Japan Geoscience Union Meeting 2013
(May 19-24 2013 at Makuhari, Chiba, Japan)

SGD22-09 Room:301B Time:May 22 16:30-16:45

Continuous gravity observation using a gPhone-133 at a hot spring area of Hachijojima, Japan

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Gravimeter is a useful tool for detecting subsurface mass variations. For elucidating groundwater variations in hot spring area, we carried out continuous gravity observation with a gPhone-133 in the Nakanogo gravity observation hut of Hachijojima (GOH) at the period from August to December 2012, following gPhone-109 observation in the last fiscal year. In addition to gravity measurements, we collected auxiliary data of atmospheric pressure, rainfall, soil moisture and the monitoring well (e.g. water level and temperature) in the vicinity of GOH. Using gPhone-109, in December 2011 and February 2012, we detected gravity decrease of an approximately 5 microGal that occurred about 3 days after groundwater temperature decrease of the monitoring well of an approximately 1 degree Celsius. By using gPhone-133, in this fiscal year, we also detected such a phenomenon. We calculated gravity effect of precipitation and/or soil moisture but the magnitude of the effect was smaller than 1 microGal. Although, at a period of a gPhone data analysis, sea level decreased about 1 m, we could not distinguish effects of mechanical drift of gPhone and sea level change.

The authors wish to express their deep gratitude to the Tokyo Electric Power Services Corporation and to Hachijo Town local government for providing generous and courteous support to our field survey team. This study was supported by the competitive research fund of the Ministry of the Environment.

Keywords: gravity monitoring, soil moisture, ground water, sea level, rain fall, atmospheric pressure