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Cenozoic Magmatism in Asia: Geochemical Signatures of slab-related Processes

S. Rasskazov, I. Chuvashova and T. Yasnygina

Institute of the Earth's crust, Irkutsk, Russia (rassk@crust.irk.ru / Fax: +3952 426900 Phone: +3952 511659)

Models of global seismic tomography and interpretation of geochemical data on oceanic basalts served as a basis for hypothesis on leading role in geodynamics of density differentiation in the Earth interior. The active down-going high-velocity and stagnated slabs coexist with upwelling low-velocity anomalies in the mantle. Structural reorganizations led to spatial redistribution of the density inhomogeneities. As a result, stagnated slabs and above-slab regions underwent repeatable melting which overlapped not only low-velocity regions but also high-velocity slabs. Mixing of high- and low-velocity constituents of the mantle could produce intermediate composition temporally dominated by involvement in melting of material derived from slab- or above-slab regions.

We demonstrate geochemical evidence on leading role of slab-related geodynamics beneath Asia using results of more than 2000 new ICP-MS analyses and recently published data on Cenozoic volcanic sequences. A diagram K/1000Ta vs. La/Ta has been applied for definition of complementary trends of liquids originated from slabs and above-slab regions in subduction and collision zones. The latter show specific trends for frontal and back-side areas. The recoded trends of volcanic rocks from different areas of Asia yield a common composition of K/1000Ta = $\sim$12 and La/Ta = $\sim$7. As compared to this composition, both ratios decrease with relative isotopic (Sr, Nd) depletion and increase with isotopic enrichment.

Subduction- and collision-related geochemical signatures are well expressed in volcanic rocks from Northeast and Southeast China, respectively. The frontal and back-

side collision-governed signatures are attributed to volcanic rocks from the southern and northern Tibetan Plateau. Complementary slab-derived components with back-side and frontal collisional signatures were recognized to be temporally substituted by the above-slab one with frontal collisional values in a sequence of East Hangay, Central Mongolia. This evolution demonstrates temporally increasing role in deep dynamics of processes developed in Indo-Asian collision zone. Liquids from the above-slab sources with back-side collisional values were identified in the Middle-Amur Basin (Southeast Russia) at 14.8-7.4 Ma with subsequent change to those from the slab-derived sources at 5-4 Ma. This case is indicative for cessation of deep collision-driven dynamics. Similar temporal change of sources was found for volcanic sequence in the Orkhon-Selenga area of Central Mongolia.

Geochemical evolution of Cenozoic magmatism in Inner Asia is inferred to preserve a style of slab-related processes developed at convergent plate boundaries.