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Swiss Federal Office of Topography swisstopo



# **EUREF-TWG Project: Monitoring of official national ETRF coordinates on EPN web**

E. Brockmann



## Number of EPN sites with official national ETRF coordinates

- Not yet asked (EPN sites)
- Ok: (xx CRD delivered / EPN sites)
- No EPN sites used: (xx CRD delivered / EPN sites)

Greenland: 4  
Israel: 2  
Jordan: 1  
Morocco: 2  
Armenia: 1

Official ETRF coordinates:  
22 countries  
149 sites

plus more site coordinates  
(additional national +  
outside of the country)

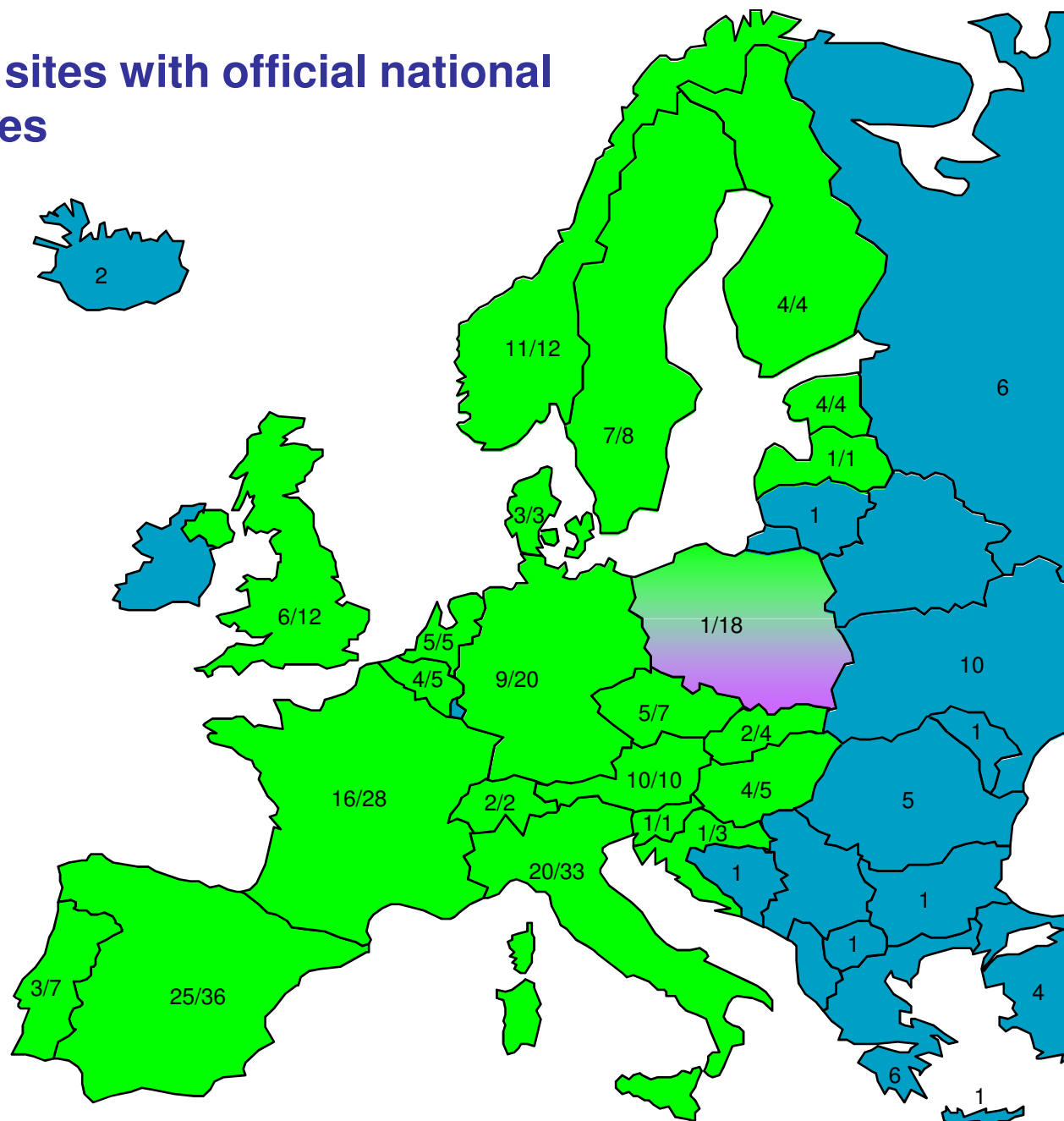
EPN: 40 countries  
243 active sites

Status National: 10.5.2010

EPN: 10.5.2010

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# Missing countries

Country	( #ETRF/ #EPN )
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UKRAINE	( 0 / 10 )
RUSSIAN FEDERATION	( 0 / 6 )
GREECE	( 0 / 6 )
ROMANIA	( 0 / 5 )
TURKEY	( 0 / 4 )
GREENLAND	( 0 / 4 )
ISRAEL	( 0 / 2 )
ICELAND	( 0 / 2 )
MOROCCO	( 0 / 2 )
MOLDOVA, REPUBLIC OF	( 0 / 1 )
CYPRUS	( 0 / 1 )
ARMENIA	( 0 / 1 )
JORDAN	( 0 / 1 )
MACEDONIA	( 0 / 1 )
LATVIA	( 0 / 1 )
BULGARIA	( 0 / 1 )
BOSNIA AND HERZEGOWINA	( 0 / 1 )
LITHUANIA	( 0 / 1 )
countries	Total number of not yet provided stations
17	50



Status: 10.5.2010

Submitted 22 countries:

83 EPN sites without official  
national ETRF coordinates  
(yet) or scientific stations



# Coordinate web page (**beta**):

 **EUREF Permanent Network**   
EUREF HOME EPN CB HOME

ORGANISATION	TRACKING NETWORK	DATA & PRODUCTS	NEWS & MAILS	FTP & WEB ACCESS
