

Vertical crustal deformation in Kii Peninsula from 1972 to 2009 deduced from leveling data

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Leveling data for the period from 1972 to 2009 in Kii Peninsula, Japan, were investigated to characterize unsteady vertical deformation. We estimated the steady vertical deformation rate at each GEONET GPS station by averaging the daily coordinates for the periods from January 1997 to January 2000, and between January 2007 and January 2010, avoiding the period of the large earthquakes.

First-order leveling surveys have been conducted repeatedly every several years since the 1970s. We determined crustal displacements by comparing leveling data from successive surveys. We subtracted subduction-related steady component derived by the GPS from the distribution of vertical crustal displacements during periods between leveling surveys. If any episodic events have not occurred, they should show little spatial variation around zero vertical displacement. However, the residual data clearly show uplift on the southern Kii Peninsula for the period from 1972.0 to 1979.6. The uplift is slightly left for the period from 1979.6 to 1983.5. It suggests that the after slip of the 1944 Tonankai earthquake and/or the 1946 Nankai earthquake remains until the early 1980s. Unsteady vertical deformation is not seen in the period from 1983.5 to 2009.0. At least a long-term slow slip event equivalent to that of Bungo channel or Tokai does not seem to occur in Kii Peninsula since 1972.

Keywords: leveling, vertical crustal movement, Kii Peninsula