




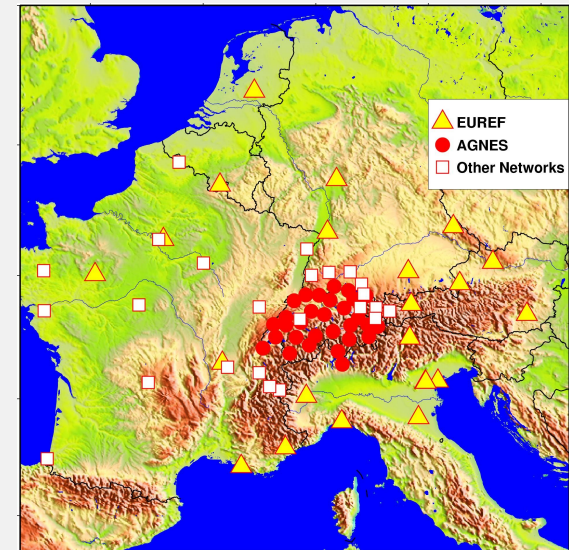
Bundesamt für Landestopografie
Office fédéral de topographie
Ufficio federale di topografia
Uffizi federal da topografia

swisstopo report LPT

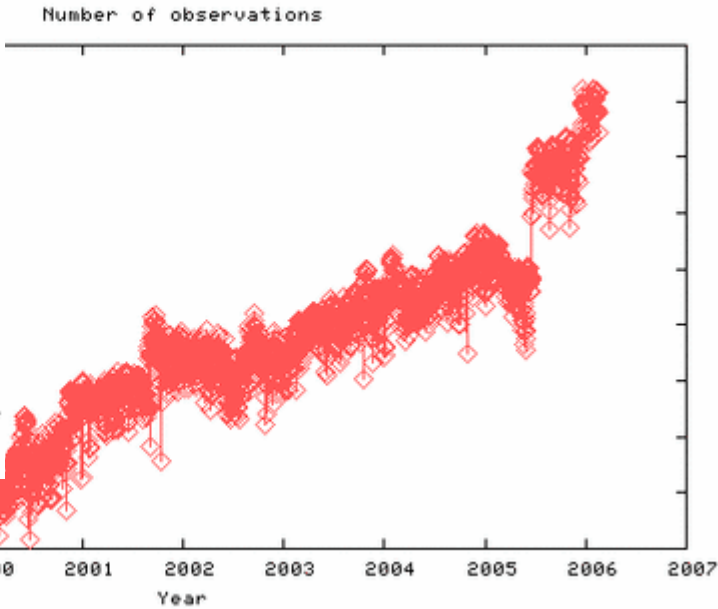
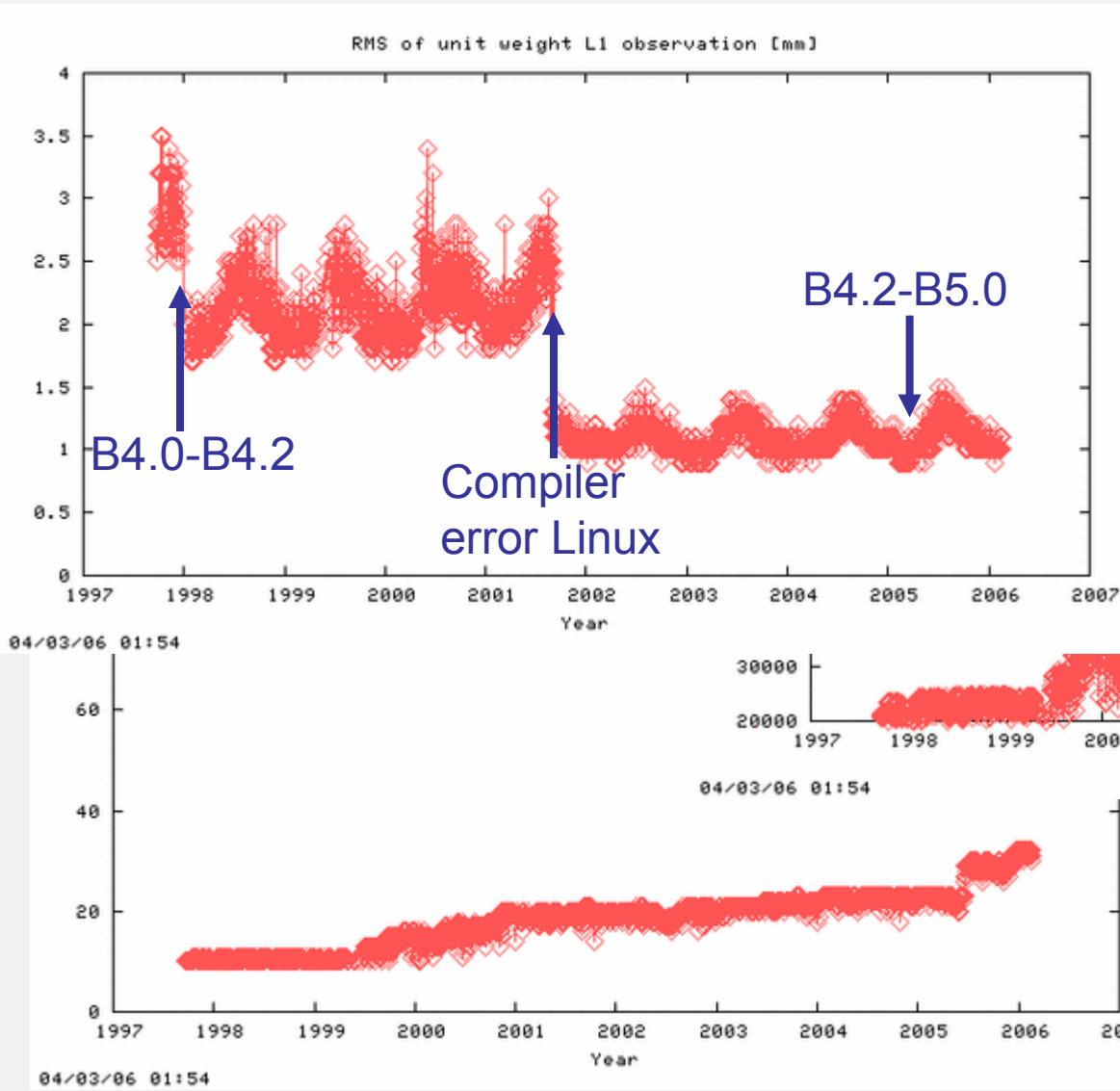
E. Brockmann, D. Ineichen, S. Schaer

