The isotopic composition of carbon and oxygen in the oysters shells from the Jurassic/Cretaceous boundary strata from Maurynia River (Western Siberia)

Igor Kosenko
Novosibirsk State University, Trofimuk Institute of Petroleum Geology and Geophysics, Siberian Branch of RAS, Russia
(KosenkoIN@ipgg.sbras.ru)

The complex research of *Deltoideum* sp. oyster shells from Jurassic/Cretaceous boundary strata from Maurynia River (Western Siberia) was made. The research includes a study of shell material by optical methods and a study of isotopic ($\delta^{13}C$ and $\delta^{18}O$) and geochemical (Fe, Mn, Sr) composition of carbonate material.

The microstructure of the shells did not change by recrystallization; only small areas along the cracks in the shell show luminescence in thin sections (Fig. 1C). There is no correlation between the isotopic composition of carbon and oxygen (Fig. 1D). In the samples an increased content of Fe (710 to 1990 ppm) and Mn (250 to 660 ppm) is observed, but the content of Sr (620 to 730 ppm) indicates the absence of diagenetic alteration of carbonate material. There is no correlation between the isotopic composition of carbon and oxygen and contents of Fe and Mn. Thus, the investigated samples (from oyster shells) satisfy most of the criteria of well-preserved carbonate material (Wierzbowski & Joachimski, 2007) and are characterized by $\delta^{13}C$ and $\delta^{18}O$, reflecting the primary variations of the isotopic composition of C and O in the Jurassic-Cretaceous palaeoocean. Data obtained from oysters with existing data from belemnites were compared (Dzyuba *et al.*, 2013).

Absolute $\delta^{13}C$ values from oyster shells are higher than the values from belemnites. At the same time general trend of $\delta^{13}C$ changes in the cross-section obtained from oyster shells repeats the curve obtained from belemnites (Fig. 1A). Maximum $\delta^{13}C$ values are typical for Jurassic/Cretaceous boundary interval. The same trend is observed in other regions (Dzyuba *et al*., 2013). This indicates global perturbations in the isotopic carbon cycle during this period. Differences in absolute values are probably caused by various carbon isotope fractionation processes during the formation of the substance of oysters shells and belemnites (oysters have an external skeleton and belemnites have internal skeleton), and possibly caused by the difference of life environments of these organisms.

Vice versa absolute $\delta^{18}O$ values measured in oyster's shells were lower than values from belemnites. Differences between the absolute $\delta^{18}O$ values are probably due to the different mode of life of these molluscs. However, the trend of $\delta^{18}O$ values changes for oysters is similar to that for belemnites (Fig. 1A). This indicates the global temperature regime change on the planet at that time.

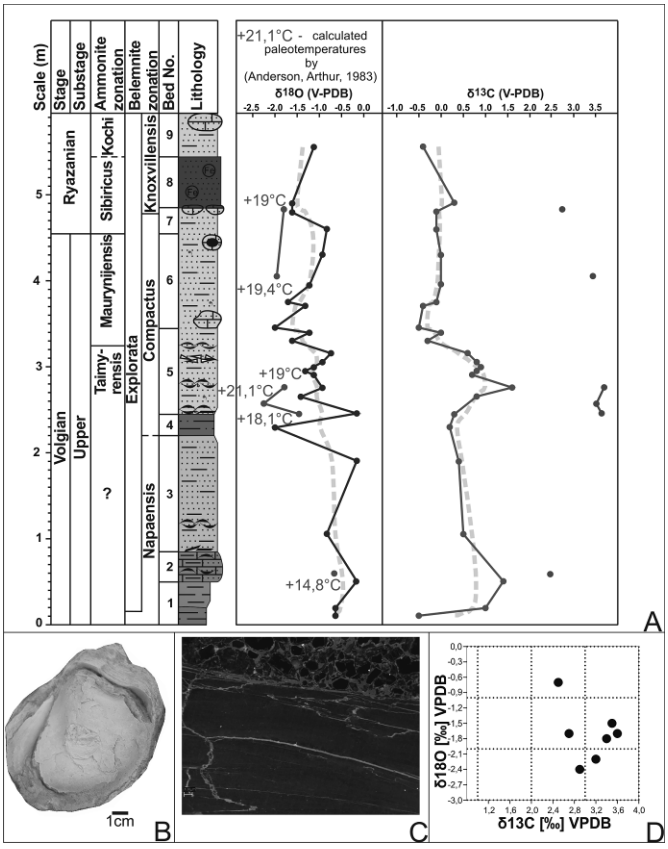

Fig. 1.: A – the cross-section of Jurassic/Cretaceous boundary strata on the Maurynia river with isotopic data from oysters (this paper) and belemnites (Dzyuba *et al*., 2013); B - the appearance of oyster *Deltoideum* sp.; C – the cathodoluminescence micrograph of oyster shell; D – the field of correlation between isotopic composition of carbon and oxygen (correlation is absent).

Anderson, T. F., Arthur, M. A. (1983): Stable isotopes in sedimentary geology, 10: 1-151.

Dzyuba, O.S., Isokh, O.P., Shurygin B.N. (2013): Palaeogeogr, Palaeoclimat, Palaeoecol, 381-382: 33-46.

Wierzbowski, H., Joachimski, M. (2007): Palaeogeogr, Palaeoclimat, Palaeoecol, 254: 523-540.

This work was performed with the support of RAS programs N23 and N28 and project N12-05-00453 of Russian Foundation of Basic Research.