[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-P10]The relation between the Vp/Vs distribution and shallow earthquake generation in the central part of the backbone range, northeastern Japan arc

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Inland earthquake occurrence is thought to be strongly influenced by the heterogeneous structure in the upper crust. In particular, the pore pressure distribution will play an important role in the earthquake generation process. In this study, we investigate the relation between the heterogeneous structure and the seismic activity in the backbone range of the NE Japan.
The Iwate-Miyagi Inland earthquake (Mj 7.2) occurred in this area on June 14, 2008. The source region of this large earthquake is located in the strain concentration zone in the backbone range, where many calderas exist (Miura et al., 2002; Yoshida et al., 2005). According to Terakawa and Matsu'ura (2010), this area is located in a reverse fault type stress field of E-W compression, and this large earthquake is also of E-W compressional reverse fault type. However, many N-S compressional reverse fault type earthquakes also occurred as aftershocks of this large shallow earthquake (Yoshida et al., 2014). Such strange aftershocks are concentrated in a region much narrower than N-S compressional stress field expected from the source model of the main shock estimated by Iinuma et al. (2009), which indicates that the distribution of the strange earthquakes is also controlled by the distribution of weak zones.
If the weak zone corresponds to a high pore pressure region, Vp/Vs is expected to be higher in the region. In order to verify the hypothesis that the distribution of the N-S compressional reverse fault

type aftershocks is controlled by the high pore pressure, we estimated Vp/Vs distribution using the method proposed by Lin and Shearer (2007).
As a result, Vp/Vs is found to be less than 1.70 in most of the aftershock area. And it turned out that the N-S compressional aftershocks are distributed in a region where Vp/Vs is higher than 1.70 and N-S compressional differential stress change caused by the main shock is larger than 8 MPa.
The Vp/Vs strongly depends on the mineral composition of the host rock and the rock is expected to show Vp/Vs lower than 1.70 if it contains a lot of quartz (e.g., Holbrook et al.,1992; Christensen, 1996; Yoshida et al., 2013). If the Vp/Vs of the host rock is less than 1.70, the regions with Vp/Vs higher than 1.70 probably correspond to the areas where crack-shaped fluid is distributed (Takei, 2002) and the strength is expected lower there. Thus, the N-S compressional events were probably generated due to the high pore pressure as well as the N-S compressional stress caused by the main shock.