THE EARLY APTIAN ANOXIC EVENT IN THE BASIN OF THE RUSSIAN CRATON

YURI O. GAVRILOV*, EKATERINA A. SHCHERBININA*, ELENA V. SHCHEPETOVA*, EVGENY YU. BARABOSHKIN**

**Geological Institute of Russian Academy of Sciences, Moscow, Russia*

***Moscow State University, Moscow, Russia*

The lower Aptian organic carbon-rich sediments are spread in the central Russian craton and represent the reference horizon. They were studied in the transect from Ulianovsk to Saratov (middle reaches of Volga R.), where a layer of bituminous shale (BS) (4-7 m, TOC up to 9.6%) is embedded into clayey sequence. In the middle part of BS there is a bed of carbonatic lenses up to 0.7 m thick so-called "Aptian plate".

The stratigraphic range of BS (the ammonite Zone *Deshayesites volgensis* = *Deshayesites forbesi* and nannofossil Zone *Parhabdolithus angustus* = upper part of CC7 Zone) indicates that they are a regional manifestation of the global geological episode defined as Oceanic Anoxic Event-la (OAE la, Selli Event). Rare and rather poor preserved nannofossils are found only within BS and entirely absent in embedded sediments. In the early diagenetic stages, the most part of nannofosils was dissolved and redistributed $CaCO_3$ was concentrated in form "Aptian plate". Dissolution was probably the main process governed the formation of monospecific nannofossil assemblage. In sediments surrounding the "Aptian plate", the nannoplankton assemblage is dominated by the most resistant to dissolution and calcium overgrowing forms *Watznaueria* spp. (*W. barnesiae, W. britannica, W. ovata*) (>90%). Clear dissolution marks in coccoliths and the predominance of *Watznaueria* spp. (>50%) were also observed at higher levels of BS. At the same time, *Watznaueria* spp. are "low fertility group", and their ubiquitous prevalence over the eutrophic group (*Zeugrhabdothus*, *Biscutum*, *Parhabdolithus*) likely indicates a deficiency in nutrients in the basin. Nevertheless, such oligotrophic conditions as occurred during BS accumulation seems to be much more favorable for nannofossil survive than the environment before and after BS accumulation. The relative abundance of *Parhabdolithus* spp. (*P. angustus, P. splendens, P. asper*) against other non-*Watznaueria* spp. evidently indicates warm surface water.

Based on petrography and geochemistry of organic matter (OM), the basinal OM is predominant in the bituminous unit, while the embedded sediments contain mainly terrestrial OM. The enrichment in OM was caused by a bloom of bioproductivity of various marine plankton species including the bacteriaplankton and phytoplankton. The contribution of terrestrial OM to the total OM budget of BS was negligible.

Many chemical elements, in particular, biophile (C, P, and Fe) and redox-sensitive (Mo, Se, a.o.) elements are concentrated within BS. The clay mineral assemblage is composed of mixed-layered smectite-mica, hydromica, chlorite, and kaolinite, which increase in content coastward. The kaolinite content is also somewhat higher in the BS than in embedded sediments. The abundance of authigenic minerals proves high intensity of diagenetic processes in lower Aptian sediments. The thin lamination of bioturbation-free BS, the lack or extremely rare occurrence of high-tolerant benthic fauna, and the geochemical signature attest the sedimentation under anoxic conditions.

We suggest that accumulation of BS occurred under warm humid climate conditions during a very rapid eustatic transgression followed the vigorous regression. The increased supply of nutrients from drowned organic-rich coastal area resulted in increased primary productivity of bacteria, microplankton, and algae, leading to the accumulation of organic-rich sediments.

This research was support by RFBR Projects 01-05-64805, 03-05-64840, and the Federal Program "Integration".