



Federal Agency for  
Cartography and Geodesy

# Post-Processing Activities at BKG

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# Post-Processing

## ➤ EPN LAC

- Since 1997
- Approx. 96 stations
- BSW 5.2 since 2013

## ➤ DREFonline

- Joint effort of AdV and BKG
- Comprises 33 GREF and 31 SAPOS stations

# Post-Processing

➤ EPN LAC

## 96 Stations

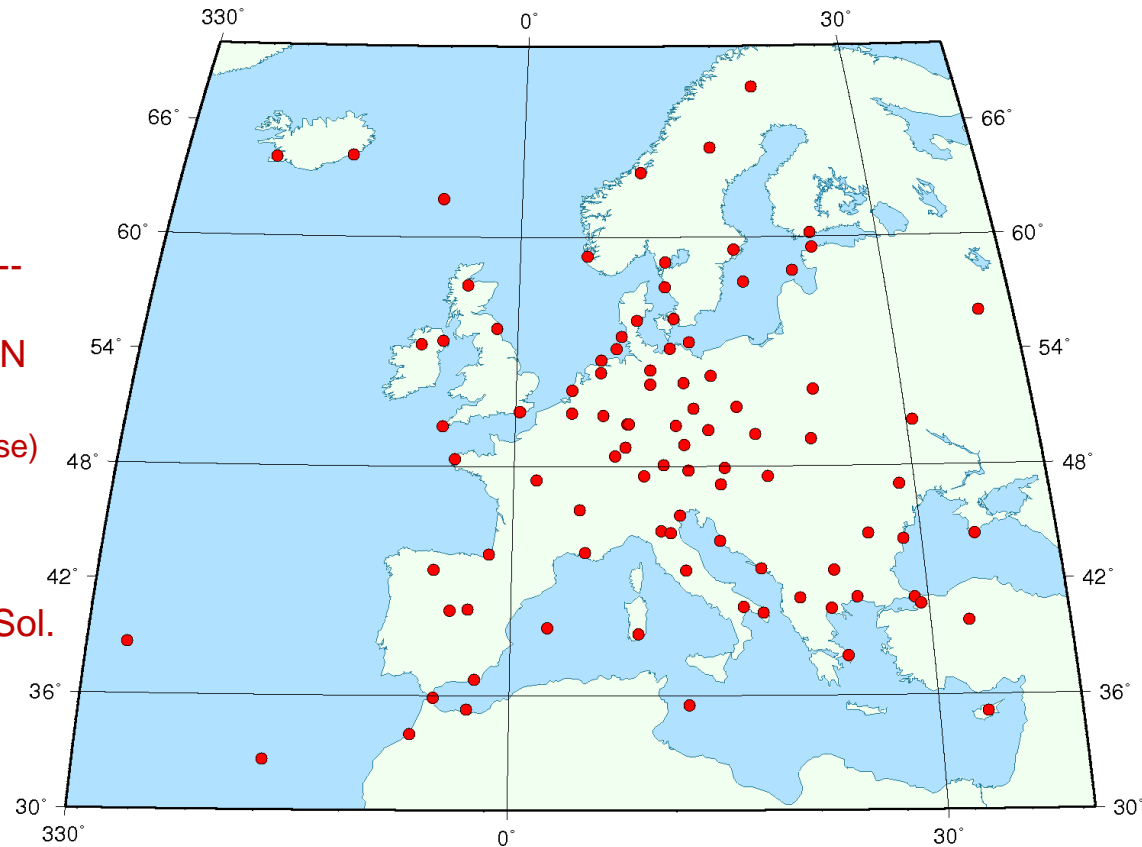
Status Oct. 2015

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Standard analysis due  
to the guidelines of EPN

Bernese 5.2 (act.Release)

- GPS + GLO
- CODE Final Orbits
- Minimum Constraint Sol.
- Daily + weekly Sol.

