

EPN DENSIFICATION

STATUS REPORT

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Ljubljana, Slovenia

EPND MILESTONES (1)

- D1933 in Igb08, as “pioneer” solution
- D2050 in IGS14, as “intermediate” solution
- D2100 in IGS14, as major achievement
 - ROMANIA INCLUDED (SGO AS AC)
 - TURKEY COMPLETE UPDATE (WEEKLY → DAILY)
 - **REVISED COMBINATION APPROACH**
COMBINATION STARTS WITH WEIGHTS COMPUTED FROM THE WEEKLY SINEX AT EACH AC INSTEAD OF UNITY - BETTER HANDLING OF SOME AC SOLUTIONS

EPND MILESTONES (2)

NEW EPND WEBSITE: <https://epnd.sgo-penc.hu>

- MIGRATION FROM EPNCB AND COMPLETE RE-DESIGN
- CLEAR VISIBILITY FOR CONTRIBUTORS, DEDICATED PLACE TO SHOW THEIR RESULTS
- INTERACTIVE MAPS, DIAGRAMS – **PLEASE PLAY WITH!**
- LONG EXPECTED CONTENT AND SUPPORTING MATERIAL
- DIRECT ACCESS TO THE COMBINATION RESULTS
- PRODUCT PORTAL SERVING MORE COMMUNITIES

EPND OPENING PAGE



Home

Working group

Thematic maps

velociRAPTOR

Products



EUREF Permanent Network

Densification Product Portal

[Read more](#)



