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Hard processing vs. episodic underplating of a terrain: isotopic signatures of mantle and crustal magmatic sources from the sub-continental lithosphere

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Hypothesese on origin of sub-continental lithosphere are tested, in this presentation, by isotopic data on magmatic liquids from crustal and mantle sources that might be genetically related or unrelated to each other. A common origin of the components reflects a radical recycling of a terrain resulted in separation of crustal and mantle constituents, characterized by a common inherited isochron of melt portions in U–Pb, Rb–Sr, and other isotope systems. A different origin assumes episodic underplating of growing sub-continental lithosphere that is reflected in contrast compositions of crustal and mantle sources, each of which yields melt potions with specific inherited isochrons. The lithospheric terrain of the former type produced 1) Late Tertiary volcanic rocks in the Shandong Peninsula, China with the inherited Pb–Pb isochron corresponding to the age of the eastern block of the North China craton (∼2.57 Ga) (data of Zartman et al. [1991]), 2) Late Tertiary volcanic rocks in the Rungwe Province, Tanzania with the inherited Rb–Sr isochron corresponding to the end of the Pan-African orogeny (∼0.46 Ga), and 3) Neoproterozoic (∼0.9 Ga) dikes in the Gargan block of Eastern Siberia, Russia with the inherited Pb–Pb isochron corresponding to the age of the block basement (∼2.7 Ga). The lithospheric terrain of the latter type yielded Cretaceous-Paleogene volcanic rocks in the Tien Shan, Kyrgyzstan and adjacent China with the inherited crustal and the newly formed mantle Rb–Sr isochrons of ∼340 and ∼50 Ma, respectively.