

## Tidal resonance phenomena detected by absolute gravity measurement at the Ontake volcano

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In the past three times of absolute gravity measurements (July of 2004~2006), we detected not only annual gravity changes, but also (1) a few microGal gravity variations and (2) growth of standard deviation, both (1) and (2) were synchronized with diurnal and/or semi-diurnal tides [Tanaka et al., 2006, Seismological Society of Japan, Fall meeting]. We propose a model interpreting these phenomena in this report comprehensively. We estimate the Mogi model that can explain the results of annual leveling and absolute gravity measurements by forward modeling based on a point pressure source model [Kimata et al., 2004, EPS]. Hence, the derived spherical magma body of a radius of 700m, located at 2 km depth from the surface, has caused pressure change of +7MPa and mass change of -30Mt (density change of -0.02 g/cc) from 2004 to 2005, pressure change of -5MPa and mass change of +55Mt (density change of +0.04 g/cc) from 2005 to 2006. (1) is proven to be physically unrealistic owed to a problem of barometric pressure correction of gravity measurement and originated from the earth's interior. (2) occurs under the condition that the solid earth extends with 240 microGal or more in peak-to-peak. This is equivalent to  $4.3 \times 10^{-8}$  in volumetric strain and furthermore corresponds to decompression of 3.2 kPa assuming Young's modulus is 75GPa. The decompression of this level in critical state may activate volcanic activity [Sottili et al., 2007, GRL]. When such a decompression occurs, tremor of 30~60 sec period (natural period of a vibration isolator of absolute gravimeter) or longer may cause the growth of standard deviation. Moreover, Rymer & Brown [1984, Nature] have reported that 50~120 microGal gravity fluctuations with one month period might be triggered by tidal resonance to magma body. We consider that diurnal & semi-diurnal tides which have more large amplitude than long-period tide also could cause similar phenomena. Therefore, approximately one unit minor pressure and density variations compared to annual change may also occur in diurnal ~semi-diurnal band in the spherical magma body stated above.