

Geodynamic implications of granites in the Lachlan Orogen, eastern Gondwana

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Granites in the Lachlan and New England orogens of the Australian Tasmanides, along eastern Gondwana, are well-known for their I-, S-, and A-type granite varieties. Crustal and magmatic processes have been broadly studied over the last few decades, but limited geodynamic implications have been discussed based on the migration of arc-related granites. In this work, we focus on the unique eastward, trans-orogen migration of the Carboniferous Bathurst Batholith within the Lachlan Orogen, which we reveal was a product of slab rollback and represents a “missing link” between the Lachlan and New England orogens. By sampling across the batholith, analysing the whole rock geochemistry and zircon U-Pb-Hf isotopes of the samples, and compiling a regional Hf database for the neighbouring orogens, we present evidence for the evolution of Carboniferous–Permian slab dynamics along the Australian Tasmanides of eastern Gondwana, and throw light on the tectonic relationship between the key orogens of eastern Australian.