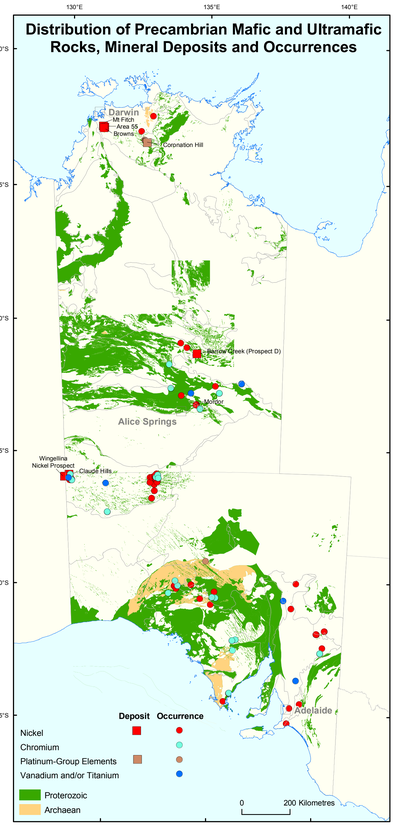
A SYNTHESIS OF AUSTRALIAN PROTEROZOIC MAFIC-ULTRAMAFIC MAGMATIC EVENTS

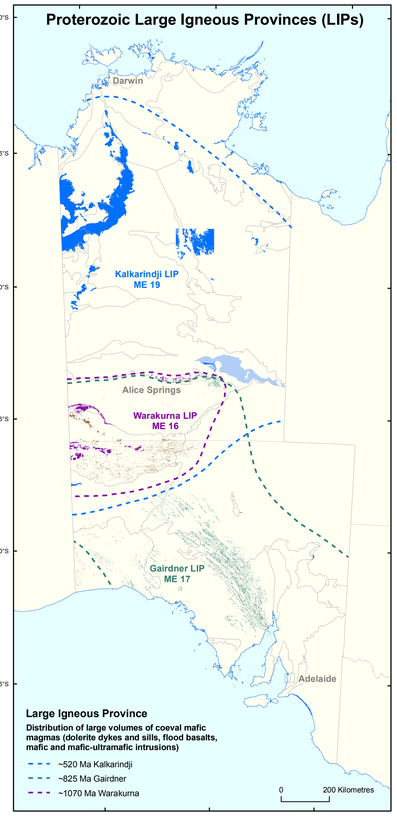
Part 2: Northern Territory and South Australia

Australian Government
Geoscience Australia

Distribution of Precambrian Mafic and Ultramafic Rocks, Mineral Deposits and Occurrences



Proterozoic Large Igneous Provinces (LIPs)



Major Magmatic Events

Named 'Magmatic Events' are defined from the published ages of mafic and ultramafic rocks in each region and shown in the Time-Space-Event Chart (far right). Time-equivalent magmatism in different regions does not necessarily imply comagmatic or cogenetic magmatism. The informal event names are taken from dated examples.

Dominantly mafic-ultramafic rock units are shown with bold colours on the map. Pale colours denote the presence of subordinate mafic-ultramafic magmatism of the same age within a region al rock package.

Note that the presence of mafic and ultramafic rocks in some areas is interpreted only from geophysical data. Further occurrences of these rocks may exist under cover.

The Early Cambrian Kalkarindji Event is included owing to the import ance of this large magmatic event.

