Oligo-monospecific assemblage of calcareous nannoplankton in response to the Messinian paleoceanographic setting: insight from Monte dei Corvi section (Central Italy)

Alan Maria Mancini

Dipartimento di Scienze della Terra, Universita degli Studi di Torino, Torino, Italy. alanmaria.mancini@unito.it

Francesca Lozar

Dipartimento di Scienze della Terra, Universita degli Studi di Torino, Torino, Italy

Rocco Gennari

Dipartimento di Scienze della Terra, Universita degli Studi di Torino, Torino, Italy

Savannah Myers

Dipartimento di Scienze della Vita e dell'Ambiente, Università Politecnica delle Marche, Ancona, Italy

Alessandra Negri

Dipartimento di Scienze della Vita e dell'Ambiente, Università Politecnica delle Marche, Ancona, Italy

During the Messinian, tectonic uplift of the paleo-Gibraltar strait resulted in the progressive reduction of water exchange between the Atlantic and the Mediterranean, promoting a sluggish thermohaline circulation and resulting in periodic oxygen starvation at the sea bottom. Before the Messinian Salinity Crisis (MSC, 5.97 – 5.33 Ma), the hemipelagic sedimentation in the Mediterranean Basin was controlled by changes in the Earth orbital parameters, and was usually characterized by the rhythmic deposition of organic-rich marls, intercalated with white marls, diatomite or limestone. The organic rich-marls, often termed sapropels by different authors, are thought to be deposited during precession minima phases (insolation maxima), when the sea bottom suffered oxygen deficiency. A clear example of precession-driven sedimentation outcrops in the Monte dei Corvi section (Ancona, central Italy), where sapropels are intercalated with white limestones. Here, we present a high-resolution study of calcareous nannofossils (CN), coupled with petrographic investigation, conducted in four sedimentary cycles (from 6.55 to 6.48) at Monte dei Corvi section, in order to better constrain the paleoceanographic conditions that promoted the deposition of the sapropels and limestones. The CN assemblage recorded in the sapropels is dominated by taxa (*Discoaster sp.* and *Sphenolithus sp.*) which were able to proliferate in the lower photic zone, when the nutricline shoaled in the photic zone and a Deep Chlorophyll Maximum occurred. The sapropels are finely laminated with abundant small-sized pyrite and lack macro bioturbation. Both the micropaleontological and petrographic features therefore point to a strongly stratified water column during the sapropel deposition, a condition that prevented oxygen diffusions at the sea bottom through thermohaline circulation. Conversely, the limestone beds are nannofossils ooze characterized either by oligospecific or monospecific CN assemblage, composed of *Umbilicosphaera jafari* and/or *Reticulofenestra antarctica* and/or *Calcidiscus leptoporus*. The limestone beds are finely laminated, especially at the top, and the lamination is made by the alternation of white (fecal pellets with nannofossils) and brown (terrigenous prevalent) laminae. The low diversity of the nannofossils assemblage in the limestone deposits suggests extreme environmental condition in the upper water column,

probably related to high salinity, colder temperature and eutrophication. Therefore, we infer that the limestone beds were deposited in response to the recovery of the mixing processes in the photic zone, which stimulated CN productivity and export to the sea bottom. A detailed comparison with CN assemblage of about the same age recorded in S-E Spain (Sorbas Basin) indicates the same features but occurring in different lithofacies. These findings suggest that the paleoceanographic conditions responsible for the sapropel deposition differ across the various Mediterranean sub-basin; indeed, in the Sorbas Basin the onset of the sapropel coincides with a precession-driven cold phase. The achieved conclusions can be useful to better constrain, and potentially predict, the Mediterranean deoxygenation trend in response to the current climate change.