

One-hour-duration SSEs found during a Short-term SSE in the Tokai region.

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The Short-term Slow Slip Events (s-SSE) occur repeatedly several times per year in the deeper than the seismogenic zone of the Nankai Trough area southwestern Japan. These s-SSEs have moment magnitude equivalent to about 5.5 - 6.0 and duration of approximately a week.

Japan Meteorological Agency (JMA) operates borehole strain-meter network and analyses the s-SSE activities by using an hourly resampled data of them.

Recently, Katsumata et al, (2020) found a small change with extremely shorter duration than usual s-SSEs in time series data of laser extensometers installed in the Aichi and Shizuoka prefectures. We confirmed the existence of the small change in the one minute resampled strain-meter data in February 2019 Tokai s-SSE. Here, we report the analysis of the small rapid change.

A Mw6.0 s-SSE (hereafter parent-SSE) occurred from 3 to 11 February, 2019 in Aichi prefecture and evident changes of strain-meter data with intense tremor activity were observed.

In 5 February which is the most active period of the parent-SSE, smaller but faster changes were observed from 15:30 to 16:30 in the some stations around Aichi prefecture.

So, we performed analysis to infer the fault plane assuming a plate boundary slow slip. Result, a small slip equivalent to Mw5.0 with 1 hour duration was calculated.

Furthermore, two other similar changes were found in the parent-SSE with a careful data checking, Mw 4.8 small slip on the plate boundary with duration of 50 minutes and Mw4.8 one with 45 minutes were also calculated.

As well as the known s-SSE, these events were also accompanied with transient intense tremor activity.

We guessed them to be an unknown Slow Slip Event, faster than the known SSE occurred in the same tectonic mechanism on the plate boundary.

Ide et al. (2007) proposed a Moment-Duration scaling law for slow earthquakes and demonstrated that the various kind of slow earthquakes observed throughout the world are on the scaling law.

And Ide et al. (2007) pointed out a possibility of existence of Mw4-5 events with tens minutes to 1 hour in which no events have been observed. The new event presented in this work are exactly the predicted ones.

Keywords: short-term SSE, One hour duration SSE, Tokai

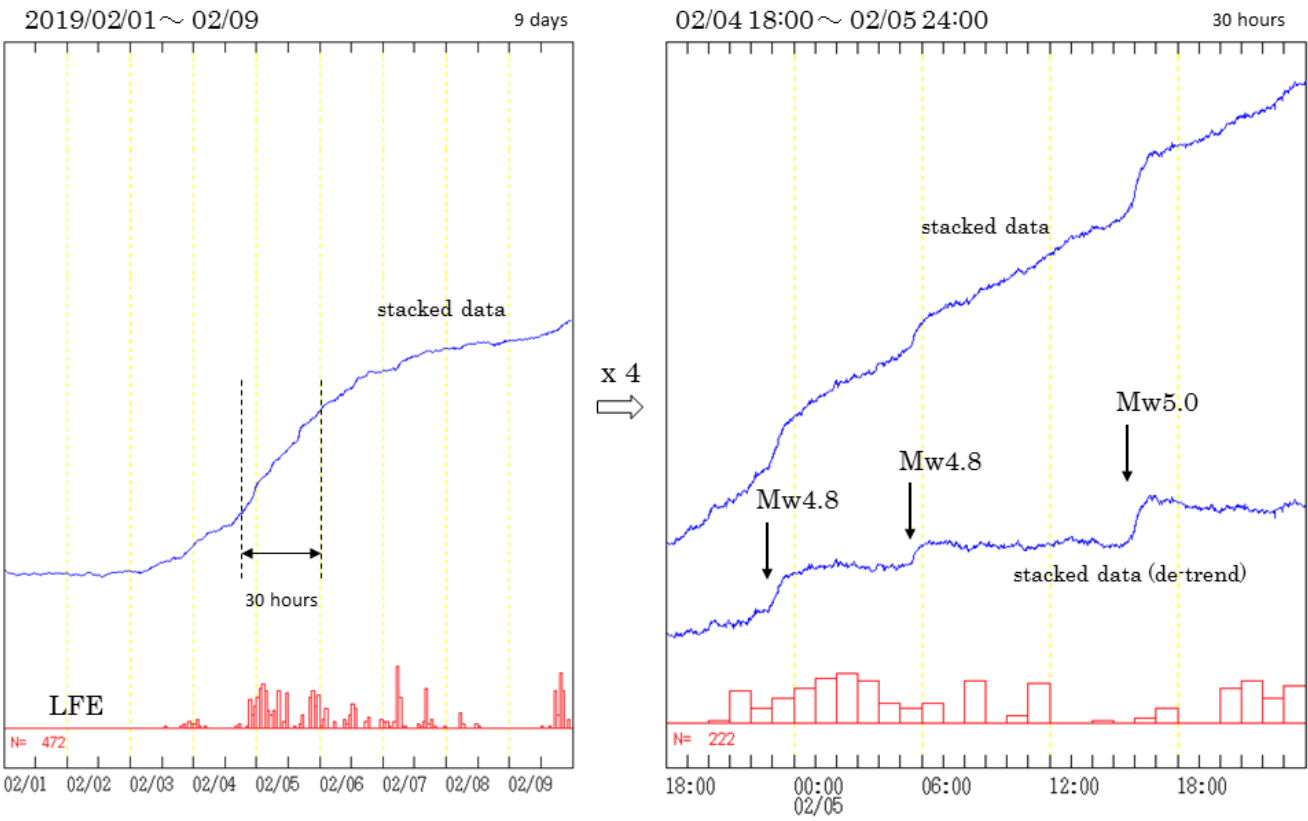


Fig. Stacked strain-meter time-series data