Crustal Deformation

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Study of crustal deformation plays an extremely important role in the investigation of wide scale earth dynamics those are earthquake and volcanic activity, plate motion and so on. In our session, we discuss the study related to crustal deformation, such as development of observation instrument, observed crustal deformation, analysis method, and simulation study.

A study for detectability of long-term Slow Slip Event using strain-meters

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We examined a detectability for a long-term Slow Slip Event (SSE) by using borehole strainmeters in two points of view. The one is a comparison between results of a long SSE analyzed by GNSS data and strainmeters. And another one is an offset system of the strainmeters which might affect its long-term stability.

The long-term slow slip event occurred in Tokai area from 2013 was detected by the borehole strain-meter network. Even though it was said that to detect a long-term SSE by strain-meters is very difficult because of their relatively lower long-term stabilities, the event was detected by using the geodetic data stacking (GDS) method reducing these background noise. A source area of the slow slip event was located on the plate boundary of the Philippine Sea plate beneath the west margin of the Tokai earthquake focal area. And a total amount of released seismic moment was 1.8e+19Nm equivalent to Mw 6.8. This event lasted for approximately 4 years, then it seemed to be terminated in 2016 or 2017. These result analyzed by strainmeter data is consistent well with that by GNSS data which has a high detectability for a long-term SSE. This means that the strainmeter got a detection capability of crustal phenomena in a wider temporal range.

However, differences between calculation and observation in the analysis of the SSE tended to be larger with time lapse because of an accumulation of various factors. A mechanical offset system seems to be one of the reasons but is needed for gaining a wide dynamic range and a high resolution of the strainmeter.

In the presentation, we would like to show the result of the L-SSE observation and analysis. And also we discuss how we should operate the offset system.