Uniting Global Efforts to Calibrate GNSS Antennas

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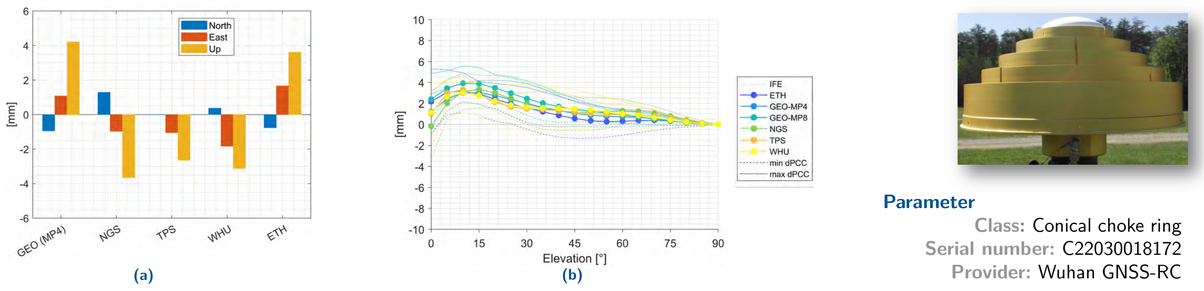
Motivation

- **Global Collaborative Effort:** Nine institutions worldwide contribute to this campaign to unify and develop requirements and standards for calibration facilities.
- **Ensuring Consistency and Reliability:** Verify the consistency of receiver antenna calibrations to ensure reliability and validity.

HXCCGX601A NONE vs. IfE



Parameter
Class: Conical choke ring
Serial number: C22030018172
Provider: Wuhan GNSS-RC

Fig. 1: Comparison of various Receiver antenna calibration sets (a) position deviations calculated by forward modelling of antenna errors, (b) observation domain GPS ionosphere free linear combination for L1 and L2 on differential phase centre patterns (reference: IfE).

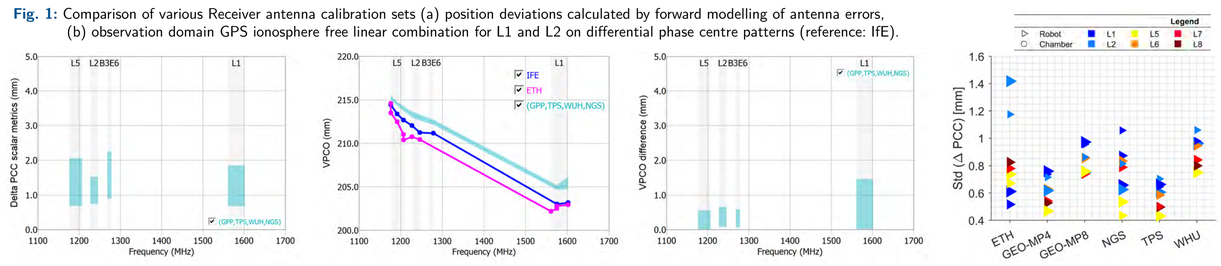


Fig. 2: Results (a) - (c) obtained using CAN software (I. Sutyagin, 2024) assess variations versus GNSS frequencies, (d) scalar metrics by Kersten et al. (2022), (reference: IfE).

