

Estimation of Slip Deficit Distributions on the Subducting Plate Interface

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The coupling on the subducting plate interface between the large earthquakes has been estimated using the geodetic inversion method. In this study, as an example, I conducted the geodetic inversion beneath the Tokai District, the Central Japan, using two different data; one is the vertical data deduced from the leveling observations, and the other is the horizontal data deduced from GPS observations. In the inversion, I employed the analytical solution of the surface displacement due to a triangular dislocation element embedded in an elastic half space in order to represent the curved plate interface. The result of the inversions indicated that, if the vertical data were used, the strongly coupled area is concentrated beneath the Omaezaki area, while the coupled area distributed in the shallower region if the horizontal data were used. The estimated maximum value of coupling from the horizontal data was 40 mm/year, while that from vertical data was 25 mm/year. Because the conditions of the two inversions are almost the same, such difference as shown above was suspected to be due to different type of data. In order to test this hypothesis, I conducted a number of two-dimensional numerical simulations. The results of simulations show, as is in the real case, the estimated slip using the horizontal data did not recover the real slip distributions, whereas the vertical data did. Therefore in the Tokai region, the vertical data may have advantageous compared with the horizontal data. However, this result might apply only in the Tokai district because other factors of parameters of fault geometry might affect the results. In order to derive more general rule of how the data control the results, the real reason lying behind the difference between two types of data will have to be examined. This kind of examination may be very important for designing the network of geodetic surveys, for example.