## BKG LAC at Week 1861



# Post-Processing

➤ EPN LAC

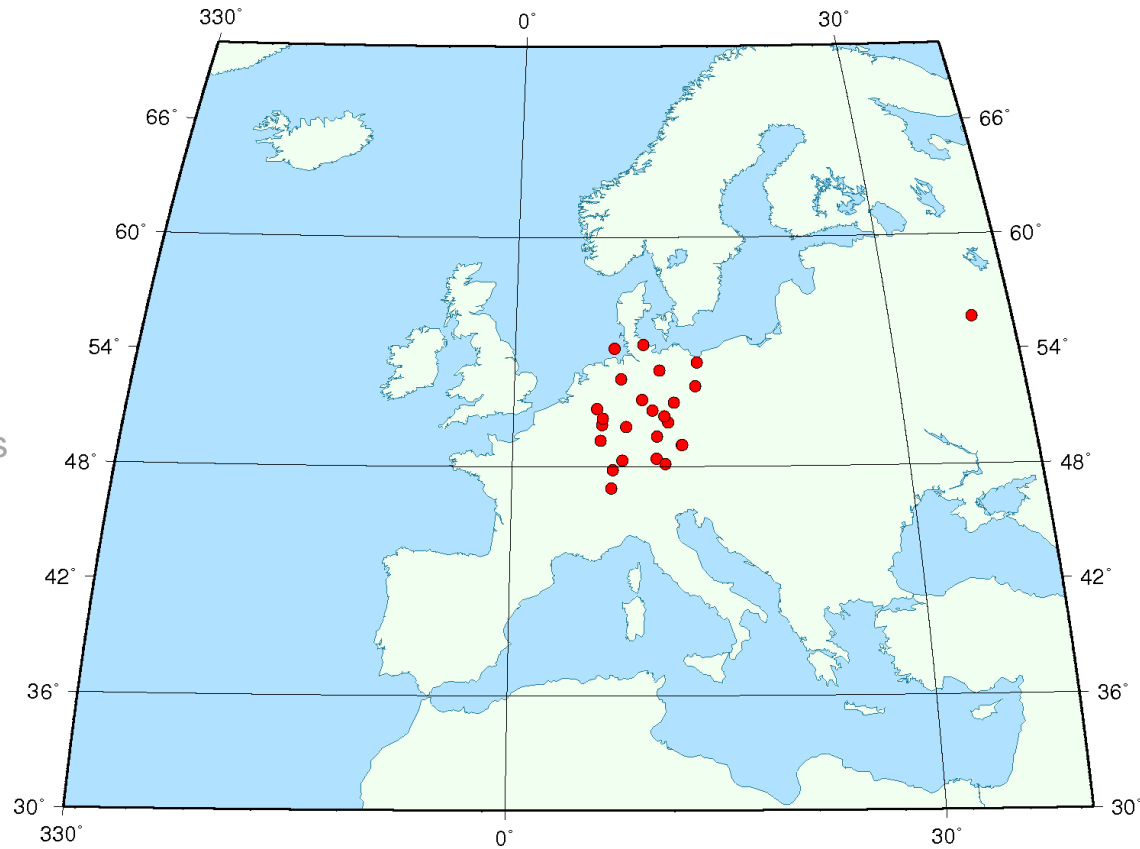
**Extension to  
127 Stations**

**Including:**

**- 24 addit. in GER  
- ZIMM, ZIM2, ZWE2**

- 4 proposed EPN sites

## BKG LAC at Week 1861



# Post-Processing

## ➤ EPN LAC

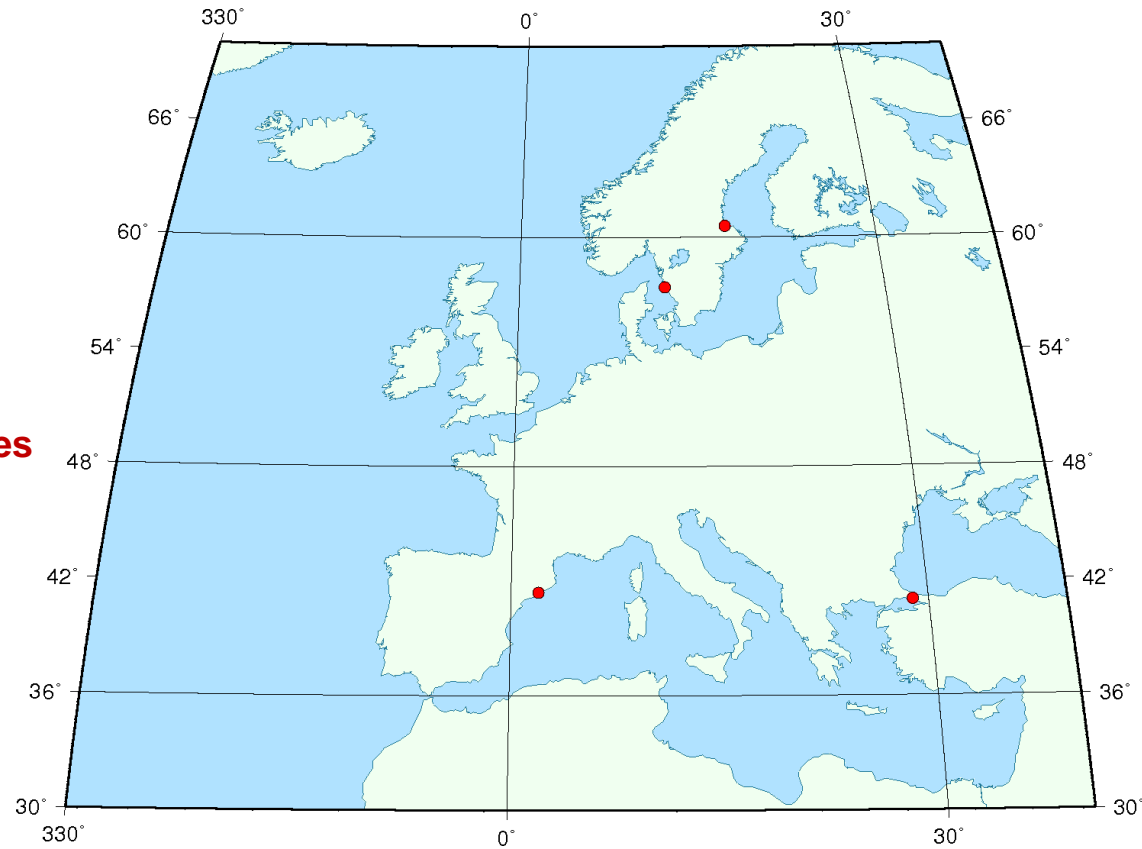
### Extension to 127 Stations

#### Including:

- 24 addit. in GER
- ZIMM, ZIM2, ZWE2