LANTMÄTERIET



University of Padova, Dipartimento di Geoscienze

EPND ANALYSIS CENTRES



Home

Working group

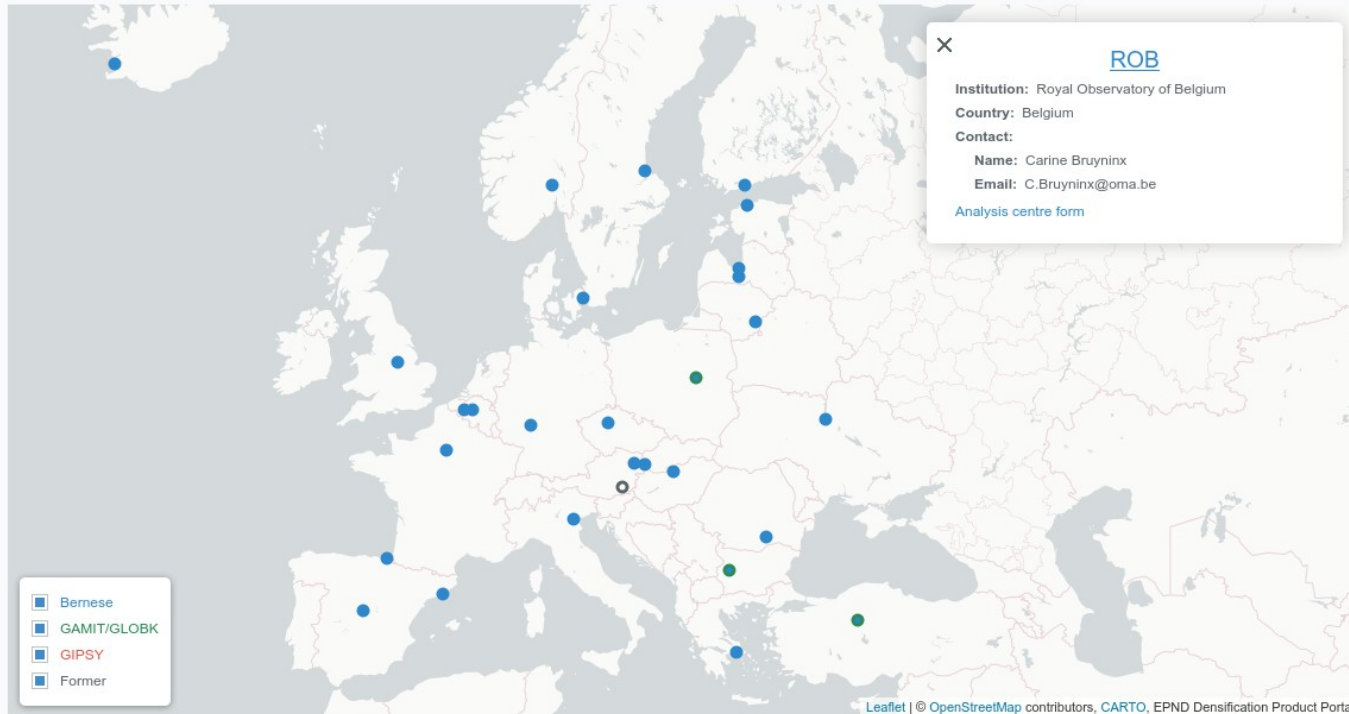
Thematic maps

velociRAPTOR

Products



Analysis centres



EPND THEMATIC MAPS

The image shows a website navigation menu for 'EPND THEMATIC MAPS'. The menu items are: Home, Working group, Thematic maps, velociRAPTOR, and Products. The 'Thematic maps' item is highlighted with a red circle and has a dropdown menu open. The dropdown menu contains the following items: Station distribution, Sitelog availability, Network Overlaps, Observation length, and DOMES availability. Below the navigation menu, the text 'EUREF Network' and 'Densification Product Portal' is visible. A blue 'Read more' button is located below the text. At the bottom of the page, there is a row of logos for various organizations, including GKU, LANTMÄTERIET, and others.

Home Working group **Thematic maps** velociRAPTOR Products

Station distribution
Sitelog availability
Network Overlaps
Observation length
DOMES availability

