Bungar 2539, section A–B, 1:100 000 geological map

(Narndee Igneous Complex, Murchison Domain, Yilgarn Craton)

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Location

Maps: Ninghan (SH 50-7) and Bungar (2539)

Zone: MGA Zone 50

End coordinates: 601540E 6789870N to 645300E 6789870N

Length: 44 km

Scale of interpretation: 1:100 000

This section is an east–west section that crosses the centre of the Narndee Igneous Complex (Fig. 1).

Tectonic units

The Narndee Igneous Complex is a large mafic–ultramafic layered intrusion assigned to the Boodanoo Suite, Annean Supersuite, dated at 2800 ± 6 Ma (Ivanic et al., 2010). It is located in the central Youanmi Terrane, western Yilgarn Craton. To the west, the complex is bounded by a shear zone hosting Tuckanarra Suite granitic rocks (Ivanic et al., 2012) and to the east it is bounded by splays off the Challa Shear Zone.

Overlying the complex are felsic volcanic and sedimentary rocks belonging to the Yaloginda Formation Member (Van Kranendonk et al., 2013). Also in upper parts of the complex are sill-like synemplacement granitic rocks of the Mount Kenneth Suite.

The Narndee Igneous Complex is prospective for orthomagmatic Cr–Ni–Cu–PGE (e.g. at Milgoo). The overlying volcano-sedimentary rocks also host small volcanogenic massive sulphide (VMS) deposits.

Structure

The overall synformal geometry of the well-layered lower and middle zones of the Narndee Igneous Complex has been truncated by a large-scale regional, north–south-trending shear zone. A large sheared lens of the complex lies to the far east of the line of section. Several smaller brittle faults trending north–south show about a 1 km displacement. Tuckanarra Suite metagranitic rocks are foliated parallel to the shear zones to the west and are likely to be syndeformational. These also host a sheared lens of the Kiabye greenstone belt to the west of the complex, which hosts Norie Group lithologies that are predominantly mafic. A large domal pluton of the Rothsay Suite is present to the southeast of the section (Ivanic, 2016).

Geophysical data

A gravity profile was extracted from the GSWA 2013 gravity merged grid of Western Australia (version 2) (GSWA, 2013) with points sampled every 440 m (Fig. 2b). Topographic data were taken from the Shuttle Radar Topography Mission (SRTM) at the same points.

Physical property data were estimated from mineral modal proportions in petrographic thin sections. These values were interpolated to corresponding lithologies in the vicinity of Bungar (Table 1).

Modelling

All modelling was performed in the GM-SYS software run within the Oasis Montaj software.

Results

The section was modelled to a depth of 5 km (Fig. 2c,e).

The Narndee Igneous Complex has an overall synformal geometry (Fig. 2a). This geometry is consistent with the concentric, inward-dipping, and broadly conformable igneous layering inferred by Ivanic et al. (2010). The complex extends down to a vertical thickness of approximately 5 km.

The Bouguer high (Fig. 2b) is accounted for by the high-density rocks of the lower zone and even higher density rocks of the ultramafic zone of the complex (Fig. 2c), which is only exposed farther north.

The complex is mantled by granitic material to the east and west. Plutons of Rothsay Suite granitic rocks are likely to intrude under large parts of the complex too.

The overlying volcanic and sedimentary units are thin (~0.5 km) and relatively flat lying. The Mount Kenneth Suite unit is conformably overlying the upper zone of the complex. It is gently west dipping at approximately 10°.

Steeply dipping shear zones and brittle faults transecting the complex, plutons of the Mount Kenneth Suite, and Norie Group rocks are consistent with gravity data.

