

## **Making new felsic crust in primitive arc settings: Contrasting case studies**

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Convergent margins are seen as one of the fundamental ways in which we generate continental crust, but often intra crustal processes, such as assimilation, mask the primary mechanism(s) of felsic crust generation. In two case studies, we have investigated the generation of felsic crust in primitive arc settings where processes can be better unravelled; (1) in a nascent arc where volcanism is just beginning (Solander Island, Puysegur Trench, S. Island, NZ); and (2) an inter-oceanic arc setting, Tonga-Kermadec. The results of the two case studies point to much shallower models for final felsic crust generation than has been previously thought. If partial melting of basaltic material at depth directly produces felsic compositions, then these two settings should be prime locations where this process occurs. However, direct partial melting producing felsic crust has not been supported. In Solander Island, the trachyandesites-andesites have geochemical signatures similar to modern-day adakites. However, petrologic and isotopic data, combined with trace element modeling showed a complex story of an open, shallow magma system, with regular injections of hotter, mafic magma, bearing adakitic signatures. In the primitive arc setting of Tonga, dacitic volcanism is present on Fonualei and directly associated with the basaltic islands of Late and Tofua. Using experimental studies combined with isotopic data, lower crustal amphibolite melting turned out to be unviable. The preferred model is mixing between the fractionates of two different basaltic-andesite parent magmas, in a shallow magma chamber 2-6 km deep.