Whole-rock geochemistry and Sr-Nd isotopic evidences for sources and processes of granulite formation in Ribeira Belt, Brazil

C. TASSINARI[1], T. BENTO DOS SANTOS[2]*, J. MUNHÁ[2] AND P. FONSECA[2]

[1]Instituto de Geociências, Universidade de São Paulo, Brazil
[2]Centro/Departamento de Geologia, Universidade de Lisboa, Portugal (*correspondence: tmsantos@fc.ul.pt)

Elemental and Sr-Nd isotopes data on migmatites, granulites and orthogneisses obtained from the central part of Ribeira Belt (SE Brazil) shows that they are LILE-enriched weakly peraluminous granodiorites. Harker trends for TiO_2, Al_2O_3, $Fe_2O_3^t$, MgO, P_2O_5, Sr, Zr, Hf, Th, U, REE^t, LREE/HREE and La/Lu, as well as incompatible element trends of Th-Hf-La suggest that these rocks represent a co-genetic sequence. Similar REE patterns and juxtaposed isotopic values of $\varepsilon_{Nd}{}^{575}$ = -5.4 to -7.3 and $^{87}Sr/^{86}Sr_{575}$ = 0.706 to 0.711 for granulites, orthogneisses and migmatites is consistent with hypothesis that these rocks evolved from a relatively homogeneous and enriched common crustal (meta-sedimentary) protolith. Results suggest that partial melting of meta-sediments formed migmatites and associated granitoid bodies, whereas long-term crustal slow cooling promoted further dehydration (re-melting) that led to development of widespread granulites [1].

Sm-Nd T_{DM} ages span from 2.0 to 1.5 Ga is consistent with Paleo- and Mesoproterozoic contributions to the sedimentary pile that was metamorphosed during the assembly of Gondwana. T_{DM} ages and paleogeographic proximity suggest that the São Francisco and West Congo Cratons are the most probable sources for these protoliths. Sm-Nd model ages and inherited zircon SHRIMP dating [2] concordance reveals that the protoliths were part of a juvenile crust formed 2.0 to 1.5 Ga ago, whereas the absence of Pan-African T_{DM} ages suggests zircon sedimentary reworking with U-Pb isotopic homogenization of older zircons. This means that during Pan-African times no significant new crust was added, which, combined with the new geochemical model for granulite formation in the studied area, contradicts poli-orogenic scenarios formerly proposed for the evolution of Ribeira Belt.

[1] Bento dos Santos *et al*. (2007) *Geochimica et Cosmochimica Acta* **71**, 15, Sup. 1, A79. [2] Valladares *et al*. (in press) *Gondwana Research* 2007.

Making continental crust: The sanukitoid connection

YOSHIYUKI TATSUMI

Institute for Research on Earth Evolution (IFREE), Japan Agency for Marine-Earth Science and Technology (JAMSTEC), Yokosuka 237-0061, Japan (tatsumi@jamstec.go.jp)

The average continental crust possesses intermediate compositions that typify arc magmatism and as a result it is believed to have been created at ancient convergent plate boundaries. One possible mechanism for intermediate continental crust formation is the direct production of andesitic melts in the upper mantle. Sanukitoids, which characterize the Setouchi volcanic belt, SW Japan, include unusually high-Mg andesites (HMA). They were generated by slab melting and subsequent melt-mantle interactions under unusual tectonic settings such as where warm lithosphere subducts into hot upper mantle. Such conditions would have existed in the Archean. Hydrous HMA magmas are likely to have solidified within the crust to form HMA plutons, which were then remelted to produce differentiated sanukitoids.

At present generation and differentiation of HMA magmas may have been taking place in the Izu-Bonin-Mariana arc-trench system (IBM), because (1) HMA (boninite) magmatism characterizes the initial stages of the IBM evolution and (2) the IBM middle crust exhibits Vp (6.0-6.5 km/s) identical to that of the bulk continental crust. Vp estimates for plutonic rocks with HMA compositions support this; especially, the observed Vp of the middle crust, which forms the present forearc crust and is likely to be created during the early stage of the arc evolution, is best explained by the lithology of HMA pluton. However tonalitic composition for middle-crust-forming rocks cannot be ruled out, especially for the presently active volcanic arc, suggesting an alternative possibility that the continental crust has been created by differentiation of mantle-derived basaltic magmas.