S149-P004 **Room: Poster Session Hall** **Time: May 29**

Modeling faulting processes around the mid-Niigata prefecture:effects of a basin structure and a weak zone in the lower crust

Bunichiro Shibazaki[1]; Aitaro Kato[2]

[1] IISEE, BRI; [2] ERI, Univ. Tokyo

The tectonic loading and generation processes of large inland earthquakes are controlled by nonuniform rheological structures in the crust and in the uppermost mantle. Shibazaki et al. (2008) performed a finite element analysis considering nonlinear viscoelasticity and plasticity in order to construct a model of the deformation and faulting processes in the crust and in the uppermost mantle in the island arc in northeast Japan. Their results revealed that a shortening deformation occurs in the low-viscosity region of the lower part of the crust and in the uppermost mantle, resulting in shear faultings in the upper part of the crust. There exist strain concentration zones in the eastern margin of the Japan Sea. During the opening of the Japan Sea, grabens and half-grabens were formed along the listric normal faults in the back-arc region and in the eastern margin of the Japan Sea. During the shortening that has been occurring since 3.5 Ma, reverse faults and folds have developed within the back-arc region and in the eastern margin of the Japan Sea. Therefore, the basin structure and the existing normal faults are important causes of inland earthquakes. In the present study, we consider the strain concentration zone around the mid-Niigata prefecture and model the deformation and faulting processes by considering a basin structure.

Kato et al. (2006) obtained the detailed three-dimensional velocity structure around the source area of the 2004 mid-Niigata prefecture earthquake by the double-difference tomography method and found that the seismic velocities in the hanging wall above the main shock fault were lower in magnitude than those in the footwall in all cross sections; further, they observed that the contrast in the velocity extended to a depth of approximately 10 km. Kato et al. (2007) obtained the detailed three-dimensional velocity structure from the source region of the 2004 mid-Niigata prefecture to that the 2007 Chuetsu-oki earthquake. They found lateral variations in the thickness of the low-velocity zones corresponding to the folding structure in the mid-Niigata prefecture. In the present study, we consider the basin structure revealed by Kato et al. (2007). We choose values for the elastic constants and frictional coefficients in the basin such that they are smaller than the corresponding values in the surrounding areas. We also consider the change in the depth of the brittle-ductile transition, which becomes shallower from beneath the Chuetsu-oki region to the Echigo Mountains. We also consider a weak region beneath the basin structure which corresponds to a low velocity anomaly revealed by Okada et al. (2006) and Nakajima et al. (2007). Numerical results show that at the boundary of the basin structure and the basement, the plastic strain concentrates and a fault zone is created. Due to the lateral variations in the thickness of the low-velocity zones, two or three conjugate pairs of fault zones are created from the source area of the 2004 mid-Niigata prefecture earthquake to that of the 2007 Chuetsu-oki earthquake. It is considered that the 2007 Chuetsu-oki earthquake occurred in one of these conjugate pairs of the fault zones. If we do not consider a weak region beneath the basin structure, plastic strain concentrates around Echigo Mountain. Both the Niigata basin and the weak zone in the lower crust and the uppermost mantle play important roles in the strain concentration process in the mid-Niigata region.