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Reconstructions of Saharan Dust Supply to the Mediterranean based on aeolian Hematite and Goethite

M. Höcker (1), C.M. Köhler (1), D. Heslop (1), T. von Dobeneck (1), W. Krijgsman (2) and C.G. Langereis (2)

(1)University of Bremen, Germany, (2)University of Utrecht, The Netherlands

The alternation of sapropels and marls is a characteristic climate controlled feature in many sedimentary sequences in the area of the Mediterranean. To study the impact of tectonic and climatic events on the Mediterranean environment, we focus on a number of Neogene major reorganisations. Late Miocene sediments (9.7 - 7 Ma) of the Metochia section (Gavdos Islands) mirror a strengthening in the Asian monsoon system (9 - 8 Ma) and, later, the tectonic closure of the Atlantic gateway triggered the Tortonian salinity crisis (7.8 -7.6 Ma). More recently, the uplifted Punta Piccola section (Sicily) recorded a further climate reorganisation (3 - 2.4 Ma), corresponding to the build up of large Early Pleistocene continental ice shields in the northern hemisphere. Abundances of hematite and goethite are used as proxies for North African dust input. Both minerals provide information on the alternation between arid and humid periods and are transported to the Mediterranean by the winds of the North African monsoon system. The variability of hematite and goethite grain sizes could therefore be indicative of palaeomonsoon intensity and source area weathering regimes. We have identified goethite in pilot samples from all sections using MPMS technology. During heating to 400 K, the Neél point of goethite was observed and upon cooling in a field, a weak TRM was formed. To provide a rapid quantification of goethite content, samples are heated to 450 K and allowed to cool in a 0.84 T Halbach cylinder. The magnitude of the resulting TRM is then used to represent goethite abundance. XRF data provide a Ti/Al ratio, serving as a proxy for the balance between aeolian and fluvial input. The ratio of Fe/χ acts as an indicator of modification to the magnetic mineral assemblage by reductive diagenesis. The study will be extended to other sections of the region to reconstruct the spatial and temporal reorganisation of the North African monsoon system during periods of regional tectonic evolution.