timber assemblage. The study will also permit to develop methodologies to identify and analyse ship timber morphology and their impact as a raw material in the shipbuilding industry.

Personal Research Project Progress Report: 2017/08/31

Research projects (Project manager):

Belinho 1: Timber recording and sampling -2/23 of August, 2015:

- o Aims:
 - To characterize the nature of the shipwreck material recovered from the foreshore in the presumed vicinity of the *in situ* wreck.
 - To develop the skills and experience of ForSEAdiscovery researchers and regional archaeologists through involvement in archaeological recording and analysis.
- o Objectives.
 - To enhance understanding of the Belinho 1 shipwreck through recording of recovered ship timbers
 - To enhance understanding of the Belinho 1 shipwreck through wood science studies of selected samples from recovered ship timbers including microscopic wood anatomy, dendrochronological analysis and geochemical analyses
 - To provide training opportunities for ForSEAdiscovery early stage researchers, regional archaeologists, and volunteers
 - To develop understanding of the importance of timber assessment and sampling within maritime archaeological investigations
- Methodology:
 - The project focus is on efficient and effective ship timber documentation and sampling. The diagram below outlines a process for timber cleaning, selection, and documentation through use of timber record sheets, photography, 3D recording using Faro-Arm and Rhinoceros 3D software, and selective white-light scanning. The process of timber documentation will be informed by presently

available guidance on best practice (Historic England Waterlogged Wood Guidelines <u>https://content.historicengland.org.uk/images-</u> books/publications/waterlogged-wood/waterlogged-wood.pdf/.

Historic England Dendrochronology Guidelines https://content.historicengland.org.uk/images-

books/publications/dendrochronology-

guidelines/dendrochronology.pdf/, and the ship timber recording manual developed for the Newport Ship Project http://archaeologydataservice.ac.uk/archiveDS/archiveDownload?t=ar ch-1563-

1/dissemination/pdf/Newport_Medieval_Ship_Project_Timber_Record ing_Manual.pdf.

- Indexes of assigned timber numbers, photographs, Rhino files, scans and samples will need to be collated within a single database which links to the ForSEAdiscovery project database and GIS. During fieldwork, temporary paper based indexes may be used but will need to be frequently and regularly entered into the Belinho1 project database (NN suggests daily at a minimum).
- In the collection of data, project team members will need to be aware of current recommendations for sustainable file formats and file naming, and ensure collation of appropriate metadata to assist in the process of archive inception and submission. Further advice on these aspects is available at the Archaeology Data Service – http://guides.archaeologydataservice.ac.uk/.
- Conclusions:
 - The Belinho Project has become essential to develop my individual research project (ESR6). The data collected during fieldwork allowed to write a full chapter as a case study, to develop suitable methodologies and to disseminate achieved conclusions.
- Papers & conference within the Belinho 1 secondment:
 - Castro, F.; Almeida, A.: Bezant, J.; Carmo, A.; Crespo, A.; Farias, I.; Gonçalves, I.; Groenendijk, P.; Magalhães, I.; Martins, A.; Monteiro, P.; Nayling, N.; Santos, A.; and Trapaga Monchet, K. (2015) Belinho 1 shipwreck, timber catalogue.
 - Martins, A. (2015) Maritime Routes and Shipwrecks at the edge of the Iberian world. Interrogating ship timbers, *in* Latin American Association Conference, San Juan, Puerto Rico
 - Martins, A.; Nayling, N. and Castro, F. (2015) Ship Timbers from the Belinho Shipwreck: Recording and Provisional Analysis, in Colóquio Internacional: Património, Turismo e Desenvolvimento, Esposende Portugal.

- Martins, A. (2015) The Anatomy of Trees & Ships: How can we see trees in their timbers?
- Martins, A. (2015) Technological Advances in Archaeological Approaches to Wood Science
- Martins, A. (2015) The anatomy of ships & trees: recording the past using 3D techniques.
- Ali, S. and Martins, A. (2015) Digital Recording in Boat Archaeology.
- Martins, A.; Eguiluz–Miranda, B; Santos, A.; Trapaga Monchet, K and Rich, S. (2016) Multidisciplinary approach in science, how far may we go?
- Martins, A. (2015) Engineering and reverse-engineering in wooden shipbuilding. The analysis of data collected from archives and seabed using a 3D CAD approach
- Martins, A. *et. al.* (2016) Reconstructing Trees from Ship Timber Assemblages Using 3D Modelling Technologies: Evidence from Belinho in Northern Portugal. In, IKUWA VI Maritime Archaeology International Conference (paper review paper being written).

Secondments:

- Archaeonauta, S.L. 1/19 of June, 2015:
 - The secondment consisted of in gaining experience in underwater archaeology within HSC archaeology ACOP's. The secondment was performed with the Archaeonauta, S.L. and project manager was the archaeologist Miguel San Claudio.
 - The objectives diving in three archaeological sites. The French corvette Bayonnaise, Spanish Frigate La Magdalena and the shipwreck of Ribadeo.
 - During three weeks the tasks involved collecting data from the selected shipwrecks to provide to other ForSEAdiscovery project fellows, in particular, to the working package n. 3 (wood science).
- Maritime Archaeology Trust 13/19 of July, 2016:
 - o Aims:
 - To gain experience within commercial maritime archaeology environment.
 - Improve skills in 3D underwater environment recording.
 - Develop skills as a workshop organization team member.
 - Objectives:
 - To achieve a better understanding of the particularities within the commercial archaeology targets and planning.
 - To developing planned tasks within particularly short time framework.

- To develop or adjust suitable methodologies within a short time timeframe.
- To achieve higher standards in terms of deliverable documents such as reports and protocols.
- Methodology:
 - The secondment consists of in undertake diving operations in the archaeological site Bouldnor Cliff and classroom workshops at the National Oceanography Centre (Southampton, UK).
 - The conditions in the Solent River are particularly aggressive in terms of underwater environment. Strong currents and fast changes of water flow aggravated by the tides has given short windows to develop archaeological survey and excavation.
 - Within these complex conditions three diving days (two dives per day) within HSC archaeology ACOP's are due to be complete in order to collect significant data to reconstruct the past landscape. Nowadays, the Solent River hides relevant evidence an old Mesolithic settlement (8000 years old).
 - The tasks to be developed within the schedule timeframe include:
 - Digital recording of section BCV using cameras with waterproof cages and lights. Photographs will be processed and exported to specific software in order to reconstruct the past landscape. Photomosaic and photogrammetry will be the employed techniques. For this process students from the University of Alexandria will be instructed and supervised about the technical methods.
 - Second stage of the secondment will be held in the National Oceanography Centre in classrooms. The tasks will involve the usage of the data collected in the Solent River at the Bouldnor Cliff (BCV) archaeological site. lectures will be given about Adobe software (Photoshop, Lightroom) and Agisoft photoscan.
 - Drone survey and digital recording of shipwrecks located in intertidal zone will also be considered during the secondment.
- Conclusions:
 - The secondment at the Maritime Archaeology Trust reveal to be highly relevant. I took part on the team from the Trust experiencing day-by-day tasks such as planning, executing and reporting the planned tasks.
 - Experiencing the adopted methods and developing techniques within higher standards and demands has reflected on my way of thinking. Developing more in less time keeping and still keeping high level of safety and professional standards is to be considered in future.
 - Working with researchers from other academic and experience background revelled to be highly important in terms of gaining

personal experience. I considered thatmulti-cultural teams are also recommended for exchangeable knowledge and research paradigm questions.

- ERC Timber / Dendro.DK (10 of October, 2016 ongoing):
 - o Aims:
 - To gain a better understanding of the shipbuilding wood management.
 - Identify the adopted criteria for the chosen wood employed in the northern Europe shipbuilding.
 - To reconstruct the trees used in shipbuilding from the observation of tangential timbers (planking).
 - Objectives:
 - To achieve a better understanding of the particularities within the commercial archaeology targets and planning.
 - To developing planned tasks within particularly short time framework.
 - To develop or adjust suitable methodologies within a short time timeframe.
 - To achieve higher standards in terms of deliverable documents such as reports and protocols.
 - Methodology:
 - Relevant information related to wood features and shipbuilding technologies will be collected from select vessels in order to provide suitable data to reconstruct parent trees.
 - Selected timbers will be recorded according with high standards in terms of accuracy and precision using 3D digitizers and photogrammetry techniques.
 - Collected data will be analysed and contribute for the reconstruction of the trees used in shipbuilding from the information gather during fieldwork.
 - Wood features and shipbuilding technology will be analysed and processed using 3D software to provide relevant information for tree reconstruction.
 - Conclusions: (no conclusion available yet the collected data from the Bremen Ship is being analysed and processed).

PhD chapter's draft (already submitted to the supervisory team):

- Literature Review / Chapter 1 (draft04) August 2016.
- Chapter 3 The Belinho01 case study an untold story (draft02) May 2016.
- Chapter 4 The Galician case study managing suitable ways to collect wooden samples (draft02) May 2016.

International conferences (paper).

- IKUWA V, Spain 15/19 of October, 2014 peer-review paper pending for publication.
 - Martins, A; Martins, A. S. (year) Tróia 1, a journey in time and sea. Shipbuilding and the shipwreck, *in* conference proceedings, Cartagena, Spain p. 872–880.
- ForSEAdiscovery Project conference, Portugal 26/27 of November, 2014 published in 2015.
 - Martins, A. (2015) How can we see trees in timbers? An approach to the Golden Age of Shipbuilding in, (R. Gomes and M. Gomes ed.) The Management of Iberian Forest Resources in the Early Modern Shipbuilding. History and Archaeology, Portugal p. 5-16
- LASA, Puerto Rico 24/31 of May, 2015.
 - Martins, A. (2015) Maritime Routes and Shipwrecks at the edge of the Iberian world: Interrogating ship timbers, *in* Latin American Association Conference, San Juan, Puerto Rico
- International conference at Esposende, Portugal 16/17 of November, 2015 pending for publication.
 - Martins, A.; Nayling, N. and Castro, F. (2015) Ship Timbers from the Belinho Shipwreck: Recording and Provisional Analysis, in Colóquio Internacional: Património, Turismo e Desenvolvimento, Esposende Portugal.
 - IKUWA VI, Australia 28 November / 2 December 2016 Peer-review paper being written.
- Martins, A. *et. al.* (2016) Reconstructing Trees from Ship Timber Assemblages Using 3D Modelling Technologies. Evidence from Belinho in Northern Portugal. *in*, IKUWA VI Maritime Archaeology International conference Proceedings.

International conferences (poster):

- ISBSA14, Poland 21/25 of September, 2015.
 - Martins, A. (2015) The Anatomy of Trees & Ships: How can we see trees in their timbers?

International conferences (attended):

• EuroDendro 2014, Spain - 8/12 of September, 2014.

Organized within the University of Wales Trinity Saint David (paper):

- Postgraduate Research Day, Carmarthen Campus, 6 of March, 2015.
 - Martins, A. (2015) Technological Advances in Archaeological Approaches to Wood Science
- Student Research Conference, Carmarthen Campus 27 of January, 2016:

- Martins, A. (2015) The anatomy of ships & trees: recording the past using 3D techniques.
- Building Bridges Seminar, Lampeter Campus 9 of March, 2016.
 - Ali, S. and Martins, A. (2015) Digital Recording in Boat Archaeology.
- NEXUS conference, Carmarthen Campus 23/24 of March, 2016:
 - Martins, A.; Eguiluz-Miranda, B; Santos, A.; Trapaga Monchet, K and Rich, S. (2016) Multidisciplinary approach in science, how far may we go?
- Research Cluster Seminars, Lampeter Campus 11 of May, 2016
 - Martins, A. (2015) Engineering and reverse-engineering in wooden shipbuilding. The analysis of data collected from archives and seabed using a 3D CAD approach
- Global Waters: Sustainability, Harmony and Awareness Day 3 of October, 2016:
 - Martins, A. and Ali, S (2016) Ships, Trees and Water.

Fieldwork (Project manager).

• Belinho 01 project, Portugal – 1/23 of August, 2015.

Fieldwork (participant):

- Finisterre Project, Spain 13/17 of September, 2014
- Trez Malaouen 2, France 7/8 of September, 2014
- Finisterre Project, Spain 1/19 of June, 2015
- Yarmouth Roads, UK 14/18 of April, 2016
- Yarmouth Roads, UK 27/29 of April, 2016
- Yarmouth Roads, UK 12/13 of May, 2016
- Llanllyar, Wales 16 of May, 2016
- Bouldnor Cliff, UK 13/19 of July, 2016
- Island of Islay, UK 22/26 of August, 2016
- Bremen ship / ERC Timber, Germany, Denmark 10 of October, 2016 (ongoing).
- Batavia ship / ERC Timber, Australia 29 30 of November (ongoing).

Published (paper peer-reviewed).

- Pending publications.
 - (IKUWA V) Martins, A; Martins, A. S. (year) Tróia 1, a journey in time and sea. Shipbuilding and the shipwreck, *in* conference proceedings, Cartagena, Spain p. 872–880.
 - (CIPTD) Martins, A.; Nayling, N. and Castro, F. (2015) Ship Timbers from the Belinho Shipwreck: Recording and Provisional Analysis, in Colóquio Internacional: Património, Turismo e Desenvolvimento, Esposende Portugal.
 - (IKUWA VI) Martins, A. et. al. (2016) Reconstructing Trees from Ship Timber Assemblages Using 3D Modelling Technologies. Evidence from Belinho in

Northern Portugal. *in* IKUWA VI conference proceedings. (Paper being written).

- Eguiluz-Miranda, B; Intxaustegi, M and Martins, A. (year) Comparativa sobre X pecios del siglo XV y XVI para establecer una teoría sólida interpretativa (Paper being written).
- Published (paper):
 - Martins, A. (2015) How Can we see trees in timbers? An approach to the Golden Age of Shipbuilding. *in*, (R. Gomes and M. Gomes ed.) The Management of Iberian Forest Resources in the Early Modern Shipbuilding. History and Archaeology, Portugal p. 5-16

Other papers.

 Castro, F.; Almeida, A.: Bezant, J.; Carmo, A.; Crespo, A.; Farias, I.; Gonçalves, I.; Groenendijk, P.; Magalhães, I.; Martins, A.; Monteiro, P.; Nayling, N.; Santos, A.; and Trapaga Monchet, K. (2015) Belinho 1 shipwreck, timber catalogue.

Workshops (attended).

- Dendrochronology and archaeology, Lampeter Campus, UK 29/30 of November, 2014.
- ForSEAdiscovery project: shipbuilding workshop, Madrid, Spain 12/17 of December, 2014.
- Digital non-contact tracing at the Newport Mediaeval Ship Centre, Newport, Wales 14/16 of April, 2015.
- ForSEAdiscovery project: Historiography workshop, Groningen, Nederland's 6/8 of May, 2015.
- ForSEAdiscovery project: GIS workshop, Madrid, Spain 12/17 of October, 2015.
- ForSEAdiscovery project: Dendrochronology workshop, Wageningen, Nederland's 9/11 of December, 2015.
- 3D Multi-image photogrammetry course. Fremantle, Australia 26/27 of November, 2016.

Workshops / sessions (given).

- 3D software workshop, Rhino 3D (with Nigel Nayling) 25 of May, 2016.
- 3D digital recording and data processing (at Maritime Archaeology Trust) 13/19 of July 2016.

Training (attend and successfully accomplished).

- HSE First aid at work 2015.
- LDC recompression chamber 2015.
- HSE Commercial diver 2015.

Secondments.

Archaeonauta, S.L. – 1/19 of June, 2015. Maritime Archaeology Trust – 13/19 of July, 2016. ERC – Timber / Dendro.DK (10 of October, 2016 – 31st of August, 2017.

Career Development Plan Updated: 2017/08/31

LONG-TERM CAREER OBJECTIVES (over 5 years):

- 1. Goals: Finish the PhD in the University of Wales Trinity Saint David and get post-Doctoral position in Europe or USA where can be followed by academic (Teaching / research) and commercial (maritime archaeology) job.
- 2. What further research activity or other training is needed to attain these goals? Improve skills in dendrochronology (tree-ring studies), maritime archaeology technics and methods; reinforce position in the maritime and dendrochronology international network and scuba diving technics (surface supply, etc).

SHORT-TERM OBJECTIVES (2014-2017):

All milestones established for the duration of the contract were achieved.

The intension to submit teases form was sent to the University of Wales Trinity Saint David Postgraduate Office mentioning that the full teases will be submitted until the 30st of September 2017.

ESR7 Antonio Santos

Host Institution: FCSH-UNL/IAP Contract Start Date: 01/09/2014 Contract End Date: 31/08/2017 *Ph.D. Activities* Registered for PhD: ⊠ Date of defence: 26/10/2015 Institution: FCSH-UNL Supervisors:Prof. Rosa Varela Gomes Title: The Portuguese Forest and its association with Shipbuilding, during the 16th Century Objectives: To contribute on the existing knowledge regarding Portuguese shipbuilding, based on the existing sources approaching forests and tratises.

Research outcomes/chapters:

Chapter 1 – The Portuguese Forested Areas and Wooden Species applied on Shipbuilding Industry during the 16th Century

• 1.1 Forest Areas. From Early Ages until the 16th Century. Antecedents and Future Influences;

- 1.2 The 16th Century Portuguese Territory: Forested Areas;
- 1.3 Maritime Structures and Wooden Species Applied on Naval Industries;

• 1.4 Timber Supply between Forest and Shipyard: the role of fluvial and coastal routes. Local and Imported Timber;

- 1.5 Describing the Portuguese Timber Species Applied on Shipbuilding Industry;
- 1.6 Describing other Timber Species Recommended for Shipbuilding Industry;

Chapter 2 – The Royal Administration: Crown, Forest and Shipyard

- 2.1 Kingdom of D. Manuel I (1495–1521);
- 2.2 Kingdom of D. João III (1521-1557);
- 2.3 Kingdom of D. Sebastião (1557-1578);
- 2.4 Kingdom of D. Filipe II of Spain, I of Portugal (1578–1598);

Chapter 3 – The 16th Century Shipbuilding in Portugal. Treatises and Timbers

• 3.1 The Necessary and Adequate Timbers according with the Treatise of Priest Fernando Oliveira from 1555 – Arte da Guerra do Mar;

• 3.2 The Necessary and Adequate Timbers according with the Treatise of Priest Fernando Oliveira from 1580 – Liuro da Fábrica das Naus;

• 3.3 The Necessary and Adequate Timbers according with the Treatise of João Baptista Lavanha from 1610 – Livro Primeiro da Architectura Naval;

Chapter 4 – Analysis of Timber Remains Identified as 'Cais do Sodré' Wreck

- 4.1 The archaeological excavation;
- 4.2 Archaeological Legislation in Vigour;
- 4.3 Preservation Conditions post-excavation;
- 4.4 Graphic List Description of Timber Remains;
- 4.5 Comparative Analysis of Timber Samples from Monuments;
- 4.6 Comparative Analysis of Timbers from other 16th Century Iberian Wrecks;
- 4.7 The appropriate species, according with the treatises versus the applied species;

Chapter 5 – Conclusions

Contribution to deliverables of ForSEAdiscovery.

- The Glossary of Shipbuilding Terminology;
- Timber sampling campaign conducted on Galicia (Finisterra, Ribadeo and Viveiro) through scientific diving operations, June 2015;
- Timber recording campaign conducted on Esposende (Belinho), August 2015;

• Yarmouth Roads campaign conducted on Southern UK (Portsmouth), though scientific diving operations, April and May 2016;

ForSEAdiscovery activities.

Personal Research Project : Timber recording campaign conducted on the "Cais do Sodré" case study in MARL, Loures, Lisboa together with Prof. Nigel Nayling in February 2015 and research of produced data in March 2015;

Personal Research Project Abstract:

To understand the species and age of timbers applied on the Cais do Sodré wreck and to compare them with other recorded Portuguese shipwrecks, according with the defended standards present on the treatises

Personal Research Project Progress Report. Click or tap to enter a date.

Click or tap here to enter text.

Secondments:

• Development of the "Illustrated Glossary on Shipbuilding" in Lampeter, December 2015;

• Another dislocation to Lampeter between April and May 2016 for the archaeological campaign of Yarmouth Roads, the development of some RHINO courses, a presentation during a Research Seminar and the presentation of ForSEAdicovery network meeting;

Scientific Activities.

GIS training, RHINO training, research seminars, secondment presentation, and Yarmouth Roads Diving Campaign

Scientific Activities:

Published or to publish articles after the presence on conferences.

- "In Poseidon's Realm Land Underwtaer!" DEGUWA, published article together with Koldo Trapaga, entitled "16th Century Forest Administration on the Iberian Peninsula ("coutadas, matas y sitios reales") and its Association with Shipbuilding";
- "The Management of Iberian Forest Resources in the Early Modern Shipbuilding: History and Archaeology" IAP, published article entitled "Forest Management on Portugal during Early Modern Ages – analysis of historical documents belonging to the Kingdom of D. Manuel I (15th and 16th centuries)";
- "IX Encontro de Arqueologia do Sudoeste Peninsular", published article entitled "Revisiting the 'Cais do Sodré' wreck. Data analysis and ship reconstruction through a dendro-archaeological approach";

• "Árvores, barcos e homens na Península Ibérica (Séculos XVI-XVIII)", published article entitled ""Trees for Ships. Forest Decrees from the Kingdom of D. Manuel I until the Kingdom of D. Filipe II (1495-1598)";

Training Activities.

• History of Wooden Shipbuilding & Books and treatises on Shipbuilding workshop in Madrid, January 2015;

- Historiography and Archive Research workshop in Groningen, May 2015;
- Application of Geographical Information Systems (GIS) to Maritime History and Archaeology workshop in Madrid, October 2015;
- Dendrochronology workshop in Wageningen, December 2015;
- ForSEAdiscovery Workshop in Dendrochronology in Lisbon, April 2017;

Dissemination Activities.

• ForSEAdiscovery Blog: "Safety First! A new way forward for archaeological diving operations", 2015;

Outreach Activities.

Stablished contact and exchanged ideas with some researchers specialized on our field of research;

Contributions towards Project Milestones / Deliverables:

Present in all the requested conferences and workshops together with all the fieldworks planed;

Career Development Plan Updated: Click or tap to enter a date.

The career development plan has not been updated since 2015, during our last gathering in Madrid

ESR8 Koldo Trápaga Monchet

Host Institution: Universidade Nova de Lisboa, IAP Contract Start Date: 01/10/2014 Contract End Date: 2017/31/03 *Ph.D. Activities* Registered for PhD: ⊠ Date of defense: September 8th 2015 Institution: Autonomous University of Madrid Supervisors: José Martínez Millán, Ana Crespo Solana Title: La reconfiguración política de la Monarquía Católica: la actividad de don Juan José de Austria (1642–1679) Objectives: The main objective of the PhD was to analyse the key-role played by Don Juan of Austria and his royal households in the political reshaping of the Spanish Monarchy during the second half of seventeenth century. It includes the performance of the Spanish Monarchy's fleets, as Don Juan of Austria headed the fleets on behalf of Philip IV since he was appointed governor general of the fleets in 1647 until he passed away in 1679.

