

The Warakurna large igneous province: A new Mesoproterozoic large igneous province in west-central Australia

Michael T.D. Wingate

Tectonics Special Research Centre, School of Earth and Geographical Sciences, University of Western Australia, Crawley 6009, Western Australia

Franco Pirajno

Paul A. Morris

Geological Survey of Western Australia, 100 Plain Street, East Perth 6004, Western Australia

ABSTRACT

Coeval mafic igneous rocks emplaced rapidly over $\sim 1.5 \times 10^6$ km² in western and central Australia represent the erosional remnants of a late Mesoproterozoic large igneous province, named here the “Warakurna large igneous province.” SHRIMP U-Pb dating of rocks separated by up to 1500 km indicates that the main episode of magmatism occurred between 1078 and ca. 1070 Ma. The Warakurna large igneous province includes layered mafic-ultramafic intrusions and mafic to felsic volcanic rocks and dikes in central Australia, a 1000-km-long mafic sill province in Western Australia, and several swarms of mafic dikes. The large areal extent and short duration imply emplacement above a mantle-plume head. Despite their wide separation, the mafic rocks have similar MORB (mid-ocean-ridge basalt)–normalized trace element patterns and rare earth element characteristics. West-directed paleocurrents, westward radiating dike swarms, and the occurrence of high-Mg rocks indicate that the center of the plume head was located beneath central Australia. Other late Mesoproterozoic large igneous provinces, in the Laurentia and Kalahari cratons, appear to be significantly older than the Warakurna large igneous province in Australia and thus are unlikely to be related to the same mantle-plume head.

in press, *Geology*, 24 Oct 2003