

# **Integration of the EPN and the dense national weekly SINEX solutions.**

**towards the dense European velocity field**

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# HISTORIC OVERVIEW

- **IAG Working Group on Regional Dense Velocity Fields, 2007-2011**
  - collection and integration of “local” cumulative solutions
  - inhomogeneities, inconsistencies
- **EUPOS Combination Centre - ECC - 2009**
  - combination of weekly SINEX solutions from national commercial permanent networks
  - successful pilot to prove the concept
- **IAG Working Group 'Unified Dense Velocity Fields' 2011-2015**
  - continental extension of the ECC-type approach
  - EUREF2010 symposium resolution #4

# ADVANTAGES

- **HOMOGENIZATION OF THE NATIONAL ACTIVE GNSS NETWORKS / ANALYSIS / PRODUCTS**
- **ETRS89 → EPN → NATIONAL NETWORKS**
- **LONG TERM SITE MONITORING**
  - SITE LOG (IF ANY!) VALIDATION AND FEEDBACK
  - OFFSETS, BAD DATA
- **QUALITY UPGRADE: PRODUCTION NETWORKS FOR SCIENCE**
  - TIME SERIES ANALYSIS & INTERPRETATION
  - VELOCITY MODELING (**HOMOGENEITY!!!**)
  - ...
- **PRICE TO PAY**
  - MORE CAREFUL SITE OPERATION
  - INTENSIVE ANALYSIS / FEEDBACK / COOPERATION

# COMBINATION

- **INPUT:** national weekly sinex solutions
- **“PATCHWORK”** - EPN as skeleton
- **COMBINATION TOOL:** CATREF
- **STRATEGY:**
  - Weekly SINEX check from each analysis centre, *1st filtering (naming, outliers)*
  - Combination: EPN + all AC solutions on the weekly level, *2nd filtering (overlaps)*
  - Datum: same as used for EPN
  - Cumulative solution, *3rd filtering*

