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Do Palaeoproterozoic terrane boundaries (defined using feldspar Pb isotope data) control mineralization in the North Atlantic region?

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By virtue of their low U/Pb and Th/Pb ratios, the Pb isotope compositions of feldspars are time invariant. They are also modally abundant rock-forming minerals and thus provide a powerful tool to map regional geochemical variations. We are systematically collecting feldspar Pb isotope data from Archaean and Paleoproterozoic basement rocks in the North Atlantic region (Laurentia-Baltica and the intervening continental plateaux) to test the significance of major tectonic terrane boundaries in controlling the location of mineral deposits.

So far we have acquired an extensive feldspar Pb isotope dataset from the Lewisian Complex, Scotland. Contrary to the widely quoted [1] multiple terrane model, our Pb isotope results suggest that the Lewisian comprises two Archaean geochemical terranes, a radical simplification. In this interpretation, most of the Lewisian Complex appears to be geochemically equivalent to the Greenland Nagssugtoqidian Orogen, and a second terrane with the Pb isotope characteristics akin to the North Atlantic Craton. This Pb geochemical pattern evokes the two plate model of Park [2]. Significantly the 0.5Mt Kerry Road Cu-Zn volcanogenic massive sulphide deposit [3] is located within a subduction-accretion complex along the terrane boundary that separates them. Some of our feldspar Pb isotopic data from the Kola Peninsula and northern Fennoscandia are consistent with the suggestion that the Lewisianoid inliers have an affinity with Baltica [4].

References:

[1] Kinny *et al.* (2005) *Journal of the Geological Society, London* 162, 175-186.

[2] Park (2005) *Scottish Journal of Geology* 41, 105-118.

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[4] Strachan *et al.* (2020) *Geology* 48, 1094-1098.