Surface ship gravity data sets in the Antarctic Ocean obtained on board Icebreaker Shirase

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The surface ship gravity measurements have been conducted on board icebreaker Shirase to and from Syowa Station in Antarctica by the Japanese Antarctic Research Expedition (JARE). The history of measurements was old. The first attempt was conducted on board icebreaker Fuji in JARE-8. However those measurements were unsuccessful due to instrumental problems and sever sea conditions The surface ship gravity data in the Antarctic Ocean was actually obtained for the first time in JARE22. Since JARE27, the measurements have been handed over on board icebreaker Shirase, and later on, not only the surface ship gravity measurements but also the geomagnetic surveys using a three-component have been conducted.

Although the surface ship gravity data of about 16 years, excluding some bad data sets due to instrumental troubles and so on, have been accumulated by now, the data sets after JARE-34 have been left unprocessed. There are several different kinds of data sets in their qualities, because 1) surface ship gravimeter before JARE-28 was NIPRORI-I while the one after JARE-29 was NIPRORI-II; 2) the positioning system before JARE-36 was NNSS and the one after JARE-37 was JARE37; 3) calibrations at the port of call were different in each year. Especially the calibration issue causes gravity difference between the data sets. Therefore, for the processing of the data sets after JARE-34, we first applied the Eotvos corrections and other corrections, and removed the drifts and the offsets so that the calculated free-air anomalies are fitting to the satellite altimeter gravity grids of Sandwell and Smith (1997). We also applied the same procedure to the data from JARE27 to JARE33, and compiled an unbiased data set in the Antarctic Ocean.