# Quality control of tilt and strain data for automated detection of slow slip events within the Nankai subduction zone, Japa

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In the Nankai subduction zone, a large amount of high-quality geodetic and seismic data enables us to study the slow earthquakes such as the slow slip events (SSEs) and the nonvolcanic deep low-frequency tremors in detail. In order to reveal the source physics of various interplate slip phenomena, it is important to understand the relationship among members of slow earthquakes. Source models of short-term SSEs estimated from geodetic data objectively and independently of seismic slow earthquake catalog (e.g., Kimura et al., 2011) are essential to clarify the relationship. We have developed an automated method to detect SSEs from tilt and strain data, and in order to apply the method to data with the length of one year or longer, it is necessary to treat temporal changes of background noise levels appropriately. To assume incorrect noise parameters is possible to cause a miss detection or an excessive detection.
In this study, we evaluate temporal changes in noise levels of geodetic data. We assumed that continuous geodetic data contains background linear trend, random-walk noise and white noise, and estimated the noise strengths for a 30-day moving time-window using maximum likelihood method. Typical strengths of the random-walk and white noises are approximately 1.0-5.0 nrad/hr$^{0.5}$ and 1.0-5.0 nrad, respectively, for tilt data, and 0.5-1.0 nstrain/hr$^{0.5}$ and 0.5-1.0 nstrain, respectively, for strain data. The random-walk noise strengths of tilt data at MASH station in Kii Peninsula had been 1.0-2.0 nrad/hr$^{0.5}$ and almost constant from 2001 to 2012. They were increasing in 2013 and reached 10-20 nrad/hr$^{0.5}$. This increase in noise levels lowered the detection capability for SSEs in Kii Peninsula.
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