# Stress pattern within the Pacific plate revealed by a stress tensor inversion method

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I applied the Horiuchi's stress tensor inversion method to microearthquakes in and around Hokkaido, the southwestern part of the Kurile subduction zone. The Pacific plate at the northwestern Pacific Ocean is descending beneath Kurile Islands and Japan Islands.

The study area was divided into grids spacing 0.2 degree in longitude X 0.2 degree in latitude and at the depths every 10 km from 15 to 135 km. At each grid point I sampled earthquakes within a box of +-0.2 degree horizontally and +-10km in depth and calculated the stress tensors for only grids including more than 20 earthquakes. I plotted the axes of the compressional and tensional stresses on a vertical cross section.

An outstanding feature for the compressional stress is the concentric half-circles pattern centered around the upper boundary of the Pacific plate at the depth of approximately 70 km. For the tensional stress the axes radiate from this center. The Pacific plate changes in the dip angle around here from the low angle of 23 degree to the high angles of 36 degree and 46 degree as the boundary gets deep. Therefore these stress patterns probably suggested the bending of the Pacific plate.

I modeled the observed stress pattern by the bending of a rectangular beam. The two-dimensional finite element method was used to calculate the theoretical stress pattern in the beam. This forward modeling strongly suggests that the Pacific plate yields the downward bending and the intermediate-depth earthquakes are caused inside of the plate by the bending.