ROB's Analysis Centre Activities to Contribute to E-GVAP

STATUS AND UPDATES - 2023

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ROB's AC Current Status

2023

General Processing Parameters: Status

Maintenance + Bug fixes + RNX V3

	Status	GTS
ROBH	Operational	Yes
ROBT	Test ⚠	No
ROBG	Operational	Yes
ROBQ	Operational	Yes

- Bernese GNSS Software v 5.2.
- IERS standards 2010.
- Troposphere Model:
  GMF dry as a priori / Estimation of the GMF wet.
- Atmospheric Tidal Loading (ATL) applied.
- GPS + GLONASS observations.
- IGV Ultra-rapid orbits and ERPs (fall back to IGU and/or CODE possible).
- Updated FES2014b coefficients for the Ocean Tide Loading (OTL).
- Products in COST-716 Format 2.2a and new file naming convention.

ROBH for European NWP Models D.A.

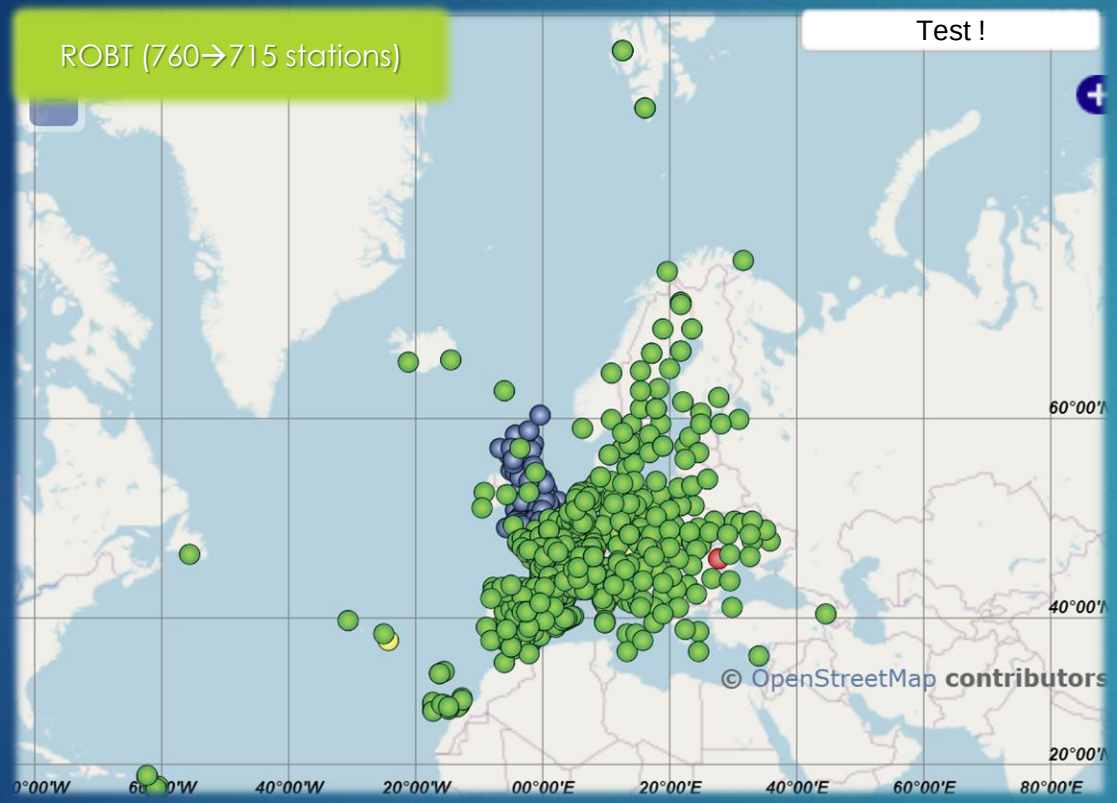
Status: 17 November 2023 (Several stations are located outside the represented domain).

