Japan Geoscience Union Meeting 2014
(28 April - 02 May 2014 at Pacifico YOKOHAMA, Kanagawa, Japan)

SGD21-P01 Room:Poster Time:April 28 18:15-19:30

Evaluation of uncertainty in distance measurement by GNSS surveying instrument and EDM

YOSHIDA, Shigeru[1*] ; SATO, Yudai[1]

[1]GSI of Japan

GSI has conducted research to establish traceability for distance measurement by GNSS surveying instrument to international standard. The international standard of distance is defined based on speed of light. In order to measure a distance based on the standard, it is necessary to use Electro-optical Distance Meter (EDM) for which the traceability to the standard is established. On the other hand, the traceability for GNSS surveying instrument used in various surveys is not established, because it is difficult and complex to estimate the uncertainty in distance measurement by the instrument. Therefore, we conducted an experiment to compare results of distance measurement by GNSS surveying instrument and EDM on a 2 km baseline.

Although the EDM measurement in this experiment should have been conducted indoors to reduce an affect of meteorological condition change, it was almost impossible to find an indoor 2 km baseline. We therefore divided an outdoor 2 km baseline into 10 short baselines and measured them by EDM. After that, the distance and uncertainty of the whole baseline were estimated from the results of measurements on the short baselines. The 2 km baseline was also measured by GNSS, and the estimated distance and uncertainty was compared to the results of EDM measurements.

The distances and uncertainties estimated by the measurements of EDM and GNSS survey instrument were 1,999.9828±0.0014 m and 1999.9828±0.006 m respectively. As a result of the experiment, we verified that the traceability for GNSS surveying instrument can be established on the 2 km baseline.

Keywords: GNSS surveying instrument, EDM, Uncertainty, Traceability