

A Zircon U-Pb Study of Metaluminous (I-Type) Granites of the Lachlan Fold Belt, Southeastern Australia: Implications for the High/Low Temperature Classification and Magma Differentiation Processes

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Following seminal studies in the Lachlan Fold Belt (southeastern Australia), it has become almost axiomatic that metaluminous granites derive from infracrustal precursors, whereas strongly peraluminous plutons have metasedimentary or supracrustal sources, as reflected in the I- and S-type designation. Recently, zircon saturation thermometry has been used to further subdivide I-type granites into high- and low temperature categories. Implicit in this classification is that low-temperature I-type granites evolved by restite separation from magmas generated in the zircon stability field. To explore this hypothesis, we report an ion microprobe U-Pb (zircon) study into three hallmark 'low-temperature' Lachlan Fold Belt I-type suites. The combined patterns of zircon age inheritance and bulk rock Zr trends suggest that each suite formed from magmas that were initially zircon-undersaturated, and that fractional crystallisation, not restite unmixing, was the dominant differentiation process. The low temperature status presently applied to these rocks cannot therefore be justified. The inherited zircons in these I-type granites reflect melting and assimilation of metasedimentary rock, and testify to a supracrustal source component.