EUREF 2006

Impact of antenna mounting on phase centre variation

Jochem Lesparre (*Kadaster*)

Kadaster

NETPOS

Governmental RTK network

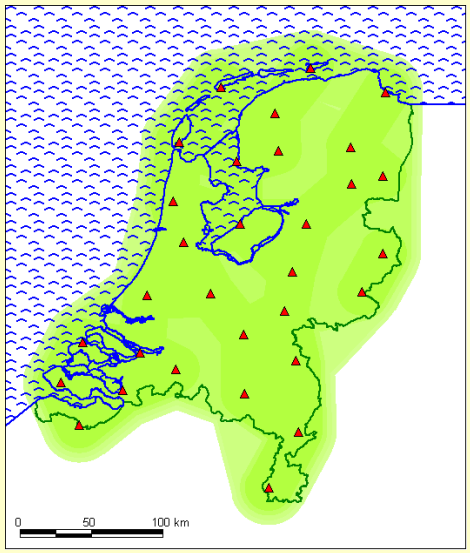
- Topcon PG-A1 antennas 14 cm, 0.5 kg
- Topcon Odyssey RS receiver

Kadaster

Quality validation

Test measurements:

- 84 points of the passive GPS base network
- x 10 initialisations
- x 10 measurements



Kadaster

Quality validation results

Precision (1 sigma):

- 6 mm longitude
- 9 mm latitude
- 17 mm height

Kadaster

Problem

Systematic height error of **31 mm**

- All measured height coordinates to high!
- Cause unknown
- Determination difficult

