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JULY 2018 NUMBER 87

Fieldnotes

Government of Western Australia
Department of Mines, Industry Regulation and Safety

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EXPLORATION INCENTIVE SCHEME

Round 17 EIS Co-funded drilling announced

In the recent State budget, the government announced it would continue the Exploration Incentive Scheme (EIS). With Mines and Petroleum Minister Bill Johnston's strong support and advocacy, the EIS will continue at $10 million per year with funds raised through an increase in the Mining Tenement Rent (MTR) over the next two years. The funding will be administered by the Department of Mines, Industry Regulation and Safety (DMIRS), and will be an enduring program to continue to bring economic benefits to the State, and the petroleum and mining resource sectors.

The flagship Co-funded Drilling program will continue with an allocation of $5 million per year. On 29 May, Minister Johnston announced the successful applicants for Round 17, which allocated $5.2 million across 42 projects. Round 17 successful projects target a range of commodities from the traditional elements such as gold and copper, to commodities sought after by the emerging battery market such as lithium, graphite, and heavy rare earth elements. The project locations are diverse, with sites located from the South West to the Pilbara, the east Kimberley and remote eastern margins of the State (see Fig. 1 for locations and successful applicants).

Drilling in the Eucla.
Image courtesy Gunson Resources

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WHAT'S INSIDE?

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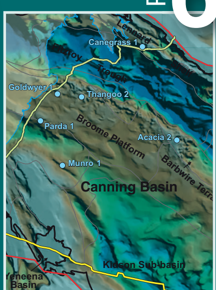

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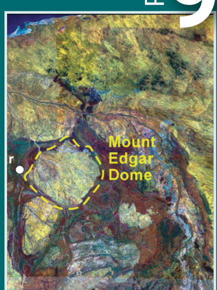

Geological Survey of Western Australia

WA 100k bedrock geology — taking you below the surface

The long-awaited statewide 1:100 000 Interpreted Bedrock Geology (IBG) digital dataset is now available in GeoVIEW.WA. The new dataset covers those areas of Western Australia where IBG exists at this scale (i.e. approximately 30% of the State), with a focus on areas of exposed Archean and Proterozoic bedrock. The dataset includes geology polygons, geology lines, and a linear structure layer, the latter referring primarily to pre-Cenozoic bedrock structures.

The statewide compilation is based on the Geological Survey of Western Australia's (GSWA's) Geological Information Series (GIS) and Geological Exploration Packages (GEP) for which digital 1:100 000 and 1:250 000 IBG is available (Fig. 1). The data packages included are: Kimberley 2017, Tanami–Arunta 2016, West Musgrave 2017, East Albany–Fraser Orogen 2014 (1:250 000 pre-Mesozoic), West Capricorn 2016, East Yilgarn 2017, South Yilgarn 2016, Murchison 2017 and Pilbara 2014. IBG is being compiled for other areas where surface geology at 1:100 000 already exists, so that the coverage can be extended; a regolith layer is also being assembled. The dataset is to be updated with any new GIS/GEP digital package release.

With the exception of minor topological corrections, the spatial integrity of the source packages has been preserved. However, in order to provide the most up-to-date geological information, attribution from the original source was modified to remove superseded stratigraphic units, display reinterpreted stratigraphic relationships, and include more recent geochronology. The source package of each feature is captured as an additional attribute field. Due to the level of detail, this layer is best viewed above 1:1 800 000 scale.

The 1:100 000 IBG dataset incorporates significant new GeoVIEW.WA functionality. The link to the Explanatory Notes System (ENS) underpinning the layer is based on lithostratigraphic number (the ENS unique identifier) rather than geological code, avoiding the breakdown of the unit report's link when a code is modified in ENS. More radically, geological attributes of lithostratigraphic units are sourced dynamically from ENS rather than from a static lookup table — this ensures that geological information (e.g. new geochronology) is updated weekly rather than annually or longer. A procedure is in place to automatically transfer updates to the Data and Software Centre, from which this dataset can be downloaded for offline viewing. This functionality will be rolled out as geological layers at other scales are updated, ensuring all State geology datasets in GeoVIEW.WA provide a seamless, truly current summary of the geology of Western Australia.

The 1:100 000 Interpreted Bedrock Geology digital dataset can be downloaded from the Department of Mines, Industry Regulation and Safety (DMIRS) website at <www.dmp.wa.gov.au/datacentre>.
Select *Statewide spatial datasets → Geology → 1:100 000 Interpreted bedrock geology*.

For more information, contact Angela Riganti (angela.riganti@dmirs.wa.gov.au).

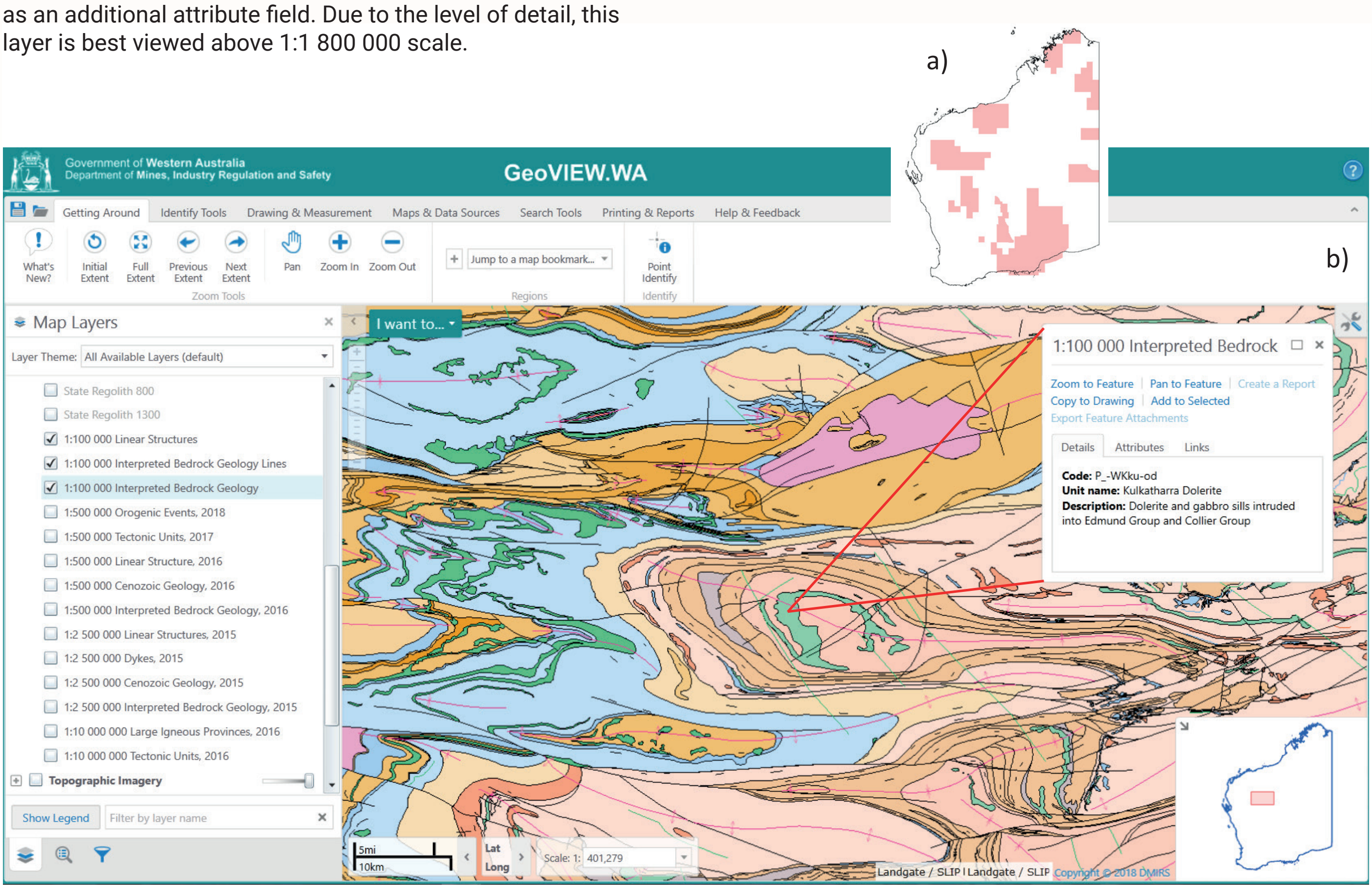

Figure 1. 1:100 000 Interpreted Bedrock Geology layer in GeoVIEW.WA: a) inset showing the GIS/GEP digital coverage; b) detail from an area in the West Capricorn GIS package

