VARIATIONS IN KINETICS AND TIMING OF MAGMA CRYSTALLISATION, INTRUSION AND DEFORMATION BETWEEN S- AND I-TYPE GRANITES

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Integrative gravity and structural modelling revealed contrasts in 3D-geometry, emplacement mode and deformation style between S- and I-type granites in the Eastern Lachlan Fold Belt (SE-Australia). Additionally, analyses of quartz cathodoluminescence and microstructures, and Al-in-hornblende barometry combined with radiometric dating constrained the conditions of magma crystallisation, intrusion and deformation. Magma of the I-type granites continuously ascended to a depth of ~6 km and accumulated in a transtensional pull-apart structure, forming square, wedge-shaped plutons. Late- to post-magmatic deformation produced weakly developed fractures and mylonites under brittle conditions. Magma of the S-type granites experienced a multiple-stage ascent and intruded a transpressional shear zone at a depth of ~10 km, forming elongated and tabular to sheet-like plutons. These granites underwent two high-temperature deformation events, which produced a well-developed foliation under ductile conditions. The geometry and deformation style of the plutons, their spatial relationship at depth with faults, and the structural development of both the granites and country rocks suggest a genetic linkage between magma emplacement and faulting. The syn- and postintrusive deformation was governed by a system of regional strike-slip faults, which operated at variable strain rates and directions. Although both S- and I-type granites were emplaced simultaneously, they show contrasts in emplacement mode and deformation style. These contrasts are due to differences in composition of granites and their response to deformation, intrusion level, geometry of the emplacement sites, and near-field stress regime. This study shows that contrasting emplacement modes can simultaneously operate under locally variable deformation conditions within a strike-slip fault system.