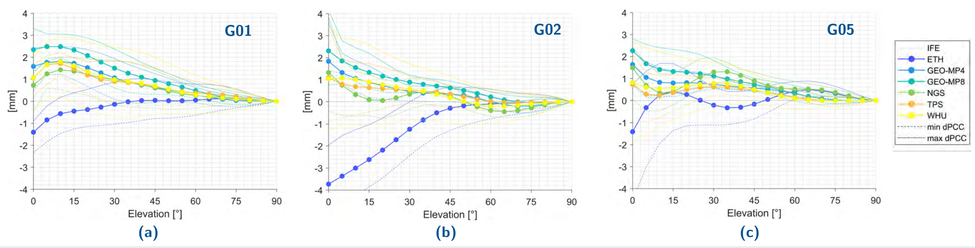
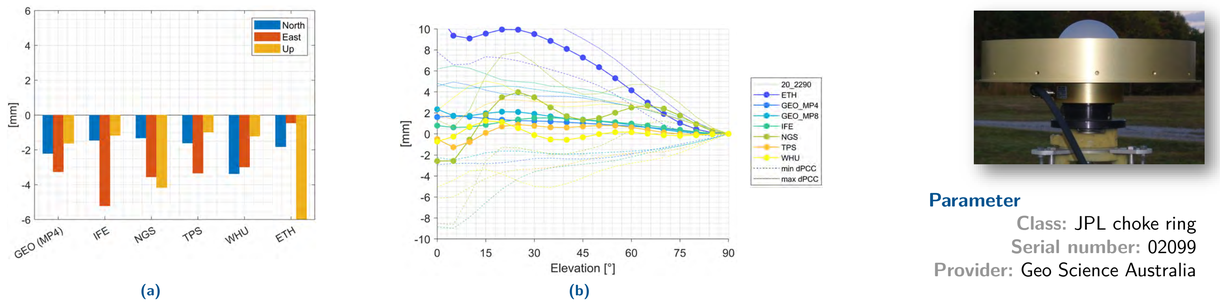


Fig. 3: Differenced phase centre corrections (dPCC) versus elevation for (a) GPS L1, (b) GPS L2 and (c) GPS L5. (reference: IfE).

JAVRINGANT_DM NONE



Parameter
Class: JPL choke ring
Serial number: 02099
Provider: Geo Science Australia

Fig. 4: Comparison of various Receiver antenna calibration sets (a) position deviations calculated by forward modelling of antenna errors, (b) observation domain GPS ionosphere free linear combination for L1 and L2 on differential phase centre patterns (reference: IGS).

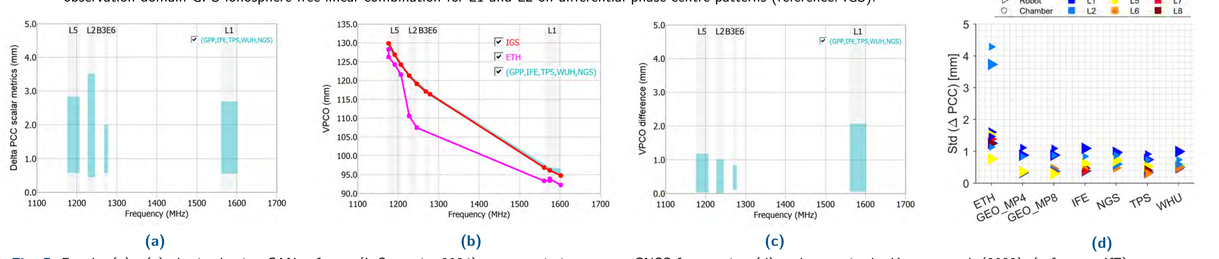


Fig. 5: Results (a) - (c) obtained using CAN software (I. Sutyagin, 2024) assess variations versus GNSS frequencies, (d) scalar metrics by Kersten et al. (2022), (reference: IfE).

