[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-P21]Precise hypocenters determined by the "0.1 Manten" hyper dense seismic network: Implication of faulting structure linked to geological observation

★ Invited Papers

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To deepen fundamental understanding of earthquake faulting, it is of crucial importance to image fine scale structure of fault zone. We have installed a thousand of seismic stations in the source area, which covers an entire aftershock zone of the 2000 Western-Tottori earthquake (Mw 6.7) from March 2017. The spatial interval of each seismic station ranges from 1 to 2 km. We initially detected ~3000 earthquakes from the continuous waveforms, using automatic arrival time picking technique. Applying a double-difference algorithm to the arrival data-set, we relocated more precise hypocenters in the studied region. The completeness magnitude of the catalog is around -1.0.

From the center to the southeast part, the relocated hypocenters are aligned along sharp fault planes, which are dipping almost vertically. In contrast, at the northwest area, the hypocenter distributions are complex, including several fault planes which are conjugate to the main NW-SE aftershock trend.

We focus on a tiny seismic cluster associated with Mj 1.7 event. Following this event, a total of ~150 micro-earthquakes were detected by matched filter technique. The relocated micro-earthquakes are sharply aligned along NNW-SSE fault strike. The length and dip-width of the fault dimension is about 200 m,

respectively. Based on the distribution of earthquakes, the fault zone width is estimated to be at most 10 m. The ratio of the fault (process) zone width to the fault length is 0.005, which fairly matches with that geological observation of fault exposure. In addition, we find out that the tiny seismic cluster consists of several minor alignments which are oblique to the main trend, suggesting a development of Riedel shear (R) planes in the fault zone. This result indicates that this fault zone is likely at incipient stage of fault evolution.