Networks processed by LPT (1)

network (#stations)	availability	comments
EUREF subnetwork (30)	100 % daily	Reference frame Europe 
AGNES + subnetwork EUREF (85)	100 % daily	Reference frame Switzerland  + + +
AGNES + subnetwork EUREF (80)	98 % hourly	Numerical weather prediction and crd. monitoring 



Evolution with time



Specific topic: swisstopo <-> CODE

- S. Schaer: employee at swisstopo, but with tasks at swisstopo and CODE
- Common perl programs for data transfer and downloading, vice-versa computer checks
- Specific requests „EUREF type AC“ / Federal surveying agency -> direct improvements to Bernese

```
# Define list of data centers to be considered
# -----
if ($ENV{AC_NAME} eq "COD") {

@CENLST=("BKG","CDDIS","GA","GODC_","IGN","JPL","SOPAC","DWH1","CRAR_","CDDISA_","ASI","BKG_E",
"IGN_E","IGN_E2","OLG","ROB","KASI_","BKG_GREF") }
elsif ($ENV{AC_NAME} eq "LPT") {

@CENLST=("BKG","BKG_E","CDDIS","IGN","IGN_E","IGN_E2","SOPAC","CDDISA_","ASI","OLG","ROB","IGN_
RGP","IGN_RGP2","BKG_GREF") }
else {
  die "AC_NAME undefined\n" }
```

