



FK201228

Pinging in the New Year: Mapping the Tasman and Coral Seas

December 28, 2020 – January 26, 2021

FINAL PROJECT REPORT

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Project outcomes

The primary objective and outcome from this voyage was to multibeam map a large area of the Tasman and Coral seas as part of the Schmidt Ocean Institute's contribution to the [Seabed 2030 Project](#) and the start of the [United Nations Decade of Ocean Science for Sustainable Development \(2021-2030\)](#). The voyage plan was developed in a short time frame (3 weeks prior to sailing), and the area chosen for mapping was based on scientific objectives and also included priority areas for the Coral Sea Marine Park. At the end of the voyage a total of 40,445 square km of seafloor was mapped (5399 line nautical miles or 9999 line km of ship track). The multibeam data have been submitted to AusSeabed for publishing/download in the [AusSeabed Marine Data Portal](#), and internationally to the [GEBCO](#) database for contribution to the Seabed 2030 Project.

The first priority area was the mapping of the northern Tasman Sea basin around the Recorder and Fraser seamounts (part of the Tasmanid Seamount Chain), which had only been partially mapped by other vessels. The next priority was the Chesterfield Plateau and the Cato Reef/Seamount, which had also been partially mapped during an earlier Falkor voyage in 2020. The area north of the Fraser Seamount lies the Coral Sea Marine Park, one of the largest marine parks in the world, and so the new mapping data contributed to a greater understanding of the southern area of this extensive marine park. The mapping data coverage continued in the southern Coral Sea Marine Park with the following voyage FK210226 'Seafloor to Seabirds in the Coral Sea'.

The new mapping data revealed submarine landslides, channels, sand waves, scour marks, volcanic pinnacles (cinder cones), and pock marks (possibly generated by seeps)

around the seamounts. The multibeam data will be used by a number of student projects looking at the seamounts, combined with rock samples that were previously collected by other vessels to understand the evolution of the Tasmanid Seamounts and associated magmatic hotspot. Further, the seafloor channels and sand waves provide new geomorphic information about the influence of deep water flows in the region, which have not been previously studied. This work studying the deep water flows was recently undertaken as a student project by Megan Jeffers at the University of Queensland.

Another objective from the voyage was to study the seabirds at sea. Approximately 15,000 seabirds were observed over the four week voyage, with over 20 different species identified. This region of the Tasman and Coral seas has never been surveyed in such a systematic way before and the data will help the management of the Coral Sea Marine Park. The seabird observation data contributes to a much larger database of Australian seabirds that Dr Eric Woehler has been developing in order to understand these protected species in the waters around Australia.

Seafloor magnetic data were also collected during the voyage to understand the ocean crust in the region. 1443 line km of magnetic data were collected using the onboard SeaSpy2 magnetometer. The lines were collected in a NE-SW and NW-SE direction to better understand the spreading of the Tasman Sea basin. All previous magnetic data from this region have been collected in an E-W direction, which is not the optimum orientation for identifying the extinct spreading ridge. The magnetic data are currently being worked on by Dr Derya Guerer from the University of Queensland who was on the voyage, together with the magnetic data collected on the following FK210206 voyage that Dr Guerer led as Chief Scientist. The data are to be used as part of a science proposal that Dr Guerer is submitting to the Australian Research Council in 2022.

Oceanographic data were collected throughout the voyage using the ADCP OS75 system, which provides current velocity data to 750 m depth. Several CTD casts were also undertaken to confirm the water masses and to ensure that the sound speed profiles being used for the multibeam systems were accurate. The CTD data from FK201228 and FK210226 were used as part of the deep water flows student project by Megan Jeffers.

Additionally, a microplastics sampling protocol was developed to sample directly from the underway seawater system onboard and the CTD water samples. We attempted to eliminate any major sources of contamination. Preliminary results suggest that there are microfibers present in every sample from the surface down to depths of 4500 m. These opportunistic microplastic samples (developed because of the Artist-at-Sea was working with fishing net debris) have not yet been worked on, but we hope to do this in 2022.

Publications

Jeffers (2021). Intermediate and deep-water circulation of the Tasman Sea and Cato Basin based on oceanographic and seafloor bathymetric data. Unpublished undergraduate project using data from FK201228 and FK210206. (Aim is to publish as a paper in 2022).

Johnson (2021). Bathymetric exploration of the Tasman and Coral Seas aboard the R/V Falkor. Quaternary Australasia, Vol. 38, No. 1, July 2021: 11-13. (Report on student experience on the R/V Falkor).