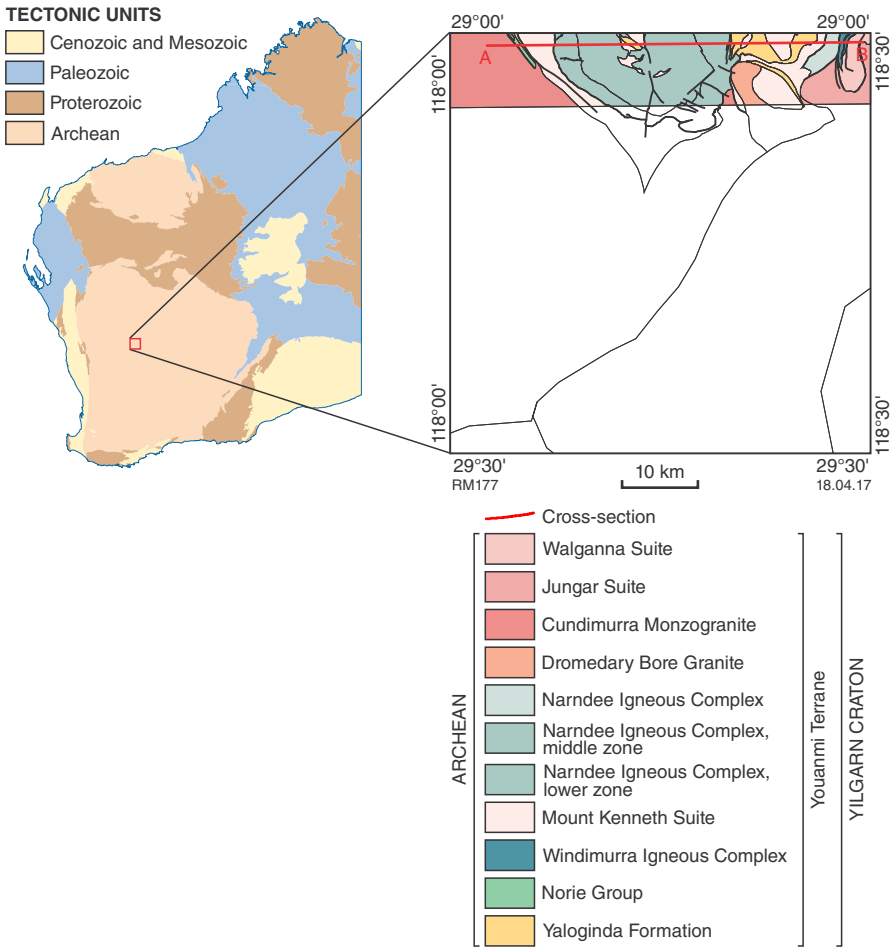

Figure 1. Location of the BUNGAR map sheet with simplified interpreted bedrock geology within 8 km of bordering cross-section A–B

Table 1. Petrophysical properties of modelled units and the corresponding map codes and lithologies. The colour column refers to colours used in Figure 2a

Colour	*Modelled unit*	*Map code*	*Rock type*	*Density (g/cm³)*
	Walgoo Monzogranite	A-BRwa-gmv	Granite	2.700
	Tuckanarra Suite	A-TU-mg, A-TU-mgmu		
	Cundimurra Monzogranite	A-TUcu-mgms, A-TUcu-mgmu	Monzogranite	2.685
	Rothsay Suite	A-ANR-mgms	Monzogranite	
	Narndee Igneous Complex			
	Metagabbro	A-Anna-mog	Gabbro	2.890 – 3.000
	Middle zone	A-ANnm-mog, A-ANnm-mat, A-ANnm-ot, A-ANnm-ax, A-ANnm-oh, A-ANnm-om	Mafic–ultramafic horizons	2.850 – 2.900
	Lower zone	A-ANnl-mog, A-ANnl-ax, A-ANnl-mat, A-ANnl-ao, A-ANnl-omh, A-ANnl-moma, A-ANnl-om	Mafic–ultramafic horizons	2.920
	Ultramafic zone	A-ANnu-xap-ao	Ultramafic rocks	3.000
	Mount Kenneth Suite	A-ANK-jmgg-mog, A-ANK-mgs, A-ANK-mg	Granitic rocks	2.680 – 2.710
	Windimurra Igneous Complex	A-ANwi-xmog-mg, A-ANwz-am	Mafic–ultramafic rocks	2.900 – 2.950
	Norie Group	A-NO-mba	Mafic unit	2.700
	Yaloginda Formation	A-NOy-mfa, A-NOy-mts, A-NOy-md	Metamorphosed rocks	2.700 – 2.800