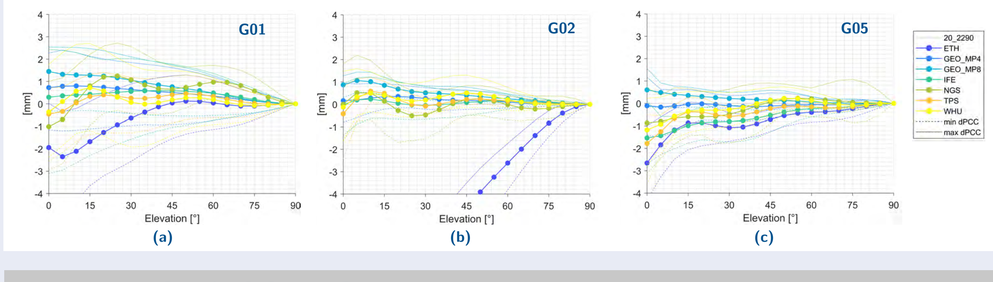
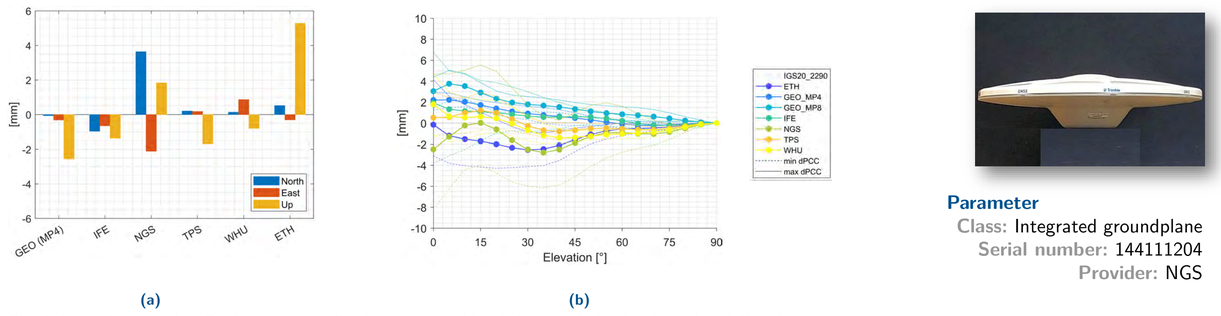


Fig. 6: Differenced phase centre corrections (dPCC) versus elevation for (a) GPS L1, (b) GPS L2 and (c) GPS L5. (reference: IGS).

TRM57971.00 NONE



Parameter
Class: Integrated groundplane
Serial number: 144111204
Provider: NGS

Fig. 7: Comparison of various Receiver antenna calibration sets (a) position deviations calculated by forward modelling of antenna errors, (b) observation domain GPS ionosphere free linear combination for L1 and L2 on differential phase centre patterns (reference: IGS).

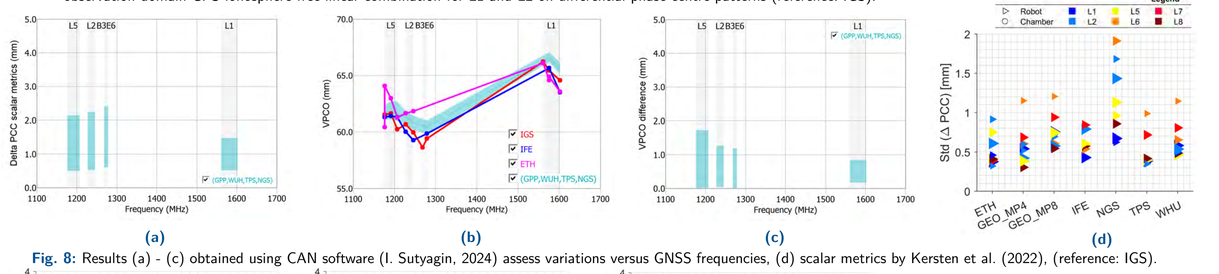


Fig. 8: Results (a) - (c) obtained using CAN software (I. Sutyagin, 2024) assess variations versus GNSS frequencies, (d) scalar metrics by Kersten et al. (2022), (reference: IGS).

