[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-P09]Post-rift, Middle Miocene stress regime of the NE Japan arc inferred from dikes and mesoscale faults in the Kakunodate area

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Intra-arc rifting in the NE Japan arc terminated around 14–15 Ma, but the Middle Miocene, post-rift stress regime is not well understood. Researchers in the 1980s and early 90s could not determine either the maximum or intermediate stress axis from dike orientations or could not deal with non-Andersonian faults for their paleostress analysis. The methodological development in the last quarter century has enabled us to determine not only all the principal axes but also stress ratio (e.g., Bear et al., 1994), and to separate stresses from heterogeneous data from dikes and faults (Yamaji, 2000; Yamaji et al., 2006; Sato, 2006; Yamaji, et al. 2006; Yamaji and Sato, 2011).

We collected orientation data from 28 doleritic dikes, 10 dacitic dikes and 59 mesoscale faults in the Kakunodate area, NE Japan to apply the latest methods to determine the post-rift stress regime of the NE Japan arc. The stratigraphic constraints and the U-Pb age of a dacitic dike indicate that the doleritic and dacitic ones were formed in ∼17.5–13.5 Ma and ∼14–12 Ma, respectively.

As a result, the doleritic and dacitic dikes yielded the normal faulting regime of stress with NW-SE extension. Stress ratio decreased during the transition from doleritic to dacitic magmatism, suggesting the approach of the minimum principal stress to the intermediate one to reduce differential stress when

the intra-arc was abandoned. It is unclear when the mesoscale faults were formed, but the similarity of the normal faulting stress regime obtained from the fault-slip data suggest their activity in the early Middle Miocene. However, the stress does not explain a quarter of the data from the faults with the reverse sense of stratigraphic separations. Those are probably younger faults.