A high-Nb OIB-like mafic province in northwestern NSW, Australia

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Late Neoproterozoic to early Palaeozoic mafic rocks crop out in three orogenic belts in northwestern NSW, Australia. Several units have volcanic facies and geochemical characteristics, in particular high-Nb abundances and primitive mantle-normalised patterns, similar to those of intracratonic rifts and ocean island basalt provinces such as Gran Comore or Ascension.

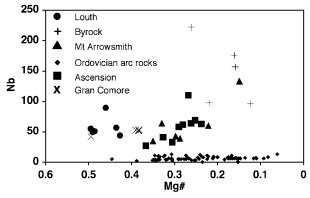
Mafic rocks from the Louth region belong to either the northern Lachlan Orogen or southern Thompson Orogen and comprise sheet and pillow lava and hyaloclastite, with immature siliciclastic and carbonate sedimentary rocks. Structures in the sedimentary rocks indicate a below wave base setting. The mafic lavas have low SiO_2 (41–50%), relatively high TiO_2 (2.2–3.5%) and high Nb (25–88 ppm).

Mafic rocks—pillow lava and breccia, with sandstone and chert, occur in the Byrock area to the southeast in the Lachlan Orogen. The lavas have variable SiO_2 (53–70%), lower TiO_2 (0.2–1.9%) and high Nb (56–222 ppm).

To the west in the Kanmantoo Orogen, are the Mt. Arrowsmith Volcanics comprising pillow lava and breccia, and hyaloclastite intercalated with immature siliciclastic and carbonate sedimentary rocks (Crawford et al., 1997). Mafic lavas have SiO_2 (45–52%), TiO_2 (2.4–3.5%) and Nb (35–64 ppm) (Crawford et al., 1997) similar to those from the Louth region.

The geochemical data from all three provinces closely resembles OIB. The data is also similar to intracratonic rifts but this does not suit the marine setting as well. The geochemical signature is different from Ordovician arc rocks in the Lachlan Orogen.

The similarity in age and chemistry of these three volcanic sequences suggests that a distinctive OIB-like mantle source underlay all areas.



Reference

Crawford, A.J., Stevens, B.J., Fanning, M., 1997. *Aust. J. Earth Sci.* **44**, 831–852.