

# Geodynamic evolution of the northeastern Murchison Domain, Yilgarn Craton

by

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A preliminary compilation of recent mapping and geochronological results from the northeastern Murchison Domain, Yilgarn Craton, suggests that there are four volcanic packages deposited as mafic–ultramafic through to felsic volcanic cycles: i) at c. 2970 Ma; ii) 2814–2799 Ma; iii)  $\geq 2785$  to 2745 Ma; and iv) 2720 to 2704 Ma. Emplacement of clotty-textured, hornblende tonalites accompanied eruption of volcanic package 3, whereas pillowed, pyroxene spinifex-textured komatiitic basalts of package 4 were accompanied by the widespread emplacement of thick differentiated mafic–ultramafic subvolcanic sills. Voluminous post-volcanic, but pre- to syn-tectonic granitic plutons were emplaced into the crust from 2676 to 2660 Ma, followed by shearing and the emplacement of post-tectonic granite plutons at c. 2623 Ma (Table 1).

Two main deformational events are recognized. Early east-trending folding ( $D_1$ ) was accompanied by the emplacement of granitic rocks, probably at around c. 2676 Ma and resulted from greenstone sinking into partially melted middle crust. Second-generation structures ( $D_2$ ) formed between 2660 and 2637 Ma and include north to north-northeasterly trending foliations, north- to northeast-plunging folds and lineations, and north-northwesterly striking sinistral shear zones and northeast-striking dextral shear zones that collectively indicate east–west compression. Structures relating to this event are concentrated within, but not exclusively to, the north-northeasterly striking Meekatharra Structural Zone (Spaggiari, 2006), which hosts significant gold mineralization.

## References

- Spaggiari, CV, 2006. Interpreted bedrock geology of the northern Murchison domain, Youanmi Terrane, Yilgarn Craton. Geological Survey of Western Australia, Record 2006/10, 19p.
- Van Kranendonk, MJ, in prep., New evidence on the evolution of the Cue–Meekatharra area of the Murchison Domain, Yilgarn Craton: Geological Survey of Western Australia, Annual Review 2006–07.

**Table 1. Comparison between the timing of deposition/intrusion for the three areas of the northeaster Murchison Domain (age data from several sources, as quoted in Van Kranendonk, in prep.)**

Age (Ma)	Dalgaranga greenstone belt (southwest)	Cue–Glen Homestead area and Weld Range	Meekatharra area (northeast)	Volcanic package/ granite suite
2600				
		2623 Ma K-feldspar monzogranite		Post-tectonic granite 5
			2637 Ma shear Au	D <sub>2</sub>
			2644, 2648 Ma granite	Pre- to syn-D <sub>2</sub> granite 4
2650			2665, 2660 Ma granite	Pre- to syn-D <sub>2</sub> granite 3
		2676 Ma layered granodiorite	2670 Ma granite	D <sub>1</sub>
2700				
		2716 Ma rhyolite		
	2719 Ma gabbro	komatiitic basalt		Volcanic 4
2750	2747 Ma felsic volcanic rocks	2747 Glen tonalite	2755 Ma andesite	
		2759 Cue tonalite	2760 Ma tonalite	Syn-volcanic granite 2
		2761 Ma rhyolite tuffs		Volcanic 3
		Tholeiitic and komatiitic basalt	2784 Ma dacite 2785 Ma hornblende granite	
		BIF and quartzite	komatiite, komatiitic and tholeiitic basalt	
2800			2799 Ma volcanoclastic sandstone	
			2804 Ma rhyolite	Volcanic 2
			2814 Ma felsic sedimentary rocks	
			tholeiitic basalt	
2850				
		× 2920 Ma	× 2898 Ma	
	× 2970 Ma	2970 Ma Weld Range		Volcanic 1
3000	× 3034 Ma	× 2998, 3010 Ma	× 3027 Ma	Early TTG granite 1

NOTES: TTG = Tonalite–trondhjemite–granodiorite  
 × = xenocrystic zircons  
 Red lettering denotes granitic events  
 Darker shading denotes volcano-plutonic events  
 Dark green lines denote base of volcanic packages  
 Gold denotes gold mineralization