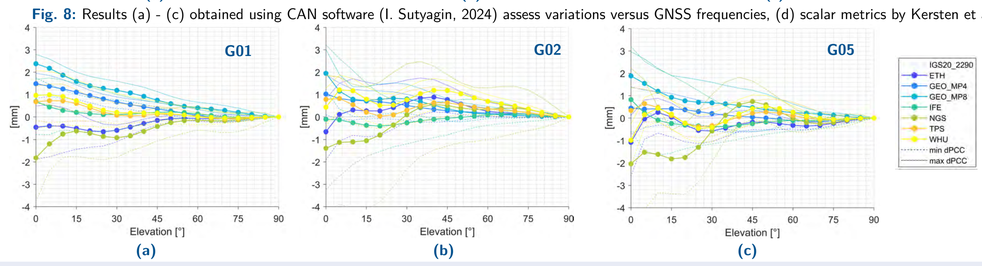
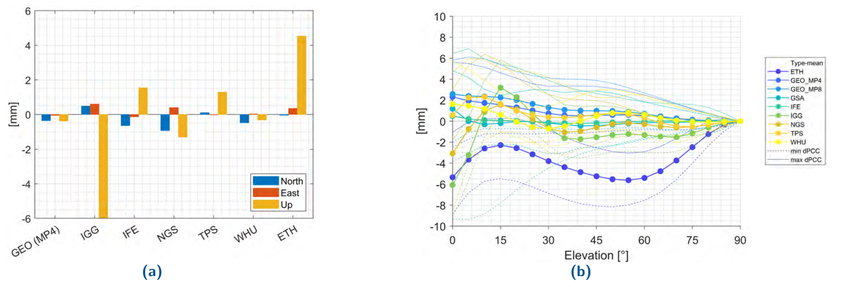


Fig. 9: Differenced phase centre corrections (dPCC) versus elevation for (a) GPS L1, (b) GPS L2 and (c) GPS L5. (reference: IfE).

LEIAR25.R3 NONE



Parameters
Class: Conical choke ring
Serial number: 08360013
Provider: IfE

Fig. 10: Comparison of various Receiver antenna calibration sets (a) position deviations calculated by forward modelling of antenna errors, (b) observation domain GPS ionosphere free linear combination for L1 and L2 on differential phase centre patterns (reference: IfE).

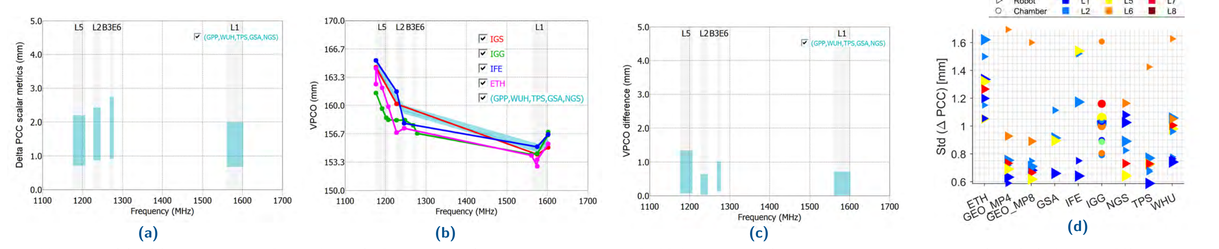


Fig. 11: Results (a) - (c) obtained using CAN software (I. Sutyagin, 2024) assess variations versus GNSS frequencies, (d) scalar metrics by Kersten et al. (2022), (reference: IGS).