To collect data, from bibliography and primary sources, regarding the servants that composed the different households of Don Juan of Austria that contributed, to greater or lesser extent, to the different assignments that Don Juan held.

To create a documentary appendix that includes a biography of the more than 2.000 servants of Don Juan of Austria's households and a list of all them arranged accordingly the different departments of the household.

Research outcomes/chapters:

- Attendance as speaker to international workshops and conference
- Publication of individual and joint articles and book chapters
- Participation on research projects
- Involvement on national (Spanish) and international research networks (European Institute "La Corte en Europa"; Premodern diplomats; Columnaria Network, chapter of Flanders and Burgundy; Spanish Foundation of Early Modern History)

Contribution to deliverables of ForSEAdiscovery:

This research has contributed in the methodology that I have applied for the research I have carried out regarding the ways to collect and arrange the historical data contained in Libraries and Archives of Portugal, Spain and England.

It has provided a background in research skills that were afterwards apply to the discovery of Portuguese and Spanish shipwrecks, including the Ribadeo shipwreck.

ForSEAdiscovery activities.

Personal Research Project : "Forestry, timber supply and military struggle in Portugal (c. 1560-1640)"

Personal Research Project Abstract.

The main aim of this project is to analyse the on-going flow of timber supply for shipbuilding in Lisbon during the Iberian Union in relation to the political evolvement of the Spanish Monarchy and the international maritime struggle.

It pretends to figure out whether the Portuguese forested areas were capable of providing all the timber demands coming from the shipyards of Lisbon for shipbuilding and ship reparations. If so, it seek to know which were the tree species deployed for such activities, timber provenance and the quantities required each year to guarantee the ships for the military struggle of the Portuguese Crown within the Spanish Monarchy.

In addition, it addresses the evolution of the Portuguese forestry legislation that the Portuguese kings have issued from mid-fifteenth century to mid-seventeenth century. The Portuguese

Monarchy was the first European country that sought to set up special and exclusive jurisdictional areas over the forested areas for gaming and shipbuilding activities. The issued and evolvement of Portuguese forestry legislation was not only due to an ecological footprint (timber scarcity for shipbuilding purposes), but also to the aim of the Portuguese kings of ensuring the existence of suitable trees for shipbuilding for the forthcoming generations.

The historical data has been crossed with the researches conducted in the field of Nautical Archaeology regarding Portuguese shipwrecks to know whether the information provided by the historic archival sources matches with material remains discovered by nautical archaeologists.

Last but not least, this personal research project also has intended to arrange historical data to create GIS layers on Portuguese forested areas, the evolution of the Portuguese forestry legislation or the personal committed to the preservation of the Portuguese royal forests.

These were the research questions that he has sought to answer:

- Were Portuguese forests resources able to guarantee timber supply for shipbuilding in Lisbon shipyards?
- Which were the forests belonging to the Crown?
- Where did the timber come from?
- Which tree species were mainly deployed in Lisbon's shipyards?
- What was the administrative procedure to ensure the timber supply in Portugal?
- Which agents took part in the supply of timber?
- Who did safeguard and preserve the Royal forests?

Personal Research Project Progress Report. 2017/07/25

When he ended up the contract at New University of Lisbon (March 31st 2017), he has concluded the collection of historical data stored in Portuguese, Spanish and English Archives and Libraries. At that time he was doing a secondment at CSIC, supervised by Ana Crespo Solana, focused on three main features:

1) To receive training on ArcGIS and QGIS to create GIS historical layers.

2) To arrange all the archival historical data regarding the flow of timber supply for shipbuilding in Portugal detailing the tree species, the areas supplying timber, the agents involved and ship components constructed with each tree specie.

3) To consult the literature of the Spanish and Portuguese Monarchies and the European maritime powers in the fields of Environmental, maritime and political history.

In April 1st he started off a new position at King University Juan Carlos (Madrid, Spain) where he is focused on the Royal Sites of the Spanish Monarchy throughout early modern age, including the royal forests of Portugal during the Iberian Union. It has permitted him to continue working, although at a slower pace, on the research of the ForSEAdiscovery project. On June he has concluded together with María José Rodríguez, which is working at CSIC within the ForSEAdiscovery project, the creation of GIS layers that depict the main Portuguese royal forest districts accordingly the forestry legislation issued in Portugal throughout 15-17th centuries. Currently, he continues working on the monograph that he and her supervisors (Rosa Varela Gomes and Ana Crespo Solana) did agree to publish once his contract would have coming to a halt (September-October 2017). Unfortunately, he would not be able to conclude the monograph in the proposed time but he is currently working on it with the hope of publishing it.

Secondments:

He has done 3 secondments.

1) Archeonauta S.L., Finisterre (Galicia, Spain) supervised by Miguel San Claudio. June 12-18th, 2015

This one-week secondment has been within the nautical archaeological campaign the Project conducted in Galicia (Spain) in June 2015. During this campaign he got involved in the nautical campaign conducted in Finisterre and Viveiro where he provided technical support to the diver's team. In addition, he received training in diving, fieldwork and research skills in nautical archaeology.

2) University of Wales Trinity Saint David (Lampeter, Wales, UK) under the supervision of Nigel Nayling, from 1st April to May 30th 2016, where he has:

- Received training in ArcGIS software to boost his skills to create GIS layers.
- Conducted one-week research at the British Library (London, UK) in the section *Manuscripts.*
- Attended as a speaker to a conference and the Project network meeting.
- Attended to the weekly seminars organized by the University.
- Has worked together with other fellows of the Project of different research fields (historians, nautical archaeologists and Wood anatomist) that has improved his background.
- Has improved his English skills and the Academic writing supervised by the staff of the University.

3) Centro Superior de Investigaciones Científicas (Madrid, Spain) from 15th February to March30th 2017 supervised by Ana Crespo Solana. During the secondment he has:

- Developed his skills in QGIS with the collaboration of M^a José García Rodríguez (member of the CSIC team of *ForSEAdiscovery*) with the main purpose of creating create historical cartography of the Portuguese forested areas throughout 15th, 16th and 17th century as a part of his personal project entitled "Forestry, timber supply and maritime struggle in Portugal (1560–1640)"
- Arranged all the archival historical data regarding the flow of timber supply for shipbuilding in Portugal detailing the tree species, the areas supplying timber, the agents involved and ship components constructed with each tree specie.

- Used the CSIC library to work on some joint and individual articles and book chapters, related to the Spanish and Portuguese Monarchies and the European maritime powers in the fields of Environmental, maritime and political history.
- He had developed his research skills working with primary sources at the Segovia Cathedral archive with Ana Crespo Solana and Marta Domínguez-Delmás, in order to use the results in an article about the history of the building combining dendrochronology and historical research.
- Has worked together with María José García Rodríguez to write the book chapter "Los aprovechamientos forestales de los bosques portugueses desde una perspectiva cartográfica durante la Unión Ibérica (1580-1640)", that they are presenting in Málaga (Spain) at the Conference organized by the Spanish Society of Digital Humanities.
- Has attended to seminars and workshops at CSIC, King University Juan Carlos and the Marie-Curie Alumni General Assembly.

Scientific Activities:

During the involvement within the ForSEAdiscovery project, he has not only concluded the PhD dissertation, but he has taken part actively in several scientific activities that here arranged in 5 main scientific activities.

1) Publications, including those which are in press or peer-review process. This includes which were delivered during the time he has been hired at New University of Lisbon, even those joint and individual papers that includes the reference of the Project (PITN-GA-2013-607545) which were published or delivered once he left the project.

2) Attendance to conference as speaker, public, conference and panel organizer.

- 3) Training activities.
- 4) Research networks
- 5) Scientific evaluations.

1. Publications

1. 1. Papers that includes the reference of the Project which were delivered or published once he left the project

Published

• Article, K. Trápaga Monchet: "El estudio de los bosques reales de Portugal a través de la legislación forestal en las dinastías Avis, Habsburgo y Braganza (c. 1435-1650)", *Philostrato*, 1 (July 2017), pp. 5-27.

In peer-review process

• Article, M. Domínguez-Delmás, K. Trápaga Monchet, N. Nayling, I. García González (in review) "Natural hazards and building history: roof structures of Segovia cathedral reveal its history through tree-ring research". Delivered July 2017 to the journal *Dendrochronologia*.

- Book chapter, K. Trápaga Monchet, M. J. García Rodríguez "Los aprovechamientos forestales de los bosques portugueses desde una perspectiva cartográfica durante la Unión Ibérica (1580–1640)", delivered July 15 2017, for the Conference of Spanish Digital Humanities "Humanidades Digitales Hispánicas. Sociedad Internacional, III Congreso Internacional. Sociedad, políticas, saberes", Malaga (Spain), October 2017.
- Book chapter, K. Trápaga Monchet: "Who protected Portuguese forests? Safeguarding and preserving royal and private forests in Portugal (1605-1640)". Delivered June 2017 to publish within the conference proceedings of the Conference "Árvores, barcos e homens na Península Ibérica (séculos XVI-XVIII)", held at New University of Lisbon, 26-27th January 2017.
- Book chapter, B. Eguiluz Miranda, M. San Claudio, K. Trápaga Monchet, M. Domínguez Delmás, J. L. Tomás-Gasch: "The *Ribadeo* shipwreck (c. 1600): can we identify the ship through a multidisciplinary approach?", of "The Sixth International Congress on Underwater Archaeology (IKUWA6)", which took place at Western Australian Museum (Freemantle, Western Australia). Delivered in May 2017.

1. 2. Publications within the Project

In peer review

 Book chapter, K. Trápaga Monchet & J. Revilla Canora: "Forgiving and Reincorporating 'Faithful' Vassals within the Spanish Monarchy: Catalonia, Portugal and Sardinia (1651–1678)", at XIIes Journées d'Histoire des Monarchies Ibériques. Réconcilier et réincorporer. Discours, cérémonies, pratiques", November 24–26. Valenciennes (France) – Kortrijk (Belgium).

In press

- Book chapter, K. Trápaga Monchet: "Más madera: agentes y vías de provisión de madera para las flotas reales en Portugal (1598–1621)", as result of the Conference "IV Encuentro de Jóvenes en Historia Moderna: 'Nuevas perspectivas de investigación en historia moderna: economía, sociedad, política y cultura en el mundo hispánico", held in Barcelona, July 6–7th 2017.
- Koldo Trápaga Monchet, **book chapter**: "Suppyling timber for His Majesty's fleets: forests resources and maritime struggle in Portugal (1621–1634)", delivered January 2017 for the book coordinated by Ana Crespo Solana and Filipe Castro.
- Félix Labrador Arroyo, Koldo Trápaga Monchet, **Article** "La configuración del espacio y la explotación forestal de un enclave singular. El Real Sitio del Soto de Roma durante la dinastía Hasburgo", in *Studia Histórica. Historia Moderna* (Spain, Salamanca). Delivered in March 2016.
- Koldo Trápaga Monchet. **Review** for the Journal *Hispania* of Ángel Alloza Aparicio. *Diplomacia cannibal. España y Gran Bretaña en la pugna por el dominio del mundo, 1638-1660*, Madrid, Biblioteca Nueva, 2015. Delivered January 2016.

• Félix Labrador Arroyo, Koldo Trápaga Monchet, **Article**: Forestry, Territorial Organization, and Military Struggle in the Early Modern Spanish Monarchy" for *Environmental History* Journal. Delivered in December 2015.

Published

- Article, J. L. Tomás-Gasch, K. Trápaga Monchet, A. R. Trindade: "Shipbuilding in times of war: Contracts for the construction of ships and provision of supplies in the Spanish Empire in the early seventeenth century", in *The International Journal of Maritime History*, 29/1, February 2017, pp. 187–192, England.
- Article, K. Trápaga Monchet & A. Rocha Santos: "Timber supply in the royal forests of the Iberian Peninsula through sixteenth century", in *Skyillis*, 15/1, pp. 62-68, Germany.
- Book chapter, Koldo Trápaga Monchet: "Las armadas en el reino de Portugal en los reinados de los Felipes (1580-1640)", en Máximo GARCÍA FERNÁNDEZ (ed.): *III cuentro de Jóvenes Investigadores en Historia Moderna. Familia, cultura material y formas de poder en la España Moderna.* Madrid, FEHM, 2016 (March), pp. 843-854.
- Book chapter, Koldo Trápaga Monchet: "Resucitando la Guerra de la mar": The timber supply as a political problem in the Court of Lisbon (1617–1622)", in Rosa Varela Gomes & Mario Varela Gomes (coords.): *The management of Iberian forest resources in the early modern shipbuilding: history and archaeology*, Zaragoza, Pórtico, December 2015, pp. 49–55.

1. 3. ForSEAdiscovery Blog

- 1. To write the blog entry "Researching between old dusty papers, the pleasure of being in Simancas", delivered 18th July 2016.
- 2. To write the entry "Confronting Portuguese palaeography. 'You never know 'til you know" for ForSEAdiscovery blog. Delivered March 2016. (https://forseadiscovery.wordpress.com/portuguese-palaeography/).
- 3. "A historian caught under the waves", delivered in 2015.

1. 4. Come out related to other projects (articles and books chapter):

- Koldo Trápaga Monchet (2016): "El oficio del caballerizo mayor en Nápoles en el siglo XVII", en ARANDA DONCEL, Juan & MARTÍNEZ MILLÁN, José (cords.): *Las caballerizas reales y el mundo del caballo*, Córdoba, Litopress, pp. 341-361, ISBN: 987-84-946378-1-0.
- José Martínez Millán & Koldo Trápaga Monchet (2015): "La transformación institucional de la Cámara Real de la Monarquía hispana durante el siglo XVI", in *La reconfiguración de la Monarquía Católica: el reinado de Felipe IV (1621-1665)*, Madrid, Polifemo, I, 317-439.
- Koldo Trápaga Monchet (2015): "Las casas reales de don Juan de Austria en la Monarquía Católica (1642–1679)", in *La reconfiguración de la Monarquía Católica: el reinado de Felipe IV (1621–1665)*, Madrid, Polifemo, I/3, pp. 1781–1867.
- Koldo Trápaga Monchet (2015): "Apéndice III: La Casa de don Juan de Austria", in *La reconfiguración de la Monarquía Católica: el reinado de Felipe IV (1621-1665)*, Madrid, Polifemo, II, pp. 3089-3357.
- Koldo Trápaga Monchet (2015): "La percepción de don Juan de Austria en Flandes (1656–1659), in Juan josé Iglesias Rodríguez, Rafael M. Pérez García, Manuel F. Fernández Chaves (eds.): Comercio y cultura en la Edad Moderna. Publicaciones de la XIII Reunión científica de la Fundación Española de Historia Moderna, Sevilla, Universidad de Sevilla, pp. 2839–2852.
- Koldo Trápaga Monchet (2015): "Los caballeros de hábito en las casas de don Juan de Austria (1642-1679)", in *II Encuentro de Jóvenes Investigadores en Historia Moderna. Líneas recientes de investigación en Historia Moderna*, Madrid, Universidad Rey Juan Carlos I, pp. 351-366.
- José Eloy Hortal Muñoz, Koldo Trápaga Monchet: "The Royal Households in the Hasburg Netherlands after the Departure of the House of Burgundy: From the Entourages of the Governors-General to the Maison Royale de Bruxelles", in *Dutch Crossing*, 1/39 (February 2015), pp. 3-25.

Came out related to other project as editor.

 José Martínez Millán, Manuel Rivero Rodríguez, Gloria Alonso de la Higuera, Koldo Trápaga Monchet & Javier Revilla Canora (2014, October): *La doble lealtad: entre el servicio al rey y la obligación a la Iglesia*, Madrid, librosdelacorte.es, online.

2. CONFERENCES

2. 1. Conference organizer

 Rosa Varela Gomes, Koldo Trápaga Monchet: "Árvores, barcos e homens na Península Ibérica (séculos XVI-XVIII)", Faculdade de Ciencias Sociais e Humanas, New University of Lisbon. January 26-27 2017.

2. 2. Panel organizer

"The reconfiguration of Catholic Netherlands during the second half of the seventeenth century: policy, religion and marriages", within the International Conference "¿Decadencia o reconfiguración? Las monarquías de España y Portugal en el cambio de siglos (1640-1724), held in Madrid 1-3 December 2015.

2. 3. Attendance to conference to which he submitted a proposal as fellow of the project

2. 3. 1. Confirmed attendances

- Koldo Trápaga Monchet & María José García Rodríguez: "Los aprovechamientos forestales de los bosques portugueses desde una perspectiva cartográfica durante la Unión Ibérica (c. 1580-1640)", held in Malaga October 18-20 2017, conference of "Humanidades Digitales Hispánicas. Sociedad Internacional, III Congreso Internacional. Sociedad, políticas, saberes", Malaga (Spain).
- Koldo Trápaga Monchet: "How did contribute the royal forests of Portugal to sustaining the Spanish Monarchy (c. 1600–1640)?", in "Kings and Queens 6: in the Shadow of the Throne", Madrid, September 12–15th 2017.

2. 3. 2. Conference he has attended

- K. Trápaga Monchet: "Más madera": agentes y vías de provisión de madera para las flotas reales en Portugal (1598-1611)[°], for "IV Encuentro de Jóvenes en Historia Moderna: 'Nuevas perspectivas de investigación en historia moderna: economía, sociedad, política y cultura en el mundo hispánico", Barcelona, 5-6 July 2017.
- K. Trápaga Monchet: "How could the maritime struggle affect the environment of Portugal within a 'Composite Monarchy' (1601-1617)", in the International Conference "European Society for Environmental History: "Environment in areas of contact among states, economic systems, cultures and religions". Zagreb, Junio 28 – 2 de Julio.
- K. Trápaga Monchet, F. Labrador Arroyo: "Beat the odds: coping with Portuguese and Spanish archival sources to study the Portuguese forested areas during the Iberian Union (1580-1640)", II conference of the Portuguese Network of Environmental History: "Environmental Changes in historical perspective", Lisbon, 4-6 mayo 2017.

2. 4. Attendance to conferences as speaker during the project

Besides the 3 network meetings and the mid-term report he has presented a paper in the following conferences.

- Koldo Trápaga Monchet: "Who did protect Portuguese forests? Safeguarding and conserving forests belonging to the Crown in Portugal (1605-1640)", held at FCSH in Lisbon (27th January)"
- Koldo Trápaga Monchet: "La ciudad de Lisboa como puerta hacia el mar: los sucesos de la nau Saõ Roque y la carrera de India (1602-1603)", held in Lisbon, January 23rd 2017 at 18:00 hours, as an activity of the "Comissão de Estudos Olisiponenses.
- Koldo Trápaga Monchet: "El sustento del Imperio: los recursos forestales de Portugal para las armadas reales (1560-1640)", within the Seminary "Novas Perspectivas em História Moderna" organized by José Vicente Serrão, December 6th 2016, University of Lisbon.
- 4. Beñat Eguiluz Miranda, Marta Domínguez Delmás, Ana Crespo Solana, José Luis Gasch-Tomás, Miguel San Claudio & Koldo Trápaga Monchet: "The Ribadeo Shipwreck (c. 1600): A multidisciplinary approach for an Iberian shipbuilding case

study", in International Conference IKUWA6, held at Western Australian Museum in Fremantle (Australy) November 29th 2016

- Koldo Trápaga Monchet, Javier Revilla Canora: "Forgiving and reincorporating 'faithful' vassals within the Spanish Monarchy: Naples, Catalonia, Portugal and Sardinia (1647-1679)", in XIIes Journées d'Histoire des Monarchies Ibériques. Réconcilier et réincorporer. Discours, cérémonies, pratiques", November 24-26. Valenciennes (France) – Kortrijk (Belgium).
- 6. Koldo Trápaga Monchet: "Y al fin fue al agua": formas de provisión de madera y construcción naval para las armadas reales en Lisboa (1589-1621)" at FCSH within the IAP Permanent's Seminars "Arqueologia em Lisboa. Contributos para a História da Cidade" (November 10th, Lisbon)
- Koldo Trápaga Monchet: "Timber supply in Portugal during the Union of Spanish and Portuguese Monarchies through a multidisciplinary approach (1580–1640)", Lampeter May 9th 2016
- Koldo Trápaga Monchet: Conference entitled "Crossing the Portuguese Sea-Eastern Empire: the logbook of vessel (Nau) Sao Roque's clerk (1602-1603)" within the Research Seminars headed by Adolfo Miguel Martins and Beñat Eguiluz Miranda at Saint David's University, Lampeter. 20th April 2016
- 9. Koldo Trápaga Monchet: "The political reconfiguration of Bruxelles' court through don Juan José de Austria: the establishment of *maison royalle de Bruxelles*", within the International Conference "¿Decadencia o reconfiguración? Las monarquías de España y Portugal en el cambio de siglos (1640-1724), Madrid 1-3 December 2015
- Félix Labrador Arroyo & Koldo Trápaga Monchet: "El Real Sitio y Soto de Roma: articulación territorial y aprovechamiento forestal en la Monarquía hispana (siglos XVI-XVII)", in International Conference *Crossing Borders: Connecting Edfes of Enviromental History*, held in Porto (Portugal), 5–7 November 2015.
- 11. Koldo Trápaga Monchet "La provisión de madera como una necesidad política: bosques, asientos y construcción naval en el reino de Portugal (1580-1640)", in Seminário de Investigadores FCT e Pós-Doc's. Held in Lisbon 21-22 September 2015.
- 12. Koldo Trápaga Monchet "Las armadas en el reino de Portugal en los reinados de los Felipes (1580-1640)", in *III Encuentro de Jóvenes Investigadores. Líneas recientes de investigación en Historia Moderna: Familia, cultura material y formas de poder*. Held in Valladolid (Spain) 2-3 July 2015.
- 13. José Luis Gasch, Ana Rita Trindade, Koldo Trápaga Monchet: "The ForSEADiscovery Project", in International Conferences *Connected Oceans: New Avenues of Research in Maritime and Oceans History*. Held in Porto (Portugal), 8–12 June 2015.
- 14. Koldo Trápaga Monchet: "La larga sombre del valimiento: el control de la Casa de don Juan por don Luis de Haro (1642-1661), in International Seminary *Hijos e hijas de* validos. Familia, género y política nobiliaria en la corte española del siglo XVII. Held in Rome, 21-22 May 2015.

