TERRAPOS

Kinematic GNSS/INS post-processing

TerraPos offers high precision processing, utilizing the Precise Point Positioning (PPP) technology to provide true autonomy: **anywhere, anytime** – without worrying about base stations or reference networks. Add that the software is easy to use, flexible with respect to input and output, multi-platform, available both with a graphical user interface and from the command line, and you have TerraPos in a nutshell.

The technology is state-of-the-art: **Tightly coupled** GNSS/INS integration, in pair with a well proven PPP engine, now with more than five years of service at sea, in the air, and on land – on all continents.

Applications

TerraPos is specifically developed for kinematic applications, such as airborne photogrammetry, LiDAR and gravimetry operations, seabed mapping, tide estimation, etc.

Processing

- GNSS (PPP)
- INS: GNSS (PPP) + IMU, tightly coupled
- INS: any GNSS solution + IMU, loosely coupled
- GPS, GLONASS, or GPS+GLONASS
- Graphical interface or command line for batch processing
- Dual GNSS antenna support for improved heading

Features

- Advanced and flexible export capabilities, including format editor, geodetic transformations, flexible height system definitions with, e.g., geoid or MSS grids, offsets and advanced scaling, user-definable Quality Control, simultaneous output for multiple sensors, export to common binary formats, etc.
- Trajectory comparison
- Trajectory import
- Grid viewer
- Resource download (grids, export formats, etc.)

Ease of use

- Default settings have been specified with great care, leaving the operator with virtually no complex decisions or tuning.
- Mount files for convenient administration and reuse of lever arms and other sensor mounting parameters.
- Automatic download of ephemerides, clock files, etc.
- Easy access to frequently used files (mount parameters, export formats, transformations, geoid grids, etc.)
- Automatic update of system files, e.g. constellation tables, antenna calibrations, etc.
- Synchronized plot marker, plot overlays, etc.

Requirements

- TerraPos is based on post-processing. Typical latency is less than 24 hours.
- A connection to the Internet is required for downloading freely available ephemerides etc.
- Dual-frequency GNSS observations from a geodetic grade receiver and antenna should be used.
- Accuracy depends on data span, typically a few hours or more will be required.
- Optional IMU for INS processing. Any sensor class supported (MEMS, fibre optic and ring laser gyros tested).

Specifications

System requirements
Windows or Linux operating systems. 512 MB RAM. Sufficient disk space, approx. 1GB required for 24h at 1Hz.

Supported satellite systems
GPS and GLONASS

General processing strategy
Optimal filter/smoother combination using ionosphere-free code and carrier phase observations. Doppler observations may be used if available. Tightly or loosely coupled INS integration.

Obtainable accuracy (kinematic)
0.03m HRMS, 0.04m VRMS (24h duration)
0.03m HRMS, 0.05m VRMS (6h duration)
0.15m HRMS, 0.20m VRMS (1h duration)

Obtainable accuracy (static)
0.01m HRMS, 0.02m VRMS (24h duration)
0.02m HRMS, 0.04m VRMS (6h duration)
0.05m HRMS, 0.10m VRMS (1h duration)

Obtainable accuracy (attitude)
Mainly dependent on IMU performance and availability of a secondary GNSS antenna.

GNSS data formats
RINEX observation files (version 2.x)
SP3 ephemerides (versions a, b and c)
RINEX clock files (version 2 and higher)

IMU data formats
Generic binary formats
Kongsberg Seapath MRU format

Error modelling

Satellite antenna offset and phase center variations
Official IGS antenna calibrations

Satellite hardware biases
Official calibrations by the IGS, estimation of system specific effects

Satellite yaw
Nominal model, block and satellite specific model during eclipses and noon-turns, optional editing and stochastic compensation

Ionospheric delays
Ionosphere-free linear combinations

Tropospheric delays
A priori models, estimation of residual effects

Receiver antenna offset and phase center variations
Official IGS or user-supplied antenna calibrations

System specific receiver hardware biases
Estimation

Tide and loading effects
Models recommended by the IERS

IMU sensor biases
Sensor-specific performance profiles. Estimation of time-varying biases and scale factors for gyros and accelerometers.

