Geophysical Research Abstracts, Vol. 8, 10503, 2006
SRef-ID: 1607-7962/gra/EGU06-A-10503

Interplate locking zone along the Nankai trough, southwest Japan, deduced from continuous GPS data

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A dense array of GPS tracking network in Japan provide us a good tool for monitoring crustal deformation. Using the horizontal and vertical velocities of 124 GPS stations of this network in southwest Japan, we obtained the spatial distribution of interplate coupling between the subducting Phillippin Sea (PHS) plate and overriding continental Amurian plate. In to this aim, we carried out an inversion analysis of GPS observation data, considering different model source regions during the period from Jan. 1, 1998 to Dec. 31, 2002. Our results show that simultaneous application of three model sources of the PHS, South Kyushu and Central Kyushu regions can explain well the crustal movement of Kyushu Island with the higher to the lower importance in this order. We obtained coupling ratio of 96% on the plate interface at depths of 15-25 km from the average back-slip rate of 6.5 cm/yr and subduction rate of the PHS (6.7 cm/yr) plate in southeast off Shikoku Island, which can be considered as a seismogenic locked zone. Coupling ratio decreases to 48% southward in the Hyuganada region at depths of 15-25 km with the average back-slip rate of 3.2 cm/yr. Back-slip direction of N57^{o}W in this region coincides well with the direction of convergence of the PHS plate (N56^{o}W). Stress accumulation at depths of 15-25 km have been taken place almost in the same region as large slipped regions of the 1946 Nankai and 1968 Hyuganada earthquakes, suggesting a potential for the next large interplate earthquakes there. In southeast off Kyushu we couldn't find any coupling while the large southeastward crustal velocity of southern Kyushu may be explained in asso-

ciation with back arc spreading of the Okinawa trough. We proposed a dislocation model for the Central Kyushu region where right lateral strike-slip with the average rate of 11 mm/yr is dominant in the lower crust at depths of 20-30 km. However, a NS oriented extensional model (7 mm/yr) is also partly supported from Mt. Aso to the Shimabara peninsula due to the activity of Beppu-Shimabara graben. Low residual rates between observation and calculation from the inversion at GPS sites with respect to the uncertainties show a good evaluation of our proposed model.