- 15. Koldo Trápaga Monchet, Antonio Santos "The administration of woodlands (Coutadas, Matas y Sitios Reales), regarding naval construction, on the Iberian Peninsula, during the 16th century", in *Posseidon's Realm XX. International Conference on Underwater Archaeology: "Land under Water"*. Held in Nuremberg, 20–22 March 2015.
- 16. Koldo Trápaga Monchet: "The political development of Habsburgs' Courts through Johf of Austria and official and unofficial Agents (1665-1679)", in *Esplendid Encounters 3: Diplomants and diplomacy in the Early Modern World.* Held in Florence, 5-6 March 2015.
- 17. Koldo Trápaga Monchet: "La organización de los bosques reales hispanos en el reinado de Felipe II. una aproximación a su estudio", in the I Encontro Científico: "A Gestão dos recursos florestais Ibéricos na construção naval da idade moderna: História e Arqueologia". Held in Lisbon, 26 November 2014.
- 18. Koldo Trápaga Monchet: "El oficio del caballerizo mayor en el reino de Nápoles durante el siglo XVII", in *Las Caballerizas Reales y el mundo del caballo*. Held in International Conferences "Las Caballerizas Reales y el mundo del caballo" Cordoba, 3-5 October 2014.

2. 5. Attendance to conferences, seminars and workshops as public

- 1. MCAA (Marie Curie Alumni) Conference and General Assembly; held in Salamanca (Spain). 24–25 March 2017.
- 2. Methodological Seminar "Sociabilidad, arte y magnificencia en los Sitios Reales, siglos XV y XVI", held at King Juan Carlos University (Madrid), March 21st 2017.
- 3. Workshop "The Adventure of the Armadas: an Historical and Archaeological perspective", held at CSIC, February 28th. 4 hours
- 4. Workshop "La extension de la Corte: los Sitios Reales en la Monarquía Hispana (siglos XVI-XVIII)", held at King Juan Carlos University (Madrid), February 22nd 2017.
- Attendance to the conference of Filipe Castro "Os Navios Ibéricos da Expansão Europeia: Tipologias e tonelagens", New University of Lisbon (FCSH). October 31st 2016
- 6. Attendance to the conferences of the Research Seminar Heritage & Environment "Building Boats and Bridges", May 4th, 11th, 18th, 2016.
- 7. Postgraduate research meeting, April 11th 2016 at Saint David's Trinity University.
- 8. Conference of António Marques " Lisboa: Gerir o Passado para construir futuro", March 30th 2016. Lisbon, FCSH. Seminary organized by IAP.
- 9. Marie Curie Annual General Assembly held in Porto (Portugal), 6-7 February 2015.
- 10. IKUWA 5th International Conferences, held in Cartagena (Spain), 16-18 October 2014.

3. Training Activities

The training activity has especially focused on GIS software, new technologies for teaching and methodologies of other disciplines such as archaeology, nautical archaeology and dendrochronology.

- 1. February and March 2017 he has worked on QGIS open software at Centro Superior de Investigaciones Cientíticas.
- "Nuevos Escenarios de aprendizaje digital (2º edición)", 25 hours, organized by Carlos Castaño (Universidad del País Vasco). October-November 2016
- 3. "C3: Dendroarchaeology of ships: prospects and practice", Lampeter (United Kingdom)", 23–27th May 2016. University of Wales Trinity Saint David.
- 4. ESRI GIS course: "Learning ArcGIS Desktop", completed 22nd April 2016 and acknowledged with 24 hours of training.
- 5. "Basics of Map Projections" course mastered by ESRI, acknowledged with 3 hours of duration, April 2016.
- 6. "Workshop Dendrochronology & Wood Anatomy", held in Wageningen University (Netherlands), December 7–11, 2015.
- 7. Workshop "Application of Geographical Information (GIS) to Maritime History and Archaeology, held in CSIS, Madrid. 13–16th October 2015.
- Workshop "Historiography and Archive research", held in Groningen (Netherlands), May 6–8th 2015.
- 9. Workshop "Intensive training course: History of Wooden Shipbuilding & Books and treatises on Shipbuilding", held at CSIC in Madrid (Spain) 13-16th January 2015.

4. Research networks

Koldo Trápaga has benefited from the ForSEAdiscovery project, as it has permitted him to strength his role in those research networks that he already was involved. It anticipated as well networking opportunities within international research networks of Environmental History, Political History, Archaeology or Diplomacy. As a result he is currently researcher or member of the following research networks_s

- 1. Researcher at European University Institute "La Corte en Europa" based in Autonomous University of Madrid.
- 2. Researcher at International Research Network "Columnaria", within the chapter of "Borgoña-Flandes" headed by Yves Junot (Valenciennes university) and Violet (KULeuven), which is devoted to transnational mobility and the government of Flanders and Burgundy within the Spanish Monarchy.
- 3. Researcher of the **European Society for Environmental** History that gathers hundreds of researches of Europe devoted to the study of Environmental History.

- 4. Researcher at **Instituto de Arqueologia e Paleociencias** of New University of Lisbon devoted to the study of the Portuguese cultural heritage.
- 5. Researcher of the **Portuguese Research Network of Environmental History** (REPORT(H)A in Portuguese) which was set up in 2015, being the chair based at Porto University.
- 6. Researcher of the **Institute of Contemporary History** based at New University of Lisbon within the workpackage "Economy, Society, Heritage and Innovation".
- 7. Researcher of **Premodern Diplomats** devoted to the study of Diplomacy.
- 8. Member of the Spanish Foundation of Early Modern History.
- 9. Member of the Network **Spanish Digital Humanities** (Humanidades Digitales Hispánicas in Spanish)

5. Scientific evaluations

He has been invited to evaluate articles for the scientific journals *International Journal of Historical Archaeology, Tiempos Modernos* and *Historia Autónoma*.

Dissemination Activities:

- As it has been shown above, he has written several single and joint articles, book chapters and reviews.
- In addition, he has written 3 blog entries with the purpose of bringing the research of the project to a broader audience.
- He has attended at international and national conferences of Nautical Archaeology, Environmental History, Archaeology, Maritime History, Political History or Diplomacy.
- He has given a lecture at New University of Lisbon.

Outreach Activities.

- He has given a lecture at New University of Lisbon within the Bachelor's degree of "Linguras, Literaturas, Culturas e Tradução" organized by the Research Institute "Estudos Ibéricos e Ibero-Americanos" (December 2016).
- He has given at oral presentation at Portuguese Archeologist assocation regarding the ocean-going ships of Portuguese Empire (January 23th 2017).
- He has published 3 blog entries within the ForSEAdiscovery blog with the purpose of bringing the research to a broader audience.
- As part of the ForSEAdiscovery project he has taken part in some activities of the project that were reported by the Media (especially newspapers).

Contributions towards Project Milestones / Deliverables:

Koldo Trápaga Monchet has conducted a multidisciplinary project within the ForSEAdiscovery project, contributing to the following **milestones** accordingly the Table B.4.1 of the project proposal.

- He has collected historical archival information that provides new insights regarding the construction (measures, construction contracts, tree species uses) of ships in Portugal.
- He has collected historical unknown data scattered in Portuguese, Spanish and English Archives and Libraries regarding the Portuguese royal forests that had provided oak, cork tree and maritime and stone pines for shipbuilding and ship reparation for Lisbon shipyards.
- He has created, together with Maria José García Rodríguez, GIS layers regarding the Portuguese forested areas.

He has contributed to the following **deliverables** of the project:

- He has collected data that contain information regarding the Portuguese forested areas that supplied timber for shipbuilding and ship reparations in Portugal.
- He is currently arranging all the information gathered in Archives to create an inventory of the tree species used in Portugal for shipbuilding (cork tree, both stone and maritime pine and cork oak).
- Together with Maria José García Rodríguez, he has created GIS layers regarding the Portuguese royal forests that supplied timber for shipbuilding.
- Together with other workmates he has worked on the identification of the Ribadeo shipwreck through a multidisciplinary approach (D. 2.3).

Career Development Plan Updated: 2017/03/31

Others (*Please include here other aspects you consider relevant, e.g., current position, application to other research grants, participation in other research projects...*):

Koldo Trápaga Monchet is currently a post-doctoral researcher at King University Juan Carlos, located in Madrid (Spain). He got a 4 year-contract of a call launched by the Autonomous Government of Madrid in June-July 2016, that pretended to get back to Spain "young research talent" (this was the name of the call. "Atracción de Talento Investigador"). He has been the only historian awarded with this contract, as a result of the very demanding selection process implemented by the call. Before being included within the selection process it was mandatory to get 85 over 100, a qualification that he could have not achieved without being involved within the ForSEAdiscovery Marie-Curie ITN network for the following reasons.

Firstly, it was required to be hired within a European Project (International). Secondly, the training he has received during his participation in the ForSEAdiscovery project has allowed Koldo Trápaga both to learn skills that are currently very demanded in the calls (GIS, background in other disciplines such as a dendrochronology or nautical archaeology) and being aware of the importance of disseminating the academic research to a broader public. Thirdly, the International mobility requirements specified in the call were fulfilled because he has been hired in Portugal. Fourthly, this project has meant a real milestone in his internationalization, not only because he has worked abroad, but also he has been included within new research networks and has published individual and joint papers with young and

well-known scholars. Last but not least, the fellow has gained confidence on himself and has improved his communication skills in such a way that he is going to teach two subjects in English that are not very connected to his background as historian (*Interculturality* and *Social History of Education*).

The current research project in which he is involved is related to the Cultural and Natural Heritage of the Spanish Monarchy, which includes the royal forests of Portugal during Iberian Union a topic that he worked during his involvement in Portugal within the ForSEAdiscovery project. As the project structure is very similar to the ForSEAdiscovery project (different partners, including private firms; multidisciplinarity), he has contributed not only with knowledge but also with expertise and skills that he gained during his involvement within the ForSEAdiscovery project.

As a result, Koldo Trápaga has received training and a background that allows him to apply (more or less successfully) to research calls funded by International public and private bodies as the European Union. In this sense, in May 2017 he has submitted a multidisciplinary project (bringing together historians of different fields and expertise, archaeologist and engineers) to a call of the Portuguese Private Foundation *Calouste Gulbenkian* as Leading Researcher, that unfortunately was not awarded.

In addition, during his participation within the ForSEAdiscovery project Koldo Trápaga has been involved in other 3 research projects related to the government of the Spanish and Portuguese Monarcies throughout early modern age. These projects were intertwined with his PhD, allowing him to better understand the political and administrative of both the Portuguese and Spanish Monarchies, including the fleets. These research projects have been a milestone to conduct the multidisciplinary personal research project he has conducted within ForSEAdiscovery. They have permitted him to understand how the Spanish Monarchy's fleets worked in all levels (administrative, economic, political and social), enabling him to find out the historical archival resources, that have been hitherto remained unknown, related both to the supply of timber for shipbuilding and the management of Portuguese royal forests in different levels. It has also permitted him to meet people that has contributed to the project by providing information.

MARTA

ForSEAdiscovery Project Marie-Curie ITN: Fellows Report Form

Personal details

Surname: *Domínguez Delmás* First Names: *Marta* Fellow Code: *ESR9* Working group: WP3 Host Institution: University of Santiago de Compostela Contract Start Date: 01/09/2014 Contract End Date: 31/08/2017

Ph.D. Activities

Registered for PhD: \Box

Date of defense: 17/11/2015

Institution: University of Huelva

Supervisors: Reyes Alejano Monge and Tomasz Wazny

Title: FOREST HISTORY, TIMBER SUPPLY AND TREE RINGS. A dendroarchaeological approach to the study of Iberian cultural heritage

Objectives:

Objective 1. Review of the current state and future prospects of dendroarchaeology in the Iberian Peninsula Objective 2. Development of chronologies from living trees Objective 3. Dendroarchaeological investigations of architectural heritage

Objective 4. Dendroarchaeological investigations of art-historic objects

Objective 5. Dendroarchaeological investigations of underwater archaeological heritage (shipwrecks)

Research outcomes/chapters:

Outcome objective 1:

Domínguez-Delmás, M., Alejano-Monge, R., Van Daalen, S., Rodríguez-Trobajo, E., Susperregi, J., García-González, I., Wazny, T., Jansma, E., **2015**. Forest history, tree-rings and cultural heritage: current state and future prospects of dendroarchaeology in the Iberian Peninsula. *Journal of Archaeological Science* **57**, 180–196.

Outcome objective 2:

Domínguez-Delmás, M., Alejano-Monge, R, Wazny, T., García-González, I., **2013**. Radial growth variations of black pine along an elevation gradient in the Cazorla Mountains (South of Spain) and their relevance for historical and environmental studies. *European Journal of Forest Research* **132(4)**, 635-652.

Outcome objective 3:

Domínguez-Delmás, M., Alejano-Monge, R, Wazny, T., *in review*. Timber resources, transport and wood-working techniques in post-medieval Andalusia (Spain): insights from dendroarchaeological research on historic roof structures. Journal of Archaeological Science.

Outcome objective 4:

Rodríguez-Trobajo, E., **Domínguez-Delmás, M., 2015**. Swedish oak, planks and panels: dendroarchaeological investigations on the 16th century *Evangelistas* altarpiece at Seville Cathedral (Spain). *Journal of Archaeological Science* **54**, 148–161. [Both authors contributed equally to this research and paper]

Outcome objective 5:

Domínguez-Delmás, M., Nayling, N., Wazny, T., V. Loureiro, Lavier, C., **2013**. Dendrochronological dating and provenancing of timbers from the *Arade 1* wreck, Portugal. *International Journal of Nautical Archaeology* **42(1)**, 118-136.

Contribution to deliverables of ForSEAdiscovery:

My whole PhD is relevant for the deliverables of WP3, as the outcomes of the objectives helped setting the sampling strategy of the work package.

ForSEAdiscovery activities:

Personal Research Project: Development and implementation of a tree-ring data network for the assessment of the date and provenance of Iberian ship-timbers

Personal Research Project Abstract:

This project focusses on the development of a much needed high-resolution tree-ring dataset of oak and pine from key areas of the Iberian Peninsula that supplied timber for shipbuilding from the 15th to the 18th centuries. Oak (Quercus robur, Q.petraea, Q. faginea, and Q. pyrenaica) and pine (Pinus sylvestris and P. nigra) forest stands were selected and sampled in the Cantabrian, Basque and Andalusian Spanish regions, as well as in the Central System (mountain range in the central part of the Iberian Peninsula, where wood may have been harvested in the past to supply the cities and harbours of Porto and Lisbon in Portugal). The chronologies form the living trees have been extended with timbers from historic buildings located in the vicinities of the selected forests. In this way, the researched sites have provided groups of contemporary samples and historic timbers representing known geographical areas, and covering from the present back to the 13th century in Andalusia, and the 14th century in the Basque Country. This datasets inform about environmental changes in the past 700 years due to natural and anthropogenic causes, and will serve to date and provenance historical wood (including shipwreck timbers) originating from those areas. Furthermore, in this project I have participated in testing new methodologies and statistical techniques to identify the provenance of historical timbers (e.g. latewood density in pine species; strontium stable isotopes; organic compounds in wood; hierarchical analysis; disturbance events), pursuing in this way a large cross section of my research interests.

Personal Research Project Progress Report: 2017/07/31

Sampling sites were selected according to the project objectives in the Cantabrian Mountains, Andalusia and the Central System. The sampling campaigns of living trees started in November 2014 and were concluded in March 2017, and the ones to sample timbers from historic buildings were carried out between November 2014 and October 2016. The lists of sampling sites, including the researched samples (<u>1,740 of them researched by me</u>), are presented in Tables 1, 2 and 3. Mayor accomplishments of Marta Domínguez Delmás up to date include:

- The development of an oak tree-ring dataset (including earlywood/latewood measurements for the living trees) for the north of the Iberian Peninsula, which consists of 18 monospecific and composite tree-ring chronologies of *Quercus robur, Q. petraea, Q. faginea, and Q. pyrenaica* developed from 15 sites (four sites in Asturias region, another four sites in Cantabria region, and seven sites on the Basque Country region) (Fig. 1, Table 1), and of 14 chronologies of *Quercus* sp. developed from timbers of 14 historic sites (standing buildings and roof planks discarded during renovation activities) (Fig. 1, Table 2). Some oak sites were discarded due to the short life of the trees or their extreme singularity (Table 1).
- The development of a pine (*Pinus nigra* and *P. sylvestris*) tree ring dataset for the Adalusian region and the Central System (Madrid region, and bordering province of Segovia, from Castilla-León Region). This dataset consists of five chronologies of *Pinus nigra* from the Cazorla and Segura Mountains, and five chronologies from the Central System, four of them of *P. sylvestris* and one of *P. nigra* (Fig. 1, Table 1). The data from the living trees has been complemented with the sampling of historic timbers in one building in Segovia province, and 12 buildings in the Andalusia region (Fig. 1, Table 2).

The oak chronologies developed in the north of Spain allowed the dating of most of the historic timbers, which allows the expansion of the chronologies from living trees to the 14th century with very good replication (Figure 1). The building from Segovia has also provided an interesting dataset that covers different periods, including the 16th century. In the Andalusian region however, only four buildings have been dated. The causes for this could be either the impossibility of crossdating the samples with the developed chronologies due to the occurrence of missing rings, or because the timbers originated from low elevations sites, which are represented by the developed chronologies only until the early 19th century. Nevertheless, the dated timbers have provided a valuable dataset that ranges from the 19th to the 12th century, covering the 13th century with very good replication (Fig. 1).

In addition to developing the reference datasets, I have also researched the samples collected for dendrochronological research from 11 shipwrecks and an archaeological structure found in Lisbon (Table 3).

From 4 December 2015 until 24 March 2016, I had a 16-week career interruption due to maternity leave, which has delayed my planning for the research of samples and preparation of articles.



Figure 1. Time span of the oak and pines chronologies developed by ESR9 (samples from DMK and UHS were measured by T. Wazny).

								Nr		
			Sampling					dendro	Nr samples	
	Region	Forest	date	Name forest	Genus	Species	Sampler*	samples	researched	
1	Andalucia	LSA	23-11-14	La Sagra	Pinus	nigra	MDD;MT;LA;FH	39	39	
2	Andalucia	NAV	24-11-14	Navanoguera	Pinus	nigra	MDD;MT;LA;FH	120	120	
3	Andalucia	LIN	25-11-14	Linarejos	Pinus	nigra	MDD;MT;LA;FH	93	93	
4	Basque	ALB	15-05-15	Sakana-Albaola	Quercus	unknown	MDD;MT;LA;FH	40	25	
	country								(15discarded)	
5	Navarra	ART	15-05-15	Artikutza	Quercus	robur	MDD;MT;LA;FH	12	Discarded	
6	Basque	OIR	18-05-15	Oiartzun	Quercus	robur	LA;FH;MT;PG	20	20	
	country									
7	Basque	UZK	19-05-15	Uzkanga	Quercus	unknown	LA;FH;MT;PG	20	20	
	country									
8	Basque	AZK	20-05-15	Azkorte	Quercus	robur	MDD;MT;LA;FH	14	14	
	country									
9	Basque	IBA	20-05-15	Ibarrola	Quercus	robur	MT;LA;FH;MDD	4	Discarded	
	country									
10	Andalucia	CBR	6-06-15	La Cabrilla	Pinus	nigra	MDD;PG;TW	78	49	
11	Andalucia	PMB	7-06-15	Poyos de la Mesa	Pinus	nigra	;TW;PG	34	34	
12	Basque	MUN	16-09-15	Munain	Quercus	NULL	LA;PG;FH	4	Discarded	

Table 1. Forests selected and samples researched by ESR9 Marta Domínguez Delmás.

	country								
13	Basque	OTE	16-09-15	Oteo	Quercus	faginea	LA;PG;FH	48	48
	country			-	-				
14	Basque	SVA	16-09-15	San Vicente de	Quercus	faginea	LA;PG;FH	50	50
1 -	Descus		17 00 15	Ardiid	••••			r	Discorded
15	Basque	BEO	17-09-15	Beoriaza	Quercus	petraea	LA;PG;FH	Z	Discarded
10	Descus		17 00 15	Zaluouolluo	••••	NII II I		40	40
10	Basque	100	17-09-15	JUBALXI	Quercus	NULL	LA;PG;FH	49	49
17	Basque	GOP	0_10_15	Gordoa	Quercus	notraoa		/10	10
1/	country	GON	9-10-13	Guidda	Quercus	μετιάεα	LA,FO,ITI	40	40
18	Segovia	ARF	11-07-16	Arroyo Frio	Pinus	sylvestris	MDD;MT;LA;PG;FH	115	115
19	Segovia	FFR	12-07-16	Fuenfria	Pinus	sylvestris	MDD;MT;LA;PG;FH	57	57
20	Segovia	ESP	15-07-16	Espinar	Pinus	sylvestris	MDD;MT;LA;PG;FH	32	32
21	Segovia	HDC	15-07-16	Hoyos del Collado	Quercus	petraea	MDD;MT;LA;PG;FH	21	Discarded
22	Segovia	NLB	15-07-16	Navafria las	Pinus	sylvestris	MT;LA;MDD;PG;FH	10	Discarded
				Barrigas					
23	Cantabria	BRR	25-09-16	Barrio	Quercus	pyrenaica	MDD;PG	45	45
24	Cantabria	ORT	25-09-16	Orticeo	Quercus	unknown	LA;PG	40	40
25	Cantabria	LAM	10-10-16	Lamedo	Quercus	pyrenaica	LA;PG	3	Discarded
26	Cantabria	ONQ	12-10-16	On Quemada	Quercus	petraea	LA;PG	30	30
27	Cantabria	MAA	13-10-16	Monte Aa	Quercus	robur	LA;PG	33	33
28	Cantabria	PDR	14-10-16	Pedroso	Quercus	robur	MDD;LA;PG	24	Discarded
29	Madrid	JRS	16-10-16	La Jarosa	Pinus	nigra	MDD;LA;PG;FH	91	91
	(Guadarrama)								
30	Cantabria	LTJ	6-11-16	La Tejera	Quercus	robur	MDD;PG	3	Discarded
31	Cantabria	AST	7-11-16	Astrana	Quercus	Pyrenaica	MDD;PG	40	Discarded
32	Asturias	MUS	7-03-17	Muniellos 1	Quercus	Petraea	IGG;LA;TW	46	46
33	Asturias	MUN	8-03-17	Muniellos 2	Quercus	Petraea	IGG;LA;TW	42	42
34	Asturias	MNL	9-03-17	Muniellos 3	Quercus	Petraea	MDD;LA;MT;TW	23	23
							Total	1330	1163
							(10/ 0	iscarueu	1

Table 2. Buildings selected and samples researched by ESR9 Marta Domínguez Delmás.

