Isotopic fractionation between carbonate and organic carbon as evidence of a productivity crash at the P/Tr boundary in the Idrijca Valley (W Slovenia)

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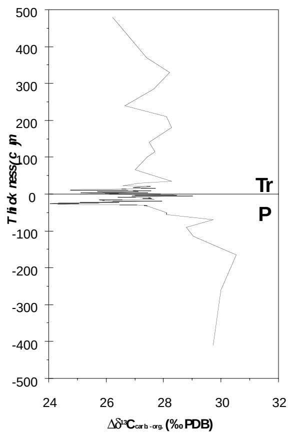
A high resolution study of inorganic and organic carbon δ^{13}C and $\Delta\delta^{13}$Ccarb.-org. variability in a continuously sampled 55cm thick P/Tr boundary interval from 33 cm below to 22 cm above the boundary, corresponding approximately to 480 kyr. shows a sharp decrease of $\Delta\delta^{13}$Ccarb.-org. values about 26 cm below and 11 cm above the boundary, as well as a dramatic increase in fractionation of carbonate-organic carbon from 23.03 ‰ to 29.03 ‰ at the boundary. The positive $\Delta\delta^{13}$C excursion of 5 ‰ occurs in a narrow stratigraphic interval only 26 cm thick corresponding to a time period of 357 kyr. This $\Delta\delta^{13}$C shift, which is associated with a reduction of the accumulation rate and a drastic disappearance of Upper Permian marine fauna observed in the fossil record, most probably indicates a sudden decrease and the end-Permian breakdown in primary production. Decreasing $\Delta\delta^{13}$C values below the boundary could be explained by an increase of primary production before the terminal Permian productivity crash, while the decrease of $\Delta\delta^{13}$C values immediately above the boundary could be related to unusual plankton blooms during the subsequent recovery in the biological system.

Figure 1: Carbonate-organic carbon isotope fractionation ($\Delta\delta^{13}$Ccarb.-org.) across the P/Tr boundary in the Idrijca Valley (W. Slovenia)



REE characteristics of technogenic products of the Orlovka Ta granite

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Geochemical characteristics of the Orlovka tantalum deposit, Eastern Transbaikalia (Russia), were studied using fractionation indicators (Zr/Hf, Y/Ho, Th/U, REE patterns) to discriminate the source rocks (barren versus mineralized granites, ores, shales, schists) that reflect specific evolution trends and features. Natural and technogenic samples were studied in order to link products of the ore processing plant (tailing pond sediments, concentrates after gravitation, flotation, magnetic separation) to its natural sources (ores from different rocks). Host rock geochemistry and relationships between different mineralized intrusive phases helped to determine the geochemical background of the area.

The Ta mineralization of the Orlovka deposit is related to the apical part of a Li-F enriched rare metal granite, which exhibits a fractionation sequence of two-mica, biotite, zinnwaldite-albite and lepidolite-amazonite granites (grey shaded area in Fig. 1). The granites (as well as their ore processing products) show typical patterns of highly evolved granites with steep Eu anomaly and developed REE tetrad effects. The poorly evolved Khangilay pluton is characterized by values of Zr/Hf (14-32) and Y/Ho (29-32), whereas more evolved granites and line rocks of the Orlovka deposit show strongly depleted ratios compared to chondrite (Zr/Hf 2-6 and Y/Ho 13-22). Less-evolved granites of the Orlovka stock show intermediate ratios for these element pairs. The Th/U ratios of granites show a slight increase during granite fractionation coupled with metasomatic processes in the Orlovka cupola. Technogenic samples from Orlovka granites inherit its geochemical signatures and allow discrimination from other sources.

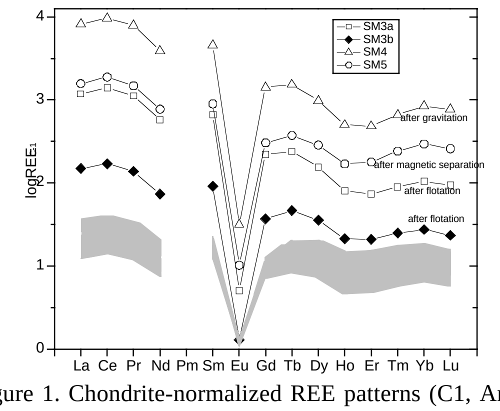

Figure 1. Chondrite-normalized REE patterns (C1, Anders & Grevesse 1989) of Orlovka granites (grey shaded box) and of technogenic samples (crushed granites) from the ore processing plant.