Crustal velocity field and estimation of deformation pattern in and around Izu Peninsula

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Nationwide continuous GPS array has shown that the motion of the Izu Peninsula is significantly deviated more westerly compared with the stationary northwestward motion of the main part of the Philippine Sea plate (PH). In this study, we proposed a new kinematic model to explain a tectonics of this region.

At first we determine a rigid rotation (the Eulerian pole and rotation rate) of the Izu block relative to PH and the central Japan. Then the rigid motions predicted from the above rotation pole and rate are subtracted from the observed GPS velocities. The residuals (observation errors and internal deformation within a block) show clear NW-SE contraction in the southeastern part of the Izu Peninsula. Next we combine a collision at the root of the Peninsula and a horizontal detachment beneath the Peninsula to explain the internal deformation. Thus the surface deformation can be expressed by a summation of two effects; collision and detachment. However, the parameters of these models and relative magnitudes of these effects are unknown. Therefore we search an optimum model that reproduces the observed deformation field varying parameters of two models and relative magnitudes of two effects. One possible model is that the relative motion between PH and the central Japan arc is absorbed by the collision and the rest is absorbed by the slip on the detachment.

The remaining problems are exact location and configuration of the boundary between the Izu block and PH, strength of interaction at that boundary, and a horizontal extent of the detachment. However, there are no observation sights in the south waters of the Izu Peninsula, so GPS data is limited to complement. Therefore, we need taking into consideration structure of oceanic crust, earthquake distribution