Dominant	Subordinate	
		ME 19 (m): ~530 to 510 Ma *(Kalkarindji Event)*
		ME 18 (m): ~775 Ma *(Boucaut Event)*
		ME 17 (m): ~825 Ma *(Gairdner Event)*
		ME 16 (mu): ~1070 Ma *(Warakurna Event)*
		ME 15 (mu): ~1130 Ma *(Mordor Event)*
		ME 14 (m): ~1320 Ma *(Derim Derim Event)*
		ME 13 (mu): ~1590 Ma *(Curramulka Event)*
		ME 12 (mu): ~1640 to 1630 Ma *(Andrew Young Event)*
		ME 11 (m): ~1655 Ma *(Tarcoola Event)*
		ME 10 (m): ~1685 Ma *(Woman-in-White Event)*
		ME 9 (m): ~1725 Ma *(Oenpelli Event)*
		ME 8 (m): ~1740 Ma *(McGregor Event)*
		ME 7 (m): ~1790 to 1770 Ma *(Attutra Event)*
		ME 6 (m): ~1820 to 1800 Ma *(Mount Hay Event)*
		ME 5 (m): ~1840 to 1820 Ma *(Edmirringee Event)*
		ME 4 (m): ~1850 Ma *(Mumbilla Event)*
		ME 3 (m): ~1860 Ma *(Wangi Event)*
		ME 2 (m): ~2020 Ma *(Stag Creek Event)*
		ME 1 (mu): ~2460 Ma *(Blackfellow Hill Event)*
		Undefined

Ⓐ Location of map comment

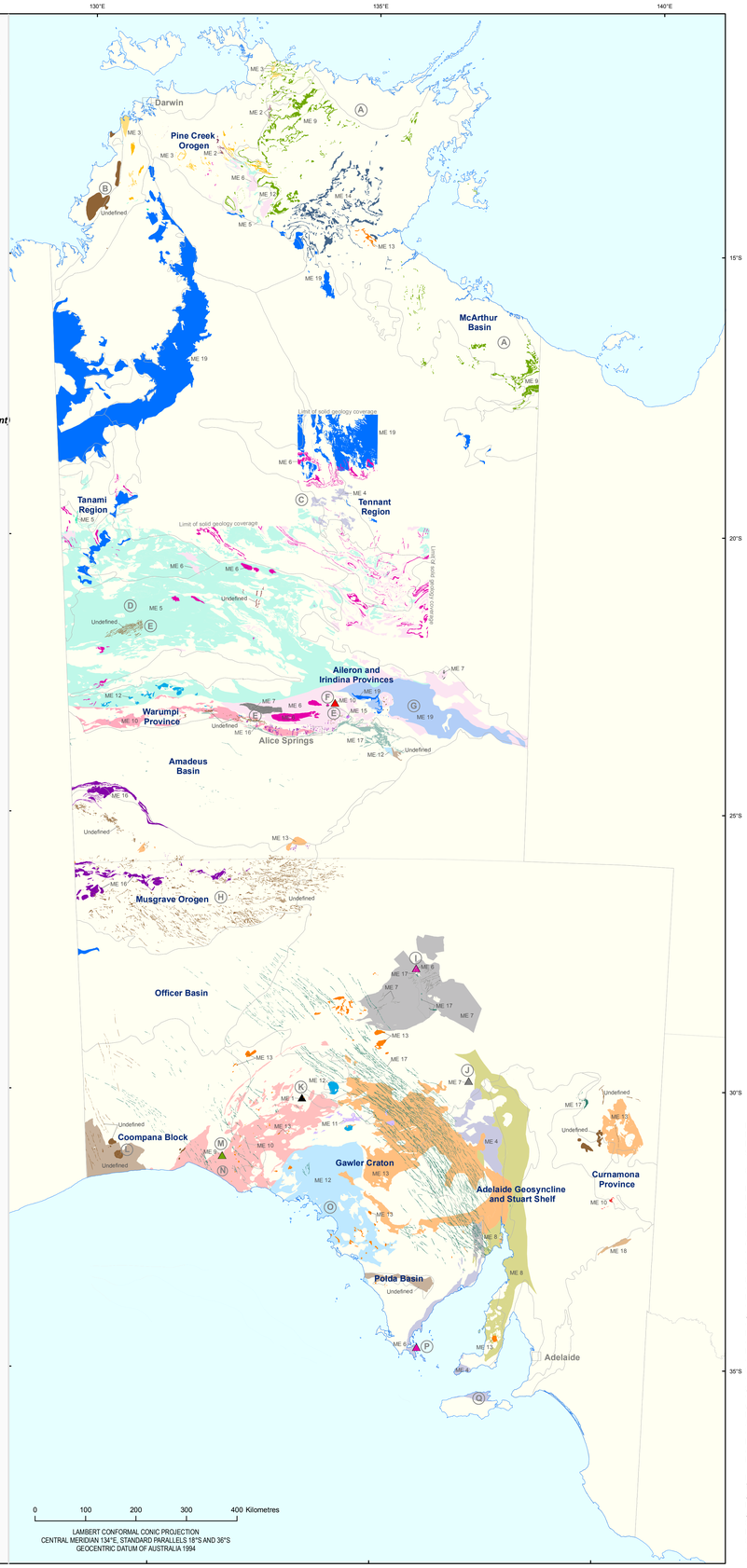
▲ Local dated occurrence of Magmatic Event with no defined extent (e.g., from drillhole)