get_nrtdata.com

Monitoring the dense national network AGNES

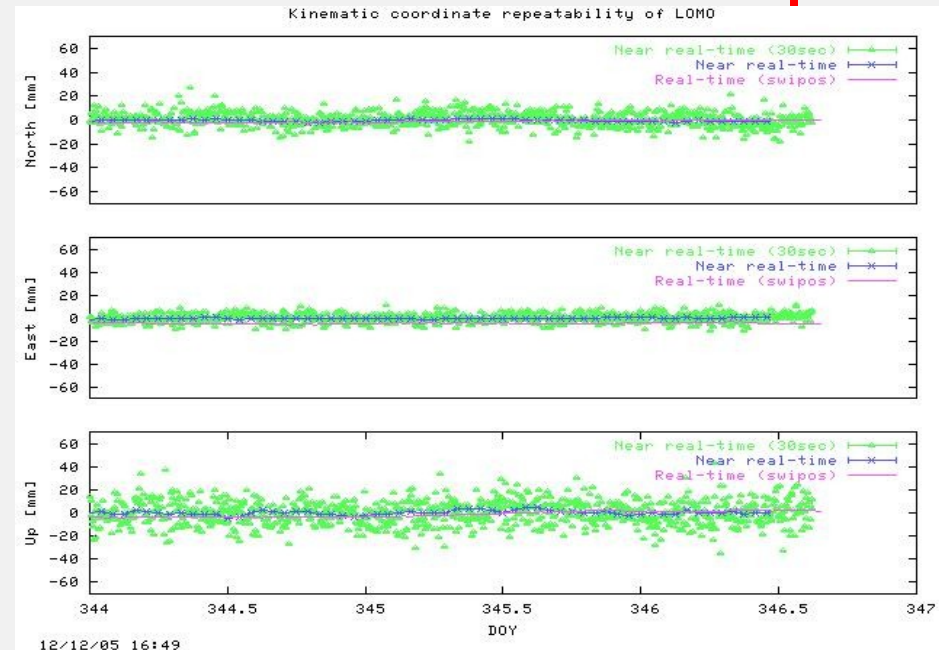
- Bernese Monitoring (hourly)
 - Coordinate monitoring
 - ZTD estimation for numerical weather prediction
- Trimble GPSNet Monitoring (real-time)
 - Coordinate monitoring
 - ZTD estimation for numerical weather prediction

Monitoring (Bernese) – Positioning Service (GPSNET)

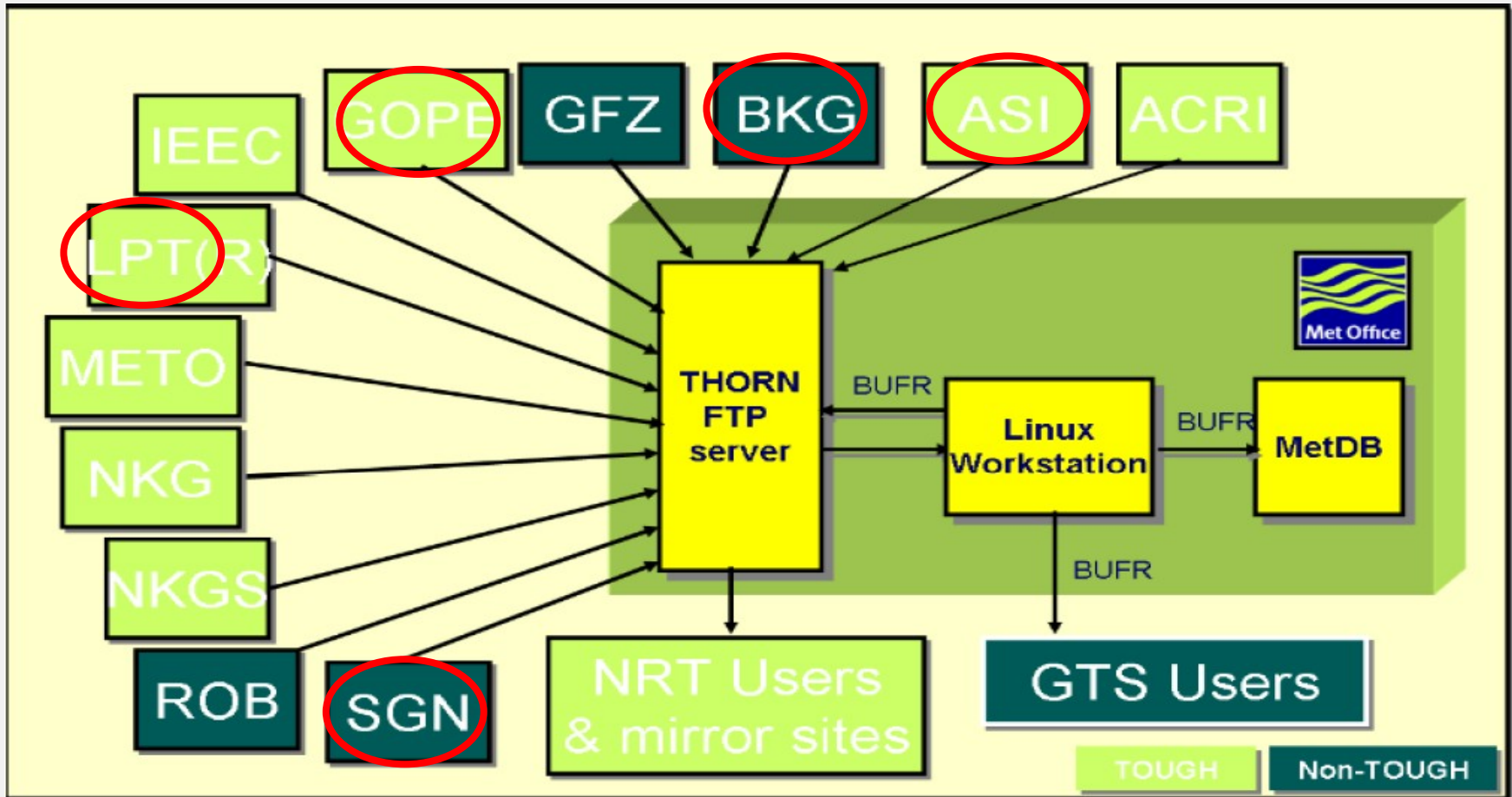
network (# stations)	availability	comments
AGNES + D-A stations (39)	95% real-time/hourly	Positioning service Monitoring + Bernese Monitoring + swisstopo

