



Detrital zircon age populations from the Moine Supergroup, Scotland, and their implications for tectonic evolution

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U-Pb detrital zircon age populations determined by LA-SF-ICPMS analysis (California State University – Northridge) from the Neoproterozoic Moine Supergroup, northern Scotland, provide important insights into its depositional age and nature of source.

U-Pb detrital zircon ages for 100 grains from the stratigraphically lowest recognized unit of the Moine Supergroup, the Morar Group (sample KMK-MT-07), were analyzed and 80 were less than 10% discordant. KMK-MT-07 has a broad major peak at 1640 Ma (52.5% of grains in sample create this peak). This major peak is skewed by a secondary hump at 1196 Ma (accounting for 21.3% of all grains). There are two minor peaks at 2618 Ma (3.8%) and 3200 Ma (3.8%). A major trough occurs between 1280 Ma and 1500 Ma (6.3%) and a minor trough appears between 1750 Ma and 2000 Ma (12.5%).

Sixty-five grains from the stratigraphically highest unit of the Moine succession, the Loch Eil Group (sample RS-IS-47), yielded ages ranging from 1843 to 885 Ma. Forty-four grains were less than 10% discordant and reveal a major peak at 1726 Ma (63.6% of all grains) and a secondary peak at 1263 Ma (9%). A minor peak occurs between 1050 Ma and 1106 Ma (4.5%) and a minor cluster occurs between 1835 Ma and 1845 Ma (4.5%). The two youngest concordant or near concordant grains have ages of 885 Ma. Troughs occur between 1300 Ma and 1500 Ma (13.6%). The youngest grain within the Loch Eil data set, ca. 885 Ma, which in combination with a previously reported age of ca. 870 Ma for the West Highland Granitic Gneiss that intrudes the group, constrains the depositional age of at least the upper parts of the Moine Supergroup to a 15 Ma period in the early Neoproterozoic.

The overall age range of detrital grains in the two samples is indicative of derivation from the Laurentian foreland to the south of Scotland (i.e. NE Canada/Labrador). However, the contrasting distribution of specific age peaks between the upper and lower units of the Moine Supergroup, as well as the absence of detrital grains younger than ~1050 Ma in the lower unit suggests evolution in the nature of rock units exposed in the source and/or a stratigraphic break between the upper and lower units of the succession. Furthermore, the age profile of the lower unit is consistent with, but not limited to, the interpretation that it correlates with the Torridon Group of the foreland, which has been argued to represent a foreland basin to the end Mesoproterozoic Grenville orogenic belt.