5.5.P05

A laser-ICPMS study of REE in garnet of Nazaré Paulista-type anatectic granites from Atibaia region, Brazil

L. MARTINS[1,2], V.A. JANASI[1] AND T. PLANK[2]

[1] Instituto de Geociências, Universidade de São Paulo, São Paulo, Brazil (lucemart@usp.br; vajanasi@usp.br)
[2] Department of Earth Sciences, Boston University, Boston, USA (tplank@bu.edu)

The 625 Ma Nazaré Paulista granite in the Atibaia region, São Paulo, Brazil, is a typical anatectic granite derived from purely crustal sources. Bodies of heterogeneous, nebulitic garnet-biotite granite surrounded by migmatitic garnet-bearing paragneisses are typical. Trace elements in garnet from different garnet-biotite granites (leucogranite, nebulitic granite and pegmatite) and migmatite (leucosome and mesosome) analyzed by laser ablation ICP-MS were used to investigate the source of the anatectic granites; in particular, whether these granites could have been derived by partial melting of the local paragneisses. The analyzed garnets show a wide range of REE patterns, particularly a varying slope in the HREE, some increasing from Ho to Lu, others decreasing. The poikilitic character of the garnet grains make zoning stuies difficult, but there appears to be no general trend toward lower HREE in garnet rims, as would be expected to result from fractional crystallization. The garnet patterns appear to reflect the bulk REE pattern of the magmas from which they precipitated. HREE-depleted granites yield garnets with decreasing HREE and are typical of one phase of the Nazare Paulista granite. They are also distinct from the leucosomes of the nearby migmatitic paragneisses. Thus, such HREE-depleted granites may have been derived from deeper sources. On the other hand, late-stage pegmatites as well as nebulitic granites contain garnets with REE patterns similar to the paragneiss leucosomes, and could have derived from local sources. Some samples contain garnets with both patterns, and may record mixing of the different magma types.

5.5.P06

Fission track analysis of the Ryoke Granitic Rocks; deep drilling core penetrating the Nojima Fault

R. YAMADA, T. MATSUDA AND K. OMURA

National Research Institute for Earth Science and Disaster Prevention (NIED), Japan (ryamada@bosai.go.jp)

FT thermochronology on an active fault drilling core:
NIED drilled an 1800m borehole penetrating the Nojima Fault activated during the Hyogo-Ken Nanbu earthquake (M7.2, 1995). Three major fracture zones (FZ) were found along the core at about 1140, 1310 and 1800 m. The core sample consists mainly of the Cretaceous Ryoke granitic rocks that crop out widely on the eastern side of the fault. We performed fission track (FT) age dating on the granitic samples around these factures, in order to assess the amount of slip and the earthquake-related thermal anomalies. Results showed contrasting patterns of apatite and zircon FT ages, whose closure temperatures (Tc) are approx. 100 and 250 deg. C, respectively.

Samples: Each of three FZs, recognized as the distribution of cataclastic rocks, has a width of 30 to 100 m along the core length. Samples were collected at different distances to the centre of the fractures. Eight samples were taken from around each FZ at 1140 m and 1300 m, and seven samples were collected from around the 1800 m FZ.

Zircon FT: Analysis of sample collected over the length of the borehole revealed a simple age reduction trend associated with exhumation cooling. Samples collected over and below each FZ showed no evidence of progressive age reduction as expected from frictional heating at around zircon Tc. However, differences in age were detected between each block of samples collected above and below the FZ whereby the mean age of lower block samples was older than that immediately above the FZ. This may be due to reverse faulting. It allowed us to evaluate the amount of the vertical slip along the fracture zones. The evaluation was aprox. 20 to 70 m for each FZ.

Apatite FT: Characteristic pattern in apatite ages was found in terms of the distance to the centres of fracture zones, that is, the shorter the distance, the younger the age of samples. The age varied from aprox. 47 to 70 Ma. It may reflect some ancient (not related to the 1995 activity) thermal anomaly around apatite Tc. Possible sources of the anomaly are frictional heat and heat convection by geothermal fluid. The latter might be more plausible because the anomaly zones around fracture zones were a few tens of metres wide.

For obtaining more information on thermal history around fracture zones, FT length measurement should be critical on the basis of partial annealing zones of FTs.