Assembly of Laurentia: evidence from the paleomagnetic and barcode records of magmatic events in the western and central Canadian Shield

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Summary

Laurentia is comprised of Archean cratons that are thought to have amalgamated in the Paleoproterozoic between 2.0 and 1.8 Ga. An increasing number of primary Paleoproterozoic paleomagnetic poles are available for mafic magmatic events in the western and central Canadian Shield, especially from the Slave and Superior cratons. Data from the 2.11 Ga Indin and 1.88 Ga Ghost diabase dyke swarms of the Slave craton are presented. They are of particular importance because they provide a direct comparison with published paleopoles from dyke swarms of identical ages in the Superior craton in the period leading up to the formation of Laurentia. The database of primary Paleoproterozoic paleopoles is utilized to demonstrate independent drift histories for the Slave and Superior cratons prior to amalagmation, and to chart the drift of Laurentia after amalgamation. 'Barcodes' illustrating the age of magmatic events are presented for each of the Archean cratons before and after amalgamation. Intervals in which magmatic barcodes match may indicate that cratons were near neighbours. Mismatches, on the other hand, could suggest that cratons were drifting separately or were distal parts of a single supercontinent. Collectively, paleomagnetic poles and magmatic barcodes establish large-scale lateral convergence during the assembly of Laurentia (2.0-1.8 Ga), and suggest that many of the Archean cratons that formed Laurentia, including Slave, Superior, Rae, Hearne and Wyoming cratons, may be fragments that rifted from one or more ancestral supercratons by 2.0 Ga.