Presentations

Conference presentations

Beaman, R.J., 2021. Schmidt Ocean Institute RV Falkor Australia campaign 2020-2021, Queensland–Smithsonian Fellowship Speaker Series. Oceans: life on the edge, 16 November 2021. Queensland Department of Environment and Science - Smithsonian Institution, Remote conference, pp. 13. (Available at: <https://www.deepreef.org/2021/11/17/soi-rvfalkor-australia/>)

Beaman, R.J., 2021. Schmidt Ocean Institute RV Falkor Australia campaign 2020-2021, Sub-Committee on Regional Undersea Mapping (SCRUM), GEBCO Week, 11-15 January 2021. General Bathymetric Chart of the Oceans (GEBCO) www.gebco.net, Virtually from Paris, France. (Available at: <https://www.deepreef.org/2021/01/13/soi-falkor-campaign/>)

Johnson, A., et al (2021, May 11). Preliminary Interpretation of Multibeam Bathymetry R/V Falkor The Tasman and Coral Seas 2021 [Specific Mapping Case Study]. 2021 GeoHab, Canberra, Australia. (Abstract submitted and awaiting confirmation for the 2022 Ocean Science Forum).

Johnson, A. (2021 April 20). Voyaging aboard the R/V Falkor. Guyots and reefs in the Tasmanid Seamount Chain. University of Queensland Centre for Marine Science Seminar Series. Brisbane, Australia.

Johnson, A., et al., (2022 Feb) Geomorphology of the Tasmanid seamounts, guyots and carbonate reefs. AGU Ocean Sciences presentation.

Public Talks

Gürer (April 2021) UQ-Women in Science Research Networking Night, From microplates to microplastics.

Bostock (June 2021) - UN Ocean Decade - talk for World Ocean Day.

Gürer (June 2021) - Falkor voyages - talk for World Ocean Day.

Gürer (July 2021) Fig Tree Pocket Kindergarten, Brisbane: What is at the bottom of the ocean?

Bostock (July 2021) - Queensland Marine Teachers Professional Development.

Bostock (Sept 2021) - Queensland Marine Teachers Association Annual Conference.

Bostock (November 2021) Plastic pandemic - University of Queensland outreach program - Young Change Makers 2021.

Datasets

Multibeam data (Robin Beaman):

All multibeam data have been provided to AusSeabed, and a 64 m resolution bathymetry grid published and available on the [AusSeabed Marine Data Portal](#).

The multibeam bathymetry and ship track data have also been uploaded by Robin Beaman to an AARNET CloudStor group drive, called 'FalkorAustralia', set up in October 2021. This is to allow the sharing of data files from the various Falkor surveys in north-eastern Australia for all participants from the voyages, which includes the voyage FK201228 'Pinging in the New Year: Mapping the Tasman and Coral Seas'.

Access is via a password-protected link to voyage participants to view, download and upload the contents of the drive.

Within each survey folder, e.g. \FK201228_PingingNewYear, are the subfolders:

\googleearth (hillshaded multibeam bathy as kml/kmz files)

\image (hillshaded multibeam survey bathy and individual ROV dive bathy, as geotif files)

\samples (combined and individual CTD sample data, as Excel files)

\shiptrack (full shiptrack position data at 1min, as Excel files)

Wherever possible, Excel data files now have consistent datetime records, e.g. 2020-10-05T23:23:28 (UTC), and are converted to point shapefiles for use in a GIS. All shapefiles use the WGS84 (unprojected) horizontal datum. The aim is that these standardised and common file types can be used for research projects, particularly by students.

Seabird data (Eric Woehler):

The FK201228 seabird observation data have been published by CSIRO and are available at: https://www.marine.csiro.au/ipt/resource?r=falkor_201228_wov

Media

There was a lot of media interest during the voyage as the Falkor was the first vessel to collect seabed mapping data at the start of the UN Decade of Ocean Science for Sustainable Development (2021-2030). These various media contributions are incorporated in the media report provided by SOI.

Following the voyage, Dr Eric Woehler had a radio interview with ABC Hobart. Dr Eric Woehler also received a Medal in the Order of Australia (OAM) for his services to conservation and the protection of seabirds.

There have been a number of public talks (listed above) given to a wide cross section of the public, to highlight the valuable data collected and the incredible opportunities provided by the SOI to onboard researchers and students.