ME 1-19 Magmatic Event 1-19

(m) mafic rocks only

(mu) mafic and ultramafic rocks

Geological province boundary



Map Comments

Northern Territory

Ⓐ Oenpelli Event ME 9: ~1725 Ma
Undated basalt horizons in Katherine River Group and correlatives (McArthur Basin) are >1710 Ma and tentatively assigned to ME 9 – coeval with 1723 ± 6 Ma Oenpelli Dolerite

Ⓑ Undefined Event younger than 1685 Ma
Undated Murrenja Dolerite intrudes <1685 Ma sedimentary rocks (Pine Creek Orogen)

Ⓒ Mumbilla Event ME 4: ~1850 Ma
Subordinate gabbro component to Tennant Creek granites (Tennant Region)

Ⓓ Edmirringee Event ME 5: ~1840 to 1820 Ma
Subordinate metadolerite and metabasalt within widespread Lander Package (Aileron Province) and Tanami Group (Tanami Region) sedimentary units

Ⓔ Undefined Event
Undated Whistleduck and other E-trending dolerite dykes (Aileron and Warumpi Provinces)

Ⓕ Woman-in-White Event ME 10: ~1685 Ma
Local 1689 ± 8 Ma N-trending dykes within Strangways Metamorphic Complex (Aileron Province)

Ⓖ Kalkarindji Event ME 19: ~530 to 510 Ma
Numerous mafic and ultramafic units of this event and younger Phanerozoic ages (Irindina Province)

South Australia

Ⓗ Warakurna Event ME 16: ~1070 Ma and Gairdner Event ME 17: ~825 Ma
Two ages of dolerite dykes with different orientations (Alcurra, Gairdner, Amata), not distinguished on map and all shown as Undefined Event (Musgrave Orogen)

Ⓘ Mount Hay Event ME 6: ~1820 to 1800 Ma
1800 ± 4 Ma un-named mafic sill (Gawler Craton)

Ⓙ Possible Attutra Event ME 7: ~1790 to 1770 Ma
1764 ± 12 Ma anorthositic gabbro near Bill's Lookout (Gawler Craton)

Ⓚ Blackfellow Hill Event ME 1: ~2460 Ma
2461 ± 5 Ma gabbronorite of the Blackfellow Hill Pyroxenite (Gawler Craton)

Ⓛ Undefined Event
Reversely magnetised bodies under cover, tentantively interpreted (by Primary Industries and Resources, South Australia) as mafic-ultramafic intrusives equivalent to Giles Complex – ME 16 Warakurna Event (Coompana Block)

Ⓜ Oenpelli Event ME 9: ~1725 Ma
1727 ± 8 Ma gabbro near Colona (Gawler Craton)

