[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-P17]Coulomb stress change on the fault in Japan assumed from focal mechanism estimated from GNSS surface displacements of GEONET

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Introduction

Many studies used Coulomb stress change (ΔCFS) to discuss effects of large tectonic events like large earthquakes on surrounding faults. Calculation of ΔCFS is usually applied dislocation model assuming in an elastic half-space. It requires a source fault model for each tectonic event. On the other hand, previous studies (Ueda &Takahashi 2005; Ohzono &Takahashi 2016) suggest a method to calculate ΔCFS directly from the observed GNSS displacement. If the method reasonably works, it gives ΔCFS imparted by not only large tectonic events but also constant deformation. Nishimura (2017) examined efficacy of the method, and demonstrated ΔCFS increase on some fault segment ruptured by large earthquake before their rupture.

The purpose of this study is to demonstrate that actual earthquakes are consistent with ΔCFS calculated by the constant deformation from the observed GNSS displacement.

Method and Result

We calculate ΔCFS in same way to Nishimura (2017) on all source faults before the 2011 Tohoku-oki Earthquake imparted by the constant deformation observed by a GNSS. When the depth of hypocenter is less than 20km, approximately 70 % of calculated ΔCFS is positive, and annually increases several kPa (fig. 1, 2). The result is as our expectation that the method to calculate ΔCFS directly from the observed GNSS displacement reasonably works at a shallow depth in the upper crust.