Creation, Management, Structure, Relation to IGS, Projects, Guidelines, FAQ	Maps, Stations, Equipment & calibration, Station coordinates, Site log validation & submission	Data access, Analysis centres, Products, Time series, ETRS89/ITRS transformation, Formats	News, Mails, Calendar, Papers, Workshops, Web site history	Anonymous FTP, Web site index, Related links



[TRACKING NETWORK](#) > [STATIONS](#) > [SITE INFORMATION](#) > MAR6\_10405M002

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**MAR6\_10405M002**

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**Site Description**

LOCATION	Maartsbo, Sweden 
LOG FILE	mar6_20080508.log (current) <a href="#">View</a>
PICTURES	
OPERATIONAL CENTRE	LMV
OTHER NETWORKS	IGS, IGS, EGN
EPN INCLUSION	Since 308/1996 (GPSweek No 0878).
INACTIVITY PERIODS	None
COORDINATES	Published positions/velocities in ITRS and ETRS89

**COORDINATES** Published positions/velocities in ITRS and ETRS89

[http://www.epncb.oma.be/\\_trackingnetwork/coordinates/stationcoordinates4onestation\\_elmar.php?station=XXXX](http://www.epncb.oma.be/_trackingnetwork/coordinates/stationcoordinates4onestation_elmar.php?station=XXXX)



# Example page MAR6 (next EPN site to Gävle)

## 1. POSITIONS/VELOCITIES PUBLISHED BY EUREF

EUREF has classified MAR6 (Maartsbo, Sweden) as a **class A station** which means that it can be used as fiducial station for EUREF densifications.

### Latest release

EPN\_A\_ETRF2000\_C1570.SSC - EPN\_A\_ITRF2005\_C1570.SSC (March 23, 2010)

EPN densif.  
solution

<a href="#">ETRF2000</a>	epoch $t_0$	Position (m)			Velocity (m/y)		
		X	Y	Z	$V_X$	$V_Y$	$V_Z$
308/1996 - 044/2010	001/2005	2998189.743 ± 0.000	931451.611 ± 0.000	5533398.522 ± 0.000	0.0044 ± 0.0000	0.0007 ± 0.0000	0.0066 ± 0.0001

