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Title: Climate reconstruction from Barrow Island, Western Australia

Authors: [Placzek, C.](#) ; [Coningham, K.](#) ; [Turner, L.](#) ; [Veth, P.](#) ;
[Ditchfield, K.](#) ; [Wurster, C. M.](#) ; [Kendrick, P.](#)

Affiliation: AA(College of Science and Engineering, James Cook University, Minneapolis, MN, United States christa.placzek@jcu.edu.au), AB(College of Science and Engineering, James Cook University, Townsville, Australia kate.coningham@my.jcu.edu.au), AC(College of Science and Engineering, James Cook University, Townsville, Australia laura.turner3@my.jcu.edu.au), AD(The University of Western Australia, Perth, Australia peter.veth@uwa.edu.au), AE(The University of Western Australia, Perth, Australia kane.ditchfield@uwa.edu.au), AF(College of Science and Engineering, James Cook University, Townsville, Australia christopher.wurster@jcu.edu.au), AG(Parks and Wildlife, Western Australia, Barrow Island, Australia Peter.Kendrick@DPaW.wa.gov.au)

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Abstract

Barrow Island (20.7°S) is ideally situated to register the first coastal occupations in Australia as well as peoples' responses to major changes in sea level, climate and eventual isolation from critical resources on the mainland. Its location in the arid region between monsoonal and extratropical rainfall belts also imply that Barrow Island may have

experienced dramatic changes in precipitation over the period of human occupation. Boodie cave has been the focus of Barrow Island Archeological Project and records a rich record of human occupation. Also present at Boodie cave are significant quantities of water-lain cave carbonates (flowstones, stalactites, and stalagmites). Active (modern) deposition of such carbonates is limited to very small encrustations and consists primarily of stalactites that are less than 5 cm in diameter. This situation indicates that deposition of significant carbonates is indicative of wetter conditions at Barrow Island and dating of these carbonates using the U/Th method provides a record of wet intervals at Barrow Island over the last 120 thousand years. In addition to ages from flowstones, three complete speleothems were collected Ledge Cave for climatic reconstruction using stable isotopes. Ledge cave is large subterranean with high relative humidity (>98%) and abundant, but largely inactive speleothems. The wettest interval in our cave carbonate record predates stratigraphic units with cultural material, but indicates that wet intervals on Barrow Island were broadly coincidental with lake expansions on the Australian mainland. In particular, a very wet interval between 120 and 90 ka is recorded in two of the Ledge Cave speleothems. The Barrow Island speleothem record suggests that displacement of the Intertropical Convergence Zone (ITCZ) and the strength of the Indo-Australian monsoon may have been the most important influence on water balance at Barrow Island. Continued development of these climate archives will offer insights into climate that is directly applicable to the unique human occupation record also preserved at this site.

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