

# From Relative to Absolute Antenna Phase Center Corrections

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# Current Situation

- GPS antenna offsets and phase center variations (PCVs) are critical part of measurement chain
- Relative calibrations (wrt AOAD/M\_T) currently in use;
  - Inadequate for long baselines
  - Long term problems with vertical reference system
  - No calibration below 10 degrees elevation
- Absolute calibrations determined from robot measurements & anechoic chamber
- Satellite calibrations currently not in use
- Given satellite phase center offset, PCVs need to be determined from observations?
- Satellite calibrations must be coordinated with absolute antenna calibrations – constrained scale needed?
- Azimuthal effects not included (ANTEX proposed)

# Oral Presentations

- **New Anechoic Chamber Results and Comparison with Field and Robot Techniques** *Görres, Campbell, Siemes, Becker*
- **Estimation and Validation of the IGS Absolute Antenna Phase Center Variations** *Ge, Gendt*
- **Impact of Absolute Antenna Phase Center Corrections on Global GPS Solutions** *Schmid, Thaller, Steigenberger, Rothacher, Krügel*
- **The Effect of SCIGN Domes on the Vertical Phase Centre Position in Routine Data Analysis** *Schmidt, Dragert, Lu, Schofield*
- **Local Monitoring of a Fundamental Site with GPS** *Rothacher, Lechner, Schlüter*

# Poster Presentations

- **Size Reduction of GPS Antenna's Ground Planes with High Level of Multipath Protection, *Tatarnikov***
- **The Impact of the PCV Parameters in the Coordinates Estimates, *Barzaghi, Borghi***
- **The Effect of SCIGN Domes on the Vertical Phase Centre Position in Routine Data Analysis, *Schmidt, Dragert, Lu, Schofield***
- **Absolute Field Calibration of Carrier Phase Multipath with a Precise Robot, *Dilßner, Seeber, Feldmann, Wübbena, Schmitz, Bachmann***

# Preview

- **Agreement between anechoic chamber and robot absolute calibrations is excellent.**
- **Satellite phase center offset comparisons are fair, while satellite PCV agreement is excellent.**
- **Satellite calibrations are not consistent within a block.**
- **Absolute calibrations show time series jumps but less elevation cutoff dependence and improved tropospheric comparisons.**
- **Radomes can introduce variable amounts of elevation dependent phase changes which distorts height.**
- **Local networks and antenna/receiver arrays may be necessary for reference frame maintenance at 1 mm-level over decades.**

# Issues

- **Correlation between satellite antenna phase center offsets and terrestrial scale**
- **Time dependence of the terrestrial scale as the mix of satellite types changes**
- **Timing of the switch from relative to absolute antenna phase center models:**
  - **Quantification of magnitudes of effects and decision on when effects are well enough known to warrant re-processing.**
  - **Expectation is that re-processing will need to be repeated a number of times over the next decade.**

# Recommendations of Position Paper

- **Antenna / Radome combinations**
  - **Avoid whenever possible**
  - **Forbid domes that do not have reproducible calibrations**
  - **Allow only domes mountable with reproducible physical relation to the antenna**
  - **Enter calibrated combinations into igs\_01.pcv**
- **Introduce antenna subgroups into rcvr\_ant.tab & igs\_01.pcv**
- **Ideally IGS00 sites should install local antenna arrays for long term stability.**
- **ANTEX format needs to be officially adopted.**

# Timescale for decision on absolute phase center models.

- **Absolute receiver & satellite antenna calibrations should be officially adopted:**
  - **By June 2004: Reconcile satellite antenna phase center patterns and offsets between the groups generating these results.**
  - **Sep-Dec 2004: IGS AC submission of final products with both relative and absolute phase center models used.**
  - **Jan 2005: Evaluation of the effects of relative and absolute phase center models.**
  - **March 2005: Adoption of new phase center models**
- **Issues:**
  - **Values for old PRNs and blocks (particularly Block I) needed.**
  - **Possible time dependence of values as fuel expended on satellites.**
  - **Elevation angle cut off tests with relative and absolute models and orbits free.**