CLIMATE VARIABILITY OF THE LAST FIVE ISOTOPIC INTERGLACIALS: DIRECT LAND-SEA CORRELATION FROM MULTIPROXY ANALYSES OF NORTHWESTERN IBERIAN MARGIN DEEP-SEA CORES

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Understanding the interglacial climatic dynamic and responses of the different earth's environments (land, ocean and cryosphere) to astronomical forcing is necessary to forecast the future climate. Few are the high resolution paleoclimatic records covering the last five interglacials, in particular, over the continent. Direct correlation between terrestrial (pollen) and marine climatic indicators and ice volume proxy from triplet deep-sea cores MD01-2447, MD99-2331 and MD03-2697, retrieved off northwestern Iberia, shows for the first time:

- the analogies and differences in the climatic variability of MIS 11, 9, 7, 5 and 1
- the phase relationship between southwestern European vegetation, sea surface temperatures in the northeastern Atlantic mid-latitudes and ice volume in northern hemisphere high latitudes over these interglacials
- a relocation of the European climatic events detected from long and fragmentary pollen sequences on the marine isotopic stratigraphy.

MIS 11 is the best candidate for understanding climatic changes in the context of low insolation forcing such as that of our present interglacial. A 31, 000 years-long and warm period at the beginning of MIS 11, maybe the longest and warmest of the last 500,000 years, encompassed the minimum ice volume. This warm period is followed by 3 warm/cold cycles, contemporaneously detected on land and in ocean. Reassessment of continental and marine sequences from North Atlantic, Europe, Siberia as well as Antarctica reveals the same climatic variability.

MIS 5, 7 and 9 are characterized by a similar climatic dynamic than that of MIS 11. However, each warm phase shows differences in vegetation succession and therefore in climatic conditions likely related with different warming amplitudes. Moreover, MIS 8-7 and 6-5 glacial-interglacial transitions are incised by a cold event similar to the Younger Dryas of Termination I.

During MIS 11, the glacial inception coincides with the replacement of warm deciduous forest by conifer (pine-fir) expansion in northwestern Iberia and, consequently, with the southward migration of the tree-line in high latitudes in response to insolation decrease. A similar vegetational response is also detected during the glacial inception at the end of Eemian (MIS5). As insolation changes cannot account solely for ice growth, vegetation changes must now be considered as a major feedback mechanism for entering in glaciation. This is particularly true for the glacial inception during MIS 11 which is marked, as MIS 1, by very weak amplitude of insolation variation.