[EJ] Evening Poster | S (Solid Earth Sciences) | S-CG Complex & General

[S-CG57]Dynamics in mobile belts

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The dynamic behaviours of mobile belts are expressed across a wide range of time scales, from the seismic and volcanic events that impact society during our lifetimes, to orogeny and the formation of large-scale fault systems which can take place over millions of years. Deformation occurs on length scales from microscopic fracture and flow to macroscopic deformation to plate-scale tectonics. To gain a physical understanding of the dynamics of mobile belts, we must determine the relationships between deformation and the driving stresses due to plate motion and other causes, which are connected through the rheological properties of the materials. To understand the full physical system, an integration of geophysics, geomorphology, and geology is necessary, as is the integration of observational, theoretical and experimental approaches. In addition, because rheological properties are greatly affected by fluids in the crust and fluid chemical reactions, petrological and geochemical approaches are also important. After the 2011 great Tohoku-oki earthquake, large-scale changes in seismic activity and regional scale crustal deformation were observed, making present-day Japan a unique natural laboratory for the study of the dynamics of mobile belts. This session welcomes presentations from different disciplines, such as seismology, geodesy, tectonic geomorphology, structural geology, petrology, and geofluids, as well as interdisciplinary studies, that relate to the dynamic behaviour of mobile belts.

[SCG57-P05]Geological structure analysis of active fault segment boundary in the southern part of the Ohchigata fault zone, central Ishikawa Prefecture,Japan

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The Ouchigata fault zone is a reverse fault type active fault zone of NE-SW trending located in central Ishikawa Prefecture(Research Group for active Faults Japan.ed,1991). It is pointed out that this fault zone is divided into several active segments based on the Paleoseismological study and the activity is restricted by the geological structure in the EW direction located at the segment boundary (Katagawa et al., 2002 etc). In particular, the form of the active fault, the distribution of the microearthquake, the difference of the geological structure are remarkable in the Houdatsusan northern marginal fault zone located at the boundary between the Sekidousan active segment and the Nodera segment. Therefore, in this study, field survey and analysis were carried out around Houdatsusan northern marginal fault zone for the purpose of understanding detailed geologic structure at the boundary of active fault segment and elucidation of the history of structural development.

The Houdatsusan northern marginal fault zone consists of the F1, F2, F3 fault in the E - W trend and faults in the NW - SE trend. With the F1 fault as the boundary, basement rocks of the Hida belt are distributed on the south side and Miocene to Pliocene is distributed on the north side. In the area between the F1, F2, and F3 fault (hereinafter referred to as “steep slope zone”), the Miocene are reversed or steeply inclined, and many small fault and fracture zones of the outcrop scale are developed.

We could not confirm the just boundary fault outcrop of Hida Belt and Miocene at F1 fault. However, we confirmed the occurrence that the granodiorite of the Hida Belt and the Miocene conglomerate are fractured respectively near the geological boundary. These fault planes show ENE-WSW striking and vertical dipping. In the fracture zone of Hida belt origin, Dextral slip sense was obtained from the outer edge of fracture zone and reverse fault sense was obtained from the fault core. Reverse fault sense and left lateral sense were obtained in Miocene origin fracture zone. F2 fault and F3 fault cut the Miocene. The fault plane of the F2 fault showed ENE - WSW striking, dipping high angle SSE, Reverse fault sense from the outer edge of the fracture zone, the dextral sense from the fault core was obtained . Although the outcrop of the F3 fault was not observed, it is estimated that it is a thrust showing ENE - WSW striking and medium dipping fault plane from the surrounding geological structure.
Small-scale faults in the steep slope zone indicate E-W striking. These are divided into dextral slip cataclasite of right lateral sense and of reverse sense fault gouge. We confirmed the occurrence of fault gouge cutting of cataclasite at outcrop.

For the small fault inside steep slope zone, stress analysis was performed using multiple inverse method by Yamaji (1999). As a result, we obtained two stress are obtained. Stress 1: Strike slip stress with σ 1 axis for NE - SW and NW - SE with σ 3 axis. Stress 2: Reverse fault sence stress with σ 1 axis for N - S ~ NNW - SSE and nearly vertical σ 3 axis. The new-old relationship of these stresses is 1 →2 from the cutting relation obtained at the outcrop.

From the above results, the tectonic history of the Houdatsusan northern marginal fault zone was classified as follows. Stage-1 (Dextral slip of the F1 fault and formation of a rateral slip small fault in the steep slope zone). Stage II (Reverse fault activity of F1 fault, F2 · F3 fault and formation of small reverse fault in steep slope by NNW-SSE compression).Stage III (Dextral slip of F2 fault by WNW-ESE compression).Each stage is thought to be contrasted with the tectonics of the Japan sea opening, N-S compression of the late Miocene and Pliocene, WNW-ESE compressionof the Quaternary.
Stress 1 obtained by Stage I shows a lateral shear stress different from the normal fault stress because the F1 fault was active as a transfer fault for the failed lift such as the Toyama trough. In the past, activities in the Quaternary of the Houdatsusan northern marginal fault zone were not recognized, but in this study ,strike slip sense was confirmed from the latest fault.plane of the f2 fault. Furthermore, since Hiramatsu et al. (2007) reported microearthquake activity with lateral deflection mechanism solution in Houdatsusan northern marginal fault zone, at least in F2 it is considered to be active in current stress. Furthermore, Hiramatsu et al. (2007) reported the lateral slip type microearthquake activity in the Houdatsusan northern marginal fault zone, so it seems likely that the Hodogaya Northern fault zone is active in the Quaternary.