**Japan Geoscience Union Meeting 2011**
(May 22-27 2011 at Makuhari, Chiba, Japan)


SCG060-P02 Room:Convention Hall Time:May 25 16:15-18:45

# Depth Dependence of Subduction Zone Seismicity and its Uniformity

Keiko Kuge[1*]

[1]Dept. Geophysics, Kyoto University

Arc volcanoes are typically located where the subducting slab is ˜110 km deep (e.g. Tatsumi, 1986). To explain the uniformity of the arc volcano configuration, Wada and Wang (2009) proposed subduction zone thermal models with common decoupling depth, in which the interface between the slab and the mantle wedge is decoupled to a depth of 70-80 km where mantle wedge flows are not dragged by the subducting slab. If the thermal models really dominate, not only thermal structure but also earthquake activity in subduction zones can be affected because the condition of temperature controls seismogenesis at plate boundaries and within slabs. In this study, I attempt to diagnose the models of Wada and Wang (2009) by examining variation of seismic activity with depth in subduction zones.

Using earthquake hypocenter data relocated by the method of Engdahl et al. (1998), I examine dependence of earthquake frequency on depth down to 200 km. In subduction zones with thermal parameters larger than 800 km, the number of earthquakes exponentially decreases with depth below ˜50 km, and the decreasing rate changes at depth of 75-100 km. The depth changing the decreasing rate seems to be uniform in the subduction zones, having no significant correlation with the thermal parameters. Depth distribution of earthquakes deeper than 75-100 km tends to depend on subduction zones. In some subduction zones the earthquake frequencies continue to be at low rates, whereas there are dominant peaks of earthquake activity at depths in some subduction zones. The similar observations are also obtained in the Global CMT catalogue.

Using the Global CMT catalog, I examine the depth distribution of earthquakes which depends on focal mechanisms. The depth of 75-100 km is close to the lower limit where thrust earthquakes occur. Low-angle thrust earthquakes, which may be plate-boundary earthquakes, occur at depths shallower than 75 km. My waveform modeling for some low-angle thrust earthquakes shows that the depths are shallower than ˜50km. The depth of 75-100 km is a turning depth where focal mechanisms change. Therefore, change in earthquake frequency at depth of 75-100 km can be a manifestation of two features: Vanishing of thrust earthquakes above 75 km and no significant increase of slab earthquakes at depths of 75-100 km shallower. Taking account of the dependence of the two features on temperature, the uniformity observed for the variation of seismic activity with depth in subduction zones is consistent with the thermal models of Wada and Wang (2009).