

## Kerogen analysis of sedimentary rocks deposited during the Cretaceous OAEs

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Some of the formations deposited during the mid-Cretaceous, which is extremely warm period, are characterized by organic-rich laminated black shale which was thought to be deposited as a result of repeated expansion of ocean anoxia, called 'the oceanic anoxic events (OAEs)'. Organic matter in the black shales from the levels of the OAEs is well preserved and abundantly contains organic microfossil (palynomorph). Palynomorph analysis under transmitted light microscope has been performed in the sedimentary rocks from the levels of the OAEs (e.g., Heimhofer et al., 2006), although most of the analyses were focused on only a few specific organic microfossils such as spore, pollen and marine algal cyst. In the present study, we analyze palynofacies and palynomorph including very-small size palynomorph such as acritarch of kerogens in sedimentary rocks from the levels of the OAEs in the Vocontian Basin.

Black shales were collected from the outcrops of the Goguel (OAE1a), Jacob, Kilian, Paquier, Leenhardt (OAE1b), unnamed (OAE1c), Breistroffer (OAE1d) and Thomel (OAE2) levels in SE France. These crushed samples were extracted with ultrasonication and their residues were sequentially treated by HCl and HF in a water bath shaker (Sawada et al., 2012).

From results of palynofacies analyses, it is found that amorphous organic matter (AOM) account for more than 80 % in whole kerogen. The relative abundances of weakly-fluorescent AOM (WFA), which is thought to be marine origin, were higher at the Goguel, Breistroffer and Thomel levels, while non-fluorescent AOM (NFA), which may be terrigenous origin was abundant at the Paquier and unnamed OAE1c levels. Moreover, the Thomel level is characterized by abundant fluorescent AOM (FA), which is thought to be fragment of terrestrial phytotissue, and phytoclasts (particle of cuticle and wood) were abundant at the Paquier, OAE1c and Thomel levels. We suppose that terrestrial input was enhanced during the OAE1b, 1c and 2. Above the Paquier level, trilete and monolete-type spores (spore of bryophyte or pteridophyte) were dominant in spore/pollen assemblage. These results imply that eutrophic condition at sea surface water in the Vocontian Basin after the OAE1b, because they favored wetter environment and their spore might be efficiently transported by fluvial system. The Paquier and more upper levels were predominated by dinocyst and related small acritarch, whereas Sphaeromorph-type acritarch that is related to Chlorophyta was mainly identified at the Goguel level. These cysts were thought to be originated from marine autotroph algae. Hence, it indicated that marine producer was different between these OAEs.

Keywords: oceanic anoxic events (OAEs), kerogen, dinoflagellate, acritarch, palynomorph, palynofacies