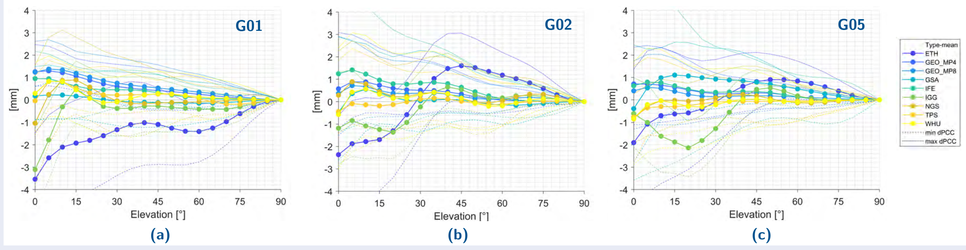
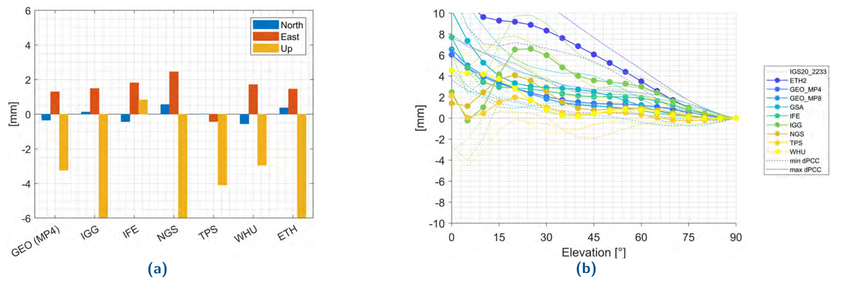


Fig. 12: Differenced phase centre corrections (dPCC) versus elevation for (a) GPS L1, (b) GPS L2 and (c) GPS L5. (reference: IGS).

TPSCR.5GC NONE



Parameter
Class: JPL choke ring design
Serial number: 1364-10003
Provider: TPS

Fig. 13: Comparison of various Receiver antenna calibration sets (a) position deviations calculated by forward modelling of antenna errors, (b) observation domain GPS ionosphere free linear combination for L1 and L2 on differential phase centre patterns (reference: IfE).

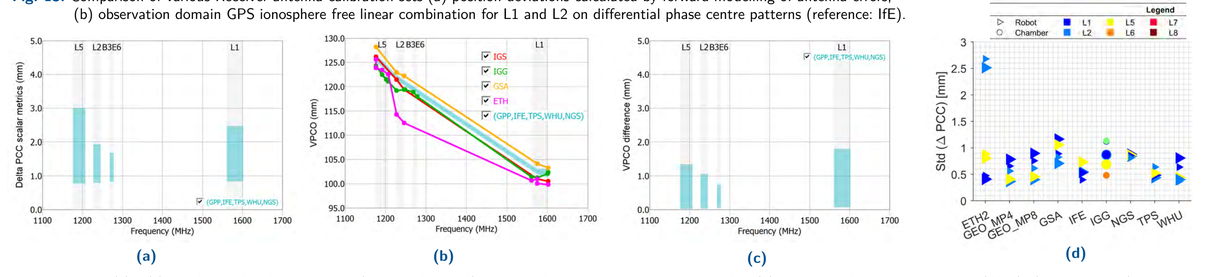


Fig. 14: Results (a) - (c) obtained using CAN software (I. Sutyagin, 2024) assess variations versus GNSS frequencies, (d) scalar metrics by Kersten et al. (2022), (reference: IGS).

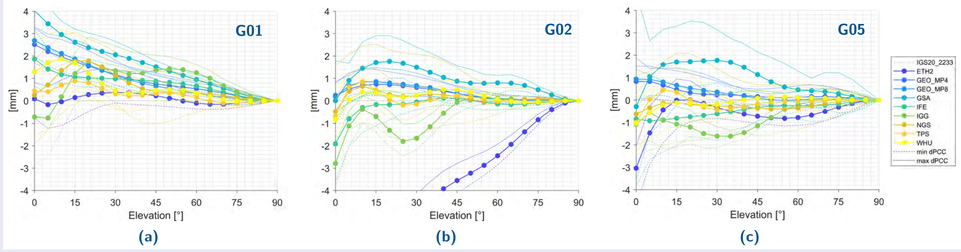
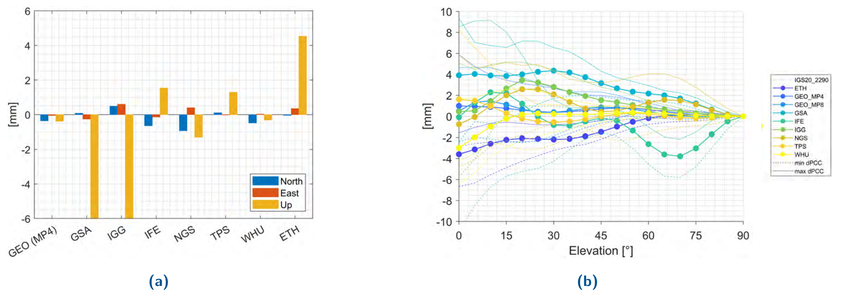