			Sampling					Samples	Samples
Nr	Region	Building	date	Building_name	Genus	Species	Id_Sampler*	collected	researched
1	Segovia	SEG	22-9-2014 /	Segovia cathedral	Pinus	spp.	MDD;NN	72	72
			JULY 2016						
2	Andalusia	GFD	18-11-14	Facultad de Derecho	Pinus	unknown	MDD;TW	31	31
3	Andalusia	LMD	19-11-14	The Madrasah	Pinus	unknown	MDD	2	0
4	Andalusia	GCR	19-11-14	Capilla Real	Pinus	unknown	MDD	3	3
5	Andalusia	GHR	19-11-14	Hospital Real	Pinus	unknown	MDD;TW;MT	16	16
6	Andalusia	IDS	21-11-14	Iglesia de Santiago	Pinus	unknown	MDD;TW;M1	5	5
7	Andalusia	TSD	21-11-14	Iglesia y convento de Santo Domingo	Pinus	unknown	MDD;TW;MT	14	14
8	Andalusia	CAB	22-11-14	Casa de los Abades	Pinus	unknown	MDD;TW;MT	۲ 13	13
9	Andalusia	CSF	22-11-14	Convento de San	Pinus	unknown	MDD;TW;MT	17	17

r								
				Francisco				
10	Basque Country	SCO	18-05-15	Hermita de San Cristóbal de Oraa	Quercusunknown	MDD	3	3
11	Basque Country	SMT	18-05-15	Iglesia de San Martin de Tours	Quercusunknown	MDD	6	6
12	Basque Country	ZLA	19-05-15	Hermita de La Antigua	Quercusunknown	MDD	4	4
13	Basque Country	CIG	20-05-15	lgartubeiti Museo	Quercusunknown	MDD	5	5
14	Andalusia	UHS	08-06-15	Iglesia Hospital de Santiago	Pinus unknown	PG;TW	22	22**
15	Andalusia	ULC	09-06-15	Palacio Don Luis de la Cueva	Pinus unknown	PG;TW	5	5
16	Andalusia	USL	09-06-15	Iglesia San Lorenzo	Pinus unknown	PG;TW	11	11
17	Andalusia	UCR	10-06-15	Casa Redonda	Pinus unknown	MDD;TW	25	25
18	Basque Country	ΟΤΟ	19-09-16	Iglesia de San Mamés	Quercusunknown	MDD;PG;TW	16	16
19	Basque Country	SVC	19-09-16	Iglesia de San Vicente	Quercusunknown	MDD;PG;TW	22	22
20	Basque Country	ARR	20-09-16	Iglesia de la Asunción	Quercusunknown	MDD;PG;TW	17	17
21	Basque Country	GRD	20-09-16	Iglesia de San Bartolomé	Quercusunknown	MDD;PG;TW	8	8
22	Basque Country	CVI	21-09-16	Santa María	Quercusunknown	MDD;PG;TW	2	2
23	Basque Country	SVT	21-09-16	Iglesia de Santa María	Quercusunknown	MDD;PG;TW	13	13
24	Basque Country	DMK	22-09-16	Iglesia de San Bartolomé	Quercusunknown	MDD;PG;TW	5	5
25	Basque Country	DOM	22-09-16	Iglesia de San Bartolomé	Quercusunknown	MDD;PG;TW	20	20**
26	Basque Country	JMT	22-09-16	Iglesia de San Martín deTours	Quercusunknown	MDD;PG;TW	9	9
27	Basque Country	ZRT	22-09-16	SanPedro	Quercusunknown	MDD;PG;TW	13	13
28	Basque Country	MAN	23-09-16	Unknown	Quercusunknown	MDD;PG;TW	15	15
29	Basque Country	MNG	23-09-16	Iglesia de San Martín de Tours	Quercusunknown	MDD;PG;TW	15	15
30	Cantabria	OGR	08-11-16	Iglesia de San Miguel	Quercusunknown	MDD;PG;TW	16	16
31	Cantabria	RIV	09-11-16	Iglesia de Nuestra Señora	Quercusunknown	MDD;PG;TW	25	25
						Total	450	448

*MDD: Marta Domínguez-Delmás; PG: Peter Groenendijk; LA: Linar Achmetzyanov; FH: Fadi Hajj; MT: Mohamed Traoré; TW: Tomasz Wazny; IGG: Ignacio García González; NN: Nigel Nayling.

Table 3. Shipwreck and other archaeological timbers researched by ESR9 Marta Domínguez Delmás, indicatingthe number of samples from different species found on each wreck/structure.

				Quercus subg. Quercus	Pinus sylvestris/nigra	Picea abies/Larix decidua	Abies alba	Conifer	Fagus sylvatica	Castanea sativa	Tropical	Others
Shipwreck	Location	Country	Company/Project									
Barreiros	Barreiros	Spain	ZETA Arqueologia	4								1
Delta I	Cadiz	Spain	CAS	22	3				1			
Delta II	Cadiz	Spain	CAS	35				3	2		4	5
Delta III	Cadiz	Spain	CAS/ForSEAdiscovery	6	1				2			
Yarmouth Roads	Isle of Wight	UK	Maritime Archaeology Ltd/ForSEAdiscovery	17								
Ribadeo	Ribadeo	Spain	Archeonauta/ForSEAdiscovery	36	2	З	2	1	1	2		1
Belinho	Belinho	Portugal	Belinho archaeologists/ForSEAdiscovery	12				2			3	
Paraça do Municipio	Lisbon	Portugal	ForSEAdiscovery	4								
Magdalena	Viveiro	Spain	Archeonauta/ForSEAdiscovery	17	4			1				
Cee 1	Cee	Spain	Archeonauta/ForSEAdiscovery	5				1				
Cee 2	Cee	Spain	Archeonauta/ForSEAdiscovery	3								
Bayonnaise	Bayonnaise Finisterre Spain Archeonauta/ForSEAdiscovery											
	171	10	3	2	8	6	2	7	7			

Secondments:

- 2 February 4 May 2015: three-month secondment at Wageningen University (Wageningen, The Netherlands) under the supervision of Ute Sass-Klaassen to carry out different activities (collaboration with ESR10 Linar Achmetzyanov testing blue intensity method to measure latewood density in conifers; working on proposal for DNA research on oaks; participation in outreach activities; collaborating in practical teaching; researching samples from pines and shipwrecks).
- 1-28 May 2016: one-month secondment at the University of Lampeter Trinity Saint Davis (Lampeter, UK) under the supervision of Nigel Nayling to train in GIS, research samples from the Yarmouth Road shipwreck and participate in the one-oak branch-stem analysis project.
- 16-27 January 2017: two-week secondment at the University of Lorrain (Nancy, France) under the supervision of Anne Poszwa to learn about geochemistry (isotopic research -strontium- and analysis of element composition in the wood).
- 24/04 24/06/2017: two-month secondment at CSIC (Madrid, Spain) under the supervision of Ana Crespo Solana to train in historical research and GIS applied to field and historical data.
- 13 and 17 July 2017: visiting Mohamed Traoré in Santiago de Compostela to analyse biomarkers in the wood (pyrolysis, FT-IR) of samples from Segovia cathedral.

Scientific outputs:

• Scientific articles and book chapters published, accepted and/or in review/revision (2014-2017)

- Domínguez-Delmás, M., Trapaga-Monchet, K., Nayling, N., García-González, I., in revision. Natural hazards and building history: roof structures of Segovia cathedral (Spain) reveal its history through tree-ring research. *Dendrochronologia*.
- Domínguez-Delmás, M., in review, Datación por Dendrocronología, in Barceló Álvarez, J.A. (Ed), Métodos cronométricos en arqueología e historia. Península Ibérica y Latinoamerica. DEXTRA Editorial.
- Martins, A.M., Almeida, A., Santos, A., Magalhaes, I., Castro, F., Bezant, J., Domínguez-Delmás, M., Nayling, N.,Groenendijik, P., in review, Reconstructing Trees from Ship Timber Assemblages Using 3D Modelling Technologies: Evidence from Belinho in Northern Portugal, in Proceedings IKUWA 6 conference, Fremantle, Australia.
- Eguiluz-Miranda, B., M., Domínguez-Delmás, M., Trapaga-Monchet, K., , San Claudio Santa Cruz, M., Gasch-Tomás, J.L., Crespo-Solana, A., in review, *The Ribadeo Shipwreck (c. 1600)* can we identify the ship through a multidisciplinary approach?, in Proceedings IKUWA 6 conference, Fremantle, Australia.
- Trindade, A.R., **Domínguez-Delmás, M.**, Traoré, M., Gallagher, N., Martins, A., Rich, S., in review, *From forests to the sea, from the sea to the laboratory: the Santa Maria Magdalena frigate*, in Proceedings IKUWA 6 conference, Fremantle, Australia.
- **Domínguez-Delmás, M.,** Alejano-Monge, R., Wazny, T., in review. Timber resources, transport and wood-working techniques in post-medieval Andalusia (Spain): insights from dendroarchaeological research on historic roof structures. *Journal of Archaeological Science*.
- Alejano-Monge, R., Wazny, T., Vázquez-Piqué, J., García-González, I., Domínguez-Delmás, M., in press. Bosques milenarios y patrimonio cultural en Andalucía: la dendrocronología como herramienta para estudiar las interacciones hombre-bosque en el Mediterráneo occidental, in Actas Congreso Forestal Español.
- Trouet, V., Domínguez Delmás, M., Pearson, C., Pederson, N., Rubino, D., in press, Dendroarcheo-ecology" in North America and Europe: re-purposing historical materials to study ancient human-environment interactions, in Amoroso, M., Baker, P., Camarero Martinez, J.J., Daniels, L. (Eds.), *Dendroecology: tree-ring analyses applied to ecological studies*, Springer (Accepted 26 January 2017).
- Sánchez-Salguero, R., Hevia, A., Camarero, J.J., Treydte, K., Frank, D., Crivellaro, A.,
 Domínguez-Delmás, M., Hellman, L., Kaczka, R.J., Kaye, M., *et al.*, 2017. An intensive treering experience. Connecting education and research during the 25th European Dendroecological Fieldweek (Asturias, Spain). *Dendrochronologia* 42, 80–93.
- Trouet, V., Harley, G.L., Domínguez-Delmás, M., 2016. Shipwreck Rates Reveal Caribbean Tropical Cyclone Response to Past Radiative Forcing. *Proceedings of the National Academy of Science* 113(12), 3169–3174, doi: 10.1073/pnas.1519566113
- Domínguez-Delmás, M., Alejano-Monge, R., Van Daalen, S., Rodríguez-Trobajo, E., Susperregi, J., García-González, I., Wazny, T., Jansma, E., 2015. Forest history, tree-rings and cultural heritage: current state and future prospects of dendroarchaeology in the Iberian Peninsula. *Journal of Archaeological Science* 57, 180–196.
- Rodríguez-Trobajo, E., Domínguez-Delmás, M., 2015. Swedish oak, planks and panels: dendroarchaeological investigations on the 16th century *Evangelistas* altarpiece at Seville Cathedral (Spain). *Journal of Archaeological Science* 54, 148–161.

• Scientific reports

- Domínguez-Delmás, M., García-González, I., 2015. Investigación dendrocronológica de maderas estructurales de la cubierta de la nave central de la Catedral de Segovia (Segovia, España). University of Santiago de Compostela unpublished report USC_2015001: 16 p.
- Domínguez-Delmás, M., García-González, I., 2015. Investigación dendrocronológica de maderas del pecio Barreiros (Lugo, España). University of Santiago de Compostela unpublished report USC_2015002: 8 p.
- Domínguez-Delmás, M., García-González, I., 2015. Investigación dendrocronológica de maderas del pecio Delta I (Cadiz, España). University of Santiago de Compostela unpublished report USC_2015003: 11 p.
- Domínguez-Delmás, M., García-González, I., 2015. Dendrochronological research of samples from the Yarmouth Roads shipwreck (England, United Kingdom). University of Santiago de Compostela unpublished report USC_2015004: 4 p.
- Domínguez-Delmás, M., García-González, I., 2015. Dendrochronological research of samples from the Ribadeo shipwreck (Galicia, Spain). University of Santiago de Compostela unpublished report USC_2015005: 11 p.
- Domínguez-Delmás, M., Groenendijk, P., García-González, I., 2015. Dendrochronological research of samples from the Belinho shipwreck (Esposende, Portugal). University of Santiago de Compostela unpublished report USC_2015006: 9 p.
- Domínguez-Delmás, M., García-González, I., 2015. Dendrochronological research of samples from Praça do Municipio (Lisbon, Portugal). University of Santiago de Compostela unpublished report USC_2015007: 6 p.
- Domínguez-Delmás, M., García-González, I., 2015. Dendrochronological research of samples from the Magdalena shipwreck (Galicia, Spain). University of Santiago de Compostela unpublished report USC_2015010: 11 p.
- Domínguez-Delmás, M., García-González, I., 2015. Dendrochronological research of samples from the Cee 1 shipwreck (Galicia, Spain). University of Santiago de Compostela unpublished report USC_2015011: 5 p.
- Domínguez-Delmás, M., García-González, I., 2015. Dendrochronological research of samples from the Cee 2 shipwreck (Galicia, Spain). University of Santiago de Compostela unpublished report USC_2015012: 3 p.
- Domínguez-Delmás, M., García-González, I., 2015. Dendrochronological research of samples from the Bayonnaise shipwreck (Galicia, Spain). University of Santiago de Compostela unpublished report USC_2015013: 4 p.
- Domínguez-Delmás, M., García-González, I., 2015. Investigación dendrocronológica de maderas del pecio Delta II (Cádiz, España). University of Santiago de Compostela unpublished report USC_2015014: 17 p.
- Domínguez-Delmás, M., Nayling, N., 2016. Investigación dendrocronológica de maderas del pecio Delta 3 (Cádiz, España). University of Santiago de Compostela unpublished report USC_2016001: 10 p.

Scientific Activities:

- Participation in scientific committees and organisation of congresses
 - 20–23 May 2015, Member of scientific committee of TRACE 2015 international conference, Tree Rings in Archaeology, Climatology and Ecology (Seville, Spain).

- 8–12 Sep 2014, Member of organising committee of Eurodendro 2014 international congress (Lugo, Spain).
- 8–12 Sep 2014, Member of scientific committee of Eurodendro 2014 international congress (Lugo, Spain).
- Participation in scientific international training fieldweeks
 - 31 Aug–6 Sep 2014, Instructor of Dendroarchaeology group at the European Dendroecological Fieldweek (Oviedo, Spain).

Training Activities:

- Attendance to courses or advanced seminars
 - 25-26 May 2016: Shipwrecks, Dendrochronology and Dendroprovenancing, University of Wales Trinity Saint David, Lampeter, UK (16 hours)
 - 12-16 October 2015: Application of Geographical Information Systems (GIS) to maritime history and archaeology, Centro de Ciencias Humanas y Sociales, Consejo Superior de Investigación Científicas (CSIC), Madrid, Spain (30 hours)
 - 6-8 May 2015: *Historiography and Archive Research*, Rijksuniversiteit Groningen, The Netherlands (15 hours)
 - 14-16 Jan 2015: *History of Wooden Shipbuilding & Books and treatises on Shipbuilding*, Centro de Ciencias Humanas y Sociales, Consejo Superior de Investigación Científicas (CSIC), Madrid, Spain (20 hours)
- Practical training in specific subjects during secondments and at my host institution:
 - o Historical research
 - o GIS applied to field and historical data
 - Analysis of biomarkers in the wood (pyrolysis, FT-IR...)
 - Use of R for statistical analyses of tree-ring data

Dissemination Activities:

Presentations at congresses, invited presentations and lectures (2014-2017)

- 16-20/10/17, Crespo-Solana, A., García-Rodríguez, M.J., García-González, I., Nayling, N., Gasch, J.L., Wazny, T., Groenendijk, P., Rich, S., **Domínguez-Delmás, M.**, San Claudio, M., Momber, G., *GIS application for an interdisciplinary project in History, Maritime Archaeology and Wood Provenance (ForSEAdiscovery)*, accepted poster presentation at the III International Conference of Hispanic Digital Humanities, Málaga, Spain.
- 7/09/17, **Domínguez-Delmás, M.**, Groenendijk, P., Wazny, T., Alejano-Monge, R., García-González, I., *Is dendrochronology enough to establish the date and provenance of Iberian shipwreck timbers?*, accepted oral comm. at the Eurodendro 2017 Conference, Tartu, Estonia.
- 7/09/17, Daly, A., **Domínguez-Delmás, M., Van Duivenwoorde, W.,** *Timber for Batavia***, accepted oral comm. at the Eurodendro 2017 Conference, Tartu, Estonia.**
- 7/09/17, Ważny, T., García González, I., Akhmetzyanov, L., Nayling, N., **Domínguez Delmás, M.**, Groenendijk, P., Crespo Solana, A., *The ForSEAdiscovery Project How wood powered the Iberian World Exploration*, accepted oral comm. at the Eurodendro 2017 Conference, Tartu, Estonia.

- 7-9/06/17, **Domínguez-Delmás, M**., Rodríguez-Ariza, M.O., Jiménez-Serrano, A., *Non-intrusive dendrochronological research reveals chronology of Egyptian coffins from Qubbet el-Hawa necropolis (Aswan, Egypt)*, oral comm. at the Second Vatican Coffin Conference, Rome, Italy.
- 06/06/2017, **Domínguez-Delmás, M**., *Dendrochronology and non-intrusive research in wooden supports*. Invited lecture at the course "Science for Curators–Paintings" organised by the Rijksmuseum, Amsterdam, The Netherlands.
- 30/03/2017, **Domínguez-Delmás, M.**, *Datación dendrocronológica de pecios en la Península Ibérica: estado de la cuestión,* invited lectura at University of Santiago de Compostela within the ARCH-BOT conferences, *Ciclo de conferencias en arqueoloxía e arqueobotánica*, Santiago de Compostela, Spain.
- 29/11/2016, Daly, A., **Domínguez-Delmás, M.**, Green, J., Van Duivenvoorde, W., *Timber for the Batavia*, Oral communication at IKUWA 6 conference, Fremantle, Australia.
- 29/11/2016, Martins, A.M., Almeida, A., Santos, A., Magalhaes, I., Castro, F., Bezant, J., Domínguez-Delmás, M., Nayling, N.,Groenendijik, P., , *Reconstructing Trees from Ship Timber Assemblages Using 3D Modelling Technologies: Evidence from Belinho in Northern Portugal*, Oral comm. at IKUWA 6 conference, Fremantle, Australia.
- 29/11/2016, Eguiluz-Miranda, B., **Domínguez-Delmás, M.**, Crespo-Solana, A., Gasch-Tomás, J.L., San Claudio Santa Cruz, M., Trapaga-Monchet, K., *The Ribadeo Shipwreck (c. 1600)—can we identify the ship through a multidisciplinary approach?*, Oral comm. at IKUWA 6 conference, Fremantle, Australia.
- 29/11/2016, Trindade, A.R., Martins, A., **Domínguez-Delmás, M.**, Traoré, M., Gallagher, N., Rich, S., 29/11/2016, *From forests to the sea, from the sea to the laboratory: the Santa Maria Magdalena frigate*, Oral comm. at IKUWA 6 conference, Fremantle, Australia.
- 10/11/2016, **Domínguez-Delmás, M.**, *Dendrochronology and non-intrusive research on half ship models'*, Invited lecture at the course "Ship model conservation: understanding techniques for research and conservation" organised by the Rijksmuseum, Amsterdam, The Netherlands.
- 28/05/2016, **Domínguez-Delmás, M.**, *Dendrochronology and shipwrecks in Iberia*, presentation at University of Trinity Saint David, Lampeter, Great Britain.
- 04/05/2016, **Domínguez-Delmás, M.**, *Dating and provenancing timbers from Iberian shipwrecks by dendrochronology: facing a major challenge*, lecture at seminar University of Trinity Saint David, Lampeter, Wales, United Kingdom.
- 15/04/2016, **Domínguez-Delmás, M.**, *Dendroarchaeology and dendroprovenance in the study of shipwrecks*, Invited presentation at Wood and Charcoal congress: Approaches from Archaeology, Archaeobotany, Ethnography and History, Braga, Portugal.
- 01/04/2016, **Domínguez-Delmás, M.**, Unravelling timber supply for shipbuilding in Atlantic Iberia in the Early Modern Period by dendrochronology, Oral comm. at 3rd Ameridendro Conference, Mendoza, Argentina.
- 05/12/2015, **Domínguez-Delmás, M.**, *Development and implementation of a tree-ring data network for the assessment of the date and provenance of Iberian ship timbers*, Poster presentation at mid-term meeting ForSEAdiscovery project held at Spanish National Research Council (CSIC-CCHS), Madrid, Spain.
- 30/04/2015, **Domínguez-Delmás, M.**, *Forest history and shipbuilding: developing a tree-ring network for provenancing oak and pine ship timber from Atlantic Iberia*, Invited presentation at Wageningen University and Research, Forest Ecology and Management group, Wageningen, The Netherlands.

- 23/04/2015, **Domínguez-Delmás, M.**, *Long-distance timber transport in Roman times: insights from a dendroarchaeological perspective*, Invited lecture at University of Cologne, Faculty of Arts and Humanities, Cologne, Germany.
- 12/01/2015, **Domínguez-Delmás, M.**, *Development and implementation of a tree-ring data network for the assessment of the date and provenance of Iberian ship-timbers*, Oral comm. at introductory meeting ForSEAdiscovery project held at Spanish National Research Council (CSIC-CCHS), Madrid, Spain.
- 11/12/2014, **Domínguez-Delmás, M.**, *Dendrocronología aplicada al estudio del Patrimonio: principios, aplicaciones y casos prácticos*, Invited lecture at Pontevedra Museum organised by the Restoration and Conservation School of Pontevedra, Pontevedra, Spain.
- 08/09/2914, **Domínguez-Delmás, M**., Rodríguez-Trobajo, E., *Swedish borne, planks and panels:* dendroarchaeological investigations on the 16th century Evangelistas altarpiece at Seville Cathedral (Spain), Oral comm. at Eurodendro congress 2014, Lugo, Spain.
- 08-12/09/2014, Crespo Solana, A., Domínguez-Delmás, M., García-González, I., Sass-Klaassen, U., Wazny, T., Nayling, N., Forest resources for Iberian Empires: ecology and globalisation in the Age of Discovery (ForSEAdiscovery, a Marie Curie ITN project), Poster presentation at Eurodendro congress 2014, Lugo, Spain.
- 03/09/14, **Domínguez-Delmás**, M., 'Crossdating and COFECHA', lecture at the European Dendroecological Fieldweek 2014, Oviedo, Spain.
- 02/09/14, **Domínguez-Delmás, M**., 'Introduction to Dendroarchaeology', lecture at the European Dendroecological Fieldweek 2014, Oviedo, Spain.

Outreach Activities:

- 17/02/15, Wood in the SPOTlight outreach event organised in the restaurant SPOT together with the department of Forest Ecology and Managementof the University of Wageningen, Wageningen, The Netherlands. Presentation about dendrochronological research on shipwrecks directed at a non-specialised audience.
- 07/09/14, Outreach day dedicated to present dendrochronological research and the ForSEAdiscovery project to the citizens of Lugo (Spain).

Contributions towards Project Milestones / Deliverables:

The results of my research (tree-ring data network and database), including the publications in preparation contribute directly to the objectives and deliverables **STO3** (characterisation of relevant oak and pine species by means of tree-ring width, earlywood and latewood measurements), **STO4** (organisation of the timber supply for shipbuilding), **STO5** (producing an article with guidelines for archaeologists about how to sample shipwrecks for dendrochronological research), and **STO6/D3.1** (providing a database of dendrochronological results for the ship timbers, buildings and forests researched during the project).