Targeted Application: regional NWP

- European Network
- ~550 GNSS Stations
- GPS+GLO, 2 HRS arc + Stacking

- ZTD-Only
- 15-min Sampled ZTD
- Hourly Update Cycle
- Comp. ~25-30min - Latency ~ 37-45min (95% C.I.)
- Uploaded to E-GVAP

ROBT for tuning ROBH and Test D.A. Purposes



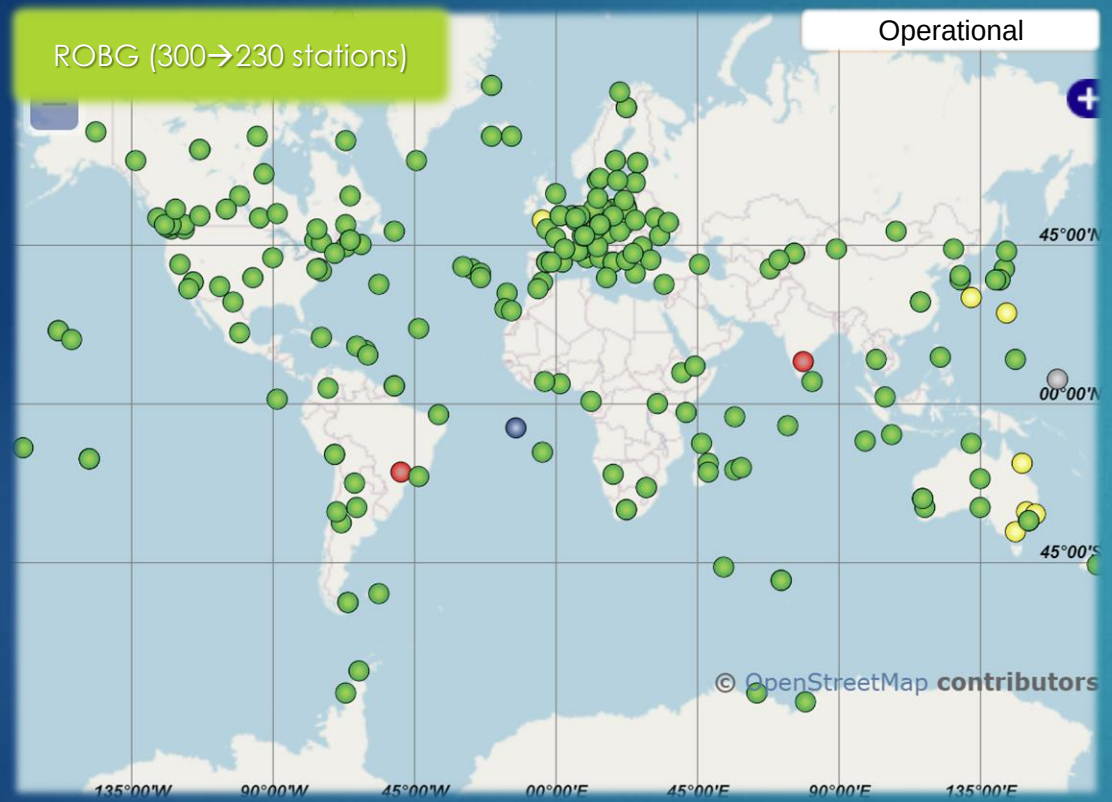
Status: 17 November 2023 (Several stations are located outside the represented domain).

Targeted Applications: Global NWP D.A.

- Mainly EPN + National Network stations
- ~715 GNSS Stations
- GPS + GLONASS, 2 HRS arc + NEQ Stacking

- ZTD-Only
- 15-min Sampled ZTD
- 1-Hour Update Cycle
- Comp. ~50 min - Latency ~ 67 min (95% C.I.)
- COST Format 2.2a
- Uploaded to E-GVAP (as test!!!)

ROBG for Global NWP Models D.A.



Status: 17 November 2023 (Several stations are located outside the represented domain).

Targeted Applications: Global NWP D.A.

- Mainly IGS stations
- ~230 GNSS Stations
- GPS + GLONASS, 4 HRS arc, no Stacking

- ZTD-Only
- 15-min Sampled ZTD
- 1-Hour Update Cycle
- Comp. ~21 min - Latency ~ 56 min (95% C.I.)
- COST Format 2.2a
- Uploaded to E-GVAP

ROBQ for (NWP) Nowcasting (D.A.)

