

# **NEW APPROACH FOR THE ITRF2008 DENSIFICATION: GLOBAL EPN**

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# OUTLINE

- ◆ REGIONAL DENSIFICATION - RELATED PROBLEMS
  - ◆ NETWORK EFFECT - BIASED POS / VEL & HARMONIC PART
- ◆ "GLOBALIZATION"
  - ◆ EXTEND REGIONAL ROUTINE ANALYSIS TO GLOBAL
  - ◆ MERGE EXISTING GLOBAL AND REGIONAL SOLUTIONS ON THE WEEKLY SINEX LEVEL
- ◆ ANALYSIS OF THE SEASONAL SIGNAL CONTENT

# REGIONAL RECOVERY OF THE GLOBAL FRAME

DATUM DEFINITION: **MINIMUM CONSTRAINED**

## NETWORK EFFECT

- GLOBAL vs. REGIONAL COVERAGE
- DIFFERENT DATA CONTENT
  - ANALYSIS SOFTWARE: OUTLIER HANDLING
  - INCREASED REGIONAL WEIGHT
  - ELIMINATED REGIONAL PATTERN: linear, seasonal

## CONSEQUENCES

- BIASED COORDINATE AND VELOCITY ESTIMATE
- ATTENUATED HARMONIC SIGNAL CONTENT

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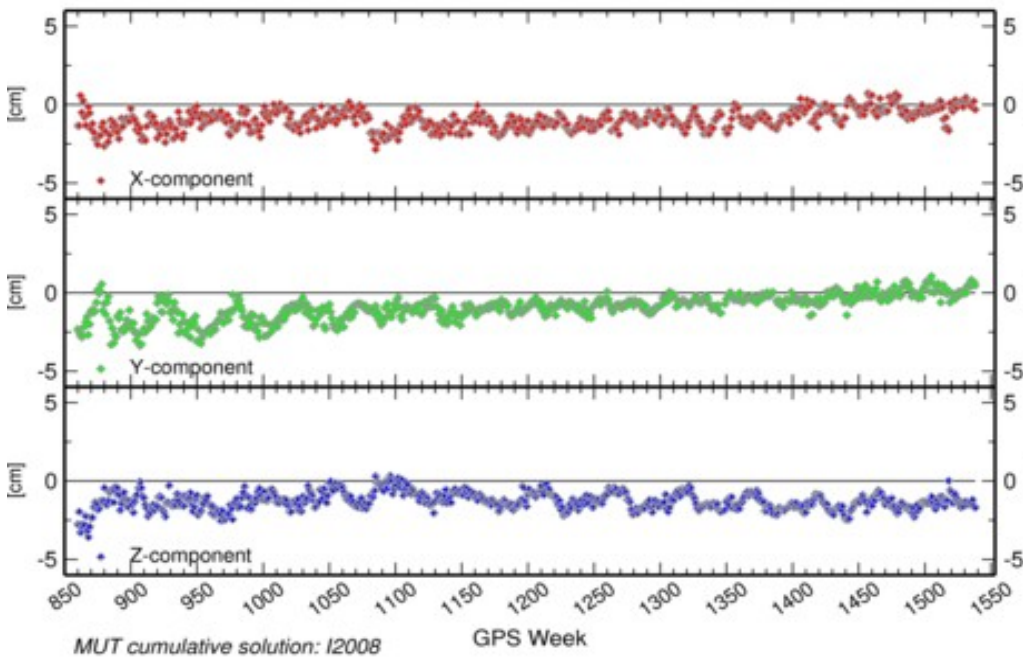
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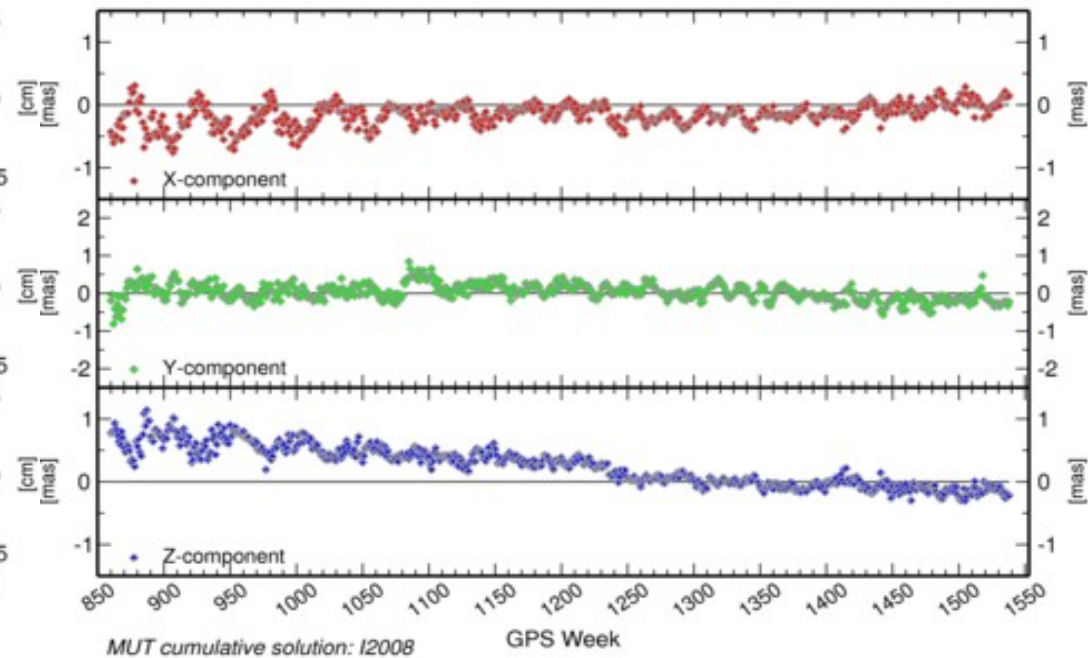
# NETWORK EFFECT REFLECTED IN THE CUMULATIVE HELMERT PARAMETERS

