



Recognition of source areas and variations between authigenic and detrital fraction along a last interglacial sequence from the Central Mediterranean Basin

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This research pointed out geochemical variations of major, minor and trace element contents (yttrium an .0d REE) related to transition between Marine Isotopic Stage (MIS) 6 and MIS 5e, along the marine sequence from the Ocean Drilling Program (ODP) Leg 160 Site 963 (Central Mediterranean Sea) (37°02.148'N, 13°10.686'E; 480m depth). The sampled interval is particularly interesting since it represents the passage from the penultimate glacial period to the last interglacial, at about 128 kyr BP (Sprovieri et al., 2006), and recorded water masses conditions during sapropel S5, one of the most severe episode of anoxia in the eastern Mediterranean basin.

Investigation on major chemical variations was carried out by means of the following compositional parameters defined as:

$$\begin{aligned} A &= [\text{Fe}_2\text{O}_3 + \text{MgO} + \text{MnO}] \\ B &= [\text{Al}_2\text{O}_3 + \text{TiO}_2] \\ C &= [\text{CaCO}_3 + \text{SiO}_2] \end{aligned}$$

They allowed to represent major chemical compositions of studied sediments in a triangular plot used to compare them with selected rocks outcropping in surrounding areas, from Sicily (Palumbo et al., 2000) and Northern Africa (Moreno et al., 2006), as possible sources of studied materials. This approach was applied to discriminate between MIS 6 and MIS 5e sequences that resulted different especially in terms of SiO_2/CaO ratio (from 1.7 to 0.8, respectively) and suggested an increased carbonate contribution along MIS 5e sequence. Furthermore, materials from MIS 5e show large similarities with compositions of Algeria-Chad-Niger rocks, whereas MIS 6 materials closely fall on the same composition of products outcropping in Sicily.

Shale-normalised REE distributions and Y/Ho ratio possibly highlight differences even within the penultimate glacial period and within the last interglacial. The lower part of MIS 6 is characterised by input of oxidised Fe-, Mn-rich products involving a distinctive “middle-REE (MREE) enriched” pattern associated to Y/Ho ratios less than crustal values and similar to those reported in marine Fe-Mn oxyhydroxides. Above, materials are characterised by “flatter” shale-normalised patterns with a more “shale –like” behaviour but with different absolute REE content. The lower part of MIS 5e shows the effect of delivery of zircon-rich detrital matter through a strong heavy REE (HREE) enriched shale-normalised pattern. The uppermost part of the investigated interval is again characterised by “flatter” shale-normalised patterns with a more “shale –like” behaviour but have different absolute REE contents.

The occurrence of weak Ce positive anomalies and lower overall REE contents in lower horizons of MIS 5e and 6 suggests a larger contribution of authigenic carbonate fraction, characterised by absence of Ce anomaly and reduced REE content with respect to detrital lithogenic material (Johannesson et al., 2006), that weakly contributed during deposition of upper horizons. In any case suggestions of variable detrital and authigenic contributions at different depth of examined sequences can be recognised by shale normalised La/Yb, Pr/Yb, Nd/Yb and Gd/Yb elemental ratios always depicting mixing hyperbolas.

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