INTEGRATED BIO- AND MAGNETOSTRATIGRAPHY OF THE TITHONIAN – BERRIASIAN INTERVAL IN THE TETHYS OCEAN: IMPLICATIONS FOR THE DEFINITION OF THE JURASSIC/CRETACEOUS BOUNDARY

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The Jurassic/Cretaceous boundary time interval is characterized by a major calcareous nannofossil speciation episode: several successful genera and species first appear and rapidly evolve, particularly nannolith genera show a progressive increase in diversity, abundance and degree of calcification through time (Roth, 1989; Bralower et al., 1989; Erba & Quadrio, 1989; Bornemann et al., 2003; Bown et al., 2004; Tremolada et al., 2006; Casellato & Erba, 2007). In the Tethys ocean this event is associated with a major change in pelagic sedimentation from predominantly siliceous to mostly calcareous (transition from Rosso ad Aptici /Rosso Ammonitico Superiore to Maiolica).

Magneto- and calcareous nannofossil biostratigraphy, and nannofloral relative and absolute abundances have been investigated on selected Tethyan land sections (Monte Pernice, Torre de Busi, Foza, Colma di Vignole, Frisoni - Southern Alps, Italy) in order to integrate calcareous nannofossil events with the polarity chron sequence and, where available, with calpionellid biostratigraphy. Biostratigraphic investigations have been performed directly on un-heated magneto-core end pieces: calcareous nannofossil biostratigraphy, relative and absolute abundances have been performed on simple smear slides and ultra-thin sections (7-8 μm thick), calpionellid biostratigraphy has been investigated on thin sections. All known calcareous nannofossil Zones and Subzones (Bralower et al., 1989) have been recognized. Differences in some taxa ranges have been also pointed out, due to the high-resolution sampling (one sample every 5 - 40 cm). *Chitinoidella*, *Crassicollaria* and *Calpionella* Zones have been identified across the Jurassic/Cretaceous boundary (Remane, 1986; Pop, 1994b; Reháková & Michalík, 1997). Nine polarity chrons (from CM24 to CM17) have been identified.

Quantitative nannofossil studies indicate that nannolith taxa (firstly *F.multicolumnatus*, then *C.mexicana*, finally *P.beckmannii*) increase significantly in abundance, size and degree of calcification gaining lithogenetic proportion. The abundance acmes are reached in discrete steps between calcareous nannofossil Zones NJ-20B and NJK-A, in the interval marked by the first occurrence of calcified calpionellids. Nannoconids also appear and rapidly evolve across the

Tithonian/Berriasian boundary, reaching lithogenetic abundances from calcareous nannofossil Subzone NJK-C to NK-1. High nannoconid abundances are concomitant with the well known Acme of *Calpionella alpina* spherical forms, both contributing to most Maiolica micrite. Calibration with magnetostratigraphy indicates that these trends could be very useful as additional bio-horizons in the Tithonian and for locating the Jurassic/Cretaceous boundary, especially when ammonites are absent, as in the Tethyan Maiolica. In particular, the speciation of highly-calcified nannofossil forms, and the remarkable abundance and size increase, could provide new reliable stratigraphic events for the Jurassic/Cretaceous boundary interval in low latitudinal pelagic and hemipelagic sequences.

We emphasize that integrated stratigraphy based on calcareous nannofossil and capionellid events and magnetostratigraphy, is a powerful tool for characterizing the Jurassic/Cretaceous boundary interval at enhanced resolution.