## EPN/MUT CUMULATIVE SOLUTION

MUT Helmert translation parameter series



MUT Helmert rotation parameter series



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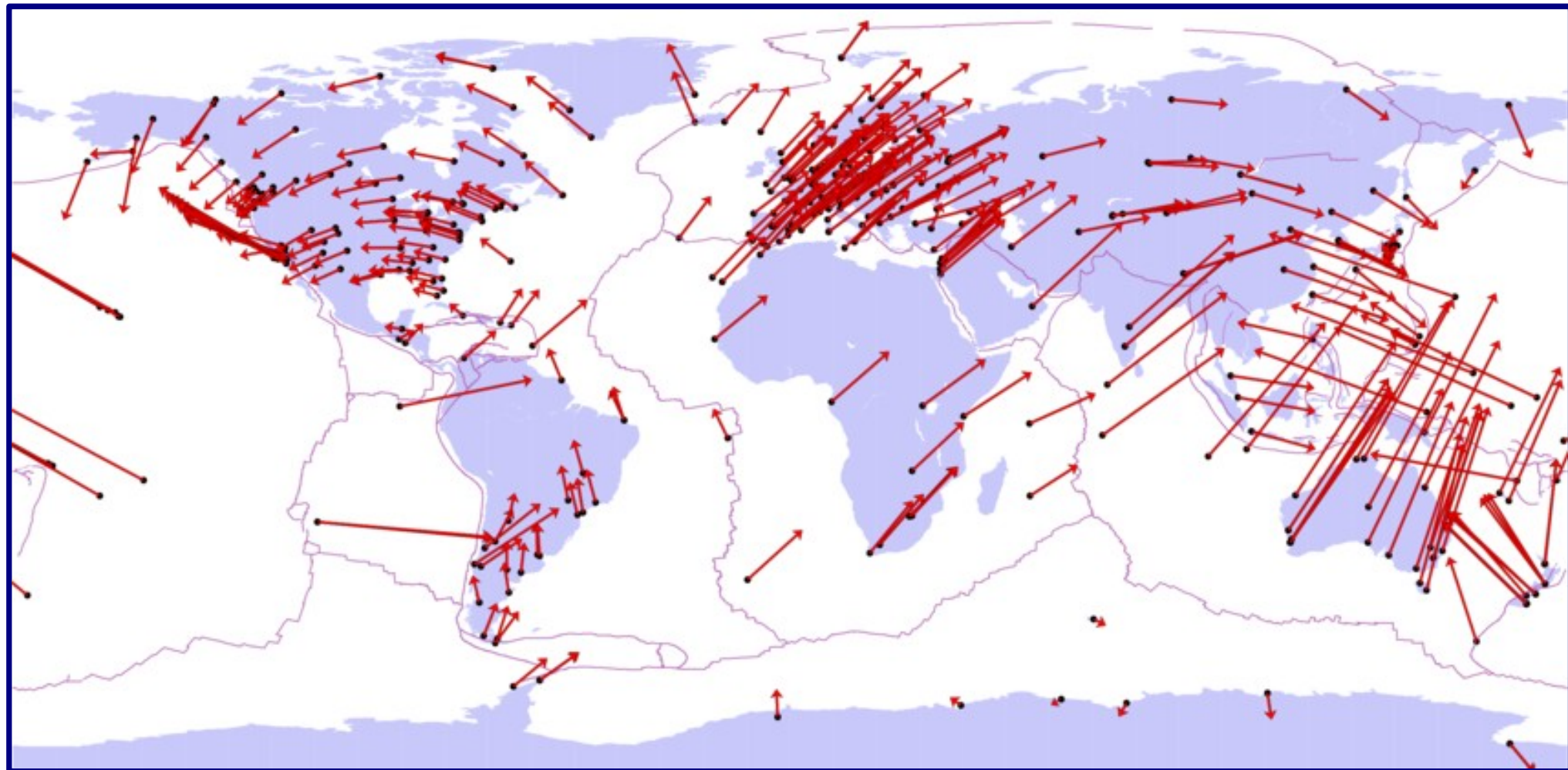
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# ITRF2008 VELOCITY FIELD