#### - 4 proposed EPN sites

## BKG LAC at Week 1861



# Post-Processing

## ➤ EPN LAC

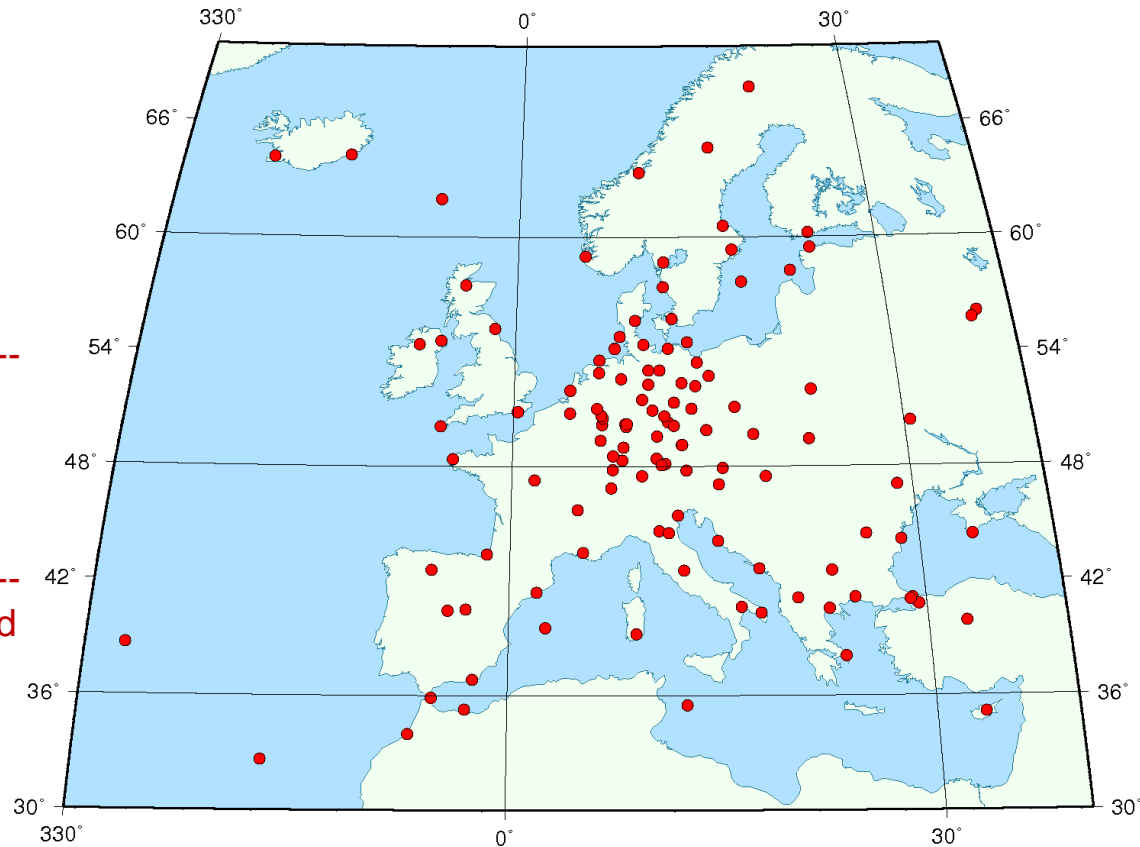
### Extension to 127 Stations

96 actual EPN +  
31 additional sites

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Distribution done by  
**ADDNEQ2** due to  
entries in the **STA-file**  
(Type 3)

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Results of the extended  
network are available  
at BKG Datacentre  
[igs.bkg.bund.de](http://igs.bkg.bund.de) at  
Project **GRAF**

## BKG LAC at Week 1861



# Post-Processing

## ➤ DREF online

### DREFonline

Control-Network for Monitoring the official coordinates of the Reference stations in the Federal States of Germany (**SAPOS®**)

Network: (about 80 Stations)

31 SAPOS®

33 BKG stations (*GREF*)

2 other in Germany (*GFZ / DLR*)