Status: 17 November 2023 (Several stations are located outside the represented domain).

Additional real-time/highrate GNSS observations from Luxembourg, north of France, Germany, Denmark can be useful.

Targeted Applications: rapid-update NWP and nowcasting

- National Networks + EPN stations
- ~230 GNSS Stations
- GPS + GLONASS, 4 HRS arc, no Stacking

↓

- ZTD-Only
- 15-min Sampled ZTD
- 15-Min Update Cycle
- Comp. ~23 min - Latency ~ 24min (95% C.I.)
- COST Format 2.2a
- Uploaded to E-GVAP

Only the last 15 minutes !!!

Main Developments in 2023

Back-end works → not directly seen by E-GVAP

- Purchase and installation of a new dataflow and database server.
- Migration of most of the databases and repositories to the new server.

- Installation and testing of the new Bernese Software v.5.4 (BSW54).
- Start upgrading our AC's processing software suite to new BSW54 and new OS:
  - Post-processing analysis is almost ready, and currently in testing phase.

- Provided several benchmark datasets for tomography fusion strategy testing (IAG WG 4.3.6: Sensing small-scale structures in the lower atmosphere with tomographic principles).

European Plate Observing System (EPOS)

- EPOS is an European research infrastructure.
- EPOS aims at ensuring sustainable and universal use and re-use of multidisciplinary solid Earth science data and products fostering state-of-the-art research and innovation.
- Brings together Earth scientists, national research infrastructure, ICT experts, decision makers...

EUMETNET-EPOS Memorandum of Understanding

- Both parties recognized the potential mutual interests in collaborating. (Forum, exchange of IT solution knowledge, innovation on FAIR data management, open data and interoperability, adoption of common standards to share open data products, communication strategies, training initiatives...).

- MoU signed on December, 2022.

- Next step: set up workplan for 2024-2025 as foreseen by MoU:
  - This may include E-GVAP-EPOS collaboration (first focus : GNSS TCS, then other TCS).
  - So, ideas for this workplan are welcome...

Plans

FOR 2024+…

Main Developments and plans for 2024+

- Investigate the purchase of a new HPC server (to run the hourly, sub-hourly and global analysis operationally).
- Continue upgrading our AC's processing software suite to new BSW54 and new OS:
  - Turn the Post-processing analysis operationally + will start undergoing next development cycle.
  - Upgrade our hourly, sub-hourly and global GNSS data analysis.
- Provide ZTD/GRD/STD dataset(s) for NWP impact studies.
- Longer-term plans: investigate the production of horizontal gradients and slant delays in hourly analysis + real-time production?

Nomenclature of the ROB solutions

ROB has 5 processing systems and provides solutions from 4 of them to E-GVAP:

ROBH	*Input:* *Update cycle:* ***Purpose:***	*Hourly RINEX files* *Hourly* ***European NWP data assimilation***	*Operational* *~ 550 stations* ***Proc. time: 25-30 min.***	BSW 5.2 GPS+GLO
ROBQ	*Input:* *Update cycle:* ***Purpose:***	*Real-time GNSS observations (NTRIP)* *Sub-hourly – every 15 Minutes* ***Nowcasting + rapid-cycle NWP data assimilation***	*Operational* *~ 230 stations* ***Proc. time: ~ 23 min.***	BSW 5.2 GPS+GLO
ROBT	*Input:* *Update cycle:* ***Purpose:***	*Hourly RINEX files* *Hourly* ***Tests + prepare next ROBH***	*Tests (for R&D)* *~ 715 stations* ***Proc. time: ~ 50 min.***	BSW 5.2 GPS+GLO
ROBG	*Input:* *Update cycle:* ***Purpose:***	*Hourly RINEX files* *Hourly* ***Global NWP data assimilation***	*Operational* *~ 230 stations* ***Proc. time: ~ 21 min.***	BSW 5.2 GPS+GLO
ROBP	*Input:* *Update cycle:* ***Purpose:***	*Daily RINEX files* *Daily (latency of 6 days)* ***CRD + validation + prepare for re-analysis***	*Internal only* *~ 1338 stations* ***Proc. time: 16-20 hours***	BSW 5.2 GPS+GLO