Japan Geoscience Union Meeting 2012
(May 20-25 2012 at Makuhari, Chiba, Japan)

SCG72-04 Room:103 Time:May 22 15:30-15:45

Diagenesis and dehydration of subducting oceanic crust within seismogenic subduction zones

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Seismogenic plate-boundary faults at accretionary margins may lie within or close to the subducting oceanic crust, composed of basaltic rocks, in contact with the overriding plate of a lithified accretionary prism (Kimura and Ludden, 1995; Park et al., 2001; Matsumura et al., 2003). Therefore, diagenesis and dehydration of the oceanic crust within the seismogenic zone (normally defined as a temperature condition from ˜100-150 to 350-450^{o}C; Hyndman et al., 1993) is supposed to have a great influence on the interplate mechanical behaviors where great earthquakes occur. Our previous work showed that basaltic basement at the top of the oceanic crust is remarkably hydrated prior to reaching the trench axis, and pointed out a possibility to be a significant source of fluid in the seismogenic zone (Kameda et al., 2011). The aim of this work is to provide complementary dataset on the state and pathways of diagenesis in the subducting oceanic crust to verify the argument presented in the previous paper. In particular our focus is on a more validate quantification of the dehydration processes within the seismogenic zone. In this work, we analyzed 5 pillow basalt samples exposed in the Cretaceous to Tertiary accretionary complex, the Shimanto Belt, southwest Japan. Based on the vitrinite reflectance measurement of terrigenous sediments accompanied by these rocks, they are estimated to have been subjected to burial diagenenesis at 150-300 ^{o}C. X-ray diffraction (XRD) analyses of the bulk samples revealed that they contain ˜25wt% of hydrous clay minerals. Moreover, clay-fraction XRD exhibited a successive conversion of smectite (saponite) into chlorite as a function of diagenesis grade. In this talk, we will present an improved model of the dehydration behavior of subducting basaltic crust inferred from these data, and address its potential influence on the evolution and physical states of the seismogenic-plate boundary faults.

Keywords: seismogenic zone, dehydration, oceanic crust, saponite