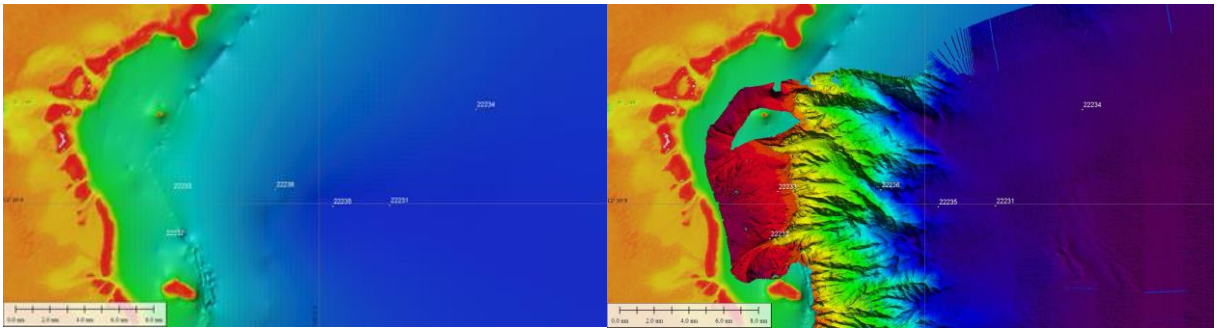
Third weekly Report on the RV SONNE expedition 256 (TACTEAC)

Monday, May 1st to Sunday, May 7th

Late in the morning, we reached our final study area east of Cape York and started a CTD-rosette water sampler cast at ~2800 m water depth. As for the previous deployments, the water column was sampled for radiocarbon and uranium, nutrients and stable N, C, and O isotopes. An extensive swath bathymetry and Parasound survey until the next day revealed the inaccuracy of the seafloor maps available for this region. Several deep-cutting canyons reaching from 600 to 2200 m water depth characterize the slope in this area. While the tops and flanks of the canyons appear barren of sediment, seafloor at depths greater than 2200 m contains slump sediments in front of the canyon mouths and rather undisturbed sedimentation further offshore. We conducted a canyon video survey from ~630 m to >1000m at the Plunge Pool edge and found a rough substrate with a thin dusting of sediments over the top of outcrops. Numerous soft corals, urchins, and cold-water corals were observed on or near the harder outcrops, which were also coated by a dark crust/stain (FeMg oxide?). On the side of the canyon wall, numerous steep cliffs and flatter terraces were observed with very rough scarps and mostly covered by sessile biota (some crinoids). A huge, undercut wall or cliff representing the canyon floor of the upper terraces showed, in addition to planar bedding, clear evidence of sub-vertical joints or fractures in the outcrop that are in a similar orientation (NE/SW) to large, regional structures (faults?) observed in the multi-beam bathymetry. We moved SE transiting over rough, slab-like outcrops with attached biota and finally reached a very steep plunge pool edge that dropped away to >1000 m before terminating the dive. Here, the rough outcrops on the edge were characterised by abundant and large sessile biota (e.g. sea fans).



Bathymetry map of the final study area before (left) and after (right) the SO256 survey. White dots and numbers indicate the position of the sampling sites.

Gravity corer (GC) and multi-corer (MUC) deployments on top of a canyon terrace at ~600 m recovered stiff, clayey fine sandy sediments in the rather short cores. After another overnight swath bathymetry and sub-bottom profiling, we sampled the seafloor at ~2850 m depth with a GC and a MUC and recovered brownish to olive mud with few sandy layers. The site survey continued until the next day, Thursday, May 4, when we deployed two gravity cores (GeoB22235-1 and 22236-1) in the mass wasting deposits of the canyons at ~2200 m water depth and recovered short sediment cores consisting of foraminifera bearing mud. We left the final study area towards the Torres Strait in the early morning of Friday, May 5, picked up the pilot on the next day at 6 AM and passed the strait by the afternoon. During the transit to

Darwin, the scientific crew started to store and pack the samples for shipping, clean up the labs and discuss plans for further processing of the samples onshore.

Aside from the IODP drilling campaigns, we obtained the longest sediments in the Great Barrier Reef (GBR) at all working areas. Combined with the priceless video images that reveal the complex biota and structure of the GBR and the unprecedented high-resolution seafloor maps, we were able to achieve a number of unexpected highlights during this voyage. The scientific party of SO256 is grateful to the master and crew of RV SONNE for their kind assistance that made this expedition successful.

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

Mahyar Mohtadi