

EPN DENSIFICATION STATUS REPORT

AMBRUS KENYERES
EPN REFERENCE FRAME COORDINATOR

T HORVÁTH

A CAPORALI - B DROSCAK - P FRANKE - B GARAYT - I GEORGIEV - M GIANNOU -
D HANSEN - L HUISMANN - I JUMARE - J NAGL - P PIHLAK - M RYCZYWOLSKI -
G STANGL

EUREF2014 SYMPOSIUM Vilnius, Lithuania, 03-06 June, 2014

TARGET

Combination of national long term weekly SINEX solutions to realize *homogeneous, dense* European level position and velocity database

TARGET GROUPS AND PARTNERS

- IAG WG on Dense Velocity Fields
 - a subset is provided for the global velocity solution
- EPN WG on Velocity modeling
 - provides input velocity field data to support the improved realization of ETRS89
- EPOS
 - close cooperation with EPOS WG4
- Earth sciences
- NMCAs

BENEFITS

USER / PROVIDER SIDE

- independent tests of the national SINEX solutions,
- cleaned and “internationalized” (site naming) SINEX back to the user for own purposes,
- the combined solution is freed from occasional reference frame definition weaknesses,
- decreased network effect,
- high quality ETRS89 positions to test the national realization (EB),
- push forward the scientific analysis and use of the national GNSS production networks,

COMMUNITY SIDE

- creation of an “absolutely” homogeneous, dense ETRS89 velocity field
→ **TECTONIC INTERPRETATION**
- steps forward to the better realization of ETRS89,
→ **POSSIBLE EXTENSION OF ETRS89 OVER THE NON-STABLE PART OF EUROPE (EPN WG)**

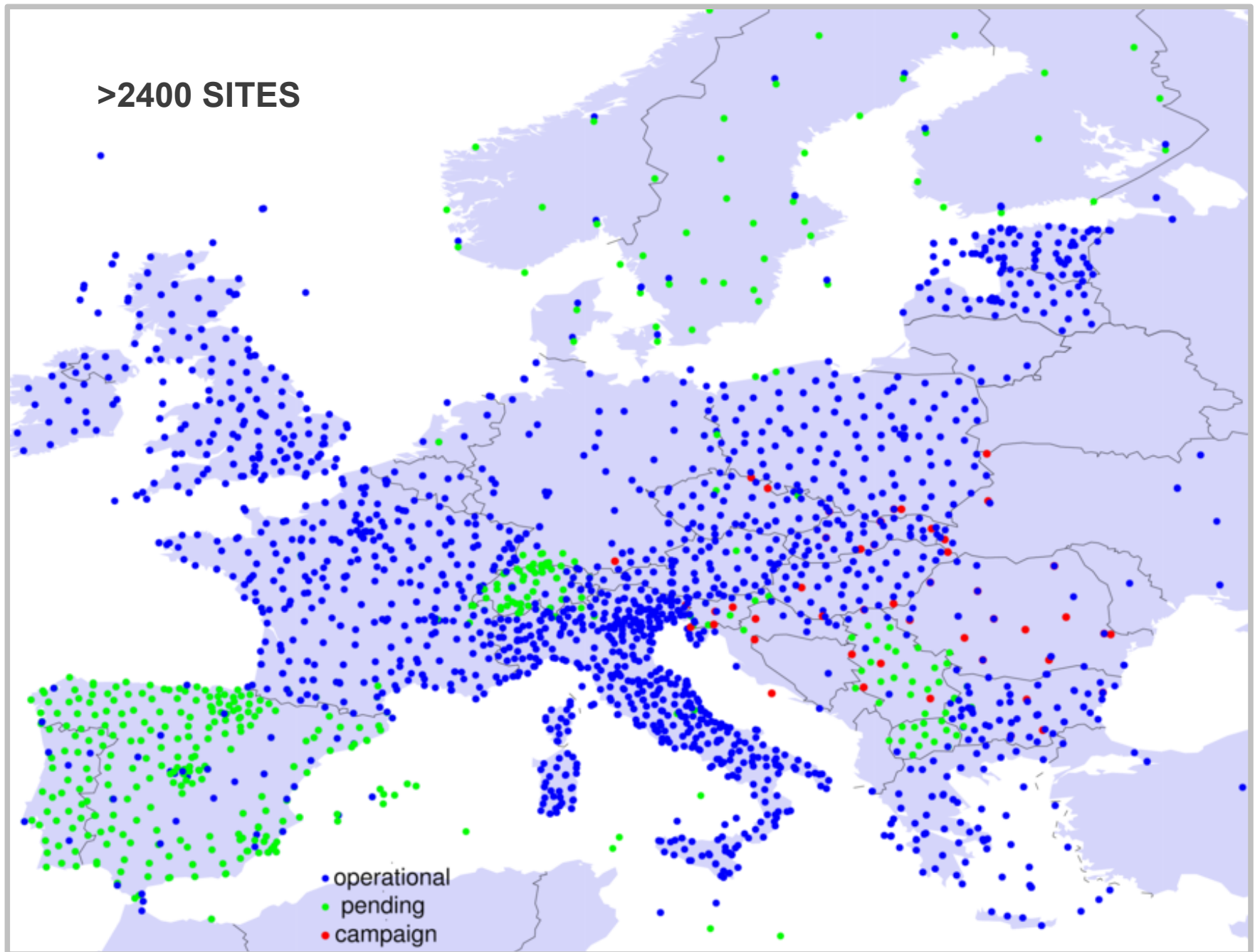
THE APPROACH

- **COLLECTION AND PREPARATION OF NATIONAL LONG TERM WEEKLY / DAILY SINEX SOLUTIONS**
 - SINEX testing (constraints, quality, site naming)
 - SINEX CLEANING: outlier and offset detection, elimination
 - soln harmonization with EPN
- **COMBINATION WITH EPN WEEKLY SINEX**
 - EPN as reference
 - CATREF / MC approach
 - Handling of different software products (BERNESE, GAMIT)
 - same reference network as for the EPN cumulative
- **RESULTS / PRODUCTS**
 - cleaned national SINEX solutions,
 - position and velocity estimates in ITRFyy/IGSyy/ETRFyy,
 - time series plots