Kadaster

Solution

Antenna calibration with mount

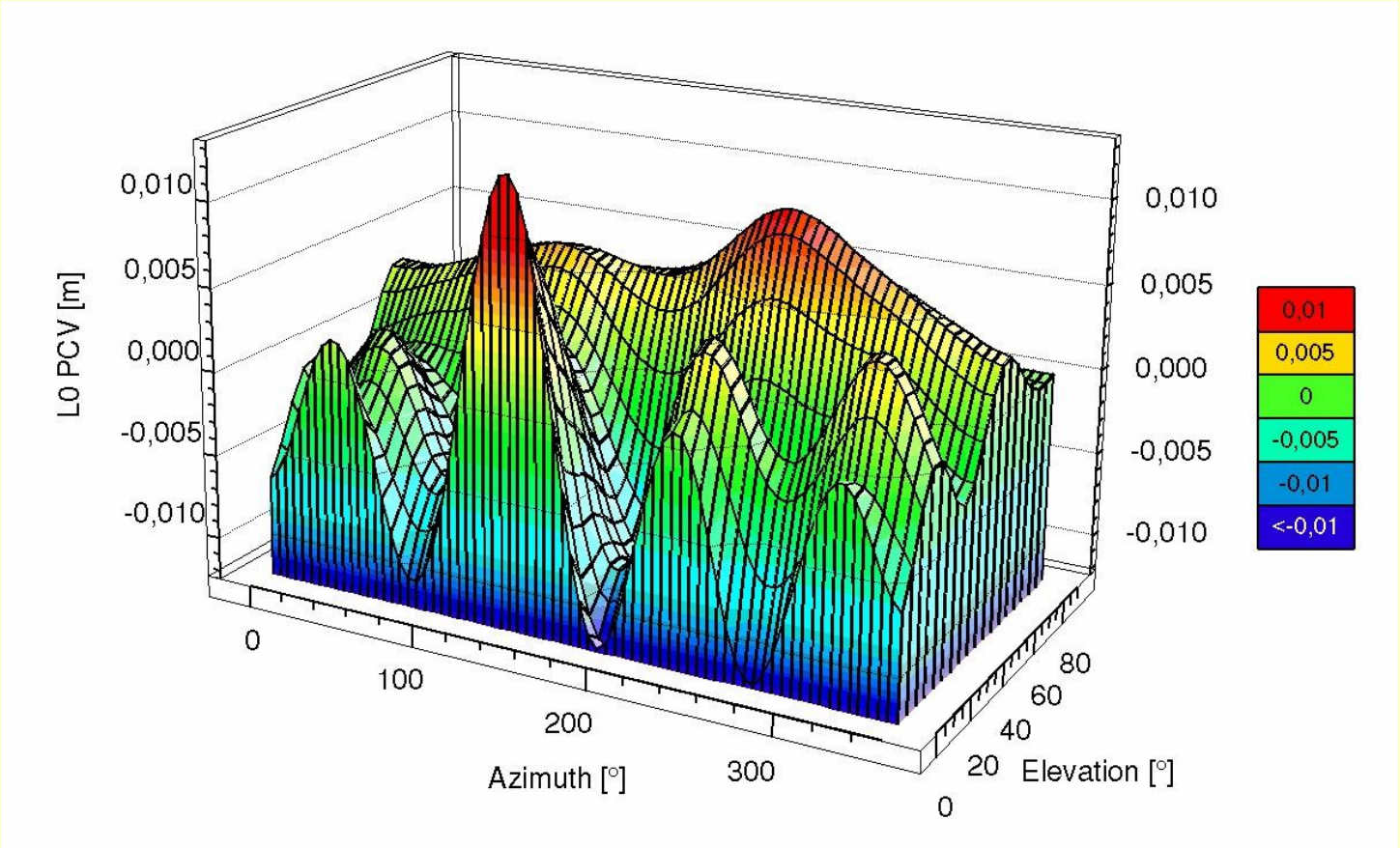
Kadaster

Calibration at Geo++

- Absolute calibration with robot

Calibration at Geo++

- Spherical harmonic expansion (degree 8, order 5)
- Accuracy (repeatability) 1 mm



Kadaster

Calibration results

Difference in calibration with and without mount:

	L1	L2
Mean:	3 mm	9 mm
Variation (max.):	3 mm	8 mm

Kadaster

Near field effect

Influence of mounting and direct environment on phase centre variation (PCV)

Mainly caused by:

- Very long periodic multipath
- Electromagnetic interaction

Kadaster

Near field effect

Large due to:

- Antenna mount
- Antenna type

Kadaster

Impact on rover positioning

- Effect on mean cancelled out
- Effect on variation (9 mm) amplified (31 mm)

