Early Paleozoic intrusives of the Kuznetsk Alatau, Siberia: Isotopic evidence of oceanic lithosphere participation in sources

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Products of the Early Paleozoic intrusive magmatism are represented in the Kuznetsk Alatau (KA) by granitoid, gabbro-syenite, and alkali basite complexes. They were formed during the period of about 510-490 Ma, which is in the Central Asian fold belt [1]. The magmatic activity implies the presence of multi-component melt sources with age that close to the age of the oceanic lithosphere formation. Nd-Sr isotopic signatures discovered for four studied complexes formed in different ways indicate possible participation of Paleo-Asian Ocean (PAO) lithosphere in the processes of magma generation at the Early Paleozoic stage of this ocean's evolution. The oldest complexes (about 510 Ma) are the differentiated series from gabbro to granodiorite as well as alkaline basic complexes. Despite the petrogenetic differences, these complexes have similar isotopic composition of Nd (εNd_T~ +4,8…+5,0). Such values are typical either for magmatic derivatives of moderately depleted mantle, or for mixing products of DMM or PREMA reservoirs with EM-type mantle and continental crust materials. The influence of crust contamination is seen in high ratio of Sr-isotopes in the rocks (εSr_T ~ +1…+28). Granitoids and gabbro–syenite series with the age of about 500-490 Ma don't have significantly different Nd-isotopic compositions (εNd_T ~ +3,5…+4,6). Apparently, it is confirmed by narrow range of these $T(Nd)_{DM}$ values (~ 0,8–0,9 Ga). According to different views [2, 3], the beginning of the Rodinia supercontinent's break-up, and following the PAO opening are estimated to be 970-800 Ma Based on our data, Sm-Nd isotopic age of ultrabasites and gabbroids of the layered series and restite suites varies from 955 to 890 Ma, respectively. Magmatism probably developed under the conditions of plume interacting with active continental margin coupled with MORB+PREMA+EM matter mixing.

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Mineralogical and geochemical variations in lower Godavari River sediments, Peninsular India: Implications to source rock weathering

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Godavari River is the third largest river in the Indian sub-continent, which originates in the Deccan Traps and drains an area of 3.1 x 10^5 km^2. The river flows in the east and the south-easterly direction for a distance of 1465 km before discharging into the Bay of Bengal. The major, trace and rare earth elements geochemistry and clay mineral compositions in bed sediments from lower reaches of Godavari River suggest that they are derived from weathering of felsic rocks. Trace and rare earth elemental compositions indicate evidence of sedimentary sorting during transportation and deposition. Lower concentrations of transition elements, such as V, Ni and Cr imply enrichment of felsic minerals in these bed sediments. The REE pattern in lower Godavari sediments is influenced by the degree of source rock weathering. The light rare earth elements (LREE) content are indicating greater fractionation compared to the heavy rare earth elements (HREE). A striking relationship is observed between TiO_2 and ∑REE content suggesting a strong control by LREE-enriched titaniferous minerals on REE chemistry. Shale-normalized REE pattern demonstrate a positive Eu anomaly, suggesting weathering of feldspar and their secondary products, which are enriched in Eu. Chondrite-normalised REE pattern is characteristic of felsic volcanic, granites and gnessic source rocks. Trace elemental compositions in sediments located near urban areas suggest influence of anthropogenic contamination. Chemical Index of Alteration (CIA) is high (avg. 65.76), suggesting a moderate chemical weathering environment. X-ray diffraction analysis in clay fraction shows predominance of clay minerals that are formed because of the chemical weathering of felsic rocks.

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