Assessing the Impact of the SCIGN Radome on Geodetic Parameter Estimates (paper, 2007)

47 Freddy Blume March 24, 2010 GNSS Antenna and Dome Test Reports, Testing 3525

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Introduction

The SCIGN radome is widely used within the geodetic community to protect GPS antennas at permanent sites from snow, debris accumulation, and vandalism. It was designed to have uniform thickness, minimizing its impact on the electrical phase center of the associated antenna. Dragert and Schmidt in their paper “The Effect of SCIGN Domes on the Vertical Phase Centre Position in Routine Processing of GPS Data” found that the radome altered the vertical coordinate solutions by 1.5 cm when used with a Dorne-Margolin(DM)/JPL Chokering antenna. This report suggested that this coordinate change was induced by a misalignment of the radome center of curvature with the mean L1/L2 electrical phase center. Ken Hudnut (the designer of the radome) confirmed this misalignment noting that the radome was designed to have a radius of curvature centered at the physical center of the DM element. There is a 3.5 cm difference between the physical position of the element and the electrical phase center; the electrical phase center is higher. Gerry Mader at the National Geodetic Survey (NGS) suggested that the NGS phase center variations (PCV) for the antenna and radome configuration should properly model this misaligment, and the radome should have no impact on geodetic parameter estimates. Dragert argues, that the empirical PCV determination technique used by the NGS does not estimate tropospheric delay parameters, inducing an error when these parameters are included in the data analysis. This report summarizes a detailed analysis of data collected at the Piñon Flat Observatory specifically collected to quantify what impact the SCIGN radomes have on geodetic parameter estimates.

[See attached .pdf file for more.]