Career Development Plan-Year 2

Name of fellow: Mohamed Traoré

Department: Edafoloxía e Química Agrícola-Universidad de Santiago de Compostela

Name of Supervisor: Professor Antonio Martínez Cortizas

Date: 12/06th/2015

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.

This project will be carry out in an interdisciplinary teamwork of historians, archaeologists, dendrochronologists and geochemists.

For this purpose, from beginning of the project until now we have done some work to advance in the goals our tasks in WP3.

- A field campaign in southern Spain for living trees sampling was done on black pine in Andalusian forests. From the 23rd to the 26th of November, sampling carried out in local forest in La Sagra Mountain, and in Linarejos and Nava Noguera two sites located in the Sierra de Cazorla. In La Sagra we sampled trees that had the thickest stem while in the Sierra de Cazorla sampling was done in circular plots with a radius of 20 m in which wood cores were taken from only the dominant trees with a diameter greater than 25 cm.

- Sample preparation: the 29 cores sampled were dried at 30 ºC during two (2) weeks in an oven. Thereafter they were polished in two sides in order to have a nice view of rings in each side. Polishing was necessary due to the presence of narrow rings and resin in these pine wood cores, and also for the handling of samples with the FTIR equipment.

- Testing of analytical method (FTIR): FTIR method was tested on a pine beam wood from Segovia Cathedral and a shipwreck wood from Ribadeo. Results from this test show the ability of FTIR to analyze these wood samples. It also showed the usefulness of multivariate statistic analysis. Wood components were clearly distinguished from the wood samples analyzed.

LONG-TERM CAREER OBJECTIVES (over 5 years):

1. Goals:

   - Identification of potentials biomarkers for Iberian shipbuilding timber provenance;
   - Contributing to the elaboration of a database for ForSEAdiscovery.

   - Progress in the field of environment geochemistry

   - Teaching at university environmental geochemistry in the framework of sustainable managing of natural resources.

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

   - Two months secondment in "Université de Lorraine", about analysis of data and writing articles (plan to July 2016): this like the previous secondment is significant for the collaboration between ESRs within the WP3. Visiting other research groups is advantageous to get ideas on various group strategies in order to develop the personal understanding about a number of ways to lead research projects.

SHORT-TERM OBJECTIVES (1-2 years):

1. Research results

   o Anticipated publications

     - Geochemical characterization of pine and 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).

     - Assessment of terpenoid as potential biomarkers in pine woods (living trees and shipwrecks).

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

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.
     - Training on Dendrochronology and wood anatomy for data analysis and interpretation.
     - Presentation of the first results obtained for archeological wood provenance studies by geochemical methods in Madrid by the 18th December 2015.

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 2015-2016

6. Anticipated networking opportunities

   - Sampling campaigns with all fellows of WP3

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

12/06th/2015

Date & Signature of fellow   Date & Signature of supervisor