continued from page 1

CO-FUNDED GOVERNMENT–INDUSTRY DRILLING
ROUND 17, 2018–19

GENERAL
1 Anglo Australian Resources NL
2 AngloGold Ashanti Australia Limited
3 Antipa Resources
4 Antipa Resources
5 Artemis Resources Limited
6 Ausgold Exploration Pty Ltd
7 Australian Mines Limited
8 Bacome Pty Ltd
9 Black Cat (Bulong) Pty Ltd
10 Blackham Resources Ltd
11 Bryah Resources Ltd
12 Comet Resources Limited
13 Cygnus Gold
14 Dacian Gold Limited
15 Doray Minerals
16 EMX NSW 1 Pty Limited
17 EMX NSW 1 Pty Limited
18 Evolution Mining - Mungari
19 GSM Mining Company Pty Ltd
20 Lefroy Exploration
21 Millennium Minerals Ltd
22 Montezuma Mining Company Ltd
23 Musgrave Minerals Ltd
24 Northern Minerals Limited (NTU)
25 Northern Minerals Ltd
26 Pindan Exploration Company Pty Ltd
27 Public Holdings (Australia) Limited
28 Red 5 Ltd
29 Rumble Resources Ltd
30 SA Drilling Pty Ltd
31 Saturn Metals Limited
32 Sayona Mining Limited
33 Serena Minerals Limited
34 Sipa Exploration NL
35 St Ives Gold Mining Company Pty Ltd
36 Toucan Gold Pty Ltd
37 Traka Resources Limited
38 Trigg Mining Pty Ltd

PROSPECTOR
39 Bacome Pty Ltd
40 Clinton Stash Moxham
41 Mark Selga
42 Peter Romeo Gianni

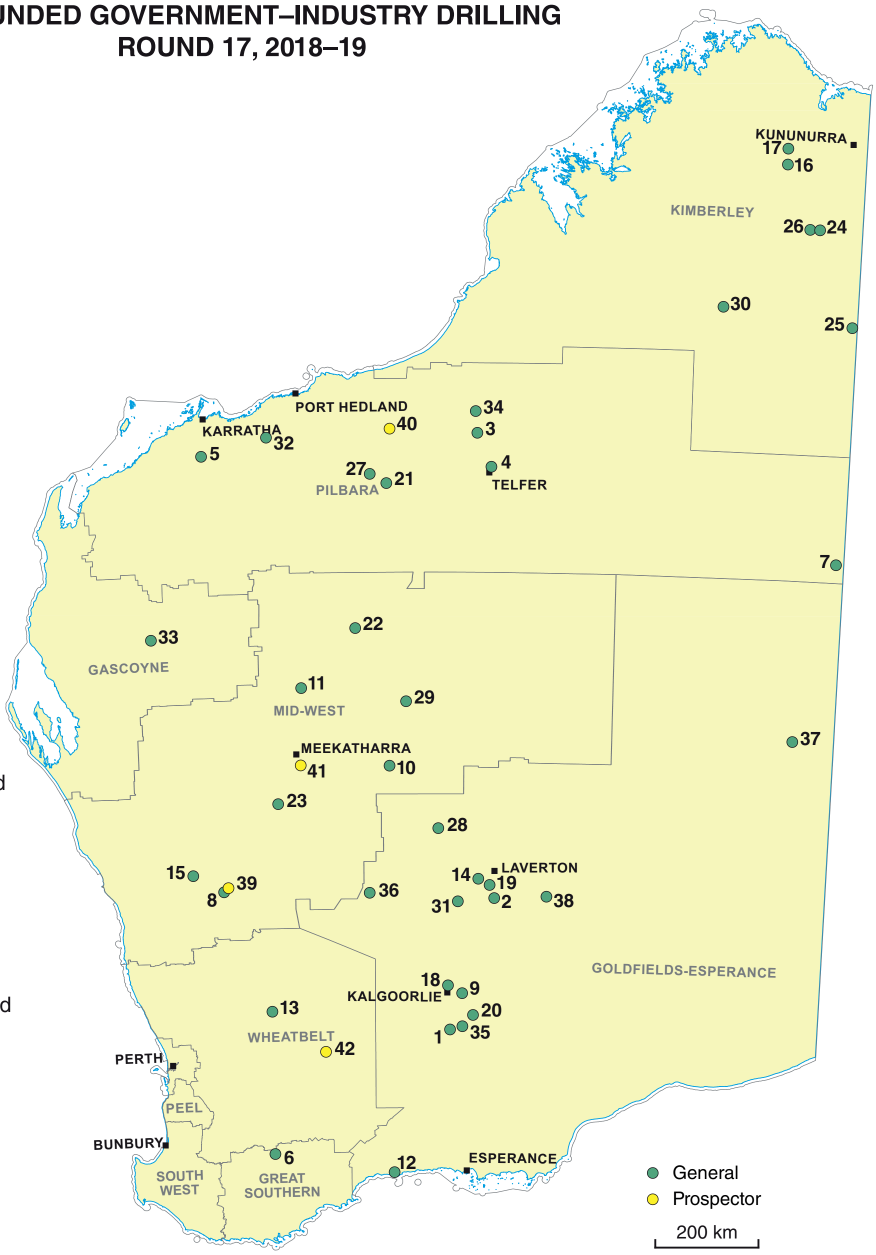

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Figure 1. List of successful applicants and locations Round 17

Successful applicants will be refunded up to 50% of their direct drilling costs — with caps of $150 000 for a multi-hole project, $200 000 for a single deep hole, and $30 000 for a prospector's project. Refunds are made after completion of drilling and submission of comprehensive reports with analytical data, which are released publically on the department's WAMEX and WAPIMS databases after a six-month confidentiality period.

Recent EIS success stories from previous rounds of co-funded drilling include the copper-dominated discoveries in the eastern Pilbara by Antipa Minerals (Minyari copper–nickel–cobalt discovery), Sipa Resources (Paterson North copper–gold project), Encounter Resources' copper and zinc prospects and Great Boulder Resources' significant copper–nickel–cobalt discovery at Mt Venn east of Laverton.

The next round of co-funded drilling (Round 18) will be open for applications on Friday 24 August and will be open for six weeks, closing at 5 pm WST on Friday 5 October 2018. Round 18 will be for drilling between 1 January and 31 December 2019. Advice, guidelines and a copy of the co-funding agreement can be found at <www.dmp.wa.gov.au/eisdrilling>.

The Co-funded Drilling program is subject to probity and financial audits for each round to ensure a fair and transparent process.

For more information, contact Charlotte Hall, EIS coordinator (charlotte.hall@dmirs.wa.gov.au)

Modernizing biostratigraphic data in the southern Perth Basin

Despite its proximity to Perth and other populated centres, the southern Perth Basin is poorly studied in comparison to the petroleum-rich northern part of the basin. Recent studies into the potential for CO_2 geosequestration in the Harvey area have provided useful new geoscientific datasets within this poorly studied region, and work is underway to reassess the stratigraphy of this area. Standardizing the biostratigraphic data in the southern Perth Basin was identified as an important step in reviewing this stratigraphy to provide a robust age framework for further work.

GSWA Report 174 represents the first part of this project, reviewing, modernizing and integrating all publically available palynological information in the basin between Mandurah and Bunbury. Over 200 individual wells, bores and field sites are reviewed in this Report, with palynological studies ranging in vintage from the 1960s to the mid-2010s. In order to maximize the usefulness of the review, a set of well sheets is included in the Report, summarizing the drilling and palynological details of each borehole. Correlations between key wells and boreholes are also provided for context.

The palynological dataset extends from the Early Triassic to the Holocene, with spore-pollen assemblages covering the Lower Triassic *Krauselisporites saeptatus* (=*Lunatisporites pellucidus*) to Lower Cretaceous *Balmeiopsis limbata* (=*Ruffordiaspora australiensis*) Zones, and dinoflagellates of the Lower Cretaceous *Kaiwaradinium scrutillinum* (=*Senoniasphaera tabulata*) to Upper Cretaceous *Xenascus asperatus* Zones. Cenozoic assemblages are not placed into zones due to the generally poor knowledge of palynofloral assemblages of this Era in Western Australia. Within this range, samples are heavily dominated by Lower Cretaceous (*B. limbata* Spore-pollen Zone and equivalent dinocyst zones) and Lower Jurassic (*Corollina torosa* and *Callialasporites turbatus* Spore-pollen Zones) assemblages, with rare Upper Cretaceous and Triassic palynofloras.

The summary highlights a number of palynological features not recorded in the northern Perth Basin, thereby supporting previous work suggesting that the stratigraphy of the southern part of the Perth Basin is distinct enough to be assessed independently of the better-known northern part of the basin. A similar project collating the biostratigraphic information from the southern Perth Basin between Bunbury and the south coast is now in preparation.

