Ber. Inst. Erdwiss. K.-F.-Univ. Graz	ISSN 1608-8166	Band 17	Graz 2012
IGCP 580, 4th Annual Meeting	Graz, 24-30th June 2012		

Magnetic susceptibility and gamma ray spectroscopy of the Jurassic/Cretaceous boundary section, Le Chouet (Vocontian basin, SE France)

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Integrated biostratigraphic (ammonites, micro- and nannofossil) and magnetostratigraphic study is focused on LeChouet section (Vocontian basin, SE France), as one of key sections studied within a frame of Berriasian Working Group of ICS (WIMBLEDON et al., 2011). Additionally, detailed rock magnetic, magnetic susceptibility (MS) and gamma ray spectroscopy (GRS) are carried out in order to understand better the palaeoenvironmental changes in the Jurassic/Cretaceous boundary interval.

The section, ca. 30 m thick is situated about halfway between the Berrias type section in the west (GALBRUN, 1985) and the Western Alpine overthrust in the east. It comprises mostly thin – to medium bedded micritic limestones intercalated by a few horizons of brecciated limestones and slumps indicating slope instabilities (JOSEPH et al., 1988). The age of the sequence (Late Tithonian – Early Berriasian) is documented by calpionellids and ammonites (*Crassicollaria* – *Calpionella* calpionellid zones; *Durangites* – *Jacobi* ammonite zones), as well as magnetostratigraphy (M20n1r in the bottom of the section to M19n). MS (mass normalized), anhysteretic remanent magnetization (ARM) and isothermal remanent magnetization (IRM) in 1T and -100 mT were measured for all magnetostratigraphically studied horizons (86 samples). GRS measurements were performed in 44 horizons. The most important magnetic mineral is magnetite, however hematite rich samples occasionally also occur. MS signal is very weak, close to diamagnetic, and generally decreasing between Tithonian and Berriasian (Fig. 1), which is a typical feature in that time interval (see GRABOWSKI, 2011 and references therein). It reveals a moderate correlation with IRM1T (R^2 = 0.47) which indicates that ferromagnetic minerals significantly contribute to MS. The correlation with ARM is worse (R^2 = 0.263, so fine grained (close to SD) magnetite is not a dominant carrier of MS. Samples with hematite are related to slumped horizons and reveal characteristically low natural remanent magnetizations (NRM) intensities, below 2 x 10^{-4} A/m, while the NRM of typical samples varies between 2 and 7 x 10^{-4} A/m. The results of GRS logging are not easy to interpret. The correlation between K and Th is low to moderate (R^2 = 0.31), while between those two elements and U even worse (R^2 close to 0). Both K and Th reveal a moderate correlation with MS, which confirms that the latter is mostly related to detrital lithogenic input. Maximum U content correlate well with slumped beds and hematite horizons. It might be speculated that slumped beds might have been originally rich in organic matter which was subsequently oxidized – therefore apparently unusual coexistence of U and hematite is now observed. The second explanation is that hematite and U might be linked to enhanced detrital inputs of specific mineral phases from the neighbouring continent. The Th/U ratio, disregarding the data from slumped beds which were affected by redeposition, show a slow increasing trend from slightly dysoxic (Th/U between 0.8 and 1.3) to oxic environment (Th/U above 1.3) in the topmost part of calpionellid zone A onto the base of zone B and encompassing the J/K boundary.

Acknowledgements: Studies were carried out within a frame of the Polish – French bilateral cooperation 7841/R09/R10 (“Polonium”) and funded by the Ministry of Science and Education (project No. 683/N-POLONIUM/2010/0).

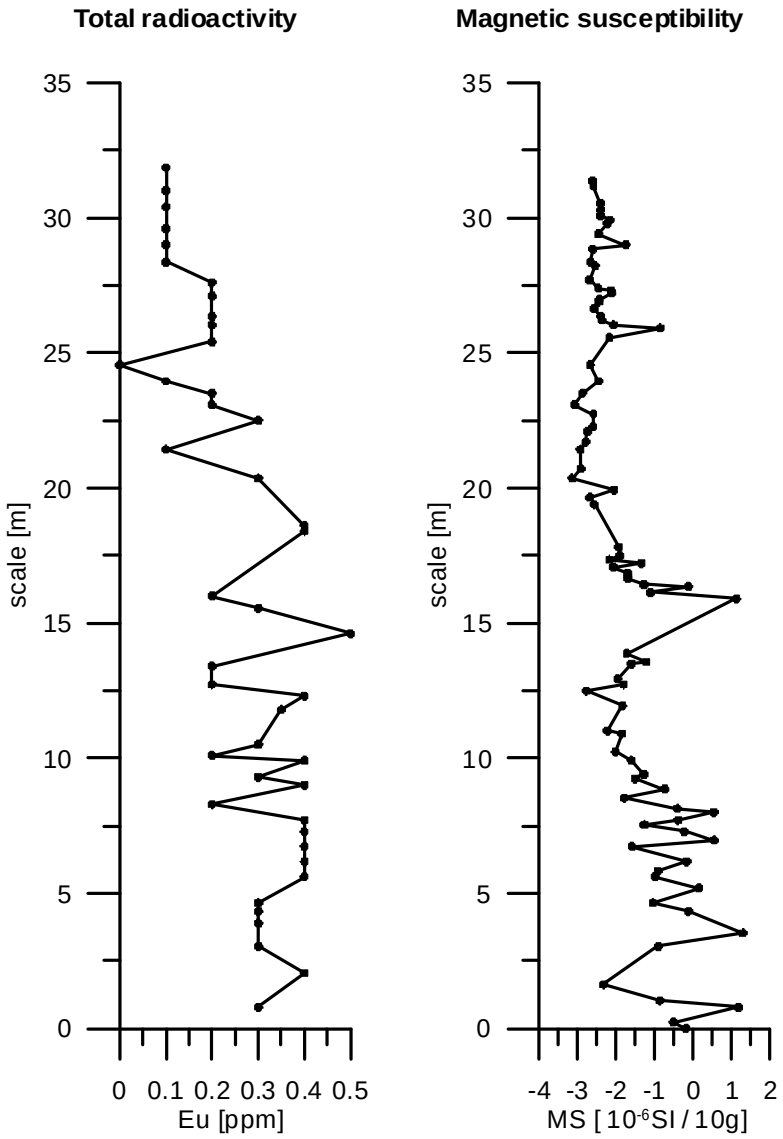

Fig. 1: Gamma-ray and MS logs of le Chouet section. Note that both GRS and MS decrease from Tithonian to Berriasian. Eu is total radioactivity recalculated as equivalent of Uranium.

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