EUREF Network
Densification Product Portal

Read more

GKU LANTMÄTERIET

EPND velociRAPTOR



Home

Working group

Thematic maps

velociRAPTOR

Products



Tectonic background

Periodogram

Spectral decomposition

EUREF Permanent Network

Densification Product Portal

Read more



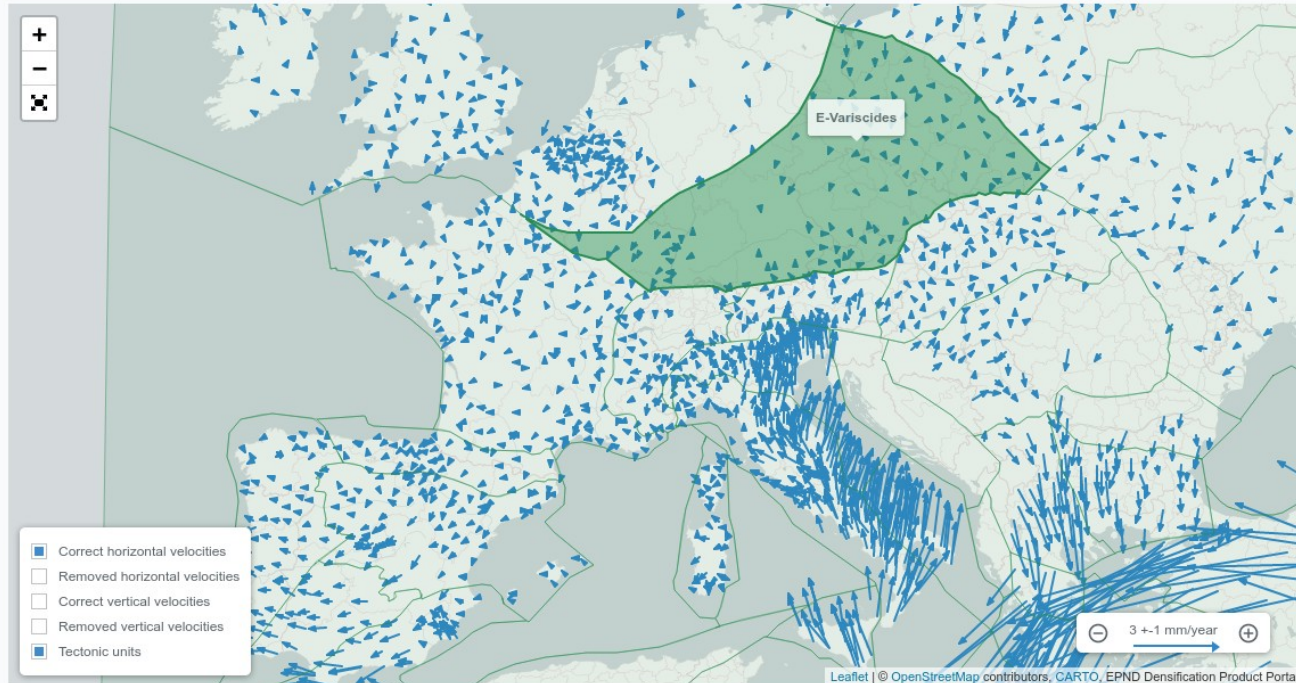
LANTMÄTERIET



TECTONIC BACKGROUND

Tectonic Background

In EPN Densification the station specific issues are identified based on an innovative approach, where we group velocities according to tectonic units. Each units are investigated separately assuming that velocities in one unit have a common trend, which make easier the identification of a station with non-representative movement. The different units are identified and selected here based on the detailed review of the literature. The software package, called velociRAPTOR comprises several features including spectral analysis in terms of Lomb-Scargle periodogram and spectral decomposition. More details on velocity filtering will come in a paper presently under review. Stations identified as "outlier" are also shown here to support investigations of local effects.



EPND TIME SERIES

Time series

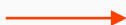
Hide description

Two types of position time series are presented here: (1) SINEX series, where the XYZ coordinate values, expressed in IGS14 are extracted from each combined weekly SINEX solution and transformed into ETRF2014 and (2) residual time series, which are the output of the CATREF combination. Type (1) includes the trend in the series and the offsets are remained, while type (2) is detrended and offsets are eliminated. Type (2) is the result of a series Helmert-transformations between the combined solution and each weekly SINEX solutions. In order to facilitate the quality check and better understanding of the combination results the antenna types used by each AC at the given station is also made accessible on an additional tab. The different colored stripes correspond to the information in the station log (LOG), EPN and the ACs (ARA to WAT) ordered accordingly.