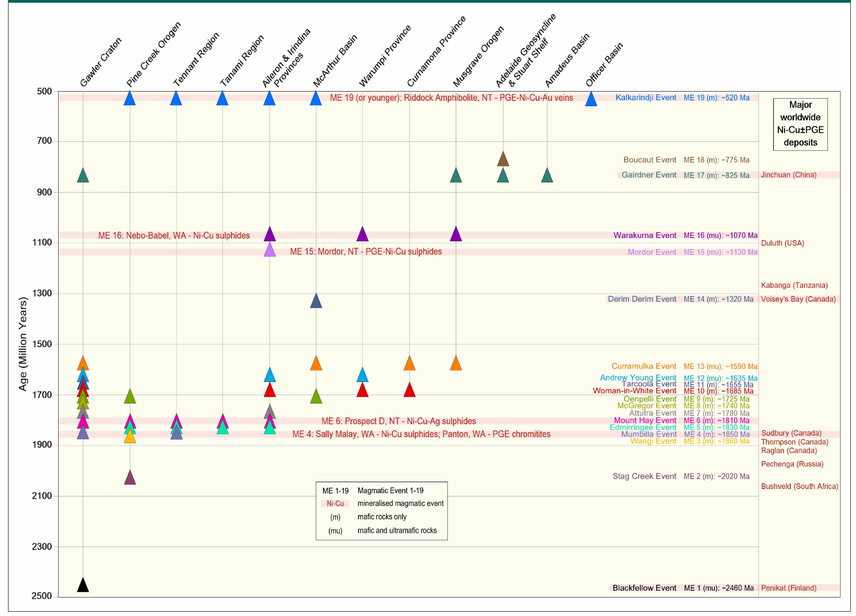
Ⓝ Woman-In-White Event ME 10: ~1685 Ma
Subordinate mafic rock components from different suites in the Fowler Domain region: ~1685 Ma Symons Granite, Engenina Adamellite, time equivalents of ~1690-1670 Ma Tunkilla Suite, and possibly ~1590 Ma Hiltaba Suite and Gawler Range Volcanics, ~1620 Ma St Peter Suite, and ~1730 Ma mafic ± ultramafic intrusions (Gawler Craton)

Ⓞ Andrew Young Event ME 12: ~1640 to 1630 Ma
Subordinate mafic rock components in bimodal felsic-mafic ~1620 Ma St Peter Suite and ~1630 Ma Nuyts Volcanics – St Francis Granite (Gawler Craton)

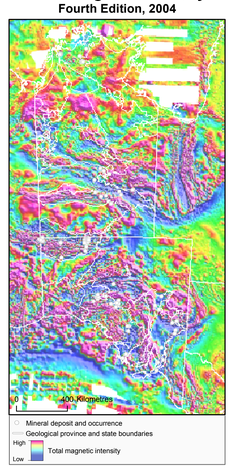
Ⓟ Mount Hay Event ME 6: ~1820 to 1800 Ma
1798 ± 8 Ma dolerite dykes of the Tournefort Dyke Swarm (Gawler Craton)

Ⓠ Mumbilla Event ME 4: ~1850 Ma
Subordinate 1849 ± 4 Ma quartz gabbronorite intrusions in bimodal felsic-mafic ~1850 Ma Donington Suite (Gawler Craton)

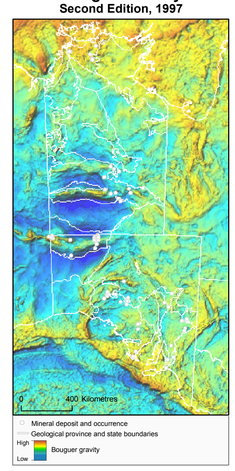
Time-Space-Event Chart



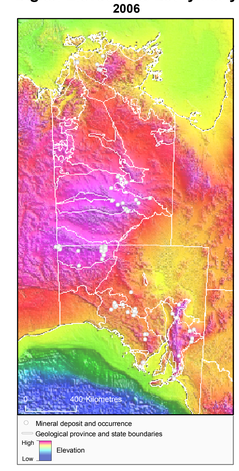
Total Magnetic Intensity
Fourth Edition, 2004



Bouguer Gravity
Second Edition, 1997



Digital Elevation & Bathymetry
2006



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Parliamentary Secretary: The Hon. Bob Baldwin, MP
Secretary: Mr Mark Paterson

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Hoatson, D.M., Claoué-Long, J.C., Jaireth, S., 2007. *A Synthesis of Australian Proterozoic Mafic-Ultramafic Magmatic Events: Part 2: Northern Territory and South Australia* (1:4,000,000 scale map), Geoscience Australia, Canberra.

