15-year acceleration along the Japan trench and the Sagami trough

Lou Marill *[1], David Marsan [1], Anne Socquet [1], Mathilde Radiguet [1],
Nathalie Cotte [1], Baptiste Rousset [2]

[1] Univ. Grenoble Alpes, Univ. Savoie Mont Blanc, CNRS, IRD, IFSTTAR, ISTerre, 38000 Grenoble, France
[2] Univ. Calif. Berkeley, Dept. Earth & Planetary Sci., Berkeley, CA 94720 USA

Recent studies on the Boso peninsula suggest a slow decoupling of the subduction interface along the Sagami trough from 1996 to 2011: Reverso et al. [2016] characterized an acceleration of the background seismicity, and Hirose et al. [2012], Ozawa [2014] and Fukuda [2018] observed a shortening of the recurrence intervals of Slow Slip Events (SSEs). Moreover, Mavrommatis et al. [2014] and Yokota and Koketsu [2015] show changes in the coupling of the subduction interface along the Japan trench.

Motivated by these observations we used GPS (Global Positioning System) time series to study the long-term acceleration of surface displacement offshore Honshu, with a specific focus on the Kanto region. We processed the data in double difference with the GAMIT/GLOBK suite. We analyzed the time series with a trajectory model [Bevis and Brown, 2014] accounting for steps associated with antenna changes and $M_w \geq 6.4$ co-seismic offsets, $M_w \geq 7.5$ post-seismic signals, known SSEs, the 2000 Miyakejima's volcanic collapse, seasonal variations, as well as a linear and an acceleration term. The need for an acceleration term is tested statistically for each station. The obtained acceleration field is then inverted for acceleration slip on the Japan trench and on the Sagami trough subduction interfaces using a linear least-square method [Tarantola, 2005]. To regularize the inversion, we computed the covariance between model parameters with a decreasing exponential function [Radiguet et al., 2011].

Our results compare well with previous studies done on the Japan trench [Mavrommatis et al., 2014; Yokota and Koketsu, 2015]. We find similar slip acceleration amplitudes of ~3 mm/yr² corresponding to ~0.55 mm/yr of coupling difference. Both the deceleration zone North of Honshu (39° to 41°N) and the acceleration zone further South (37° to 39°N) observed in previous studies are also robust features in our inversions. Our analysis includes data further South than previous studies, and we characterize an acceleration zone under Kanto (35° to 36°N and 139° to 141°E) that had not yet been observed. The slip acceleration in Kanto from 1996 to 2011 is consistent with the acceleration of background seismicity observed offshore Boso [Reverso et al., 2016] and the shortening of the Boso SSEs recurrence intervals [Hirose et al., 2012; Ozawa, 2014; Fukuda, 2018].

Mots-Clés : double difference, GPS proccesing, Japan trench, subduction interface, Kanto district, GAMIT/GLOBK suite, slip rate acceleration.

Merci de ne rien inscrire dans cette zone et ne pas modifier les marges des pieds de page et entêtes.