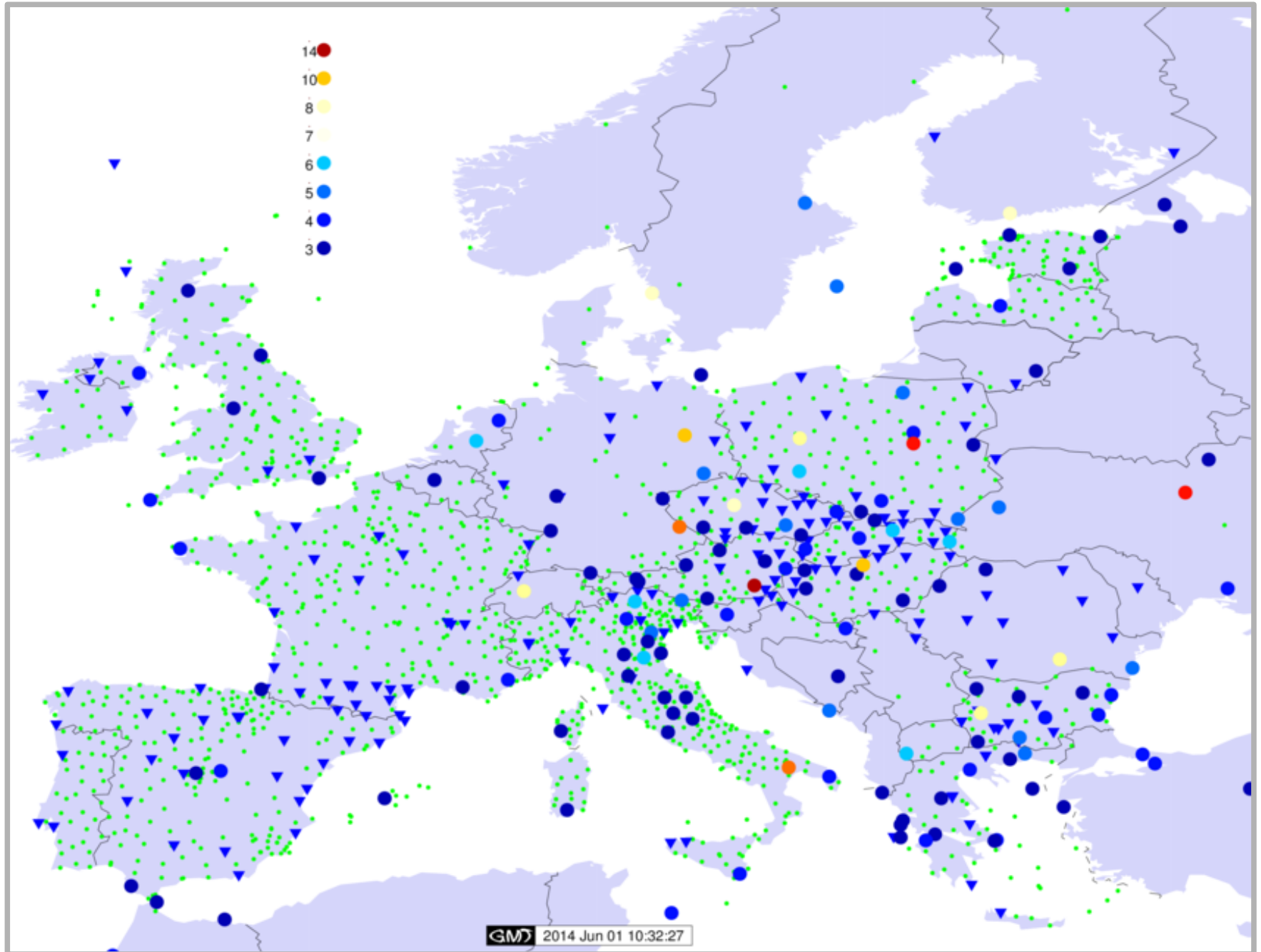
DATA AVAILABILITY - JUNE 2014

ASG	Poland	: 1482 -	>1770	(2007 - 2014)
EST	Estonia	: 1448 -	>1770	
GGI	Latvia	: 1461 -	>1770	
GKU	Slovakia	: 1408 -	1729	
CZE	Czech R	: 1565 -	1770	
SGO	Hungary	: 1400 -	>1770	EUPOS
AMON	Austria	: 1356 -	>1770	
MON	Middle East	: 1400 -	>1770	
GRE	Greece	: 1721 -	>1770	
HEPOS	Greece	: 1460-	1616	RAW data
CEGRN	CE-Europe	: 1400 -	>1770	G.Stangl
BUL	Bulgaria	: 1434 -	1770	daily GAMIT
UPA	Italy	: 1623 -	>1770	(1422-)
IGN	Spain/Portugal	: 1400 -	1770	restricted publication
AGRS	The Netherlands	: 0782 -	>1770	
SGN	France (glo)	: 1200 -	>1770	GLOBAL
BIGF	UK (glo)	: 1200 -	>1770	GLOBAL
AGNES	Switzerland	: 0953 -	>1770	IGS01 - cumulative

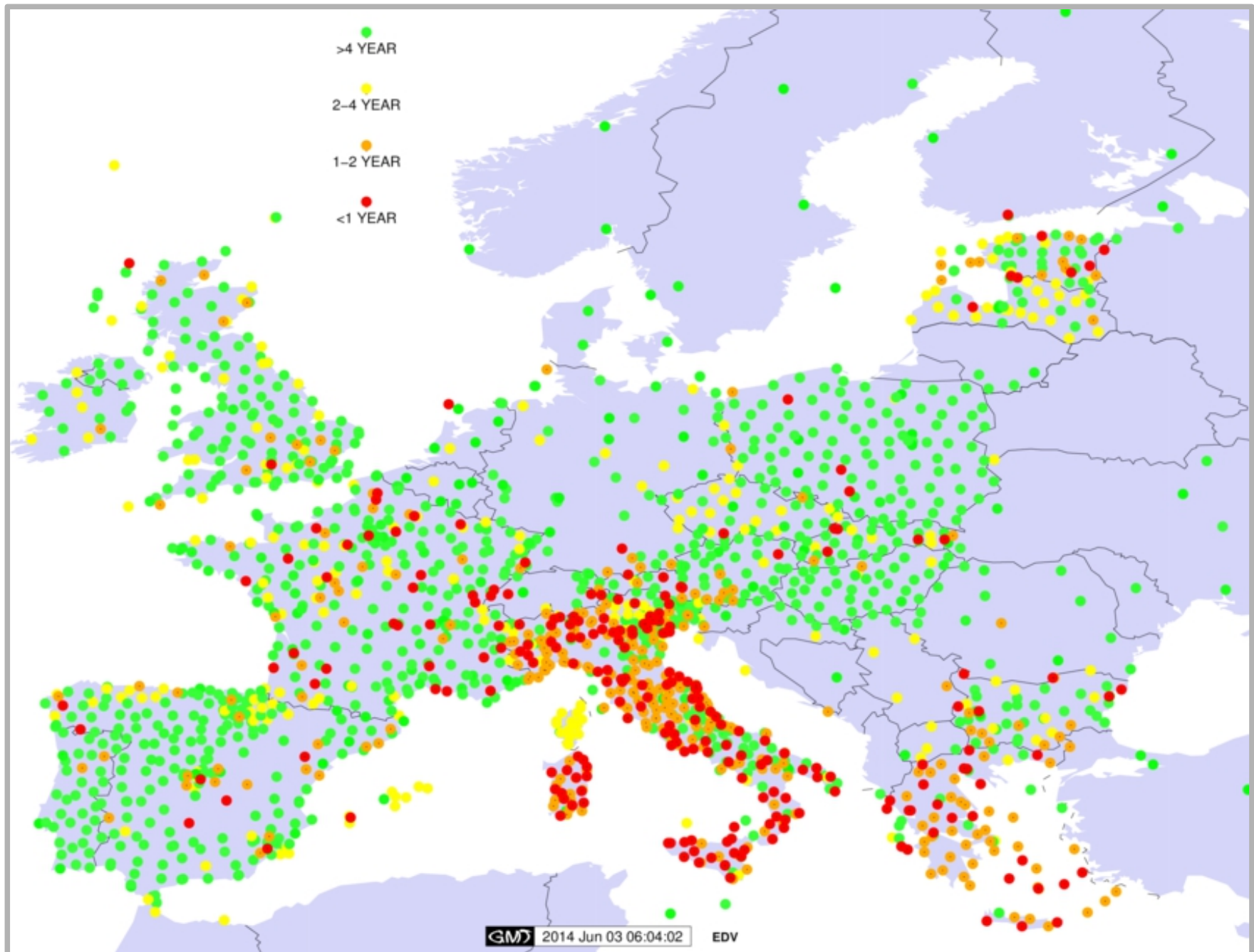
STATUS OF THE NETWORK



OVERLAPPING SITES



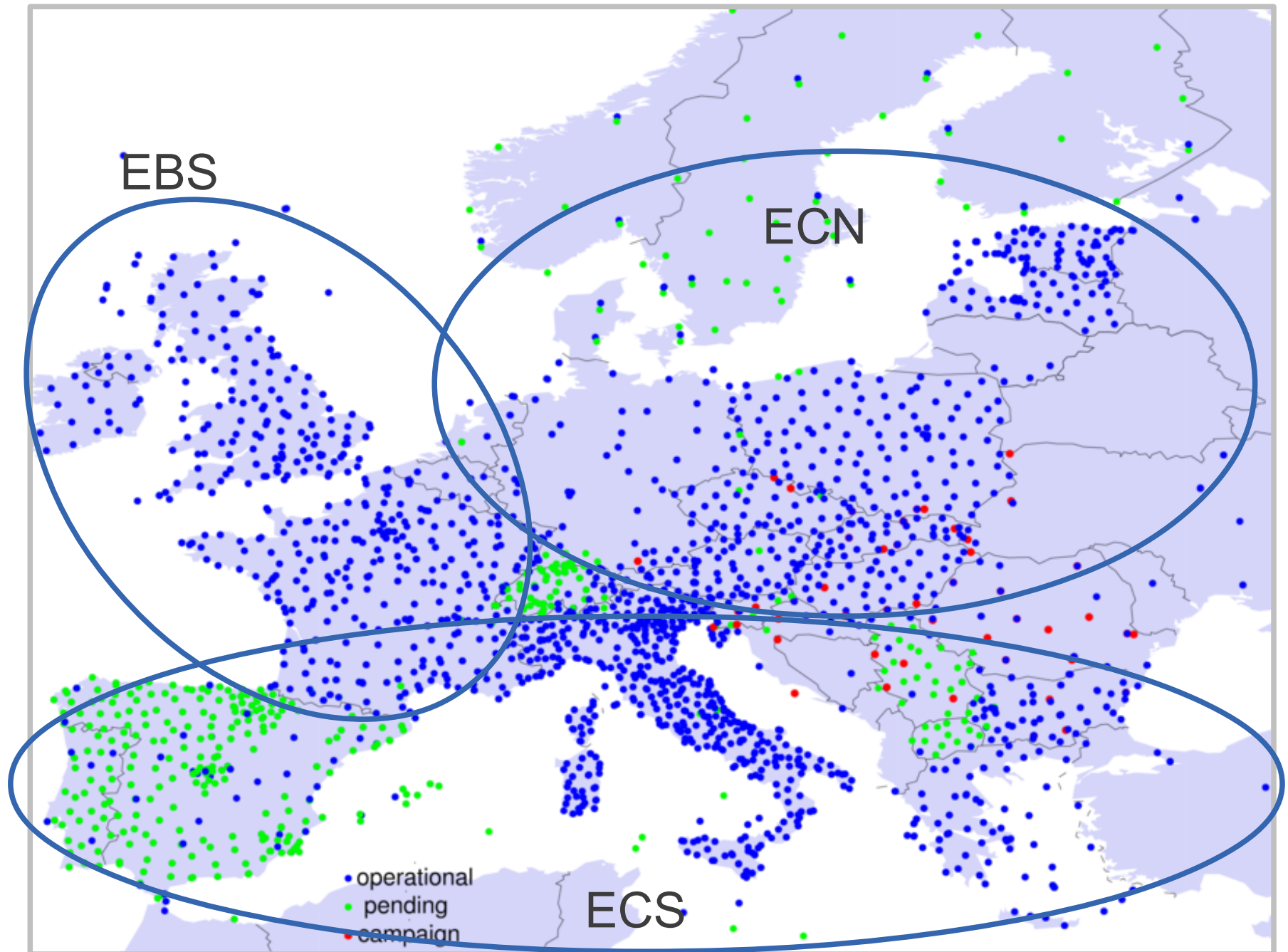
LENGTH OF SINEX AVAILABILITY



some STATISTICS, as of today

- 2630 sites and 3770 solutions* in the EDV solution SINEX
- only 70 4charID overlap
- 5084 weekly SINEX files (plus daily - w/o AGRS and HEPOS)
- 19.5 GB of SINEX data
- data availability usually since 2007 (after w1400)
- ~2000 outliers/periods deleted
- runtime: a bit much ...

