This abstract is part of the session of 10-minute talks

A subduction origin for 2820–2735 Ma magmatism in the western Youanmi Terrane, Yilgarn Craton

by

J Lowrey

During the last several years, evidence has emerged that questions the basis for a mantle plume origin for 2820–2735 Ma high-Mg mafic magmatism in the western Youanmi Terrane (previously the 'Murchison Domain') of the Yilgarn Craton. Many, or possibly all, of the 'platy spinifex' textured units in the region, have liquid compositions that are notably less magnesian than the International Union of Geological Sciences definition for komatiite, and they are defined by a previously unrecognized platy morphology of pyroxene, rather than the platy olivine spinifex that is commonly observed in komatiites. Samples that contain ≥18% MgO invariably contain abundant polyhedral olivine phenocrysts, that is they are picrites or olivine orthocumulates, and do not represent liquid compositions. Hence, the distribution of komatiites appears to be grossly overstated, and the necessity for anomalously high mantle temperatures becomes questionable.

In contrast, multiple lines of evidence point towards a subduction or subduction-like origin:

- Mafic volcanic and subvolcanic rocks with boninite-like chemistry and mineralogy occur in two units at c. 2820 and c. 2800 Ma. In modern volcanic settings, boninitic magmas commonly erupt during the embryonic stages of subduction.
- 2800–2735 Ma mafic–ultramafic sills that intrude the greenstone sequence locally contain abundant hornblende, while 2785–2735 Ma granitic rocks are also commonly hornblende rich and locally have sanukitoid compositions, indicating a widespread hydrous metasomatized mantle throughout the western Youanmi Terrane by 2800 Ma, at the latest.
- The 2820–2735 Ma stratigraphic package also contains tholeiitic basalts and calc-alkaline basalt–andesite–dacite–rhyolite series, locally with adakite compositions, that are all consistent with a subduction origin.