

Newly Mapped Seamounts on the Antarctic Plate off Southern Chile

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We conducted bathymetry, gravity, and magnetic survey of seamounts on the Antarctic Plate off southern Chile in the R/V Mirai MR16-09 Leg 2 cruise (January 20 - February 5, 2017: Puerto Montt - Punta Arenas). The survey including transit was an unprecedented opportunity to collect data in the regions of the Pacific Ocean where it has been sparsely surveyed.

A SeaBeam 3012 multibeam echo sounder was used for the bathymetric survey. The Micro-G LaCoste and Romberg S-116 shipboard gravity meter, a Geometrics G-882 cesium towing magnetometer, and a Tierra Tecnica SFG1214 shipboard three-component magnetometer were used for the gravity and magnetic surveys, respectively. Unfortunately, dredge rock sampling and seismic reflection survey was not conducted.

The seamounts are located on the Antarctic Plate. The mid-ocean ridge (Chile Ridge) was considered to be already subducted beneath the South American Plate. Magnetic Anomaly 6a was identified by Cande et al. (1982) on the seafloor in the vicinity of the seamounts. The crustal age around the seamounts is 18 Ma according to Muller et al. (2008). We observed magnetic anomaly stripes with amplitudes of about 400 nT, therefore, we will examine the crustal age and the seafloor spreading rate.

Since the seafloor was covered with a sedimentary layer, abyssal hills and their strikes could not be identified. The largest seamount was located at 51°00'S, 79°25'W. The seamount has a major axis of about 17 km, a minor axis of 10 km, and the strike of the major axis is N45°W. The water depth of the base of the seamount is about 3900 m and the shallowest depth is about 2900 m, thus the relative height is about 1000 m. The seamount was surrounded by a moat with the maximum deep of 100 m. The basal area is about 160 square kilometers and the volume above the seafloor is about 70 cubic kilometers. The seamounts have calderas, and the depth and the diameter of the largest seamount are 200 m and 2.5 km, respectively.

The existence of the largest seamount was estimated by satellite altimetry and gravity observations. The relative height was estimated to be 364 m (Kim and Wessel (2011) seamount catalogue, ID: KW-05846). However, the accurate estimation of such a small seamount is difficult. We observed free-air gravity anomaly of about +20 mGal at the base of the seamount, and of about +50 mGal over the top of the seamount, thus the peak-to-trough amplitude of the gravity anomaly was 30 mGal. The gravity anomaly due to the seamount with 20 mGal larger amplitude was observed compared with a satellite-based gravity anomaly (Sandwell et al., 2014).

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