



## Sequence–stratigraphic correlation and characterization of cyclic facies arrangements using magnetic susceptibility, Late Devonian (Frasnian) Hull platform, Canning Basin, Australia

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Frasnian reef-rimmed platforms evolved during active extension of the Fitzroy Trough along the northern margin of the Canning Basin, northwestern Australia. Although back-reef cyclicity is well known in these platforms, detailed examination of the Lower Frasnian Hull platform, which is composed of mainly back-reef to leeward margin facies associations, shows considerable upsection variation in the degree of development of cyclic facies arrangements. Shallowing upward trends (~10-50 m) are evident in the stacking of facies associations. Overall evolution of this platform was strongly controlled by syn-depositional faulting and block rotation (George et al. 2009) suggesting a likely complex interplay between local tectonism and eustatic changes in controlling stacking patterns. Magnetic susceptibility (MS) analysis of two ~260 metre measured sections through the Hull platform was undertaken to test their sequence-stratigraphic correlation and examine cyclicity variation. Most of the samples were taken from the well-exposed shallower subtidal carbonate facies (including stromatoporoid boundstones, rudstones-floatstones and fenestral peloidal grainstones–packstones) and hence MS values are generally low. Recessive intervals are represented by samples from thin bioclastic rudstones–floatstones. MS data from both sections, southeastern (SE) Hull Range and Guppy Hills, show a number of peaks and a cyclic pattern. In the SE Hull section, three prominent peaks coincide with a platform-wide sequence boundary–flooding surface and two local subaerial exposure surfaces (George et al. 2009). The same three peaks are interpreted in the Guppy Hills section even though only the sequence boundary–flooding surface is represented in outcrop (as an erosion surface). Correlation of elevated MS values associated with the local exposure surfaces is a significant result because the Guppy Hills section records deposition in deeper subtidal conditions diminishing the likelihood of developing karst features. The MS peaks in the data support overall lowered relative sea-level and associated influx of siliciclastic sediments during short-lived subaerial exposure events. In addition, the higher MS values in the Guppy Hills section probably reflect closer proximity to the major bounding fault that controlled supply of siliciclastic sediment. The sequence boundary–flooding surface is associated with a smaller peak in the MS data in both sections. Flooding and extension of the carbonate platform in the hangingwall coincident with sequence boundary formation suggests rotation and tectonic control and the minor MS peak associated with this major event may reflect relative sea-level rise at the shoreline inhibiting spread of siliciclastic sediment. Additional peaks, e.g. ~90 m in both sections, may highlight the presence of other relative sea-level falls for which there is no or only equivocal evidence of paleokarst. Comparison of MS values and facies trends is consistent with observations from other Frasnian platforms (e.g. da Silva et al. 2009). Mean MS values are higher for the basal strata of the Hull platform sections when ramp conditions prevailed following initial flooding and carbonate production was lower. Overall decrease in mean values towards the top of the sections is consistent with increase in stromatoporoid facies of the leeward platform margin.

- DA SILVA, AC., MABILLE, C. & BOULVAIN, F., 2009. Influence of sedimentary setting on the use of magnetic susceptibility: examples from the Devonian of Belgium. *Sedimentology* 56: 1292-1306.

- GEORGE, A.D., CHOW, N. & TRINAJSTIC, K.M. 2009. Syndepositional fault control on lower Frasnian platform evolution, Lennard Shelf, Canning Basin, Australia. *Geology* 37 : 331-334.