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Specialized field: Crustal deformation based on the satellites Geodesy

Research subject: Study of the crustal deformation on subduction zones based on the satellite geodesy

Objectives:
The crustal deformation in subduction zone reflecting the superposition of the rigid motion and strain accumulation in and around subducting slab. This strain accumulation process is very important for the understanding of the occurrence of the earthquake. The rheology of the earth’s interior is also important for the understanding observed crustal deformation especially longer time period. The objective of our research is to study the strain accumulation process in and around plate convergence margin, and rheology structure understanding based on the geodetically measurement.

Results:
(1) Investigate the coseismic deformation of the 2008 Iwate-Miyagi Nairiku earthquake
*Ohta investigated a simple rectangular fault model based on a dense GPS network, including continuous GPS sites conducted by four agencies, to describe the coseismic deformation. Our results show that no major slip on the Dedana fault system occurred. Thus we can conclude that IMEQ occurred on an unidentified fault system other than the Dedana fault. This result has provided an important constraint for investigating the process of strain accumulation around the Dedana fault. [Ohta et al., EPS, 2008b]

(2) Investigate the co- and postseismic deformation of the 2007 Niigataken Chuetsu-Oki earthquake
* Ohta and others constructed a dense GPS network to investigate postseismic deformation after this event. Our GPS sites were chosen to complement the nationwide GPS array called GEONET. Coseismic displacements caused by the mainshock detected at some GEONET sites were used to estimate coseismic fault parameters. The results indicate that the geodetic data could be explained by some combination of two rectangular faults dipping northwest and southeast. Moreover, minor but definite postseismic deformation was detected largely in the southern part of the dense network. The time series of site coordinates can be characterized by a logarithmic decay function and the estimated time constant seems to be almost similar in range to that of the 2004 Mid-Niigata Prefecture Earthquake. [Ohta et al., EPS, 2008a] [Iinuma, Ohta and others, 2008]

(3) Investigate the new technique for the tidal signal detection based on the kinematic GPS data
*Ohta and others applied a kinematic PPP method to extract the tidal signals from the time series of GPS coordinates. We also investigate these errors mentioned above in our GPS analysis. As the results, the kinematic GPS method works well to recover the tidal signals at the sub-centimeter accuracy or better for some tidal constituent, especially M2 signal. [Sato, and others, J. Geodynamics, 2008] [Inzau and others,
Construction of the new continuous relative gravimeter in South-east Alaska

*Ohta and others constructed a new continuous relative gravimeter in South-east Alaska (Juneau), February 2009 for the precise gravity measurement until December 2009. This measurement will give a constraint to tidal modeling and rheology structure estimation in this area.

Publications:

Journals:
Earthquakes and Tsunamis, 2008.

Symposium Participations:


Zones, Japan, Sendai, Katahira Sakura Hall, Tohoku University, 2009, 2.


31. Takatsuka, K., Y. Ohta, S. Miura, T. Sato, Y. Fujii, Modeling of surface deformation caused by loading of the 2004 Indian Ocean Tsunami at Diego Garcia atoll, Geodesy Society of Japan, Japan, Hakodate city hall, 2008, 10. [Received Outstanding Student paper Award]

