

## Development of a compact VLBI system on a 10 km baseline with 1-m class antennas for calibration purposes

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The National Institute of Information and Communication Technology (NICT) and the Geographical Survey Institute (GSI) are cooperating on the development of a compact VLBI system with a 1-m diameter class dish which is planned to be used for calibration of geodetic measurement tools on a 10 km baseline. Thus electronic distance meters (EDM), GPS receivers, etc. can be calibrated by the precise baseline defined by VLBI. One antenna will be located around the GSI and used together with the existing 32m antenna at Tsukuba. Between the sites several measurement pillars, made of stainless steel, are constructed. These pillars can be equipped either with GPS receivers or EDMs to determine the baseline. However, visibility will not be obtained for the complete 10 km what prohibits the usage of EDMs, only. Thus the full 10km GPS baseline length can be validated by the compact VLBI system. Since VLBI and GPS observations are expected to determine the baseline on the same accuracy level, the compact antennas should guarantee that GPS receivers can be calibrated on that long baseline. Beside the fact that VLBI can determine the baseline at the needed accuracy level, the antennas will be designed to make them transportable, what permits to calibrate any site throughout the country. Since the diameter of the antennas will be kept small to handle them at the different locations the signal to noise ratio (SNR) will be low. Accuracy of VLBI measurements scales inverse proportional to the SNR, what make is inevitable to look for other ways to keep the SNR at a high level. But, the signal to noise ratio grows direct proportional to the used bandwidth of the receiving signal. Thus, by extending the bandwidth of the receiver of the compact VLBI system we will be able to meet the accuracy targets needed for calibration purposes.

We have already carried out measurements using CARAVAN2400 (a 2.4 m antenna prototype for the compact VLBI system) and the Tsukuba 32m antenna. The analog data was digitized by the AD1000 (which can handle up to 512 MHz bandwidth) and the geodetic observations were used to estimate station coordinates and obtain the accuracy of the baseline between Kashima and Tsukuba. We will present the results of this wide-band geodetic VLBI experiment and compare the findings to the results of geodetic observations using K5/VSSP technique.