

Linking basic and felsic magmatism in late orogenic settings

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The late-orogenic period (also known as post-collisional) is marked, in many Precambrian orogens, by the emplacement of large volumes of metaluminous granitoids having mantle-like isotopic signatures. Taking examples from the West African Archean domain in Mauritania and the Pan-African belt cropping out in Algerian Hoggar, we show that these metaluminous plutons are fed by melts derived from lower to middle crustal ultramafic-mafic intrusions. The parental basaltic magmas formed in a subduction-modified mantle, having heterogeneous isotopic compositions ranging from depleted to radiogenic signatures, sometimes reaching the isotopic signature of the continental crust. During differentiation in deep crustal levels, the residual melt left after 30 to 60% crystallization of the basaltic magma can reach andesitic to dacitic compositions. This intermediate to felsic melt can be squeezed out from mushes formed in the basic intrusion in response to an increase of the internal chamber pressure induced by a magma recharge or a tectonic event. Although rather simple, the proposed scenario explains many petrological and geochemical characteristics observed in bimodal post collisional suites, including those formed in Phanerozoic and Alpine belts.