# KEY REQUIREMENTS

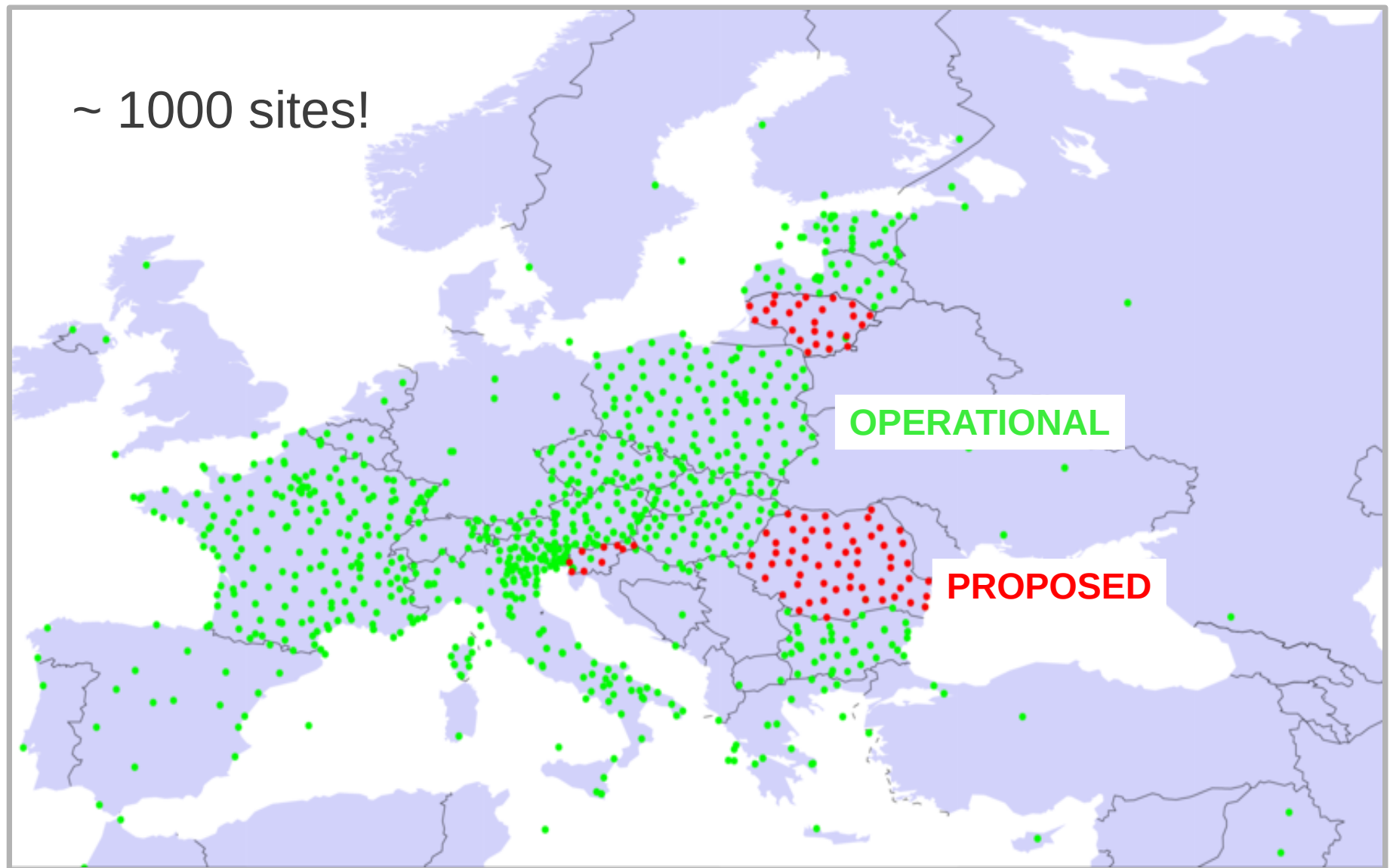
## WEEKLY NATIONAL SINEX SOLUTIONS

- scientific (BERNESE, GAMIT, GIPSY ...) analysis,
- EPN strategy,
- include EPN stations as datum,
- MINIMUM CONSTRAINED solutions,
- Naming (4 char) → internal re-naming  
<http://sopac.ucsd.edu/scripts/checkSiteID.cgi>
- DOMES numbers are requested → internal DOMES  
current DOMES standard (cccnMsss) does not fit for dense  
networks (Poland)

# SITES AVAILABLE AS OF 2011



# SITES AVAILABLE AS OF TODAY



# CONTRIBUTING PARTNERS - MAY-2012

ASG	Poland	: 1482 - 1664	
EST	Estonia	: 1448 - 1670	
GGI	Latvia	: 1461 - 1647	
GKU	Slovakia	: 1408 - 1668	
SGO	Hungary	: 1400 - 1680	
AMON	Austria	: 1107 - 1672	2012
MON	Austria	: 1107 - 1677	
BUL	Bulgaria	: 1434 - 1685	daily GAMIT
CZE	Czech R	: 1565 - 1660	
UPA	Italy	: 1422 - 1688	
CEGRN	C-Europe	: 1994 - 2009	biannual campaigns