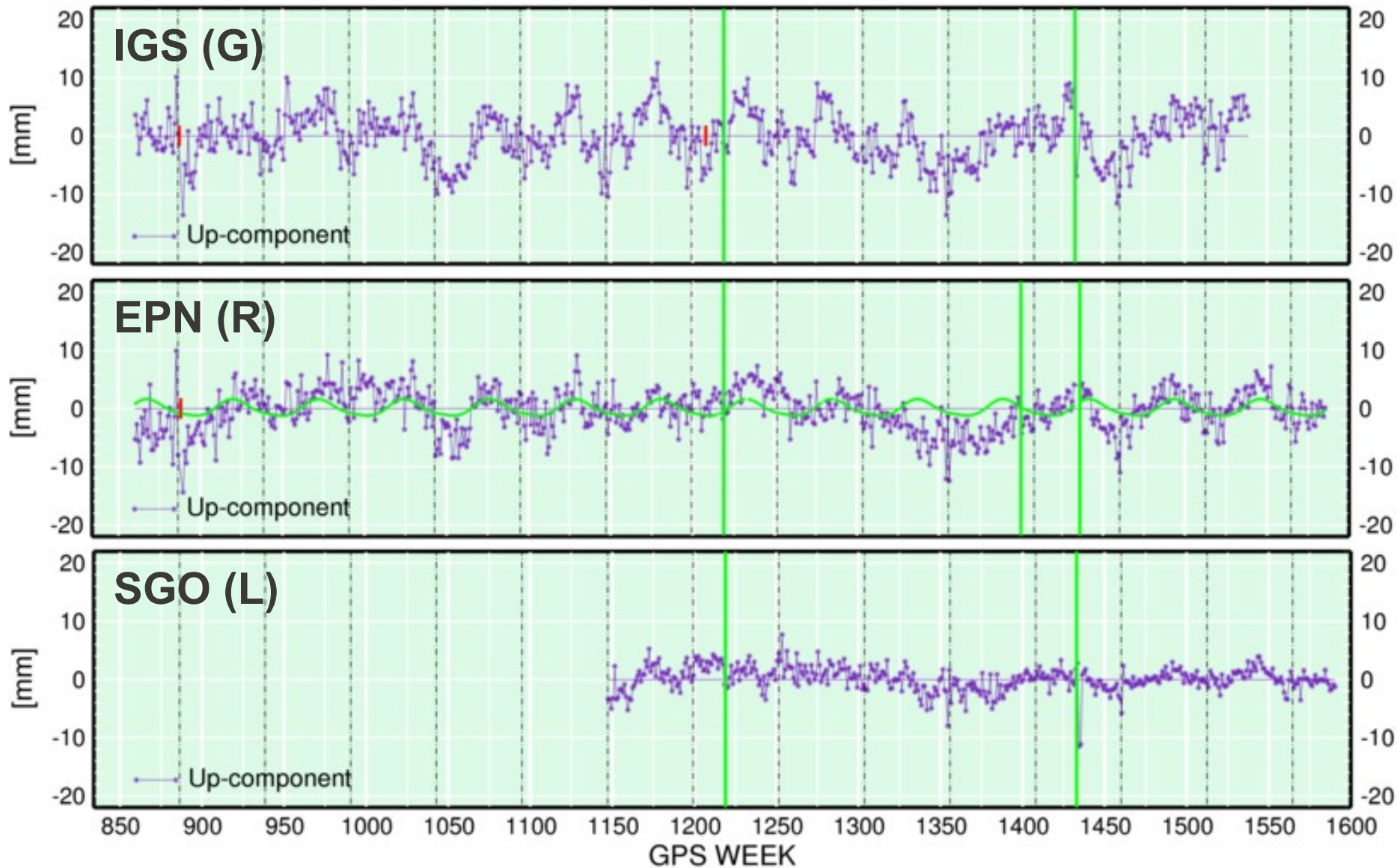




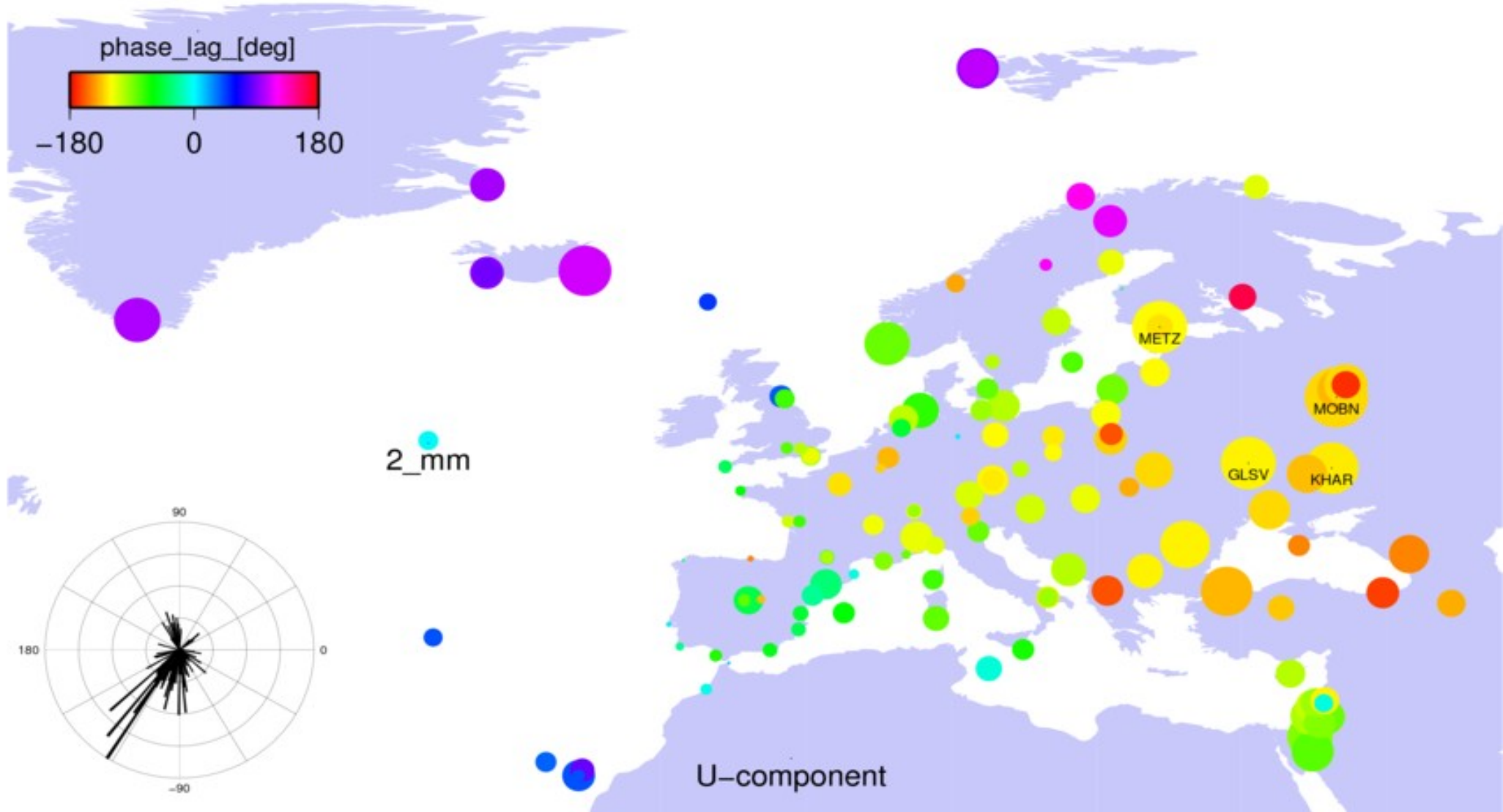


# G-R-L CUMULATIVE SOLUTIONS

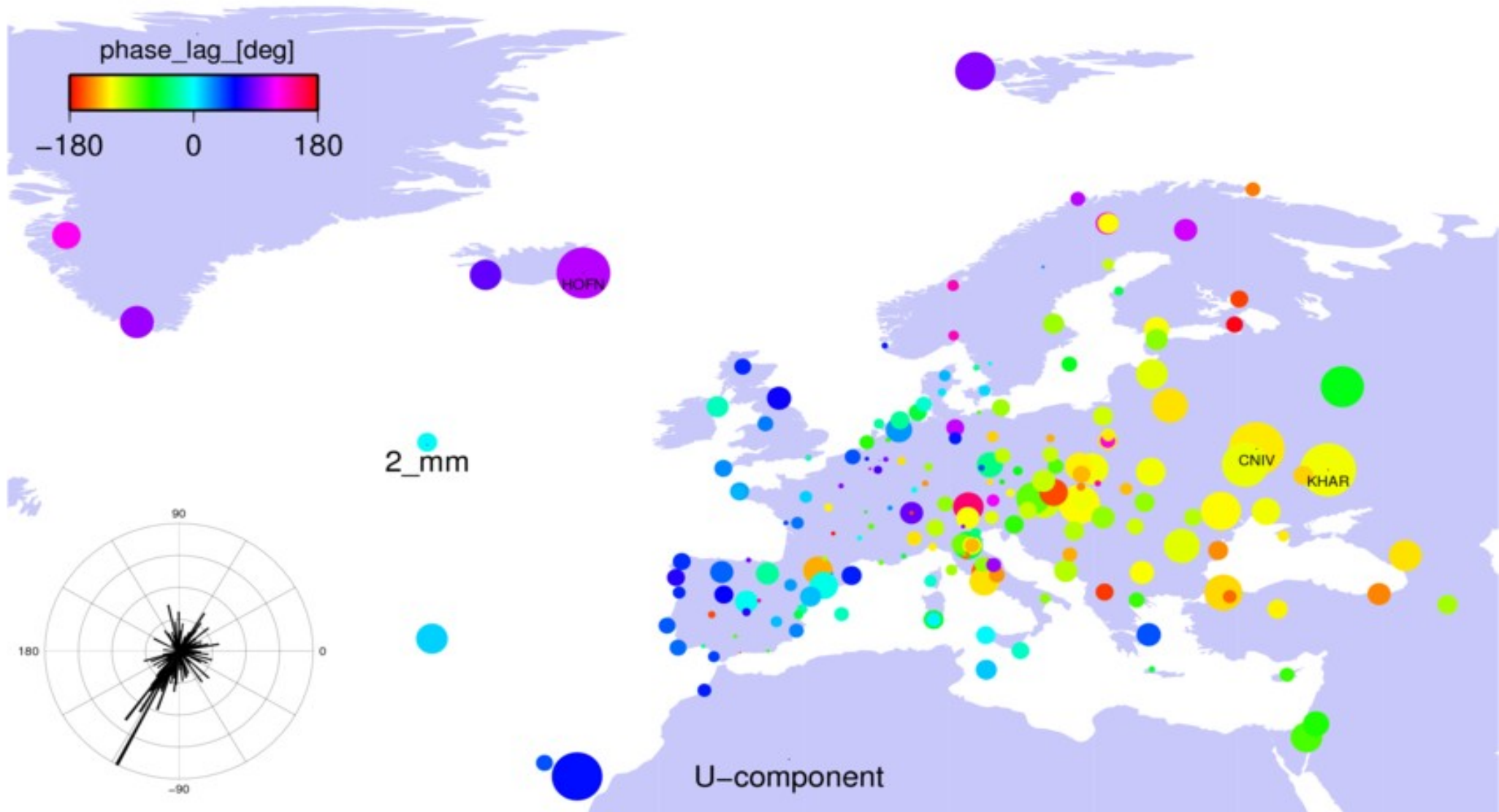
## EXAMPLE: PENC UP COMPONENT



# ANNUAL SIGNAL IN IGS REPRO1

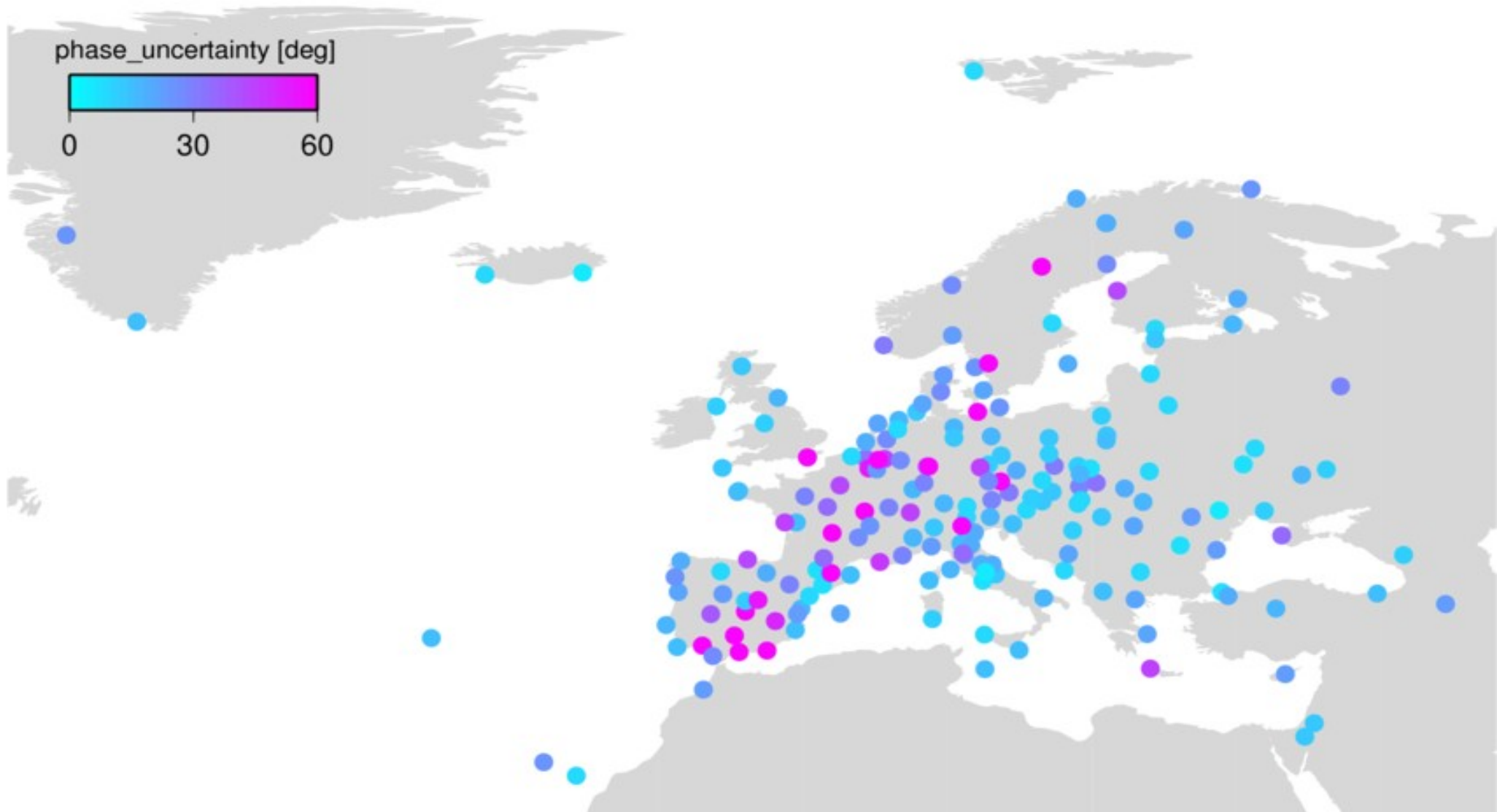


# ANNUAL SIGNAL IN EPN REPRO





# PHASE UNCERTAINTIES IN EPN REPRO ANNUAL SIGNAL ESTIMATES



# REGIONAL TO GLOBAL

A./ ADDING NEW GLOBAL (IGS) SITES INTO THE ROUTINE NETWORK PROCESSING

works only forward (or in case of re-processing)

B./ MERGING THE GLOBAL (IGS) AND REGIONAL WEEKLY SINEX SOLUTIONS

## ADVANTAGES OF APPROACH B./

- NO ADDITIONAL ROUTINE PROCESSING CAPACITY IS REQUIRED
- 'HISTORICAL' SINEX SOLUTIONS ARE AVAILABLE,
- FULL CONSISTENCY OF IGS/ITRF AND THE REGIONAL NETWORK



# IGS/EPN COMBINATION: DATA

DATA SPAN: GPSWEEK 860 - 1538 (EPN & ITRF)

**IGS/REPRO1:** SELECTION OF THE BEST QUALITY <400 ITRF SITES

- STABLE TIME SERIES (CONSIDERING LENGTH, GAPS, OFFSETS, OUTLIERS, NON-LINEARITY)
- "HOMOGENEOUS" DISTRIBUTION OVER THE GLOBE,
- REPRESENTATIVE AMPLITUDE/PHASE DISTRIBUTION