## 2. POSITIONS/VELOCITIES PUBLISHED BY THE IERS

## 3. POSITION PUBLISHED WEEKLY IN THE EPN COMBINED SOLUTION

## 4. POSITIONS PUBLISHED BY THE COUNTRY

The official ETRS89 coordinates used in Sweden are maintained by **LM**. This agency is fully responsible for the information (frame name and coordinates) kindly provided to the EPN:

new

Frame	Valid (from - to)	epoch $t_0$	Position (m)			Velocity (m/y)		
			X	Y	Z	$V_X$	$V_Y$	$V_Z$
ETRF97	213/1993 - now	182/1999	2998189.713	931451.589	5533398.474	NA	NA	NA

Following a recent initiative of the EUREF Technical Working Group ([Monitoring of official national ETRF coordinates on EPN web](#)), the differences between the national coordinates and the latest cumulative EPN solutions (section 1) are regularly monitored. They are given in two maps: [\[horizontal differences\]](#) and [\[vertical differences\]](#).



# Comparison with EPN reference solution

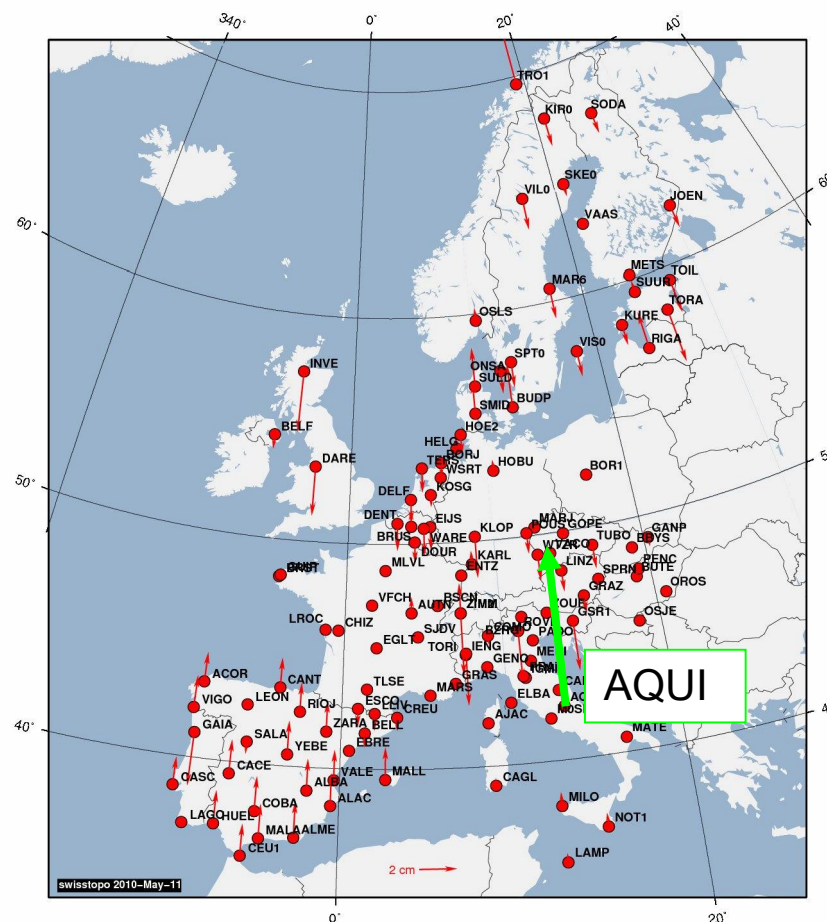
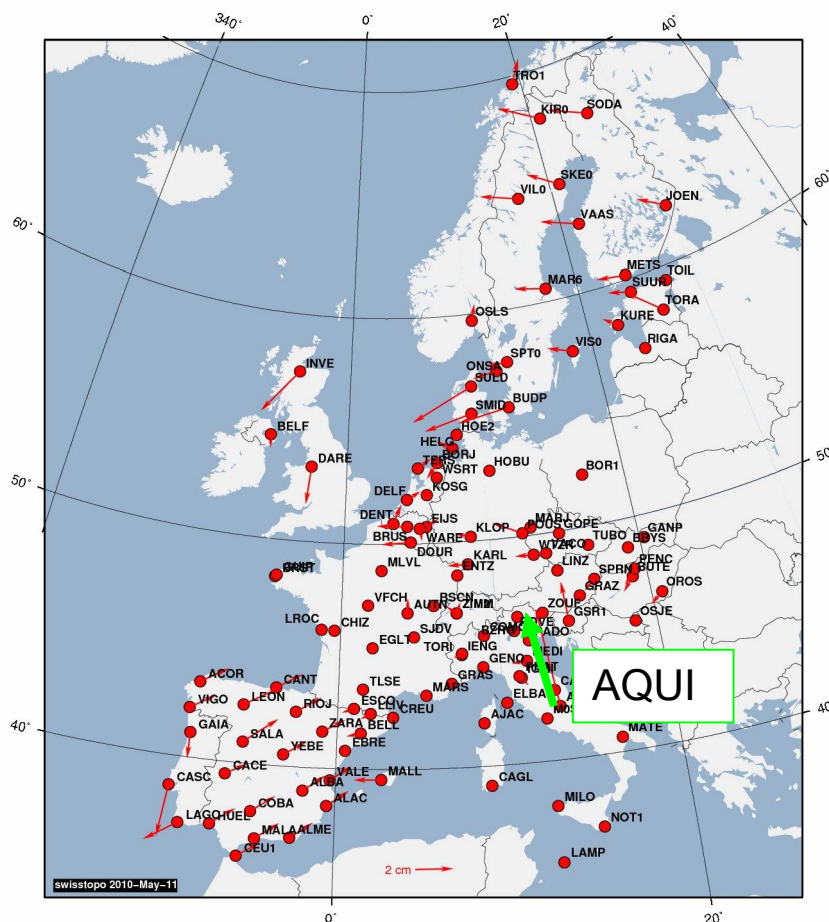
121 stations