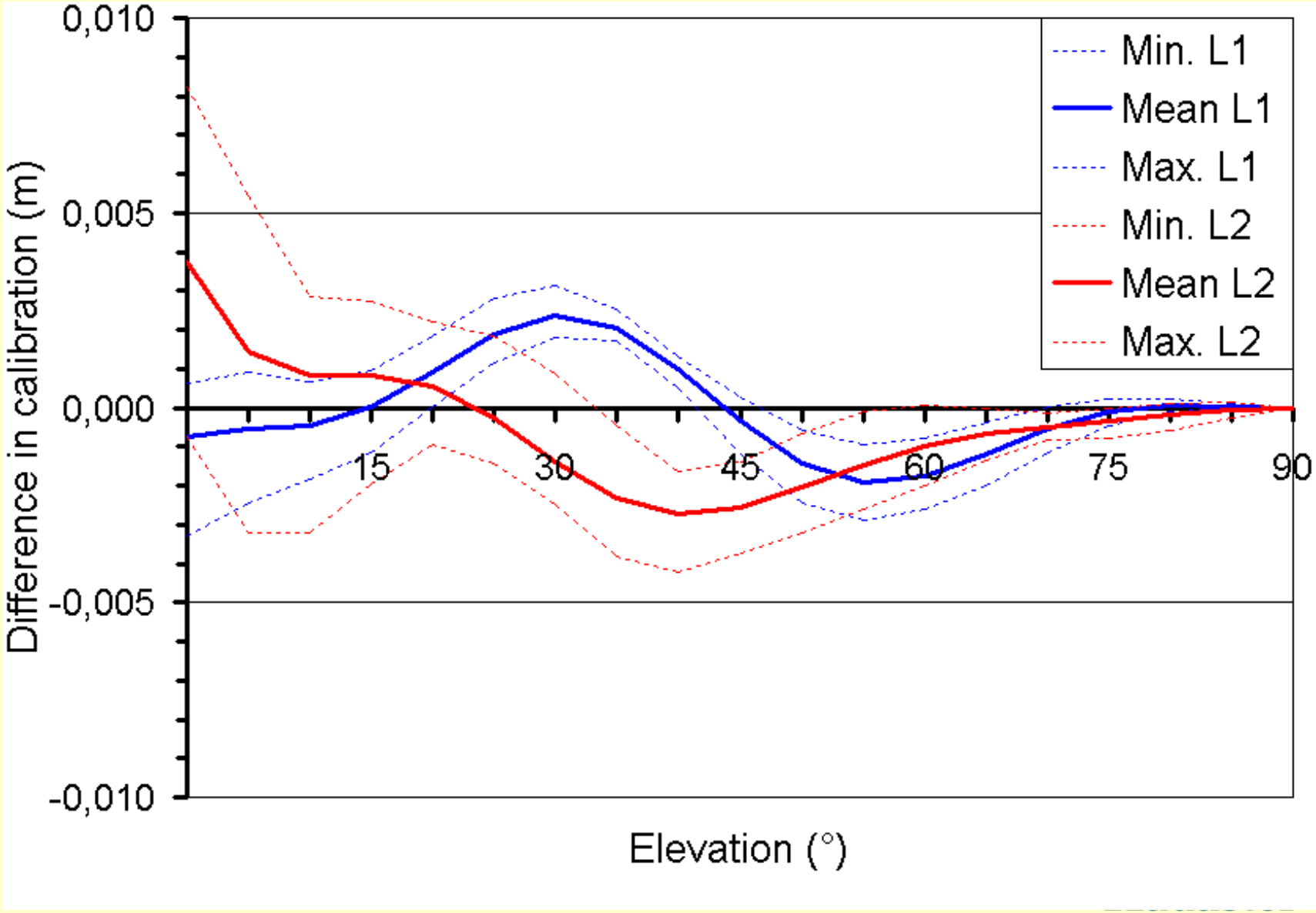
Kadaster

Amplification

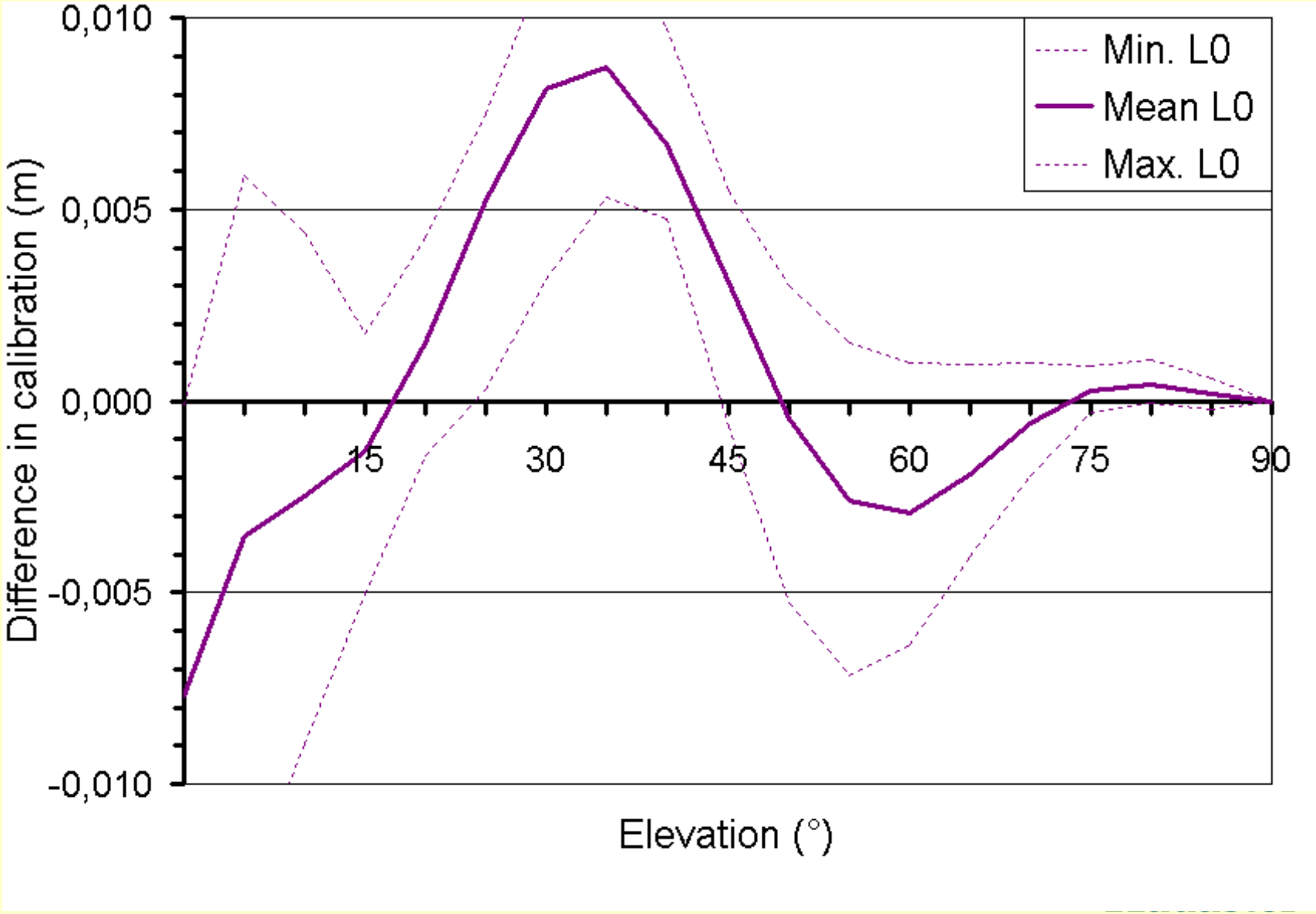
- Ionosphere free linear combination 3 x larger
  due to different influence on L1 and L2
- Tropospheric modelling
  due to mixing up PCV and troposphere
- Effect of satellite geometry
  due to unmodelled PCV

Kadaster

Different influence on L1 and L2



Ionosphere free linear combination



Conclusions

- Near field effect of mounting on phase centre
- Impact on rover positioning > 3 x
- Solution: calibration with mount
- Relevant for all users of reference stations
- *Kadaster* will calibrate all new antennas including the mount

Kadaster

Questions?

Kadaster