Geological base maps and data references used:
Northern Territory
- Ahmad, M., Scrimgeour, I.R., 2006. *Geological map of the Northern Territory* (1:2,500,000 scale map, 2006 Edition), Northern Territory Geological Survey, Darwin;
- Donnellan, N., Johnstone, A., 2004. *Mapped and interpreted geology of the Tennant Region* (1: 500,000 scale map, First Edition), Northern Territory Geological Survey, Darwin and Alice Springs;
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- Meixner, A., Hoatson, D.M., 2004. *Geophysical interpretation of Proterozoic mafic-ultramafic intrusions in the Arunta Region, central Australia*, Geoscience Australia Record 2003/29, 125 p;
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- Slater, K.R., 2000. *Tanami 1:250,000 integrated interpretation of geophysics and geology* (First Edition), Northern Territory Geological Survey, Darwin;
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- Slater, K.R., 2004. *Musgrave Block Special, Northern Territory, integrated interpretation of geophysics and geology* (1: 500,000 scale map, First Edition), Northern Territory Geological Survey, Darwin and Alice Springs;
- Vandenberg, L.C., Johnstone, A., Donnellan, N., Green, M.G., Crispe, A., 2004. *Northern Arunta Region integrated interpretation of geophysics and geology, Northern Territory* (1: 500,000 scale map, First Edition), Northern Territory Geological Survey, Alice Springs.

South Australia
- Cowley, W.M. (Compiler), 2006. *Solid geology of South Australia*. South Australia. Department of Primary Industries and Resources. Mineral Exploration Data Package, 15 (version 1.1.).

Province boundaries
Based on Geoscience Australia's Georegions ArcInfo coverage.

Imagery used:
Total Magnetic Intensity, 4th Edition, 2004: Milligan, P.R., Franklin, R., 2004. *Magnetic Anomaly Map of Australia* (1:5,000,000 scale map, Fourth Edition), Geoscience Australia, Canberra
Bouguer Gravity, 2nd Edition, 1997: Murray, A.S., Morse, M.P., Milligan, P.R., Mackey, T.E., 1997. *Gravity Anomaly Map of the Australian Region* (1:5,000,000 scale map, Second Edition), Australian Geological Survey Organisation, Canberra.
Digital Elevation & Bathymetry, 2006: Image compiled from *Land Digital Elevation Model* (SRTM), National Geospatial-Intelligence Agency and the National Aeronautics and Space Administration; *Australian bathymetry and topography grid* (June 2005), Geoscience Australia; and *ETOPO2 Global 2-Minute Gridded Elevation data – ocean bathymetry*, U.S. Department of Commerce, National Oceanic and Atmospheric Administration.

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Other maps in this series:
This map is ***Part 2*** of a Geoscience Australia series showing the geographic extent and time-space relationships of Proterozoic mafic-ultramafic magmatism and associated mineral deposits across the Australian continent.

Copies of the *Part 2* map are available free online at: www.ga.gov.au in pdf format.

Part 1: Western Australia was published in October 2006 and documents 15 Proterozoic mafic-ultramafic magmatic events.

Copies of the *Part 1* map are available free online at:
http://www.ga.gov.au/image_cache/GA8798.pdf in pdf format
http://www.ga.gov.au/image_cache/GA8797.jpg in jpeg format

Part 3 (the final map in the series to be released in 2008) will show a national time-space-event chart and individual State/Territory maps (including Queensland, New South Wales, Victoria, and Tasmania) merged into a seamless coverage of Proterozoic mafic-ultramafic magmatic events across Australia.

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