13 IGS / EPN Stations

Bernese 5.2 GPS+GLO

Minimum-constraint solutions

Network-datum: IGB08 stations

Comparison EPN ⇔ DREFonline

## GNSS Auswertung DREFonline



# Post-Processing

## ➤ DREF online

Comparison EPN ↔ DREFonline

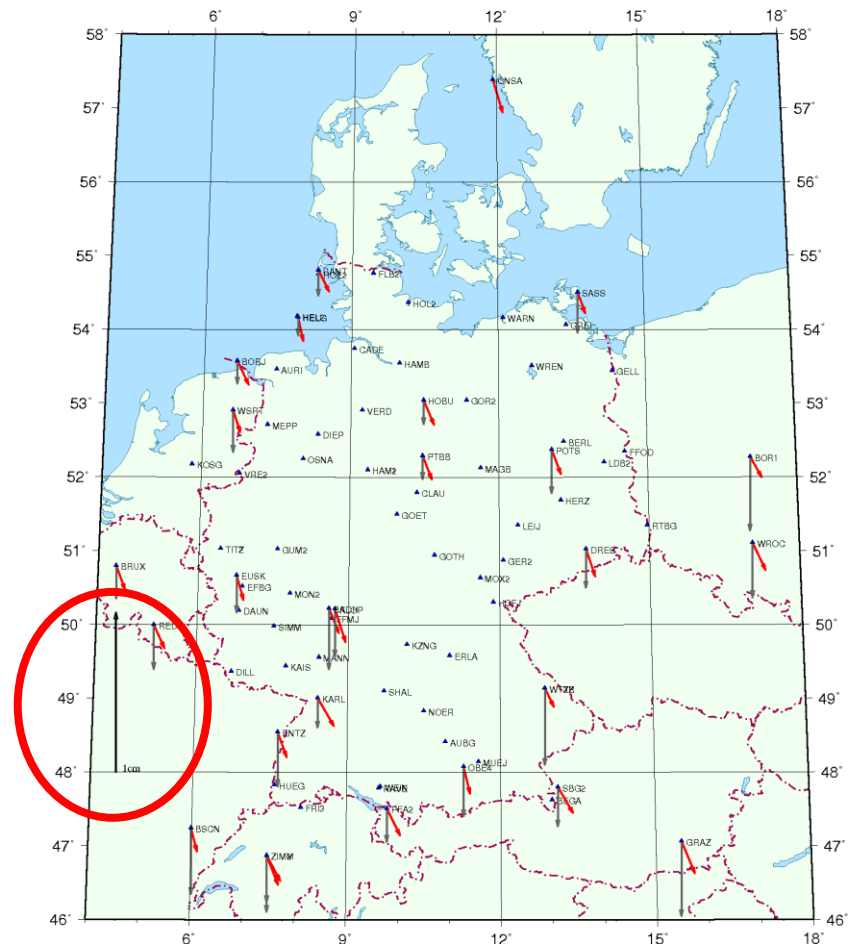
Absolute differences of the weekly  
DREFonline solutions  
relative to the EPN solutions  
[eurwww7.crd](http://eurwww7.crd)

27 common stations (30%)

Example: Week 1852:

differences smaller than  
2 mm Lat./ Lon. | 4 mm Up

DREFonline <=> EPN wk1852





# Post-Processing

➤ DREF online

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Bernese GNSS Software, Version 5.2

Program : HELMR1  
 Purpose : Helmert Transformation

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RESIDUALS IN LOCAL SYSTEM (NORTH, EAST, UP)

NUM	NAME	FLG	RESIDUALS IN MILLIMETERS		
3	BADH 14288M001	I A	0.06	-0.03	-1.15
6	BOR1 12205M002	I W	0.20	0.09	-1.58
7	BORJ 14268M002	I A	0.03	0.09	0.14
8	BRUX 13101M010	I A	0.01	-0.09	-0.07
9	BSCN 10028M007	I A	0.18	-0.26	-1.05
14	DRES 14108M001	I A	-0.14	-0.09	0.62
16	ENTZ 10014M002	I A	0.05	-0.08	-0.40
18	EUSK 14258M003	I A	0.01	-0.21	0.00
28	GRAZ 11001M002	I W	-0.27	0.05	-0.36
34	HELG 14264M001	I A	0.03	-0.29	0.42
36	HOBU 14202M003	I A	-0.01	0.04	0.65
41	KARL 14216M001	I A	-0.13	0.38	1.11
42	KLOP 14214M002	I A	-0.49	0.04	-0.29
53	OBE4 14208M007	I A	-0.02	-0.29	0.46
54	ONSA 10402M004	I W	-0.57	0.14	0.95
56	PFA2 11005M003	I A	0.01	0.17	1.44
57	POTS 14106M003	I A	0.01	-0.05	-0.11
58	PTBB 14234M001	I A	0.07	-0.04	0.90
59	RANT 10914M001	I A	0.18	0.08	-0.15
60	REDU 13102M001	I A	0.09	0.03	-0.50
62	SASS 14281M001	I A	0.16	-0.08	-0.45
63	SBG2 11031M002	I A	0.09	0.24	1.39
72	WROC 12217M001	I A	-0.19	0.12	-0.05
73	WSRT 13506M005	I W	0.14	-0.19	-0.90
75	WTZR 14201M010	I W	0.49	-0.13	-1.33
77	ZIM2 14001M008	I A	-0.15	0.09	0.46
78	ZIMM 14001M004	I W	0.11	0.23	-0.14