Fig. 15: Differenced phase centre corrections (dPCC) versus elevation for (a) GPS L1, (b) GPS L2 and (c) GPS L5. (reference: IGS).

TPSG5.A1 NONE



Parameter
Class: Integrated groundplane
Serial number: 1327-10001
Provider: TPS

Fig. 16: Comparison of various Receiver antenna calibration sets (a) position deviations calculated by forward modelling of antenna errors, (b) observation domain GPS ionosphere free linear combination for L1 and L2 on differential phase centre patterns (reference: IGS).

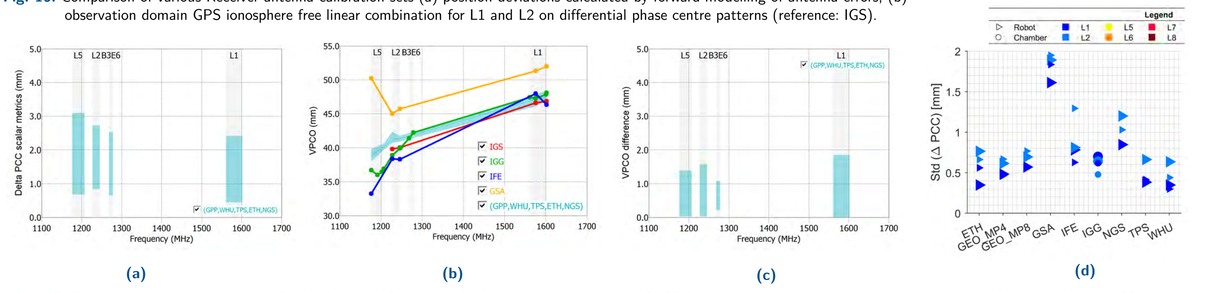


Fig. 17: Results (a) - (c) obtained using CAN software (I. Sutyagin, 2024) assess variations versus GNSS frequencies, (d) scalar metrics by Kersten et al. (2022), (reference: IGS).

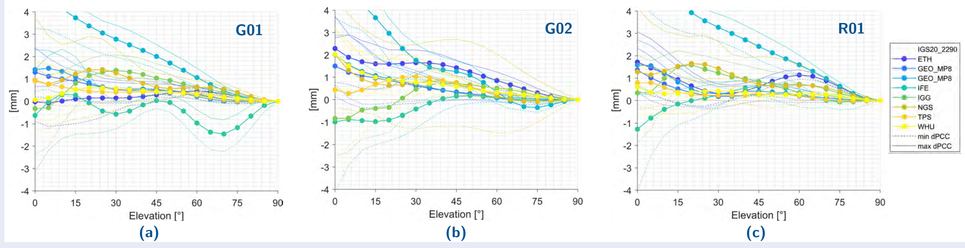


Fig. 18: Differenced phase centre corrections (dPCC) versus elevation for (a) GPS L1, (b) GPS L2 and (c) Glonass L1. (reference: IGS).

Conclusion & references

- **First and preliminary results** of the campaign show promising accuracy and reliability to achieve common requirements; multiple frequencies analysed.
- Scalar measures are essential quality indicators for the efficient analysis of multi-GNSS antenna patterns.

Kersten et al. (2022). *Comparison concept and quality metrics for GNSS antenna calibrations*, **J GEODESY 96:48**

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