

Groundwater pressure changes at the Ohtaki observatory before and after the 2007 and 2014 eruptions of Mt.Ontake

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Geological Survey of Japan, AIST started groundwater observation at the Ohtaki observatory (GOT) in 1998. GOT is about 10km southeast of the top of Mt.Ontake. At GOT we measure groundwater pressure in a sealed well. Since the groundwater pressure at GOT has tidal changes caused by the earth tides, we estimated the volumetric strain sensitivity of the groundwater pressure, which is 1-3 mm/nstrain, where the groundwater pressure is expressed as water head and "nstrain" means 10^{-9} strain. Since the resolution of the pressure gage at GOT is about 2 mm, that of the volumetric strain converted from the groundwater pressure is about 1 nstrain. The altitude of the well is about 1040m and the depth of the screen is 645-663 m. It means that we can observe the volumetric strain at the depth of about 650 m or at the altitude of about 390 m by measuring the groundwater pressure.

After 1998 there were two eruptions at Mt.Ontake. One is the 2007 eruption, which occurred in March, 2007. The other is the 2014 eruption, which occurred in September 2014. A few months before the 2007 eruption, a relatively large crustal deformation, which was the gradual increase in the length of the baseline crossing Mt Ontake, was observed although no such crustal deformation was observed in the 2014 eruption. At the 2007 eruption the groundwater pressure at GOT dropped 20 cm during almost the same period when the length of the baseline gradually increased. However no such groundwater pressure change was observed in the 2014 eruption. Taking the volumetric strain sensitivity into account, the 20 cm drop in the groundwater pressure means about 100 nstrain increase in the volumetric strain at GOT. The precursory gradual increase in the length of the baseline is converted into about 300 nstrain increase in the linear strain along the baseline. These two values are well-matched.

In the presentation we will report the details of those groundwater pressure changes and the crustal deformation.

Keywords: Mt.Ontake, eruption, groundwater, crustal deformation