Willkommen im

BEV

Bundesamt für Eich- und Vermessungswesen

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Concept and Status of the Austrian Positioning Service APOS

Contents

- Station segment
- Computer center and system design
- Processing strategy and services
- Quality control and antenna handling
- Reference frame and datum definition
- The problem of seamless cross border realtime systems
- The next steps

APOS station segment

- Monumentation: **concrete pilars** on bedrock or **stable buildings**
- Multi porpose **sensor stations**
- Max. distance between reference stations **< 70 km**
  In heigh mountain areas **< 50 km**
- Following IGS- and EUREF- **site guidelines**
  Exception: Use of special **Radoms**
- Use existing permanent stations of governmental and private partner organisations where possible (**Private Public Partnerschip**)
- Realtime data exchange with similar services in neighboring countries (**Cross border connections**)

High mountain stations: Hauser Kaibling (1920 m), Kops (1906 m)

Lech am Arlberg (1823 m)

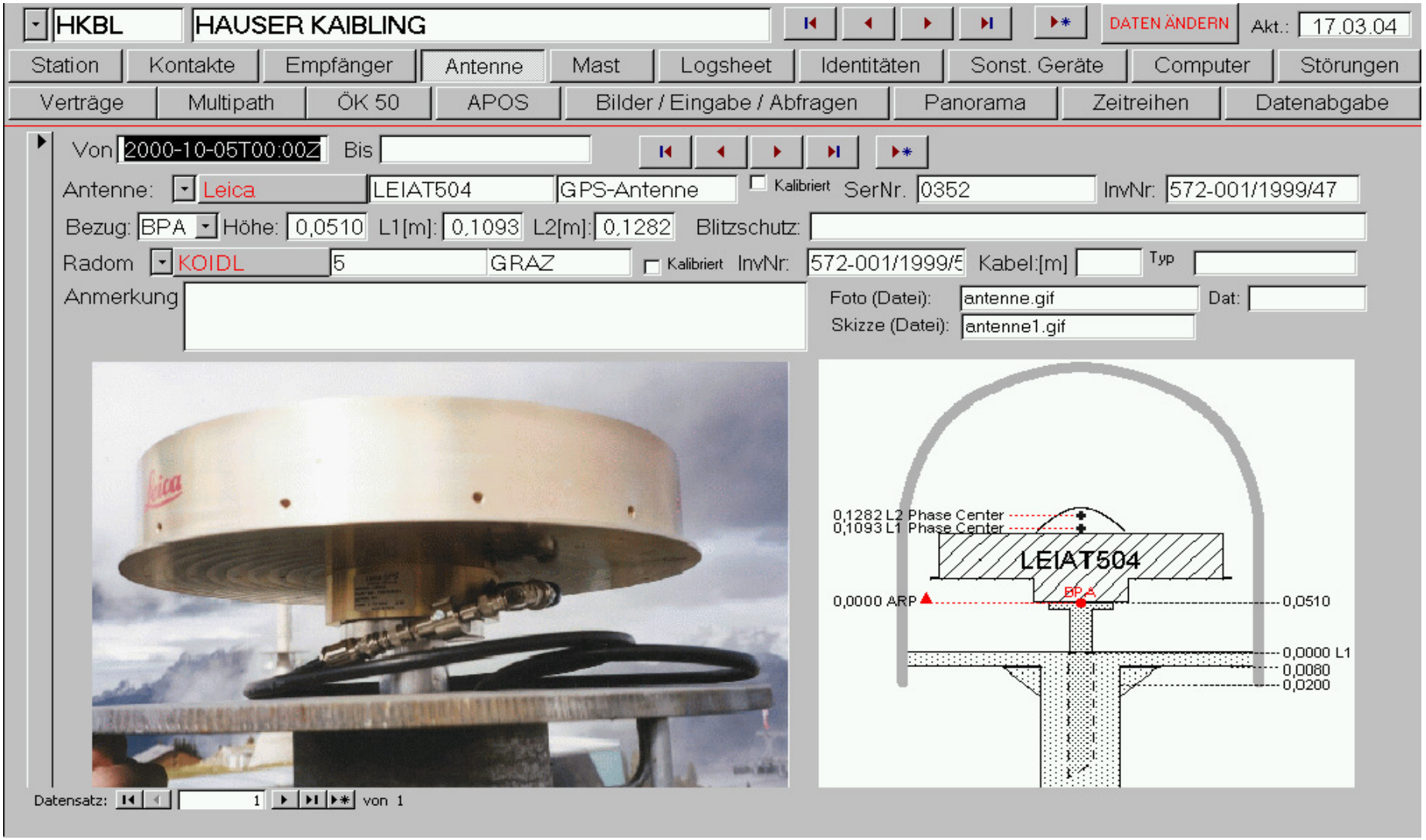
Wels – Cadaster Office (385 m)

