

EPN DENSIFICATION – status and future

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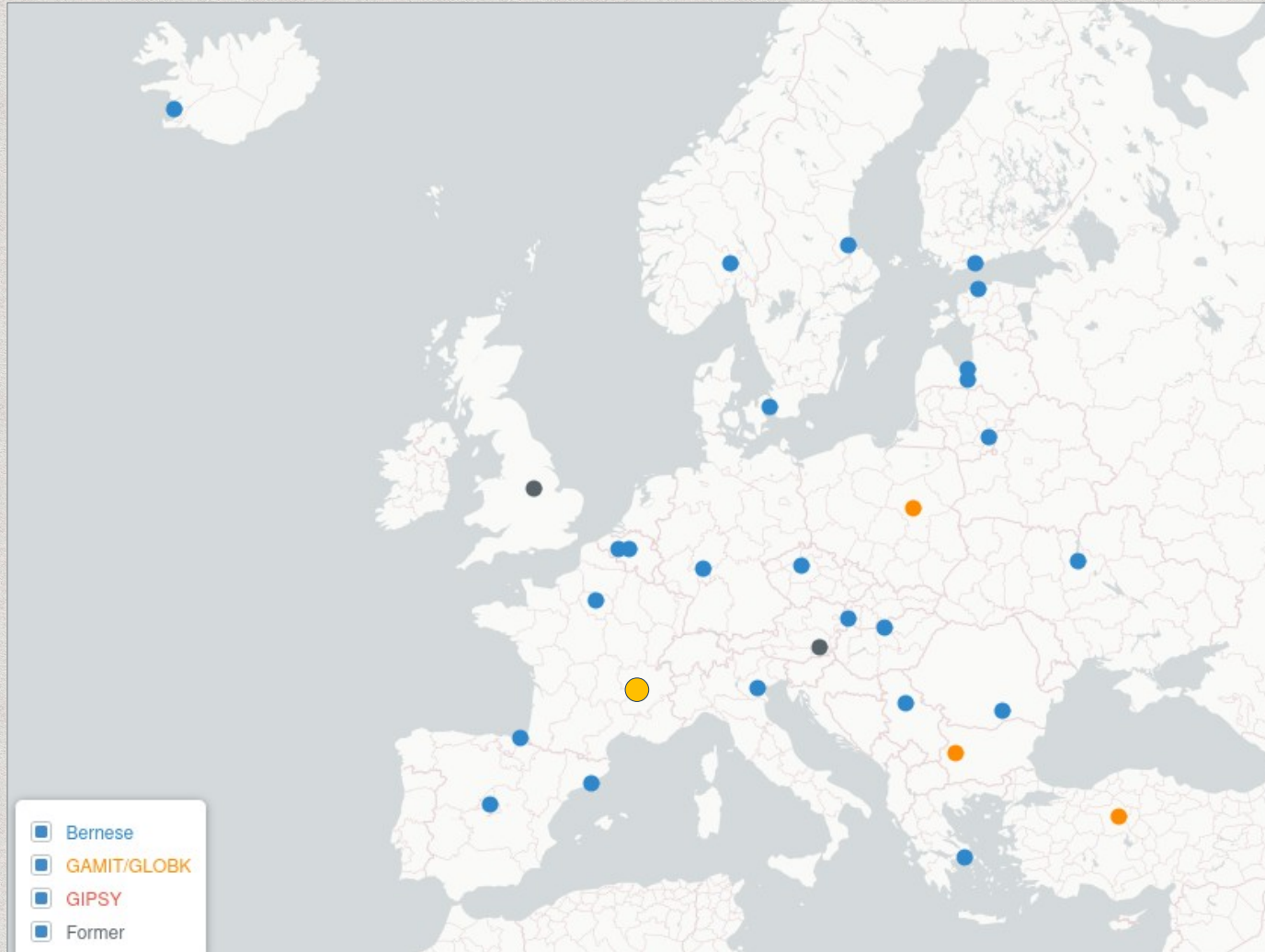
D Anastasiou (X Papanikolaou) – A Araszkievicz – T Arnell (OB Tangen) – M Bertocco (A Caporali) – C Bruyninx – N Dimitrov (I Georgiev†) – F de Doncker – A Duret – M Ferianc – M Flueraş – D Gomez – M Gonzalez (E Azcue) – G Janex – L Jivall – A Keiselis (K Kosenko) – O Khoda – S Peker (Al Kurt) – S Marila (S Lahtinen) – J Metsar – O Odalovic – E Parseulinas – D Prizginiene – J Reznicek – M Varga – L Wang (P Franke) – M Weber

