'Mantle plume' type magmatism in the Central Belt of Peninsular Malaysia and its tectonic implications

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None of the existing tectonic models of Peninsular Malaysia fully explains the spatial, age or geochemical characteristics of the Central Belt intermediate to basic igneous rocks. The Central Belt granitoids, which lie critically close to the Bentong-Raub Line, have distinct geochemical characteristics. They have very high LIL elements, i.e. Ba and Sr are nearly 1,000 times rock/mantle. The high Ba and Sr values may result from the penetration of the lower lithosphere by a small volume of mantle material that is enriched in those elements attributed to 'mantle plume' type magmatism. Other supporting evidences include the presence of bimodal magmatism, the presence of mafic enclaves of older granitoids in younger granitoids and the new age data indicated that there is a significant time interval (up to between 30 Ma) between the first mafic magmatism and the later felsic magmatism; the Central Belt plutons are post-orogenic and penecontemporaneus with rapid post-orogenic uplift, and erosion with the development of the Jurassic-Cretaceous continental deposits of the Central Basin; the presence of thin continental crust beneath the Central Belt; the Benom granite has yielded an initial $^{87}Sr/^{86}Sr$ ratio of 0.7079, which points to an origin in highly enriched lithospheric mantle; and the presence of mafic enclaves is consistent with a mafic lower crust beneath central belt formed by underplating. A model have been proposed that involved the oblique convergence of the two tectonic provinces of Peninsular Malaysia where slab breakoff which is the natural consequence of the attempted subduction of the continental crust is invoked to account for the 'mantle-plume' type magmatism of the Central Belt. The outcome of the slab breakoff is the long linear belt of single plutons characterized by high-K, shoshonitic granitoids with characteristic trace element signatures, specifically high Ba and Sr, which lie critically close to the Bentong-Raub Line. Other features include the bimodal association of mafic and felsic rocks, the low grade regional metamorphism, thinned continental crust, rapid uplift and erosion with the development of extensional/transtensional basins.

Warta Geologi (Newsletter of the Geological Society of Malaysia), Vol. 29, No. 3, May-June 2003