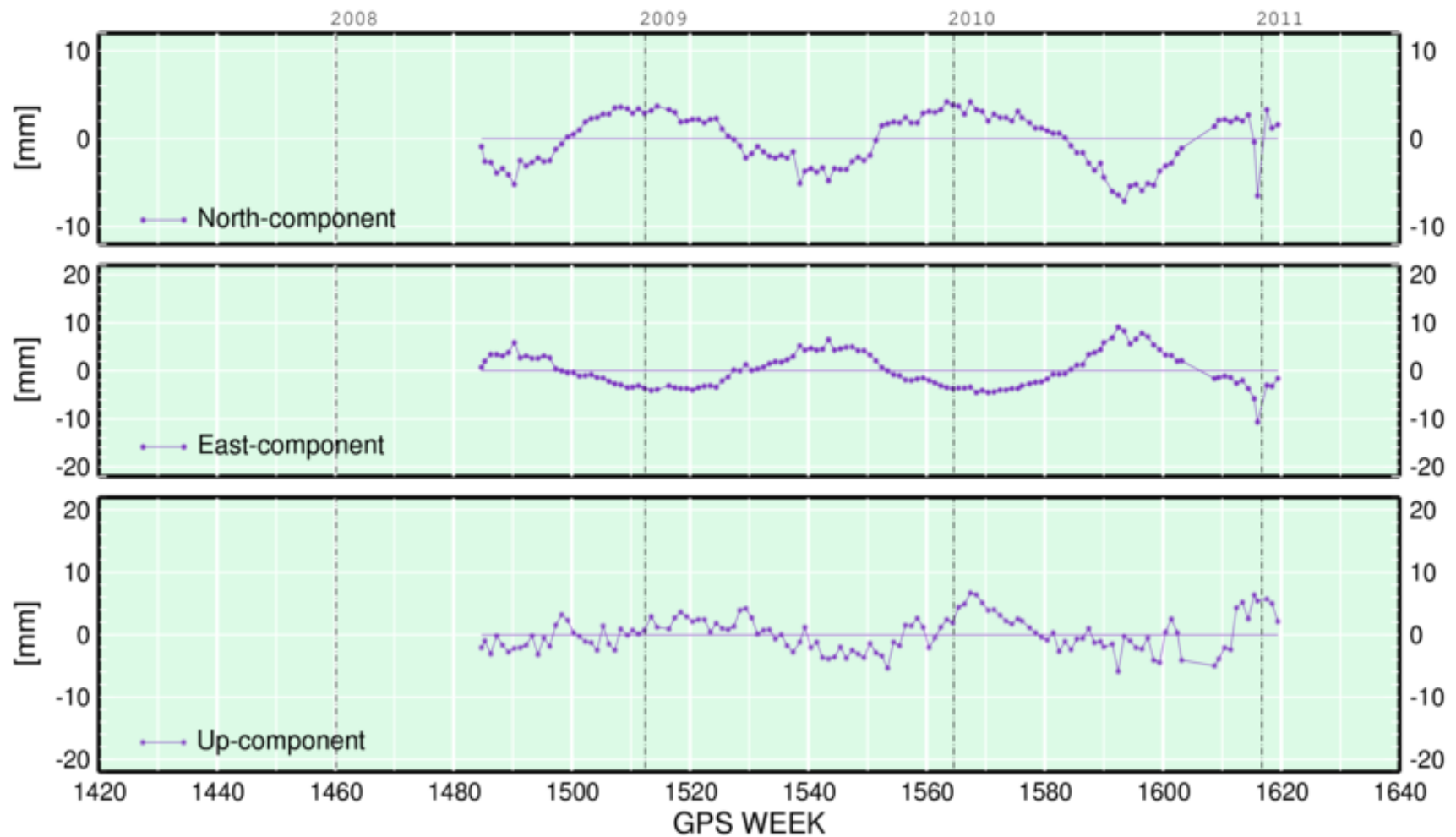
**MORE CONTRIBUTIONS ARE EXPECTED, AN INVITATION LETTER FROM THE EUREF PRESIDENT IS BEING SENT TO ALL EUROPEAN PARTNERS.**



