T054-001 Room: 303 Time: May 28 9:00-9:15

Secular Crustal Deformation in Central Japan, Estimated from Wavelet Analysis of GPS Time-series Data, and Its Tectonic Modeling

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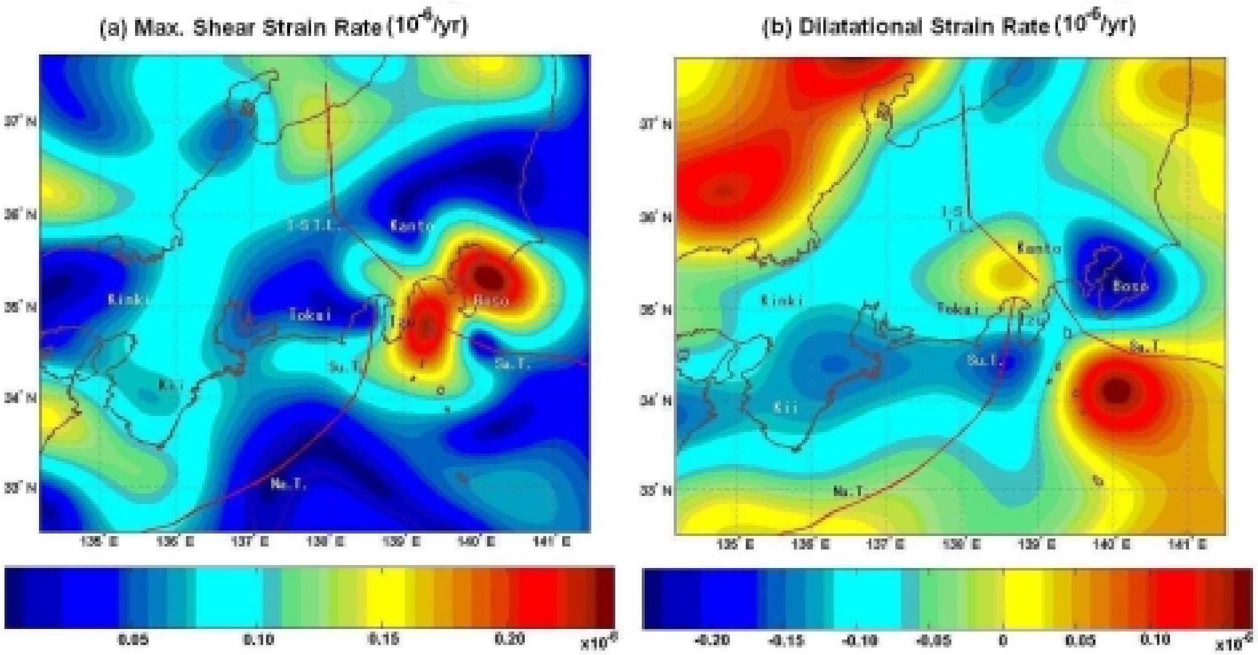
Secular crustal deformation in the central part of the Japanese Islands was estimated by applying the wavelet decomposition analysis to the GPS time-series data from GSI/GEONET (Geographical Survey Institute/GPS Earth Observation NETwork). We used the GPS time-series data obtained during the period from April 1996 to March 2002, which have been re-analyzed to be improved (Hatanaka et al., 2001). These time-series data were considered to be composed of secular (a linear trend), seasonal, discontinuous (co-seismic or artificial jumps), and noisy (white noises) components. The NS (north-south), EW (east-west), and UD (up-down) components of the time-series data were also assumed to be mutually independent. After removing data-jumps in the time-series, we decomposed each of the NS, EW, and UD time-series to the 8th level by using Daubechies wavelets. We could find out a seasonal variation clearly in the detail part of the 8th decomposition component, and could estimate a secular velocity from the approximation part at the same level.

We estimated secular velocities at about 450 GPS sites in the study region on the basis of the wavelet decomposition analysis, and then evaluated secular velocities at 7 km x 7 km grid points covering the study region by applying the least-square collocation method. We also estimated distributions of several kinds of secular strain rates, i.e., dilatational, maximum shear, and principal strain rates in the study region. From these distributions of secular strain rates, we could find out several kinds of characteristics concerning the secular crustal deformation in the central part of the Japanese Islands. Firstly, we could recognize that (1) the entire region is generally under a compressive regime. Next salient features were as follows: (2) there exists a remarkable concentration of maximum-shear and compressive strains near Tokyo Bay and Boso Peninsula in the Kanto region; (3) there is a dilatational area in and around Mt. Fuji and Mt. Hakone in the Tokai region.

We tried to explain the observed characteristics of the secular crustal deformation fields on the basis of the back-slip model, which has multiple faults along the plate boundaries, i.e., Sagami and Suruga-Nankai Troughs, and Japan Trench. However, it was needed to consider another additional mechanisms in order to explain the characteristics stated above. It might be a possibility that near Tokyo Bay and Boso Peninsula there locates a relatively weak zone such as a potentially faulting zone. It might be also suggested that near Mt. Fuji and Mt. Hakone there is a compressive source, associated with a volcanic flow.


(a) Max. Shear Strain Rate (10^-6/yr)
(b) Dilatational Strain Rate (10^-6/yr)
37° N
36° N
35° N
34° N
33° N
135° E
136° E
137° E
138° E
139° E
140° E
141° E
Kanto
Kinki
Tokai
Izu
Boso
Kii
Su.T.
Sa.T.
Na.T.
I-S.T.L.
0.05
0.10
0.15
0.20
-0.20
-0.15
-0.10
-0.05
0
x10^-6