Station	Netzwerk / Info	Koordinaten-Wiederholbarkeit	Meteo	7 Tage 1h-Monitor	3 Tage 30s-Monitor
LOMO	Agnes				

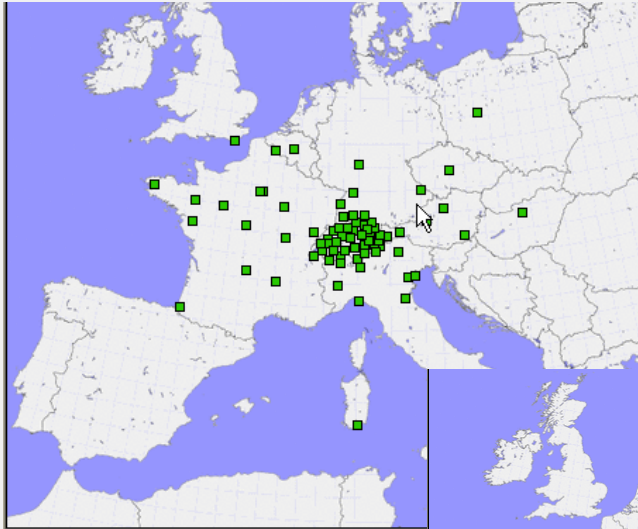
- 3 monitoring series
 - NRT 1h Bernese monitoring
 - NRT 30-Sek. Bernese kinematic solutions
 - swipos GPSNet coordinate monitoring
- Quick and high quality check of the reference frame
- Bernese-Monitoring and swipos-Monitoring quite similar results (constraints in swipos too big)



Data Flow of NRT ZTD's EPN AC's



NRT-ZTD submission to MET community



SITE	SITE	SITE	SITE	SITE
ANDE	ARDE	AUTN	BORJ	BOU
BSCN	BZRG	CAGL	DAVO	EGL
ETHZ	FALE	FHBB	FLDK	FREI
GENO	GOPE	GRAZ	GUIP	HER
HUTI	JUJO	KARL	KLOP	KOP
LECH	LILL	LIND	LINZ	LOM
MART	MATE	MEDI	MLVL	NAN
PAYE	PDEL	PENC	PFAN	PUY
SAAN	SAME	SANB	SARG	SBG
SIGM	SMNE	STAB	STCX	STG
UZNA	VENE	VFCH	WTZR	ZER

SITE	SITE	SITE	SITE	SITE	SITE	SITE
ANDE	ARDE	BOUR	DAVO	EPPL	ETHZ	FALE
FHBB	FLDK	FREI	FRIC	GENE	HOHI	HUTI
JUJO	KOPS	KRBB	KREU	LECH	LIND	LOMO
LUZE	MART	NEUC	PAYE	RAVE	SAAN	SAME
SANB	SARG	SCHA	SCHW	SIGM	STAB	STCX
STGA	UZNA	ZERM	ZIMM			