EDV CLUSTERS



some STATISTICS, as of today

- 2630 sites and 3770 solutions* in the EDV solution SINEX
- only 70 4charID overlap
- 5084 weekly SINEX files (plus daily - w/o AGRS and HEPOS)
- 19.5 GB of SINEX data
- data availability usually since 2007 (after w1400)
- ~2000 outliers/periods deleted
- runtime: a bit much ...
- combined weekly SINEX size:
 - 43 MB ECN (850 MB cumulative SINEX)
 - 120 MB ECS (1450 MB cSNX)
 - 75 MB ESB (1120 MB cSNX)

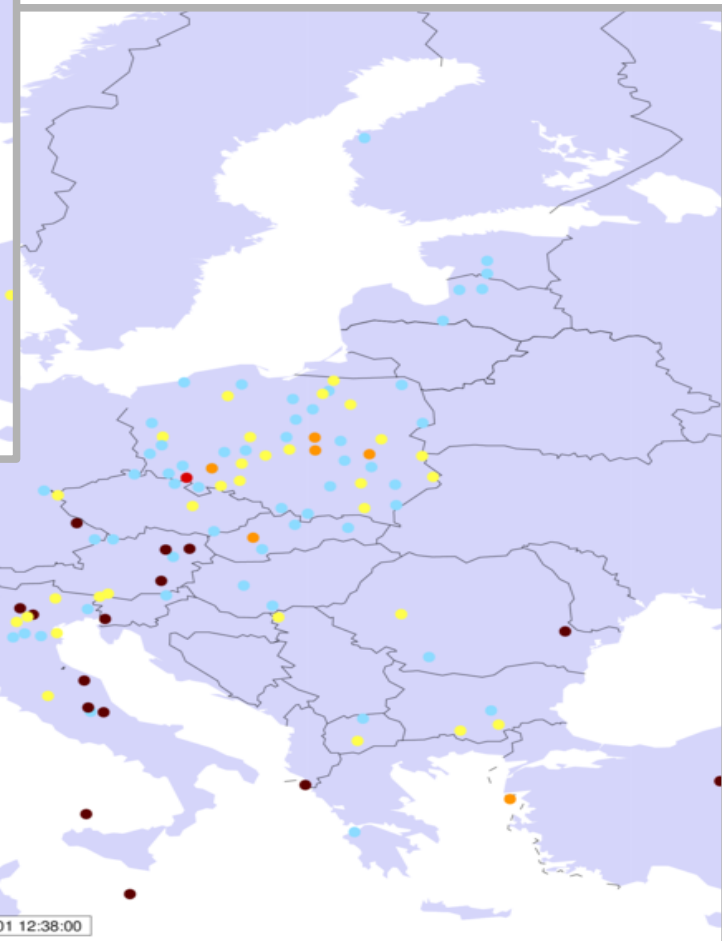
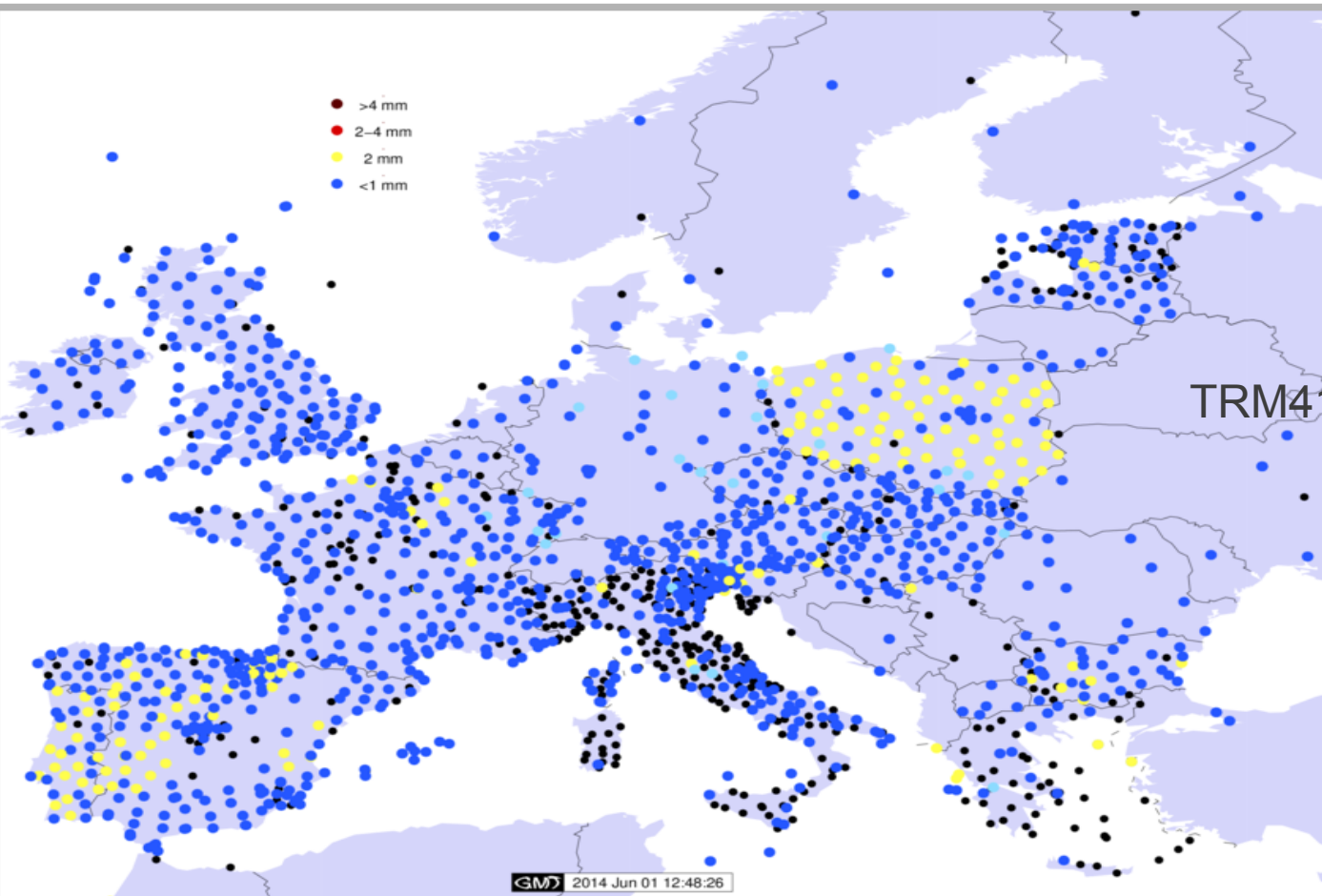
ANALYSIS ISSUE: MIXED IGS05/08 ATX

ALL ANALYSIS GROUPS - EXCEPT BIFG/UK - USED IGS05 UNTIL GPSWEEK 1632, THEN CHANGED TO IGS08 AND TO IGb08 AT WEEK 1709
→ POSITION OFFSET MAY APPEAR AT GPSweek1632 IN THE POSITION TIME SERIES