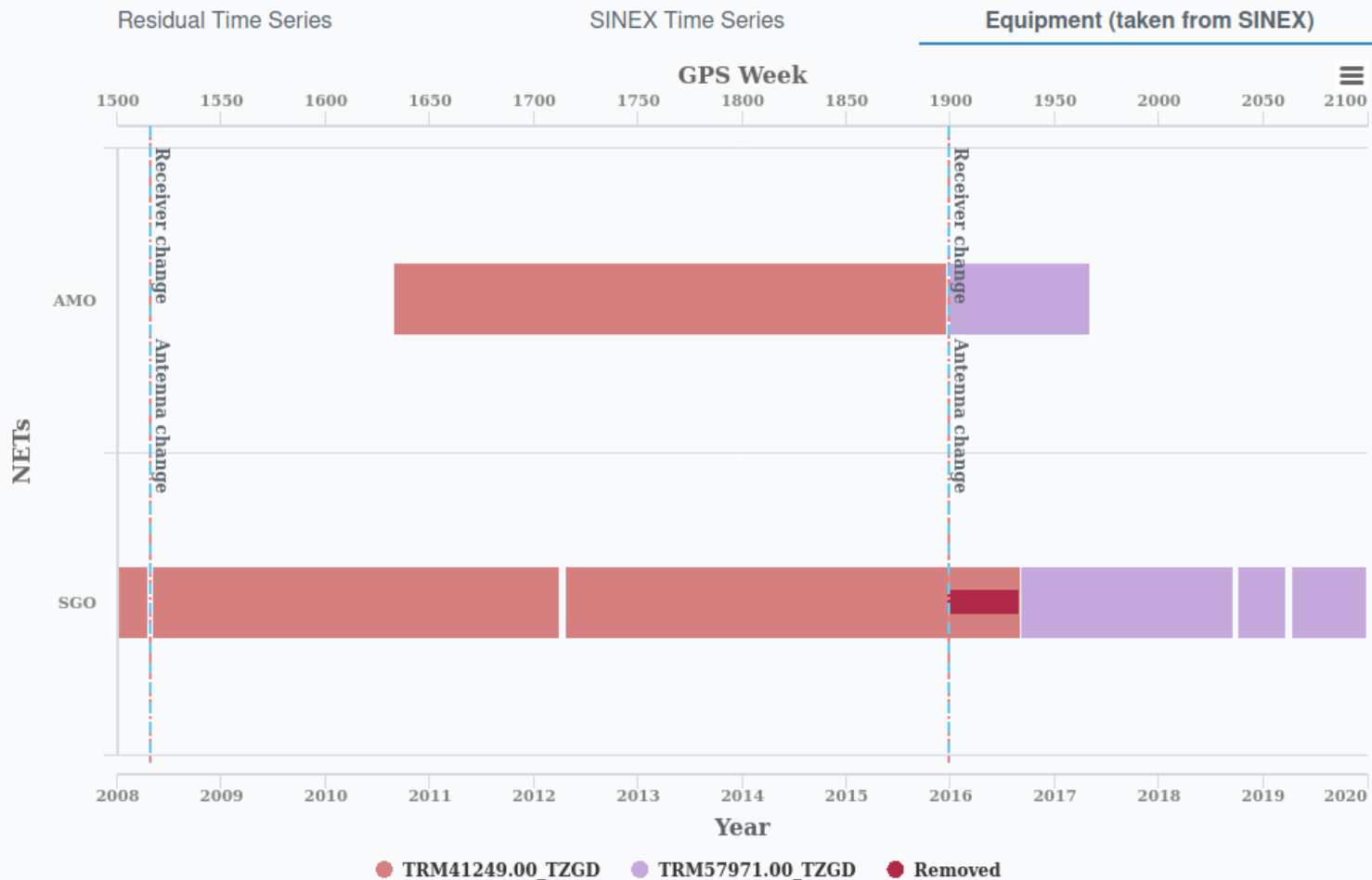
Station list

SEARCH

RCER00ITA
RDPI00ITA
RDVL00UKR
REBO00ITA
REDU00BEL
REDZ00POL
REGG00ITA
REN000ITA
RENN00FRA
RENS00ESP
REPI00ITA
RESI00ROU
RESU00ITA
RET100GRC
RETH00GRC
RETS00GRC



EPND STATION EQUIPMENT



EPND VELOCITY UNCERTAINTIES

Hide description

The velocity estimation of the CATREF software is based on the least-squares method (LSQ) indirectly assuming that the input data has normal distribution. In general the LSQ derived uncertainties are considered as too optimistic, as assumes the normal distribution of the input data, but according to the general view of the community the real uncertainties should be 2-3 times higher. In order to deliver realistic velocity uncertainty estimates alternative mathematical approaches had also been implemented. Beyond CATREF we use HECTOR (M. Bos) and MIDAS. HECTOR is based on an accelerated Maximum Likelihood Estimation (MLE) approach, where the correlated time series noise is also taken into account. At MIDAS the velocities are estimated using shifted pairs of data separated by one year and it is considered as a robust estimator, because it is not sensitive to the offsets present in the time series. Using these alternative approaches station velocities and their uncertainties had also been estimated and published below. The values and the diagrams clearly indicate that as expected the CATREF uncertainty estimate is the lowest. The HECTOR estimate is about 2 times higher, while the MIDAS estimate is the highest, probably this should be considered as a set of pessimistic values. The understanding and explanation need further investigations.

