

Description of the data files used in Metsähovi local network adjustment

- **10503_localGPS_20_232_0.SNX**
 - SINEX for combined solution of the GPS-network
 - This file provide the orientation in local frame which is aligned with ITRF2014
- Points description **point_description.xlsx**
 - Approximation coordinates, identification and description of monumentation
 - VLBI antenna angle position for prism points in antenna structure
- Tachymeter observations **obs.txt**
- Ellipsoidal height differences **dhobs.txt**

1.1. 10503_localGPS_20_232_0.SNX

The main parameters and models used in Bernese GNSS processing for Metsähovi 2020 GPS campaign in GeoMetre project daily solutions:

Software	Bernese 5.2
Adjustment method	Least-squares estimation
Input data	
GPS observations	Interval 30s in RINEX file format, Azimuth file for antennas not oriented to north
Orbits	IGS final products (IGb14)
Datum	ITRF2014, EPN solution coordinates and velocities (EPN_A_IGS14_C2100, EPN cumulative solution)
Antenna calibrations	Absolute individual corrections (GEO++, Germany) except for station METG type calibration
Parameters and models	
Observables	Carrier phase double differences Elevation cut-off angle 10 degrees L1 frequency
Parameter estimation, correlations	Correlations between the double-difference observations are handled correctly even when processing several baselines of a network, baselines adjusted together
Baseline strategy	STAR starting from datum site
Receiver clock biases	Estimated using code observations of individual receivers, eliminated in double differences
Satellite clock biases	Eliminated in double differences
Data rejection criteria	Double difference phase residual screening, threshold 4 mm for a normalized zenith residual, Baseline data exceeding over-all sigma of 6 mm excluded as whole
Ambiguities	SIGMA algorithm
Ionosphere	Global ionosphere models from CODE
Troposphere	GMF model used (both dry and wet components)
Tidal displacements	Solid Earth tides implemented in Bernese 5.2 according to IERS conventions 2010
Ocean loading modelling	Not modelled
Atmospheric loading	Not modelled
Datum definition	Network tightly (sigma 0.1 mm) constrained to observation epoch of the reference one site at a time (MET3) in ITRF2014

Output data

Files SINEX files with covariance matrix or normal equations, CRD, PRC, OUT etc.

Daily SINEX-files were combined to final solution with CATREF software:

10503_localGPS_20_232_0.SNX

Epoch of solution is 20:232

1.2. point_description.xlsx

Approximate coordinates come from a pre-adjustment of the network.

1.3. obs.txt

This file include horizontal and zenith angles and slope distances with standard deviations and instrument and target offsets with standard deviations observed in 2020 and in 2021 at Metsähovi. The angles include the deflection of vertical corrections. The zenith angle include the refraction correction too ($k=0.13$). The scale of the tachymeter, traceable to the definition of metre, is transferred from Nummela Standard Baseline. Corrections applied to slope distances are: the first velocity correction (Ciddor), the scale correction (from Nummela) and additional constant corrections (from Nummela). The observations are mean values of two faces and 2-4 series of same instrument setup.

- Instrument No: 369543
- Instrument name: TS50 I 0.5 R1000

1.4. dhobs.txt

Ellipsoidal height differences have been derived using the geoid undulation differences interpolated from the new local geoid model, FIN_Geoid_Geo-Metre_MH2000. It is an updated version of the high resolution Finnish geoid model, FIN_EIGEN-6C4.

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