# STATUS, EXPERIENCES, PLANS

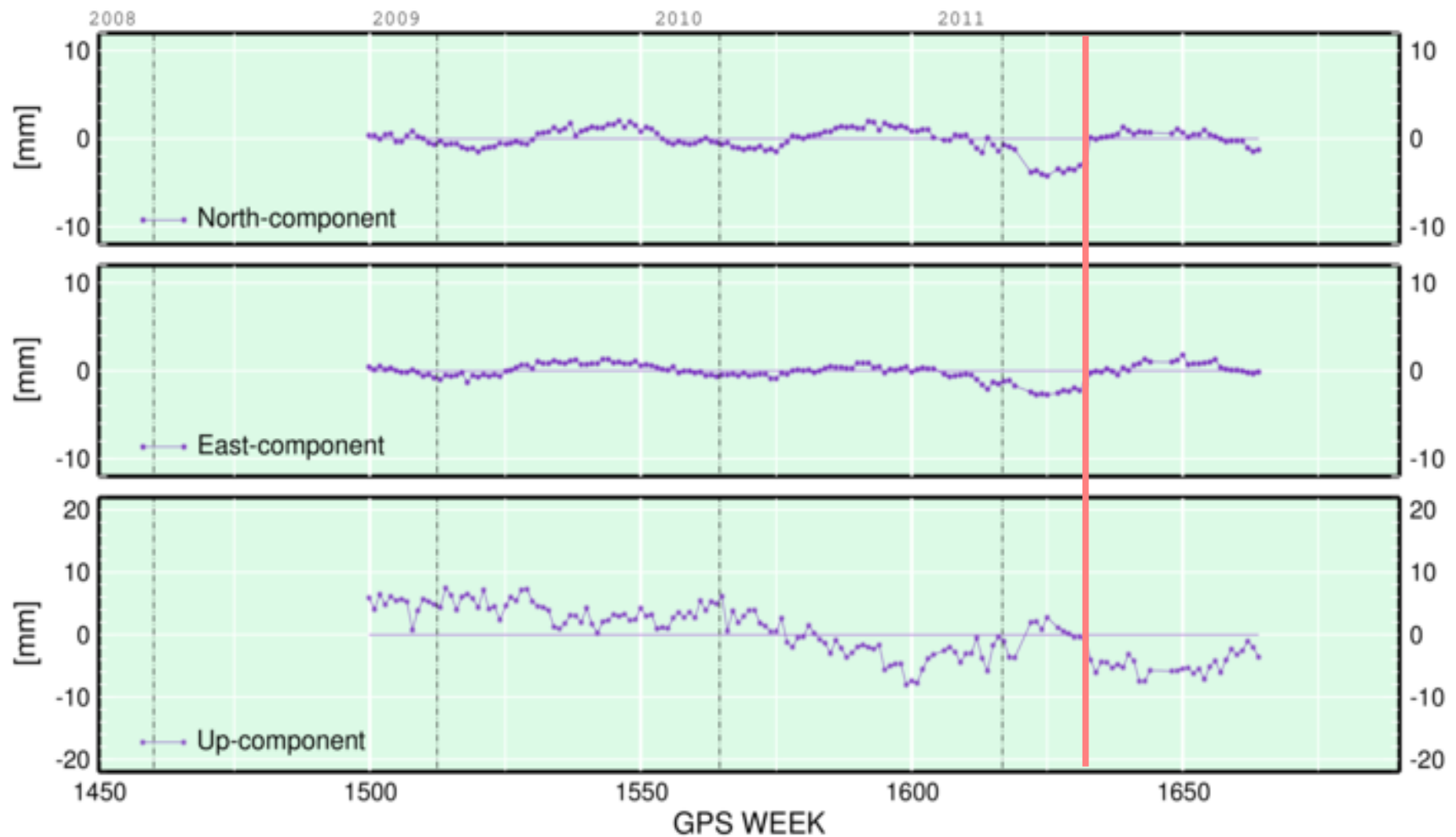
- AC-specific cumulative solutions have been prepared, *tests are in progress*,
- Observed problems (naming, SINEX content, constraints) will be discussed by the partners,
- **Test cumulative solutions using data of weeks 1500-1670 has been prepared,**
- Specific problem-types identified
  - Station attributes (overlapping and duplicate stations, 4 char ID, DOMES numbers)
  - Times series: noise, seasonal signal, offsets
  - epn05.atx to epn\_08-atx
  - Monumentation weaknesses - longer TS is needed
- Iterations and filtering are necessary

# SEASONAL ~~SIGNAL~~ AS NOISE



# e pn05.atx to e pn08.atx change

WLOC\_18999M001 (CLEAN)