Career Development Plan Updated: 2017/07/31

Due to the delay I have had in the analysis of samples caused by my 16 week maternity leave from December 2015 until March 2016, and given that my ESR contract will not be extended proportionally, my short term objectives are focussed on concluding the publications I had planned since the beginning of my contract to achieve an excellent publication record focused on dendroarchaeology and methods for wood provenancing, but including considerable evidences of a multidisciplinary background. Planned publication include:

• Domínguez-Delmás, M., Van Daalen, S., (García-Ginzález, I.?), in prep. Dendrochronological dating of historical barns in the Ancares mountains (NW Spain).

• Domínguez-Delmás, M., Rich, S., Daly, A., Nayling, N., Haneca, K., in prep. Selecting and sampling shipwreck timbers for dendrochronological research: practical guidelines.

• Domínguez-Delmás, M., García-González, I., in prep. Sapwood statistics for estimating felling dates of oak timbers in the Cantabrian Mountians (Spain).

• Domínguez-Delmás, M., in prep. Dendrochronological research on shipwrecks in the Iberian Peninsula: current state and future prospects.

• Domínguez-Delmás, M., Achmetzyanov, L., (Groenendijk, P.?), García-González, I., in prep. A treering data network of oak and pine for provenancing studies in the Iberian Peninsula.

- Article about the buildings in the Basque Country
- Joint article WP3 fellows

•Article about growth releases in the Cazorla and Segura mountains in relation to historical logging events.

• Articles collaborating as coauthor with the other members of WP3 and other ForSEAdiscovery fellows.

Alongside the publications, I am preparing proposals for different programs to get a post-doctoral position to continue my line of research in dendroprovenancing. I aim to achieve a curriculum that will help me get an ERC Starting Grant and/or, eventually, other position that allow me to create my own research group at some European research institute or university.

Others (Please include here other aspects you consider relevant, e.g., current position, application to other research grants, participation in other research projects...):

- Parallel projects I am collaborating or have collaborated with in the past three years:
 - A multi-scale and uncertainty approach for the analysis of the aging of timber art objects adhesively bonded by animal glues (submitted on 21 July): project submitted by Dr. Emanuela Bosco, (Eindhoven University of Technology, Department of the Built Environment, The Netherlands) to the NICAS program of the Netherlands Organisation for Scientific Research (NWO). In this project I am a member of the advisory board.
 - Dendroprovenancing in Japan, ongoing project undertaken by Dr. Motonary Ohyama (Botanical Gardens, Tohoku University, Sendai, Japan) who has been collaborating with me and Dr. Ignacio García González through a six month internship (1 March - 31 August 2017) supported by the program KAKENHI(Fostering Joint International Research, grant number 15KK0032).
 - Qubbet el-hawa project (2013- 2018): collaborative project between the University of Jaen (Spain) and the Egyptian Ministry of Antiquities (Egypt), coordinated by Dr. Alejandro Jiménez Serano (University of Jaen). My collaboration consists on assisting archaeobotanist Dr. Oliva Rodríguez Ariza (University of Jaen) with the dendrochronological research of the coffins they find at the necropolis.
 - National Geographic Society (Waitts Grant W329-14) project Millennia old black pines and Andalusian cultural heritage to unravel human-environment interactions in the Western Mediterranean (September 2014-July 2016). As coapplicant I have had a major contribution to the design and execution of this project, which has consisted on the collection of samples

from living trees and historic buildings in the Andalusian region that have contributed to the dataset achieved within the ForSEAdiscovery project.

- My research in the media (radio, digital and printed newspapers):
 - Trouet, V., Harley, G.L., Domínguez-Delmás, M., 2016, Shipwreck Rates Reveal Caribbean Tropical Cyclone Response to Past Radiative Forcing, PNAS 113(12), 3169–3174. doi: 10.1073/pnas.1519566113 reached an impressive media impact, featuring in more than 30 news items around the globe in two weeks after publication on 7 March 2016. Digital and printed media included some of the most influential newspapers and online science media such as <u>The Washington Post (http://tinyurl.com/juqf3np)</u>, <u>The Conversation</u> (http://tinyurl.com/zxcrk2u), <u>Archeology magazine</u> (http://tinyurl.com/jfx73yx), <u>Accuweather.com (http://tinyurl.com/hwkr25w)</u>, <u>Atlas of Science</u> (http://tinyurl.com/jl7zt9w), <u>Science News</u> (https://tinyurl.com/znxpmzd), <u>Christian Science</u> Monitor (http://tinyurl.com/hyukr55), Daily Mail (https://tinyurl.com/zr7ujoq), <u>Heritage</u> Daily (https://tinyurl.com/hj5ff5b), <u>Europa Press</u> (Spain) (https://tinyurl.com/glq8xxg), <u>El</u> País (Spain) (http://tinyurl.com/j2vvzdr), <u>El Español</u> (Spain) (https://tinyurl.com/jxc6qfv), <u>De</u> Morgen (Belgium) (<u>http://tinyurl.com/zb5ykmx</u>), <u>News Tonight Africa</u> (https://tinyurl.com/zavpsat), etc.
 - The National Geographic Project that run parallel to the ForSEAdiscovery from September 2014 till July 2016 and where I was coapplicant received media attention of local news in 2016 (<u>Huelva Buenas Noticias http://tinyurl.com/yanjtwex</u>), and national coverage in 2017 (<u>Noticias Cuatro http://tinyurl.com/ybo4mp36; El País http://tinyurl.com/y8pnbbyg; ABC http://tinyurl.com/yaam2784; <u>El Español http://tinyurl.com/ya6bnhk8</u>, etc).
 </u>
- Fellowships or other funding programs applied for:
 - Marie Curie Individual Fellowships (deadline 14 September 2017), proposal in preparation.
 - Discovery Early Career Researcher Award (DECRA), Australian Research Council (submitted on 22 March 2017). Project title: Need or greed? Timber, globalisation, and climate in the First Global Age (c. 1400-1800 CE) (DE180100881), supported by The Flinders University of Southern Australia. Requested funding ARC \$418,105 AUD, with a top-up contribution from The Flinders University of \$155,766 AUD. The DECRA will be resolved in September/October 2017.
 - Juan de la Cierva Formación, Ministerio de Economía, Industria y Competitividad; FJCI-2016-28013 (submited in January 2017). Program resolved in June 2017: I made it to the list, but ended in position 49 out of 63, only the first 23 got granted.
- Teaching activities
 - 07/03/17: teacher of subject *Dendrocronología* at Máster de Arqueología Náutica y Subacuática Universidad de Cádiz. Hours of teaching: 4.
 - 18-19/03/15: assistant in the practical course on Forest Ecology for Master students at Wageningen University, The Nethelands. Hours of teaching: 16.

ESR10 Linar Akhmetzyanov

Host Institution. Wageningen University and Research

Contract Start Date: 20/08/2014

Contract End Date: 20/08/2017

Ph.D. Activities

Registered for PhD: 🛛

Date of defense: Not defined yet

Institution: Wageningen University and Research

Supervisors: Prof. dr. ir. GMJ (Frits) Mohren , Dr. UGW (Ute) Sass-Klaassen, Prof. Dr. Ignacio García González, Dr. ir. J (Jan) den Ouden

Title: Provenancing of oak and pine wood from Atlantic Iberia by application of wood anatomical analyses

Objectives:

Explore potential of xylem anatomical features of oak and pine for dendroprovenancing

Research outcomes/chapters:

- 1. Oak earlywood vessels as indicators of microclimate site conditions
- 2. Change of climatic signal from tree-rings to maximum latewood densities (MLD) of two different pine species
- 3. Potential of genetic analyses for specie identification and provenancing of archaeological oak timber

Contribution to deliverables of ForSEAdiscovery:

- 1. Tree-ring database including records on wood-anatomical characteristics of oak and pine species from Atlantic Iberia reaching back to at least the 15th century
- 2. The longest oak earlywood vessel chronologies and their potential for dendroprovenancing
- Potential of MLD for provenancing and application of method in the study case of Segovia cathedral
- 4. Method for genetic analyses of archaeological wood and potential of it for haplotype analyses for further provenancing purposes

ForSEAdiscovery activities.

Personal Research Project : Application of ecological wood anatomy for species determination and wood provenancing of oak and pine from Atlantic Iberia

Personal Research Project Abstract:

This project aims to study xylem structure of Iberian pine and oak species, intensively used for shipbuilding, to add to already existing time-series and to use them for provenancing of ship timber. Studied earlywood vessels from four oak species from Northern Spain and maximum latewood density of two pine species from Central and Southern Spain. State-of-the-art approaches were used to build long time-series from anatomical. Potential of xylem features for provenancing will be done by statistic comparison of tree-ring widths time series with chronologies built from the wood-anatomical features of corresponding tree species. In addition, samples from living trees and shipwrecks underwent genetic analyses in order to identify species used for specific parts of the ships.

This study is among the first using xylem features for provenancing purposes, and will provide substantial input for dendroprovenancing studies.

Personal Research Project Progress Report. 2017/08/04

Chapter 1. Review paper- "Potential of long chronologies of wood-anatomical variables (WAV) for Dendroprovenancing". Left aside due to the need of delivering results for the ForSEAdiscovery. Needs input from supervisory team.

Chapter 2. Oak paper – "Long vessel chronologies of Iberian oaks for improving precision of Dendroprovenancing". At the moment all of the measurements for this chapter are finished. Work was a little bit delayed due to the unexpected inclusion of an additional site into the analyses (Muniellos). Decision of inclusion of the additional site was made for benefits of the ForSEAdiscovery. Preliminary statistical analyses of the data has been done.

Chapter 3. Pine paper – "Ultra-long maximum latewood density chronologies of Iberian pine species (P. nigra, P. sylvestris) for high-precision provenancing of ship timber". All samples are prepared for the analyses. Measurements have been started by June 2017. Work is still in progress.

Chapter 4. DNA paper – "Application of DNA techniques to improve precision of provenancing of Iberian oak timber used in ship building". All needed materials are available.

Trials of extracting genetic material from historical timber (old buildings) is planned for autumn 2017. Delays in this chapter were caused by uncertainties in availability of the genetic laboratory and availability of the collaborators.

Secondments.

Secondment #1

Date: from 11 May 2015 to 29 May 2015

Place: University of Santiago de Compostela, Lugo campus, Spain

Objective: Widening of knowledge and learning new methods in quantitative wood anatomy

Secondment #2

Date: from 03 June 2016 to 29 July 2016

Place: University of Santiago de Compostela, Lugo campus, Spain

Objective: Improving skills in wood-anatomical analyses of ring-porous tree species (Quercus

spp.)

Secondment #3

Date: from 16 January 2017 to 27 January 2017

Place: Université de Lorraine, Nancy, France

Objective: Acquisition of knowledge and methodology on geochemical fingerprinting of

potential source areas of wood from shipwrecks

Scientific Activities.

Data acquisition of.

- a. Oak earlywood vessels
- b. Pine TRW and MLD

Sampling campaigns.

- a. Sampling campaign Pinus Nigra, Andalusia, Spain, November 2014.
- b. Sampling campaign shipwreck, Cádiz, Centro de Arqueología Subacuática,
- c. Universidad de Cádiz, February 2015
- d. Sampling Campaign, Quercus spp. Basque Country, Spain, May 2015.
- e. Sampling campaign, Quercus spp. Basque Country, Spain, October 2015
- f. Sampling campaign, Pinus Sylvestris, Central System, Spain, July 2016

Supervision.

- a. Master student (finish year 2017)
- b. Intern student (finish year 2017)

Training Activities.

1. ForSEAdiscovery: INTENSIVE TRAINING COURSE:

History of Wooden Shipbuilding & Books and treatises on Shipbuilding (Madrid, Spain)

2. ForSEAdiscovery: INTENSIVE TRAINING COURSE:

Application of Geographic Information System (GIS) to Maritime History and Archaeology (Madrid, Spain)

- 3. ForSEAdiscovery: INTENSIVE TRAINING COURSE:
 - Historiography and Archive Research (Groningen, The Netherlands)
- 4. training course (Rijksuniversiteit Groningen (Groningen, The Netherlands)
- 5. Basic statistics course, Wageningen, The Netherlands
- 6. Training School: Quantitative Wood Anatomy: from sample to Data, Zurich, Switzerland
- 7. The Essentials of Scientific Writing and Presenting course, Wageningen, The Netherlands
- 8. Statistics in Dendrochronology, Freising, Germany
- 9. Workshop "R Fundamentals in Dendrochronology", TRACE 2017
- 10. Workshop "Detecting Climate-Growth Relationships by Use of the Statistical Analysis Tool CLIMTREG", TRACE2017

Dissemination Activities.

Oral presentation in the European Dendroecological Fieldweek 2014

Poster presentation in the EuroDendro 2014

Oral presentation in the TRACE 2017

Outreach Activities.

Participation/Organization of DendroWorkshop 2015 in WUR

Contributions towards Project Milestones / Deliverables.

1. The longest oak earlywood vessel chronologies and their potential for dendroprovenancing

3. MLD and TRW pine chronologies and their potential for provenancing with further application of method in the study case of Segovia cathedral

4. Method for genetic analyses of archaeological wood and potential of the method for further provenancing purposes

Career Development Plan Updated: 2017/08/04 Career Development Plan-Final year

BRIEF OVERVIEW OF PROGRESS, ACHIEVEMENT AND PERFORMANCE (half page should be sufficient).

LONG-TERM CAREER OBJECTIVES (over 5 years):

Application either for individual Postdoc position (personal proposal) or join ongoing project with Postdoc position available

SHORT-TERM OBJECTIVES ACHIEVED DURING THE TRAINING PERIOD:

- 1. Research results
- o Publications (incl. in press):

Outline of the first publication

- Conference, workshop attendance, courses, and /or seminar presentations.
 Dendroecological fieldweek 2014, Eurodendro 2014, TRACE 2017
- 2. Research Skills and techniques acquired.
- o Training in specific new areas, or technical expertise etc.

Basic Statistics: refreshing course; Quantitative Wood Anatomy: from Sample to Data, Introduction in R; Introduction in CLIMTREG;

- 3. Research management:
- o No
- 4. Communication skills:

Essentials in Scientific Writing and Presenting; Spanish language courses

5. Other professional training (course work, teaching activity).

Supervision of the Master Student

- 6. Anticipated networking opportunities TRACE2018
- 7. Other activities (community, etc) with professional relevance.

ESR11 Mohamed Traoré

Host Institution: Universidade de Santiago de Compostela Contract Start Date: 10/01/2014 Contract End Date: 30/09/2017 *Ph.D. Activities* Registered for PhD: Yes □ Date of defense: 24/11/2017 Institution: Universidade de Santiago de Compostela Supervisors: Antonio Martínez Cortizas and Joeri Kaal Title: Identification of Potential biomarkers of provenance of the wood from Iberian typology shipwrecks (15th to 17th centuries) Objectives:

- Establishing methodologies for wood characterization (living tree and shipwreck samples) using FTIR and Py-GC-MS; and collecting living tree samples in referenced Iberian forests.
- Processing innovative methodologies for wood provenance biomarkers identification.
- Publishing obtained results, production of a geochemical database for Iberian shipwrecks and forest woods.

Research outcomes/chapters:

Paper 1. Application of FTIR spectroscopy to the characterization of archeological wood
Paper 2. Identification of *Pinus nigra* and *Pinus sylvestris* by analysis on FTIR spectra.
Paper 3. Potential of pyrolysis-GC-MS molecular fingerprint as a proxy of Modern Age Iberian shipwreck wood preservation.

Contribution to deliverables of ForSEAdiscovery:

Paper 1. Deliverable 3.2Paper 2. Deliverable 3.3Paper 3. Deliverable 3.2

ForSEAdiscovery activities.

Personal Research Project :

Personal Research Project Abstract:

This research develops within the framework of the European ForSEAdiscovery project and focuses on the study of wood from Iberian shipwrecks and living trees (pine and oak) from referenced forest in Iberian Peninsula; wood which was predominant for the European expansion during the Age of Discovery and European expansion. The aim is to contribute to the project by providing a better understanding of history and science through the chemical composition of wood. Fourier-Transform Infrared-Attenuated Total Reflectance (FTIR-ATR) spectroscopy and Py-GC/MS are two powerful analytical techniques that are known to be useful to characterize wood. Using these analytical techniques attention will be paid to the organic components that remain in archaeological wood. Moreover, the application of multivariate statistical analyses to data produced with these techniques may allow getting insights into wood structure and molecular composition.

Personal Research Project Progress Report: 2017/07/31

Secondments.

- Introduction to dendrochronology and wood anatomy at the Wageningen University, from the 26th of October to the 15 of December 2015.
- Introduction to wood strontium measurement at Laboratoire Interdisciplinaire des Environnements Continentaux (LIEC) at Université de Lorraine, from 06th 17th of June 2016.

Scientific Activities.

Publications.

- Application of FTIR spectroscopy to the characterization of archeological wood (SPECTROCHIM ACTA A. 153 (2016) 63–70).
- Potential of pyrolysis-GC-MS molecular fingerprint as a proxy of Modern Age Iberian shipwreck wood preservation (J. ANAL. APPL. PYROL. 126 (2017) 1–13).

Training Activities.

- ITN-Project (PITN-GA-2013-607545) Training course. "History of Wooden Shipbuilding and Books and treatises on Shipbuilding", January 14-17 2015 (20 h workload) held in CSIC Madrid, by Prof. Dr. Filipe Castro (TAMU).
- ITN-Project (PITN-GA-2013-607545) Training course. "Historiography and Archive Research", May 6-8 2015 (15 h workload) held in University of Groningen, by Dr. Jan Willem Veluwenkamp (RUG).
- ITN-Project (PITN-GA-2013-607545) Training course. "Application of Geographic Information System (GIS) to Maritime History and Archaelogy", October 13-16 2015 (30 h workload) held in CSIC Madrid, by Dr Jemma Bezant (UWTSD).
- ITN-Project (PITN-GA-2013-607545) Training course. "Dendrochronology and Wood Anatomy", December 9-11 2015 (15 h workload) held in Wageningen University by Dr. Ute Sass-Klaassen (WU).
- Advanced statistical course, during the worshop of advanced statistic applied to geochemistry, September 2016, University of Aberdeen.

Dissemination Activities:

- Oral presentation of the ESR11 within the ForSEAdiscovery project, CSIC Madrid 13th January 2015.
- Oral presentation of the work plan of the ESR11 within the ForSEAdiscovery project, workshop organized in the department of soil science and agricultural chemistry-Universidad de Santiago de Compostela, 11th May 2015
- Lecture during the dendro-workshop "Wood chemistry supporting tree ring analysis";
 Wageningen University 09th of December 2015.
- Lecture during the dendro-workshop "Results and integrating approach from the WP3 within ForSEAdiscovery"; Wageningen University 11th of December 2015.
- Oral presentation to the MidTerm meeting "Wood, books written in an organic language"; CSIC Madrid 18th of December 2015.
- Oral presentation at Wood and Charcoal. Approaches from Archaeology, Archaeobotany, Ethnography and History International Meeting, April 15th 2016 in Braga (Portugal).
- Oral presentation of the ForSEADiscovery project with Fadi Hajj at Laboratoire Interdisciplinaire des Environnements Continentaux (LIEC) at Université de Lorraine, June 2016.
- Oral presentation at the CMA4CH meeting, December 2016, Sapienza University of Rome.

Outreach Activities: (Works in progress)

Differentiation between oak samples according to species and growing locations: this work is about FTIR and Py-GC/MS data from the oak species in the Iberian Peninsula.
 FTIR spectra recorded: >500, Py-GC-MS currently recording >150 samples (finalized by the end of March 2017). This work is within the framework of the Deliverable 3.3.

- Assessment diagenesis in the shipwreck samples: the biggest pyrolysis databases of shipwreck samples will be produced in order of evaluate the degradation processes undergone on shipwreck samples. FTIR and Py-GC-MS everything measured, data interpretation in process. This work is within the framework of the **Deliverable 3.4** (Protocol for an integrated approach, (tree rings, biomarkers, isotopes) to maximise the precision of wood provenancing.)
- Identification of biomarkers for species and provenances for shipwreck samples. This will be based on the "correction" of shipwreck wood composition for diagenesis followed by identification of wood species and hopefully predictions on the growing location of ship timbers. This work is within the framework of the **Deliverable 3.2**.

Contributions towards Project Milestones / Deliverables. **Paper 1.** Deliverable 3.2 **Paper 2.** Deliverable 3.3 **Paper 3.** Deliverable 3.2 And upcoming works contributing to project deliverables

Career Development Plan Updated: 2017/07/31

BRIEF OVERVIEW OF RESEARCH PROJECT AND MAJOR ACCOMPLISHMENTS EXPECTED (half page should be sufficient).

This thesis focuses on wood from Iberian shipwrecks and living tree (pine and oak) woods from Iberian forest available by ForSeaDiscovery teams. Potential biomarkers in these two kinds of wood may allow determination of the provenance of Iberian shipbuilding timber. Fourier-transform infrared- attenuated total reflectance (FTIR-ATR) and pyrolysis coupled to gas chromatography and mass spectrometry (Py-GC/MS), are two powerful analytical methods. They will be applied for characterization of living tree woods and archaeological woods. Through these analytical techniques much attention will be paid to the main organic compounds in wood materials (cellulose, hemicellulose and lignin) that have been characterized in archaeological wood.

This work is based on the following steps:

- Analysis by FTIR and Py-GC/MS of wood sampled from Iberian forests that may have been the source of shipbuilding timbers.
- Analysis by FTIR and Py-GC/MS of wood from Iberian shipwreck.

• Data analysis using multivariate statistic for a synthetic characterization of wood composition, and the selection of potential wood markers.

LONG-TERM CAREER OBJECTIVES (OVER 5 years):

- 3. Goals:
 - Evolution in the field of environment geochemistry and developing skills as expert.
 - Lecturer and researcher at university environmental geochemistry and hydrology for sustainable management of water and forest resources.
- 4. What further research activity or other training is needed to attain these goals?
 - Expend collaboration with researcher (met at conferences or known from referenced publications) in the working discipline (geoscience).

SHORT-TERM OBJECTIVES (1-2 years):

- 1. Research results
 - Anticipated publications
 - Geochemical characterization of oak living tree woods
 - Geochemical characterization of shipwreck timbers (identification of compound with less degradation undergo by the conservation conditions related to the environment and the period).
- 2. Research Skills and techniques:
 - Training in specific new areas, or technical expertise etc.
 - Training in multivariate statistic methods that are the main way to get detailed information from data provided by the analytic techniques (for database managing by statistical analysis method (regression, PCA, HCA, ANOVA and also modeling.).
 - Training in advanced interpretation of FTIR and Py-GC-MS data.
- 3. Research management:
 - Fellowship or other funding applications planned (indicate name of award if known; include fellowships with entire funding periods, grants written/applied for/received, professional society presentation awards or travel awards, etc.)