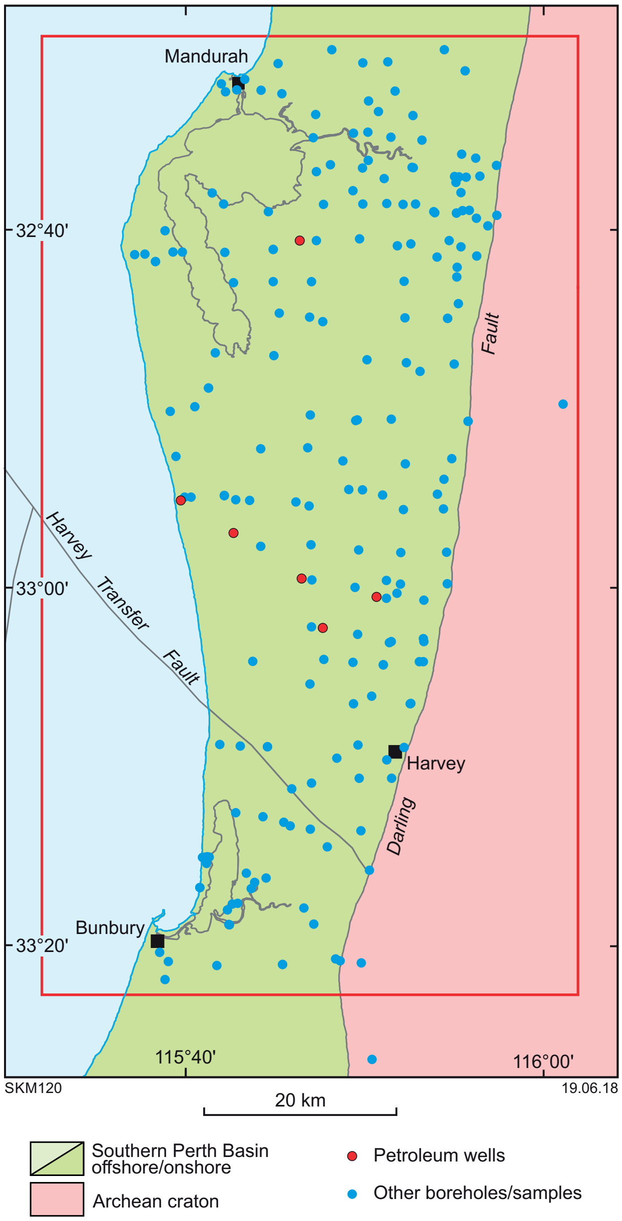

Figure 1. Distribution of the boreholes and wells re-examined in this project

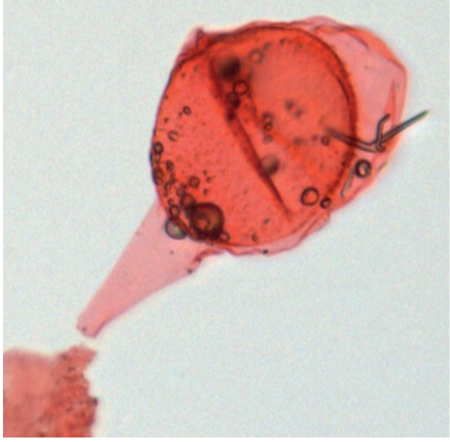

Figure 2. Iconic dinoflagellate Dingodinium cerviculum *Cookson and Eisenack, 1958 from water bore Harvey Shallow 41 at 27–30 m (GSWA F12421/1)*

GSWA Report 174 A review of palynology from the Harvey region, southern Perth Basin, Western Australia is available as a free downloadable PDF from <www.dmp.wa.gov.au/ ebookshop>.

For more information, contact Sarah Martin (sarah.martin@dmirs.wa.gov.au).

A new mafic magmatic event in the Capricorn Orogen

Numerous dolerite sills and dykes intrude Proterozoic basement and cover rocks of the Capricorn Orogen, located between the Archean Pilbara and Yilgarn Cratons. Recent field mapping, integrated with Geological Survey of Western Australia (GSWA) geochronology, geochemistry, and isotope information, has identified a previously unrecognized suite of dolerite sills in the western part of the orogen: the 1514–1505 Ma Waldburg Dolerite. New GSWA data also refine the ages of the previously known 1465–1450 Ma Narimbunna Dolerite and the 1083–1075 Ma Kulkatharra Dolerite.

The Waldburg and Narimbunna Dolerites were emplaced within metasedimentary rocks of the 1679–1455 Ma Edmund Basin, whereas the Kulkatharra Dolerite [a component of the Warakurna large igneous province (LIP)] intruded both the Edmund and the 1171–1067 Ma Collier Basins. Field relationships and geochronology suggest that dolerite sills were emplaced shortly after or during sedimentation, implying links between extensional tectonics, basin formation, and mafic magmatism.

GSWA Record 2018/4 documents the petrographic, geochronological, geochemical, and isotopic characteristics of all three dolerite sill suites. Although highly altered, Waldburg sills are distinct geochemically, and exhibit low concentrations and weak fractionation of most rare earth and high field strength elements. Geochemical and isotopic compositions show that the Waldburg, Narimbunna and Kulkatharra Dolerites were sourced from similarly shallow depths within a subduction-modified lithospheric mantle. Differences in petrographic and geochemical compositions between the three sill suites also reflect minor crustal contamination as well as fractionation during magma transport and emplacement.

The Edmund and Collier Basins host a wide range of mineral occurrences, including supergene manganese and lead, minor gold and phosphate minerals, and Western Australia's largest stratabound Pb–Ag–Cu–Au deposit at Abra. Many of these deposits are associated with major crustal-scale faults that have been reactivated multiple times. Mafic intrusive suites are emplaced typically within a few million years, and are one of the few rocks in sedimentary basins that can be dated precisely, making them ideal targets for constraining the ages of sedimentation, basin formation, tectonism, and mineralization.

GSWA Record 2018/4 A new Mesoproterozoic mafic intrusive event in the Capricorn Orogen is available as a free downloadable PDF from <www.dmp.wa.gov.au/ebookshop>.

For more information, contact Olga Blay (olga.blay@dmirs.wa.gov.au).

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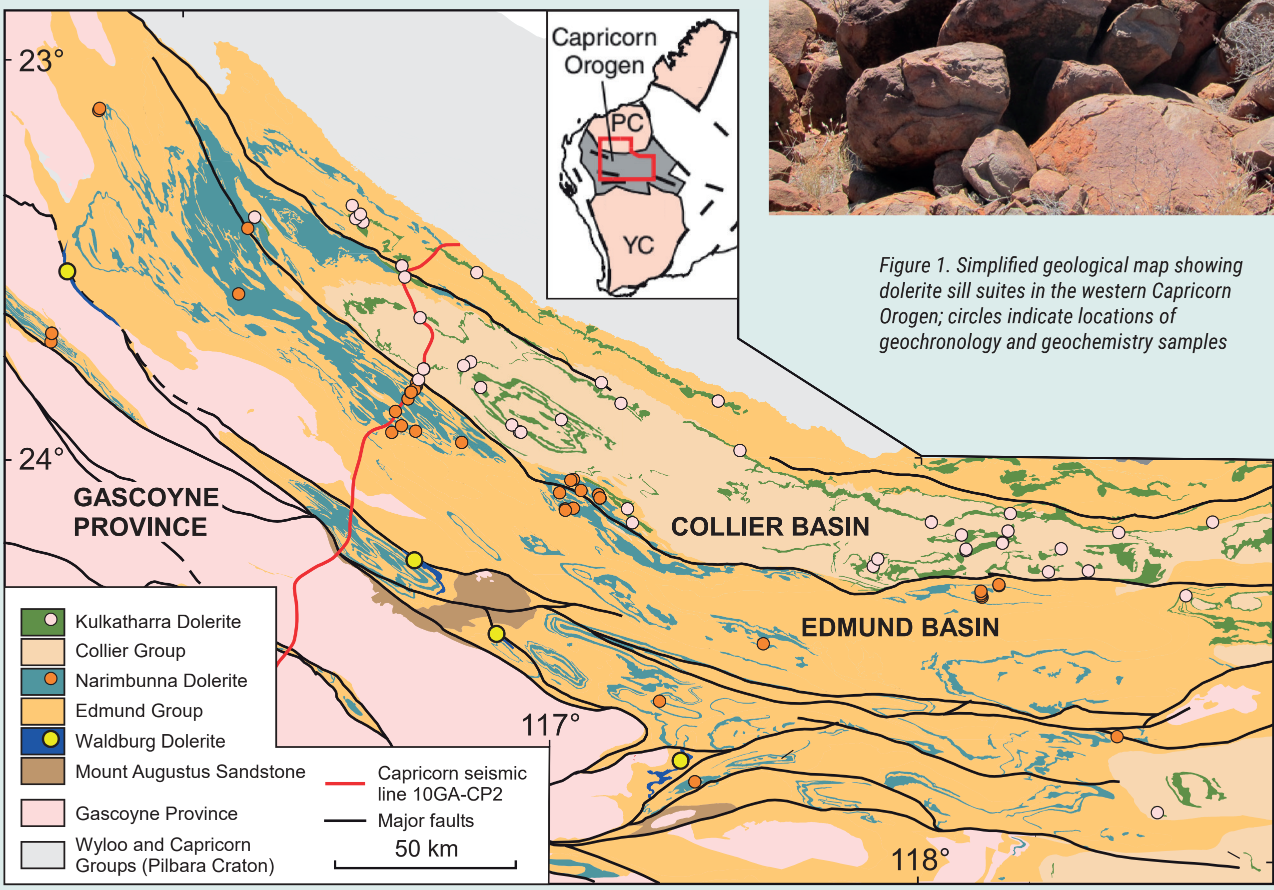