	RMS / COMPONENT				
			0.21	0.17	0.80
	MEAN		-0.00	-0.00	-0.00
	MIN		-0.57	-0.29	-1.58
	MAX		0.49	0.38	1.44

NUMBER OF PARAMETERS : 7  
 NUMBER OF COORDINATES : 81  
**RMS OF TRANSFORMATION : 0.50 MM**

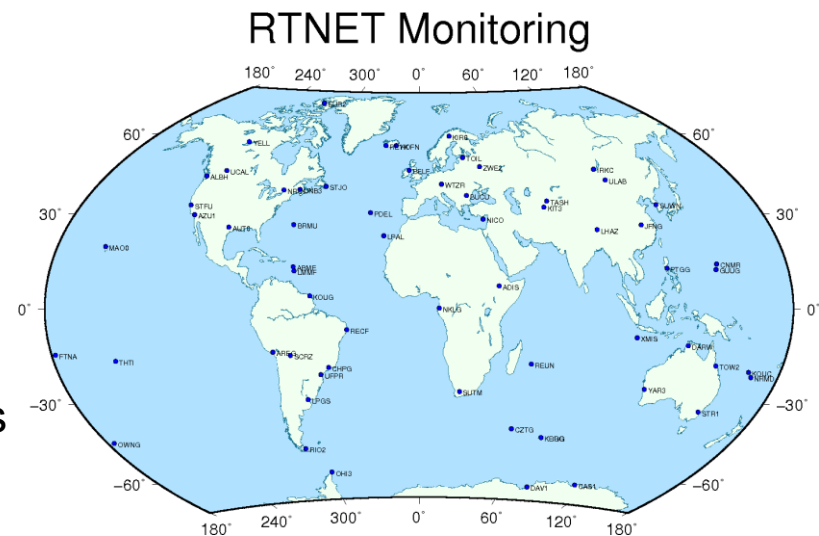
# Monitoring

## ➤ Daily RNX

- Using 30-seconds daily RINEXv2 files sampled with BNC from real-time data streams (RTCM 3.1 and RTCM 3.2 MSM)
- Since 2012
- Global solution
- GPS+GLO
- Approx. 90 stations

## ➤ Daily RINEX 3

- Using 30-seconds daily RINEXv3 files sampled with BNC from RTCM 3.2 MSM real-time data streams
- Since 2013
- Global solution
- GPS+GLO
- Approx. 75 stations



# Monitoring

## ➤ Daily RNX via PPP

- Using 30-seconds daily RINEXv2 files
- Since 2014
- National Solution (DREFonline)
- GPS+GLO
- Approx. 70 stations
- PPP routine of Bernese 5.2
- Code rapid orbits

