The Neogene/Quaternary boundary at the Monte San Nicola Gela section and its global correlation

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Abstract

The Gelasian Stage spans the interval from 2.58 and 1.80 Ma, and it represents the first stage of the Pleistocene Epoch and Quaternary Period. It was defined at Monte San Nicola section 6 km far from Gela town (South Sicily), just above the base of the sapropel A5 known as "Nicola Bed" (Rio et al. 1994, Lourens et al., 1996). The "Nicola Bed" corresponds to the MIS 103 and approximates the Gauss/Matuyama geomagnetic reversal. From a biostratigraphic point of view, the base of the Gelasian coincides with a sharp decrease of *Globigerinoides extremus*, a warm tropical species. Few meters above, a drastic reduction of Discoasterids have been described, with the extinction of *Discoaster pentaradiatus* at the MIS 100/99. Further, an increase of *Neogloboquadrina atlantica,* considered as polar species by Poore and Bergren (1975), occurs between MIS 100 and 96 (Lourens et al., 1996, Caruso, 2004; Becker et al., 2005; Capraro et al., 2022). *N. atlantica* well marks the interval between MIS 100 and 96 (2.52 and 2.4 Ma) and its increasing coincides with the stabilization of the Arctic ice sheet (Lisiecki and Raymo, 2005). The above mentioned calcareous planktonic species testify the drastic climate change occurred during the beginning of the Quaternary and have been astronomically calibrated in several successions from the Mediterranean area (Lourens et al., 1996, Caruso, 2004, Hilgen and Lourens, 2004, Capriaro et al., 2022). Initially, the Gelasian stage was proposed as the third stage of the Pliocene Epoch (Rio et al., 1994) and only later Gibbard and Head (2010) proposed it as the first stage of the Pleistocene, because this cooling is well recognizable in extra Mediterranean successions and occurs just above the Gauss/Matuyama geomagnetic reversal. This choice created considerable confusion in the Italian scientific community, since MIS 103 represents a warm climatic phase of the Earth' climate history which coincides with one of the strongest insolation peaks (MPCR 250; Hilgen, 1991). Most of Italian scientists were against this decision, because during the INQUA London congress (1948) was proposed the beginning of the Quaternary in coincidence of the first colonization in the Mediterranean area of molluscs considered as "northern guests" (i.e. *Arctica islandica*, *and Panopea norvegica* among all). However, their first real colonization is not easily recognizable as these molluscs live at bathymetries lower than 120 meters. On the basis of this considerations, Aguirre and Pasini (1985) proposed the Vrica section (Southern Italy) as GSSP for the base of the Pleistocene, introducing the term Calabrian (Gignoux, 1909) and, due to the absence of northern guests, proposed the base of Calabrian stage at the sapropel "e" coinciding with the increase of the polar species *Neogloboquadrina pachyderma* left coiling that falls at MIS 64 close to the Olduvai subchron. Although this latter bioevent has been astronomically calibrated at 1.805 Ma (Lourens et

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al. 1994, Caruso 2004, Hilgen and Lourens, 2004), the cooling trend is not so evident in the extra-Mediterranean successions and this has triggered a debate in the scientific community. Becker, J., Lourens, L.J., Hilgen, F.J., van der Laan, E., Kouwenhoven, T.J. & Reichart, G.J. 2005. Late Pliocene climate variability on Milankovitch to millennial time scales: A high-resolution study of MIS 100 from the Mediterranean. Paleoceanography, Paleoecology, Paleoecology, 228, 338-360.

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