Station list

SZEG00HUN

SZFV00HUN

SZOL00HUN

TABG00POL

TABU00PRT

TAFA00ESP

TAH100PYF

TALA00KGZ

TALR00ESP

TALS00LVA

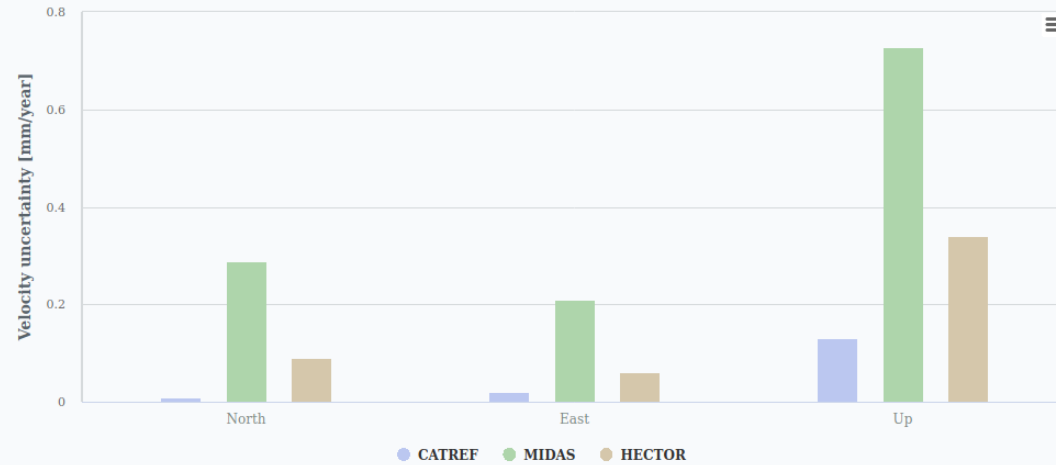
TAM200AUT

TAMB00ITA

TANC00FRA

TANZ00FRA

TAOR00ITA



TABG00POL - EPN Densification - Solution: D2100

| | North | East | Up |
|---------------|------------------|------------------|-----------------|
| CATREF | 14.76+-0.01 mm/y | 21.5+-0.01 mm/y | 1.28+-0.01 mm/y |
| MIDAS | 14.71+-0.29 mm/y | 21.48+-0.21 mm/y | 1.21+-0.73 mm/y |
| HECTOR | 14.74+-0.09 mm/y | 21.48+-0.06 mm/y | 1.36+-0.34 mm/y |

EPND DOWNLOADS



[Home](#) [Working group](#) [Thematic maps](#) [Analysis](#) [Products](#) [Acknowledgements](#)



D2100



Downloads

[EPNDsoln.snx](#)

The metadata file of all handled EPND stations including station name/position and identified offsets.

[EPND_D2100_E2000NEU.VEL](#)

Velocity estimates of the D2100 densification solution expressed in ETRF2000 and converted into the local NEU system.

[EPND_D2100_E2014NEU.VEL](#)

Velocity estimates of the D2100 densification solution expressed in ETRF2014 and converted into the local NEU system.

[EPND_D2100_E2000XYZ.VEL](#)

Velocity estimates of the D2100 densification solution expressed in ETRF2000.

[EPND_D2100_E2014XYZ.VEL](#)

Velocity estimates of the D2100 densification solution expressed in ETRF2014.

[EPND_D2100_E2000.SSC](#)

Position and velocity estimates of the D2100 densification solution expressed in ETRF2000.

[EPND_D2100_ETRF2014.SSC](#)

Position and velocity estimates of the D2100 densification solution expressed in ETRF2014.

[EPND_D2100_IGS14NEU.VEL](#)

Velocity estimates of the D2100 densification solution expressed in IGS14 and converted into the local NEU system.

[EPND_D2100_IGS14XYZ.VEL](#)

Velocity estimates of the D2100 densification solution expressed in IGS14.

[EPND_D2100_IGS14.SSC](#)

Position and velocity estimates of the D2100 densification solution expressed in IGS14

EPND INTER-PROJECT RELATIONS

- INPUT TO EUREF WGs (EU DenseVel & Def. Models)
- EPOS GNSS
 - D2150 WITH EPOS AAC INPUT
 - EPND-EPOS PRODUCT ON EPOS GNSS PORTAL
 - INPUT TO EPOS STRAIN RATE PRODUCT
- EGMS – EUROPEAN GROUND MOTION SERVICE
 - INSAR GM REFERENCE BY GNSS MODEL
 - INSAR VALIDATION

FUTURE STEPS

- PREPARATION OF D2150
 - **NOT JUST EXTENSION** TO GW 2150, BUT
 - UPDATE OF SEVERAL SOLUTIONS (DEN and MAO: WEEKLY → DAILY DONE)
 - NEW NETWORKS: BALKAN (SLO & SRB)
 - FURTHER CLEANING WITH REMOVAL OF SOME PCV OVERLAP ISSUES
 - INCLUSION OF EPOS PAN-EUROPEAN SOLUTIONS
 - PUBLICATION IN LATE SUMMER
- **PREPARATIONS FOR REPRO3**
 - **indiPCV** collection and share

**THANKS TO ALL ACs,
INSTITUTIONS AND INDIVIDUALS
FOR THE LONG TERM SUPPORT OF
EPN DENSIFICATION!**