GNSS Auswertung DREFonline



# Near Real-Time Processing

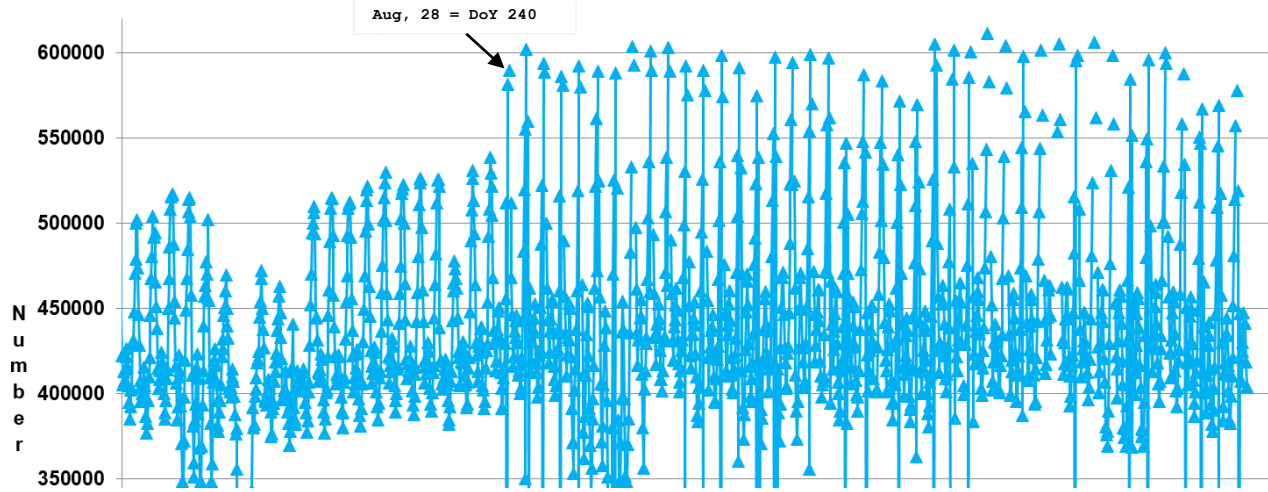
## ➤ bkg\_

- Using hourly RINEXv2 files
- Contributing to COST716/E-GVAP since 2002
- Between 90 and 120 stations
- Since 2014 BSW 5.2

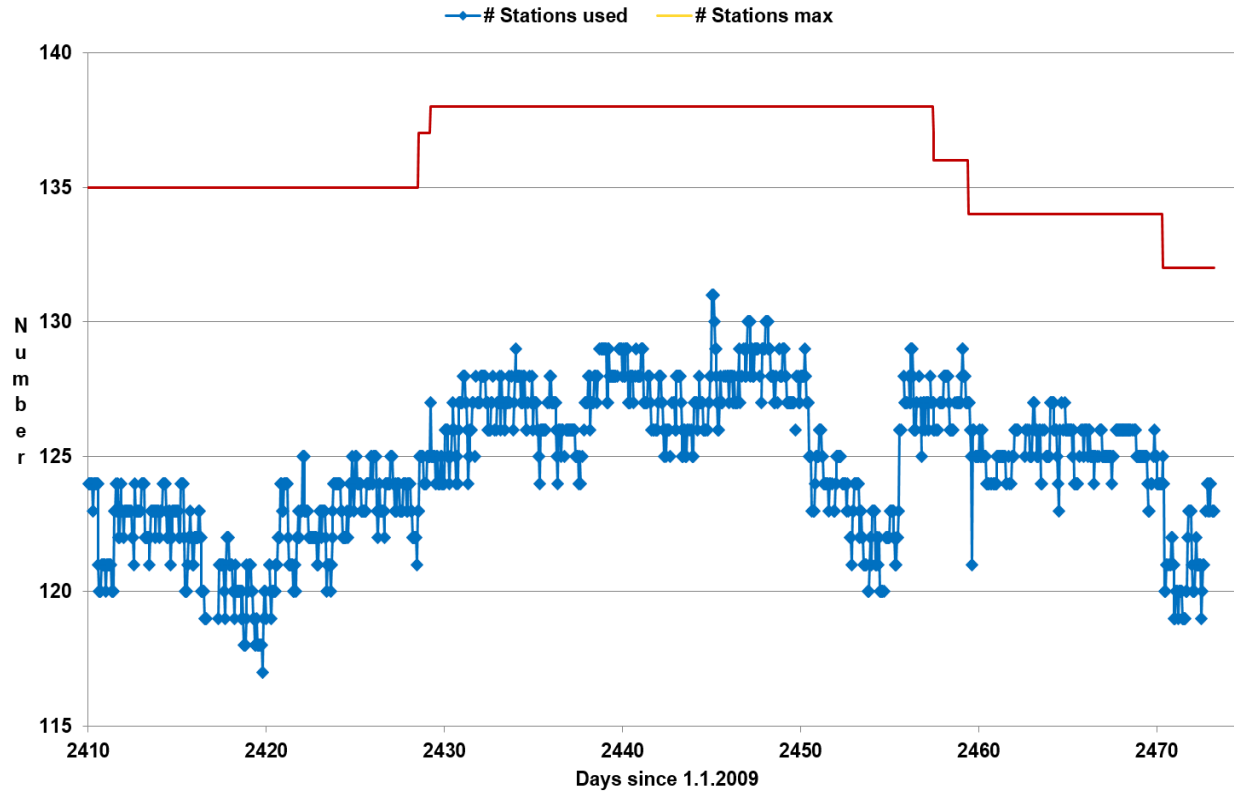
## ➤ bkgh

- Using highrate files sampled with BNC from real-time data streams
- Contributing to E-GVAP since 2009
- Between 120 and 135 stations
- Still using BSW 5.0

