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Hotspot-ridge interaction in the Paleo-Asian Ocean: geochemistry and petrogenesis of Vendian accreted paleooceanic plateau basalts

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A 600 Ma new accreted oceanic plateau has been identified within the Kurai accretionary prism in Gorny Altai, SW Siberia, Russia. The accretionary prism hosts slivers of the Baratal oceanic island, which consist of mid-oceanic shallow marine carbonates and the underlying oceanic island/plateau basaltic units, oceanic ophiolites and serpentinitic mélange. The accretionary prism was folded in the Middle-Late Paleozoic. Sedimentary rocks of the paleo-island demonstrate a clear facies change from shallow-water reefal limestone, through deeper-water sedimentary-volcanogenic units, to terrigenous clastics interbedded with chert and limestone of island-slope facies. Uchio et al. (2002) determined the Pb-Pb age, 598$\pm$25 Ma, of the seamount-capping limestone. The overlapping limestone cap is about 500 m thick and over 50 km long.

Two main types of oceanic basalts are transitional (oceanic plateau basalts - OPBs) and depleted (mid-oceanic ridge basalts - MORB) varieties co-existing within this geological structure. The least altered transitional basalts are characterized by variably depleted LREE and flat HREE patterns (La/Sm_N =0.67-1.3, Gd/Yb_N = 0.95-1.39). Ni/Co and Cr/V are lower, while P_2O_5/TiO_2, Th/Ta and Rb/Sr are higher that in N-MORB; Nb/La_{pm} <1. There is also a subordinate amount of LREE-Nb and Ti enriched basalts. The former have small negative Zr (Hf) anomalies relative MREE. Mg# varies from 36 to 53 over a relatively narrow range of SiO_2 (48-52 wt%). Fe, Ti, Zr and all REE increase erratically with Mg#. Th anomalies relative to La are negative (Th/La_n=0.4-0.7), and Nb anomalies relative to La are negative as well (Nb/La_N =0.2-0.7). The Kurai basalts are interpreted to have been an oceanic plateau, possibly complicated with an oceanic island derived from a heterogeneous multi-component

mantle plume. Small negative Zr (Hf) anomalies do not contradict the idea that tholeiitic basalts melted at spinel facies depths. The plateau was fragmented and incorporated in a subduction-accretion complex formed at the SW margin of the Siberian continent and tectonically mixed with island-arc volcanic rocks in Early Cambrian time. More evidence for the existence of oceanic plateaux in the Paleo-Asian Ocean comes from the study of Dzhida paleoguyot of the Central-Asian mobile belt (Gordienko, Filimonov, 2005). Widely varying trace-element composition of paleo plateau basalts can be explained by their melting from heterogeneous mantle source implying mixing of depleted and enriched melts, hotspot-ridge interaction, and different degrees of partial melting. The latter can be due to a thickening oceanic lithosphere and different depth levels in the mantle.