



Absolute GNSS Antenna Calibration at the National Geodetic Survey

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Geodetic GNSS applications routinely demand millimeter precision and extremely high levels of accuracy. To achieve these accuracies, measurement and instrument biases at the centimeter to millimeter level must be understood. One of these biases is the antenna phase center, the apparent point of signal reception for a GNSS antenna. It has been well established that phase center patterns differ between antenna models and manufacturers; additional research suggests that the addition of a radome or the choice of antenna mount can significantly alter those a priori phase center patterns. For the more demanding GNSS positioning applications and especially in cases of mixed-antenna networks, it is all the more important to know antenna phase center variations as a function of both elevation and azimuth in the antenna reference frame and incorporate these models into analysis software.

To help meet the needs of the high-precision GNSS community, the National Geodetic Survey (NGS) now operates an absolute antenna calibration facility. Located in Corbin, Virginia, this facility uses field measurements and actual GNSS satellite signals to quantitatively determine the carrier phase advance/delay introduced by the antenna element. The NGS facility was built to serve traditional NGS constituents such as the surveying and geodesy communities, however calibration services are open and available to all GNSS users as the calibration schedule permits. All phase center patterns computed by this facility will be publicly available and disseminated in both the ANTEX and NGS formats.

We describe the NGS calibration facility, and discuss the observation models and strategy currently used to generate NGS absolute calibrations. We demonstrate that NGS absolute phase center variation (PCV) patterns are consistent with published values determined by other absolute antenna calibration facilities, and outline future planned refinements to the system.