**EPN:** GPSWEEK 0860 - 1410: MUT RE-PROCESSED

1411 - 1538: ROUTINE EPN COMBINED

ALL EPN DATA (230 SITES, 90 OVERLAP WITH IGS)

# IGS/EPN COMBINATION: IEC

DISCONTINUITIES: fully harmonized with ITRF2008

DATUM: INTRINSIC/ITRF2008

COMBINATION TOOL: CATREF (IGN)

COMBINATION STRATEGY:

1./PARALEL TEST COMBINATIONS

ITERATIVE FILTERING COMBINATIONS (IGS)

ELIMINATION OF NON-ITRF AND LOW-QUALITY SITES

2./MERGE WEEKLY SINEX SOLUTIONS

COVARIANCE MATRIX SCALING

3./COMBINATION WITH A THINNED CORE NETWORK

SAVE TRANSFORMATION PARAMETERS

4./NEW COMBINATION WITH THE CORE PARAMETERS

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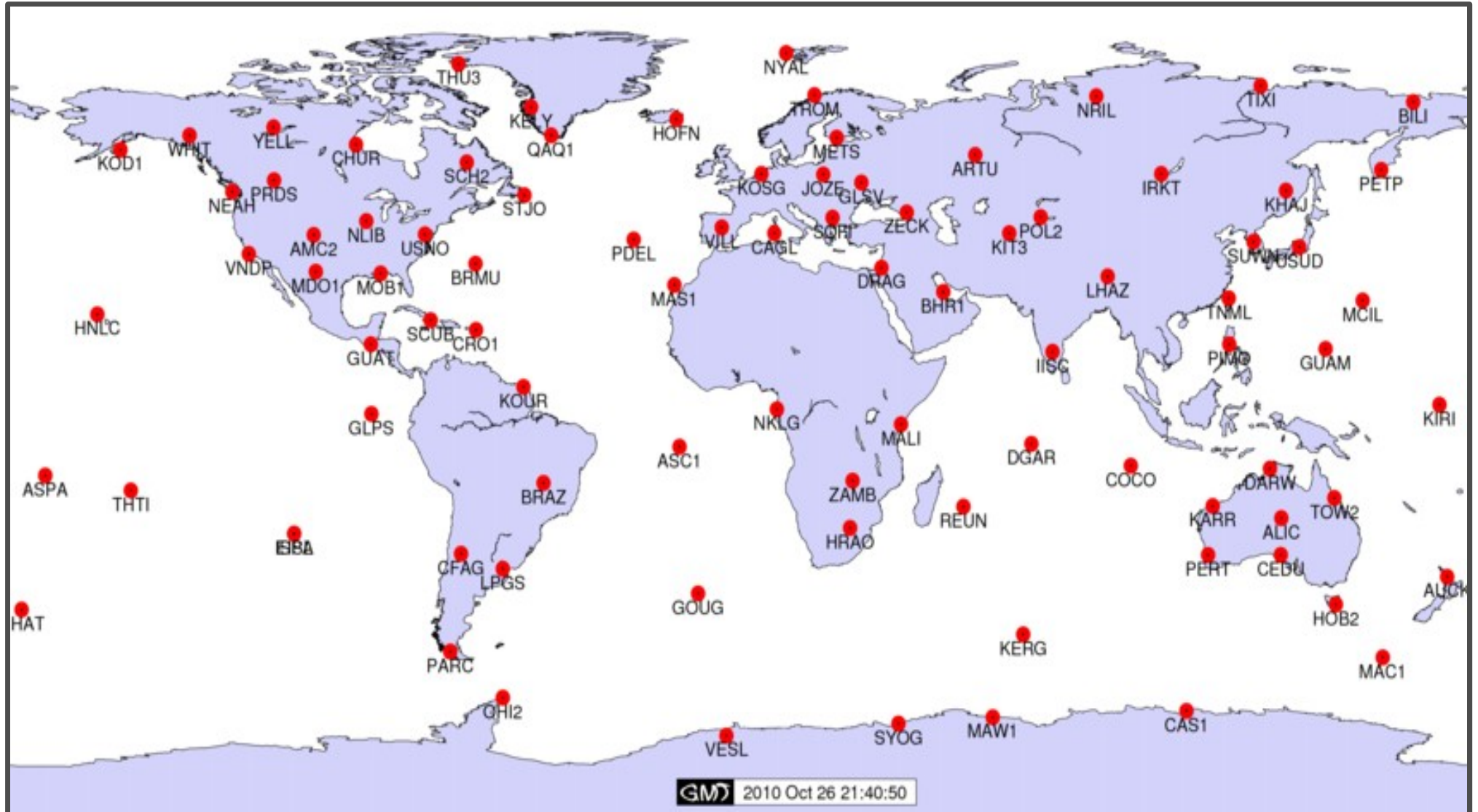
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# ITRF2008 CORE SITES



