



Palaeoenvironmental significance of organic facies variation across the Lower Toarcian in the northeastern sector of the Lusitanian Basin, Portugal

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The Pliensbachian - Toarcian is particularly well represented in the Lusitanian Basin (central western Portugal), dominated by benthic and nektonic marl-limestone succession, well dated by ammonites. In this general context, and besides all aspects related to the Toarcian Oceanic Anoxic Event (T-OAE), the Polymorphum (=Tenuicostatum) – Levisoni (=Serpentinum) ammonite zone boundary marks one of the most sedimentological changes occurred in the whole basin (Duarte, 1997). Among all well known available sections for this interval (e.g. Peniche and Rabaçal), the Alcabideque section shows at the base of Levisoni Zone a singular record of brownish marls very poor in macrofauna (the “Chocolate Marls”), unit that is exclusive of northern part of the basin (see Pittet et al., 2014). With the aim to improve the understand about the sedimentary vertical changes occurred between the late Pliensbachian (Emaciatum Zone) and the base of Levisoni Zone, and to clarify the palaeoenvironment of such unit, we developed an organic facies analysis, including palynofacies and organic geochemistry [total organic carbon (TOC), sulfur and biomarkers].

Results confirm that sediments are particularly poor in organic matter, with the highest TOC value reaching 0.41 wt.% around the top of Polymorphum Zone. In the studied succession (around 20 m thick) the organic content is represented mainly by components from palynomorph (essentially sporomorphs) and phytoclast (both opaque and non-opaque) groups (>85%). A strong change occurs at the base of Chocolate Marls, through a clear increase of sporomorphs under the form of tetrads and agglomerates and the lowest occurrence (<2%) of amorphous organic matter, after a peak of this group and marine palynomorphs recorded at the top of Polymorphum Zone. This continental influence occurred at the base of Levisoni Zone is also confirmed by the η -alkanes distribution profile and several biomarkers such as isoprenoids, terpanes and steranes.

With these data we emphasize the special sedimentation occurred in the Lusitanian Basin across the T-OAE, clarifying the sedimentary nature and the palaeoenvironmental significance of the “Chocolate Marls”, clearly associated with a drop in the sea level. This evidence agrees with the general interpretation presented by previous works about the sedimentary evolution of the whole Lower Toarcian of the western Iberian margin.

References

- Duarte, L. V. 1997. Facies analysis and sequential evolution of the Toarcian-Lower Aalenian series in the Lusitanian Basin (Portugal). *Com. Inst. Geol. e Mineiro*, 83: 65-94.
- Pittet, B., Suan, G., Lenoir, F., Duarte, L.V. & Mattioli, E. 2014. Carbon isotope evidence for sedimentary discontinuities in the lower Toarcian of the Lusitanian Basin (Portugal): Sea level change at the onset of the Oceanic Anoxic Event. *Sedimentary Geology*, 303: 1-14.