

## Anomalous crustal deformation in the Tokai region detected by continuous GPS observation from 2001

# Shinzaburo Ozawa[1], Makoto Murakami[2], Masaru Kaidzu[3], Yuki Hatanaka[4], Takeshi Sagiya[5], Hiroshi Yarai[3], Takuya Nishimura[3]

[1] Geographical Survey Institute, [2] Crustal Deformation Lab., The GSI, [3] GSI, [4] Geodetic Observation Center, Geographical Survey Inst., [5] Research Center, GSI

### 1. Introduction

After October 2000, the Izu islands activity subsided gradually and the Tokai region returned approximately to a previous normal state of crustal deformation. However, from March 2001, we detected a clear change in crustal deformation rates around the Tokai region. Detrended GPS coordinate time series data show southeastward motion of about 2 cm for the period between March 2001 and January 2002. Taking into account the effect of the 2000 Izu islands event, which still continues with much less activity than in summer 2000, we estimate slip motion on the plate boundary in the Tokai region using the latest GPS observation result.

### 2. Data and analytical procedure

We use east-west, north-south, and up-down displacement data at 99 selected GPS sites on the Izu island chain, the Kanto and Tokai regions from 1997 and 2002 [Hatanaka et al., 2001]. Annual and linear trend components are removed from raw data by regressing a second order polynomial function together with trigonometric functions. Degree of trigonometric functions is determined by AIC criteria. By extrapolating the estimated linear and annual components to the entire period, we estimate the detrended ground motion from the steady state deformation.

By employing time dependent inversion [Segall and Matthews, 1997] to the detrended time series for the period between October 2000 and January 2002, we estimate slip history between the Philippine Sea and the overriding continental plates in the Tokai region, taking into account the 2000 Izu islands activity. As a model region, we use plate boundary estimated by Ishida [1992] and the 2000 Izu islands model [Nishimura et al. 2001, Ozawa et al. 2001]. Adopting the above model region, we estimate slip history of the presumed Tokai silent earthquake.

### 3. Results and discussion

Our preliminary result shows that a slow thrust slip occurring on the plate boundary with its main area beneath Lake Hamana in the western Tokai region abutting the anticipated Tokai earthquake source area from late 2000. Estimated seismic moment of the Tokai silent earthquake is around Mw6.6 (rigidity=3.3Gpa) for the period between October 2000 and January 2002. As for the Izu Islands model, dike opening is estimated at scores of cm and the estimated moment of creep faults amounted to around Mw6.4.

Moment release of the Tokai silent earthquake started from October 2001 and increased its rate for the period between March and August 2001. After August 2001, the estimated moment release rate decreased and still continues in January 2002. Reflecting on a change of spatial pattern of anomalous crustal deformation, estimated slip west of Lake Hamana increases its magnitude from around August 2001, though this change is still within a margin of error.

We are now extending data period for analysis back to around June 2000 or before the occurrence of 2000 Izu Islands activity and scheduled to present a result in the meeting.