EUREF symposium / AC Workshop, Covilha, Portugal, 24-26 June, 2025

EPND in short

- Continental scale integration of national processing results;
- Daily / weekly SINEX solutions as input, then cleaned, homogenized and merged into a unique weekly SINEX series
- Combination with CATREF software, EPN as backbone;
- **Free from national scale reference frame realization biases;**
- Unique position / velocity solution fully compatible with EPN;
- Velocity product: input to European scale velocity modeling: EuVM2022 and EGMS reference;
- **Promising application: reference velocity model for ETRS89 realization over non-stable part of Europe**

EPND Analysis Centres



EPND history

- D1933 in IGb08, as “pioneer” solution
- D2050 in IGS14, as “intermediate” solution
- D2100 in IGS14, as major achievement
 - revised weighting approach
- D2150, as first “stable” solution
 - new webpage, still complete WEEKLY re-combination
- D2200 – extension of D2150, no complete re-combination
- D2237, just an extension up to the last week in IGb14

and then came repro3

EPND REPRO3

- The **biggest challenge we ever faced** in GNSS data processing – big data superposed with sw & strategy update...
- Delays of course and some **mission impossible** cases: large countries, large networks;
- re-taking the routine processing (wk2238 onward) is already a general success;
- Benchmark campaign offered successfully for AC validation;
- Combination expected to be easier – get rid of PCV issues

