[EE] Evening Poster | S (Solid Earth Sciences) | S-CG Complex & General

[S-CG53]Science of slow earthquakes: Toward unified understandings of whole earthquake process

convener:Satoshi Ide(Department of Earth an Planetary Science, University of Tokyo), Hitoshi Hirose(Research Center for Urban Safety and Security, Kobe University), Kohtaro Ujiie(筑波大学生命環境系, 共同), Takahiro Hatano(Earthquake Research Institute, University of Tokyo)
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Accumulating observational studies on various types of slow deformation events, such as tectonic tremors, very low frequency events, and slow slip events, portrays some universal characteristics in generally complex behavior, including interaction among events and influence by various outer loadings. Some of these phenomena seem to have causal relation with the occurrence of very large earthquakes. A unified understanding of these slow and fast earthquake processes requires an approach integrating geophysics, seismology, geodesy, geology, and non-equilibrium statistical physics. We welcome presentations based on, but not limited to, geophysical observation, data analysis, analytical theory, numerical simulation, field study, and laboratory experiments.

[SCG53-P17]Seismic anisotropy monitoring for characterizing low-frequency tremor activities

*Motoko Ishise[1], Kiwamu Nishida[1], Kimihiro Mochizuki[1] (1.Earthquake Reseach Institute, University of Tokyo)
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Seismic anisotropy is a good proxy for stress state, physical properties, and structural heterogeneities of the earth’s interior. For the purpose of detection of the changes, we have developed a monitoring method of seismic anisotropy (Ishise and Nishida, 2015) and conducted continuous measurements of seismic anisotropy at Hi-net and DONET stations deployed in the Shikoku and off the Kii peninsula, respectively (e.g., Ishise and Nishida, 2016; Ishise et al., 2017).

The previous studies showed a close relationship between temporal variations of seismic anisotropy and that of low-frequency tremor activity around the study area (e.g., Ishise et al., 2017). In addition, polarization analysis included in the monitoring method provides rough locations of tremors. These facts suggest that monitoring of seismic anisotropy is helpful to understand the mechanism of tremors. Therefore, monitoring of seismic anisotropy using long-term seismograms at many seismic stations would provide insights into the spatiotemporal evolution of tremor activity, temporal changes in seismic structure, and the relationship between them. However, it is difficult to perform the task because the current procedure of monitoring is time-consuming. In this study, therefore, we developed the monitoring method using Graphics Processing Unit (GPU).

Under the new computational environment, we are proceeding to monitor of seismic anisotropy. At this moment, we have obtained the temporal variation of anisotropy parameters for 6 months at Hi-net stations in Shikoku. Monitoring results revealed that each seismic station has characteristic directions

and strength of seismic anisotropy. For example, N.SJOH in Ehime prefecture tends to show NE-SW, NNW-SSE, and WNW-NEN anisotropy and about 0.02 sec delay time. Following Bostock and Christensen (2012), it is explained that the characteristics of anisotropy represent crustal anisotropy beneath the seismic station. However, there are differences in characteristics of seismic anisotropy provided by tremor episodes those located in the same region. Further expansion of the monitoring would reveal the origin of the temporal variations in seismic anisotropy and mechanism of low-frequency tremors.