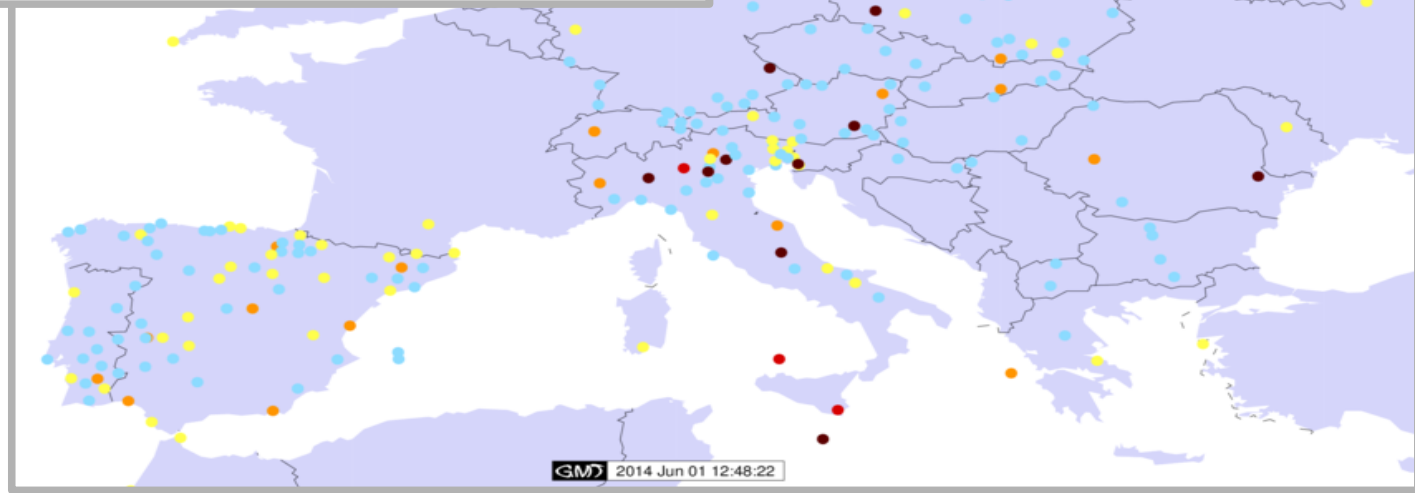
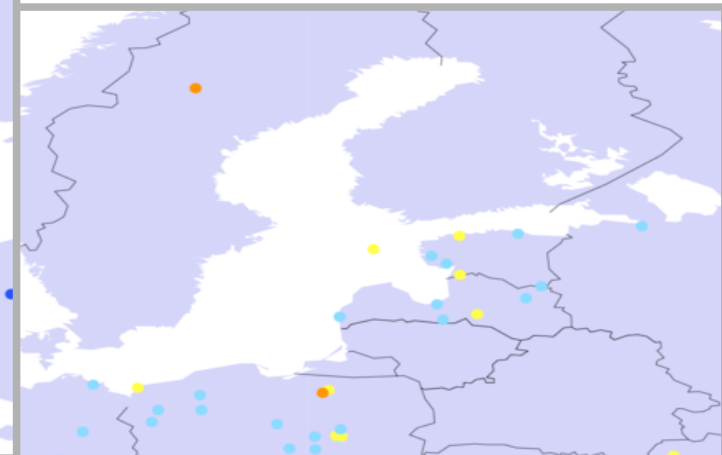
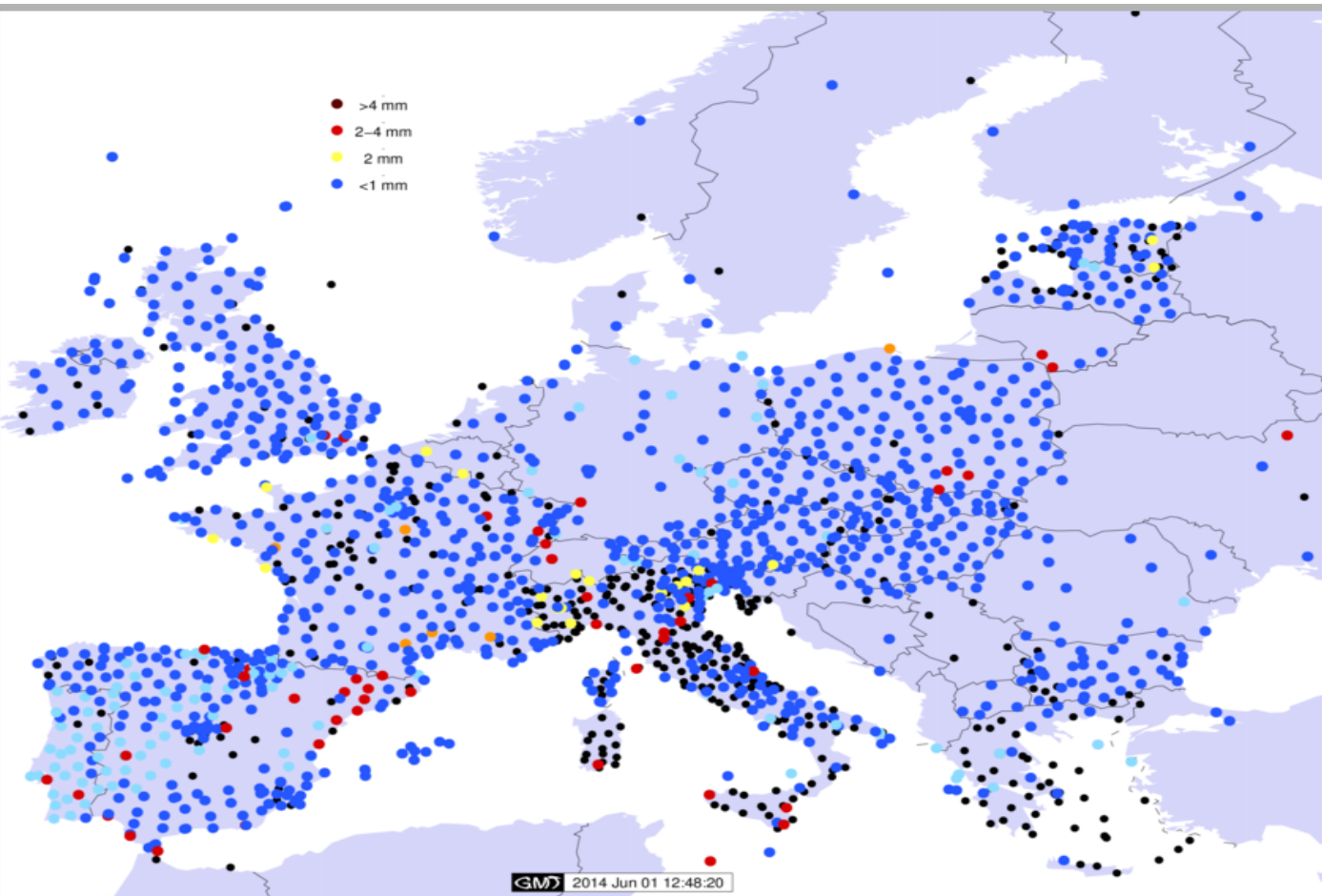
OFFSET ESTIMATES FROM THE

- 1) IGS TOOL (REBISCHUNG ET AL, IGSMail 6354)
 - 2) RESIDUAL POSITION TIME SERIES FROM THE EDV COMBINATION
- HAVE BEEN COMPARED AND ANALYZED

