

Introduction

We often receive questions in support about the treatment of **Phase Centre Variations (PCV)**.

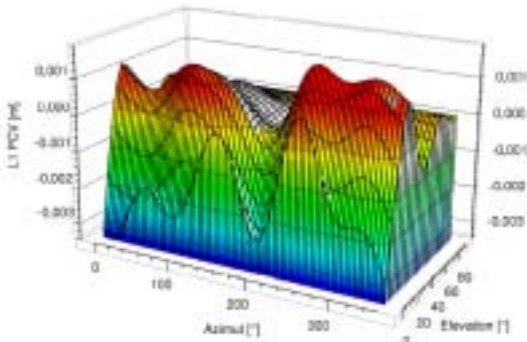
This newsletter explains what PCVs are and briefly describes the methods of how a PCV calibration is performed. It is necessary to understand the principles of how an antenna calibration is actually done – it will then be clear when it is necessary to take PCV into consideration or not. Ultimately this should help to almost eliminate this error source.

If only Leica antennas are used, then the correct PCV corrections are already stored and automatically applied when using these antennas. This applies to both the field system and SKI-Pro.

However, if you wish to use 3rd party antennas, this newsletter explains what you need to know when mixing different antenna types.

Phase Centre Variations

A PCV is primarily a result of a non-spherical phase response pattern of the GPS-antenna. The measured phase of the incoming signal depends on the direction of the angle of incidence. The aim of using PCV calibration files is to minimise this effect.



The figure above shows how the PCV varies with azimuth

and elevation on the L1 signal.

The influence of PCV to the final result is often underestimated, it could be that the incorrect treatment of the PCV is the reason for unsolved ambiguities.

Relative Calibrations

The most commonly used PCV correction models are estimated in relative field calibrations.

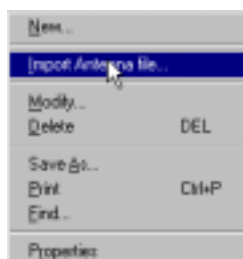
Using this rather uncomplicated approach, the PCV are always calibrated relative to a given reference antenna. The IGS (International GPS Service) standard reference antenna is JPL's Dorne Margolin Choke Ring antenna Model T.

The PCV of the reference antenna are set to zero and their offsets are set to a certain value. The antenna phase centre correction models delivered with System 500 (including the re-calibrated System 300 antennas) are all relative models with respect to this standard antenna.

These correction models have been derived in collaboration with the Astronomical Institute of Bern. Additional antenna correction models of other manufacturers referring to the same reference antenna can be downloaded from the web page of the Bern University:

(<ftp://ftp.unibe.ch/aiub/BSWUSER/GEN/>) and then directly imported into SKI-Pro.

Other sources for antenna models are the NGS web site (<http://www.grdl.noaa.gov/GRD/>)



where also correction models for most common antennas are available and can also be imported into SKI-Pro.

Both correction models use the Dorne Margolin T as reference, therefore, the models from the two sources can be mixed.

When mixing antennas, it needs to be checked whether the same standard reference antenna is used or not. Remember, the best choice would be to use correction models of the same field calibration, **never mix models which refer to different reference antennas.**

Absolute Calibrations

The second group of PCV calibrations are absolute, which define the phase centre correction variations in an absolute sense. Usually, absolute calibrations make use of artificial signals in anechoic chambers.

A different method to derive absolute calibration models was developed by GEO++. This method is based on GPS field observations in several thousand different antenna orientations (rotations, tilts). Absolute antenna models are only available for a few antennas at the moment and mainly used in Germany.

Absolute and relative correction models must not be mixed.

Remember

- When mixing antenna types, you should always take care to use the correct PCVs.
- Never mix correction models which refer to different reference antennas.
- Neglecting to use the correct antenna models may dramatically reduce the system performance.