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Lower–Middle Pleistocene ostracod assemblages from the Montalbano Jonico section (Basilicata, Southern Italy)

Giuseppe Aiello*, Diana Barra, Roberta Parisi

Dipartimento di Scienze della Terra, dell'Ambiente e delle Risorse, Università degli Studi di Napoli Federico II, Largo San Marcellino 10, 80138 Napoli, Italy

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ABSTRACT

The Montalbano Jonico section is a Pleistocene sequence, about 450 m thick, comprising silty clays and silty sands deposited during the upper part of the Calabrian Stage and lower part of the "Ionian" Stage. It is a candidate global boundary stratotype section and point for the Middle Pleistocene Subseries. Ostracod assemblage analyses were carried out on 40 samples from the uppermost levels of the Lower Pleistocene and the lowermost part of the Middle Pleistocene, with the aim of reconstructing the paleoenvironmental evolution around the Matuyama–Brunhes boundary. Taxonomic investigations, quantitative distribution data and statistical analysis (Q-mode cluster analysis) define four intervals, correlated with sea-level changes linked to Marine Isotope Stages (MIS) 21–18. The lower part of the section, ranging from 864.00 to 820.00 ka, was deposited in an outer shelf paleoenvironment during a period of high sea level associated with MIS 21. The transition to the second interval (815.42–785.62 ka) is marked by a shallowing trend, reflecting the MIS 20 decrease in sea level. The overlying part of the section (783.54–749.91 ka) yielded assemblages indicating a return to deeper-water conditions corresponding to the warm phase MIS 19. The uppermost interval was deposited during 746.60–740.54 ka, when cooling in MIS 18 produced a sea level drop. Here, some levels (164.20 m, 745.51 ka; 170.10 m, 743.05 ka; 176.10 m, 740.54 ka) show the presence of both "deep" and "shallow" autochthonous taxa, suggesting the occurrence of upwelling episodes during this cold phase. In some layers, deposited during warm stages, the ostracod assemblages indicate the presence of kenoxic bottom waters. The lowest paleo-oxygen levels are correlated with Marine Isotope Substages 21.3 and 19.1.

1. Introduction

Investigations into the taxonomy and distribution of Southern Italy's Plio-Pleistocene ostracods have provided, since the 19th Century (*e.g.* Costa, 1853; Seguenza, 1880), a level of data suitable for reliable paleoecological and stratigraphic reconstructions. The most relevant studies concerning Quaternary assemblages of the Ionian side of Southern Italy are the contributions by Ruggieri (1953), Colalongo (1966), Ciampo (1972), Greco et al. (1974) and Colalongo and Pasini (1980). The last of these papers analyses the ostracods of the well-known Vrica section, of great significance for the chronostratigraphy of the Pleistocene. The Pliocene–Pleistocene boundary was ratified by the International Union of Geological Sciences in 1984 at the top of sapropel "e" in the Vrica section (Aguirre and Pasini, 1985). Presently the section is recognized as Gelasian–Calabrian in age (brief review and extensive references in Maiorano et al., 2010), and now serves as the global boundary stratotype section and point (GSSP) of the Calabrian Stage, with an astronomical age of 1.80 Ma (Cita et al., 2012). The ostracod assemblages of the Monte San Nicola section, which contains the GSSP of the Gelasian Stage (Gibbard and Head, 2010; Gibbard et al., 2010), have been studied in detail by Abate et al. (1993, 1994), Aiello et al. (1993, 1996a, 1996b, 1996c, 2000), Barra et al. (1996) and Bonaduce et al. (1999, 2000), providing the basis, together with the aforementioned contributions, for Pleistocene ostracod systematics and paleoenvironmental interpretations. The only previous study of the ostracod

* Corresponding author.
E-mail address: aie64llo@hotmail.com (G. Aiello).

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assemblages of the Montalbano Jonico succession (Maiorano et al., 2008) concerns the IM-5 agosto section. This mid-Pleistocene part of the Montalbano Jonico composite section includes sapropel 19 (insolation cycle 90, ~954 ka). The results of that investigation showed the sensitivity of ostracod assemblages to paleoenvironmental factors, in particular bathymetry and dissolved oxygen levels in bottom waters.

The aim of the present paper is to describe the composition and variation of the ostracod assemblages recovered from sediments of the Montalbano section (Basilicata Region, Southern Italy; Fig. 1) at the Early–Middle Pleistocene boundary, and to investigate the relationship with paleoenvironmental changes during the considered time span. The Montalbano Jonico succession (MJS) has been regarded as a potential candidate for the Middle Pleistocene GSSP (Ciaranfi and D'Alessandro, 2005; Ciaranfi et al., 2010; Maiorano et al., 2010).

