SANDSTONE 2742, section C–D, 1:100 000 geological map

(Gum Creek greenstone belt, Southern Cross Domain, Yilgarn Craton)

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Location

Maps: YOUANMI (SH 50-4) and SANDSTONE (2742)

Zone: MGA Zone 50

End coordinates: 733230E 6938422N to
746262E to 6938450N

Length: 13 km

Scale of interpretation: 1:100 000

This east–west section crosses the southern end of the Gum Creek greenstone belt (Fig. 1).

Tectonic units

The Gum Creek greenstone belt has also been mapped as a synclinal structure, although only the southern extend is present on this map sheet. In this region, the structure consists of an interlayered sequence of metabasalts, banded iron-formations (BIF) and cherts which have a distinctive magnetic signature. They are overlain by a sequence of monotonous basalts, which is probably a continuation of the previous basalt, but without environments to form the BIF and cherts (Beeson et al., 1993; Tingey, 1985). Lenses of ultramafic and gabbroic rock are found within the basalt layers.

The greenstones have fault-bounded contacts with the surrounding Archean granites, which are typically poorly exposed. They are dominated by monzogranites with subordinate granodiorites. Strongly deformed granitic rocks are mapped with, and adjacent to, the major shear zones (Chen, 2005).

Structure

The Gum Creek greenstone belt has been mapped in less detail than the Sandstone greenstone belt, but also has a synclinal form with the Youno Downs Syncline hinge passing close to the eastern edge of the greenstone rocks.

Geophysical data

A gravity profile was extracted from the Geological Survey of Western Australia (GSWA) 2013 400 m gravity merged grid of Western Australia (GSWA, 2013a). Magnetic data were extracted along the same profile from the 80 m magnetic compilation of Western Australia (GSWA, 2013b). Topographic data were taken from the Shuttle Radar Topography Mission (SRTM) at the same points.

Physical property data were compiled from Williams (2009) and Gessner et al. (2014; Table 1).

Modelling

All forward modelling was performed in 2.5D in the GM-SYS software run within the Oasis Montaj software.

Initial conceptual models were generated from the cross-section on sheet SANDSTONE (Chen and Painter, 2005).

Results

Section C–D across the Gum Creek greenstone belt was modelled down to a depth of 4 km (Fig. 2c). The gravity anomaly appears as a broad peak (Fig. 2b), which reflects the denser greenstone units within the vicinity of the surrounding granites.

The units in the west of the belt are mapped as BIF and amphibolite, which generally implies a higher density. Therefore, by modelling with appropriate densities, they appear to be truncated at shallower depths than in the cross-section (Fig. 2c) more shallowly than in the section (Fig. 2a).

The magnetic profile was not modelled. However, the magnetic profile (Fig. 2d) shows two extremely strong magnetic susceptible units, which relate, in position, to the two sets of BIF.

