

Episodic, potassic, ‘A-type’ Mesoproterozoic magmatism in the Mount Isa Inlier, NE Australia: a syn-tectonic origin?

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The Eastern Succession, Mount Isa Inlier is dominated by the Williams and Naraku Batholiths, which are mainly comprised of magnetite-bearing, potassic intrusive rocks (1.54-1.50 Ga) that have ‘A-type’ geochemical characteristics (Mark, 2001). Emplacement of these rocks was initiated during three periods of magmatism that largely form in discrete spatial domains: 1. 1.54-1.52 Ga (centre), 2. 1.52-1.51 Ga (west & south), 3. 1.51-1.50 Ga (north). Igneous complexes representing these periods of magmatism exhibit geological relationships supporting the coincident emplacement of mafic and felsic intrusions early in magma genesis, and the subsequent fractionation of the felsic intrusions during east-west compression. Such field relations indicate that intrusions of this ‘A-type’ composition are not restricted to ‘strictly’ anorogenic environments (cf. Nyman et al. 1994). Nd isotopic data also show a systematic mixing relationship between a ca 2.3 Ga crustal reservoir, preserved in the granites, and a juvenile mantle component in the coeval mafic intrusions, which produce T_{DM} ranges between 2.0 and 2.3 Ga. We favor repeated, short-lived, slab rollback as a mechanism for episodic potassic, ‘A-type’ magmatism, which involves the generation of granitic magmas via the production of transient thermal pulses in the crust associated with the emplacement of mafic magma in a broader syn-compressional regime.

References

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