[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-P30]Percolation of cracks in annealed alumina polycrystalline aggregates

*Yohei Kaiwa[1], Tohru Watanabe[1] (1.Department of Earth Sciences, Faculty of Science, University of Toyama)

Keywords:Percolation, Electrical conductivity, Grain boundary cracks

Transport properties in rocks are controlled by the connectivity of pores. Grain boundary cracks (open grain boundary) are pervasive particularly in rocks containing quartz grains. What fraction of open grain boundaries are required to form an interconnected network? Numerical experiments on an array of cubic grains have shown that the percolation threshold is 20%. The aim of this study is to determine experimentally percolation threshold of grain boundary cracks in polycrystalline aggregates.

A crack-free alumina polycrystalline aggregate (Coors Tek Co., Ltd., SPHALL, d~25 µm) was used as a starting material. Thermal cracks are introduced by annealing. Though corundum is anisotropic in linear thermal expansivity, it is difficult to introduce thermal cracks in a very fine grained aggregate by annealing at temperatures lower than 1000 ℃. Cylindrical samples (D=10 mm, L=10 mm) were, thus annealed at 1800-1900 ℃ to accelerate the grain growth. Thermal cracking is facilitated in a sample with larger grains. The average grain size was increased to 120 µm by annealing at 1850 ℃ for 30 hours. SEM observations have shown that there are open grain boundaries in annealed samples. The amount of cracks was characterized by the crack density parameter (O’Connell and Budiansky, 1974), which can be evaluated from measured compressional and shear wave velocities. More cracks were created in a sample with larger grains. The crack density parameter was increased to 0.039. However, impedance measurements on samples filled with brine (0.1 M KCl aqueous solution) suggest that

connected paths are not formed. More cracks are required to form an interconnected network of cracks.