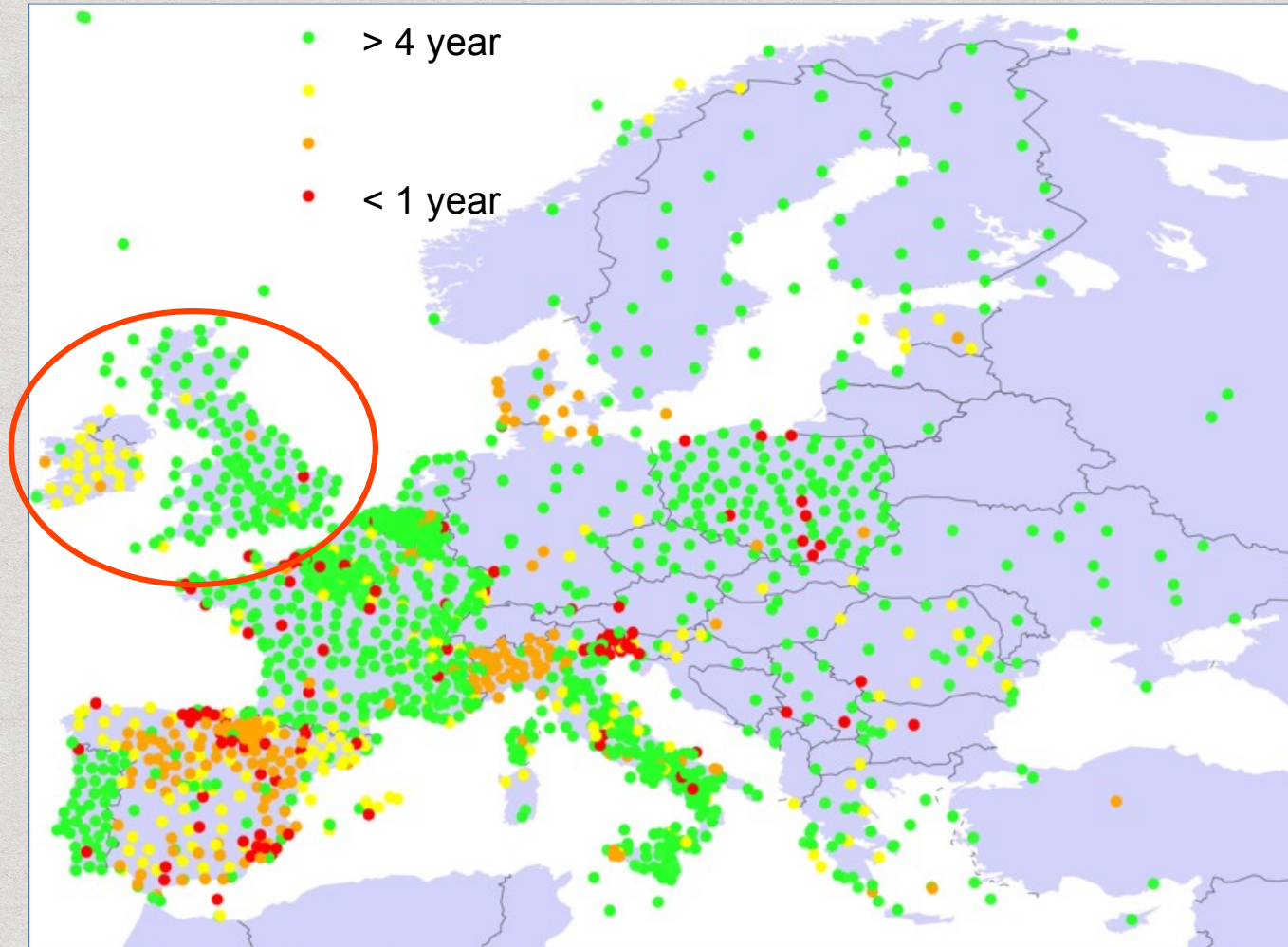
EPND REPRO₃

- No new combination may expected in 2025 ...
- The routine part (from week 2238 onward) can be done, but this a short sequence ...
- Temporarily the merger of the old processing and igs20 routine may need to be considered (EPN experience);
- BUT exploiting the idle time one more IGb14 combination was computed in 2025!

EPOS-UGA PAN-EUROPEAN SOLUTION

- Daily solutions of weeks 1500 – 2237: still expressed in IGb14
- extended solution with global stations
 - DD solution with GAMIT sw
 - large daily files (~200 mBytes)
 - stations outside of the EURA plate were removed
 - 1838 stations (150 <1yr; 370 <2yr; 457 <3yr)
 - Some conflicts due to PCV issues (indi vs type mean)
- Cleaning on the daily level, then weekly SINEX generation

EPOS UGA PAN-EUROPEAN SOLUTION



EPND – EPOS INTEGRATION

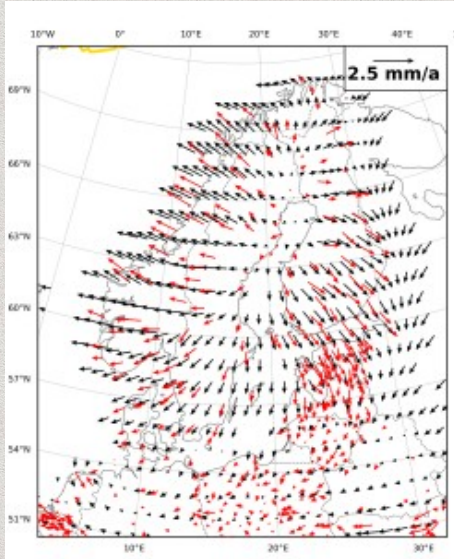
- UGA integrated with selected EPND networks (maximize coverage, optimize overlap (UGA+21EPND AC))
- Solution called EPO2237
- 3515 stations, 2975 retained after filtering
- Available at the EPND website: <https://epnd.sgo-penc.hu>
- the EPND website partially updated to allow switch between solutions
- YOU ARE INVITED TO CHECK OUT THE RESULTS!

EPND – BASIS FOR VELOCITY MODELING

- 1) EuVM2022 model by R Steffen et al* – based on EPND exclusively and uses an enhanced collocation approach
- 2) EGMS reference velocity model – assisted model adding the NGL PPP solution to fill in EPND gaps (e.g. Germany)
- 3) Ongoing discussion about new ETRS89 realization to extend the solution to non-stable EURA regions (Mediterranean) . An **AGREED model** may preferred and offered for implementation.

