

# U-Pb, Sm-Nd, Pb-Pb and Rb-Sr isotopic constraints on the origin of the rapakivi granites of Rondônia

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Six distinct successive episodes of rapakivi magmatism, in part associated with mafic and ultramafic rocks, have been identified in the Rondônia Tin Province (RTP), during the interval between ca.  $1.606 \pm 24$  to  $0.991 \pm 14$  Ma, on the basis of U-Pb single zircon grains and microgram-size multigrain fraction geochronology.

A new designation for the rapakivi association based on these results, is now proposed, as follow: 1 - Serra da Providência Intrusive Suite (SPIS:  $1606 \pm 24$  to  $1532 \pm 4.5$  Ma), 2 - Santo Antônio Intrusive Suite (SAIS:  $1406 \pm 32$  Ma), 3 - Teotônio Intrusive Suite (TIS:  $1387 \pm 16$  Ma), 4 - Alto de Candeias Intrusive Suite (ACIS:  $1347 \pm 4.7$  to  $1346 \pm 4.6$  Ma), 5 - São Lourenço/Caripunas Intrusive Suite (SLCIS:  $1314 \pm 13$  to  $1309 \pm 24$  Ma), 6 - Santa Clara Intrusive Suite (SCIS:  $1082 \pm 4.9$  Ma) and 7 - Younger Granites of Rondônia (YGR:  $0.998 \pm 5$  to  $0.991 \pm 14$  Ma). The suites are confined almost exclusively to the Rio Negro-Juruena Province (RNJP: 1.80 - 1.55 Ga) arc accretionary domain, as proposed by (1), and can be confidently correlated with orogenetic activities in its immediate surroundings, exception made to the SPIS. The oldest suite (SPIS) is related to an extensional regime at the end of the RNJ orogeny.

The next four suites, SAIS, TIS, ACIS, and SLCIS, represent inboard silicic anorogenic magmatism in the same province. The SAIS, TIS, and ACIS are correlated to back-arc rifting related to San Ignacio-Rondonian orogeny (1.50-1.30 Ga), also probably emplaced close to the continental margin of the Grenvillian ocean, and the SLCIS to the late extensional regime preceding the Sunsás/Aguapei orogeny (1.25-1.00 Ga). The two youngest rapakivi suites (SCIS and YGR) might represent distal effects of Sunsás/Aguapei orogenesis (1.25-1.00 Ga) overprinted to the Rio Negro-Juruena Province, accompanied or synchronous with convergent tectonics, at the scale of the orogen, between the time interval 1.1 to 1.0 Ga.

The preliminary Sm-Nd data from the rapakivi massifs  $\epsilon_{Nd(t)}$  values (+2.74 to - .25) and  $T_{DM}$  values (range from: 1.47 to 2.0 Ga) are indicating mixing of a depleted mantle magma, with a short crustal prehistory, and high level crustal material. Pb-Pb data of the granitoids clearly indicate a dominance of crustal Pb in the rocks and involvement of Paleoproterozoic crust in the rock genesis. The suggested crustal origin is consistent with available elevated  $^{87}Sr/^{86}Sr$  values ( $>0,705$ ).

The Sm-Nd  $T_{DM}$  model ages (+2.1 to +1.7 Ga) of the RNJP arc rocks reported by (4;5), suggest that this juvenile crust is the magmatic source of the rapakivi granites which, in part, is corroborated by our results.

The rapakivi granites seem, in this way, to derive from successive partial melting events not only from the older RNJ magmatic arc complex but also, in some cases, from younger granitoid crustal sources (1.6 to 1.45 Ga), induced by intrusion of basaltic magma into the lower crust and crustal underplating.

The new isotope results, now obtained, will further help to constrain the interplay between the several episodes of rapakivi magmatism and the above referred orogenesis. It is also of utmost importance to record the temporal, tectonic and metallogenetic correlations between the rapakivi suites and their correlatives in eastern Laurentia, Fennoscandia and Southern USA (whether or not the magmatism reflect comparable environments), within the framework of the lateral geometrical fit of Laurentia and Amazônia (6, 7) and implications of such a correlation already discussed by (2, 8).

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