

Identifying controls on organic matter enrichments in hemipelagic settings: a biomarker approach

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The Marnes Bleues Formation (Aptian-Albian) from the Vocontian Basin (Southeastern France) shows many dark colored levels, some of which are concomitant to oceanic anoxic events OAE1a and OAE1b. These levels are scattered among a thick succession of organic matter (OM)-poor marls. The aim of this study is to compare the dark levels in order to determine whether their deposition was related to similar or variable mechanisms of formation.

The Goguel Level, Niveau Noir Interval, Fallot Interval, Jacob, Kilian and Paquier Levels were sampled, as well as encasing marls. Samples were analyzed by Rock-Eval pyrolysis and their biomarker content was analyzed using standard procedure.

The studied samples are characterized by low contents of organic carbon, with TOC values often lower than 2%. Maximum TOC values (up to 7.2%) were observed in the Goguel Level. The average TOC value of the marls is 0.74%. Hydrogen index (HI) and oxygen index values indicate type II to type III OM, with the highest HI values observed in the Goguel Level. Tmax values are generally below 435°C and indicate immature OM.

The biomarker contents of the different dark levels and marls are overall comparable. Their distribution indicate OM of marine origin deposited under moderately oxygenated conditions. The Paquier Level, however, differs by its abundance of archaea-derived compounds. Terrestrial plant biomarkers are present in low proportion in all the samples. The marls, as well as several dark levels, show a significant proportion of highly condensed polyaromatic compounds.

The Paquier Level excepted, the apparent homogeneity of results confirms that depositional conditions remained relatively stable in the hemipelagic setting of the Vocontian Basin during the studied interval. Nevertheless, differences in the relative proportions of minor compounds e.g. terrestrial plant biomarkers or polyaromatic compounds allow identify subtle differences in the depositional conditions.

Mots-Clés : Biomarker, Vocontian Basin, OAE, Marnes Bleues Formation