Effects of a seamount on the lithospheric bending at a subduction zone

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The aim this study to estimate qualitatively effects of a seamount to plate bending around a trench. Our results are as follows. A seamount between the outer rise and the trench restricts the stress accumulation near the trench. The additional load by a seamount controls that the outer rise development, it pushs down the plate.

These results can explain qualitatively that the differences on topography and seismicity from off Sanriku and off Fukushima along the Japan trench axis. Seamounts off Fukushima region push down the oceanic plate, prevent the growth-up of the outer rise. The inactive intraplate seismicity off Fukushima region near the trench axis may be caused by overlapping the flexure by seamounts and subducting of the plate.

The aim this study to estimate qualitatively effects of a seamount to plate bending around a trench. We constructed a two-dimensional finite element model to simulate with elastic-perfectly plastic rheology under a hydrostatic restoring force. The dimensions of the model are 2,000 km in length by 50 km in thickness. We applied vertical load, representing a gravitational body forces of the subducting lithosphere, on 150 km from the left edge of the plate. A seamount was also treated as an additional vertical load on the plate. We examined how a seamout changes the plate shape, the stress distribution and the plastic region of the plate by its sizes and its existing positions.

Our results are as follows. A seamount around the outer rise promotes the stress accumulation near the trench. On the other hand a seamount between the outer rise and the trench restricts the stress accumulation near the trench. The additional load by a seamount controls that the outer rise development, it pushs down the plate.

These results can explain qualitatively that the differences on topography and seismicity from off Sanriku and off Fukushima along the Japan trench axis. Seamounts off Fukushima region push down the oceanic plate, prevent the growth-up of the outer rise. The inactive intraplate seismicity off Fukushima region near the trench axis may be caused by overlapping the flexure by seamounts and subducting of the plate. Further, it might be also possible to reduce interplate seismicty because the push down of the oceanic plate by seamounts will reduce the normal stress between each plates.