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

[S-CG57]Dynamics in mobile belts

convener:Yukitoshi Fukahata(Disaster Prevention Research Institute, Kyoto University), Toru Takeshita(Department of Natural History Sciences, Graduate School of Science, Hokkaido University), Hikaru Iwamori(海洋研究開発機構・地球内部物質循環研究分野)
Wed. May 23, 2018 5:15 PM - 6:30 PM Poster Hall (International Exhibition Hall7, Makuhari Messe)
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-P22]Fault development process and paleostress fields in the 2000 Western Tottori Earthquake

*Hideto Uchida[1,2], Hideki Mukoyoshi[1], Satoshi Tonai[3], Kenta Kobayashi[4], Shunya Kaneki[5], Tetsuro Hirono[5]
(1.the Earth Resource Environment department,Shimane University, 2.Department of Civil Engineering, Shikoku Research Institute Incorporation, 3.Department of Applied science, Faculty of science, Kochi University , 4.Department of Geology, Faculty of science, Niigata University, 5.Department of Earth and Space Science, Graduate School of Science, Osaka University)
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Fault topography in aftershock area of the 2000 Western Tottori Earthquake was poorly recognized. There are little information of earthquake in the poor topographic region and paleo fault activity may help to the sesmic evalustion. It is important to understand deformation process of fault systems in the poor fault topography for mitigation of geological hazard.

In this study, we discuss the paleostress fields and fault ages around aftershock area of the 2000 Western Tottori Earthquake. We adopted Hough transform inverse method to estimate the paleostress fields because of using incomplete fault-slip data (Sato, 2006) and we determined K-Ar dating of fault gouges in the aftershock area. The fault gouge contains auhigenic illite related to fault activity. It is difficult to separate the only authigenic illite from fault gouge with muscovite and detrital mica. Therefore, we conducted illite polytype analysis by the XRD patterns and evaluated mixure rate of muscovite and detrital mica. The 100% authigenic illite is considered as timing of fault activity in this study.

The Kawai and the Kuri formations (19-15Ma) and the Omori Formation (16-13Ma) is distributed in the northern area. The granitic rocks (65Ma) called ‘Neu Granitc Pulton’ is widely exposed around the central and southern area.

As a result of the paleostress analysis, we detected reverse faulting stress regime with NNW-SSE σ1 and high ratio in the northern area. This stress state is dominant after 13Ma and consistent with the stress field of formation of the Shinji Folded Zone. Two stress states, one is stress states Strike-slip stress regime with E-W σ_1, N-S σ_3 and intermediate stress ratio and the other is Strike-slip stress regime with N-S σ_1, E-W σ_3 and intermediate and high stress ratio in the Neu granite was also detected. The former is concordant with the contemporary stress in a whole Chugoku region (Kawanishi et al., 2009). And the latter is consistent with the stress regime which formed NE-SW trending geological faults distributed in Chugoku region (Kanaori, 1990). The stress change from N-S σ_1, E-W σ_3 to E-W σ_1, N-S σ_3 which was revealed from cutting-relationships between the dikes of the Yokota monogenetic volcanoes origin and faults considered to be caused when volcanic activity of the Yokota monogenetic volcano was occurred.
We constrained the timing of the authigenic illite in the fault gouge is approximately 22.8Ma from K-Ar age dating and XRD patterns. In the presentation, we discuss relationship between the timing of fault activities and palaestress fields.