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D F E

PNAC monitoring

PNAC monitoring

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Data monitoring	Analysis monitoring
swisstopo: PNAC AgendaX Stefan swisstopo: Hourly Check Datapool summary file Hourly missing data Datapool hourly log file Daily check Datapool daily summary file teqc statistics ZIMM files (www) y files (www) nformation nformation M general information M quality information M latency information hourly files at data centers n ftp statistics rved satellites atus directory cle slips ps slips CM connections ssing hours	swisstopo: PNAC time series web page swisstopo: PNAC processing web page swisstopo: AMET processing summary file swisstopo: AMET hourly helmert to official crd swisstopo: AMET NRT and RRT solution statistics ACRI: AMET delivery <div style="border: 2px solid red; padding: 2px;">EUMETNET: AMET monitoring page</div> <div style="border: 2px solid red; padding: 2px;">EUMETNET: GPSNET monitoring page</div> swisstopo: AGNES processing summary file swisstopo: AGNES weekly helmert to official crd swisstopo: AGNES weekly ADDNEQ output swisstopo: AGNES processing web page swisstopo: AGNES data availability in postprocessing swisstopo: AGNES history swisstopo: EUREF processing summary file swisstopo: EUREF processing web page swisstopo: MULTI helmert to official crd swisstopo: MULTI helmert to CHTRF04 coordinates swisstopo: MULTI velocity plot for CH

www3: Missing epochs

Bernese

GPSNet

swisstopo

GPS-Meteo Projects

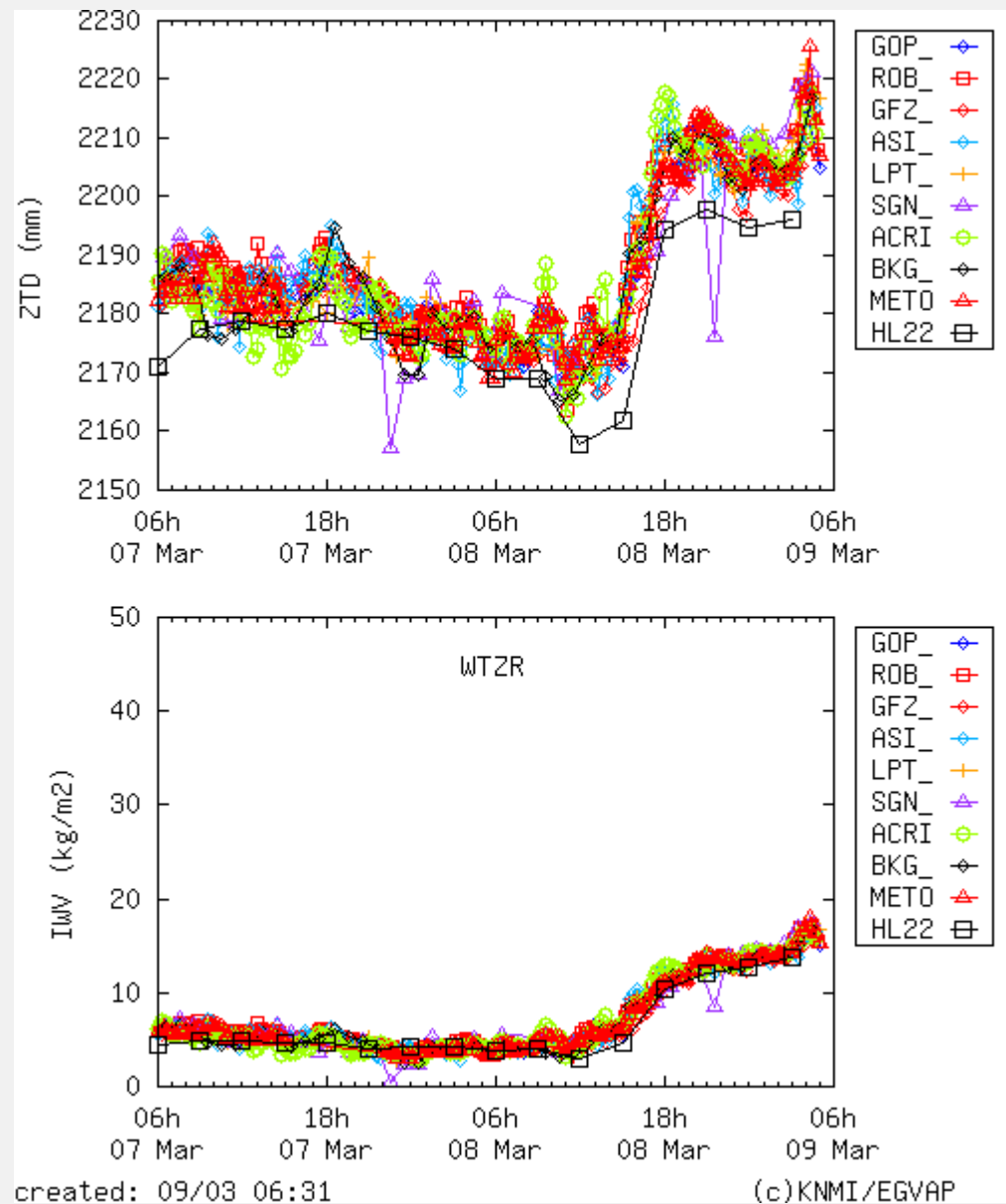
- TOUGH (Targeting Optimal Use of GPS Meteorology)
 - EU Reserch project
 - Jan. 2003 – Jan. 2006
 - Web page: <http://web.dmi.dk/pub/tough/>