Figure 1. Simplified geological map showing dolerite sill suites in the western Capricorn Orogen; circles indicate locations of geochronology and geochemistry samples

New insights from basement geochronology

The 2014 Canning Coastal seismic survey and 2018 Kidson Sub-basin seismic survey (the latter in progress at the time of writing) are major collaborative projects with Geoscience Australia (Fig. 1). Such deep crustal surveys not only image the basin, but also the basement structure underneath, although the ages of the rocks involved were previously poorly constrained. This is being partly remedied by a program of SHRIMP U–Pb zircon geochronology on magmatic and metasedimentary basement rocks penetrated in selected petroleum wells near the Canning Coastal seismic survey (Figs 2, 3), with further dating of samples from wells near the Kidson Sub-basin seismic survey currently in progress.

The new geochronology includes a few surprises. An igneous crystallization age of 654 ± 3 Ma (Fig. 2a) for granitic rock at the bottom of Goldwyer 1 is within the age range reported for granitic rocks of the O'Callaghans Supersuite in the Telfer area of the Paterson Orogen. This suggests that magmatism from this event may be more extensive than previously thought as Goldwyer 1 is more than 300 km north of the northernmost outcrops of O'Callaghans Supersuite. Granitic rock at the bottom of Samphire Marsh 1 has an igneous crystallization age of 505 ± 4 Ma (Fig. 2b). The dominant group of inherited zircons in the same rock yields a weighted mean age of 653 ± 7 Ma, similar to the age of the granitic rock in Goldwyer 1.

A pegmatite vein intruding schist at the bottom of Parda 1 yields a crystallization age of 537 ± 13 Ma (Fig. 2c). These Cambrian ages are significantly younger than previously known felsic igneous events in the region, with the exception of the 512.5 ± 4.3 Ma U–Pb baddeleyite date reported by Jourdan et al. (2014: Geology, v. 42, p. 543–546) for basement in nearby Munro 1 (Fig. 1). The baddeleyite is presumably hosted within abundant mafic enclaves in this granodioritic rock, and Jourdan et al. suggested a connection with the 510.7 ± 0.6 Ma mafic Kalkarindji Large Igneous Province that is extensive to the north and south of the Canning Basin. The oldest biostratigraphically dated marine rocks within the Canning Basin are of early Ordovician age (Tremadocian; 485–478 Ma), although seismic interpretation suggests that somewhat older strata are present within early rift grabens that have not been penetrated by wells. The relatively short period separating Cambrian mafic–felsic magmatism and the onset of sedimentation suggests that the magmatism may reflect an early phase of extension related to initiation of the Canning Basin.

The ages of low-grade metasedimentary basement rocks have been constrained by SHRIMP U–Pb dating of detrital zircons. The youngest detrital zircon in basement quartzite in Thangoo 2, at 953 ± 21 Ma (1σ), is similar in age to the youngest date of 961 ± 29 Ma (1σ) previously reported from metasandstone in

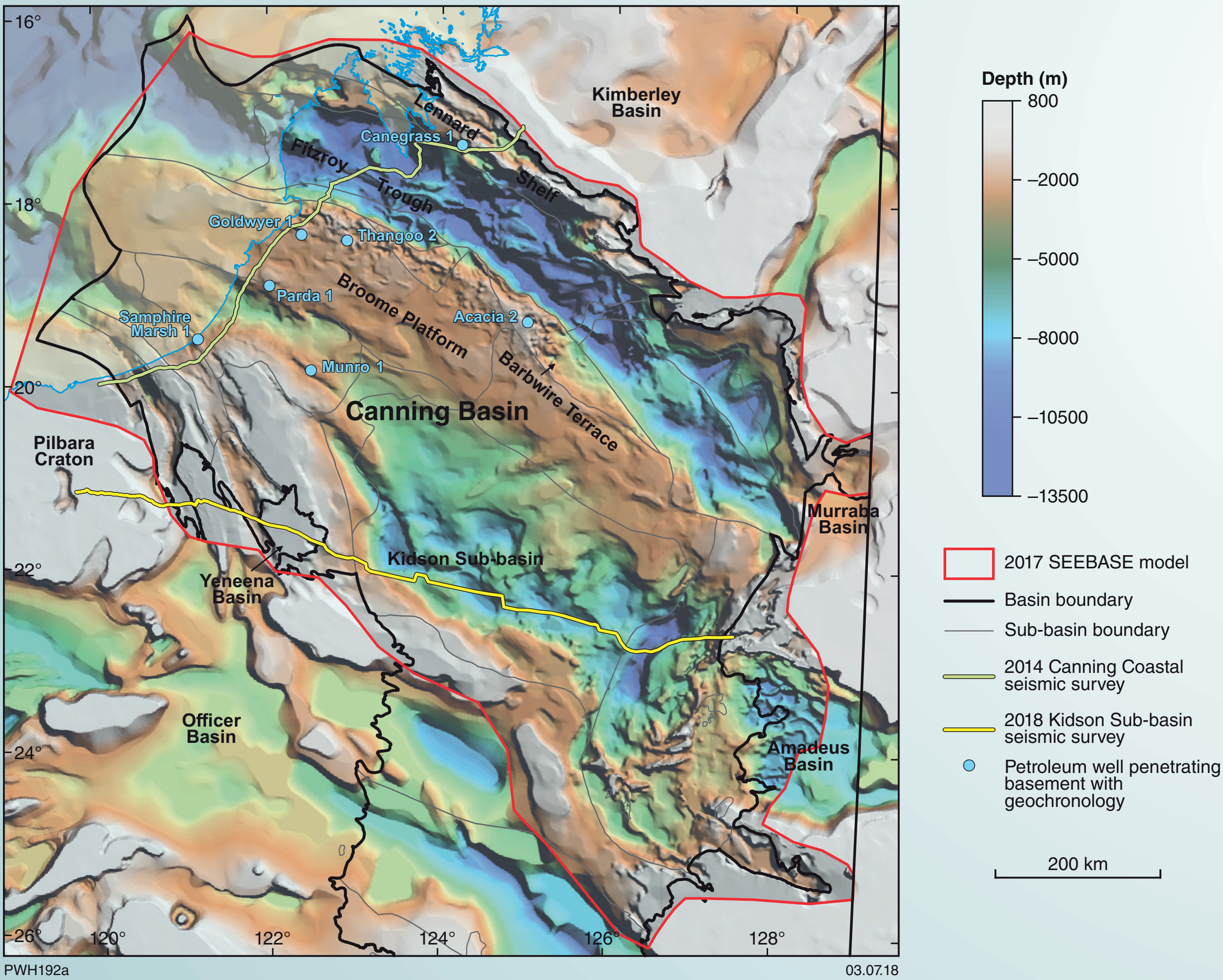


Figure 1. 2017 SEEBASE image for the Canning Basin with 2005 SEEBASE image as background, coloured for modelled basement depth (a proxy for sediment thickness). Petroleum wells with dated basement, most near the 2014 Canning Coastal seismic survey, are indicated. Dating of basement from wells near the 2018 Kidson Sub-basin seismic survey is in progress

Acacia 2 farther east (Figs 1, 3a,b). These samples yield detrital zircon age spectra similar to those of sedimentary successions of the lower Yeneena and lower Murraba Basins, components of the extensive Neoproterozoic Centralian Superbasin exposed along the southern and eastern margin of the Canning Basin, respectively. The granitic rock in Samphire Marsh 1 and pegmatite in Parda 1 contain early Neoproterozoic inherited zircons (Fig. 2b,c), suggesting that the rocks they intrude may also be part of the Centralian Superbasin. Thus, metamorphosed and tectonized components of the Centralian Superbasin may be widespread beneath the Canning Basin, at least south of the Fitzroy Trough. In contrast, a basement metasedimentary breccia from Canegrass 1 on the Lennard Shelf of the northern Canning Basin has no zircons younger than 1791 ± 13 Ma (1σ) and an age spectrum similar to samples reported from the Paleoproterozoic Kimberley Basin farther north (Fig. 3c). This suggests that low-grade metamorphic rocks of the Kimberley Basin directly underlie the Canning Basin in this area and that strata of the Centralian Superbasin were either not deposited here, or were uplifted and eroded prior to deposition of the Canning Basin.