Mounting errors
Estimation of GNSS antenna lever-arms

Front page photos: Background: E. Haaversen. Air: TerraTec. Sea: H.U. Sverdrup II, Norwegian Defence Research Establishment. Land: Norwegian Polar Institute.

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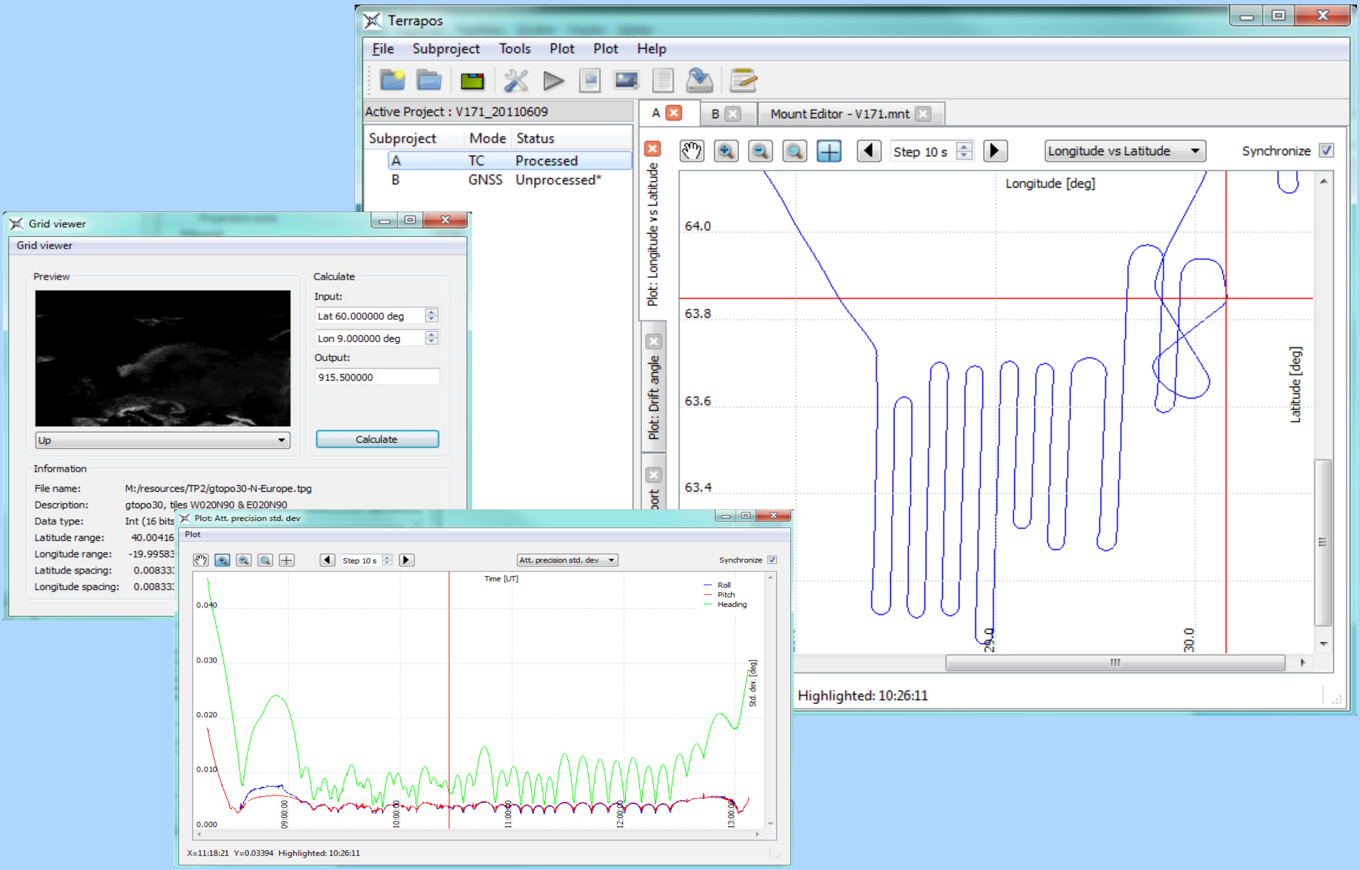

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