- E-GVAP
 - EUMETNET project (-> towards operational use)
 - Since April 2005 (3 years)
 - Web page: <http://egvap.dmi.dk/> (-> validation)



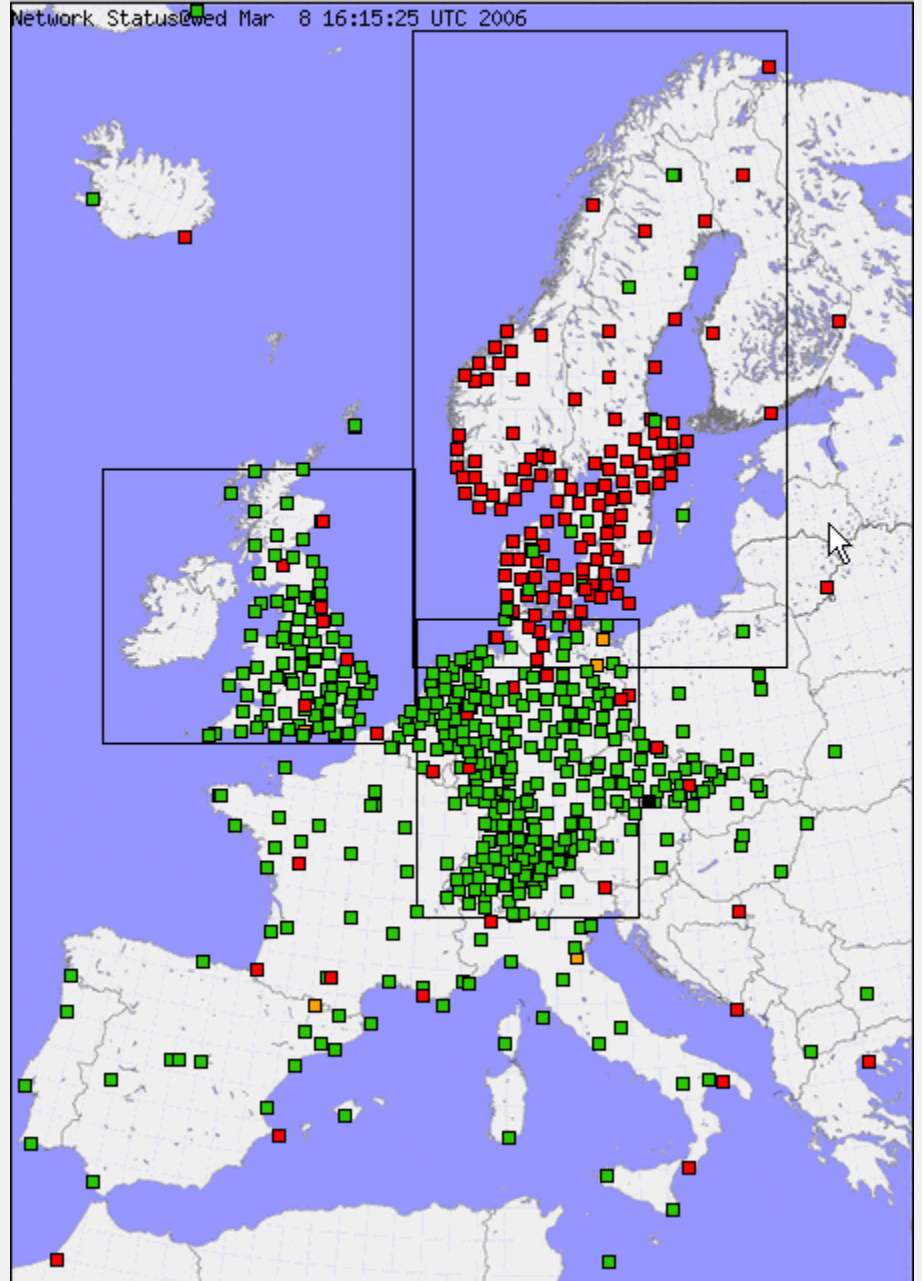
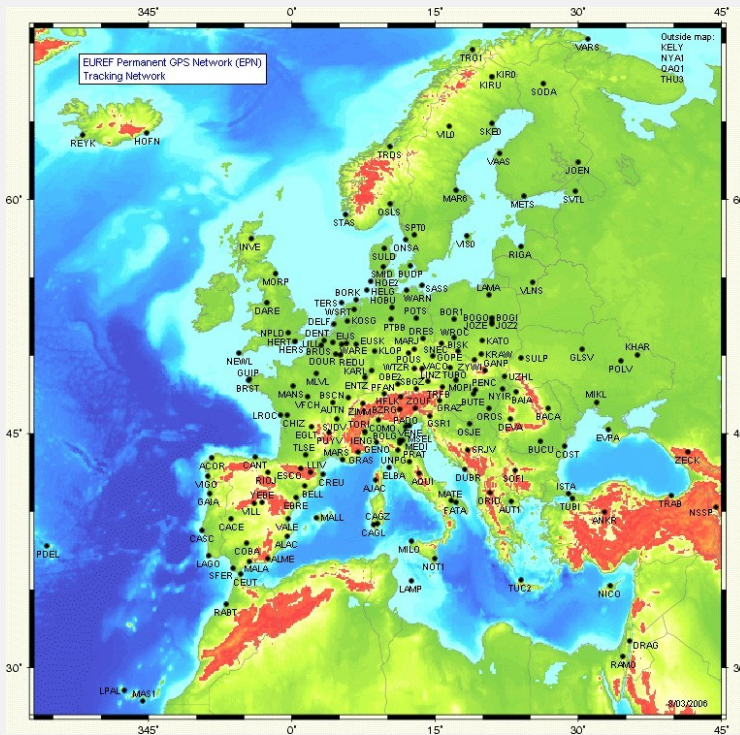
ZTD estimates

