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Stratigraphic palaeobiology around the Pliocene-Pleistocene boundary at Altavilla Milicia (Sicily, Italy)

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The Pliocene-Pleistocene around Altavilla Milicia, near Palermo (Sicily), includes a thick siliciclastic succession rich with shell beds, dominated by molluscs, brachiopods and annelids in fine-grained, totally bioturbated sandstones. Taphonomy of fossil assemblages indicates the importance of taphonomic feedback and within-habitat time-averaging in proximity of maximum flooding intervals. The trace fossil suite is characterized by the abundance of *Thalassinoides paradoxicus* boxworks and by local occurence of *Scalichnus*, *Piscichnus*, ?*Scolicia*, ?*Bichordites*, *Ophiomorpha*, ?*Gyrolithes*, *Palaeophycus*, *Diopatrichnus* and ?*Taenidium*. These trace fossils are typical of the archetypal *Cruziana* ichnofacies, with local elements of the proximal *Cruziana* ichnofacies, which point to deposition mainly below the fairweather wave base. Three depositional sequences, characterized by geometries driven by the interplay of eustatism and regional tectonics, were recognized through sedimentary facies analysis. Biostratigraphic data frame the oldest sequence in the upper Pliocene, whereas the thickest part of the succession, occupied by the second sedimentary sequence, includes biozone NN16b/17 of calcareous nannoplankton stratigraphy, thereby comprising the base of the Pleistocene. Transgressive deposits of the third and uppermost sequence are marked by encrusted and bioeroded pebbles with sparse oyster shells. The whole time interval is characterized by glacio-eustatic fluctuations in the 50–100 m range and with 100 ky-periodicity. We performed a multivariate analysis of 22 samples yielding 92 species of mollusks collected in the first and second sequences. Clustering and ordination analysis allowed to recognize a gradient controlled by depth-related environmental variables. At one end of the continuum we have a very-shallow water assemblage dominated by the bivalve *Loripes orbiculatus*, indicating an organic-rich seagrass bottom. Opposite in the continuum is an offshore assemblage dominated by *Corbula gibba* and the extinct gastropod *Petaloconchus intortus*. Both the shallowest and the deepest assemblages are from the first (Piacenzian) sequence. The gradient at intermediate depths is better characterized by restricting the analysis to 17 collections from the second sequence (Piacenzian-Gelasian). The shallowest assemblage is here dominated by upper shoreface species, such as *Tellina* spp. and *Spisula subtruncata*, and the deepest by muddy bottom, offshore transition species, such as *Venus nux*, the extinct gastropod *Nassarius semistriatus* and deposit-feeding nuculanoid bivalves. Plotting samples along the composite section allows to recognize two deepening-upward trends and two intervals of maximum flooding, in accordance with the sequence-stratigraphic interpretation. Stratigraphic palaeobiology proves to be a powerful tool to understand factors that control the geologic record during an interval of intense climate change.