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Isotopic composition of carbon and oxygen in the upper Devonian (Frasnian-Famennian) sections from the Kuznetsk Basin and Western part of South Urals

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One of the largest mass extinction occurred at Late Devonian close to the Frasnian-Famennian (F-F) boundary. The causes of this extinction event remain debated [Joachimski, Buggisch, 1993; McGhee, 2001; Murphy. et al., 2000; Racki, 1998]. Almost all over the world it coincides with the appearance of the black shales that reflects the anoxic conditions in the sedimentary basin (Lower and Upper Kellwasser events). Besides the black shale horizons, Kellwasser Event boundaries correspond to major positive excursions of δ^{13}C trend, whose values are up to 3-4 ‰ [Joachimski M. et al. 2002].

In Russia, in spite of wide spreading of the upper Devonian (Frasnian-Famennian) carbonate sections their isotopic studies have not been carried out.

Two sections cropped out in the North-Western Kuznetsk Basin (Kosoy Utyos section) and in the western part of South Urals (Akkyr section) were investigated. They are represented by upper Frasnian and lower Fammenian carbonates.

Oxygen and carbon isotope analyses were performed with a preparation line (Gas Bench II) connected online to a Thermo Finnigan 253 mass spectrometer. Micritic carbonates were used for the isotopic analysis in Kosoy Utyos section and brachiopod shells – in Akkyr section.

In both sections two positive excursion δ^{13}C and of δ^{18}O values are fixed. δ^{13}C values increase to 5,4‰ in Kosoy Utyos section and to 6,7‰ in Akkyr section. δ^{18}O increase from -8,8 to -7,3‰ in Kosoy Utyos section and from -4,4 to -2.9‰ in Akkyr section.

In comparison with other sections from different regions Kosoy Utyos and Akkyr sections have some peculiarities:

1) Magnitude and absolute values of δ^{13}C at the studied sections are greater then in carbonate section of Australia, Poland and Germany [Joachimski M. et al. 2002].
2) Observed δ^{18}O values in Kosoy Utyos section are 4‰ lower and in Akkyr section are 1,5‰ higher than in the other section [van Geldern et al. 2006].

Such differences in the isotopic composition of carbon can be explained by distant position of these basins - in higher latitudes than other described sections. Differences in the isotopic composition of oxygen in Kosoy Utyos section can be due to rainfall exceeding evaporation and melt water mixing at high latitudes [Jaffrés et al. 2007].

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