Geophysical Research Abstracts
Vol. 13, EGU2011-8996-1, 2011
EGU General Assembly 2011

Magneto-biostratigraphy and rock-magnetism of the late Cretaceous-late Paleocene Ardo section (Belluno Basin, NE Italy).

Edoardo Dallanave (1), Claudia Agnini (1), Giovanni Muttoni (2), and Domenico Rio (1)

(1) Dipartimento di Geoscienze, Università degli Studi di Padova, (2) Dipartimento di Scienze della Terra, Università degli Studi di Milano

Here we present the magnetic polarity stratigraphy and rock-magnetic properties of the ∼100 m-thick upper Cretaceous–upper Paleocene Tethyan marine South Ardo section (Belluno Basin, NE Italy). The paleomagnetic results, integrated with calcareous nannofossil biostratigraphy, indicate that the section extends from Chron C29r to Chron C24r, encompassing nannofossil Zones Micula prinsii–NP9 (Maastrichtian–Thanetian). The sediment accumulation rates, determined by means of correlation with the CK95 geomagnetic polarity time scale, vary from ∼3 m/Myr in the basal ∼15 m, up to ∼15 m/Myr upsection. Rock-magnetic data indicate that magnetic mineralogy of the Paleocene sediments generally consists of a maghemite-magnetite mixture coexisting with minor amounts of hematite. We used the age-depth function to place the rock-magnetic variability on a temporal reference frame; we integrated this new dataset with already published rock-magnetic data from the nearby late Paleocene–early Eocene Cicogna section (Dallanave et al., 2009; 2010). These data indicates that relatively warmer climate periods (i.e. the Paleocene-Eocene Thermal Maximum and the early Eocene leading to the Early Eocene Climatic Optimum) are associated with high relative content of detrital hematite with respect to magnetite-maghemite, while relatively cooler climates (i.e. the Paleocene) are associated with a relative increase of magnetite-maghemite. We speculate that the relative increase of detrital hematite observed during global warming periods is associated with enhanced chemical weathering conditions. This scenario is supported by the fact that hematite is one of the most abundant iron oxide phase produced on land during the chemical weathering of Fe-bearing silicates under warm and humid climates. Our hypothesis is confirmed by a statistical correlation between rock-magnetic properties and global climate as revealed by a standard benthic oxygen isotope record from the literature. This approach confirms the existence during the latest Cretaceous–early Eocene interval of the silicate weathering negative feedback mechanism for the long-term stabilization of the Earth's surface temperature first proposed by Walker et al. (1981).

References:
Dallanave, E., Agnini, C., Muttoni, G., Rio, D. (2009). Magneto-biostratigraphy of the Cicogna section (Italy): Impllications for the late Paleocene–early Eocene time scale. Earth and Planetary Science Letters 285, 39–51, doi:10.1016/j.epsl.2009.05.033.
Dallanave, E., Tauxe, L., Muttoni, G., Rio., D. (2010). Silicate weathering machine at work: Rock magnetic data from the late Paleocene–early Eocene Cicogna section, Italy. Geochem. Geophys. Geosyst., 11, Q07008, doi:10.1029/2010GC003142.
Walker, J.C.G., Hays, P.B., Kasting, J.F. (1981). A negative feedback mechanism for the long-term stabilization of the Earth's surface temperature. J. Geophys. Res. 86, 9776–9782, doi:10.1016/j.quascirev.2003.11.007.