



Presentation of the FMI 5000 Project: Environmental changes: Fluvio-marine interactions over the last 5000yrs

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FMI 5000 Project (between 2010 and 2012) aims to evaluate, in different estuarine environmental conditions, the balance between fluvial and marine influences, the responses to climatic events and the impact of land use changes. The temporal window chosen, contains different trends of the sea level, climatic fluctuations like the Bond events or humid episodes recorded in the Iberian Peninsula, as well as the increase of the human intervention in the landscape, particularly sensitive since the Bronze Age (circa 3500yr), imprinted in the filling-up of the alluvial plain estuaries.

The Portuguese mainland mesotidal coast spreads out in two different environmental conditions: (i) the West coast exposed to the NW dominant waves, with a temperate oceanic climate and fluvial regimes and (ii) the Southern sheltered one, but open to the SW storms, with a Mediterranean climate and with occasional heavy fluvial discharges. This contrast along the coast creates a good field of research to achieve the aims of the project. To prosecute this goal, estuaries of medium drainage basins were selected as they have homogeneous climate, geologic and geomorphologic conditions, allowing to define accurately the hydroclimatic events that contribute to the infilling of the estuarine plains. The small changes are recorded not only in the textural properties of the sediments, already recognized in the sediments of the Tagus and Guadiana rivers and in the small estuaries of the Spanish southern coast but also in the micro fauna, pollens and non-pollen-palinomorphs allowing to define the environmental changes, both marine and fluvial.

To achieve the Project goals we select three estuaries in different climatic and wave climate conditions, to develop four different kinds of research and methodologies:

(i) To identify millenary evolution, several hand-operated gauge auger cores or vibracores will be carried out in the infilling sediments of the estuaries alluvial plains. The cored sediments will be treated to define the textural sedimentary changes, to identify the pollen and non-pollen-palinomorphs and the foraminifera content. The changes in the sedimentary record are fundamental in the flood episodes evaluation and the sequence of wet and dry period's establishment over the Middle and Upper Holocene. The identification of the pollen and non-pollen-palinomorphs will add information on the natural and human induced climatic and environmental conditions. The presence and the type of foraminifera content will set aside the marine incursion episodes and the environmental changes. Stable isotope ratios (^{13}C) in muddy deposits will be used to identify sources of fine-sized organic matter (marine or terrestrial).

(ii) To identify the secular evolution, the research of regional historical documents will focus not only on rainy/flooded episodes and droughts but also on the land use changes (e.g. deforestation, drying of marshes).

(iii) To assess dating of the detected environmental change events, the sedimentation rates and the landscape evolution over the last 5000 yr, radiocarbon dating will be carried out. For the last century another approach will be used, based on radiometric data tools adequate to this temporal scale (^{210}Pb) and compared with climatic and hydrological Portuguese network observational records.

(iv) The correlation of the results provided by the three previous set of tasks would be performed and compared with Paleoclimatic Data Sets (e.g. NOAA) in order to evaluate how the global and regional climatic changes are reflected along the Western coast of the Iberian Peninsula during the last 5000yr.

All data will be integrated in a GIS, allowing the reconstruction and modelling of paleolandscape, its evolution during the Middle and Upper Holocene and future tendencies in the global change scenario.

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