

## GELASIAN TO CALABRIAN ONLAND MARINE RECORD: THREE CASE STUDIES IN THE MEDITERRANEAN AREA

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ABSTRACT: Baldanza A. *et al.*, *Gelasian to Calabrian onland marine record: three case studies in the Mediterranean area*. (IT ISSN 0394-3356, 2011)

Neogene to Quaternary marine sedimentation along the Italian peninsula occurred into physiographical articulated basins and was characterized by a paleoenvironmental diversification, both nearshore and offshore. Nevertheless, the nannofossil biostratigraphy allows comparisons in the Mediterranean area, also in the case of on-land sections. Three case studies are here proposed, testifying the importance of Calcareous Nannofossils also to correlate on-land sections throughout Italian Neogene deposits.

RIASSUNTO: Baldanza A. *et al.*, Record marino del Gelasiano-Calabriano su serie a terra: tre casi di studio nell'area mediterranea. (IT ISSN 0394-3356, 2011)

La sedimentazione marina lungo la Penisola Italiana, durante il Neogene e il Quaternario, ha avuto luogo entro bacini dalla fisiografia articolata e riflette differenze sia in ambiente costiero che distale. Tuttavia, la biostratigrafia a Nannofossili permette correlazioni nell'area mediterranea, anche nel caso delle successioni a terra. Tre situazioni vengono proposte in questa sede, nell'intento di mostrare la fondamentale importanza dei Nannofossili calcarei anche nelle correlazioni di successioni a terra di depositi neogenici italiani.

Key words: Nannofossil stratigraphy, Mediterranean area, Gelasian, Calabrian.

Parole chiave: Stratigrafia a Nannofossili, Mediterraneo, Gelasiano, Calabriano.

The evolution of coastal marine environments along the Italian peninsula, throughout the Neogene and the Quaternary, is related to the late phases of the Apennine chain - foredeep basin - foreland eastward migration, and to the opening of the Tyrrhenian Sea. The Pliocene and Pleistocene marine successions have been deposited into physiographical articulated basins and are characterized by a paleoenvironmental diversification, taking place on coastal environments as well as on basin deposits. Nevertheless, Foraminifer and Calcareous Nannofossil stratigraphy allow to compare deeply different situation in the Mediterranean area, also in the case of onland sections: three case studies are here proposed (Fig. 1).

1 - The western Umbria Plio-Pleistocene marine record, from *Città della Pieve* to *Orvieto* (Central Italy) is characterized by shallow marine deposits, varying from gravel to sand, to clay (AMBROSETTI *et al.*, 1987; BIZZARRI, 2006). The evolution of the area among Pliocene and Pleistocene has been described in terms of two main sedimentary cycles, referable to Piacenzian *pp.* and Gelasian *pp.*-Santernian, respectively, and separated by the "Acquatraversa" stratigraphic gap (AMBROSETTI *et al.*, 1987; GIROTTI & MANCINI, 2003; MANCINI *et al.*,

2004). Coastal paleomorphologies varied from rocky coasts to deltaic coasts, to sand and gravel beaches locally fed by fan deltas (BIZZARRI *et al.*, 2005; BIZZARRI, 2006, 2007, 2010; BIZZARRI & BALDANZA, 2009). The documented facies heteropy is due to lateral subenvironmental variations, inherited from previous subaerial evolution of landscape, and testifies of a complex shoreline articulation. On the other hand, deposits distally homogenize to silty sand (transition to offshore) and clay/silty clay (offshore). Analyses on both Calcareous Nannofossils and Foraminifers lead to a stratigraphic review (BIZZARRI *et al.*, 2004; BIZZARRI, 2006; BIZZARRI & BALDANZA, 2006). The recent documentation of still unknown volcanic events, in the MNN 19b to MNN 19d stratigraphic interval (BIZZARRI *et al.*, 2003; FAMIANI, 2010; PECCERILLO *et al.*, in press), represents another fine stratigraphic tool to compare onland sections.

2 - The underground *Camerano* town (*Ancona*, Central Italy) allows to describe a composite sedimentological and stratigraphical section into Early Pleistocene marine deposits (LUCCIONI, 2007; BALDANZA *et al.*, 2010b), attributable to the Qm-A<sub>3</sub> phase (CANTALAMESSA *et al.*, 1986; CENTAMORE *et al.*, 1991, 2009; CENTAMORE & MICARELLI, 1997;

CENTAMORE & NISIO, 2003). Deposits are mainly characterized by yellow-brown sand and grey-green clay couplets; in the uppermost and in the middle cave system, matrix-supported gravel horizons also occur. Sand-clay couplets are interpreted as carbonatic turbidites (BALDANZA *et al.*, 2010b). The large clay fragments, matrix-supported gravels probably derive from seismic remobilization of partially lithified deposits along the basin's flank. Deposits suggest the sedimentation in a tectonically active basin, with mixed distal river and storm- to seismic-induced carbonatic turbidites deposits; nevertheless, biostratigraphic analyses on nannofossil content allow to refer them to Early Pleistocene (MNN 19c Nannofossil Subzone: RIO *et al.*, 1990).

3 - The north-eastern Sicily marine grey-blue clay deposits have been recently re-evaluated and



Fig. 1. Ubicazione of the study areas: 1= Orvieto area; 2= Camerano section; 3= north-eastern Sicily (Messina Province).

Ubicazione delle aree studiate: 1= Orvieto; 2= Camerano; 3= Sicilia nord-orientale (Prov. di Messina).

mapped (PINO *et al.*, 2007, 2009; TRISCARI *et al.*, 2007; BALDANZA *et al.*, 2010a), with the aim to better define the stratigraphic range. The nannofossil analyses allow to integrate the local stratigraphic succession (KEZIRIAN, 1992; DI STEFANO & LENTINI, 1995; MACCARRONE *et al.*, 2000). In the Messina Province, on the Tyrrhenian side of the Peloritani Mts., the most important clay unit (about 70m thick) has been studied in the Venetico and C.da Scarano outcrops, and the MNN 19e and MNN 19f Subzones have been recovered. Other reduced exposures, in the eastern Villafranca Tirrena area (C.da Baronello, Massa S. Lucia), also document the presence of

MNN 19b to MNN 19d Subzones. The occurrence of volcanic materials, still in the Early-Middle Pleistocene clay deposits of the Tyrrhenian side, is also reported (CASELLA *et al.* 2006; PINO *et al.*, 2007). On the Ionian side of Sicily, Early Pleistocene clay deposits are firstly reported in the nearby of Giardini Naxos (PINO *et al.*, 2007; BALDANZA *et al.*, 2010a).

The comparison of the three case study is an example of the large affidability of Nannofossils as stratigraphic marker, which confirms the identification, also in the onland sections, of the same Nannofossil events as in the Mediterranean ODP pits, in the same order, and shows the applicability to onland sections of the standard Mediterranean Neogene Nannofossil scales.

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