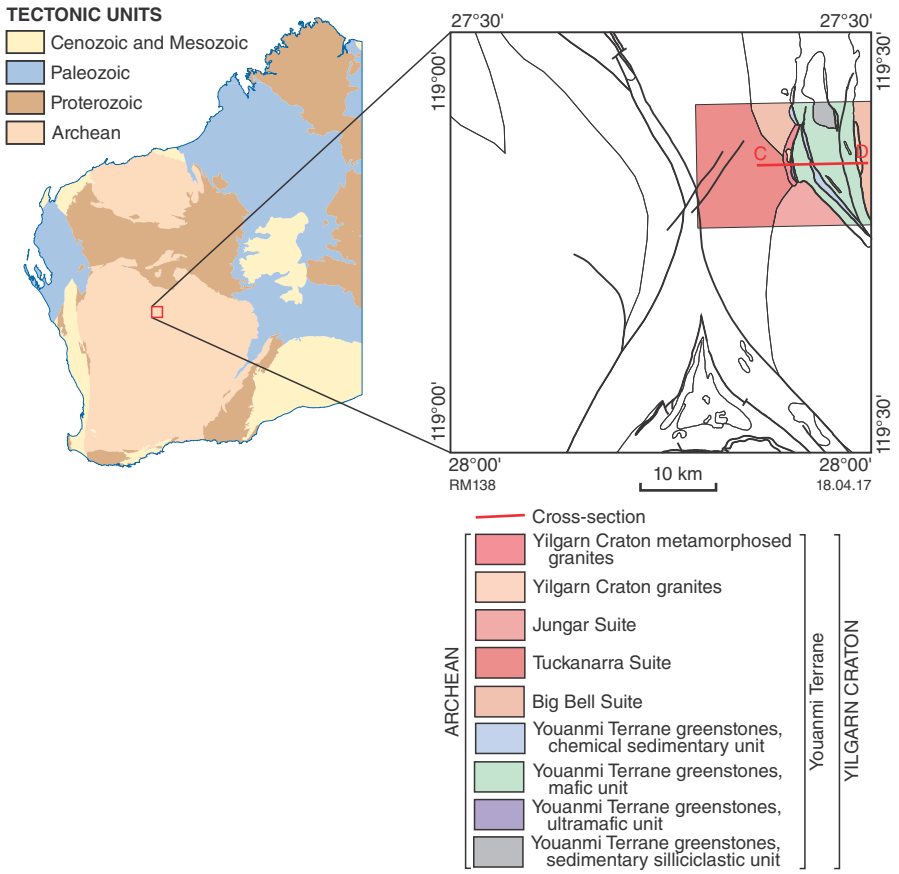

Figure 1. Location of sheet SANDSTONE with simplified interpreted bedrock geology within 8 km of cross-section C–D

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

Colour	*Modelled unit*	*Map code*	*Rock type*	*Density (g/cm³)*
	Youanmi Terrane greenstones (Gum Creek greenstone belt)			
		A-bb-YGC	Basalt	2.85 – 2.92
		A-bs-YGC	Spinifex-textured basalt	2.85 – 2.86
		A-cib-YGC	BIF	2.90 – 2.96
		A-mba-YGC	Amphibolite	2.82
		A-mogs-YGC	Schistose metagabbro	
		A-musr-YGC	Tremolite schist	2.75
		A-og-YGC	Gabbro	
		A-up-YGC	Peridotite	2.94
	Youanmi Terrane granites (Southern Cross Terrane granites)			
		A-g-Y	Granites	2.57 – 2.58
		A-xg-mb-Y	Granites with mafic rocks	2.72
		A-mgms-Y	Metagranites	2.70

