

New tools for detecting the Miocene/Pliocene boundary in the Mediterranean region by means of calcareous nannofossils

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The recognition of the Miocene/Pliocene boundary in the Mediterranean region by means of calcareous nannofossil has been widely debated. Three important biological events take place very close to the Zanclean base and are very well constrained outside the Mediterranean: the last occurrence (LO) of *Triquetrorhabdulus rugosus*, the first occurrence (FO) of *Ceratholithus acutus* and the LO of *Discoaster quinqueramus*, respectively astronomically calibrated at 5.231 Ma, 5.372 Ma and 5.537 Ma by Backman & Raffi (1997). All these biohorizons anyway show low applicability in the Mediterranean region. The presence of typical *Discoaster quinqueramus* is a controversial point. Many authors (e.g. Raffi *et al.*, 2003 and reference therein) assess that this species, and the co-distributed, similar *D. bergrenii*, are not present in the Mediterranean area. On the other hand, the presence of typical specimens is documented in the Mediterranean area (Mazzei, 1985; Cipollari & Cosentino, 1995; Iaccarino *et al.*, in press), but the scattered distribution and the low frequencies do not allow to define either a FO or a LO at synchronous levels in the Mediterranean area.

Both *T. rugosus* and *C. acutus* are rare in the Mediterranean area. Rio *et al.* (1984) and Di Stefano *et al.* (1996) did not mention the presence of *C. acutus* in the Zanclean of the Capo Rossello area and southern Italy. Castradori (1998) points out the presence of very rare *C. acutus* only in one sample in the basal Zanclean sediment of Site 969B succession (Eastern Mediterranean).

Here, we present data from four sedimentary sequences encompassing the Miocene/Pliocene boundary, located in different areas of the Mediterranean basin. From west to east, we have selected ODP Hole 975B (Balearic Basin, western Mediterranean), the Cava Serredi section (Tuscany, central Italy), the Montepetra borehole (Emilian Apennines, NE Italy) and ODP Hole 969B (Mediterranean Ridge, eastern Mediterranean). All the selected sections have been investigated at high resolution, with the exception of the Montepetra borehole, performing quantitative analyses on the whole assemblage, to better highlight the presence of useful biohorizons.

Our study confirms that *C. acutus* and *T. rugosus* are very rare in the Mediterranean area, and do not provide useful bioevents through the investigated sections. Particular attention has been paid to selected taxa that were known to be potentially useful for biostratigraphy. The quantitative analyses on the *Reticulofenestra* genus pointed out the presence of a sharp paracme interval, very close to the Zanclean base, previously documented on a qualitative basis (Castradori, 1998; Di Stefano *et al.*, 1996). On the contrary, small reticulofenestrads (less than 7 μm) dominates the nan-

nofossil assemblage within the same stratigraphic interval. In addition, we have tested the biostratigraphic value of a peculiar circular morphotype of *Reticulofenestra*, whose presence seems to be restricted to the lowermost part of the Zanclean.

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