GSWA Record 2018/2 Looking beneath the Canning Basin: new insights from geochronology, seismic and potential-field data *in* GSWA 2018 extended abstracts: promoting the prospectivity of Western Australia, p. 31–33 is available as a free downloadable PDF from <www.dmp.wa.gov.au/ebookshop>.

For more information, contact Peter Haines (peter.haines@dmirs.wa.gov.au) or Michael Wingate (michael.wingate@dmirs.wa.gov.au).

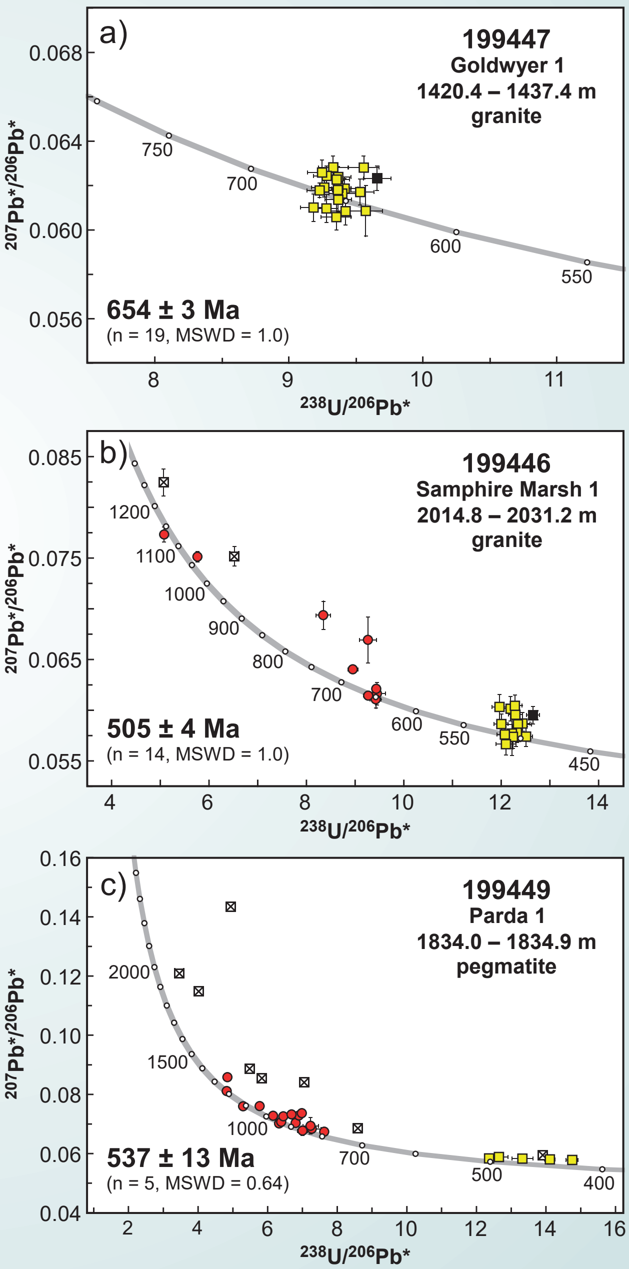


Figure 2. U–Pb analytical data for magmatic zircons (yellow squares) and inherited zircons (red circles) in igneous basement rocks from Canning Basin petroleum wells. Black squares indicate analyses affected by Pb loss and crossed squares indicate data with discordance >5%. Weighted mean ages are quoted with 95% uncertainties; Pb, radiogenic Pb*

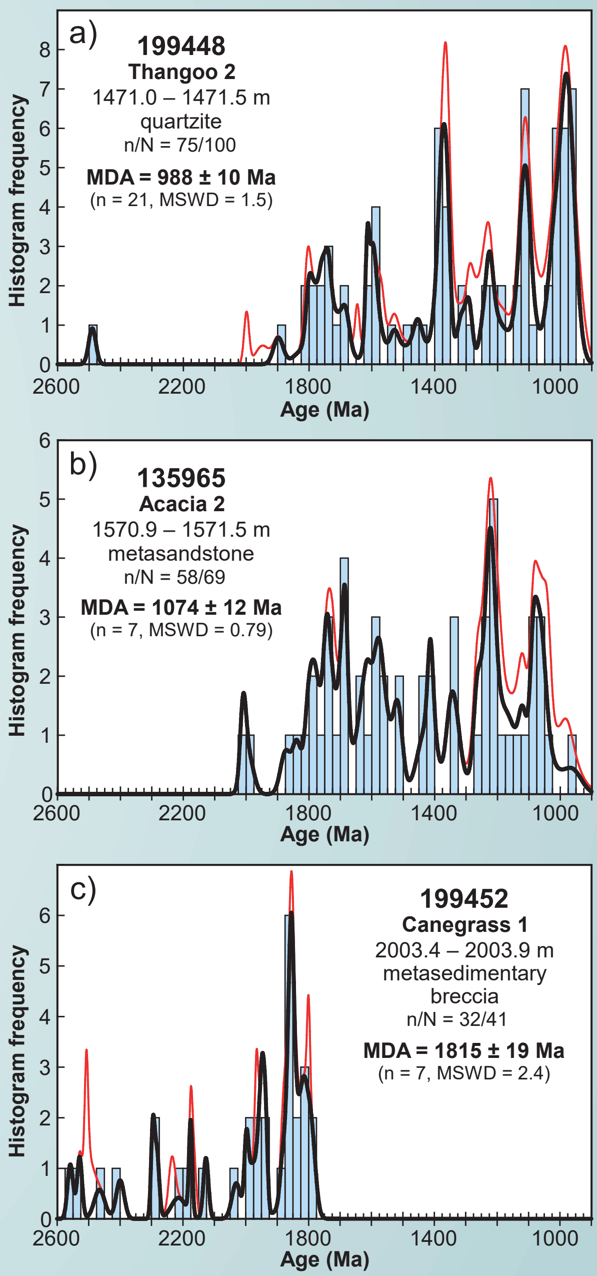


Figure 3. Probability density diagrams and histograms for U–Pb detrital zircon data from metasedimentary basement rocks in Canning Basin petroleum wells. Thick black probability curve and frequency histograms include only data <5% discordant; thin red curve includes all data (n/N = number of analyses <5% discordant/total number analyses). MDA is maximum depositional age expressed as weighted mean age of the youngest age component (uncertainties are 95%, n = number of zircons in youngest age component)

Archean metamorphosed porphyry-style mineralization

The Calingiri Cu–Mo–Ag deposits, located in the South West Terrane of the Archean Yilgarn Craton, are the subject of The University of Western Australia Master of Science thesis research by Michael D Outhwaite, published as **GSWA Report 183**. Four deposits (Ninan, Bindi, Dasher and Opie) that make up Calingiri extend 20 km south from the Wongan Hills greenstone belt, about 120 km northeast of Perth. The mineralization is disseminated in garnet-bearing granite gneiss, a style not recognized elsewhere in the Yilgarn Craton. Although Cu mineralization at the greenstone-hosted Ninan deposit has been known since 1975, the larger gneiss-hosted Bindi and Opie deposits were intersected by Dominion Mining Ltd in 2010, and gneiss-hosted mineralization was discovered at Dasher by the present owner, Caravel Minerals Ltd, in 2013.

GSWA Report 183 focuses on the timing of magmatic, structural, metamorphic and mineralization events, mainly at the Dasher deposit, and details the drillcore logs, petrography, whole-rock and mineral chemistry, and geochronology. Dasher mineralization formed at c. 3.0 Ga, based on Re–Os dating of molybdenite, within a 3010 ± 4 Ma high-Ca biotite monzogranite gneiss, which is cut by 3010 ± 4 Ma syenogranite intrusions (U–Pb ages based on SHRIMP zircon dating). Younger deformation and upper amphibolite facies metamorphism was accompanied by additional granitic magmatism at 2673 ± 5 Ma. This younger event deformed the Cu–Mo–Ag mineralization and recrystallized synmineralization hydrothermally altered rocks into garnet- and sillimanite-bearing assemblages.

