An investigation into slow-slip detection capability of the Tokai Strainmenter Network

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We studied the ability of the Tokai Strainmeter Network (hereinafter referred to as TSN) to detect slow slips on a plate boundary where the Nankai trough earthquakes occur. Referring the method of probability-based magnitude of completeness (hereinafter referred to as PMC) that has been applied to several seismic networks (e.g., [1,2,3]), we modified it to be applicable to TSN. While previous studies on slow-slip detection capability of TSN [4] and the network covering a wider region [5] were based on the model assumption that the medium is elastic and the strainmeters record elastic strain changes caused by slow slips, our study is not based on such model assumption, but uses only empirical data: slow-slip catalog, decfiles, and station information. Using slow-slip events with magnitude *M*5.1-5.8 during 2012-2016, we found spatial variability of network detection probability. In general, the detection probability for slow slips of any given *M* is high within the network or inland, whereas it decreases with distance from the coast to offshore. In more details, the detection probability for *M*5.1 in Suruga Bay is above 90%. Although no strainmeter included in TSN has been installed in Suruga Bay, operating strainmeters on land are located so as to surround this Bay. If we consider a large magnitude such as *M* 5.8, slow slips are detectable even in far offshore regions: for example, slow slips with *M*5.8 at the southern edge of the anticipated source region of the Tokai earthquake can be detected with high (>90%) detection probabilities, a consistent result with [5]. We further explored the possible use of our method as a network planning tool with simulation computations of installations of one or more virtual stations to identify appropriate locations for new station installations [2]. Our results show an illustrative example of the applicability of the PMC method to strainmeter networks.
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