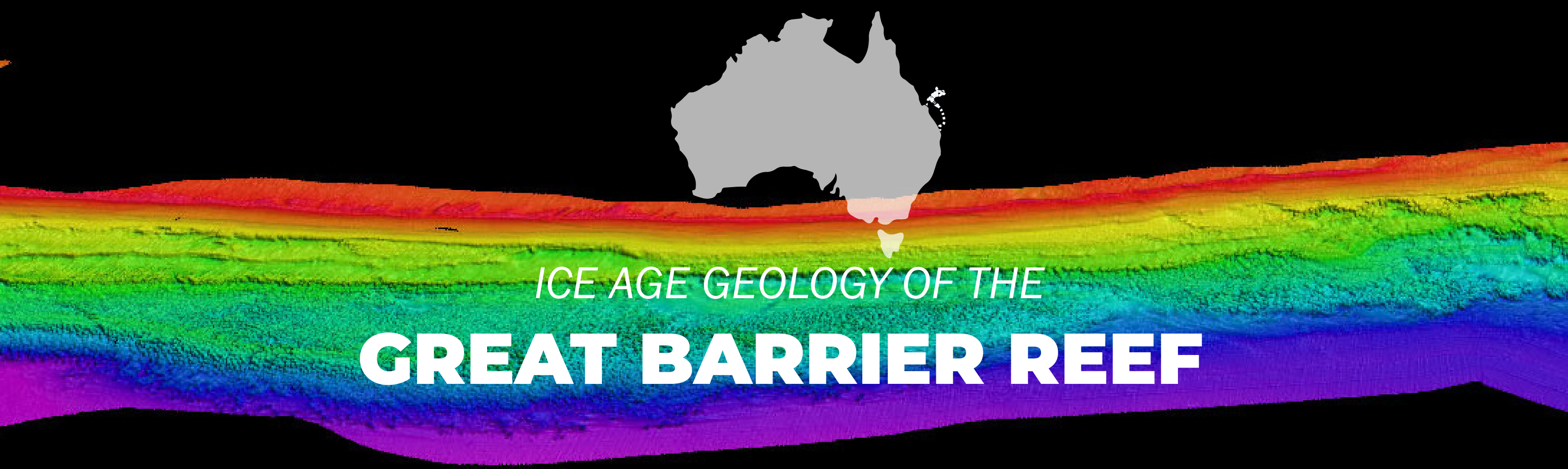


ICE AGE GEOLOGY OF THE GREAT BARRIER REEF

#IceAgeGBR

11/22/20 - 12/17/2020
Brisbane, Australia
Dr. Mardi McNeil
Dr. Jody Webster

Queensland University of Technology, James Cook University, University of Sydney, University of Queensland, Geoscience Australia, AusSeabed.

Expedition Objectives

Mapping Expedition

The expedition systematically mapped the shelf edge and upper continental slope at the Capricorn-Bunker Reefs, Capricorn Channel, and Swain Reefs in the southern extent of the GBR.

Ice Age Geology

The research team searched for geologic features that were submerged when sea level rose after the last Ice Age. These geologic features include pinnacles, terraces, river channels, and reefs.

