

High-resolution, quantitative description of chemical characteristics of a Cretaceous black shale horizon

Junichiro Kuroda[1], Naohiko Ohkouchi[2], Teruaki Ishii[3], Hidekazu Tokuyama[4], Asahiko Taira[5]

[1] Earth and Planetary Sci. U-Tokyo, [2] IFREE, [3] Ocean Floor Geotec., Ocean Res. Inst., Univ. Tokyo, [4] ORI, Univ. Tokyo, [5] Ocean Research Institute, Univ. of Tokyo

<http://ofgs.ori.u-tokyo.ac.jp/~ofgs/>

The Cretaceous stratigraphic record is punctuated within several important organic-rich black shale intervals representing quasi-global Oceanic Anoxic Events (OAEs). Many researches have focused on the paleoenvironmental conditions of these black shales using sedimentological and geochemical methods. However little is known about the detail variations in sediment geochemistry of these black shales. In this study we attempted high-resolution (10-micrometer scale), quantitative description of chemical characteristics of Livello Bonarelli (LB) black shale deposited during the Cenomanian/Turonian boundary (OAE2) at around 93.5 Ma. The LB is widely distributed in central Italy and consists of approximately 1 meter of unbioturbated black shales interbedded with light layers, and contrasts sharply with the extensive overlying and underlying pelagic limestones.

Major elemental compositions were determined by an electron probe microanalyzer for thin sections vertical to bedding-planes with high-resolution mapping technique (10-micrometer probe diameter; 10-micrometer scanning interval). Sediment components such as biogenic-Si, calcium carbonate and pyrite were reconstructed by image processing of Al, Si, P, Ca and Fe compositional mappings almost through the LB section. Total organic carbon (TOC) content was determined by an elemental analyzer for samples manually taken every 1.5 mm.

We found the following chemical features;

- 1) In the middle part of LB, TOC content is relatively high (up to 26%), whereas it increases intermittently in the lower and upper parts of LB.
- 2) TOC-enriched layers are clearly discriminated from those depleted in TOC.
- 3) The intervals enriched in TOC are depleted in biogenic-Si, and vice versa.
- 4) Pyrite concentrates in intervals where TOC content is high.
- 5) Calcium phosphate tends to be abundant in some intervals enriched in TOC.
- 6) Calcium carbonate often increases in which biogenic-Si is rich.
- 7) Biogenic-Si tends to be abundant in lower and upper part of the LB.

Based on these observations, in the presentation, we will discuss some paleoclimatological implications during the deposition of the Bonarelli black shale.