Discovery of the Calingiri mineralization shows the potential of underexplored Archean granite gneiss terranes, and illustrates the effectiveness of exploration focused on major crustal structures to produce discoveries that are unusual in location and style. It also contributes to a recent trend of significant mineral discoveries in high-grade metamorphic terranes, such as Tropicana and Nova–Bollinger, where structural and mineralogical complexity has inhibited previous explorers. The Calingiri deposits have grade–tonnage profiles, metal distributions, and alteration characteristics comparable to those of Phanerozoic porphyry Cu–Mo deposits.

GSWA Report 183 Metamorphosed Mesoarchean Cu–Mo–Ag mineralization: evidence from the Calingiri deposits, southwest Yilgarn Craton is available as a free downloadable PDF from <www.dmp.wa.gov.au/ebookshop>.

For more information, contact Michael Outhwaite (michael_outhwaite@hotmail.com) or Michael Wingate (michael.wingate@dmirs.wa.gov.au).

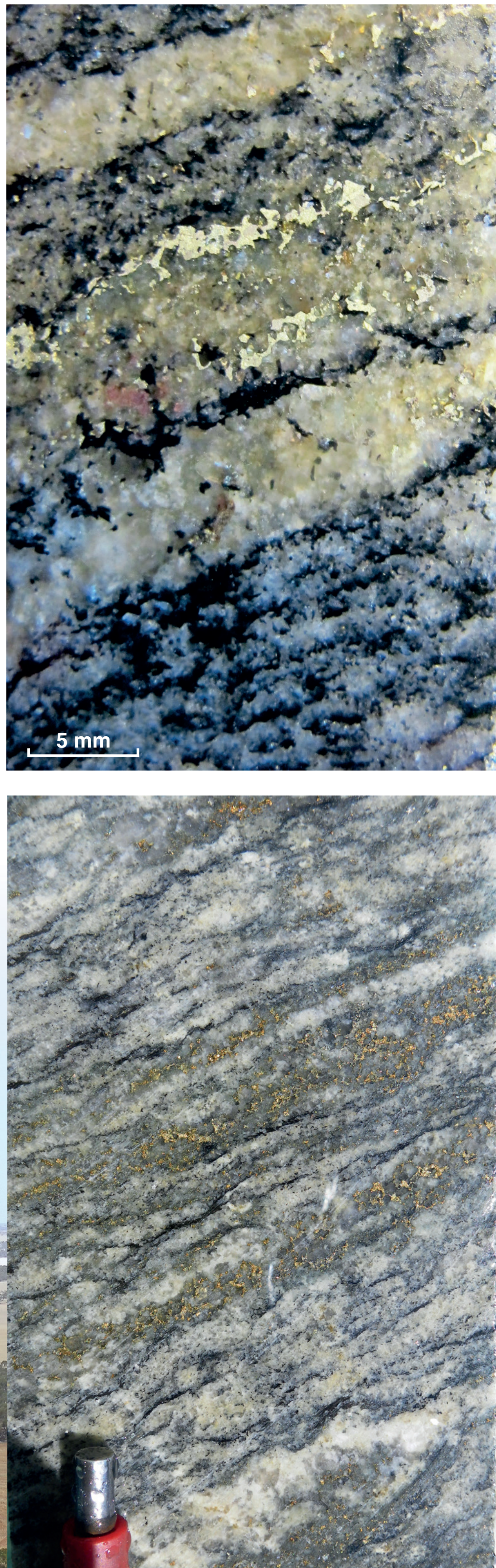


Figure 1. Dasher prospect: foliation-parallel chalcopyrite–pyrrhotite–pyrite–magnetite–molybdenite mineralization in granite

THE UNIVERSITY OF WESTERN AUSTRALIA

John de Laeter Centre

Hf isotope insights into Paleoarchean magmatism

GSWA Report 181 combines previous geological, geochronological and isotopic evidence with new Lu–Hf isotope data to provide improved insights into the Archean crustal evolution of the Pilbara Craton.

The Report reviews Sm–Nd data from the East Pilbara Terrane and presents new zircon Lu–Hf data for several generations of granitic rocks in the Mount Edgar Dome. The data are used to chart the crustal evolution of the Mount Edgar Dome, and to look for secular trends from the Paleoarchean to the Mesoarchean, a time period that spans the interpreted transition from early Earth processes to more modern-style plate tectonic processes. This contribution is a new and unique study that documents the growth of one of the major domes of the East Pilbara Terrane during cratonic evolution and stabilization.

The East Pilbara Terrane consists of large composite granite domes surrounded and separated by narrow belts of steeply dipping and faulted greenstones. The Mount Edgar Dome is representative of these domes and comprises a central core of granitic intrusions emplaced during five tectono-magmatic events between 3484 and 2831 Ma.

Zircons from 27 granitic samples represent four of these events and provide Hf isotope data that support two significant conclusions. First, granitic magmas older than 3200 Ma were derived by the episodic reworking (melting) of older crust (mainly 3700–3500 Ma) with only limited additions of juvenile material. This is consistent with a volcanic plateau setting in which vertical tectonic processes accompanied magmatic episodes during growth of the East Pilbara Terrane. Second, crustal evolution after 3200 Ma included substantial additions of juvenile magma, which supports previous interpretations of a Mesoarchean change to plate tectonic processes in the Pilbara Craton.

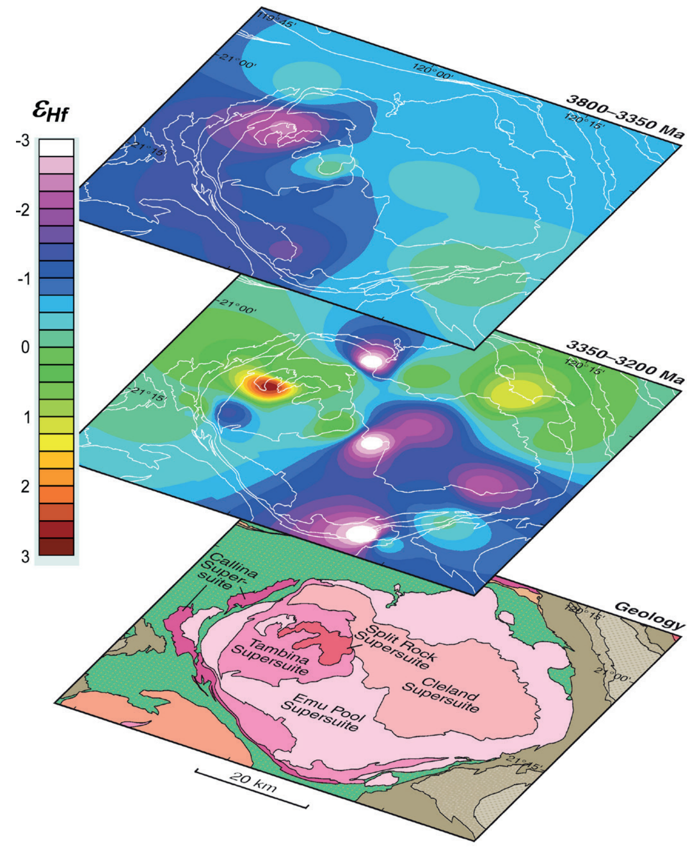


Figure 1. ε_{Hf} isotope maps for the Mount Edgar Dome, for two time slices relevant to Eoarchean–Mesoarchean crustal evolution. Each map presents data for samples with magmatic crystallization ages within that time interval

GSWA Report 181 New Hf isotope insights into the Paleoarchean magmatic evolution of the Mount Edgar Dome, Pilbara Craton: implications for early Earth and crust formation processes is available as a free downloadable PDF from <www.dmp.wa.gov.au/ebookshop>.

For more information, contact Nick Gardiner (nicholas.gardiner@curtin.edu.au) or Michael Wingate (michael.wingate@dmirs.wa.gov.au).

