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

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

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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-P11]Depth-dependent periodic change in the interplate locking in SW Japan inferred from spatial gradient of displacement rate field

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Large earthquakes such as Tokai, Tonankai, and Nankai earthquakes repeatedly occur that rupture the plate interface fault between the Philippine Sea plate and the continental plate (Eurasia or Amurian plate), because the Philippine Sea plate is subducting from the Suruga-Nankai Trough in southwestern Japanese Islands, namely from the Tokai to the Kyushu districts. Interplate locking at the rupture areas of these large earthquakes are strong during the inter-seismic periods, and strong locking generates the surface displacements that can be measured by performing GPS observations. Many studies have been carried out to estimate the distribution of interplate locking using the surface velocity fields [e.g., Ito *et al.*, 1999; Mazzotti *et al.*, 2000; Loveless and Meade, 2010]. Yokota *et al.* [2016] revealed that the spatial variation of the inter-plate locking degree is large along the trough-parallel direction based on the seafloor geodetic observation data.

However, temporal change in the degree of interplate locking in and around the source region of Tonankai and Nankai earthquakes has not been considered in previous studies. Long-term slow slip events (SSEs) with duration of several months to several years have yet to be detected in these regions.

Uchida *et al.* [2016] revealed that the degree of interplate locking between the subducting Pacific and overriding continental plates at the northeast Japan subduction zone periodically changes at recurrence intervals from 1 to 6 years based on an analysis of small repeating earthquakes and surface displacement rate fields. In addition, the results of Uchida *et al.* [2016] with respect to small repeating earthquakes imply that the spatial variation of recurrence interval of SSEs on the plate interface depends on the depth, specifically, that SSEs occur at shorter recurrence intervals at the deep portion than that at the shallow portion along each profile perpendicular to the trench. While such small repeating earthquakes do not occur

in the source regions of Tonankai and Nankai earthquakes, it may be possible to reveal the periodic occurrence of SSEs and the spatial variation of the recurrence interval based on the temporal change in the spatial gradient of the surface displacement rate field.

In this study, I applied the monitoring method for spatial and temporal variation of the degree of the interplate locking proposed by Iinuma [2018] to the southwestern Japanese Islands to examine the depth dependency of the recurrence interval of the SSEs at the plate interface by comparing the predominant periods of temporal changes in the spatial gradients of horizontal and vertical surface displacement rate field. The results show that the predominant period of temporal change in the vertical velocity gradient is shorter than that in the horizontal component at most profiles. I will perform comprehensive numerical tests to examine the sensitivities of the spatial gradients of horizontal and vertical velocity fields to the interplate coupling at various depth ranges, and will report a quantitative evaluation of the depth dependency of the recurrence interval of the periodic change in the degree of interplate locking.