



New evidence for the timing of Neoproterozoic metamorphic events in the northwest Highlands - insights from Lu-Hf and Sm-Nd dating

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The Moine Supergroup of the Northern Highland Terrane, Scotland records several orogenic events. The earliest of these is the Knoydartian, which has been described as consisting of three discrete phases; 830-820 Ma, 800-790 Ma and 740 Ma. The majority of the previously published geochronological data that has yielded Knoydartian ages (U-Pb zircon, monazite; Sm-Nd garnet) from Scotland comes from the Moine Supergroup of western Inverness-shire, which could suggest that either Knoydartian metamorphism was restricted to this area, or that the Caledonian orogeny over-printed any Knoydartian effects elsewhere.

Lu-Hf and Sm-Nd garnet geochronology has been undertaken to provide further constraints on the timing of peak metamorphism. In many cases, the garnet cores and rims were dated separately, thus providing a more detailed record of the complex history. Garnets throughout much of the Moine Supergroup have been dated and provide evidence for a much more widespread Knoydartian, recording Neoproterozoic metamorphism between Sutherland and on Mull. The isotopic ages obtained from this study are generally older than those previously published ages, ranging from 947-748 Ma, and in some cases are correlatable with the Renlandian event (980-910 Ma) recognised by other workers within the Westing Group of Shetland, the Krummedal Succession of East Greenland and the Laurentian derived units of Norway. This implies that parts of the Moine Supergroup were affected by Renlandian metamorphism and that younger ages (840-790 Ma) correspond to later over-printing by Knoydartian related deformation.