4. Communication skills:

Publications, poster, presentation at seminars, conferences focused on organic geochemistry analytical spectroscopy

- 5. Other professional training (course work, teaching activity):
 - Participation in educational activities at university in the period 2017-2018
- 6. Anticipated networking opportunities

Collaboration with fellows of WP3 to publish an article on pinewood from Segovia cathedral and living trees

ESR12 Fadi Hajj

Host Institution: University of Lorraine

Contract Start Date: 01/09/2014

Contract End Date: 31/08/2017

Ph.D. Activities

Registered for PhD:

Date of defense: 14/11/2017

Institution: University of Lorraine

Supervisors: Anne Poszwa

Title: Use of stable and radiogenic strontium isotopes to trace the provenance of wood. Application on wood from shipwrecks

Objectives:

Determine the provenance of wood from shipwrecks using geochemical tracers:

- Determine the geochemical and Sr isotopic signature of Spanish potential sites for wood provenance
- Retrieve the original signature of wood from shipwrecks waterlogged in seawater
- Trace the provenance of wood from shipwrecks by comparing its original signature to that from the potential sites

Research outcomes/chapters:

The thesis will be written in French and will include three articles to be published in peer reviewed journals.

• Article 1: Radiogenic and "stable" strontium isotopes in provenance studies: a review and first results on archaeological wood from shipwrecks (Fadi Hajj, Anne Poszwa, Julien Bouchez and François Guérold)

The revised version of the manuscript was submitted to Journal of Archaeological Science

Article 2: Species-dependent fractionation of stable Sr isotopes during tree uptake (Fadi Hajj, Anne Poszwa, Julien Bouchez, Danièle Bartier and François Guérold)
In preparation, will be submitted to Geochimica et Cosmochimica Acta in August 2017

Article 3: Decontamination of waterlogged archaeological wood for dendroprovenance studies (Fadi Hajj, Anne Poszwa, Julien Bouchez, Danièle Bartier and François Guérold)

In preparation, will be submitted to Journal of Archaeological Science in October 2017)

The dissertation manuscript is in writing phase. The expected submission date of the thesis manuscript to the doctoral school of Lorraine is September 2017.

To be noted that there is a project of an article integrating the results of all the fellows in the WP3. This article will present combination of the different methodologies used by the WP3 researchers to trace the provenance of archaeological wood.

Contribution to deliverables of ForSEAdiscovery.

- Create a geochemical database of element composition and strontium isotopic ratios in oak and pine trees from the Iberian Peninsula.
- Create an extraction protocol to remove the contamination by seawater elements and retrieve the original signature of wood from shipwrecks

ForSEAdiscovery activities,

Personal Research Project: Geochemical fingerprinting of potential source areas of wood from shipwrecks

Personal Research Project Abstract.

In the Early Modern Age (16th-17th centuries), the construction of ocean-going ships was paramount to the development of cultural encounters in what became the Age of Discovery and European expansion. Spain was one of the biggest forces of that time.

The European project "ForSEAdiscovery" seeks answers in this context to the following key questions. Could Iberian forest resources sustain the increasing demand of sound timber, or were the wood imported from elsewhere? If so, how were the trade networks organized? This project will address these questions through a multidisciplinary and innovative training research program to improve the understanding of our historical past, our cultural heritage, and our knowledge of the use of resources for shipbuilding.

The objective of this PhD thesis (ESR 12), taking part of the project, is to identify the provenance of the Iberian shipbuilding wood. The hypothesis is that trees growing on contrasted rocks and soils have specific geochemical signatures, which can be an indicator of geographic provenance. For this, geochemical tracers (Sr isotopes, major and trace elements contents) were used and measured in shipwreck woods and actual Spanish forests (living trees, local soils and geological materials).

We characterized the link between rocks, soils and trees on Spanish potential sites. We found that Sr isotope ratios in trees reflect the signature of the corresponding soil exchangeable pool. We measured the local signature of Spanish potential sites for provenance of wood. We identified the contamination of wood from shipwrecks by seawater elements. We created a protocol to extract the seawater elements and retrieve the original signature of the archaeological wood. We succeeded to retrieve the original signature of one wood sample while most of the other shipwreck samples showed no conservation of original Sr in their wood.

Personal Research Project Progress Report: 2017/07/28

• Article 1: Radiogenic and "stable" strontium isotopes in provenance studies: a review and first results on archaeological wood from shipwrecks (Fadi Hajj, Anne Poszwa, Julien Bouchez and François Guérold)

The revised version of the manuscript was submitted to Journal of Archaeological Science

 Article 2: Species-dependent fractionation of stable Sr isotopes during tree uptake (Fadi Hajj, Anne Poszwa, Julien Bouchez, Danièle Bartier and François Guérold) In preparation, will be submitted to Geochimica et Cosmochimica Acta in August 2017

• Article 3: Decontamination of waterlogged archaeological wood for dendroprovenance studies (Fadi Hajj, Anne Poszwa, Julien Bouchez, Danièle Bartier and François Guérold)

In preparation, will be submitted to Journal of Archaeological Science in October

2017)

- Article 4: Article integrating the results of all the fellows in the WP3 in order to elaborate a maximum precision methodology for wood provenance (in preparation)
- Oral communication at the Goldschmidt 2017 conference in Paris: Mass-dependent fractionation of strontium isotopes by tree uptake (Fadi Hajj, Anne Poszwa, Julien Bouchez, Danièle Bartier and François Guérold)
 Abstract accepted for oral presentation (August 2017)

Secondments:

Secondment achieved #1

Date: from 11 May 2015 to 29 May 2015

Place: University of Santiago de Compostela, Lugo campus, Spain

Objective: Acquisition of knowledge and methodology on wood anatomy and dendrochronology for provenance studies

Tasks achieved and knowledge acquired.

- Theory on wood anatomy and dendrochronology
- Acquiring knowledge on the different softwares used commonly for wood anatomy

- Sample preparation
- Measurement of samples

Comments:

Learning about wood anatomy helped me to widen my knowledge on the wood science and certainly helped for a better understanding of my own research project

Secondment achieved #2

Date: from 03 October 2016 to 19 October 2016

Place: University of Santiago de Compostela, Santiago campus, Spain

Objective: Acquisition of knowledge and methodology on organic analyses for provenance studies

Tasks achieved and knowledge acquired.

- Theory on organic analysis (FTIR-spectroscopy and Pyrolisis-GC/MS)
- Sample preparation
- Measurement of samples using FTIR-spectroscopy
- Statistical treatment of the results using SPSS software

Comments:

During this secondment I acquired the necessary knowledge about the organic analyses methods and their application in provenance studies

Secondments hosted

- Date: from 6 June 2016 to 17 June 2016
 - Concerned fellows: Mohamed Traoré (ESR11)
- Date: from 14 November 2016 to 25 November 2016 Concerned fellows: Peter Groenendijk (ER3)
- Date: from 16 January 2017 to 27 January 2017

Concerned fellows: Marta Dominguez-Delmas (ESR9) and Linar Akhmetzianov R10)

(ESR10)

The fellows prepared and worked on real samples. They learned:

- The precautions and the safety measures to be taken during practical work
- The procedures to be followed while working in a 'clean room' for isotope separation
- The methodology used for measuring element contents and Sr isotope ratios in wood

Scientific Activities.

Participation to the workshops of the ForSEAdiscovery project

- Workshop W1 (Madrid Spain, January 2015). Communication and Presentation Skills
- Workshop W2 (Wageningen The Netherlands, December 2015): Scientific communication and multidisciplinary team-work
- Workshop W3 (Lampeter Wales, May 2016): Advanced team and project management
Training Activities.

Participation to the courses of the ForSEAdiscovery project

- Training courses C1 and C2 (Madrid Spain, January 2015): History of wooden shipbuilding
 Books and treatises on shipbuilding
- Training course C3 (Groningen The Netherlands, Mai 2015): Historiography and archive research
- Training course C4 (Madrid Spain, October 2015): Geographic Information Systems
- Training course C5 (Wageningen The Netherlands, December 2015): Dendrochronology and wood anatomy
- Training course C6 (Lampeter Wales, Mai 2016):
 Dendroarchaeology of ships practice and prospect

Participation to courses of the doctoral school of Lorraine RP2E (Ressources, Procédés, Produits Environnement)

- Participation to a training course organized by the doctoral school of Lorraine University on the development of the capacity in public communication and management (November 2015)
- Participation to conferences and workshops organized by the doctoral school of Lorraine University on how to mobilize our connections and prepare for a job interview (February 2017)
- Participation to courses organized by the doctoral school of Lorraine University on the security and accident prevention during lab work (June 2017)

Dissemination Activities:

Seminars and presentations

- November 2014 Presentation during the LIEC laboratory seminar (Nancy, France)
- January 2015 Presentation during the meeting of the ForSEAdiscovery project (Madrid, Spain)
- June 2015 Poster communication at the LIEC doctoral conference presenting the PhD objectives, methods and results (Nancy, France)
- December 2015 Seminar as part of the course on dendrochronology and wood anatomy (Wageningen, The Netherlands)
- December 2015 Mid Term Report: Presentation of the advances and the latest results in the PhD (Madrid, Spain)
- January 2016 Poster presentation during the annual meeting of the University of Lorraine Doctoral School (Nancy, France)
- April 2016 Oral communication during the LIEC DOCDAY (Metz, France)

• October 2016 – Presentation for the hosting team during the secondment on organic analyses (Santiago de Compostela, Spain)

Outreach Activities.

ForSEAdiscovery blog

• March 2016 – ForSEAdiscovery blog entry on the objectives and the methodology used during my PhD

Presentation at international conference

 August 2017 – Oral communication at the Goldschmidt 2017 conference in Paris: Mass-dependent fractionation of strontium isotopes by tree uptake (Fadi Hajj, Anne Poszwa, Julien Bouchez, Danièle Bartier and François Guérold) Abstract accepted for oral presentation

Contributions towards Project Milestones / Deliverables:

- We created a geochemical database of element composition and strontium isotopic ratios in oak and pine trees from the Iberian Peninsula.
- We characterized the link between rocks, soils and trees on Spanish potential sites and determined the source of Sr for trees (which is the soil exchangeable pool).
- We identified the contamination of wood from shipwrecks by seawater elements and created a protocol to extract these elements in order to retrieve the original signature of the archaeological wood.
- We succeeded to retrieve the original signature of one wood sample while most of the other shipwreck samples showed no conservation of original Sr in their wood.
- We are working on integrating the results of all the fellows in the WP3 in order to elaborate a maximum precision methodology for wood provenance (Paper in preparation)

Career Development Plan Updated: 2017/07/28

BRIEF OVERVIEW OF RESEARCH PROJECT AND MAJOR ACCOMPLISHMENTS EXPECTED

In the Early Modern Age (16th-17th centuries), the construction of ocean-going ships was paramount to the development of cultural encounters in what became the Age of Discovery and European expansion. Spain was one of the biggest forces of that time.

The European project "ForSEAdiscovery" seeks answers in this context to the following key questions. Could Iberian forest resources sustain the increasing demand of sound timber, or were the wood imported from elsewhere? If so, how were the trade networks organized? This project will address these questions through a multidisciplinary and innovative training research program to improve the understanding of our historical past, our cultural heritage, and our knowledge of the use of resources for shipbuilding.

The objective of this PhD thesis (ESR 12), taking part of the project, is to identify the provenance of the Iberian shipbuilding wood. The hypothesis is that trees growing on contrasted rocks and soils have specific geochemical signatures, which can be an indicator of geographic provenance. For this, geochemical tracers (Sr isotopes, major and trace elements) were used and measured in shipwreck woods and actual Spanish forests (living trees, local soils, geological materials, rainwater).

We characterized the link between rocks, soils and trees on Spanish potential sites. We found that Sr isotope ratios in trees reflect the signature of the corresponding soil exchangeable pool. We measured the local signature of Spanish potential sites for provenance of wood. We identified the contamination of wood from shipwrecks by seawater elements. We created a protocol to extract the seawater elements and retrieve the original signature of the archaeological wood. We succeeded to retrieve the original signature of one wood sample while most of the other shipwreck samples showed no conservation of original Sr in their wood.

LONG-TERM CAREER OBJECTIVES (OVER 5 years).

- 5. Goals:
- Get an academic position as a Researcher or Associate professor in a university.

- Participate in the creation of a team regrouping geologists and environmental researchers at the Lebanese University.

- 6. What further research activity or other training is needed to attain these goals?
- Find a post-doctoral position after the PhD.
- Get an experience in teaching.

- Participate in management training

* To learn to work in a team and to communicate and discuss with other colleagues.

* To supervise a group of scientific researchers.

SHORT-TERM OBJECTIVES (1-2 years).

- 7. Research results
 - Anticipated publications:

– Publication 1: Radiogenic and "stable" strontium isotopes in provenance studies: a review and first results on archaeological wood from shipwrecks (Fadi Hajj, Anne Poszwa, Julien Bouchez and François Guérold)

(Revised version submitted to Journal of Archeological Science)

– Publication 2: Species-dependent fractionation of stable Sr isotopes during tree uptake (Fadi Hajj, Anne Poszwa, Julien Bouchez, Danièle Bartier and François Guérold)

(In preparation, will be submitted to Geochimica et Cosmochimica Acta in August 2017)

- Publication 3. Decontamination of waterlogged archaeological wood for dendroprovenance studies (Fadi Hajj, Anne Poszwa, Julien Bouchez, Danièle Bartier and François Guérold)

(In preparation, will be submitted to Journal of Archaeological Science in October 2017)

- Anticipated conference, workshop attendance, courses, and /or seminar presentations.
- Participation to the three workshops of the ForSEAdiscovery project
 - * Workshop W1 (Madrid Spain, January 2015): Communication and Presentation Skills
 - * Workshop W2 (Wageningen The Netherlands, December 2015): Scientific communication and multidisciplinary team-work
 - * Workshop W3 (Lampeter Wales, May 2016): Advanced team and project management

Participation to a training course organized by the doctoral school of Lorraine University on the development of the capacity in public communication and management (November 2015)
Participation to conferences and workshops organized by the doctoral school of Lorraine University on how to mobilize our connections and prepare for a job interview (February 2017)

- Participation to courses organized by the doctoral school of Lorraine University on the security and accident prevention during lab work (June 2017)

- Participation to international meetings (oral communication if possible)

* Oral communication at the Goldschmidt 2017 conference in Paris: *Mass-dependent fractionation of strontium isotopes by tree uptake (Fadi Hajj, Anne Poszwa, Julien Bouchez, Danièle Bartier and François Guérold)*

Abstract accepted for oral presentation (August 2017)

- Local presentations.

* Presentation of the PhD context, objectives and methods during the LIEC laboratory seminar (Nancy, France, November 2014)

* Presentation of the first PhD results during the meeting of the ForSEAdiscovery project (Madrid, Spain, January 2015)

* Poster communication at the LIEC doctoral conference presenting the advances and the latest results in the PhD (Nancy, France, June 2015)

* Mid Term Report: Presentation of the advances and the latest results in the PhD (Madrid, Spain, December 2015)

* Seminar as part of the course on dendrochronology and wood anatomy (Wageningen , The Netherlands, December 2015)

* Poster presentation and article in French required by the University of Lorraine Doctoral School (RP2E, Nancy, France, January 2016)

* Oral communication during the LIEC DOCDAY (Metz, France, April 2016)

* Presentation for the hosting team during the secondment on organic analyses (Santiago de Compostela, Spain, October 2016)

- Participation in short documentaries

8. Research Skills and techniques:

• Training in specific new areas, or technical expertise etc.

- Training to perform geochemical preparation of samples in a clean room and to be able to do isotopic analysis on a mass spectrometer and MC-ICP-MS (November 2014)

- Formation on Geographic Information Systems (GIS) and cartography techniques (Lampeter, Wales, May 2016)

- Trainings of the project.

* Training courses C1 and C2 (Madrid - Spain, January 2015):

History of wooden shipbuilding

Books and treatises on shipbuilding

* Training course C3 (Groningen – The Netherlands, May 2015):

Historiography and archive research

* Training course C4 (Madrid - Spain, October 2015):

Geographic Information Systems

* Training course C5 (Wageningen - The Netherlands, December 2015):

Dendrochronology and wood anatomy

* Training course C6 (Lampeter - Wales, May 2016):

Dendroarchaeology of ships - practice and prospect

9. Research management:

 Fellowship or other funding applications planned (indicate name of award if known; include fellowships with entire funding periods, grants written/applied for/received, professional society presentation awards or travel awards, etc.) - Application for a postdoctoral position on the use of strontium isotopes and/or other isotopic tools and elements for provenancing studies (wood provenance and/or provenance of other materials).

10. Communication skills:

- Techniques of writing reports, scientific articles and short notes.

- Techniques of oral presentation to spread information, ideas and innovative concepts in academic meetings and general public conferences.

11. Other professional training (course work, teaching activity):

- To have an experience in teaching courses.

12. Anticipated networking opportunities

Create a long-term interdisciplinary network and working relationships to facilitate discussions, exchange of knowledge, advices, technical facilities and development of new scientific projects.

13. Other activities (community, etc) with professional relevance.

Management of own career progression.

Others (Please include here other aspects you consider relevant, e.g., current position, application to other research grants, participation in other research projects...):

Searching for a post-doc position on the use of strontium isotopes and/or other isotopic tools and elements for provenancing studies (wood provenance and/or provenance of other materials)

Nathan1 SEPTIEMBRE 2015 1 MARZO 2017 1 SEPTIEMBRE 2016

Nathan Gallagher – Work Package 1 – ESR13 – Summary of ForSEAdiscovery activities

Results and Publications

- Gallagher, Nathan. "A Methodology for Estimating the Volume of Baltic Timber to Spain Using the Sound Toll Registers: 1670-1806." *International Journal of Maritime History*. Vol. 28 No. 4. Nov, 2016. (Accepted, Forthcoming)
- Abstract: The Sound Toll Registers Online project has opened a trove of information for historians, but calculating the actual volume of Baltic trade in the early modern era remains a challenge. Attempts have been made for products that were measured in weight or volume, but timber products are necessarily excluded from these methodologies since they were usually recorded by the amount of pieces in a ship's cargo. Different timber products varied greatly in size, so the amount of pieces is not useful for determining the volume of timber transported via the Danish Sound. Here I propose an approach for estimating the volume of this particular share of Baltic trade using the Iberian Peninsula as a case study. Such an estimate can be done with a fair degree of confidence by dividing distinct products and assigning them predictable dimensions. First, the process of converting the amount of timber pieces into volume is discussed. I then discuss the possibilities and problems with estimating tonnage. The paper concludes with a discussion of the problems and limitations of this methodology.

Contribution to "From forests to the sea, from the sea the laboratory: the *Santa Maria Magdalena* frigate in the ForSEAdiscovey project" to be presented at IKUWA 6 Conference (November-December, 2016) by Ana Rita Trindade. Proceedings to be published.

Abstract: Driven by the increased demands on seafaring defense, the Spanish Crown launched the Santa Maria Magdalena frigate from the Esteiro shipyard of Ferrol (Galicia) in 1773. After nearly 40 years of naval service, she wrecked in a storm in the bay of Viveiro, not far from her origin, as part of an Anglo-Spanish squadron against the French occupation during the Peninsular Wars of Santoña (Santander). In June 2015, the project ForSEAdiscovery (Forest Resources for Iberian Empires: Ecology and Globalization in the Age of Discovery) organized an underwater timber sampling campaign on this shipwreck site. Through various wood provenance studies (i.e. dendrochronology, inorganic and organic chemistry), combined with historical research in national archives and international sources such as the Sound Toll Registers, the ship's timbers promise to shed light on late 18th c. Spanish naval construction, forestry practices, and timber supply in relation to shipbuilding in northern Spain. As a highly interdisciplinary project, ForSEAdiscovery integrates research fields in the Humanities and Life Sciences; therefore, this paper presents the joint efforts of historians, archaeologists and wood scientists to determine 1) what kinds of trees were used to construct which parts of the Santa Maria Magdalena, 2) their eventual provenance, 3) the timber trade networks and state management involved in supplying lumber to the Ferrol shipvard, and 4) best-practice methodologies conclusions. to reach these

Historical explanation of trends in the Sound Toll Registers. (Draft, to be submitted)

Abstract: While many of the states in Europe that received Baltic timber show a similar, gradual rise of imports starting in the 1720s and increasing throughout the eighteenth century,

Spain shows a unique and dramatic explosion of imports between the 1740s and 1750s. Typical explanations for this kind of shift, such as local supply shortages, increased price of local production, or decreased price of imports, are insufficient to explain the sudden and dramatic increase seen for Spain. Rather, this appears to be a result of intensified forest regulation by the Spanish navy in 1748 that particularly effected builders outside of the military. This is demonstrated by quantitative data from the Sound Toll Registers, analyses from secondary historiography, and examination of purchases by the Spanish Navy during the decades in question.

I hereby confirm that the scientific results I obtained are available to the project for the use and benefit of other researchers and in the case that I should use these data in a publication, I will refer to the ForSEAdiscovery project.

All research notes are contained in the online notebook here: <u>https://1drv.ms/o/s!AugJGut1VzeegY1_8IlsoG5QdcXb9A</u>

Secondments

CSIC Madrid, 29 February – 29 April, 2016:

The primary focus of this secondment was to collect documents pertaining to timber from the section of *Tribunal Mayor de Cuentas*, a record of naval department purchase receipts from the *Archivo General de Simancas*. Ana Rita Trindade and I focused on the Cadiz department, and were able to collect a complete series from the 1730s through the 1770s, with some gaps due to inaccessible *legajos* in the series of interest. While not in the archives, I focused on familiarizing myself with those photocopies of documents that were already ordered and received by Ana Rita Trindade. As such, I was able to experiment with tabulating these receipts and putting them into a small database for the years of 1770-4 in the *El Ferrol* naval arsenal. This was relevant to a collaborative case study that is being prepared for presentation at the IKUWA6 conference in Western Australia at the end of November and beginning of December 2016. I created a successful database of this information that was able to be successfully cross-referenced with the Sound Toll Registers. This allowed me to write my full contribution to the case study presentation.

University of Wales Trinity Saint David, 2-27 May: ArcGIS course:

This short secondment of three weeks was used to build a skill set in ArcGIS, with the intention of displaying some information from the Sound Toll Registers on GIS maps. I feel this was successful, as I was able to produce proportional maps, both static and animated, of the exports of timber from the Baltic region to Spain. These maps will be made available to the other members of the project for use in blog entries or publications with the understanding that I will be credited for creating them.

Conferences & Meetings Attended

- Intensive Training Course in GIS & Database, October, 2015, CSIC Madrid, Spain
- Sound Toll Registers Conference, October 2015, Antwerp, Belgium
- Intensive Workshop in Dendrochronology, December, 2015, Wageningen, Netherlands
- ForSEAdiscovery mid-term meeting, December, 2015, CSIC Madrid, Spain (Presented research)
- Intensive Workshop in Dendroarchaeology of Ships, May, 2016, Lampeter, Wales (Presented research)

Other Activities

- Access database training, October, 2015
- Private course in advanced Access database techniques, November 2015
- Entry for ForSEAdiscovery Blog: "Digital Humanities: Navigating a Sea of Data."

