Using the past to predict the future of the Great Barrier Reef

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The RV D. Hill research vessel.

An international research team led by University of Queensland scientists has returned from the Great Barrier Reef with historical insights that could predict how the reef will respond to future environmental change.

Project co-leader Professor Gregg Webb of UQ's School of Earth Sciences said 12 high-quality core samples were recovered from One Tree Reef in the southern Great Barrier Reef, near Gladstone, during a second deployment of the purpose-built UQ research vessel, the RV D.

Hill.

"The project is producing significant new data to help us understand the recent history of the Great Barrier Reef and so predict future reef responses to environmental change," he said.

"Despite the great amount and variety of research carried out in the southern Great Barrier Reef, especially on Heron and One Tree reefs, very little is known about how these reefs responded to changing sea levels and climate in the past."

Professor Webb said rising sea levels inundated the current continental shelf of Queensland after the end of the last great Ice Age (around 18,000 years ago).

"Before that, what is now the Great Barrier Reef was high and dry and consisted of a series of limestone tablelands complete with trees, grasses and soils," he said.

"Our new samples allow us to see what coral communities first colonised those tablelands as they were inundated by the sea around 9,000 years ago.

"We are learning how rapidly the reefs grew, and how coral communities changed over thousands of years, in response to changing climate, through to the present day.

"By analysing the geochemistry of corals within the cores, we can understand how ancient water quality, seawater temperature and nutrient loads governed natural reef growth before humans arrived with their own effects on the environment, such as pollution.

"Importantly, the research is not only unlocking the history of modern

reef growth, but we were able to recover soils from the interval when the reefs were exposed, and below that, even more ancient reef rock (about 120,000-130,000 years old) from the last time the shelf was flooded."

Professor Gregg Webb said the research vessel, the RV D Hill, was commissioned and built by the Integrated Palaeoenvironmental Research Group, UQ School of Earth Sciences, and was first deployed to Heron Reef last year.

The vessel, designed by Professor Trevor Graham, consists of a barge and a separate jack-up drilling platform that allows recovery of rotary cores to a depth of 30 metres below the reef flat, while avoiding environmental damage.

The vessel is named for the late UQ alumnus Professor Dorothy Hill, who was one of the world's preeminent authorities on fossil corals and reefs. As secretary of the Great Barrier Reef Committee (1945-1955), she was instrumental in founding what is now the Heron Island Research Station. Professor Webb said the vessel gave the researchers an "unparalleled capability" to understand the recent history of coral reefs.

"Most of that critical history remains hidden from view and obscure from scientific investigation because it is buried deep beneath the living reef," he said.

"Only through the recovery of core samples can that history be studied and understood, but coring is a very difficult and specialised operation, especially within the constraints of environmentally sensitive areas like coral reefs."

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palaeoclimate from cores.

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