



MEDIA RELEASE

Great Barrier Reef corals unveil sea-level changes and climate history

Bremen, July 19th. Since early July, 28 scientists from nine countries have been analyzing fossil coral reef cores at the IODP Bremen Core Repository. The cores were recovered during an expedition to the shelf edge of the Great Barrier Reef, Australia between February to April 2010 under the auspices of the Integrated Ocean Drilling Program (IODP) and organised by the European Consortium for Ocean Research Drilling (ECORD). Co-chief scientists Dr. Jody Webster (Sydney University) and Dr. Yusuke Yokoyama (University of Tokyo) now presented the first findings of their investigations related to past sea-level rise, climate change and the response of the Great Barrier Reef to these environmental changes.

During the offshore phase of the expedition, the team acquired cores from 34 holes at three key geographic locations on the outer edge of the Great Barrier Reef in water depths of 42 to 167 metres (see map below). The expedition team recovered more than 225 metres of material, including 191 m of fossil coral reef, which were investigated during the so-called Onshore Science Party that ended on July 16th.

“Fossil coral reefs are very difficult to core due to the great variability of rock and sediment types”, says Dr Yokoyama. “Moreover we had to cope with very bad weather conditions”, adds Dr Webster. “In spite of these challenges, we have recovered fantastic fossil coral reef samples ranging from more than 30,000 to 9,000 years in age”

“Initial observations of the cores confirm the presence of the shallow fossil reef biota needed **to construct a new and robust sea level curve**”, says Dr Webster. Because the Great Barrier Reef is on a tectonically stable portion of the Earth’s crust, and is far from the confounding influence of vast-ice sheets that existed in the northern hemisphere during the last ice age, this region represents a prime location to investigate global sea-level changes over the last 20,000 years including the final phase of the last ice age.

Climate variations based on information such as ocean temperature, salinity and chemistry **can also be reconstructed**. “The coldest time in recent Earth history was 20,000 years ago” explains Dr Yokoyama. “Accurate sea surface temperature records from equatorial regions are a key constraint needed to improve future global climate models”

The cores are also being studied to see **how the reef ecosystem responded to rapid rises of sea level** and changes in climate. Scientists currently believe that there may have been at least three such periods of accelerated sea-level rise about 19,000, 13,800, and 11,300 years ago. "From previous studies, we know that the last deglacial sea-level rise was not smooth and continuous but may have been characterized by several rapid jumps in sea level", the Co-chief scientists point out. "The new cores from the Great Barrier Reef will help to greatly refine the timing and magnitude of these events as well as the ecological response of the reef to environmental changes."

Although the investigations deal with past events in Earth history they can be very important to our understanding of **how the modern Great Barrier Reef**, a World Heritage Site since 1980, **will respond to future changes**. Analysis of the cores will provide important insights into how robust the reef is over different timescales and under different environmental conditions and stresses such as changing sea level and sea-surface temperatures, changing sediment input and ocean chemistry. Says Dr Webster: "The expedition has provided us with a truly unique opportunity to test ecologic theories about coral reef resilience and the vulnerability of the Great Barrier Reef to future climate change."

The Great Barrier Reef Environmental Changes Expedition is a European Consortium for Ocean Research Drilling (ECORD) contribution to the Integrated Ocean Drilling Program and was organised by the ECORD Science Operator (ESO). The Great Barrier Reef Marine Park Authority (GBRMPA) was consulted throughout the permitting and Environmental Impact Assessment process of the expedition.

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Dr. Webster will be back in Australia on Tuesday, July 20th.

Drilling location:

