Meteorological observations at the summit of Mt. Ikenoyama, Kamioka

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Correction for environmental effects on gravity is critically important for precise gravimetry with superconducting gravimeters (SG). The Kamioka SG station is housed deep inside a mine tunnel, approximately 1,000 m below the summit of Mt. Ikenoyama (1,369 m above sea level). Whereas this location contributes to the quiet and stable environment of the station, it also introduces some complexities in understanding the atmospheric and hydrological effects on gravity observed there.

Environmental effects are three-dimensional in their nature, and so it is necessary to monitor and model spatial distributions of relevant physical properties. Kamioka is an ideal station for such experiments, because it is possible, in principle, to obtain information on environmental factors around and above the station.

Based on this idea, we planned to make meteorological observations near the summit of Mt. Ikenoyama. After several times of preparatory explorations to the mountain, we installed meteorological instruments from September through October 2006. The site is an open ground along a small valley in the northern hill of Mt. Ikenoyama. According to measurements with GPS, the site is located about 360 m north from the summit and at the height of 1,259 m above sea level. Our barometer system is almost the same as that developed by The Earthquake Research Institute, The University of Tokyo. A commercial product (HOBO Weather Station) is also used for monitoring rainfall, temperature and pressure. We visited the site again in November 2006, to verify that all instruments were operating well. In addition to these, we installed a barometer near the entrance of the tunnel for a ground-level reference.

Preliminary analysis of data has revealed that (i) scale height of the atmosphere, as estimated from the ratio of pressure above and below the mountain, indicates systematic changes corresponding well to observed temperature, (ii) pressure changes inside the tunnel is delayed by several tens of seconds than that outside, and (iii) gravity tends to decrease after rainfall. Results of more detailed analysis will be presented.