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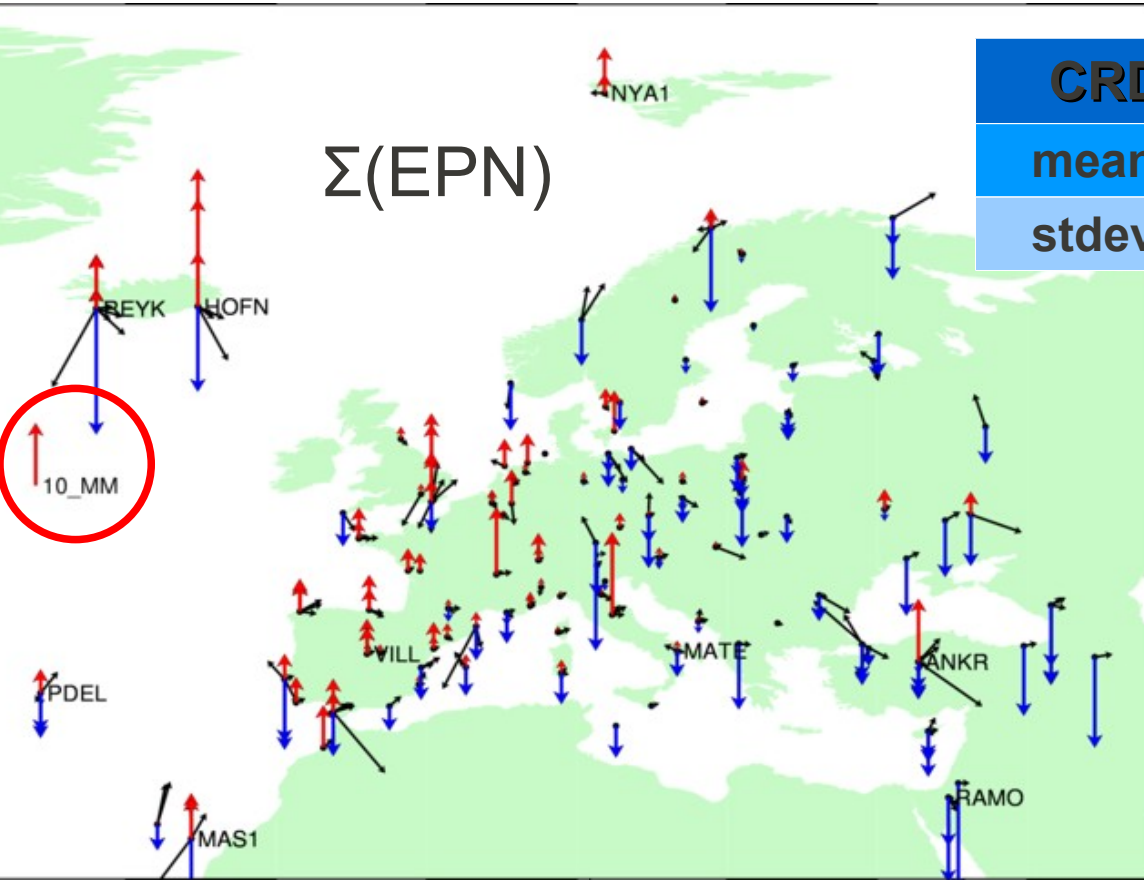
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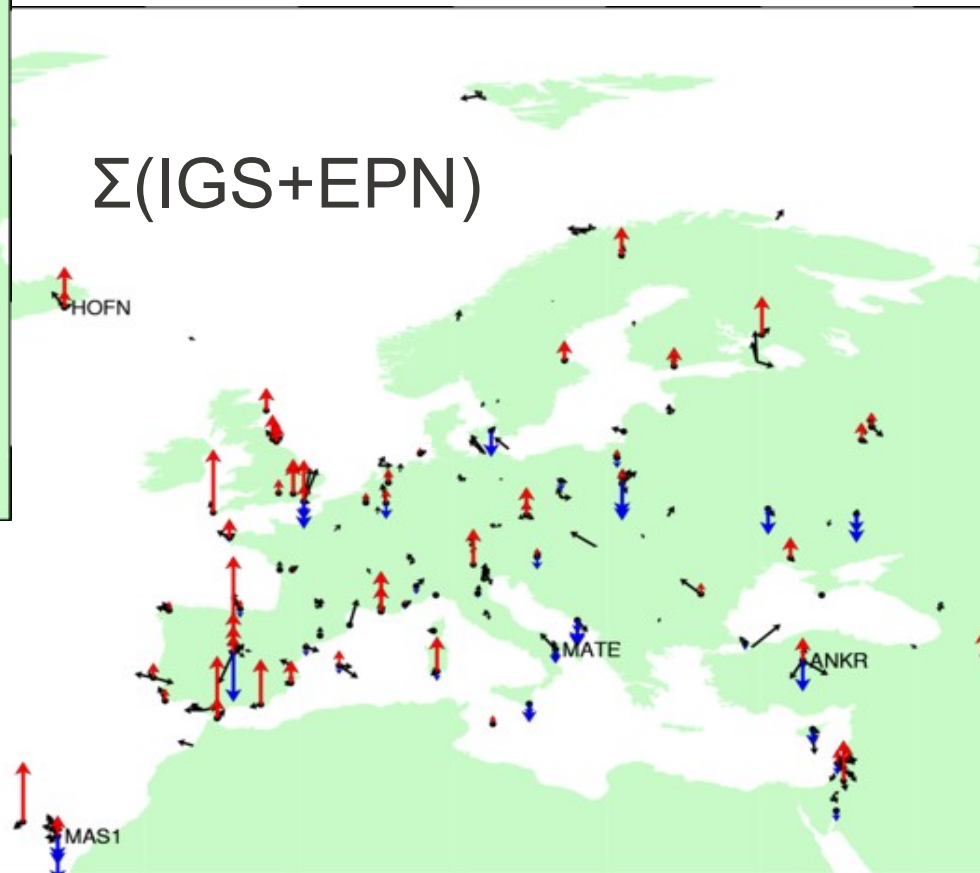


