

Preliminary results of Japanese surveys on multibeam bathymetry off East Antarctica

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The seafloor covers more than 70 percent of the solid-earth surface, however most parts have not been explored because of observation difficulty, especially in polar regions. Significant records of glacial erosion and submarine volcanism as well as traces of continental breakup and seafloor spreading are preserved in the seafloor. In addition, recent developments of ocean and ice sheet numerical modeling needs better constraints of topographical boundary conditions for precise and high-resolution calculations. Therefore, further observations of acoustic bathymetry are essentially needed. Since 2009, the multibeam swath bathymetric mapping has started in the Japanese Antarctic Research Expeditions (JAREs) and several campaign observations by multipurpose research vessels were conducted in the past decade. Here, we present preliminary results of Japanese surveys on multibeam bathymetry off East Antarctica, showing geomorphological structures from continental margin to ocean basins.

Multibeam bathymetric data were acquired by a 20 kHz frequency SeaBeam3020 system (L3 Communications ELAC Nautik) installed on the Japanese icebreaker *Shirase*, R/V *Hakuho-maru*, and R/V *Mirai*. The data were acquired during following fifteen expeditions; *Hakuho-maru* cruises of KH-07-4 (Feb. to Mar. 2008), KH-09-5 (Dec. 2009 to Jan. 2010), KH-10-7 (Dec. 2010 to Jan. 2011), KH-16-1 (Jan. to Mar. 2016), KH-19-1 (Jan. to Feb. 2019), and KH-20-1 (Jan. to Feb. 2020); *Shirase* cruises of JARE 51 (Dec. 2009 to Feb. 2010), JARE 52 (Dec. 2010 to Feb. 2011), JARE 53 (Dec. 2011 to Mar. 2012), JARE 54 (Dec. 2012 to Feb. 2013), JARE 55 (Dec. 2013 to Feb. 2014), and JARE 61 (Dec. 2019 to Feb. 2020); *Mirai* cruises of MR12-05 leg2 (Dec. 2012 to Jan. 2013), MR12-05 leg3 (Jan. 2013 to Feb. 2013), and MR19-04 Leg3 (Dec. 2019 to Feb. 2020). The *Shirase* data was mainly provided by Japan Coast Guard for the utilization of scientific purpose. The sound velocity was corrected by real-time data of the surface water velocity meter, and deep-sea observations of conductivity, temperature, and depth (CTD) cast, and expendable CTD profiles. The CARIS HIPS and SIPS software (Teledyne CARIS Inc., Ltd., Fredericton, Canada) was used for raw data processing. In the Lützwahlm bay, multibeam data were merged with the point echo sounding data using sea ice drill holes acquired during the JARE 9, 14, 15, 18, and 22 (see Hirano et al., 2020).

Obtained bathymetric map covers the continental shelf of Lützwahlm bay (off Shirase glacier), Prytz Bay (off Amelie ice shelf), and off-Totten glacier, where landforms likely associated with grounded ice flow, proglacial and subglacial erosion, flat terrain, and grounding line retreat were observed. The continental slope was systematically investigated off Cape Darnley and off Lützwahlm bay in order to understanding linkage between submarine channels and Antarctic bottom water. In the Gunnerus ridge, we newly identify volcanic edifices which shows 150-m topographic high and high amplitude of magnetic anomaly. Several series of linear depressional structure were observed in the south of Southern Kerguelen plateau.

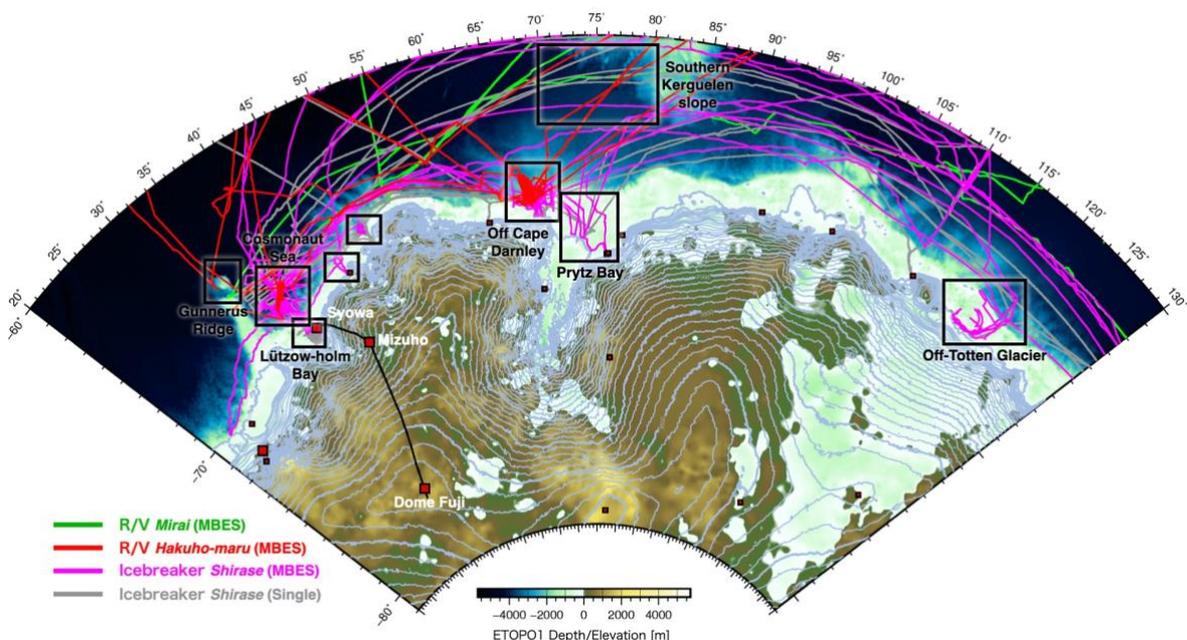


Figure. Study area of multibeam bathymetry off East Antarctica.