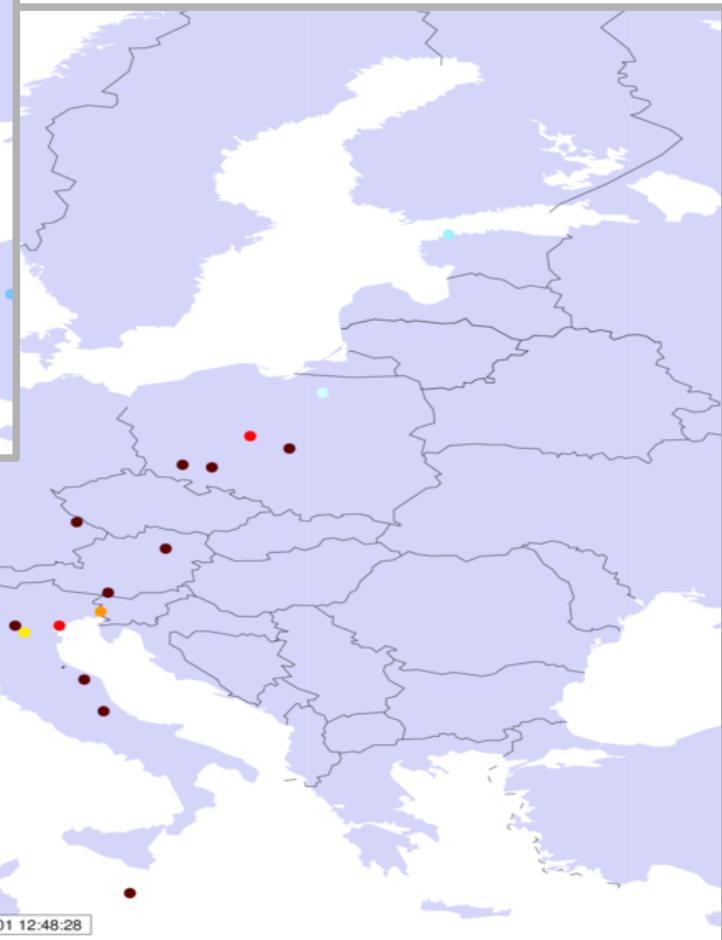
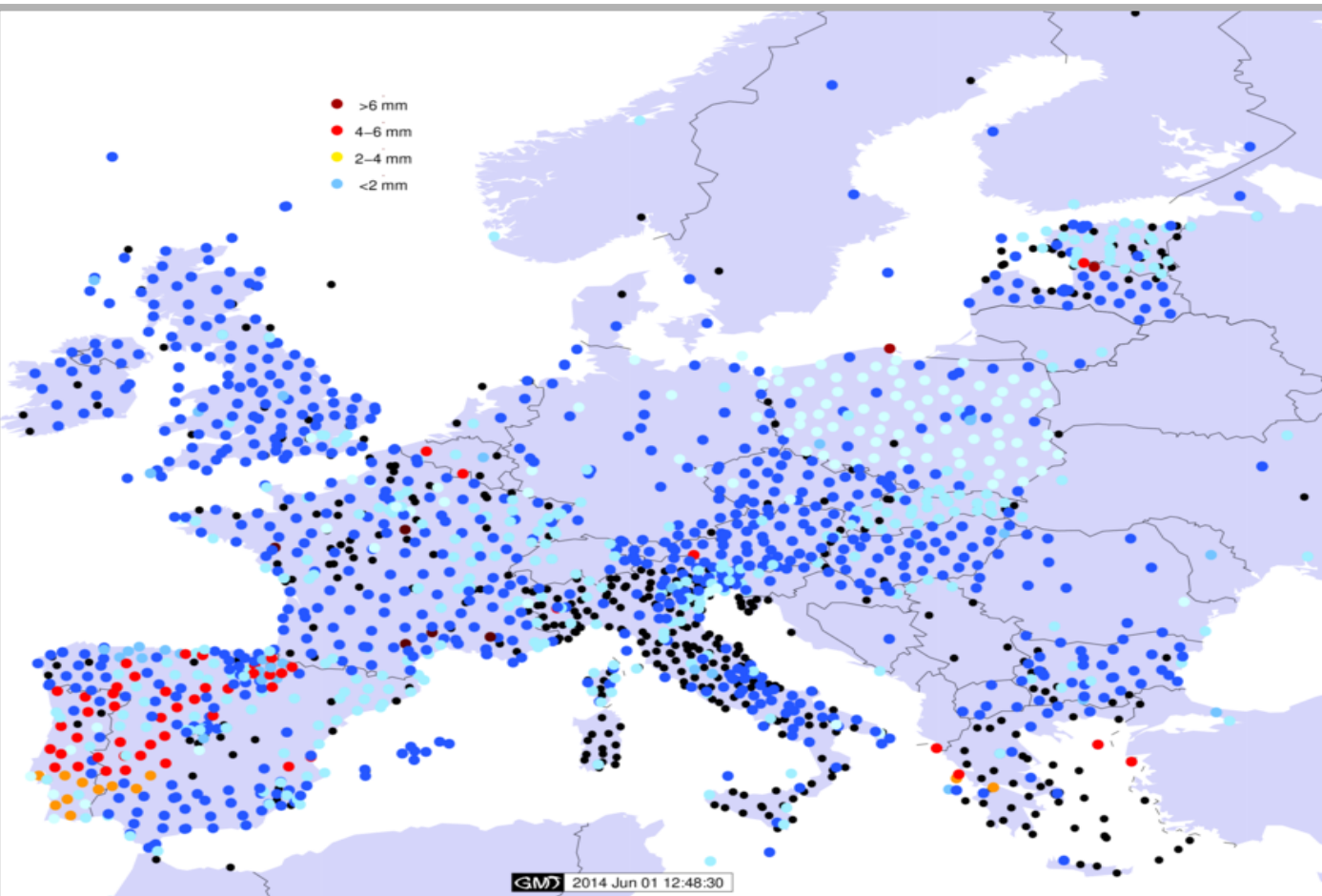
IGS05/08 ATX OFFSETS: N-COMPONENT



IGS05/08 ATX OFFSETS: E-COMPONENT



IGS05/08 ATX OFFSETS: U-COMPONENT

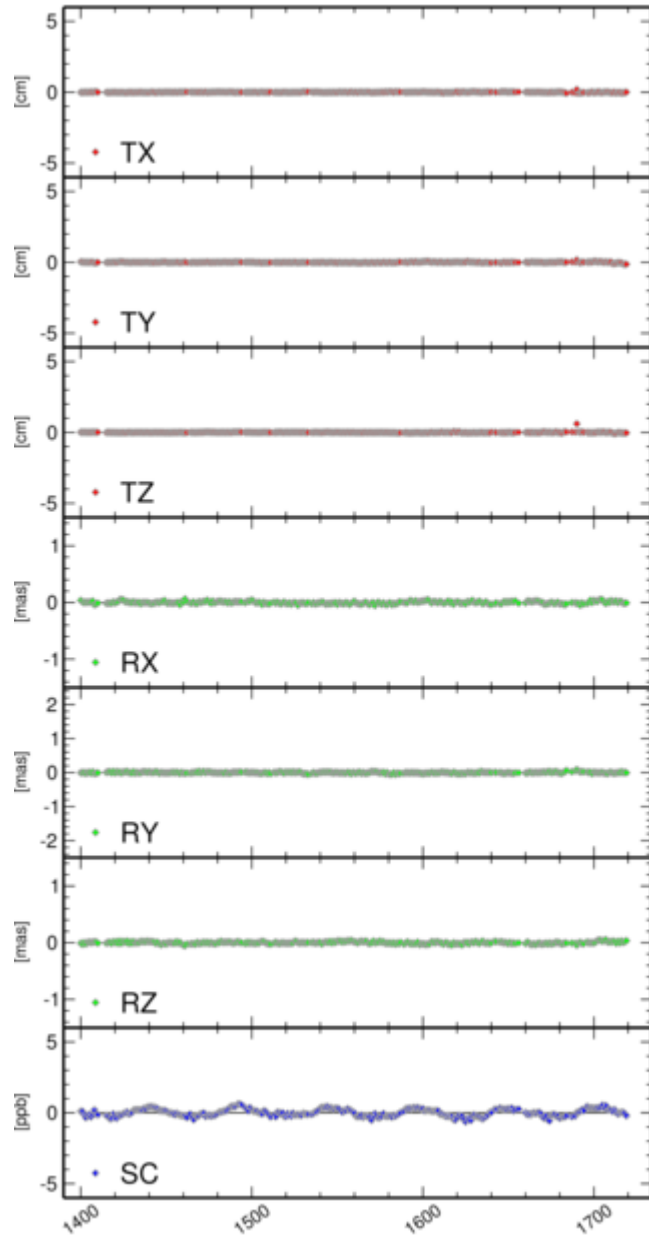


CONTRIBUTION SPECIALITIES

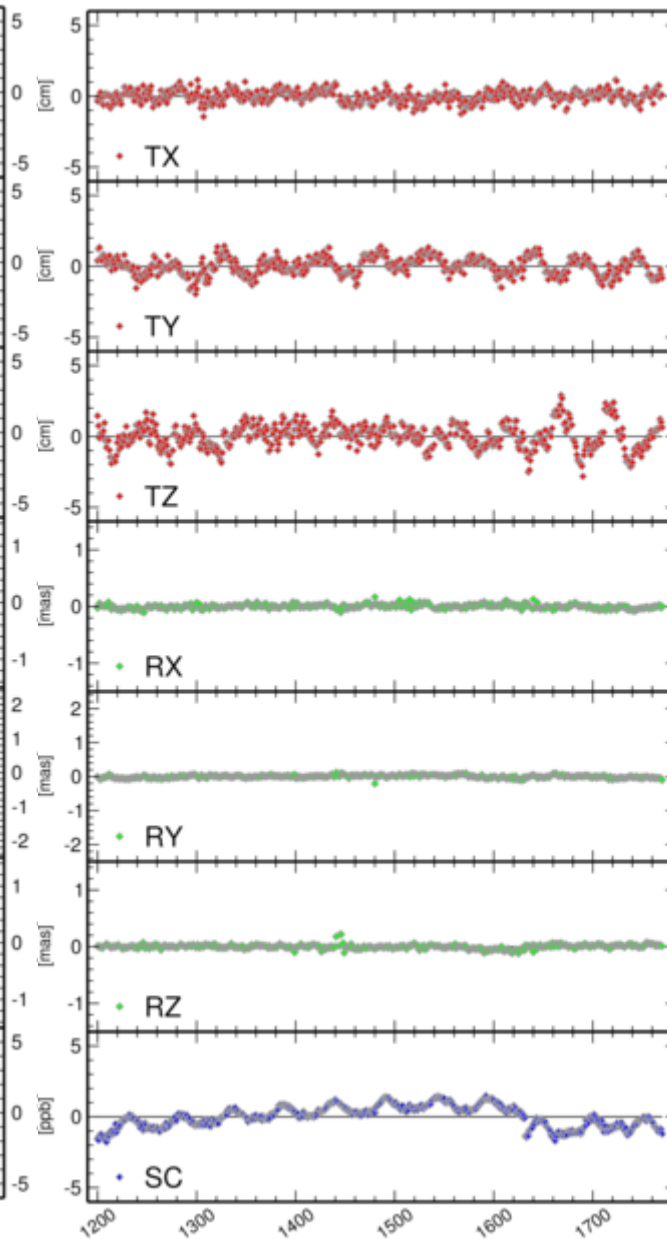
- RELEVANT CONTRIBUTIONS WITH STILL **SHORT** SERIES
 - Italy (400 sites!)
 - Greece, HEPOS
- **PENDING** CONTRIBUTIONS
 - Spain / Portugal: available and ready, but wait for the PhD of MV
 - Serbia, Croatia: invitation letter sent ...
- **EXPECTED** CONTRIBUTIONS
 - The Netherlands (✓), Belgium
 - NKG
 - Germany
- **NEED FOR METADATA (STA FILE and/or LOG files)**

