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Lava and Life: New investigations into the Carson Volcanics, lower Kimberley Basin, north Western Australia

Karin Orth (1), Chris Phillips (2), and Julie Hollis (2)

(1) Australia (kor93288@bigpond.net.au) CODES University of Tasmania, (2) Australia(Christopher.PHILLIPS@dmp.wa.gov.au) Geological Survey of Western Australia.

The Carson Volcanics are the only volcanic unit in the Paleoproterozoic Kimberley Basin and are part of a poorly studied Large Igneous Province (LIP) that was active at 1790 Ma. New work focussing on this LIP in 2012 and 2013 involved helicopter-supported traverses and sampling of the Carson Volcanics in remote areas near Kalumburu in far north Western Australia's Kimberley region.

The succession is widespread and flat lying to gently dipping. It consists of three to six basalt units with intercalated sandstone and siltstone. The basalts are 20–40 m thick, but can be traced up to 60 km along strike. The basalt can be massive or amygdaloidal and commonly display polygonal to subhorizontal and rare vertical columnar jointing. Features of the basalt include ropy lava tops and basal pipe vesicles consistent with pahoehoe lavas.

The intercalated cross-bedded quartzofeldspathic sandstone and siltstone vary in thickness up to 40 m and can be traced up to 40 km along strike. Peperite is common and indicates interaction between wet, unconsolidated sediment and hot lava. Stromatolitic chert at the top of the formation represents the oldest life found within the Kimberley region.

Mud cracks evident in the sedimentary rocks, and stromatolites suggest an emergent broad tidal flat environment. The volcanics were extruded onto a wide marginal margin setting subject to frequent flooding events. Thickening of the volcanic succession south and the palaeocurrents in the underlying King Leopold Sandstone and the overlying Warton Sandstone suggest that this shelf sloped to the south. The type of basalt and the basalt morphology indicate a low slope gradient of about 1°.