Post-Project Activities

- Education:
 - o teamtreehouse.com
 - November 2016 January 2017
 - Self-guided learning in computer programming
 - Completed tracks in Web Design, Front-End Development, Full-Stack JavaScript, Python
 - o Master of Information Science, Indiana University, Bloomington, IN, USA
 - Began January 2018
 - Specialization in Digital Humanities
 - Expected Graduation: December 2019
- Employment:
 - Temporary Clerical Positions, Kelley Services
 - February, 2017 July 2017
 - Web Services Support Support Specialist, Indiana University University Information Technology Services, Bloomington, IN, USA
 - January, 2018 Present

Career Plans

I have recently entered the Master of Information Science program at Indiana University, which is one of the top ten programs for Information Science in the United States. I will be specializing in Digital Humanities with the goal of becoming a digital humanities consultant at an American university. These positions are often employed through university libraries and require an American Library Association (ALA) accredited Master of Library Science or Master of Information Science. The focus of these positions is to help researchers incorporate digital and interdisciplinary methods into their projects. The training I received during my time in the ForSEAdiscovery project has prepared me well for the rigors of this program.

Signature of Supervisor:

ESR14 Selina Emma Ali

Host Institution: UWTSD Contract Start Date: 01/08/2016 Contract End Date: 31/01/2018

ForSEAdiscovery activities.

Personal Research Project: Digital data compilation and accessible archives. Developing models for sustainable research data.

Personal Research Project Abstract:

The aim of this particular fellowship is to design, create, and submit a digital archive of the project. In order to do this a workflow must be established to produce an archive design and deposition plan for data that has been generated by this project. The archive design will be made in compliance of a Historic Environmental Data Archive centre (DAC), such as the Marine Environmental Data and Information Network (MEDIN) and the Archaeology Data Service (ADS).

Personal Research Project Progress Report: 2017/07/31

Data Deposition: Test trials have been undertaken with two different data deposition centres, the Digital Collaboratory for Cultural Dendrochronology (DCCD) and the Archaeological Data Service (ADS).

DCCD:

A test upload was initially done with dendro data from the Normans Bay Wreck in order to understand and test the DCCD guidelines. This upload was done following the steps published by the DCCD work team. The main complication with the DCCD is its meta-database, called tridabase, which uses a very old version of 32 bit Access which can only currently be opened on very old computers.

Once a sufficient understanding was obtained of the DCCD recommended methods, myself and Marta Dominguez Delmas (ESR9) began to experiment with the FSD data to try and create a faster and more efficient way of uploading large quantities of data. This was done while on secondment in Lugo. The experiments were undertaken using the software PAST 5 to attempt to upload directly to the DCCD website by exporting in the tricycle format that is required by the website. This was partially successful. It allows us to skip the tridabase step, however it does not understand samples with multiple radii measured. This could potentially be a problem for some of the data from FSD. Additionally the DCCD allows the upload of supporting documentation, so it was discussed that we could use mean curves for the samples that were uploaded, and upload a .txt file with the raw measurements as supporting documentation. A training exercise was done to understand the ADS deposition process using the Severn Estuary Levels Research Committee's (SELRC) back catalogue of journals. 22 Volumes were included in this exercise, 17 of which were not available digitally, and instead only existed in print form. Every article was scanned individually, OCR'ed, and the metadata was uploaded following the ADS guidance into an excel file. The final work was submitted to the SELRC and is currently in the process of the final upload. Completion of this exercise gave the researcher a fuller understanding of what type of metadata and file format data needs to be coded in.

Archiving digital models.

Research has been ongoing about the best way to store and share the 3D digital models produced by the project. The best solution found so far has been to create 3DPDFs which can be shared and interrogated by any user with a basic adobe PDF reader. These 3D models are created using a software called Tetra4D Enrich. Unlike the website Sketchfab, a major online sharing platform, the digital models created by Tetra4D are not hosted on the internet, and can be enhanced with metadata and 3D attributes. This is done using XML coding and .CSV tables created in excel. Research is still ongoing with the most streamlined workflow for this software. Once a workflow is established, it will be transcribed as a clearly laid out, interactive training manual.

Secondments.

Lugo Spain 9–13 January 2017: research was undertaken with two major objectives in mind. The first objective was to look at an expedited way to upload dendro data onto the DCCD, in the hopes of creating a workflow that bypasses the use of Tridabase, option instead for doing everything in Past 5 dendro software.

The second objective was to look at the structure and content of WP3's entries into the FSD database.

Both objectives were met. A new workflow was created with Marta Dominguez Delmas (ESR 9) using Past 5 to successfully upload data onto the DCCD. The second objective was met after a long meeting with Ignacio García González and Peter Groenendijk (ER1), where minor structural changes were made to the database. Most notable of these changes is the addition of a Sub Sample number for the Sub-Sub-samples that are taken by WP3. This leads to a longer string, but a clearer picture of what data is being presented. An example of the new character string is as follow T-ALB01-002S-01S-001.

Scientific Activities.

3D PDFs

Research is ongoing to find the best workflow for creating 3DPDFs, which is seen as one of the best way of archiving the digital models created by the project. Tetra 4D Enrich is the best software to create 3D PDFs however the documentation behind the software is thin. Immediate problems that were solved with the help from the developers include the ability to include

special characters, common in both Spanish and Portuguese in the model, and the best way to create .CSV files from the excel datasheets created by the project.

Diving Activities

Two weeks of commercial diving were completed with the Maritime Archaeology Trust, in the Solent, UK. The diving activities were on the site Bouldnor Cliff and various WWI wrecks around the Solent. The diving work gave further experience in challenging environments and at various depths, including a new personal depth record set at 43 M. This work aided in the understanding of the working dive set up of the ForSEAdiscovery project, and of our associated partner institution, and gave insight into HSE diving protocols, as personal previous experience has only been in commercial Swedish and Danish protocols.

Reporting Activities

Ahead of writing individual site reports for the Galicia campaign in 2015, new templates were made for the project. The templates include a word document template, which follows earlier reports written by WP 2. A template was created to show archaeological site plans, and to showcase digital models made from photogrammetry for all the wrecks. Several cover pages were also created for the final reports. This proved a useful exercise in gaining experience in various professional software's such as Adobe InDesign and Adobe Illustrator

Drafts have been created for each site visited during the Galicia campaign, the most current draft being the third. Drafts of the final report, including appendices, have been made, and new vector site plans have been created where possible using the underwater photogrammetry. These site reports were made with the help of Benat Eguiluz Miranda (ESR 5).

A walkthrough is currently being created in Adobe InDesign for the software Tetra 4D Enrich. The aim for this walkthrough is to create a document that can take a user through the creation of a sophisticated, enhanced 3D PDF without the user having to have any background in coding or 3D modelling. Work on this is ongoing, and is expected to be tested and finalised by the end of the month.

Digital Work

Assistance was given to both UWTSD based fellows in the best way to create, enhance, and troubleshoot 3D digital models using the software Rhino 3D. This included the best way to create digital solids, troubleshooting modelling problems, and creating digital models following the instruction of the fellows.

Training Activities.

The follow section is broken up into sub sections that details the types of training received thus far as part of this fellowship.

Digital Training.

This includes the use of professional packages such as the Adobe Suite, notably Adobe Fuse, Adobe InDesign, Adobe Illustrator, Adobe Photoshop, and ArcGIS. Free, open source software training has also been provided for programs such as Blender 3D, Unreal Engine, and Unity 3D, through an ongoing subscription to a digital artist training website CG Cookie. This training has focussed on digital mesh modelling, digital sculpting, animation, game creation, and editorial work, and graphical design.

Proficiency in Blender especially has aided in creating engaging videos for dissemination for the project, and proficiency in the Adobe Suite has helped create a professional looking, high quality reports for the project.

A workflow has been tested and developed for archaeologists to go from Rhino 3D into Blender to create realistic texturing and animation. However a more streamlined workflow for texturing is currently being explored and developed using the Algorithmic software suite, notably Substance Designer and Substance Painter.

A partnership has been forged with the Game Design and Animation departments at the host university UWTSD. A pilot study is forthcoming to try and create immersive digital environments for archaeological sites. Immersive and experiential digital environments will be created for both underwater archaeological sites and land based sites. The act of diving, the various underwater conditions will be modelled to re-create for members of the public the feeling of being underwater with the aid of a VR headset (an HTC Vive and an Occulus Rift). The land based site will start in how an archaeological site looks like today, and will slowly go into the past to demonstrate how the site might have looked at its height. The Ribadeo Shipwreck (ES), a WWI wreck from the Solent (UK), and the Monks Mound at Cahokia (U.S.) will be used for the pilot study. Results of this study will be completed by the end of this fellowship, and will hopefully be presented at e the SHA 2018, a major archaeological conference located in New Orleans, LA, USA.

Personal digital recording skills have been polished using the FaroArm and Rhinoceros software through the recording of timbers from Llanllyr excavation in West Wales and the East Williamston Church Timbers from Pembrokeshire, Wales. This work has also led to some early attempts of piecing together a site reconstruction of Llanllyr using the Faro drawings. A photogrammetry workshop was attended with Dr. Kotaro Yamafune and the 3DMAPPA project in Australia during IKUWA VI that provided a deeper insight into working with the photogrammetric software Agisoft Professional. This has enhanced personal skills in photogrammetric recording. These skills are now being used with the Llanllyr project. Fieldwork Training.

Land or inter-tidal based training opportunities have been offered while being at the host university. This included work in August 2016 in the Hebrides, and work recently in July 2017 on the foreshore in Kent, England UK. This had provided an excellent training opportunity to work in different environments, each with different challenges. The focus of both fieldwork session was aimed at sampling archaeological ship timbers and prehistoric trees for dendro analysis. This provided training in the correct way to select, sample, package, label, and handle dendro samples. It also provided safety training for the best way to work in difficult environments, whether they be a peat bog in the Hebrides, or the foreshore in Kent.

Dissemination Activities.

A YouTube video was produced with the help from Adolfo Miguel Martins (ESR 6) that presented a digital dive through the site. This was produced using the software Blender 3D. This can be found here: https://www.youtube.com/watch?v=Y1TkkxaWhpY&t=8s

The creation of site reports and 3D PDFs for dissemination to the public is ongoing, and very near completion.

Outreach Activities:

Talks about the project, and the researcher's particular role in the project have been given around the world and to a variety of different audiences. Most of the talks are to university audiences, to fellow colleagues, lecturers, and both Undergraduate/postgraduate students through the form of research seminars at the host institution UWTSD.

The project has also been presented to middle school aged children (ages 11-13) and high school aged children (16-18) at schools located in the Greater Los Angeles area, California, USA.

Contributions towards Project Milestones / Deliverables:

Myself and Benat Eguiluz Miranda (ESR 5) have drafted the individual site reports (D 2.3) for the Ribadeo Wreck, the Bayonnaise and Cee wreck, and the Magdalena Wreck. It is currently on the third draft.

A digital element of the ship term glossary is ongoing, with coding and .CSV trials in Tetra 4D Enrich. The template has been finalised, and a few more timbers need to be modelled on the digital model being used as illustration.

Career Development Plan Updated: 2017/07/31

BRIEF OVERVIEW OF RESEARCH PROJECT AND MAJOR ACCOMPLISHMENTS EXPECTED (half page should be sufficient).

Research Project. Digital data compilation and accessible archives. Developing models for sustainable research data.

This research forms a part of the ForSEAdiscovery project, a larger European project that made up of both early stage researchers and experienced researchers who are united in a goal to research the history and archaeology of Iberian trade networks, shipbuilding, wood biology, forestry management, and dendro-archaeology. The aim of this particular fellowship is to design, create, and submit a digital archive of the project. In order to do this a workflow must be established to produce an archive design and deposition plan that is acceptable and clearly laid out for all of the research members involved in this project. The archive design will be made in compliance of a Historic Environmental Data Archive centre (DAC), such as the Marine Environmental Data and Information Network (MEDIN) and the Archaeology Data Service (ADS).

A methodology will be created once key information is identified through discussions with the researchers working throughout the project. The result of these discussions should include selecting and formatting digital datasets and the creation of useful metadata that will be included with all the datasets, complete with agreed upon filenames and formats, ultimately leading to a final archival creation and deposition. This project will also examine dynamic ways of public engagement with digital data, data access, and effective publications using DACs and associated publishers (e.g. internet archaeology). It also hopes to lay the foundation for a methodology for future projects and help in the long term goal to create sustainable data repositories that are easily searchable and accessible.

The major outcome by the end of this fellowship will be a completed archive published with an acceptable DAC, which is comprised of datasets from across the Forseadiscovery project. An easy to follow methodology will also be created that could act as a template for future research projects, and a greater awareness of the possibilities of publishing digital datasets through alternative online formats for greater public engagement. The planned dissemination of this archive will be done through presentations at international conferences, articles in international journals, and lectures to non-specialised audiences.

LONG-TERM CAREER OBJECTIVES (over 5 years):

Goals: Upon finishing this fellowship, return to the US to start a non-profit archaeological education company called Dive into the Past. This will allow me to continue research into implementing dynamic ways of digitally recording and publishing archaeological data. During this time period, try and secure funding for a PhD to study digital environment creation in game engines and game design technology with VR headsets to create immersive experiences for members of the greater public. What further research activity or other training is needed to attain these goals?

A greater, multi-disciplinary understanding of historical and dendrochronological datasets, and experience with online data repository centres. More experience and training with different databasing software that are available. Further training in grant application and writing skills. Greater understanding of game engines

SHORT-TERM OBJECTIVES (1-2 years):

1. Research results:

• Design, create, and implement a DAC compliant archive for the ForSEAdiscovery project.

• Publication of methodology and discussions for the archive in relevant international journals.

• Complete a pilot study on the use of Game engines and VR headsets to disseminate archaeological sites as they are today, and how they might have looked in the past.

2. Research Skills and techniques:

- Improve computing skills to be able to effectively and efficiently post process datasets
- Obtain greater training in 3D photogrammetry, both on land and underwater.
- To gain more experience within the commercial archaeological sector through fieldwork in various types of conditions, i.e. intertidal/ foreshore work, and underwater diving operations.
- Gain intermediate to advanced proficiency with the following software: Substance Designer, Substance Painter, Blender 3D, Unreal Engine, ArcGIS, QGIS

3. Communication skills:

- Present work and research at both national and international conferences
- Give lectures to groups of specialised and non-specialised audiences through seminars and lectures at the University.

4. Research management: -Fellowship or other funding applications planned (indicate name of award if known; include fellowships with entire funding periods, grants written/applied for/received, professional society presentation awards or travel awards, etc.) N/A

5. Other professional training (course work, teaching activity).

- Photogrammetry workshop at IKUWA IV in Australia Nov-Dec 2016
- Online training with CG Cookie

6. Anticipated networking opportunities.

SHA/ACUA conference 2018

7. Other activities (community, etc) with professional relevance.

Partnership with the UWTSD game design and animation degree program to conduct a pilot study using game engines and game design technology to create immersive archaeological experiences for the general public.

ESR 15 Ignacio González Espinosa

Host Institution: Instituto de Arqueologia e Paleociências (IAP). Universidad Nova de Lisboa (UNL)

Contract Start Date: 01/07/2017 Contract End Date: 31/12/2017 *ForSEAdiscovery activities*. Personal Research Project : *Shipwrecks in the Iberian coasts during the 16th-17th Century. Vessels, provenances and routes.*

Personal Research Project Abstract: Communication and commerce during Early Modern Age were made mainly by the navigation. Through the oceans Europe, Asian, America and Africa were connected for the first time in history and a new period started. Shipping became in the most important way of transport and exchanges, not only for the commerce, also for ideas, culture and of course migrations.

Our personal research is focused in two of the principal objectives of the ForSEADiscovery project. On the one hand, the Atlantic routes of connection between the different European areas during the First Global Age. On the other hand, shipwrecks in the Iberian coast and the possibly remaining of timber. Using the archaeological reports and the historic records, our purpose is to elaborate a data base with information about this wrecks, including the provenance of the vessels, their destinations, nationalities and, in case of exists, the results of the archaeological interventions.

The purpose is to complete the information available about the Atlantic routes, and how networks operated in the redistribution of goods, spices and money in Europe, also how these connections worked in the configuration of the relationships between the different territories. In addition, the elaboration of a data base of shipwrecks in the Iberian coast provided us and important tool for future investigations. Including this information in a GIS we can obtain better results in the systematization of our data. Moreover, the use of historical documents permitted us to draw in maps the possibly places and localizations of the historic wrecks in the case of future discoveries.

Personal Research Project Progress Report: 18/09/2017 Objectives:

The Career Development Plan written here is a guideline of the objectives and activities that we are doing during our stay in the University Nova de Lisboa as part of the ForSEADiscovery Project. The duration of the agreement makes the aims very specific, as well as the topics of the investigation. The goals of this CDP are closer to the objectives of the current project. Either way, as a work in progress, changes will be made, in order to offer better results according to information provided by sources and the own interests of the ForSEADiscovery project.

Due to the interest of the project aforementioned in the Atlantic trade and the connections between the different Europeans spaces, an according to the suggestion of our supervisor, we are finding information about shipwrecks in Castile and Portugal coasts during the Early Modern Age.

The time frame of our research is the 16th and 17th Centuries. During this period the shipbuilding in Portugal and Spain had similarities in the techniques of construction. An Iberian tradition that put the vessels made in this shipyards at the head of the Atlantic commerce. Both territories had a close commercial, cultural and demographic relationship that existed for centuries. Furthermore, Dynastic Union (1580–1640) increased this during the period that Portugal and Castile where ruled by the Habsburg Dynasty.

Despite most of this years are in line with the "Pax Hispanica" the monarchy was awareness about the importance of the maintenance of his power in the sea. The monarchs tried to put all the resources at the service of the monarchy. But it would not be so easy, despite the fact that the necessity of timber in Spain and Portugal for the construction of the vessels was constant. The kings try to preserve the most suitable trees for the royal shipyards, especially cork oak trees, which were used for the hulls and pines trees for the planks. But forest and parks were the hunting places for the nobility, who refused to lose their right in the cinegetic activities. Also, trees were necessary for people that use the woods to made their houses and charcoal. Anyway, the power of the crown finally won and the cut-down of these trees was forbidden. Despite of this, the demand of timber for the shipyards were not supplied only with wood from the national forests and the importation of northern timber was necessary.

Lisbon and Seville were the principal ports of operation of the Iberian Peninsula in Early Modern Age. From these cities vessels left the Iberian Peninsula way to America, Africa and Asia. In return, gold, slaves, drugs and other goods came to Europe mainly through these same city ports, which are the only allowed to commerce with the colonies. Both cities became in the redistribution centers of the economic system that connected the three continents. In the case of the Iberian Peninsula, for example, it is well known that Portuguese merchants had a main role in the slave trade from Africa to the American territories. Some of these Portuguese merchants, specialized in the sugar and slave trade, were the main characters of the construction and expansion of the new Atlantic economy.

We're beginning to understand how these merchants' networks ran and their importance during First Global Age. To cope with the challenge of a new global economic, it was necessary new skills. For that reason, these networks weren't national, but international. In the case of the Iberian Peninsula, mixed companies existed that operate in order to facilitate the exchanges between these two territories and their overseas colonies.

This system needed the presence of agents in the different places and ports, who provided information and support for the economic transactions in order to seek the maximum benefit. This way, different territories were connected through the maritime ports that vertebrate the local economy with the rest of the world. The ports connected the different territories and the production of the interior lands with other countries and overseas territories. Smalls traders made possible the functioning of this system through the union of local production with the ports cities.

As we said before, timber supply was a primary issue for the king, due ships were necessary tools for commerce and war in Modern Ages. The need of resources by the king was continuous, and it is include the knowledge of shipbuilders and pilots for the vessels. For example, the organization of the Great Army that Phillip II (first of Portugal) sent to Britain Island was possible thanks to the coordination of Portuguese and Spanish ports. In this sense, merchants and their networks were the main beneficiaries of the monarchy's needs, since they provide the materials and also the information necessary. We know that the king usually assignment to these merchants the recruitments of vessels to his armies.

Flemish agents were an important part of this commerce. American and Indian products were redistributed along Europe thanks to the Flemish trader, who had agents in the different ports of Iberian Peninsula, in Seville and Lisbon mainly. These agents are also the responsible of

timber supply for the Hapsburg monarchy. They were the necessary intermediaries between the north forests and the necessities of wood for the vessels' masts.

Due we are working in the Intituto de Arqueologia e Paleociências and as part of the WP2. Nautical archaeology and shipbuilding, our research should be linked with these objectives. Our current investigation is the localization of the shipwrecks in the coasts of the Iberian Peninsula. On the one hand, we found information about hull's remains and evidences of vessels in the subaquatic archeological excavations. On the other hand, the registration of ships lost in the coasts during their voyages.

A paper will be published with the results of our research in a scientific journal. The objective is offer information about the potential places were rest of this shipwrecks could be found. Also, were interested in the routes of these vessels, their provenance and the goods that they transported. This dates, could be included in the GIS of the ForSEADiscovery, in order to complete the information about the Atlantic routes.

Key questions.

The research tries to answer the following questions.

-Where evidences of shipwrecks in the Iberian coasts could be found?

-What kind of ships was used in the Atlantic commerce?

-What kind of timber was used in their constructions?

-What were the trade routes of these vessels?

-How the merchants' networks between Seville and Lisbon were used for timber supply during the Dynastic Union?

-What other kind of stuffs their provided?

Methodology.

The first step is in this case is the elaboration of a bibliographical base that helps us to understand better the framework of our research. Historical works about topics such a timber supply, commercial networks, relationships between Castile and Portugal, maritime ports, shipbuilders and Atlantic commerce will be consulted. Archeological magazines and

excavations reports will help us to find information about shipwrecks. Bibliography will be widened as results of the works and papers quoted in this first approach.

Some studies are especially useful for our research. It is the case of the ForSEADiscovery publications about timber supply and forest resources during Early Modern Age. But also, the works of Leonor Freire Costa about seafarer pilots registered in the Livros das Ementas. Other interesting publications are the written by Amândio Jorge Morais Barros about the city of Porto and Amélia Polónia about Viana Castelo. This last ones offer up role models about the functioning of the city ports what if it is possible will be applied in our research.

We are going to consult the FCSH's library at the Universidad Nova de Lisboa, as well as the Biblioteca de Arte Gulbenkian and the Biblioteca de Ajuda and Biblioteca Nacional de Portugal, in order to find the specific bibliography for our research. In the case of the shipwrecks, we were working at the Biblioteca de Arqueologia in Palacio de Ajuda. Excavations reports such as Trabalhos do CNANS provided us excellent information about shipwrecks evidences. National congresses of archeology also were essential for our works.

