Crustal deformation pattern at Iwo-jima caldera during the past 25 years

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Ogasawara-Iwojima, which belongs to the Izu-Ogasawara arc, is a caldera volcano with high thermal activity and large crustal deformation rate. The uplift rate estimated from marine terraces is 15 to 20 cm/yr for the recent several hundred years (Kaizuka et al., 1985). The NIED has performed geodetic survey almost every two years to detect the temporal and spatial changes of the crustal deformation since 1976. The crustal deformation has been measured by the leveling and triangulation survey before 1995, and by GPS instruments since 1996. We compare the result of the 25 year measurements with the longer term deformation.

The deformation during the survey period shows two distinctive patterns; The first is concentric deformation centered at Motoyama, the center of the Iwojima volcano, and the total deformation at the center has reached about 1 m. The other is uplift between Motoyama area and Suribachi-yama area, and the maximum uplift has exceeded 3 m.

These two patterns of the crustal deformation had detected by the marine terrace analysis (Kaizuka et al., 1985) and by the leveling surveys during the middle 1900s. The temporal changes of these two modes of the deformation are different, but both of them are the principal feature during the past several hundred years. It is reasonable to assume that there are two subsurface sources corresponding to the two modes of the crustal deformation. For the concentric deformation that centered at Motoyama, the source depth is estimated to be about 2 km deep by the leveling and the InSAR analysis. The source of the other deformation mode is probably located at depths deeper than the source of concentric deformation. We have performed micro-gravity survey since 1996 in order to identify the materials at the source.