



Rock magnetism and paleomagnetism of the Montalbano Jonico section (Italy)

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The Montalbano Jonico section, cropping out in Southern Italy represents a potential candidate to define the Lower/Middle Pleistocene boundary and it has been proposed as suitable for selection of the GSSP of the Ionian Stage (Middle Pleistocene). The combined biostratigraphy and sapropel chronology, tephra stratigraphy and a complete high-resolution benthic and planktonic foraminiferal stable oxygen isotope record provide strong chronostratigraphic constraints and point out the global chronostratigraphical value of the Montalbano Jonico section, which is the only continuous benthic and planktonic ^{18}O on-land reference in the Mediterranean area for the Mid-Pleistocene transition, between about 680 and 1240 ka.

A paleomagnetic study was carried out with sampling of 55 oriented cores in 80 m in one sector (Ideale section) of the composite Montalbano Jonico section, including the volcanoclastic layers V3 and V4 and spanning the oxygen isotopic stage 19, with the aim to precisely locate the position of the Brunhes-Matuyama reversal. A pilot study indicated that both thermal and alternating field (AF) stepwise demagnetization methods provide consistent results and allow the clear identification of a characteristic remanent magnetization (ChRM). On the basis of these results all the samples were subject to AF demagnetization in 12 steps up to a maximum AF peak of 100 mT. The ChRM was clearly determined by principal component analysis for all samples, as indicated by linear paths toward the origin in orthogonal vector diagrams between 5-10 mT and 50-60 mT. The ChRM declination and inclination for the samples of the Ideale section indicate that the sampled interval shows always a constant normal polarity. The ChRM declination oscillates around 0° and the ChRM inclination around the expected value (59°) for a geocentric axial dipole field at the sampling locality. This result indicates that the section should have been remagnetized during the Brunhes Chron. A preliminary study of 27 other not azimuthally oriented hand samples, collected at various levels from other parts of the sub-horizontal 450 m thick Montalbano Jonico composite section, indicate that all the samples are of normal polarity and point out that the remagnetization is widespread across all the exposed stratigraphic sequence.

A series of specific rock magnetic techniques were then applied to investigate the nature of the main magnetic carrier in the study sediments. These measurements include the stepwise acquisition of an isothermal remanent magnetization (IRM) in fields up to 1 T, the thermal demagnetization of a composite IRM, the analysis of the hysteresis behaviour and of first order reversal curves. The results indicate that samples are saturated in field of 0.5 T, and that the main magnetic carrier shows typical coercivities of the order of 30 mT (B_c) and 60 mT (B_{cr}) and is characterized by maximum unblocking temperatures between 350 and 400°C. In several samples the AF demagnetization induced the acquisition of a significant GRM in peak fields higher than 50-60 mT. The whole rock magnetic evidences suggest that the main magnetic mineral in the Montalbano Jonico section is the iron sulphide greigite. Therefore, we infer that the remagnetization of the section is due to the late-diagenetic growth of greigite under reducing conditions, that most likely caused also the almost complete dissolution of the original magnetic minerals. Specific scanning electron microscope observations and elemental microanalysis are in progress, with the aim to identify the mechanism of remagnetization in the section.