*<https://doi.org/10.23701/euvem2022>

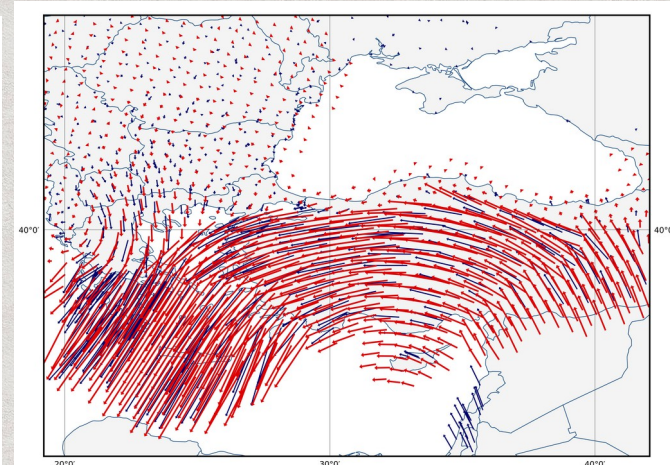
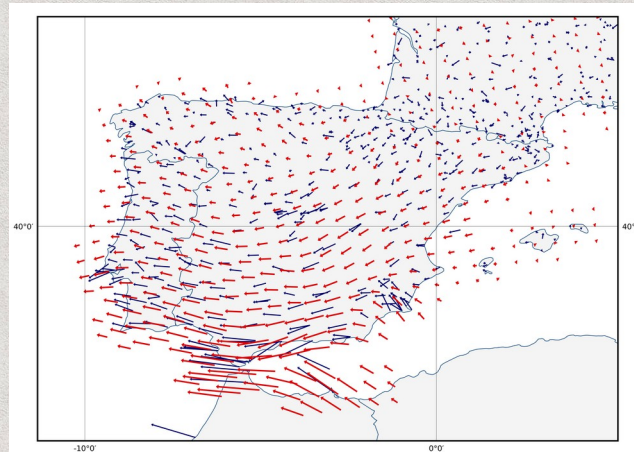
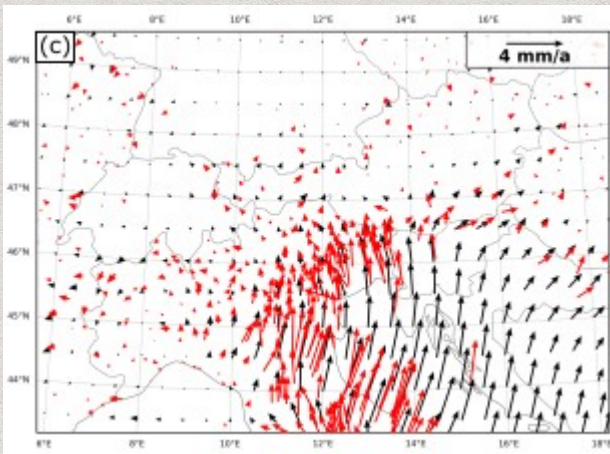
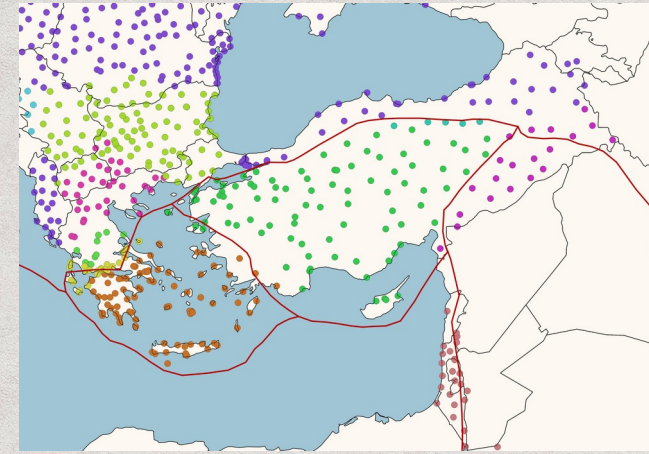
EPND – BASIS FOR VELOCITY MODELING



EuVm2022

<https://doi.org/10.23701/euvem2022>

EGMS
by SGO



EPND OUTLOOK

- Waiting for the completion of REPRO3 – **some network may need assistance ...**
- Completed networks being pre-processed, routine part pre-combined in 2025;
- IGb14 & IGS2020 combination to be tested just in case ...
- In optimal case in Q1 2026 preliminary combination
- Results in EUREF2026 may presented ...

EPND ON LONGER TERM

- (1) The WG chair is still active, but his retirement phase approaching
- (2) as EPND is a key EUREF activity we need to make sure its long term continuation
- (3) Joaquín Zurutuza already actively contribute, but we also call the community for interested colleagues to help, learn and be part of the WG combinaton team!

AND FINALLY ...

- REPRO₃ WAS AND STILL THE HIGHEST CHALLENGE FOR OUR COMMUNITY.
- ENDLESS APPRECIATION AND THANKS TO ALL OF THE ACs FOR THE ENORMOUS EFFORTS!!!

MANY, MANY THANKS TO ALL OF YOU !!!