THE LEGNAGNONE SECTION (NORTHERN APENNINES): HIGH-RESOLUTION PALAEOENVIRONMENTAL EVOLUTION TOWARDS THE ONSET OF THE MESSINIAN SALINITY CRISIS.

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Abstract

An integrated study is presented on the lower Messinian, pre-/syn-evaporitic Legnagnone section, located in the Northern Apennine. The study of ostracodes, foraminifers, benthonic macrofossils and pollen associations, together with magnetostratigraphic and foraminiferal biostratigraphic data, allow reconstructing a chronostratigraphic framed paleoenvironmental evolution during the uppermost phase leading to the Messinian salinity crisis and an high resolution stratigraphy of the pre-/syn-evaporitic transition.

Keywords: Messinian, Paleoceanography, Stratigraphy, Evaporites

An integrated approach to the study of the pre-evaporitic sediments in the Mediterranean basin [1] permitted to define a precise time frame of the evolutionary steps towards the MSC (Messinian salinity crisis). Unfortunately, these studies are often carried out in sections lacking primary gypsum (PLG [2]); conversely, they record the deposition of clastic evaporites, both sulphates and carbonates (RLG and Calcare di Base, [2]). Due to these problematic, comprehensive palaeoceanographic reconstructions of the evolution towards the MSC are related to different geological settings. An integrated study of the Legnagnone section (Northern Apennines) was carried out to reconstruct the chronology and palaeoenvironmental evolution of the latest pre-evaporitic events preceding the MSC onset in a marginal area.

The Legnagnone section is located in the Northern Apennines chain. It rests unconformably on Miocene calcarenites and it shows a fining upward trend from deltaic conglomerates and sandstones to marls with limestone intercalations. At the top of the prevalently marly portion of the section, two limestone/organic-rich shale couplets are present just below the first gypsum bed that is up to 10 m thick. Based on facies and stacking pattern characteristics of PLG evaporites in the western Mediterranean [3], the two basal cycles are here missing. Thus the first local gypsum bed can be correlated with the third PLG cycle. Biomagnetostratigraphic data allow to correlate the Legnagnone section with the Molinos-Perales section [4] and thus with astronomical curves. The presence of two *Turborotalita multiloba* influxes, an influx of *Globorotalia scitula*, several influxes of planktonic foraminifera, the coiling ratio of Neogloboquadrinids, and the Gilbert chron base indicate that the Legnagnone section is comprised between ca. 6.15 Ma and 5.9 Ma.

On the basis of benthonic macrofossils, foraminifers and ostracods, three distinct intervals can be recognised, depicting a palaeoenvironmental evolution from infralittoral well-oxygenated domain (up to ca. 6.13 Ma) to upper circalittoral-upper bathyal settings (from 6.13 to 6.03 Ma) and back again to infralittoral depths (from 6.03 Ma up to the MSC onset), both characterized by dysoxic bottom water.

The high percentage of reworked palynomorphs, especially dinocysts, makes unreliable the climatic value of palynological data from the base (54 m) up to 35 m (ca. 6.13 Ma). On the contrary the quite rich pollen assemblages in the upper part of the section, dominated by arboreal taxa (*Taxodium* type, *Engelhardia, Quercus*, *Ulmus*, *Juglans*), testify for a prevalent humid and warm climate.

Concluding, the proposed age of 5.96 Ma [5] for the onset of the MSC is marked by the disappearance of benthonic foraminifers and ostracods, preceded by the disappearance of planktonic foraminifers. However, data indicate that the deposition of sulphates is here delayed of at least two cycles. The lack of several gypsum cycles, replaced by laminated limestone, at the base of PLG deposits is a common features observed also at Sorbas basin and in Piedmont [6] casting a new light on the onset of the MSC.

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