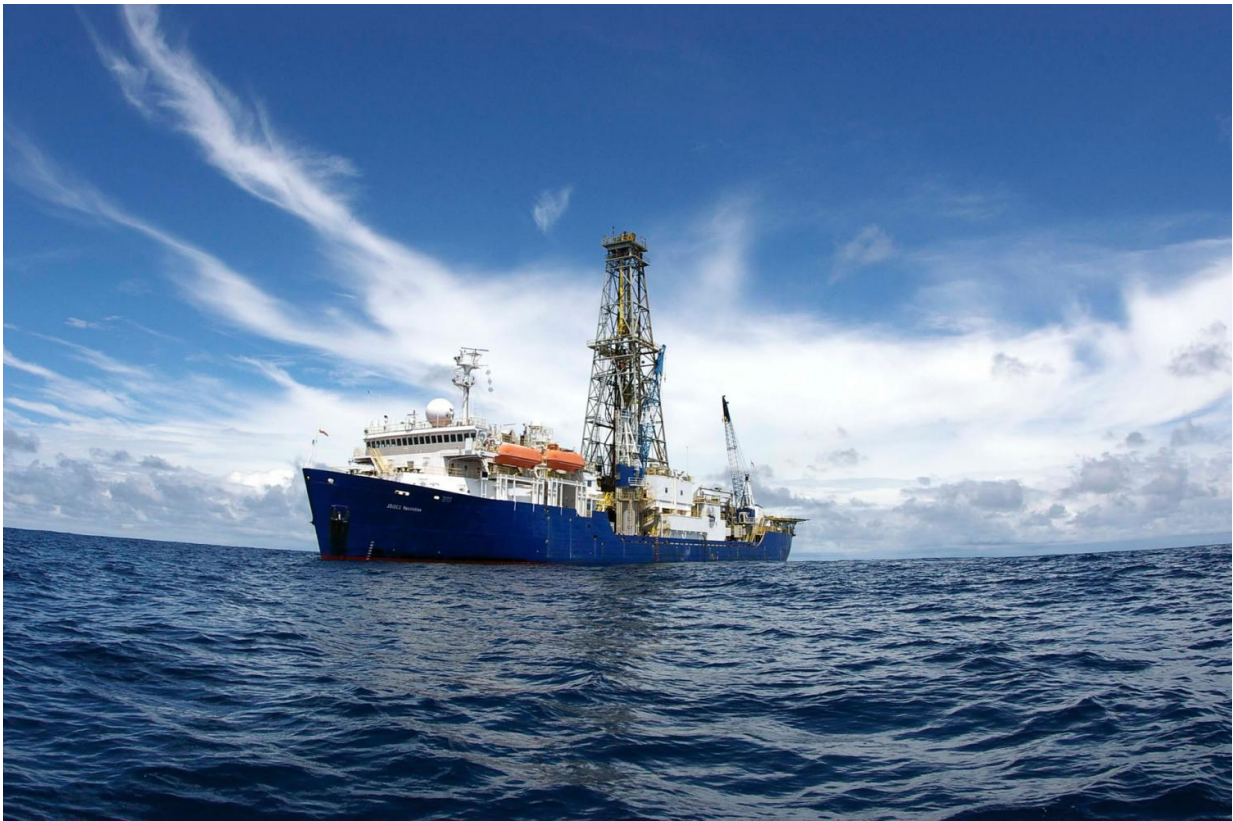


Shelf sediments reveal climate shifts through the eons

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Shelf sediments reveal climate shifts through the eons. JOIDES Resolution.
Credit: Arito Sakaguchi & IODP/TAMU

Climate change around Antarctica can severely affect Australia's rainfall and even influence the distribution of wet and dry zones across southeast

Asia, an international study has revealed.

Chelsea Korpanty of The University of Queensland's School of Biological Sciences worked on the study, which was led by Dr Jeroen Groeneveld from the Center of Marine and Environment Sciences at the University of Bremen, Germany.

Ms Korpanty said [global climate](#) underwent significant change about 14 million years ago when the Antarctic ice sheet expanded.

"The new study presents shallow-marine sediment records from the Australian continental shelf, providing the first empirical evidence linking high-altitude cooling around Antarctica to [climate](#) change in the subtropics during the Miocene era," she said.

"Our data is consistent with the inference that expansion of sea ice around Antarctica resulted in a northward movement of the westerly winds.

"In turn, this may have pushed tropical atmospheric circulation, shifting the main rainfall belt over large parts of Southeast Asia."

The study used sediment cores drilled along the west coast of Australia during International Ocean Discovery Program Expedition 356 with the research vessel JOIDES Resolution, providing a long-term history of how rainfall and aridity changed on Earth from 16 to six million years ago.

Ms Korpanty worked aboard the JOIDES in 2015 as a sedimentologist alongside scientists from 29 different international institutes and with expertise across paleontology, sedimentology, and physical geological properties.

The results of the expedition, and the data published in the paper, provided an unprecedented climate record for western Australia, capturing when and how Antarctic climate changes affected Australian climate conditions.

Dr Groeneveld said the new study had the enormous advantage of using a complete and thus continuous sediment record which had not been influenced by potential drilling disturbances.

"Today the climate in western Australia varies from north to south - in the north the seasonal monsoon brings pronounced dry and wet seasons, farther south the climate is dry throughout the year, and in the south the [westerly winds](#) bring rain during the Australian winter," he said.

Expedition 356 aimed to determine how this climate gradient developed over longer time periods, especially in the Miocene and Pliocene (16-six million years ago).

Dr Groeneveld said that over longer timescales, tectonic changes played an important role, such as in the closing of the Indonesian Gateway and the northward movement of Australia away from Antarctica.

"Global climate during the Miocene era was much warmer than today, and at the end of the middle Miocene a large part of Antarctica became glaciated and continued to cool the Southern Ocean into the late Miocene."

The researchers used the natural gamma-ray data acquired with downhole logging during the expedition to reconstruct variations in river runoff and dust and relate these to a history of precipitation and aridity for western Australia.

The findings are published in *Science Advances*.

More information: "Australian shelf sediments reveal shifts in Miocene Southern Hemisphere westerlies" *Science Advances* (2017).
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Provided by University of Queensland

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