

New geophysical observation of circum-Antarctic mid-ocean ridges

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Mid-ocean ridges (MORs) play an important role in Earth system through shaping ocean basins and transport of heat and material from sub-seafloor to ocean. Abyssal hills are common bathymetric features in MORs, and it has been considered that they are formed and shaped by the combination of normal faulting in spreading environment and magmatic constructional processes (e.g., Buck et al., 2005). Recent studies presented new “Milankovitch cycle hypothesis” for abyssal hill construction (Crowley et al., 2015; Tolstoy, 2015), and implied its expectable value for reconstructing a record of global sea level fluctuations and climate history over >10Myr. While the hypothesis has gained independent support from sedimentological evidences (e.g., Lund et al., 2016), it has been the focus of substantial criticism from systematic statistical approach (e.g., Goff, 2018). In addition, the discussion about the upper mantle dynamics and the presence of chemical heterogeneities is essentially limited (e.g., Roth et al., 2019). To understand temporal and/or spatial variation of MORs in detail, further constraints from integrated observational records with precise age determination in several regions are needed. Here, we present new geophysical dataset across circum-Antarctic MORs. We newly conducted underway geophysical mapping and deep-tow magnetics during the R/V *Hakuho-maru* and R/V *Mirai* cruises of KH-19-1 (Jan. to Feb. 2019), KH-19-6 Leg 3 (Nov. to Dec. 2019), KH-19-6 Leg 4 (Dec. 2019 to Jan. 2020), KH-20-1 (Jan. to Feb. 2020), and MR19-4 (Dec. 2019 to Feb. 2020). Systematic data of multibeam bathymetry, total and vector magnetic fields, sub-bottom profiler, and gravity were acquired across the Chile Ridge, southern Mid-Atlantic Ridge, and two segments of Southeast Indian Ridge. In this presentation, we overview preliminary geophysical results in these regions combined with previous data collected during the R/V *Hakuho-maru* and Icebreaker *Shirase* cruises of KH-07-4, KH-10-1, KH-16-1, and Japanese Antarctic Research Expeditions 51–55. Based on these results and satellite observations, we further present the future design of integrated observations utilizing research vessels.

References

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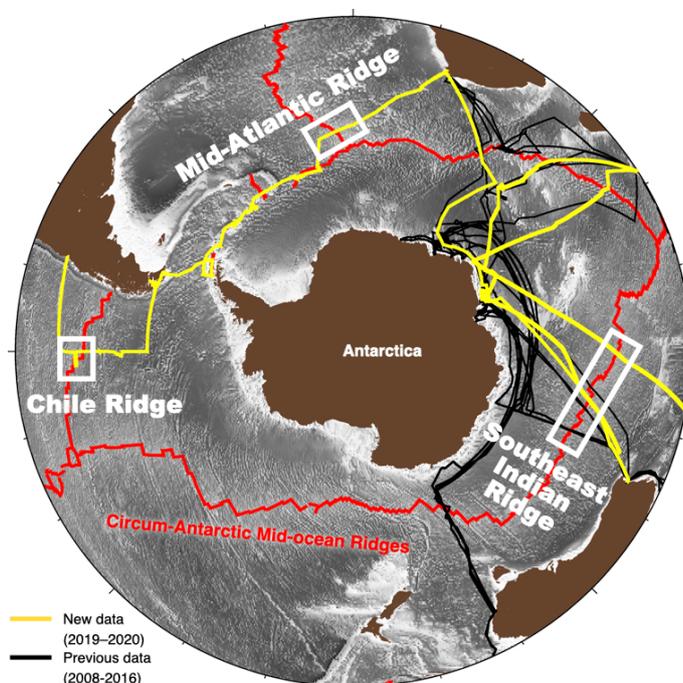


Figure. Study area of circum-Antarctic mid-ocean ridges.