

# **Small repeating earthquakes beneath the Tokai region from 1979 to 2017 derived from NIED Kanto-Tokai seismic network and the NIED Hi-net.**

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## 1. Introduction

The Philippine Sea (PHS) plate is subducting beneath the Eurasian (EUR) plate in the southwestern Japan from the Nankai Trough. The megathrust earthquakes occurred repeatedly and is predicted to occur at this plate boundary. The Tokai region and the Suruga Trough are located at the easternmost part of this region. The interval of repeating earthquakes (REs) on small asperities has been used to determine the rate of slip on plate boundaries (e.g. Nadeau and Johnson, 1998; Igarashi et al., 2003, Uchida et al., 2003; Matsubara et al., 2005). The National Research Institute for Earth Science and Disaster Resilience (NIED) operated the Kanto and Tokai seismic network (KT-net) from 1979 to 2003 in the central Japan where the Pacific (PAC) and PHS plates are subducting beneath the EUR plate and also operates the high-sensitivity seismograph network (Hi-net) from 2000. We analyzed the RE activity beneath the Tokai region around the Fujikawa-kako Fault Zone to estimate the plate boundary slip along the Suruga Trough.

## 2. Data and method

There are 152,333 events with magnitude equal to 1.5 or larger from August 1979 to December 2017 detected by the NIED KT-net and Hi-net within the target area as 137-139E and 34-36N. We used vertical-component bandpass-filtered seismograms with a passband frequency of 1-8 Hz. Earthquake pairs were defined as earthquakes with epicenter separations of less than 0.1 degrees (about 10 km) in order to confirm whether the earthquake pairs is RE or not. REs were identified based on event pairs with waveform cross-correlation coefficients of larger than 0.95 at three or more seismic stations (Matsubara et al., 2005) within the epicentral distance of 100 km.

## 3. Results

A total of 1431 groups of REs composed of 4641 events were identified, A large number of them are located within the EUR and subducting PHS plates and a few of them with low-angle thrust REs occurred at the plate boundary between EUR and PHS plates. We consider the REs continuing less than two years as burst-type RE. A total of 246 REs composed of 1411 events are identified with continuous REs. Low-angle thrust type REs occurred beneath Fujieda, at the almost center of the Tokai region, and thrust REs occurred beneath southern Yamanashi, at the inland area and estimated as the collision zone, at depths between 18-25 km near the plate boundary.

#### 4. Discussion

We estimated the slip rates of the plate boundary with the assumption of Nadeau and Johnson (1997). Those are 1.1 and 3.2 cm/year beneath Fujieda and Yamanashi, respectively. Fujieda group is located and extremely less than the relative rate of plate motion as 4.0 cm/yr (Seno, 1993).