22 countries

horizontally

vertically

at country  
specified epoch





# Realized activities



- Resolution 3 regarded as completed (Europe almost covered; bigger part of East Europe missing)
  - Countries not yet submitted: please contact us and send information



- Beta coordinate web pages are available on the EPN



- All countries got a feedback and request to check carefully the information in section 4 (responsible institution, station names, coordinates, reference frame name, epoch).

Countries are responsible for information in section 4



# Frame names

COU	Frame Name
-----	
AUT	ETRF00
BEL	ETRF2000
CHE	ETRF93
CZE	ETRF2000(R05), ETRF89
DEU	ETRS89
DNK	ETRF92
ESP	ETRF2005
EST	ETRF96
FIN	ETRF96
FRA	ETRF2000(R05)
GBR	ETRF97
HRV	ETRF2000(R05)
HUN	ETRF00
ITA	ETRF2000
LVA	ETRF2000
NLD	ETRF2000
NOR	ETRF97
POL	ETRF2000(R05)
PRT	ETRF97
PRT	ETRF97
SVK	ETRF2000
SVN	ETRF05
SWE	ETRF97

```
$countryframes = array(  
    'ETRF2000(R05)' => 'ETRF2000(R05)',  
    'ETRF2000' => 'ETRF2000',  
    'ETRF00' => 'ETRF00',  
    'ETRF2005' => 'ETRF05',  
    'ETRF05' => 'ETRF05',  
    'ETRF92' => 'ETRF92',  
    'ETRF93' => 'ETRF93',  
    'ETRF96' => 'ETRF96',  
    'ETRF97' => 'ETRF97',  
    'ETRS89' => 'ETRS89',  
    'ETRF89' => 'ETRF89',  
    'ETRF05(R05)' => 'ETRF05(R05)',  
);
```

No “translation”, because  
responsibility is by the countries





# Planned activities

- Activation of the beta web page on the EPN web
- Development of an update mechanism of coordinate changes (e.g. as established with station log). Update feedback at the moment manually.
- Coordinate Monitoring: At present automated check of the coordinates every 15 weeks. In future possibly automated e-mailing in case of bigger differences.





# Results

- Different ETRF realizations very homogeneous realized (1-2 cm horizontally, 1-4 cm vertically)
- AQUILA (Aquila): Abruzzo Earthquake April 2009:  
~6 cm horizontally; ~8 cm vertically
  - nice example that EUREF/EPN gives feedback to the countries!
  - official national ETRF coordinates updated May, 21
- Countries with movements w.r.t stable part of Europe:  
reference epoch is important (e.g. Scandinavian postglacial rebound; Italy; Greece; ...)