



# INTERNATIONAL OCEAN DRILLING PROGRAMME

**PROPOSAL 1115-L2S-PRE**

**Connecting Indo-Australian Monsoon and  
Palaeo-groundwater recharge by Land to Sea  
Drilling**

## Abstract

The Great Artesian Basin (GAB), underlying 22% of the Australian continent, is the 2nd largest freshwater aquifer system in the world. The GAB and overlying unconfined aquifers are predominately recharged by Indo-Australian Summer Monsoon (IASM) precipitation, and tropical moisture further south. For the GAB, this recharge predominately occurs along the western slopes of Australia's east coast tablelands, and, to a limited degree, along the GAB's western and north-western fringe. The GAB groundwater can be up to 1-2 million years old due to its size and slow water movements. However, the history and underlying mechanics of IASM-derived groundwater recharge in tropical to desert Australia remains unresolved. This is due to the lack of suitable deep-time, continuous palaeoclimate archives in the Southern Hemisphere that can inform on tropical monsoon precipitation, inland moisture supply via river runoff and atmospheric circulation, as well as tropical versus desert groundwater recharge history.

Furthermore, the lack of deep time, Quaternary palaeoclimate archives in Australia hinders detailed reconstructions of inter-hemispheric interactions between Southern Hemisphere tropical to sub-tropical atmospheric circulation and the East Asian Monsoon system that affects more than 2.2 billion people. This project will provide the first Quaternary (ca. 2 million years) palaeoclimate record of Southern Hemisphere tropical to sub-tropical monsoon intensities and inland moisture supply. This will be achieved via a land-sea (L2S) drilling project, linking palaeoclimate records from tropical Australia in the Gulf of Carpentaria to Lake Yamma Yamma in the desert of central Australia. It will provide an opportunity to precisely track IASM intensity, inland moisture transfer, and groundwater recharge in the world's driest, permanently inhabited continent. We propose to use two distinctly different proxies, namely sediment core data and groundwater data to provide independent, but complementary climate archives to assess climate change, and water-borne hazards of tropical flooding and groundwater depletion.

Understanding climate-groundwater flow processes and interactions in palaeo-recharged aquifer systems is indispensable for predicting future water resource availability.