

## VLBI-GNSS Co-location Survey at the Ishioka Geodetic Observing Station

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The International Terrestrial Reference Frame (ITRF) is realized by a combination of four space geodetic observing techniques (VLBI, SLR, GNSS and DORIS), where VLBI contributes in determining scale and EOP, and SLR contributes in determining scale and the center of mass. To perform this combination, it is necessary that relative coordinates between these space geodetic observing stations are precisely known at co-location sites.

The Ishioka Geodetic Observing Station operates the two space geodetic observing stations, VLBI and GNSS. Ishioka station is a fundamental site on a geodetic perspective since the VLBI station is one of the VGOS (VLBI Global Observing System) stations which is promoted by IVS (International VLBI Service for Geodesy and Astrometry) as the next-generation standards, and the GNSS station "ISHI" is registered as one of the IGS (International GNSS Service) sites. To measure the relative coordinate between the VLBI invariant point (IVP) and the GNSS reference point, we conducted the co-location survey in November 2018 in Ishioka station. In this survey, we adopted two methods to determine the IVP. One is "outside method" where we observe the target attached on the antenna movable part (near the counterweight) with "Total Station" at the reference pillars installed around the antenna. The other is "inside method" where we observe the targets attached near the IVP from the inside of the antenna cabin. "Inside method" was adopted for the first time in Ishioka station so we discussed the way of observation, computation and evaluation of error.

In this talk, we will report a co-location survey result in November 2018 and discuss details on two different methods.

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