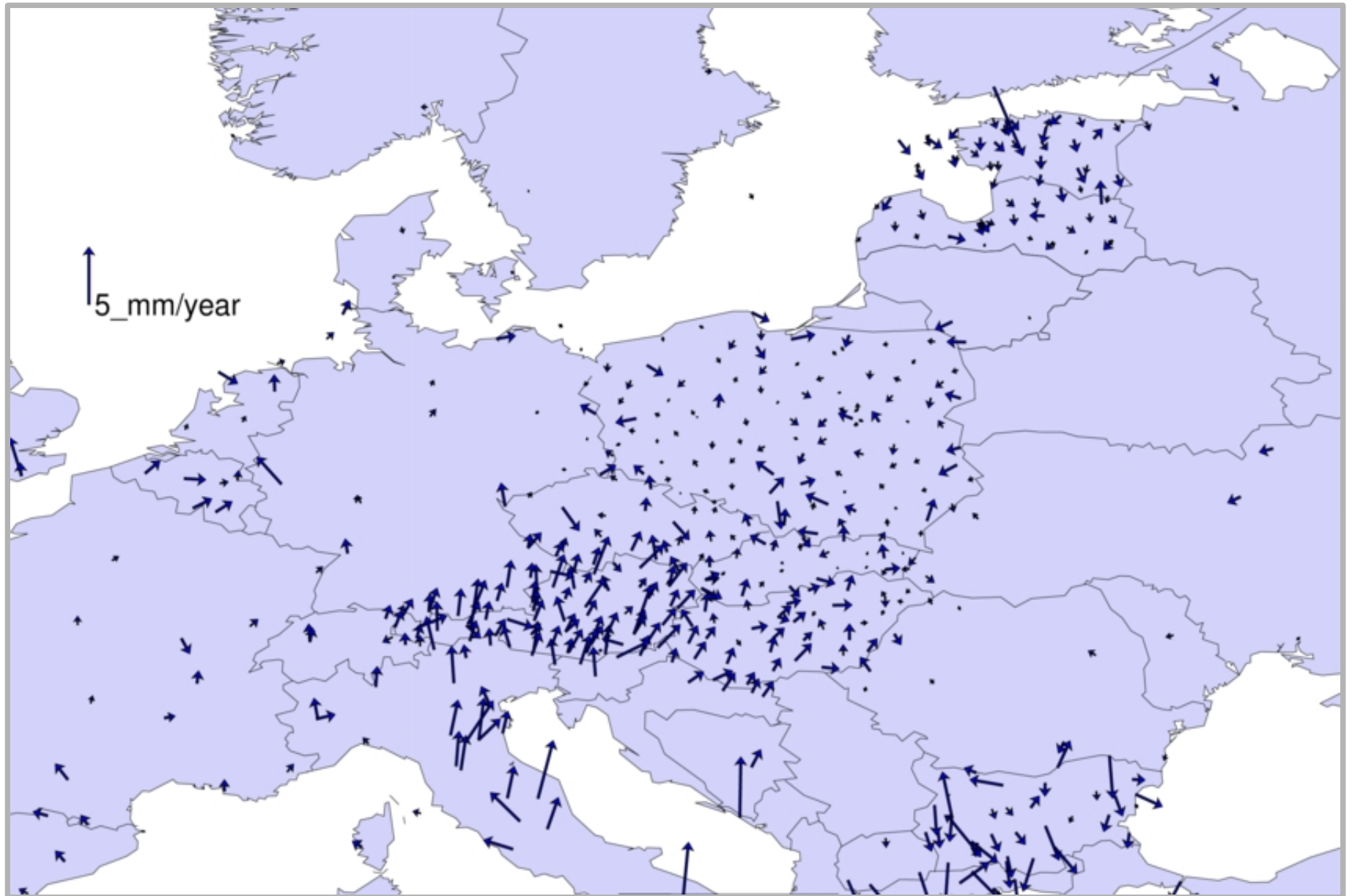


# PRODUCTS AND THEIR USE

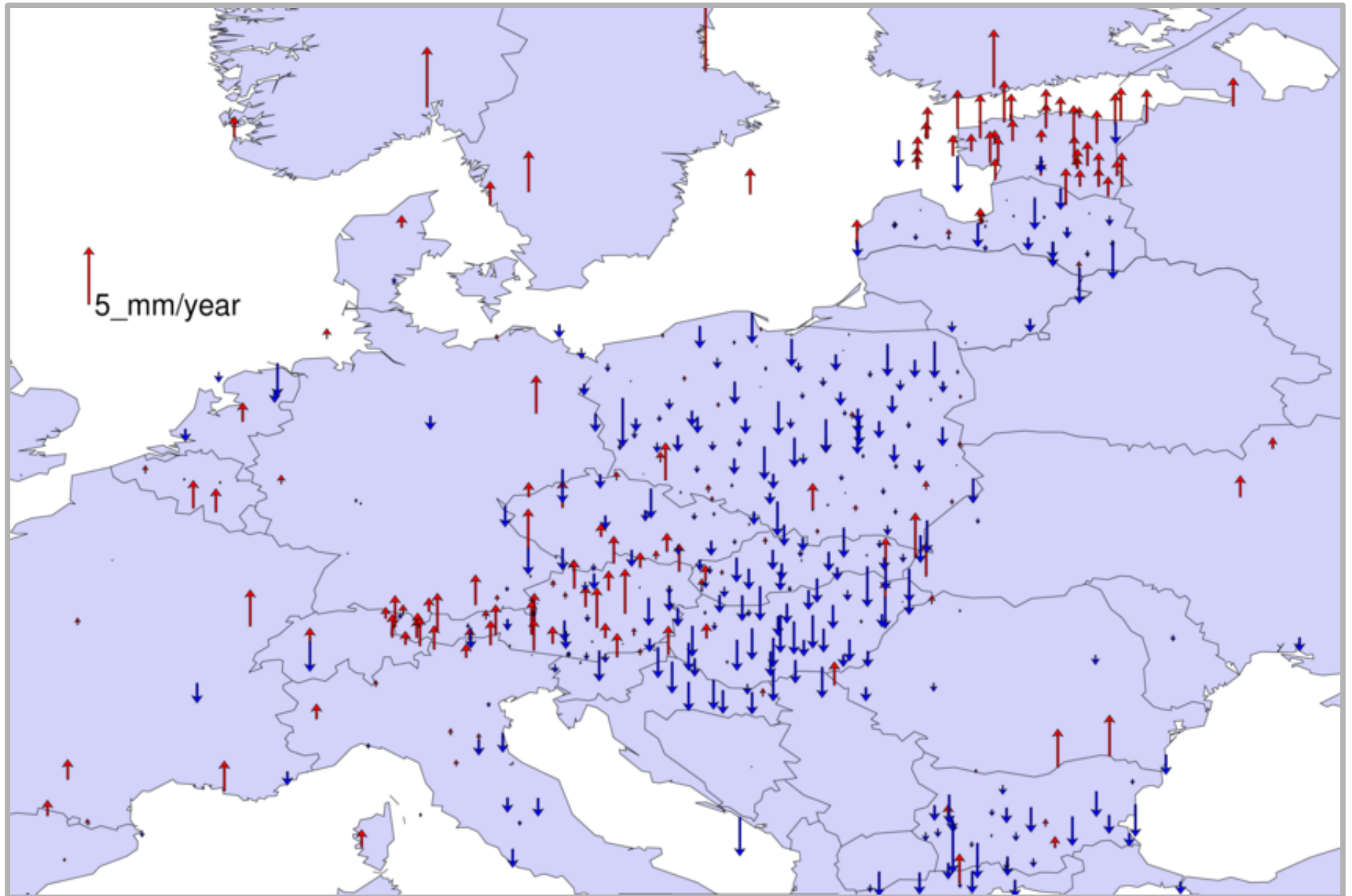
- Cumulative solutions per national network  
**THE CLEANED WEEKLY SINEX WILL BE RETURNED TO THE PROVIDER!**
- Cumulative SINEX solution
- Coordinate and velocity estimates in  
ITRF2005 → ITRF2008 / IGS08  
ETRS89 - ETRF2000
- Time series plots for site monitoring
- Coordinates for ETRS89 validation (TWG project)
- **Unified, homogeneous European velocity model**
- Improved future realization/implementation of ETRS89

# ESTIMATED VELOCITIES

## horizontal



# ESTIMATED VELOCITIES vertical



# ACKNOWLEDGEMENTS

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Günter Stangl

UP, Italy

GKU, Slovakia

IGN, France

BAS, Bulgaria

LU, Latvia

CUZK, Czech R

MAAAMET, Estonia

ASG, Poland

OEAW, Austria

**PLEASE JOIN THIS CLUB, WHERE ONE OF THE MOST  
IMPORTANT EUREF PRODUCT IS BEING PREPARED!**