Relative vs Absolute Antenna Calibrations: How, when, and why do they differ? A Comparison of Antenna Calibration Catalogs

Andria L Bilich1, Gerald L Mader2
1National Geodetic Survey, NOAA/NOS, Boulder CO; corresponding author: andria.bilich@noaa.gov
2National Geodetic Survey, NOAA/NOS, Silver Spring, MD

**Purpose**

Compare NGS relative catalog to the IGS catalog of absolute calibrations, and determine if/when/why the two catalogs are similar or different.

**QUESTIONS WE WANT TO ANSWER**

• When is or is not valid to process a geodetic network using a combination of relative and absolute calibrations?

• If/when it is valid to combine the NGS and IGS catalogs?

**Data**

**Calibration Catalogs**

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<th>Purpose</th>
<th>File name / URL</th>
<th>Published version (download date)</th>
<th># ants in catalog</th>
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<td>IGS absolute calibrations</td>
<td>Antenna Calibrations</td>
<td>13/09/20</td>
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</table>

**Antenna Classification**

- Chokering [38]
- Non-standard Chokering [31]
- Patch with groundplane [18]
- Patch without groundplane [1]
- Geodetic with large groundplane [3]
- Integrated receiver/antenna unit [4]
- Rover antenna [7]

**Results**

• Bias (constant difference) - ± 1 mm for L1 North, regardless of absence/presence of radome.
  - Other components and frequencies are unbiased.

• Histogram width - L2 North peak is 2x wider than other horizontal components.
  - Wide peak for vertical.

• Histogram tails - Horizontal PCO values are the same ± 2 mm, except for few “sudden” differences.
  - Large tails for verticals.

**Patterns by Date of Calibration at NGS**

• ΔPCO bias (constant difference) - L1 North bias consistent over 15-year history of NGS calibrations.
  - Other components and frequencies are unbiased.

• ΔPCO trends/groups with time - Possible trend in L2 North calibrations (explains the wide ΔPCO histogram shape [see above]); apparent trend could be offset related to software versions.

**Conclusions**

• Reasonable agreement for horizontals (± 2 mm).
  - Large variation for verticals, but variation correlates with antenna type.

• ΔPCC
  - Strong correlation with PCO differences.
  - Negative correlation on L1.
  - Positive correlation on L2.

**Next Steps**

• Attempt to correlate differences and patterns with software changes at NGS
• Reprocess older data with newest software, and analyze calibration differences (if any)