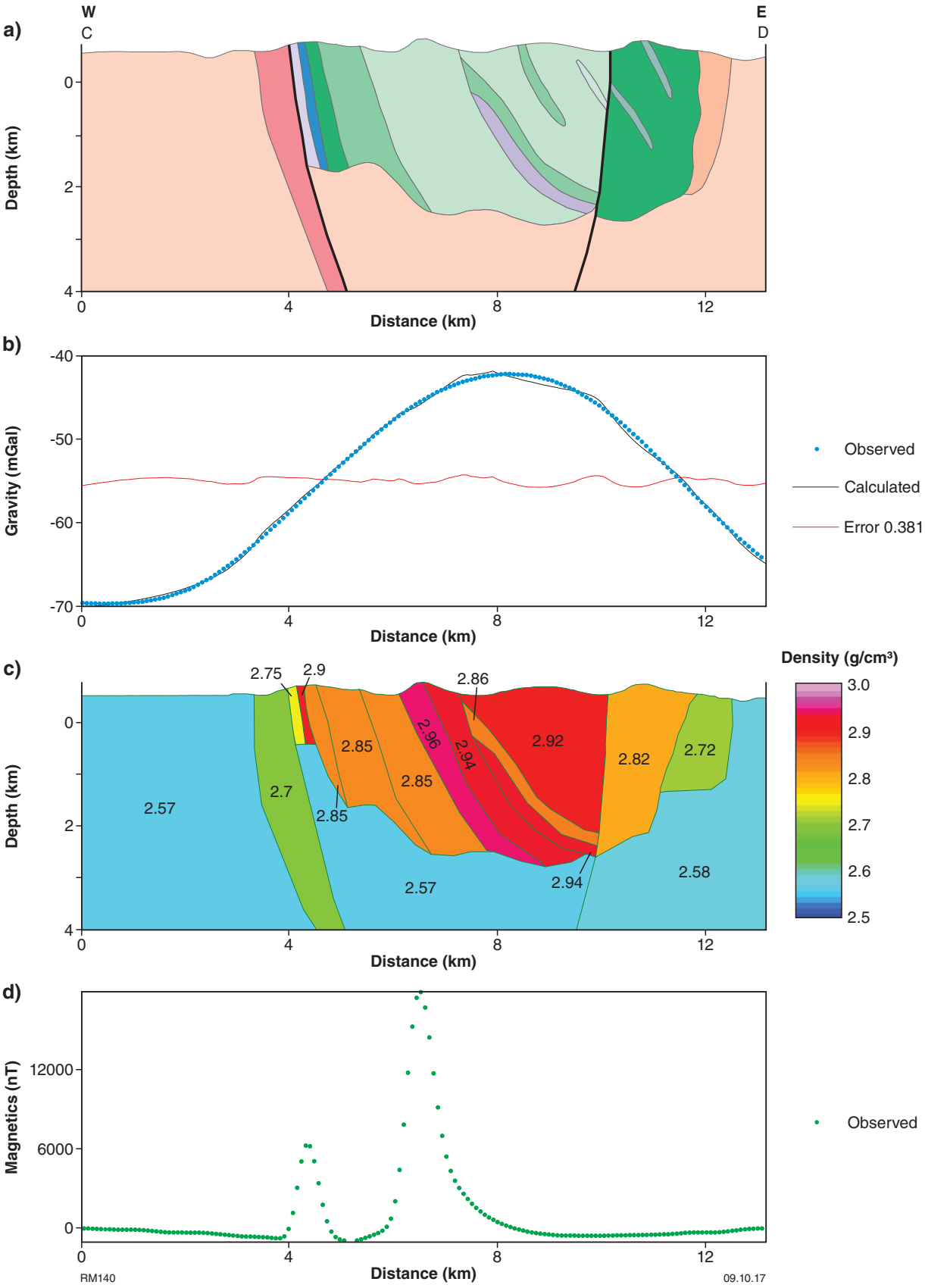

Figure 2. **Profiles across section C–D from sheet SANDSTONE showing: a) lithological section; b) observed and calculated gravity anomaly profile with error line; c) section of density per lithology; d) observed and calculated magnetic anomaly profile with error line; e) section of magnetic susceptibility per lithology**

References

Beeson, J, Groves, DI and Ridley, JR 1993, Controls on mineralisation and tectonic development of the central part of the northern Yilgarn Craton (Volume 109): MERIWA, Perth, Western Australia, 93p.

Chen, SF 2005, Geology of the Atley, Rays Rocks, and southern Sandstone 1:100 000 sheets: Geological Survey of Western Australia, 1:100 000 Geological Series Explanatory Notes, 42p.

Chen, SF and Painter, MGM 2005, Sandstone, WA Sheet 2742: Geological Survey of Western Australia, 1:100 000 Geological Series.

Geological Survey of Western Australia 2013a, Gravity anomaly grid (400 m) of Western Australia (2013 – version 2), 11 November 2013 update: Geological Survey of Western Australia, digital data layer.

Geological Survey of Western Australia 2013b, Magnetic anomaly grid (80 m) of Western Australia (2013 – version 2): Geological Survey of Western Australia, digital data layer.

Gessner, K, Jones, T, Goodwin, JA, Gallardo, LA, Milligan, PR, Brett, J and Murdie, RE 2014, Interpretation of magnetic and gravity data across the Southern Carnarvon Basin, and the Narryer and Youanmi terranes, *in* Youanmi and Southern Carnarvon seismic and magnetotelluric (MT) workshop 2013 *compiled by* TJ Ivanic, S Wyche and I Zibra: Geological Survey of Western Australia, Record 2013/6, p. 65–77.

Tingey, RJ (compiler) 1985, Sandstone, Western Australia: Geological Survey of Western Australia, 1:250 000 Geological Series Explanatory Notes, 37p.

Williams, NC 2009, Mass and magnetic properties for 3D geological and geophysical modelling of the southern Agnew–Wiluna greenstone belt and Leinster nickel deposits, Western Australia: Australian Journal of Earth Sciences, v. 56, no. 8, p. 1111–1142.