# EVALUATION OF THE 'REGIONALITY' ITRF2008 'DENSIFICATIONS' OF THE EPN



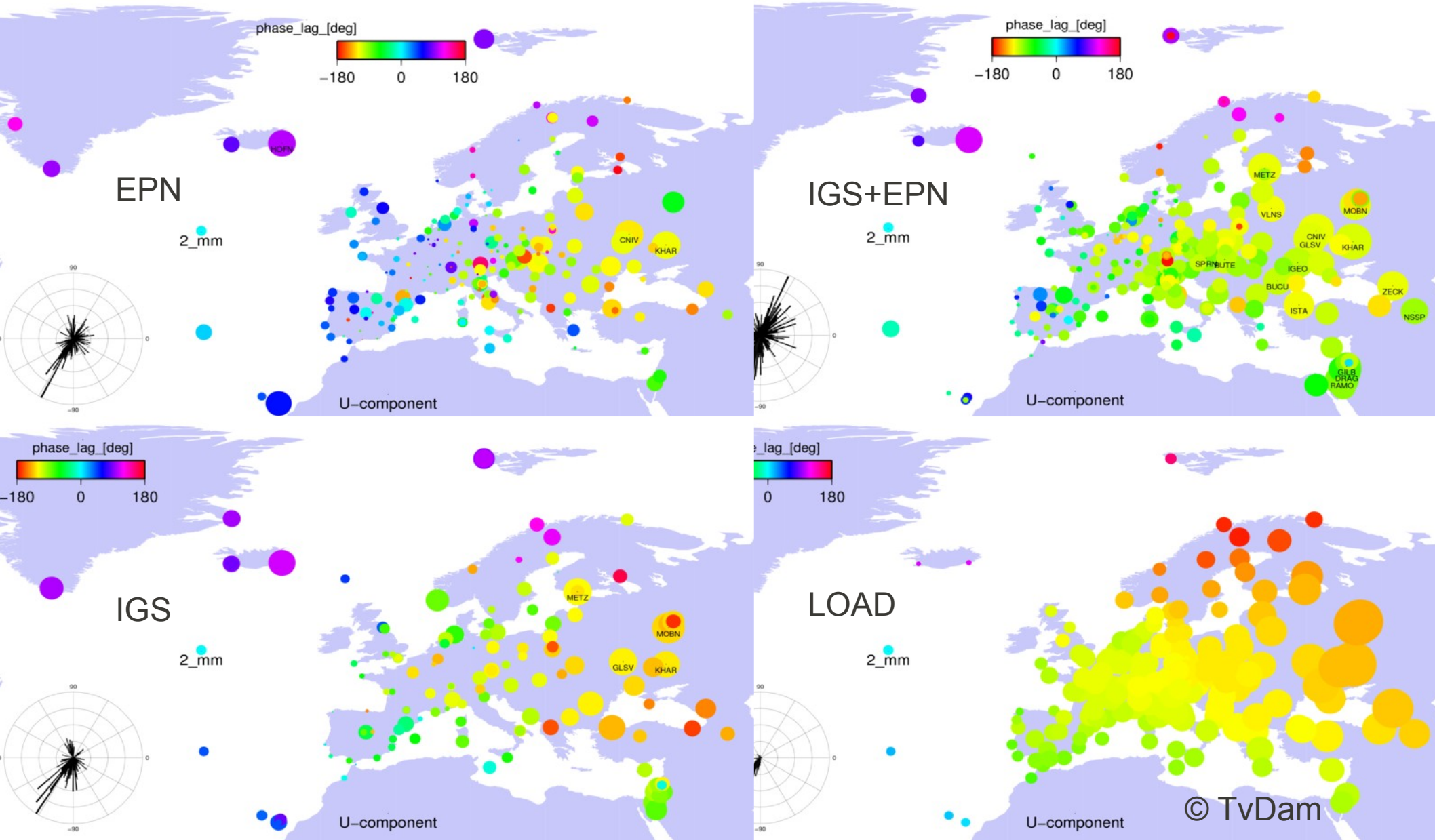
CRD_A	N	E	U
mean (mm)	0.19	0.97	-0.08
stdev (mm)	1.86	1.6	4.91

**FILTERING!**



CRD_B	N	E	U
mean (mm)	0.37	0.04	1.24
stdev (mm)	1.37	1.29	3.29

# UP COMPONENT ANNUAL SIGNAL IN DIFFERENT SOLUTIONS



# SUMMARY

- REGIONAL DENSIFICATION: **NETWORK EFFECT**
  - POS / VEL AND HARMONIC SIGNAL BIASES
- **SOLUTION\_B**: MERGE GLOBAL AND REGIONAL (LOCAL?) SINEX SOLUTIONS ON THE WEEKLY (DAILY) LEVEL
- IGS REPRO1 AND EPN MUT REPRO (860-1538)
- RESULTS: **BIASES DECREASED**, ESPECIALLY FOR THE ANNUAL SIGNAL ESTIMATE (PHYSICAL INTERPRETATION!)
- FURTHER STUDIES AND REFINEMENT ARE NEEDED (**STATION SPECIFIC ISSUES, REMAINING 'NETWORK EFFECT'**)