- Example WTZR



NRT GPS Network

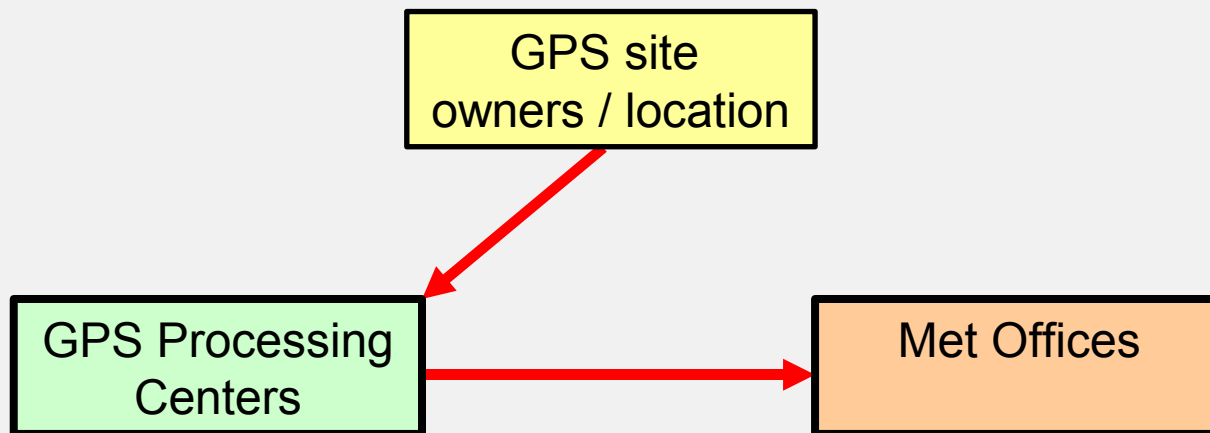
- 550 sites
 - 150 EPN sites
 - 400 national non-EPN sites



