



First evidence of the Oceanic Anoxic Events in Cenomanian paleoceanic deposits of the Eastern Kamchatka

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They are a few stratigraphical levels corresponding to OAEs in the deep-water drilling sites in the Pacific ocean. Discoveries of evidences in fold-thrust belt of Pacific are important for correlation of Pacific ocean sections with well investigated sections of Europe. We studied Albian-Cenomanian paleoceanic carbonate-siliceous deposits of the Kamchatsky Mys Peninsula (Eastern Kamchatka, Russia). They are deposited in association with pillow-basalts and hyaloclastites. The thickness of the studied section (56°03.353'N, 163°00.376'E) is about 10 m. The deposits are represented mainly by rhythmical intercalation of red-brown radiolarian jaspers, pink nannoplankton limestones as well as siliceous limestones. In the middle and upper parts of the section there are two thin beds enriched by organic carbon. The thickness of the beds is about 2 cm and 5 cm. Such carbon-rich beds were also found in several other exposures. Near the carbonaceous beds jaspers and limestones lose red and pink colours and become gray and black (on the weathered surface almost white). The content of the mineral matter in the carbon-rich beds amounts 27-75%. It consists of biogenic silica and clay minerals (likely altered hyaloclastites). Carbonaceous beds contain pyrite, barite, phosphates in the form of pellets and fish bone detritus. Mo/Mn ratio in the mineral matter of carbon-rich beds corresponds to euxinic conditions. Total organic carbon contents change from 18 to 53%. The calculated values of the hydrogen and oxygen indexes indicate that the organic carbon originated from marine (sapropelic) organic matter.

In studied section the curve of $\delta^{13}\text{C}$ (analyzed in limestones) is characterized by a clearly expressed positive shift at the level of the lower carbonaceous bed. Below it and in the overlapping stratum of siliceous limestone (1 cm thickness) $\delta^{13}\text{C}$ has the values of 1.9-2.1 ‰, and above it $\delta^{13}\text{C}$ increases up to 2.5-3 ‰.

The radiolarian assemblages are dominated by Tethyan species. They exhibit higher diversity (10-20) in comparison to those of the moderate and high latitudes. Some species (i.e. *Schaafella tochilinae*, *S. deweveri*), which were known in DSDP holes drilled in the Hess Rise in the Pacific Ocean, were found in Kamchatka for the first time. The studied radiolarians limit the age of strata embedded between two carbonaceous beds to the Cenomanian and allow the correlation of those beds to the MCE (the Middle Cenomanian) and OAE 2 (the Cenomanian-Turonian boundary) oceanic anoxic events. The studied beds are the first evidence of Cretaceous OAEs in Kamchatka.

Organic beds among Cretaceous siliceous-carbonate deposits are recovered in Pacific ocean during deep-water drilling on some seamounts. Such seamounts formed at the time of active intraplate volcanism. Previous research established geochemical similarity of basalts of association described by us with basalts of volcanic seamounts of Pacific ocean (Portnyagin et al., *Geology*, 2008). The sedimentary deposits of Kamchatsky Mys Peninsula are similar to Cretaceous deposits of seamounts in lithological structure, presence of a few orders of rhythmicity, presence of basalts flows and sills, and also in the association of carbonaceous beds with volcanoclastic. Organic carbon-rich beds in the studied deposits have the common features with analogous beds on the Pacific seamounts (comparable contents of organic carbon, mainly marine organic matter and similar geochemical anomalies connected with organic beds). Therefore we suggest studied carbonaceous deposits were accumulated on the seamount top in the oxygen minimum zone during the most intense biological productivity of phytoplankton.