

Automated detection of slow slip events from tilt and strain data

*Takeshi Kimura¹, Satoshi Itaba², Takanori Matsuzawa¹, Hisanori Kimura¹

1.National Research Institute for Earth Science and Disaster Prevention, 2.National Institute of Advanced Industrial Science and Technology

In subduction zones such as Nankai and Cascadia, various types of slow earthquakes have been detected using dense geodetic and seismic observation networks. Kimura et al. [2011] developed an automated detection method for the identification and location of short-term slow slip events (SSEs) within the Nankai region using continuous tilt data observed at NIED Hi-net stations. Recently, AIST has constructed a borehole strainmeter network around the Shikoku and Kii peninsula regions, and these strainmeters are generally more sensitive to short-term SSEs than the Hi-net tiltmeters [Itaba, et al. 2010]. In this study, we apply the automated detection method of SSEs not only to the tiltmeter data but also to the strainmeter data in order to enhance the detection capability and improve the accuracy in the SSE model.

We evaluated the capability of detecting short-term SSEs in Shikoku using the strength of the white and random-walk noises estimated for each geodetic time-series data [Kimura et al. 2011]. The comparison between the capability using tiltmeter data and that using both the tiltmeter and strainmeter data indicated that the addition of the strainmeters enhances the detection limit by 0.1-0.2 in the magnitude of SSEs in the Bungo channel and western and central Shikoku regions. On the other hand, in the eastern Shikoku region, the detection capability does not change significantly because strainmeter stations are relatively far from short-term SSE source area.

Keywords: Slow slip event, strainmeter, tiltmeter