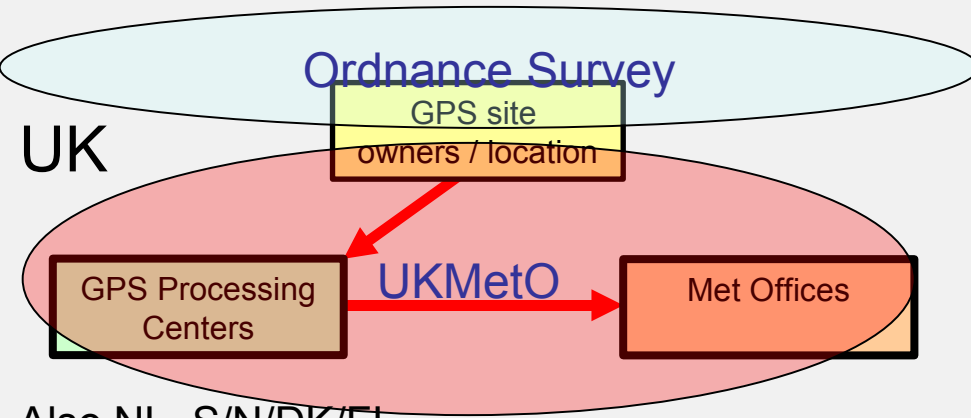
swisstopo

+ + +

Cooperation options

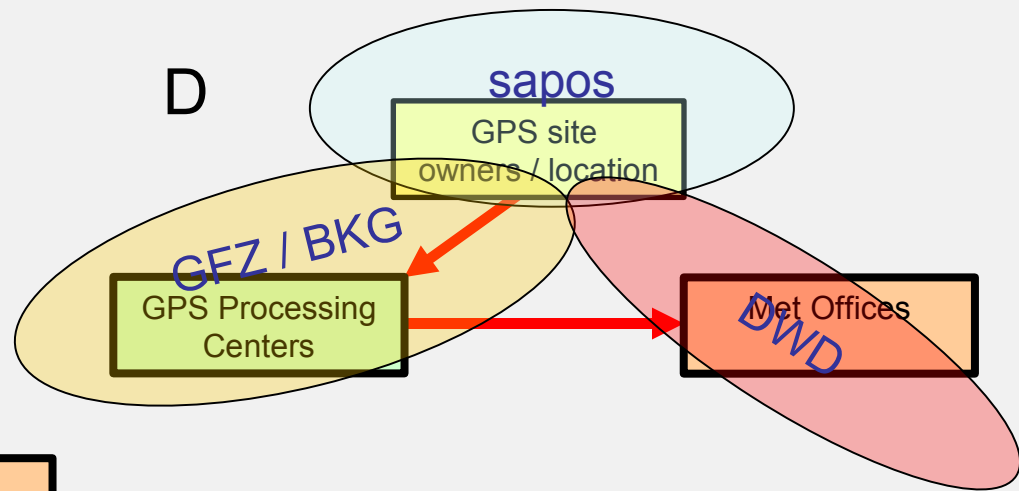
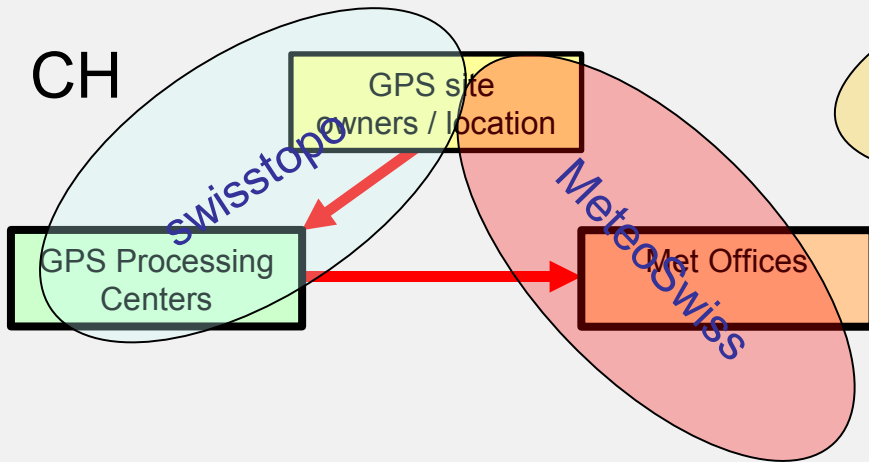


Cooperation options (2)



Cooperation based on contracts

Also NL, S/N/DK/FI
geod. support by universities



Questions / Role of EUREF

- Backbone network (150) <-> dense networks (400)
 - Data provider (daily, hourly, real-time data)? **YES? -> No further actions**
 - Data and analysis provider ? which networks? Which observation rates?
YES? -> further actions necessary
- NRT processing of dense national networks + EPN network is usefull:
 - EPN-only NRT analysis not useful for MET
 - **Synergy of coordinate monitoring and ztd generation !**
 - ZTD generation as an additional application of permanent networks – more applications (and potentially contracts with MET institutions) increase usage of permanent networks
 - Interesting for EPN AC's with dense national networks