# Lithospheric controls on emplacement of post-collisional granitoids: examples from the Pan-African and Caledonian orogens.

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Major orogenic events are typically characterised by a period of voluminous post-collisional magmatism. These post-collisional magmas, most commonly granitoids, can represent a major addition to the continental crust. Although the driving force for this melting and magmatism may be either lithospheric delamination or slab break-off, either process will eventually lead to substantial melting of lithospheric material to produce post-collisional magmas. It thus seems likely that the nature of that lithosphere will be an important factor in the types of magmas that are generated.

The southern part of the Neoproterozoic – Cambrian East African-Antarctic Orogen (EAAO) is characterised by voluminous post-collisional granitoids. These are mildly alkaline in their geochemistry, and include high-temperature orthopyroxene-bearing magmas. In Madagascar, the post-collisional Maevarano Suite was emplaced between 537 ± 5 and 522 ± 6 Ma, into a collage of Archaean and Neoproterozoic terranes. Voluminous Maevarano Suite plutons intruded the Neoproterozoic terranes of North Madagascar; in contrast, plutons of this age are almost absent from the adjacent Archaean Antongil craton.

Slightly younger, but petrographically and geochemically similar plutons are found along the southern continuation of the EAAO in southern Mozambique (512 ± 4 to 507 ± 3 Ma) and Dronning Maud Land (501±7 and 499 ± 4 Ma). As with Madagascar, post-collisional granitoids are not found throughout the country, but are focused to the south of a major tectonic zone known as the Lurio Belt. North of the Lurio belt, very few post-collisional granitoids are seen.

The presence of broadly coeval post-collisional magmatism along the length of the southern part of the EAAO indicates the operation of an orogen-scale tectonomagmatic process such as lithospheric delamination. However, smaller-scale regional controls are indicated both by the variations in abundance of post-collisional plutons in different basement terranes, and by local differences in age and chemistry of the plutonic rocks.

Similar contrasts across terrane boundaries occur in the Caledonian orogenic belt and are well-demonstrated in Scotland. Voluminous post-collisional plutons occur in the Grampian terrane, which has probable Palaeoproterozoic basement. In contrast, the Northern Highland terrane, with high-grade Archaean basement, has a much lower abundance of post-collisional plutons, and the igneous suite includes more strongly alkaline compositions. The products of post-collisional magmatism are clearly controlled not just by the operation of orogen-scale processes but also by variations in the lithosphere on which those processes act.