

First weekly Report on the RV SONNE expedition 256 (TACTEAC)

Monday, April 17th to Sunday, April 23rd

Twenty-two scientists from eight different countries boarded the RV SONNE in Auckland, New Zealand to participate in the SONNE expedition 256. The expedition started on April 17th at 10 AM. During the transit from Auckland to the southern Queensland margin the EM122 multibeam and Parasound sub-bottom profiler were started on April 18th once inside Australian waters. On April 19th, the vessel transited over the New Caledonia Basin with a deepest depth of 3300 m then commenced surveying up the western side of Lord Howe Rise. Through April 20th, we passed over the Lord Howe Rise and into the Middleton and Tasman basins lying on the western side of the rise. The vessel continued across the Tasman Basin with depths around 4700 m over a very flat seafloor. On April 21st, we mapped the north flank of the Brisbane Guyot, one of the Tasmantid Seamounts, then crossed the south flank of the Moreton Seamount before passing back over the Tasman Basin. By midday, we started the transit up the continental slope opposite the south end of Fraser Island.

After more than 4 days of transit we finally reached the designated working area 1 off Fraser Island in the afternoon of Friday, April 21st, and immediately started the sampling campaign at 154° 3.0' E, 26° 3.0' S with a CTD-rosette cast. At this site (GeoB22201-1), we sampled 2500 m of water column for oxygen, nitrogen and carbon isotopes, nutrients, uranium and radiocarbon at 23 different depths. About 6 nm upslope at 1700 m, sediments were successfully sampled using a Multiple Corer (MC) and a Gravity Corer (GC). During the MC cast, the new video telemetry system on board SONNE was tested. The overnight swath bathymetry and sub-bottom profiling of the shelf edge were followed by dredging on the paleo-shorelines features between ~110 and 80 m on April 22nd. At GeoB22203-2 dredging operations were successful breaking of fist sized limestones from ~92 m water depth. Preliminary observations reveal the surfaces of the limestones were covered with a patchy veneer of living crustose coralline algae, encrusting bryozoans, gastropods and worm tubes. Two of the rocks show clear breakage surfaces confirming they were broken off in situ. Lithologically, they are composed of a dense, heavily bioeroded packstone to bindstone facies, with visible bioclasts (e.g. larger benthic forams) and thin crusts of coralline algae. The next Giant Box Corer (GBC) deployment recovered surface sediments rich in benthic biota, mainly coralline algae and benthic foraminifera.



Left: Members of the science party discussing the benthic biota on surface sediments recovered by the MC at site GeoB22202-1 (153° 59.0' E, 25° 58.5' S). Right: Sediment recovered from ~100 m depth by a GBC at site GeoB22204-1 (153° 49.116' E, 26° 4.276' S).

After the GBC site, we returned to site GeoB22201 and sampled the sediment with a GC before leaving for the second working area, where we started with the site survey on Sunday, April 23rd. In accordance with the permit conditions for the Great Barrier Reef Marine Park, we deployed a video telemetry system attached to the Multiple Corer in order to survey the designated dredging areas in advance. The system provided images of extraordinary high quality and enabled us to survey two transects at 120 and 90 m water depths, which revealed an intact live coral reef community growing on top of fossil reef structures. While bathymetric lows are covered by unlithified carbonate sediments, the surface of the “pinnacles” are characterized by a highly complex, honeycomb style outcrop with large cavities with abundant attached biota and fish life. These are the first moving pictures of such coral communities in the Great Barrier Reef (GBR) at these depths and of great importance for further mapping, managing, and protecting such structures in the GBR.



Left: Two snapshots from the site survey GeoB22208-1 starting at 152° 07.62' E, 23°18.738' S and crossing the paleo-reef/shoreline between 90 m and 120 m water depth. Right: Sampling of the gravity core GeoB22202-2 on board SONNE with three syringe series at 4cm spacing.

On Monday, we will deploy the next video imaging transect across the southern part of this paleo-reef feature and continue the sampling of this working area by several GC and GBC deployments before leaving for the third working area in the Capricorn Channel. According to the weather forecast, the conditions will remain calm during the next week and allow for a smooth working environment.

With warm regards from the crew and the scientific party of SO256,

Mahyar Mohtadi