From Archean to Cambrian: Isotopic crustal evolution of the Borborema Province, NE Brazil

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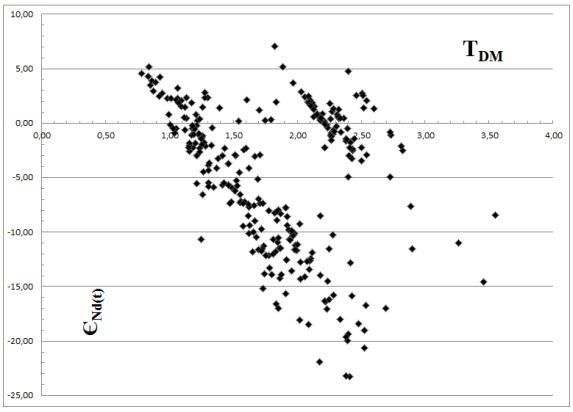
Crustal accretion occurs mainly by the input of calc-alkaline granitoids in the cores of pericontinental and intraoceanic orogens. The added magmas are mainly hybrid, a mixture of a mantle derived component with older crustal rocks as the result of the underplating of major amounts of mafic magma beneath the continental crust. The Santa Quitéria Batholith, Borborema Province, is a good example of the mixing of a juvenile Brasiliano component with older, mainly Paleo-proterozoic, crustal material [1]. One consequence of this growth process must be a systematic change in the crustal isotopic composition through time. This assumption is confirmed by 307 Sm-Nd data for Archean, Paleo- and Neoproterozoic rocks from the northern Borborema Province [1-7] which show a systematic change of the $^{144}Nd/^{143}Nd_{(t)}$ values with time.



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Plastic deformations in zircon and their influence on its chemical composition

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We studied 150 grains of zircon from 8 gabbro samples, dragged at 4 sites in axial part of the MAR, Markov Deep, 6ºN, during 10th cruise of R/V "Academic Ioffe" (2001-2002) and 22nd cruise of R/V "Professor Logachev" (2003). This part of the MAR represents typical oceanic core complex (OCC), where altered lower crustal gabbros and serpentinized mantle peridotites expose on seafloor. These rocks were undergone by different tectonic deformations, including plastic flowage. The zircon in gabbros along with host rocks were undergone by plastic creep at 815 to 680ºC (Ti-in-zircon thermometry).

During deformations zircon was enriched by diversity of rare elements (U, Th, Hf, Pb, P and Y) and REE. We suggest that it was linked both with appearance of deformation-related crustal-plastic microstructures in zircon, which enhanced diffusion of these components, and circulation of intergranular fluid as demonstrated processes of delution and redeposition of the zircon material with appearance of secondary small pyramidal zircons on another side of the crystal. Nature of this high-temperature fluid is not clear yet: it can be residual fluid, formed under solidification of host-gabbros, or result of involving of fluids, circulated in upper oceanic lithosphere, under it heating by these intrusions; most likely both factors were setting in motion. Introducing U, Th and Hf into zircon crystals can change their original isotopic systematics and influence on results of their isotopic dating.