HELMERT-TRANSFORMATIONS

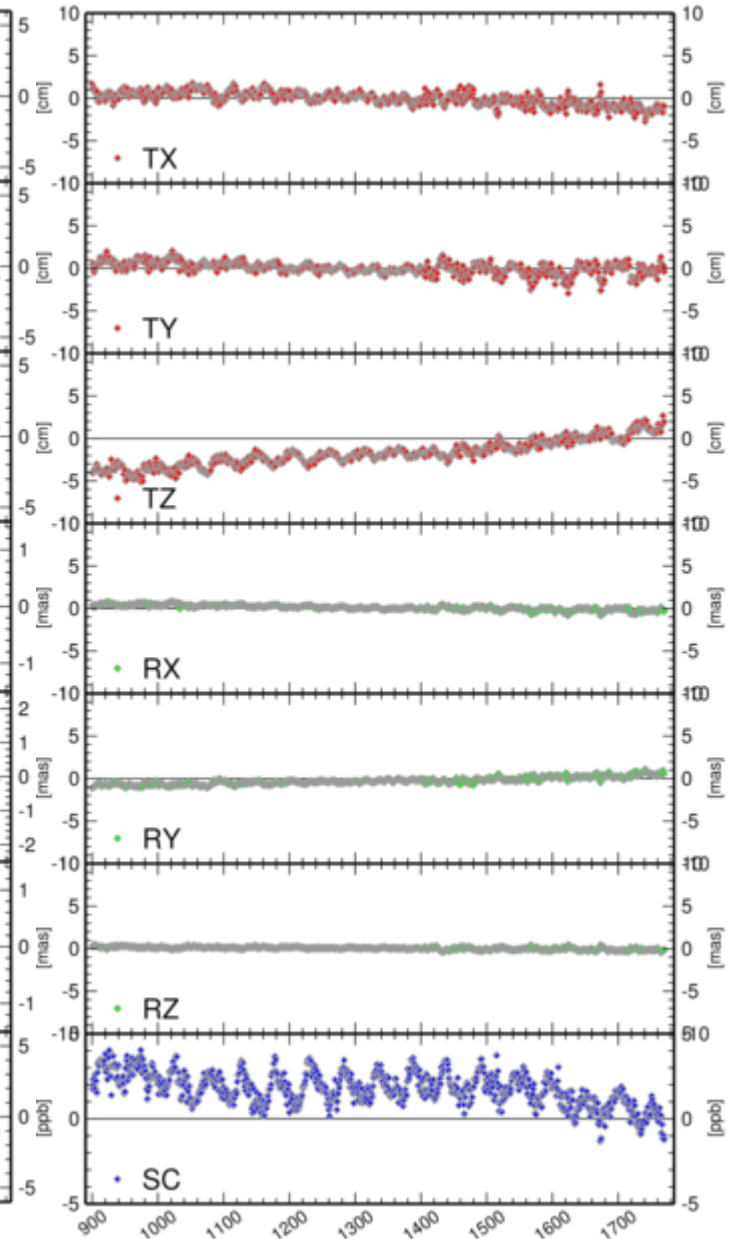
BGF_Helmert_parameters



SGN_Helmert_parameters



ECW_Helmert_parameters

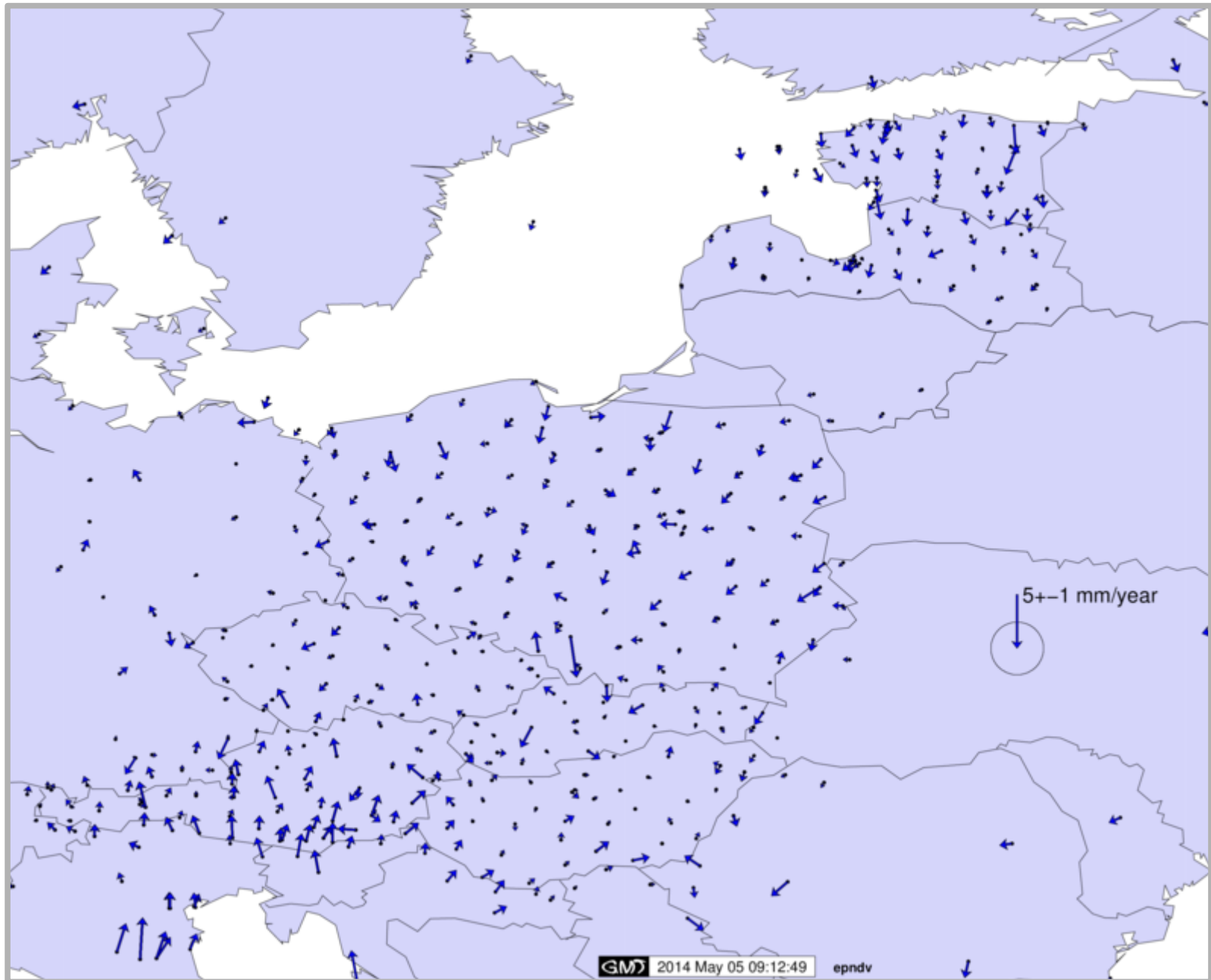


BGF cumulative solution: epndv

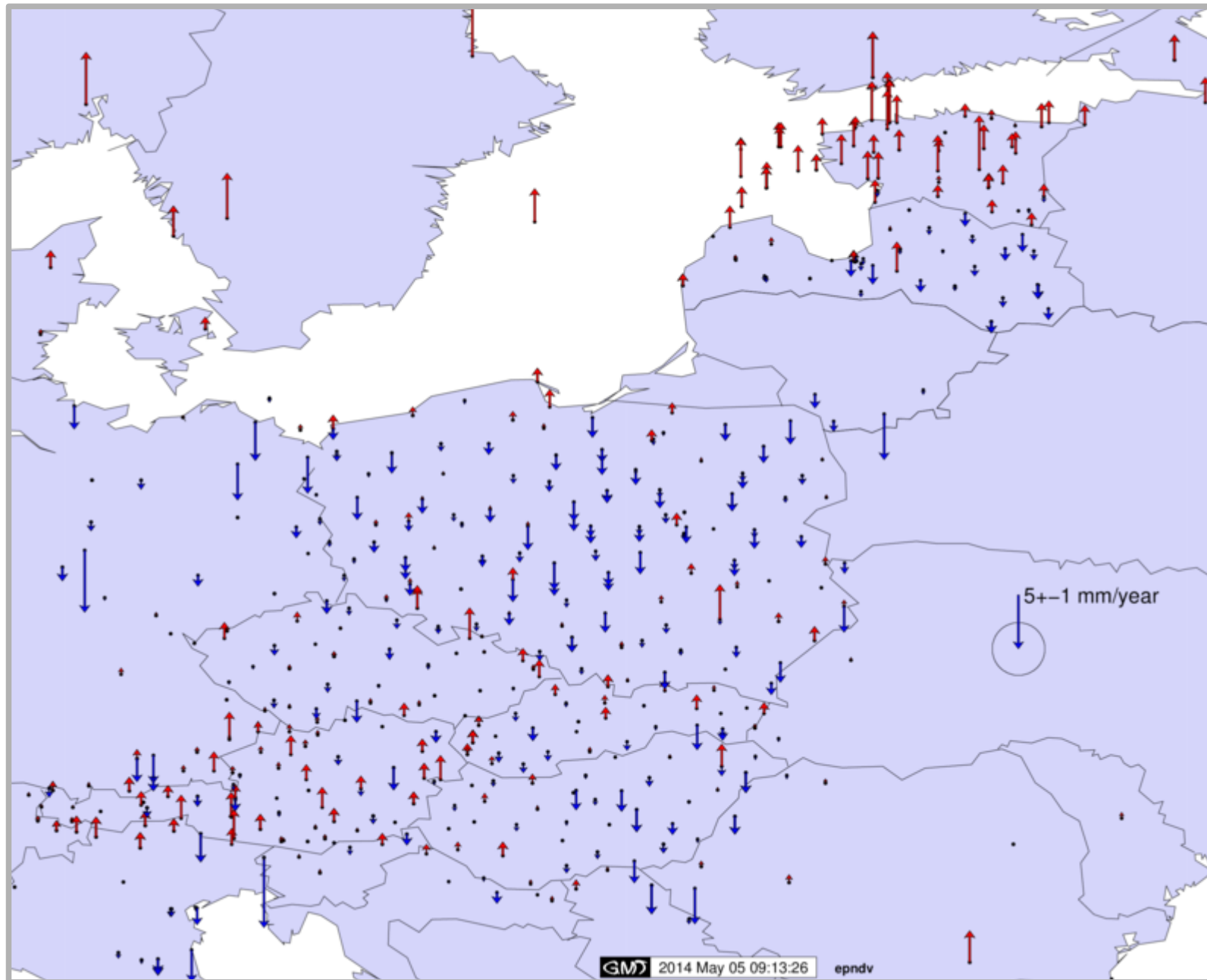
SGN cumulative solution: epndv

ECW cumulative solution: epndv

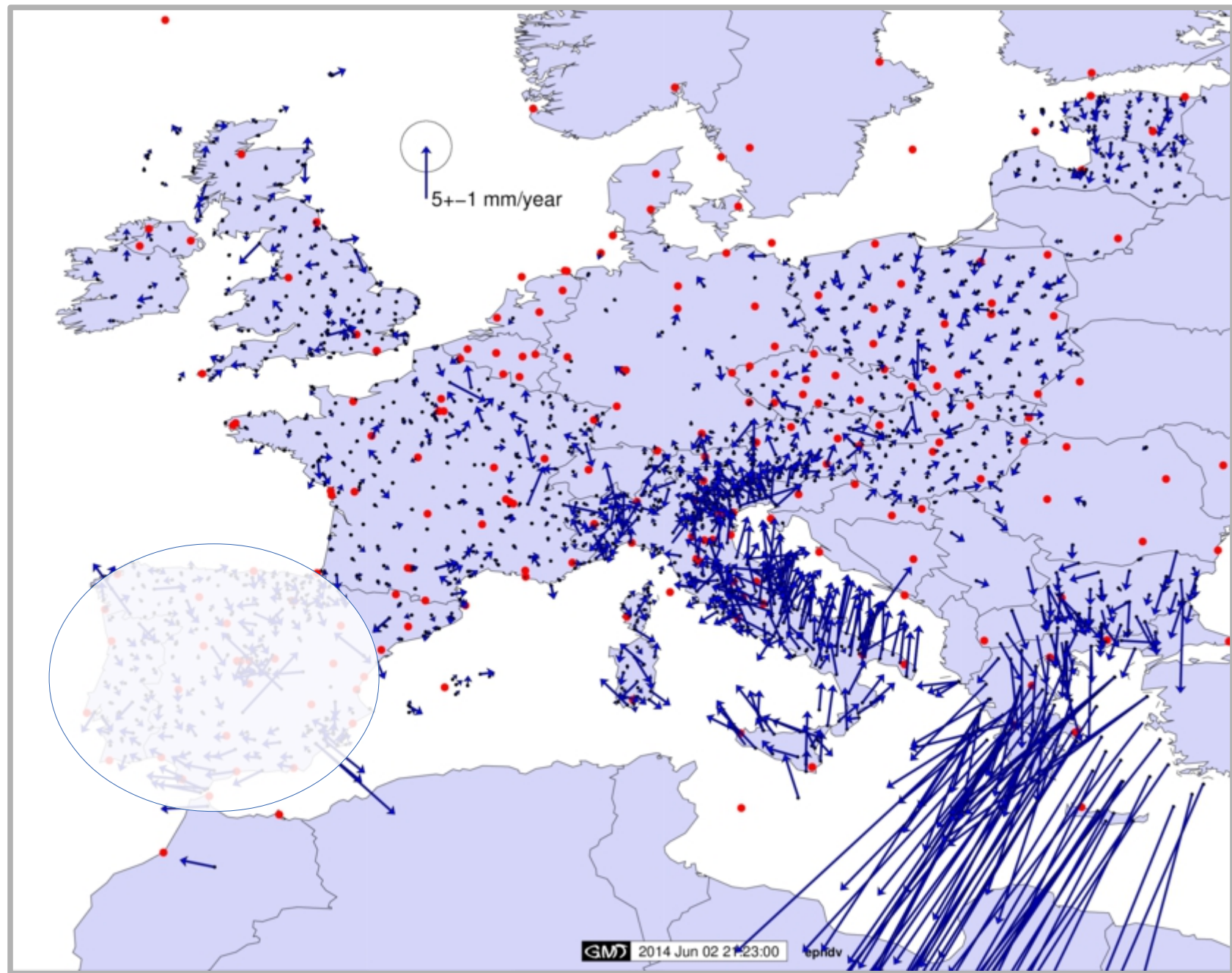
