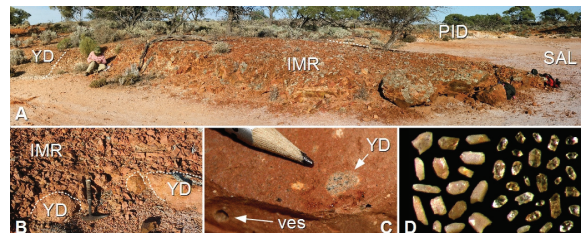


**THE ACRAMAN IMPACT MELT ROCK REVISITED**

M. Schmieder<sup>1,2</sup>, E. Tohver<sup>1</sup>, F. Jourdan<sup>2</sup>, S. Denyszyn<sup>1,2</sup> and P. W. Haines<sup>3</sup>, <sup>1</sup>University of Western Australia, Crawley, Australia, martin.schmieder@uwa.edu.au, <sup>2</sup>Curtin University, Perth, <sup>3</sup>Geological Survey of Western Australia, Perth, Australia.

**Background:** With an estimated original diameter of ~90 km [1], the deeply eroded Acraman impact structure, South Australia, set in ~1.6 Ga volcanics (mainly the Yardea Dacite) of the Gawler Ranges, is one of Australia's largest impact structures. Distal impact ejecta in the Bunyeroo Formation exposed in the Flinders Ranges and in drill cores from the Officer Basin stratigraphically constrain the impact age to roughly ~580 Ma (Ediacaran) [1;2]. Compared to the extensive work on the ejecta layer and although major uncertainties remain on the exact age of the impact, less work has been done on the autochthonous melt rock that occurs in the remote uplifted central part of Acraman [2;3].

**Impact Melt Rock:** A gently (~15°) NNW-dipping dike-like body of reddish impact melt rock (Fig. 1A-C) occurs at 32°3'21.00" S, 135°26'50.45" E, at the eastern tip of the southern central salina island, and exposes a ~32 m long outcrop section. The mineral constituents of the melt rock are mainly spinifex-textured albite, K-feldspar, quartz, matrix hematite, Ti-magnetite, vesicle-filling zeolites [2;3], and accessories (e.g., zircon; Fig. 1D). Three transitional subtypes of the melt rock can be distinguished in the field: *a*) an essentially fine-grained, largely non-vesicular, and clast-poor type; *b*) a medium-grained, vesicular, and clast-poor type; and *c*) a medium-grained, vesicular, and clast-rich variety containing variable amounts of partially molten fragments of shocked Yardea Dacite. In places, such as along the wall rock contact, the melt rock entrains larger dacite clasts [2] and locally exhibits narrow jointing. Previous Ar-Ar dating of the melt rock yielded minimum (alteration) ages of ~440 Ma [3;4].



**Fig. 1:** Impact melt rock at Acraman. **A:** Panoramic outcrop view with impact melt rock (IMR) juxtaposing shocked Yardea Dacite (YD), post-impact deposits (PID), and recent salina sediments (SAL). E. Tohver for scale. **B:** Fine-grained melt rock surrounding larger clasts of Yardea Dacite. **C:** Clast-rich, vesicular (ves) variety of the melt rock. **D:** Non-translucent granular (left) and smaller, translucent to crystal-clear (right) zircon grains separated from the melt rock. Image width ~1.5 mm.

**Objective and Outlook:** Several kilograms of the Acraman melt rock were recently recovered for a new refined shock petrographic and geochemical characterization of the rock and its subtypes, including target rock clasts and (hydrothermal?) alteration phases. A U-Pb and Ar-Ar dating campaign is underway to establish a high-precision age for the Acraman impact.

**References:** [1] Williams G. E. and Gostin V. E. 2005. *Austral. J. Earth Sci.* 52:607-620. [2] Williams G. E. 1994. *Proc. Royal Soc. Victoria* 106:105-127. [3] Baldwin S. et al. 1991. *Austral. J. Earth Sci.* 38:291-298. [4] Jourdan F. 2012. *Austral. J. Earth Sci.* 59:199-224.