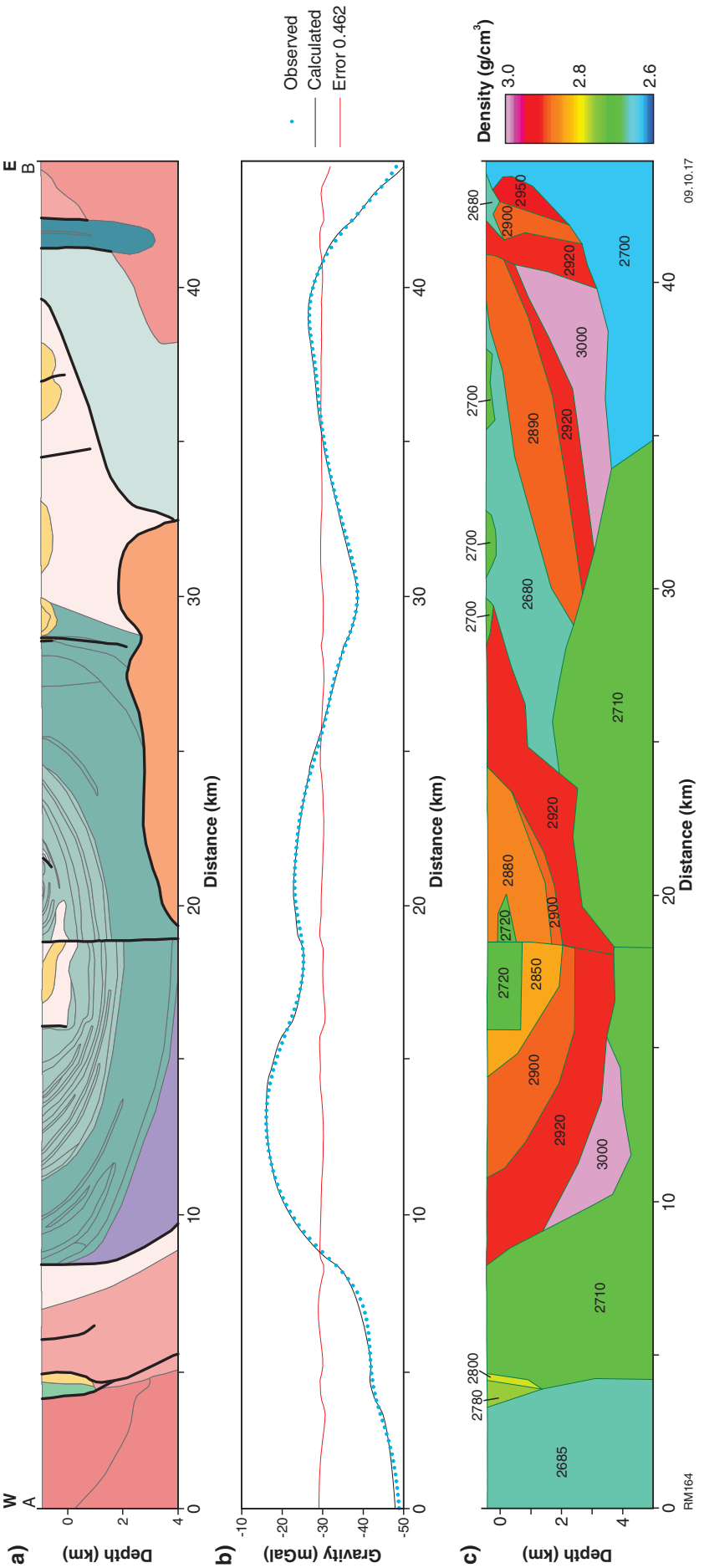

Figure 2. Profile of section A–B showing: a) lithological section on BUNGAR map sheet; b) observed and calculated gravity anomaly profile with error line; c) section of density per lithology

References

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