Oral | Symbol S (Solid Earth Sciences) | S-GD Geodesy

[S-GD22_1AM2]Gravity and Geoid

Convener:*Yuichi Imanishi(Earthquake Research Institute, The University of Tokyo), Koji Matsumoto(RISE Project Office, National Astronomical Observatory), Chair:Taku Ozawa(National Research Institute for Earth Science and Disasters), Koji Matsuo(Graduate School of Science, Kyoto University)

Thu. May 1, 2014 11:00 AM - 11:45 AM 413 (4F)

Gravity originates from the universal gravitation, and has fundamental effects on the structure and dynamics of the Earth, the Moon and the planets. In this session, we solicit papers on a wide variety of topics related to gravity and geoid, including the theory of the gravity field, absolute/relative gravity measurements/observations, data analysis for satellite gravity missions, and development of gravity sensors.

11:30 AM - 11:45 AM

[SGD22-P05_PG]Crustal thickness deduced from a three-dimensional gravity modeling with seismic survey results

3-min talk in an oral session

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Keywords:gravity

The Japan Coast Guard (JCG) has conducted multichannel seismic reflection and refraction surveys as part of the Continental Shelf Survey from 1983 through 2008 in the area from the northwest part of the Pacific plate to the Philippine Sea plate. On the other hand, it has also conducted marine gravity surveys in the same area and possesses enormous amount of gravity data. We calculate crustal density distribution by applying the three-dimensional gravity inversion method (Ishihara and Koda, 2007) using these data.This method has performed in the following procedures: First, an initial density structure model constituting of seawater, sediment, crust and mantle is made by interpolation of seismic survey results with reference to a gravity distribution. Second, gravity anomalies are calculated using the initial model. Mantle Bouguer anomalies are calculated by subtracting a constant, which depends on the regional structure, from the differences between observed and calculated gravity anomalies. Finally, the Moho depths are obtained by inversion analysis to minimize the mantle Bouguer anomalies. We can estimate the crustal thickness distribution in this way.It confirmed that the above method improves the initial model with the Moho depths due to velocity structure from refraction surveys, and that a more appropriate density structure model can be obtained.In addition, it is necessary that whole structure depending on a sea area with the effects given by structure, such as a density and/or a thickness of sediment and/or lithosphere, should be considered if the effects of them are large. For example, in the case of the northwest part of Philippine plate, we found that the thickness of the lithosphere depending on its age strongly affects the result of the inversion. Therefore, we used the calculated gravity data after removal of variation for wave length than or equal to 400 km in order to remove effect given by the structure under crust.We will report these revisions and the crustal thickness distribution in several sea areas. It is expected that gravity determination of the crustal thickness distribution in large sea area gives important clues on tectonic evolution of crust.