

D-19: A-type and I-type Granitoids of Southern Sri Lanka

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Forty samples of garnetiferous pyroxene granulites of intermediate to acidic composition were collected from southern Sri Lanka and were analysed for major elements and 18 trace elements including light rare earth elements (LREE). Apparently, all of them were metaigneous rocks. Twenty five samples were of granitic composition and the rest of tonalitic composition. Granitic rocks were characterized by high FeO/MgO+MgO ($0.8 \leq$) ratios, high Ga/Al ratios, high contents of Zr (250-1600 ppm), Nb (≈ 50 ppm), Y (≈ 50 ppm) and LREE. Moreover, many of them contained ferrohedenbergite, ferrohastingsite and iron-rich biotite. These features together with highly fractionated REE patterns suggested that the protoliths of these rocks were A-type granites. In fact, these rocks belonged to Ce-enriched A-type granites. It seems that they had been derived from a felsic crust which had already undergone a cycle of subduction or continent-continent collision magmatism. This inference was supported by high and variable initial $^{87}\text{Sr}/^{86}\text{Sr}$ ratios and older crustal residence ages. They may have been emplaced in an anorogenic environment probably characterized by attenuated crust (tensional tectonics) or in a post-collision environment characterized by normal crust formed after an episode of crustal thickening (trans-tensional tectonics).

Tonalitic rocks were characterized by relatively high MgO/FeO+MgO ratios, low Zr, Nb, Y and LREE contents. These rocks were tentatively classified as I-type granitoids. They had the chemical characteristics of calc-alkaline volcanic arc magmas commonly encountered in convergent plate settings (compressive tectonic setting). Felsic nature and compositional diversity of these tonalitic rocks suggested an arc setting founded on continental crust. Distinctly different trends in the AFM diagram and in other variation diagrams as well as comparable SiO₂ wt. percentages indicated that granites

and tonalites did not represent products of different degrees of fractional crystallization of a common magma. In spite of their close field association, the 2 types of granitoids appeared to be polygenetic. Present intercalation of these granitoids generated in different tectonic environments was a result of collisional tectonics that prevailed before or during Pan-African granulite facies metamorphism.