[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-P07]Activity of shallow low-frequency tremor in the Hyuga-nada, revealed by ocean bottom seismological observation

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The Hyuga-nada, located in the western part of the Nankai Trough region, is one of the most active regions of the shallow slow earthquake activity such as the low-frequency tremor [Yamashita et al., 2015] and very-low-frequency earthquake (VLFE) [Obara and Ito, 2005; Asano et al., 2015]. Some previous study suggest that the shallow slow earthquake may play a key role in causing the huge coseismic slip at the shallow plate boundary and following tsunami [e.g., Ito et al., 2013]. Therefore, it is important for understanding the relationships between the shallow slow earthquake and megathrust earthquake to clarify various characteristics of shallow slow earthquake such as a spatiotemporal variation and released source energy. For this reason, we have started the long-term ocean bottom seismological observation from March 2014 in the Hyuga-nada region.

In this study, we analyzed data obtained by the 2016 observation for a period from January 2016 to February 2017. First, we visually selected tremor events from the seismic records because many aftershocks of the 2016 Kumamoto earthquake were included. During the observation period, shallow tremor activity was only found after the 2016 Kumamoto earthquake, which activity intermittently lasted for approximately two weeks until the end of April 2016. Comparing with the short period and broad-band seismogram, the shallow tremor and VLFE occurred simultaneously as was the case with previous activity in 2013-2015.

Next, we estimated the spatiotemporal distribution of shallow tremor hypocenters and source energy using hybrid envelope cross-correlation method [Maeda and Obara, 2009]. This method has advantages of simultaneous estimation of event location and released source energy. In addition, this method can be applied in the case of a network with a small number of stations. Generally, it is difficult to estimate precise location only using travel times when the number of stations in a network is limited.

Preliminary results show that the 2016 activity occurred the same area as previous activity in this region.

Migration of hypocenters was not confirmed clearly during the 2016 activity, although that was observed in the 2013 activity. A released source energy of shallow tremor might be larger than that of deep tremor. However, more consideration for effect of thick sedimentary layer below a station is needed.

We will show the spatial distribution of seismic energy released by the shallow tremor activity in 2016. Next, we will apply the same analysis to the seismic data obtained by the long-term ocean bottom observation from 2014 to 2018 in this region.

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