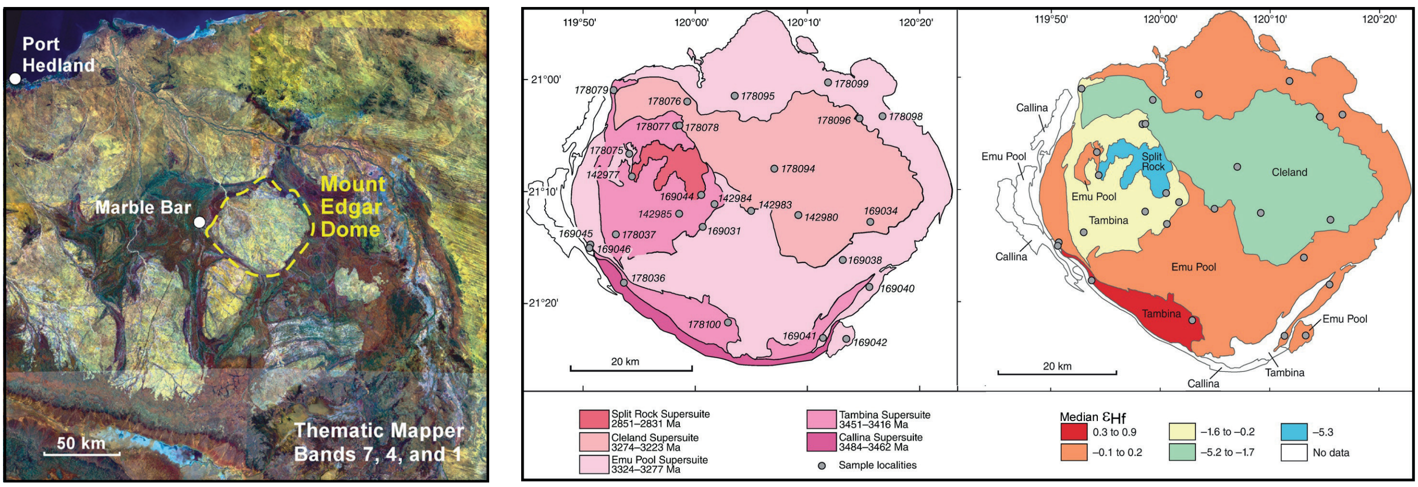


Figure 2. Location of the Mount Edgar Dome in the eastern Pilbara region (left). Younger intrusions in the core of the Mount Edgar Dome are progressively more isotopically evolved (negative ε_{Hf}), consistent with progressive reworking of older crust (right)

EXPLORATION INCENTIVE SCHEME CCFS GEMOC

A seismic interpretation of the southwestern Canning Basin, Western Australia

Recently acquired seismic data prompted a reinterpretation of the succession within the southwestern Canning Basin. **GSWA Report 178** integrates the 2014 Canning Coastal seismic survey, pre-existing seismic profiles (Fig. 1), petroleum and mineral well data, and potential field data to highlight regional structural features and better understand their significance. Results are presented on maps showing the depth of, and two-way time to, three key seismic horizons: Top Precambrian basement, Base Grant–Reeves unconformity and the Fitzroy Transpression unconformity.

Gravity data indicate that the structural complexity of the Canning Basin is related to the fundamental basement fabric. Forward modelling of the data suggests that the changes in gravity acceleration along an anomalously high gravity belt in the southwest are probably too great to be associated exclusively with the sedimentary succession. Instead, the significant changes in gravity across the belt can be explained best by the presence of multiple basement terranes of different densities. The boundaries between these terranes may have remained zones of lithospheric weakness through time that were subject to reactivation which controlled the erosion and preservation of the Paleozoic succession. This has produced discrete outliers in the southwestern Canning Basin, such as the Wallal and Waukarlycarly Embayments.

The maps of these horizons indicate that the structural complexity decreases within the younger stratigraphy. In general, these horizons shallow landwards along strike of each structural element, as well as southwestwards from the Willara Sub-basin to the preserved edge of the basin.

The Top basement horizon (Fig. 2) is highly faulted and deformed, defining the Wallal and Waukarlycarly Embayments through substantial changes of depth to the basement. The structural trends of the Base Grant–Reeves unconformity mimic the Top basement but with more subtle depth variation. The base of Jurassic succession, which is equivalent to the Fitzroy Transpression unconformity in the northern Canning Basin, provides evidence for a right-lateral wrenching movement and subsequent erosion during the Mesozoic. The Fitzroy Transpression unconformity gradually deepens from south to north — from 700 m at the coast to about 1000 m at the northernmost offshore extent of the study area. This unconformity is generally not displaced by pre-existing faults. The depth of these horizons and the thicknesses between them contributes to an intuitive understanding of the structural framework and regional petroleum prospectivity of the southwestern Canning Basin.

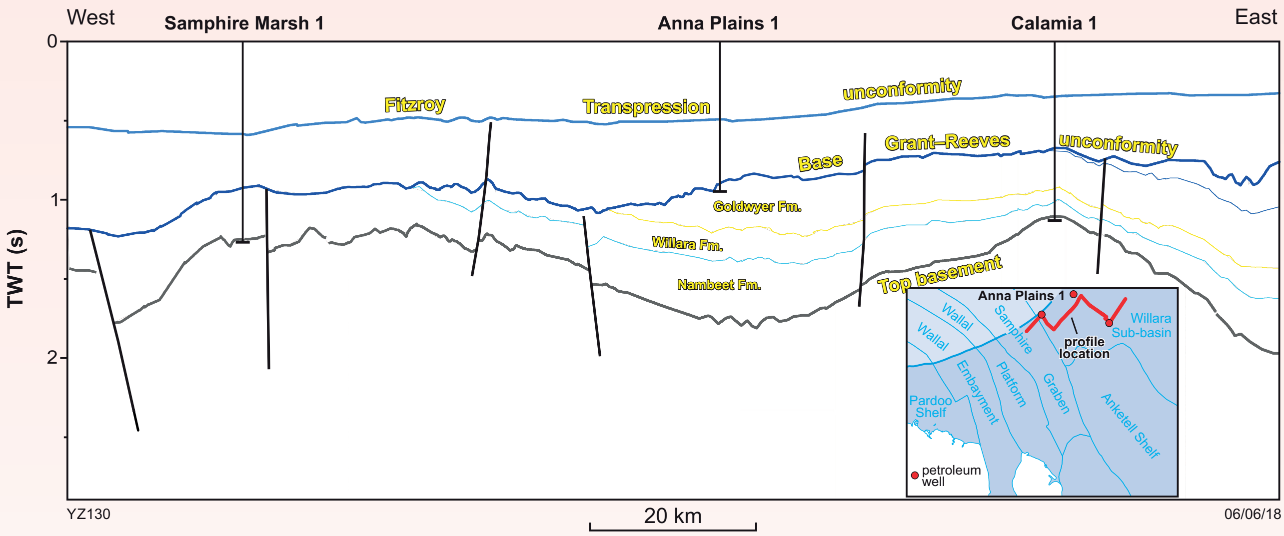


Figure 1. Seismic interpretation from Samphire Marsh 1 to Calamia 1

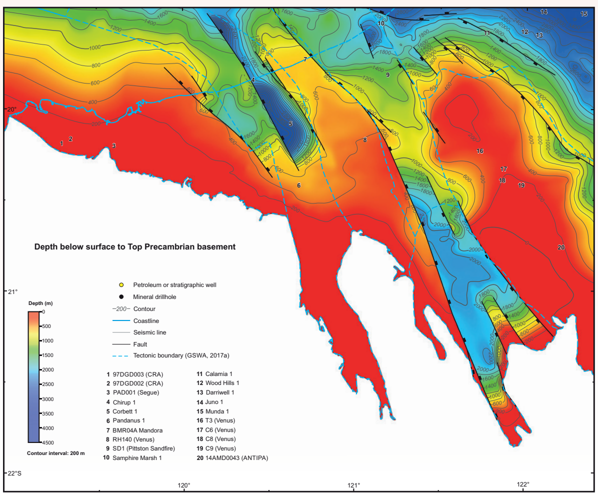


Figure 2. Depth below surface to top Precambrian basement in the southwestern Canning Basin

GSWA Report 178 A seismic interpretation of the southwestern Canning Basin, Western Australia is available as a free downloadable PDF from <www.dmp.wa.gov.au/ebookshop>.

For more information, contact Alex Zhan (alex.zhan@dmirs.wa.gov.au).

Airborne gravity program: 2 July 2018 update

Data downloads

Located data — Geophysical Archive Data Delivery System <www.ga.gov.au/gadds>.

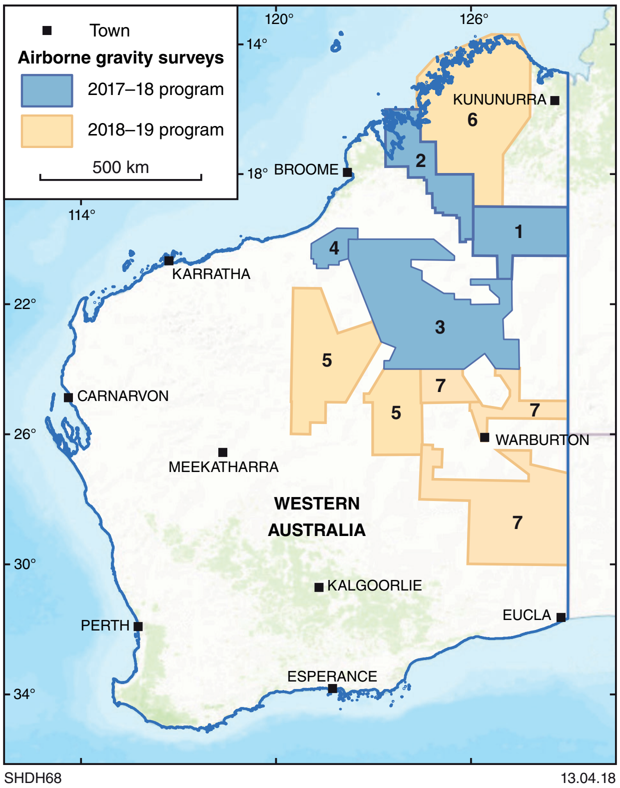
Grids and images — search in GeoVIEW.WA under Government Surveys layers.

