DATING OF BRAZILIAN SHELLS THROUGH ELECTRON PARAMAGNETIC RESONANCE

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The chronology of the formations of coastal planes in Brazil has been investigated by a large number of geologists. Among few possible mechanisms, one that drew major attention is the relative marine sea level fluctuation in the past. Before 1974 geomorphological, biological and sometime pre-historical arguments were used but after 1974 an extensive radiocarbon dating has been carried out by several authors and has allowed to obtain information about sea level variations, especially in Holocene period for southeastern and southern coast (Suguio & Martin 1978). For the northeastern coast of the state of Rio de Janeiro, sea level fluctuation curves were observed during a period between 8,000 years ago and present (Castro et. al. 2014): the maximum sea level occurred between 3,000 and 6,000 years ago. During that period, the region was under the sea. Then there was a proliferation of very large number of mollusks and oysters. The death of such mollusks produced a layer of shells inside the soil before the sea level receded to the present one. In the present work, we report dating procedure of these shells by using the electron paramagnetic resonance. The first step of the analysis was the definition of the optimal procedure for sample preparation. At this aim the analysis of the sample composition was carried out by X-ray fluorescence (XRF) measurements and an accurate analysis was study on the effect of the chemical etching with varying typology and concentration of acid to be used for removing the external layer of shells which are affected by alpha particles.
The EPR measurements were performed by applying the accumulated dose method. This method allows to extract the radiation dose the shells were exposed to and then, through the knowledge of the annual dose rate, the age of the shells. Furthermore, a comparison of the EPR dating results with radiocarbon method was performed. The Authors acknowledge funding also from the Project MIUR_PON03PE_00214_2 "Sviluppo e Applicazioni di Materiali e Processi Innovativi per la Diagnostica e il Restauro di Beni Culturali (DELIAS).

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