2D VELOCITIES- ECC



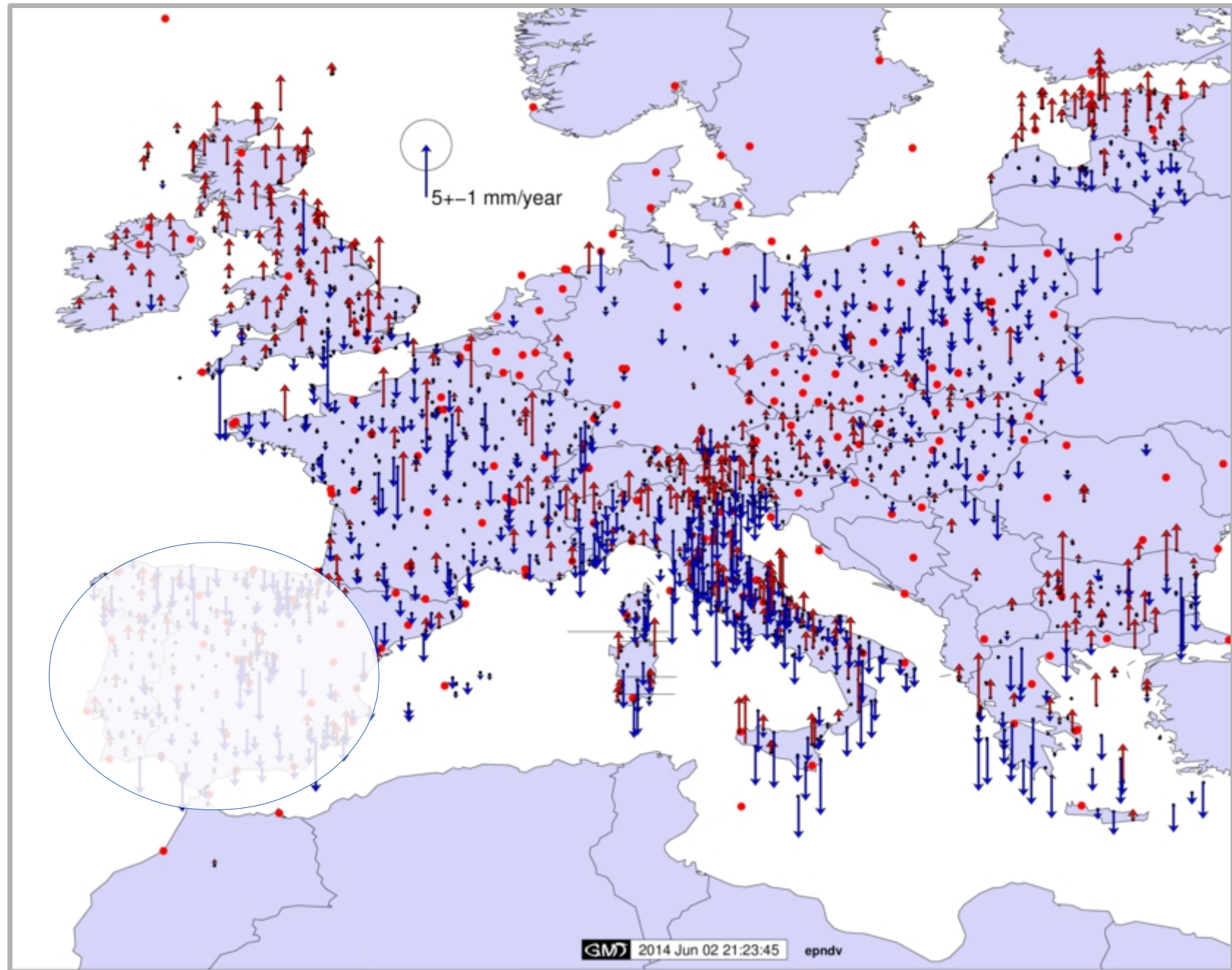
UP VELOCITIES - ECC



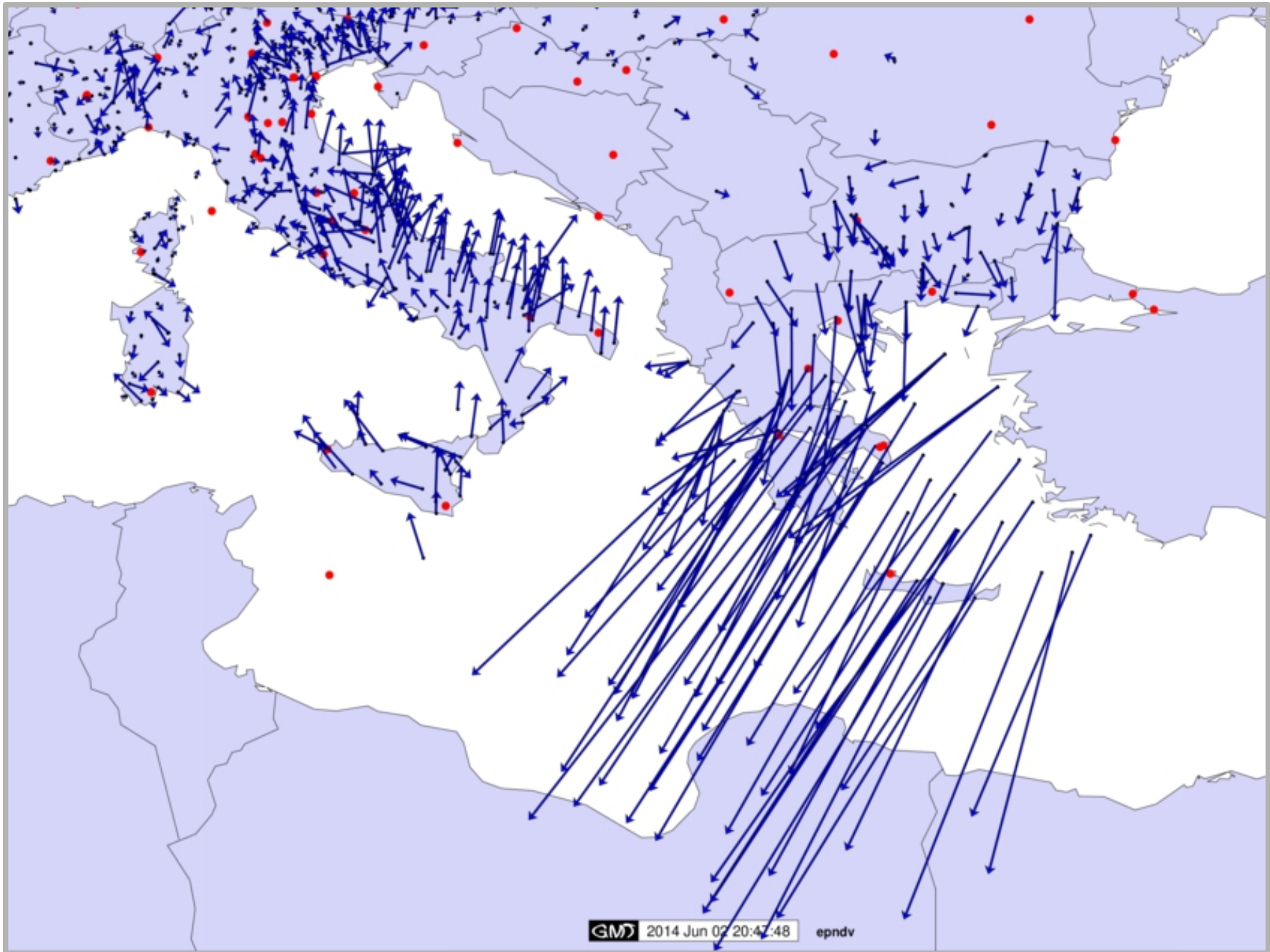
2D VELOCITIES



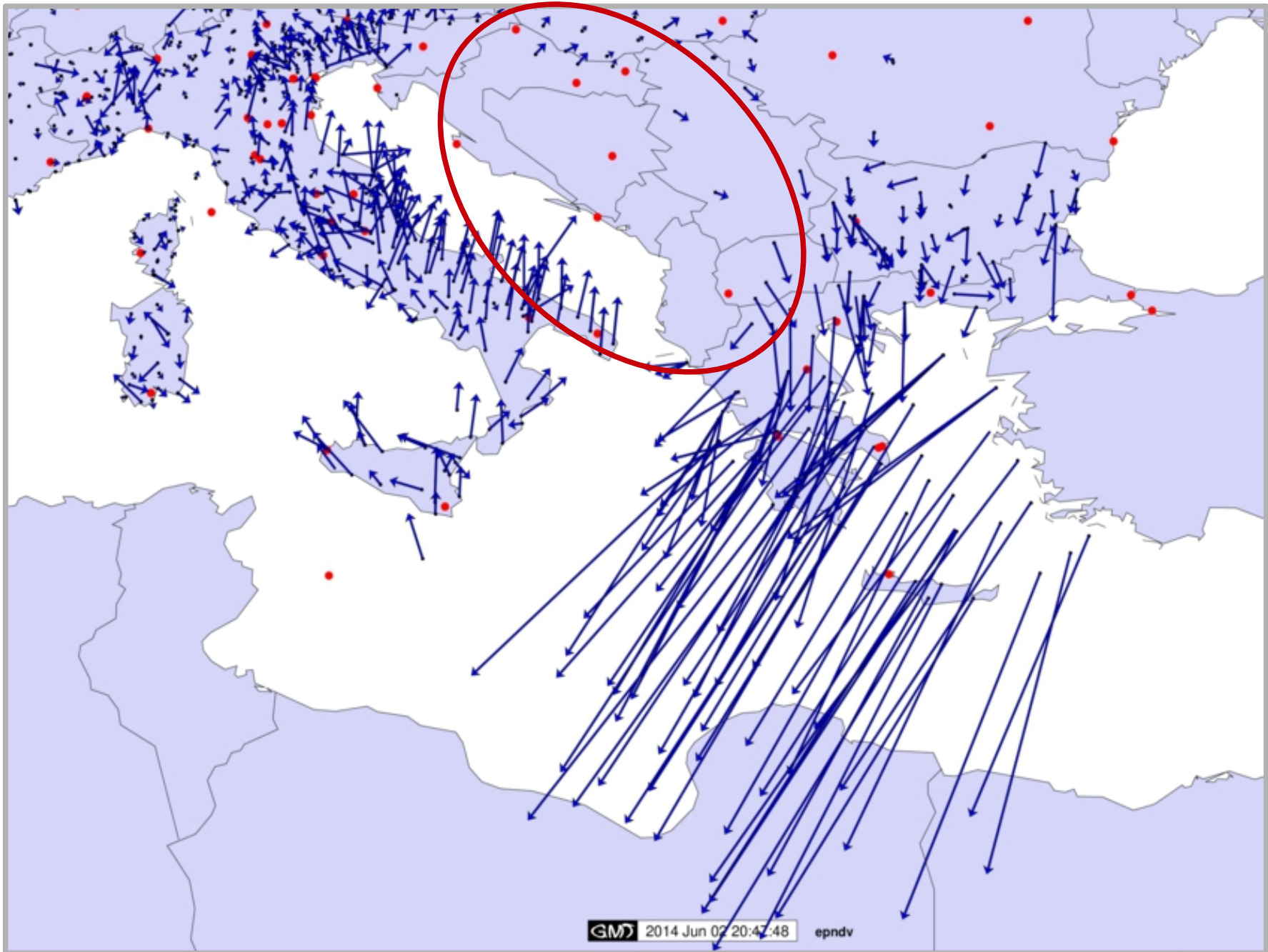
UP VELOCITIES



2D VELOCITIES - MEDITERRANEAN



2D VELOCITIES - MEDITERRANEAN



ISSUES, TASKS, PLANS

- **IGS01 / IGS05 / IGS08 ATX**

- IGS08 only: BIGF
- mixed (week 1632)

What to do?

- Keep them as they are!
- Correction did not help – only reprocessing!

- **HANDLING OF LARGE DATASETS**

- Further tests with clustering
- Latest CATREF version to be implemented

- **FILLING IN WHITE SPOTS (CS-EUROPE)**

- **EPN DENSIFICATION WILL BE GLOBAL → ← EPN not (yet)**

- **WEBSITE PREPARATION**