### 'TOTAL NUMBER OF OBSERVATIONS' in bkg processing (Aug-Oct 2015)



### Number of stations in bkg processing (Aug - Oct 2015)



# Re-Processing

## ➤ German Reference Network (GREF)

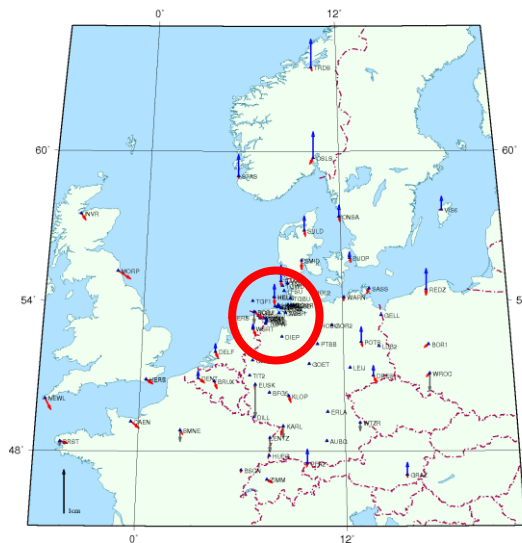
- About 30 stations in Germany
- BSW 5.2 RNX2SNX + FODITS
- Covering 2004 – 2015
- Results are not published yet

# Other Activities

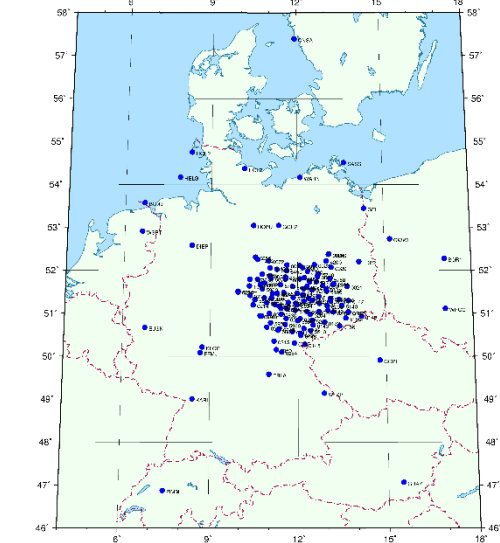
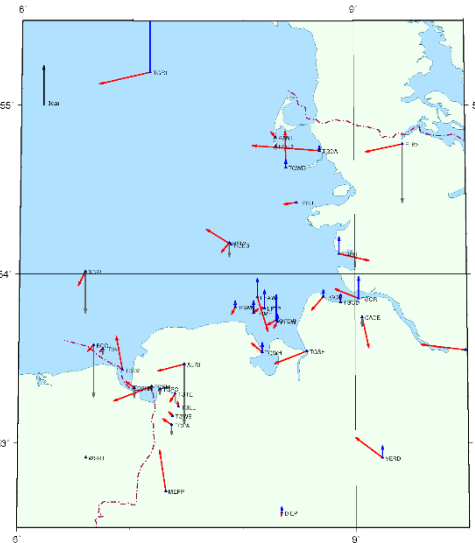
## ➤ Campaigns

- BfG monitoring network (tide gauges)
- Reference networks of the German States

BFG-REF wk1858 <=> last EPN Sol.



BFG-REF (wk1858) <=> DREF91 official



# Other Activities

## ➤ Campaigns

- BfG monitoring network (tide gauges)
- Reference networks of the German States

## ➤ Planned activities

- DREFonline Re-Processing
- Processing in co-laboration with other federal agencies



# Thank you for your kind attention!

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