Analysis of the variations in topographic features around the outer-rise of Japan trench

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The 1933 Showa-Sanriku earthquake which was caused by a shallow and near-trench earthquake-fault on the outer-rise of the northern part of Japan Trench occurred 37 years after the 1896 Meiji-Sanriku tsunami earthquake. Precise location of earthquake-fault of the 1933 earthquakes have not yet been obtained (e.g. Obana et al., 2018).

For identifying the earthquake-fault around the outer-rise of Japan trench, it is necessary to determine the mechanism by which the topographic features of the outer-rise are formed. Most of the previous studies about flexural modeling identify only the deformed shape of the subducting plate without considering the features unrelated to flexural bending, such as earthquake-faults, seamounts, and volcanic ridges. Sparse topographic and gravity data make it difficult to estimate the elastic thickness distribution of the local area adjacent to the faults. To solve this problem, we aim to calculate the "non-isostatically-compensated topography (non-isostatically topography)" by using the method of Zhang et al. (2014). The non-isostatically topography was calculated by removing from the observed bathymetry (1) the effects of sediment loading, (2) isostatically-compensated topography based on gravity modeling, (3) age-related lithospheric thermal subsidence, and (4) flexural model of the bending plate. Fine scale bathymetry data set, which was compiled and provided by JCG and JAMSTEC (after Kido et al., 2011), was used for the analysis. The Matlab toolbox TAFI (Jha et al., 2017) was applied for modeling flexural deformation of the bending plate. The plate flexural bending model was estimated by every 0.05 degrees for latitude perpendicular to the subduction.

We will discuss the non-isostatically topographic features and elastic thickness in the local area of the outer-rise of Japan Trench.

References

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