In our data base we also include information about vessels lost according to the records in historical archives. In this sense we started consulting the books written by Cesaréo Fernández about this topic and the investigations of Perez-Mallaína. For the shipwrecks in the Portuguese fleets we consulted the Historia Trágico Marítima and the investigations of Damião Peres and more recently by Jorge Monteiro.

This bibliography provides us of the information about this shipwrecks that we are organizing in our data base introducing the provenance, routes and the owner of these vessels. During our research stay in Madrid we expect improve this data base in order to cross the information with the dates of the ForSEADiscovery Project and put in maps the localization of the shipwrecks.

The bibliography consulted give us tracks about the archive sections for continue or research. In Portugal we are going to research in.

- Arquivo Nacional Torre do Tombo

• Chancillerias Reais

Corpo Cronologico

-Arquivo Histórico Ultramarino.

• Oriente. India

In Spain we will be consulted the following archives.

-Archivo General de Simancas (Simancas)

- Guerra Antigua
- Contaduría Mayor de Cuentas
- Secretarías Provinciales

Archivo General de Indias (Sevilla),

- Catálogos de Pasajeros a Indias
- Indiferente General
- Contratación

A more extensive organization provides us the tracks to search in other different sections of these historical archives for a deepening in our investigation.

The cross-reference of this information with our data base about the Portuguese settlement in Seville allow us to understand better the mobility and integration patterns of this community. The results of our research should be useful for being used in the GIS system of the ForSEADiscovery project, in order to complete the information about routes and trade in the Atlantic Ocean during the First Global Age.

Skills to achieve.

ForSEADiscovery has the goal of forming students with capacities to deal with the new demands of the scientific world. As part of the project when I finish my participation I should be able to acquire some skills and abilities.

-Improvement of my skills in Portuguese language: speaking and writing

- -Ability to management with paleographic in Portuguese
- -To participate in International Scientific Congress in English and Portuguese

-Use of GIS System and Data Bases

Secondments:

-CSIC. Madrid: 02/10/2017-06/10/2017

During this week we were at the Consejo Superior de Investigaciones Científicas (CSIC) under the coordination of the profesora Ana Crespo Solana. One of the objectives are to concrete the aims of our research. We had our first approach to the GIS Systems and the possibilities that this tool provide to the historical investigation. In the case of the wrecks, how we can localize them on the maps and trace the routes of the shipping. Firstly, it was necessary to organize the data of our research to make it useful and introduce it in the system.

Also we deepen in the bibliography about networks and cooperation, in order to improve our project and prepare future applications.

-AGI. Sevilla: 09/10/2017-13/10/2017

Our investigation in the Archivo General de Indias (AGI) had two principal aims. On the one hand complete the information that was incomplete in the publication consulted. In many cases, when we only have some data about the wrecks, we can fulfil it by consulting directly the historical records. On the other hand we found for unpublished wrecks in the archive. The search in the register of "Idas y venidas" was fundamental. In the register appear all the vessels that come and back to America. In the case of the ship was sunk, the record offer information about the place and dates. Other collections, related to lawsuits also provide information about wrecks, the routes and cargoes.

Scientific Activities.

Attendance

-International Congress: "The 17 provinces of the Low Countries and the Iberian Peninsula: New perspectives and methodologies".

Organisers: ForSEADiscovery, Faculty of Arts, N.W. Posthumus Institute. Date: 28–29 September, 2017. Groningen, The Netherlands.

-Workshop: "Edificios antigos e navios/Dendroarchaeology Workshop-Old Buildings and ships"

Organisers: ForSEADiscovery, IAP Universidad Nova de Lisboa, University of Wales, Associação dos Arqueologos portugueses.

Date: 10 November, 2017. Lisboa, Portugal.

Dissemination Activities. Talk in International Congress.

-"Timber for the royal shipyards in Portugal: Between self-sufficiency and northern supply" in International Congress, *The 17 provinces of the Low Countries and the Iberian Peninsula: New perspectives and methodologies.* 28–29 September, Groningen.

Publications.

-Article in the forthcoming publication of the ForSEADiscovery Project. Possible title "Building empires: The role of German and Flemish entrepreneurs in the maintenance of the Iberian fleets in the 16th century"

Contributions towards Project Milestones / Deliverables: -Data on suspected Portuguese shipwreck sites collated and built into GIS-data model.

This results is for the completion of milestone 9 of the ForSEADiscovery Project.

Our data base will be available for consultation.

Career Development Plan Updated: 2017/12/01

During these six months I had to define, redefine and finally accomplish my tasks. Firstly the idea of my personal project was titled '*Networks and agents of commerce and timber supply between Seville and Lisbon during the Dynastic Union (1580–1640): cooperation, resilience and integrations patterns*'. The purpose was study the commerce networks between Portugal and Spain during the Iberian Union, using as example the two principal ports of both territories, namely Lisbon and Seville. The idea was to use the Portuguese Archives and cross-referencing the information with the provided by the Archives in Spain and the data of our current investigation about the Portuguese settlement in the city of Seville. But due the short time of my linkage and the requirements of the project I should to change the objectives and elaborate a more specific draft. In addition, the WP2: Nautical and archaeology and shipbuilding, which I was part of, required that part of the objectives of my research was more closely linked to the aims of this Work Package.

According to these premises, and attending the suggestion of our supervisor, prof. Rosa Varela of the *Intituto de Arqueologia e Paleociências* in the *Universidad Nova de Lisboa*, we decided to focus our personal project on the shipwrecks in the Iberian coasts during the 16th and 17th centuries. This lack is more specific and will contribute better in the objectives of the ForSEADiscovery Project.

Specifically, the compilation of this data base is part of the objectives of the Milestone 9 of the project, "Data on suspected Iberian shipwreck sites collated and built into GIS-data model", including on the Work Package 2 aforementioned.

Our research framework is based in the importance of shipping in Atlantic connections. A lot of vessels and ships fund in the Castilian and Portuguese waters during the Early Modern Age. From Lisbon and Seville the *naus* and *galeões* left the Iberian Peninsula course to America and India, and after their voyage they return to the same ports. It is clear that if we want to understand the commercial networks, cultural transfer and mobility patterns the study of these two city ports is necessary.

An extensive bibliography about the importance of these two cities has been written. Most of them stress the volume of cargos and commerce. There were some classical studies in the case of Seville, as the P. Chaunu about the fleets of Indies and the silver arrive to the Iberian Peninsula and the E. Otte about the traders in the city. The Portuguese historiography has they own studies too. The analysis of the importance of the Indian trade for the economy of the crown was perfectly exposed by V. Godinho in *Os Descobrimentos e a Economia Mundial*. The functioning of this empire, on the other hand, was analyzed by C. Boxer in The Portuguese Empire in Asia, 1500–1700".

These cities not were only important for the trade and commercial, there were important nodes of communication and transferences. Their role made that people from very different places came to them, transforming the social structures. For example in Seville is well known the importance of the Genoese, Irish, French and also Portuguese migration. Merchant guilds and brotherhoods were the mechanism of cohesion and interconnection of these groups. Apart

of the maintenance of the identity, through these organizations the foreign groups interact with the others social agents and the power.

Coming back to the importance of the city ports, recent studies have emphasized the role play of the medium ports in the Atlantic commerce during the Early Modern Age. This is the case of Porto, for example. Research made by Amandio Barros point out the city function in the navy supplies for the Indian Route and Cape Route. And what is more important, Porto also provided Lisbon with seaman and shipbuilder. The city also had an important role play connecting the hinterland and the local markets with the international commerce circuits. Other city that had and important function in the redistribution of goods and the interconnections of the local territories was Vila do Conde. Amelia Polonia has written at this respect, stressing the importance of this city port, also in the north of the country.

However, despite the importance of these secondary ports in the structuring of the Portuguese economy, it is seems clear that the Cape Route and the commerce with Indie were always monopolized by Lisbon.

The prominence of the route that connected Lisbon with Goa, or better said Europe with Asia, was fundamental in the development of the Global history in the next years. Also, the increase of the commerce with north Europe, especially with the Hansa and the German territories, made necessary resources for the maintenance of these routes. Vessels were needed, as well as timber for their construction, ropes and pitch.

We can see the importance gave by the king to the naval construction through the historical records. Also we can observe the becoming of Lisbon in the principal port of the country and the privileges given by the king. An important part of the royal deliberations related with this matter were related to the necessity of workforce. Indeed, the king was aware of that and ordered the formation of a permanent carpenter corps for his shipyards. The first information about this is dated in 1492. A group between one to three hundreds (unspecified in the documents) carpenters was working in the Lisbon's shipyard under the king demands. In 1503 they were 200 hundreds and all of them must been examined by the "Maestre de Ribera", who decided if they were appropriate or not for this kind of work. Anyway, they

didn't work only for the king and were allowed to live in their own cities, whenever they were willing to work in the shipyards every time that they were required for the king. The payment was not good enough, but they also received some privileges in the municipal council. The raw materials for the construction were provided by the crown. Furthermore the necessary tools, since they can't afford their price.

According to a privileged given by the D. João III in 1533 mostly of this carpenters were from Entre-Douro e Minho, in the north of the country. We also know that another group was living in Porto and Vila do Conde. That stressed again the important part of secondary ports in the trade. Even though the monopoly, other ports were necessary for the supply of the Indian Route.

In addition of labours, the king stablished a specific place to the construction of the vessels. Mostly of the naus and caravels were built in the royal shipyards of Lisbon. Since 1515, the Ribera das Naus only can be used for this and any other kinds of activities were forbidden. One step more were made for the king in 1546, when he ordered that a specific area of the Ribera das Naus , which was closer to Paço, were only used for the construction and reparation of the royal fleets. In case of necessity, more vessels were built in other ports by the order of the king. This is the case of Porto, for example, or Vila do Conde. But according to Freire Costa, mostly of these ships was usually smaller than the one constructed in the capital. Anyway, these vessels had an important role in the coasting shipping and supply.

Another good example of the importance of vessels construction during these years is the amount of texts and treatises that were written. They not only show us that the more brilliant minds in the country were thinking about this matter, also provide us a lot of information about the characteristics of the vessels in the last 16th century.

The most famous are the Livro da Fabrica de Naos by Fernando de Oliveira (ca. 1580), the Livro Primeiro de Architectura Naval written by João Baptista de Lavanha (ca. 1600) and the Livro de Traças de Carpintaria by Manuel Fernandes (1616).

As is usual in this kind of texts, they include information about practically everything related with shipping. For our research the most interesting element is the great amount of details about the more suitable trees for the shipbuilding –including the time for cutting-down them-, the appropriate size of the vessels and the art of navigation.

For our research the most important point is the timber, the supply of course, but also the kind of trees that were used for the construction. The authors aforementioned coincide on the trees that would be use. The most beautiful example, due the language use, is from Olivera. He compare the ships with a living being. For the skeleton, the keel, the stem and all the frames, he recommended the use of sobreiro (Cork oak, bot. Quercus suber) on account of its strength and hardness. For what Olivera called the skin, the planks that cover the vessel, he said that the best kind of tree is the pino manso (stone pine, bot. Pinus pineas) because of his flexibility, which made possible the adjustment of the planks to the shape of the vessel. He also brings about the differences between the navigation in the south and the north. The different characteristics of the navigation in these areas make that the kind of timber for the construction of ships could be quite different. Olivera points out that the cold waters of the North allowed shipbuilders to use carvalho (Oak. Bot. Quercus robur), but he totally refuse the use of this trees. The autochthone from Portugal was too dry and even the variety of the European north, which was similar to the pino manso, was not good enough for the Portuguese routes. The reasons provided by Olivera are the different climate and the temperature of the waters. While the cold waters of the north didn't cause so many problems in the timber of the ships, the warm waters where the Portuguese vessels shipped made that the planks would rot. Lavanha also mentioned this problem, the risk of worms (gusanos) if the timber was not the most suitable. Lavanha also refuse the use of wooden nails in the construction for the same reason.

Despite both authors were right, many times another kind of timber were used. We also are aware that they are justifying the use of the national resources. Lavanha is very clear in this aspect, when he said "he forçado que usemos as que nacem nesta terra" (It is mandatory that we use which born in this lands).

Both cork oak and stone pine were native trees in Portugal. The first one was localized along all the territory, however now we only can find it in the north. Pines were also very common,

especially in all the area of Ribatejo, the river Tagus valley. Until the last quarter of the 16th century, most of the timber used was national, except for one exception that we will mention below.

The good quality of trees and facilities for the exploitation was behind this use. All the area near to Lisboa, the Ribatejo aforementioned, is well communicated by the River, which made really easy the transportation of the cut-downed trees to the shipyards. Other places, such Pederneira o Leiria, also had a good maritime communication and supply with timber from Alcaçoba the city.

But the increase of the amount of vessels constructed in Portugal as well as of the growth of the population, who also need timber and charcoal, started to have a big impact on natural resources. Devy-Vareta stressed is her papers how the pines of Ribatejo were nearly gone and in Leiria the forests were almost depleted at the end of 16th century because of the cut down and the fires.

For this reason the king started a preventive legislation trying to preserves the forests. This legislations didn't have an ecological motivation, due they were mainly worry about the suitable tree for shipbuilding.

Actually the kings never were worried about the deforestation caused by the nascent industry and the increase of the use of charcoal as long as this not affected the trees used in the vessel construction.

A look into the legislation shows us the preoccupation about this matter. The compilation made by Baeta Neves includes some of these royal decrees. Reforesting policies was ordered by the government, indicating that preservation it was not the only solution to the problem. In 1565 D. Henrique ask for the local councils to plant trees in the empty spaces. Called *Lei das Árvores*, this law stressed that trees that have to be replanted were cork oak trees and pines. It is not casual that they were the most useful for the shipbuilding. According to John Wing in his book *Rootts of empire* this kind of policies are very similar in the case of Spain, where a similar law was approved in 1547. The emperor Charles V in order to prevent the deforestation in Guipúzcoa and Vizcaya areas, which was the principal timber supplier for the

shipyards, commanded that two trees have to be plant for each one that was cut down. In Castile, even a special corps of king agents was created with this objective.

Periodically new laws and real prerogatives were enacted, so it seems that their fulfilment was very far of being reached. Preservation of *coutadas* and *matas* (the name of forest spaces when the timber was recollected) was an especial preoccupation of the monarchs. The investigations made by some colleges of the ForSEADiscovery project, as Koldo Trápaga or Antonio Santos, stressed the importance of this matter in the case of Portugal.

As we mentioned before, in both cases we cannot think in an ecological interest, but the construction of vessel was behind all this ordinances. The most important step in Portugal was made in 1574 with the approbation of the cork oak trees law that forbade the cut down of this trees and also pines in all the zone of Ribatejo.

The problem was that the forests were also necessary for the population. Usually the mount and vacant land were for the communitarian use of the towns and cities. Timber was necessary for the construction of the houses and the charcoal was used to warm them as long as in the transformation of raw materials in the little-scale urban industries. Some communities ask the king not to comply the decrees. Almedia, for example, obtain a special leave to not plant pines in its lands in 1577. On its part the village of Algoso avoid the mandatories by planting the trees in the private lands of the inhabitants and not in the public ones, arguing that the spaces were uses for other purposes. Apart from the villages, nobility also claimed not to be deprived of his privileges, principally hunting, and managed the by themselves as Joanaz de Melo show in her publications.

Those are only some examples of the resistances to this kind of laws, which only look for the benefits of the crown. What is happening here is a confrontation between the royal power on the one side, and the councils and nobility on the other one. Or in other words, and more specifically, we observe an opposition between the centralization and the traditions and privileges. The centralization imposed by the kings finally won.

In spite of the promulgated decrees, the tree areas decrease year after year. The increased demand by the royal shipyards and the growing population exhausted the natural resources.

Due the shortage of timber the use of young trees (*madeira verde*) began to be more common at the end of the 16th century. Authors as Lavanha claimed about this use, because of the poor quality of the timber. They were right since the planks of the ships began to rot sooner and the costs ultimately were higher.

But there were a kind of timber needed that was not at hand in the territory. The wood required for the mast need to be strong and flexible at the same time. Also, they could be constructed in one piece and any tree from the Iberian Peninsula has this properties. The solution was in the north European forests.

Scots pine (bot. *Pinus sylvestris*) was the most suitable tree for the mast of the vessels, even more when the size of the ships increased. These kinds of trees were common in the cold north European areas, such as Norway or Poland. The arrival to Portugal was made through the intermediation of German-Flemish agents.

Trade between Portugal and German-Flemish traders was working at least since 14th century. The first Portuguese agents were in Bruges and lately they came to Antwerp, where they acquired a storage house and residence (Kipdorp) in 1511.

The investigations of José da Silva Figuereido, *Os peninsulares nas guidas de Flandres*, Joaquim Maurício Lopes, *Les portugais à Anvers au XVI siècle*, or Albert de Burbure de Wesembreek, *La casa de Portugal d'Anvers*, stressed the importance of the commercial and cultural relations between this two areas. Portugal had a factor in Antwerp since 1498 in charge of control the commerce and watch for the interest of his fellows.

We know well the kind of goods of this commerce. Portugal exported the Indian species (the most interesting item for the Flemish trader) and products for the land such as salt, oil and cork; also money in gold and silver. The commerce was rooted in the agricultural output, despite the importance of the exotic products came from the Cape route. In exchange, Portugal imported grain, cloths, cooper, tar and pitch, leather and trees for the masts. Pitch and tar were also necessary for the maritime industry, since it we used for caulking the ships before the voyages.

Provenances of the masts were mainly Poland or Sweden. The port of Riga had and important in the traffic, being called as *mastro riga* a large number of this masts. Also, and according to Freire Costa, the denomination *mastro pruça* (from Prussia) were very common in the records. The same author notices that the length of the pieces indicates they were used in big vessels. Pitch were also part of the cargoes of the Hanseatics arrivals to Lisbon. Caulking was specially required for the Cape Route in order to prevent the wood rot. The covering of the hull with pitch gave a black color to the ships that impact in the Asian societies.

The commerce was possible thanks to the presence of multiples agents stablished in Lisbon. Due the scarcity of historical records it is difficult to know the number of them or their names, but undoubtedly the importance of those traders was huge.

This is evidenced by the large number of privileges granted to the German traders in Portugal and later extended to the Hanseatics agents. Thanks to a manuscript from the Évora's library, where these privileges are collected, transcribed and edited by Paul Pohl we know the facilities given to them. Since 1503 they didn't have to pay taxes for the goods that imported to Lisbon, including the masts. In the next years more privileges was granted to these agents, including not being judge by the ordinary justice and even be considered as neighbor.

But the constant reaffirmation of the privileges and complaints made by the traders indicate us that they didn't be fulfilled. Anyway it is a good indicative of the importance of this commercial group that also has their own chapel and factor in the city.

Some researcher as Figuereido or Freire Costa provided us significant information about the importation made through these agents in the city of Lisbon. However, we still have a long way to go in order to get to know the volumes of this commerce and the functioning of the networks that made it possible. Also about the differences with timber supply in other Atlantic ports that operate with the same intermediaries, like the case of Seville and lately Cádiz.

Objectives

Our objective is to contribute to fulfill the information available of the Atlantic commerce during the 16th and 17th century. To know the different routes and cargos of the vessels that

shipped along the Iberian coasts. According to the milestones of the WP2, our interest is focused in the shipwrecks.

The chronology of our research includes the 15th-16th and 17th centuries vessels sunk in the aforementioned space.

Key questions

The most important key-questions of our research are the following:

-Where we could find evidences of shipwrecks in the Iberian coasts?

-What kind of ships was used in the Atlantic commerce?

-What is the timber remaining?

-What kinds of goods were in the cargoes?

-What were the most common places of wrecks during the trade routes?

-How the merchants' networks between Seville and Lisbon were used for timber supply during the Dynastic Union?

The information compiled should be compatible with the data base guide of the ForSEADisvoery, according to the parameters published by José Luis Gasch-Tomás, María José García –Rodríguez, Sara Rich and Peter Groenendijk.

Methodology

After the elaboration of a bibliographical base that allowed us to understand better the functioning of the merchants' networks and the role play of the ports, we search information about the possible wrecks that were interesting for our research.

There are two kind of information. On the first hand, we have material evidence from archeological excavations. On the other hand, the information that is available in the historical records. We didn't do a clear differentiation for the two kinds of data until our secondment in Madrid. The fields of our data base have practically the same organization that in the guide aforementioned and the entrance are identified by and particular ID for each one. Our principal source for the archeological excavations was the fund of the *Biblioteca de Arqueologia* in the Palacio de Ajuda. In addition to a large number of Proceedings for International Congress, in the library also has the reports about the CNANS (Centro Nacional

de Arqueologia Náutica e Subaquática) responsible for the majority of the excavations effectuated in wrecks in Portugal. The consultation of them provided us the necessary information about the archaeological shipwrecks remaining for our data base.

Some of the fields are related to the construction of the vessels, including the place and the chronology. Due it is a table for archeological vestiges other fields including information about timber remains, ballast pile and the specific location of the site. We fulfill all the information that the different reports and publications provided us.

On the other hand, we have a data base for the historical shipwrecks. In this case we included the references about wrecks in the historical records. Usually information about the name, captain, route, etc. can be found in the documents. However, mostly of the times we can't identify where the sunk exactly happened. Also, other aspects such timber remaining was impossible to know.

In both cases the information are complementary but different. Sometimes exists the possibility of identify a vessel by the historical records and an archeological intervention, but it's not common.

However, the elaboration of the historical shipwrecks data base is interesting in two aspects. Firstly, it is a complete register of the possible places of wrecks and information about the vessels. This makes easier in the future the identification of the ship remaining in the archeological finds. Also, the data base provides us a great amount of information about the routes, agents and cargoes in the Atlantic trade.

We started our search about the historical wrecks in the publications about this matter. "Naufragios de la Armada Española" written by Cesáreo Fernández Duro and "El hombre frente al mar" by Pérez Mallaína were very helpful in the case of the Spanish wrecks. Both books there not only give information about it, also facilitate clues about the most interesting documentation collections where we can complete our research.

Information about shipwrecks in the case of Portugal is more complicated to find. Normally the archives used in the investigations are Archivo General de Indias and Archivo General de Simancas. However, the "História Trágico-Marítima" gives us details of some of these wrecks.

"Naufrágios e accidents marítimo no litoral cascalense" written by Da Silva and Guilherme used differents archives and sources to do a complete list of wrecks in the Cascais's area. More recently the research made by Alexandre Monteiro is interesting in the case of the lost vessels in the Azores Islands.

The compilation off all the information found in the different publications and the classification in the data base model gave us a first base to work. We could contrast some of the data and find coincidences and complementary details. After that, we were ready for the research in the Archivo General de Indias during our secondment.

Others (Please include here other aspects you consider relevant, e.g., current position, application to other research grants, participation in other research projects...):

-Curso Elementar de Língua Portuguesa – Nível A2. (64 hours). Faculdade de Ciências Sociais e Humanas da Universidade Nova de Lisboa.