2. Materials and methods

Ostracod assemblages from 40 silty-clay samples, pertaining to the sampling of the Montalbano Jonico section described and dated in Ciaranfi et al. (2010), Maiorano et al. (2010) and Marino et al. (2015), have been studied. The astronomical calibration of the section has been provided using the sapropel pattern, the Ar/Ar age of selected volcaniclastic layers, biostratigraphic constraints based on calcareous plankton, and oxygen isotope records (Ciaranfi et al.,

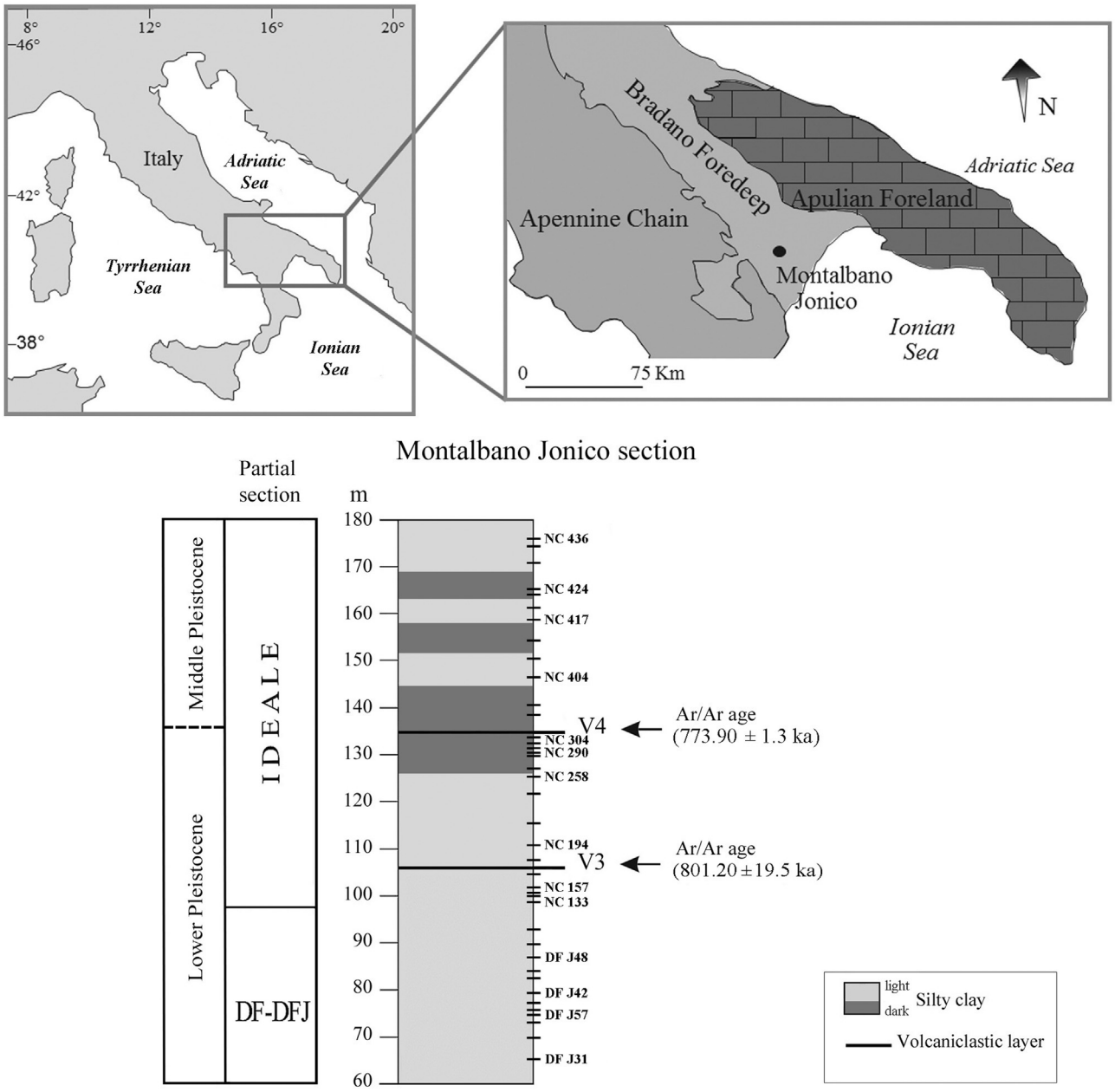

Fig. 1. Location, lithology and chronostratigraphy of the Montalbano Jonico section (following Marino et al. 2015); dashes on the right side of the lithological column indicate the location of samples examined.