Measure Atmospheric Particles

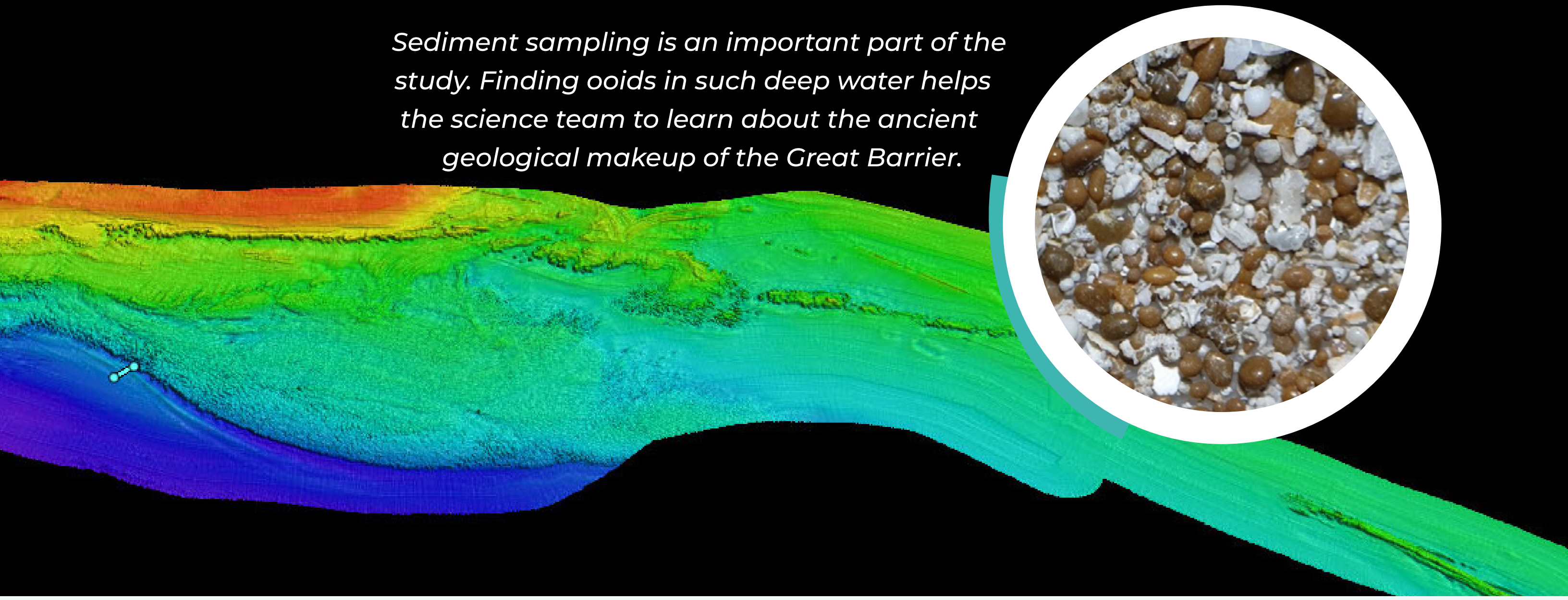
A supplementary project was conducted for the Reef Restoration and Adaptation program measuring atmospheric aerosol particles for a potential cloud-seeding program designed to shade and cool the GBR.

The upper continental slope and shelf edge of the southern Great Barrier Reef was largely unknown and poorly mapped prior to the Ice Age Geology of the Great Barrier Reef (GBR). The goal of the expedition was to explore ancient undersea features in the southern extent of the GBR that formed during the last Ice Age, when sea level was almost 120m lower than it is today. While once an exposed part of the Australian coastline, these features submerged, or 'drowned,' as glaciers and ice sheets melted creating rising sea levels flooding Australia's continental shelf. R/V Falkor's team utilized high-resolution multibeam sonar to search for these past shorelines, drowned reefs, pinnacles, and shelf-edge terraces, as well as ancient river channels and deltas.

The expedition completed the most comprehensive systematic multibeam mapping of the southern extent of the GBR along the shelf-edge and upper continental slope.

The science team mapped more than 400 kilometers of submerged shoreline, and systematically mapped the 50 to 120 meter depth range. The maps revealed the drowned reef terraces, pinnacles, beaches and shorelines, river channels and deltas that the science team expected to see. This depth range is significant because it contains geologically and ecologically significant submerged features that formed between 10,000-20,000 years ago when sea level was 120 meters lower than today.

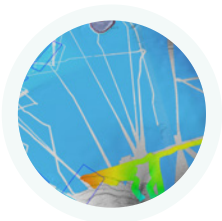
Sediment sampling is an important part of the study. Finding ooids in such deep water helps the science team to learn about the ancient geological makeup of the Great Barrier.



30 *days at sea*

01 *CTD cast*

13,046 *km^2 mapped*

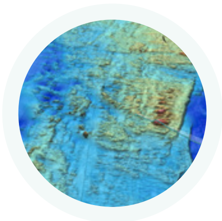


UNDERSTANDING THE GBR'S HISTORY

The data analysis and results will inform new models of the growth and evolution of the southern GBR from 20,000 years ago to the present.

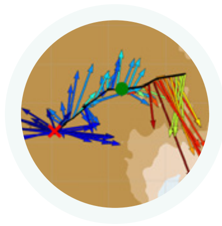
FUTURE RESEARCH PROPOSALS

The mapping data will be used to develop proposals for geophysical surveys and the collection of core samples to better understand the GBR.



MODELING THE PAST

Future analyses of physical samples will inform revised sea level curves for the southern GBR, as well as paleoclimate and paleoceanographic models.



MEASURING PAST STORMS

The shape of the submerged coastlines, in particular the paleo-shorelines and beach ridges, will be used to inform the timing and magnitude of past storm events.

PROTECTING THE FUTURE OF THE GBR

The atmospheric aerosol data will be used to inform a feasibility study on cloud brightening for shading and cooling the GBR as part of the Reef Restoration and Adaptation Program.

DATA FOR MANAGEMENT

All of the data is collected in collaboration with Geoscience Australia and the Great Barrier Reef Marine Park Authority, and will be used in future management decisions of the GBR.