Subscribe to the eNewsletter for alerts of preliminary and final data release dates. Go to <www.dmp.wa.gov.au/gswaenewsletter>.

Survey outline shapefiles are available online at <www.dmp.wa.gov.au/geophysics>.

For more information, contact David Howard (david.howard@dmirs.wa.gov.au).

EXPLORATION INCENTIVE SCHEME

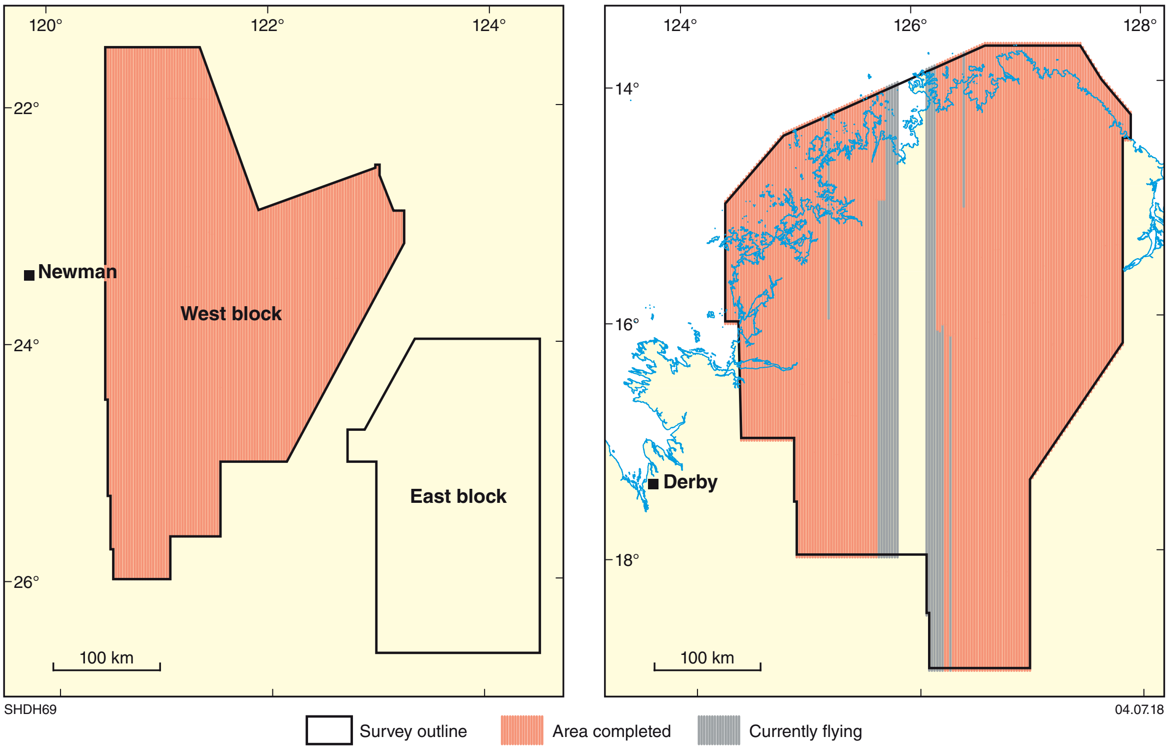


All surveys at 2.5 km line spacing

ID	Area/Name	Line direction	Size (km)	Status	Start	End	Release
1	Tanami 2017	N-S	26 000	Released	15-06-17	13-08-17	12-04-18
2	NE Canning 2017	N-S	24 000	Released	17-08-17	15-11-17	12-04-18
3	Kidson 2017	N-S	70 000	Processing	21-07-17	03-05-18	(Jul-18)*
4	Kidson extension 2018	E-W	5 500	Processing	02-04-18	18-04-18	(Jul-18)
5	Little Sandy Desert 2018	N-S	52 000	Paused 55%	23-04-18	(Oct-18)	(Dec-18)
6	Kimberley Basin 2018	N-S	61 000	Survey 75%	04-06-18	(Jul-18)	(Oct-18)
7	Warburton – Great Victoria Desert 2018	E-W N-S	62 000	Pending	(Jul-18)	(Oct-18)	(Dec-19)

* Preliminary data as Bouguer anomaly grids and images available for part-area Kidson survey

Dates in parentheses are estimates.



Left: Little Sandy Desert 2018 — status 25 June 2018, east block survey deferred until July 2018 Right: Kimberley Basin 2018 — status 2 July 2018

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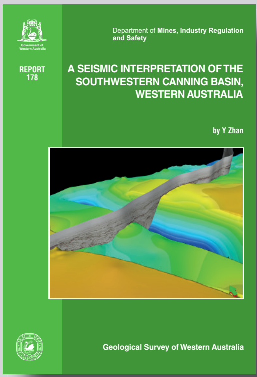
by Y Zhan

Includes three plates:
Plate 1. Two-way time and average velocity to significant seismic horizons
Plate 2. Depth below mean sea level and surface to significant seismic horizons
Plate 3. Isopach maps of the pre-Permian and Permian strata



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compiled by Gorczyk, W and Gessner, K

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by Smithies, RH, Lu, Y, Gessner, K, Wingate, MTD and Champion, DC

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Murchison 2018

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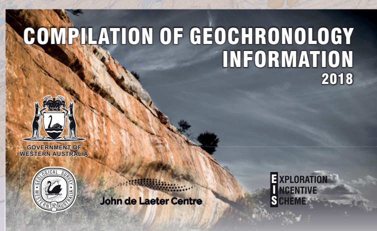

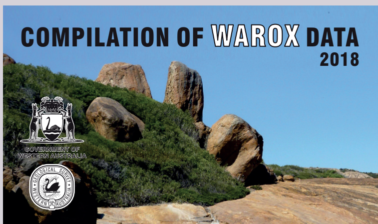

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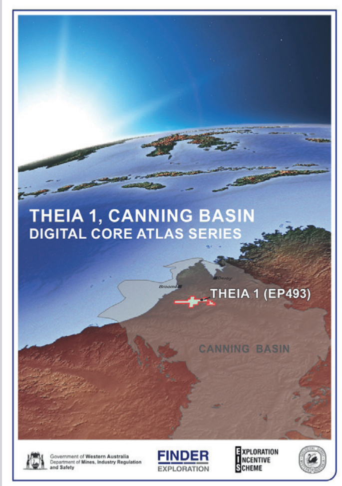

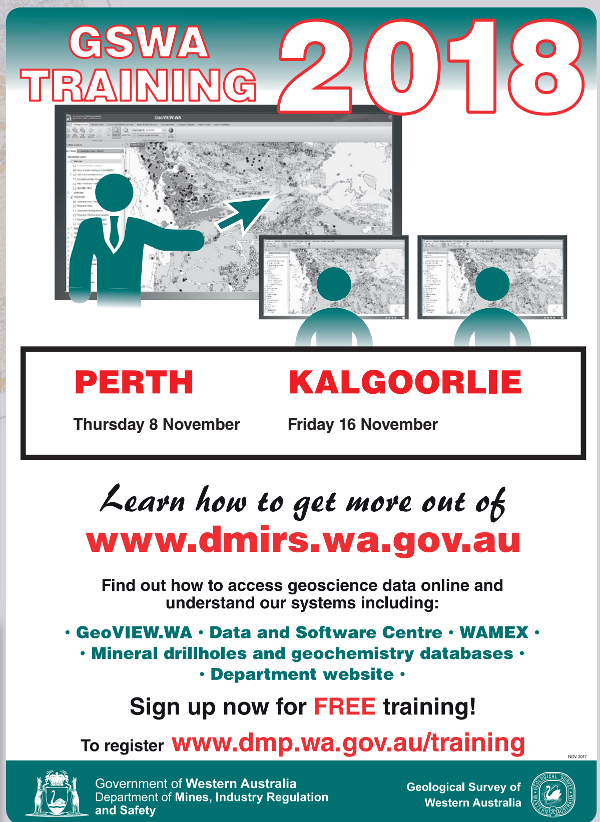

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