

Determination of the Fault Plane for the 2007 Kuril Islands Earthquake using the Hypocenter Relocations of Aftershocks

Kimie Norimatsu[1]; James Mori[1]

[1] EQH, DPRI, Kyoto Univ.

Two great earthquakes occurred in the Kuril Islands region in 2006 and 2007. The Kuril Islands earthquake of the 15 November 2006 (Mw 8.3) occurred on the boundary between the Pacific Plate and Okhotsk Plate. About two months later, a Mw 8.1 earthquake on 13 January 2007, occurred with an epicentre approximately 95 km ESE of the November earthquake, close to the outer-rise portion of the Pacific Plate.

It is relatively-uncommon that great earthquakes (magnitude greater than 8.0) have occurred in the same region within a short span of the time, also great outer-rise earthquakes (magnitude greater than 8.0) have occurred only three times since the early 20th century.

The aim of this study is estimate the orientation of the fault plane for the 2007 outer-rise earthquake. It is reasonable to assume that the fault plane of the 2006 earthquake is on the westward dipping subduction plate boundary, however, there is currently not a clear indication of the geometry of the 2007 earthquake.

To relocate the associated seismicity, we used well recorded master events. The depth of the master event was determined by teleseismic waveform modelling, using the program of Kikuchi and Kanamori, 2003. To relocate the seismicity we used the location program HYPOCENTER 3.2 [Lienert, 1994]. For the master events, the earthquake were relocated with the depth was fixed at the value determined from a waveform inversion. The station residuals from the master event relocations were subtracted from the arrival times of the other events and the events were relocated. The data we used are P wave arrival time data compiled by the United States Geological Survey (USGS) for over 1000 earthquakes during the period 20 September 2006 to 15 March 2007. Number of event was 1651.

The results of relative relocations show that the fault plane of the 2006 thrust event is a shallowly northwest dipping plane and the 2007 normal fault event is dipping more steeply to the southeast.