Preliminary results on the post-evaporitic Messinian sequence of Eraclea Minoa (Sicily): biostratigraphy and palaeoenvironmental evolution

FRANCESCO GROSSI, ELSA GLIOZZI

Dipartimento di Scienze Geologiche, Università Roma Tre, L.go S. Leonardo Murialdo, 1, I-00146 Roma, Italy

The Eraclea Minoa section, located on the south-western coast of Sicily, 33 km SE of the city of Sciacca, is a well known geological site as it is the type locality for the Messinian/Zanclean GSSP (Van Couvering *et al*., 2000), and also one of the most famous section for the study of the Messinian Salinity Crisis. Although numerous authors have studied the Eraclea Minoa section with a great detail from a sedimentological and stratigraphical point of view (see Roveri *et al*., 2006 for updated references), the paleontology of the post-evaporitic Messinian portion counts very few studies (Decima, 1964; Sgarrella *et al*., 1997; Bonaduce & Sgarrella, 1999).

Recently, the 258 m-thick sedimentary succession cropping out at Eraclea Minoa has been sampled again with a great detail (when possible every 1 meter), with the aim of carrying out multidisciplinary paleontological (benthic foraminifers, molluscs, ostracods, pollen, dinocysts) and geochemical (Sr, O, C stable isotopes and trace elements) in order to depict the palaeoenvironmental changes that occurred during the lago-mare phase of the Messinian Salinity Crisis. In this communication we will present the preliminary results of the ostracod analyses.

The Messinian portion of the Eraclea Minoa succession is made up by eight (or ten) sedimentary cycles, each of which (except for cycles 6' and 6" in the 10-cycles option) starts with clays and marls interbedded with sands and thin layers of fine-grained carbonates and, in the upper part, is made of alternating layers of finely-laminated gypsum and gypsarenites. Paleontological samples were collected from each fine-grained portion of all the cycles.

The lowest three cycles crop out very badly. The few samples collected from Cycles 1 and 2 were sterile, while Cycle 3, completely barren at the base, yielded few ostracod valves in its upper silty portion, referable to *Cyprideis agrigentina* and *Loxoconcha mülleri*. This very scanty assemblage, to which few instars of Candoninae indet. are added, has been recognized also at the beginning of Cycle 4, but, going upwards, more diversified assemblages, although with low frequencies, have been recovered in the remaining portion of Cycle 4, and in Cycles 5 and 6. Together with *Cyprideis agrigentina* and *Loxoconcha mülleri* a progressively richer contingent of Paratethyan ostracod species appears along the section: *Loxocorniculina djafarovi*, *Loxoconcha eichwaldi*, *Loxocauda limata*, *Zalanyiella venusta*, *Loxoconcha kochi*, and *Amnicythere* spp. (among which *A. propinqua).* Cycle 7 (in the 10-cycles option, cycles 6', 6" and 7) marks an abrupt change of the assemblage that, for about 75m of thickness become monospecific, made only by abundant to very abundant *Cyprideis agrigentina*. In the upper portion of Cycle 7 and in the entire Cycle 8 (that in part includes the Arenazzolo Fm), the ostracod assemblages become diversified again, with the same species that occurred in the lower cycles, to which some other Paratethyan species are added, such as *Tyrrhenocythere pontica*, *Cytherura pyrama*, and *Euxinocythere (Maeotocythere) praebaquana*.

A first palaeoenvironmental interpretation based on the recovered ostracod assemblages would suggest, at the base of the post-evaporitic Messinian succession, the existence of a subaqueous environment characterised by physico-chemical parameters not suitable to host life. Going upwards, the first ostracods colonized the environment, *Cyprideis agrigentina* (which can withstand very huge salinity variations and low oxygen contents) and *Loxoconcha mülleri*, the first Paratethyan ostracod that it is supposed to inhabit brackish waterbodies up to mesohaline salinity). The environmental amelioration continued upsection, and the assemblages became more diversified, pointing to a brackish environment with salinities comprised in the mesohaline range. Abruptly, after the deposition of the selenitic gypsum that marks the end of Cycle 6, it is possible to suppose a remarkable palaeoenvironmental change towards and hyperhaline environment that, only at the end of Cycle 7 and during Cycle 8 was again diluted to oligo-mesohaline conditions. Such palaeoenvironmental interpretation is supported by the results of the percentage analyses of the sieve-pores on *Cyprideis agrigentina* valves carried out by Bonaduce & Sgarrella (1999) on two scattered samples along the Eraclea Minoa section, that gave salinity estimates around 50-70‰. Anyway, preliminary results on the percentage analyses of the sieve-pores carried on well-preserved valves of *Cyprideis agrigentina* collected in samples with monospecific assemblages from the base of Cycle 7 (cycles 6' and 6" in the 10-cycles option) do not show any hyperhaline condition, but gave salinity values around 8-11‰, in the mesohaline range, showing that the palaeoenvironmental history of the lago-mare facies at Eraclea Minoa is far more complicated than it was supposed.

References

Bonaduce, G., Sgarrella, F., 1999. Paleoecological interpretation of the latest Messinian sediments from southern Sicily (Italy). *Memorie della Società Geologica Italiana*, 54, 83-91.

Decima, A., 1964. Ostracodi del genere *Cyprideis* Jones del Neogene e del Quaternario italiani. *Palaeontographia Italica*, 57(1962), 81-133.

Roveri, M., Manzi, V., Lugli, S., Schreiber, B.C., Caruso, A., Rouchy, J.-M-, Iaccarino, S.M., Gennari, R., Vitale, F.P., Ricci Lucchi, F., 2006. Clastic vs. primary precipitated evaporites in the Messinian Sicilian Basins. R.C.M.N.S. *Interim Colloquium "The Messinian Salinity Crisis revisited-II" Post-Congress Field Trip, Acta Naturalia de "L'Ateneo Parmense",* 42 (4), 125-199.

Sgarrella, F., Sprovieri, R., Di Stefano, E., Caruso, A., 1997. Palaeoceanographic conditions at the base of the Pliocene in the Southern Mediterranean Basin. *Rivista Italiana di Paleontologia e Stratigrafia*, 103, 207-220.

Van Couvering, J.A., Castradori, D., Cita, M.B., Hilgen, F.J., Rio, D., 2000. The base of the Zanclean Stage and of the Pliocene Series. *Episodes*, 23 (3), 179-187.