[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)

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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-P16]Persistent and time-dependent characteristics of crustal deformation in the Central-Northern Nagano area associated with the 2011 Tohoku-oki and the 2014 Northern Nagano earthquakes

*Koki Kumagai[1], Takeshi Sagiya[1,2], Angela Meneses-Gutierrez[3], XUELEI ZHANG[1], Nobuhisa Matsuta[4], Daisuke Hirouchi[5], Kenjiro Matsuhiro[6], Takashi OKUDA[6] (1.Graduate School of Environmental Studies, Nagoya University, 2.Disaster Mitigation Research Center, Nagoya University, 3.Disaster Prevention Reserch Institute, Kyoto University, 4.Graduate School of Education, Okayama University, 5.Faculty of Education, Shinsyu University, 6.Earthquake and VolcanoReserch Center, Nagoya University)

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The Itoigawa-Shizuoka Tectonic Line (ISTL) in central Japan is one of the major active fault system in Japan. Along the northern and central ISTL, there exist many active faults such as the Kamishiro fault, the East Matsumoto Basin fault and the Gofukuji fault. In 2014, Mj 6.7 Northern Nagano Earthquake occurred at the Kamishiro fault. The possibility of occurrence of large earthquake along ISTL is estimated as large as15-30% (HEPP, 2015). So it is important to monitor tectonic strain accumulation and to propose fault models of future earthquakes.

Recent studies suggested inelastic deformation in the crust plays an important role in tectonic loading of intraplate faults. Meneses-Gutierrez and Sagiya (2016) identified localized inelastic deformation in the Niigata region through a comparison of interseismic and postseismic crustal deformation associated with the 2011 Tohoku-oki earthquake. It is of great importance to know how the crustal deformation and tectonic

loading is occurring around ISTL while postseismic deformation of the 2011 Tohoku-oki earthquake continues in a large scale. For such a purpose, we conduct dense GNSS observation around the central and northern ISTL. Based on GNSS daily solutions from December 2013 to November 2017, we calculate average horizontal velocity at each GNSS site and compare them with those before the 2011 Tohoku-oki earthquake (Teratani et al. 2014). We also calculate and compare the strain rate before and after the Tohoku-oki earthquake.

We find no significant change in the strain rate pattern around the Gofukuji fault. The result suggests that tectonic loading of the Gofukuji fault or the aseismic creeping below the fault is persistent regardless of elastic perturbation due to the 2011 Tohoku-oki earthquake postseismic deformation. On the other hand, accelerated NW-SE contraction is found around the East Matsumoto Basin fault and the Western Nagano Basin fault. In particular, the change is remarkable in Saigawa Hills located east of the East Matsumoto Basin fault. We also divide the time period after the 2011 Tohoku-oki earthquake by the occurrence of the Northern Nagano earthquake in November 2014. The contraction of Saigawa Hills was further accelerated after the Northern Nagano earthquake and the contraction rate increased by a factor of 1.5~2 by both the 2011 and 2014 earthquakes. We summarize GNSS observation data and discuss their possible implications, with special foci on the aseismic crustal faulting and surface geology.