KELAG –Stations in Klagenfurt (500 m) and St. Leonhard (769 m)

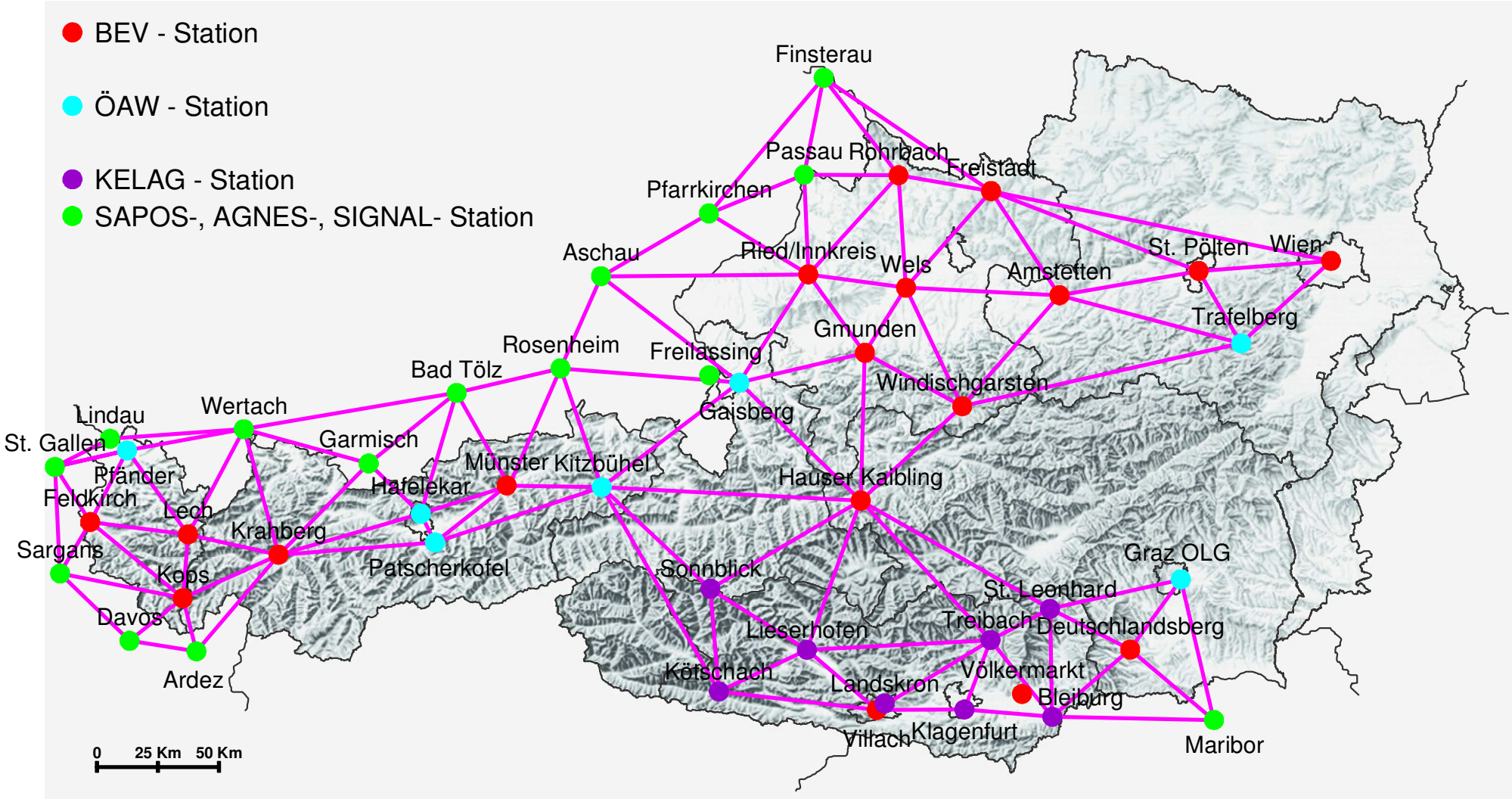
Station equipment – sensor station

- GPS receiver with onboard storage
- Network components
- WAN connection (Corporate Network Austria)
- UPS with ethernet-interface (SNMP, HTTP)
- ePowerswitch with ethernet-internface (HTTP)

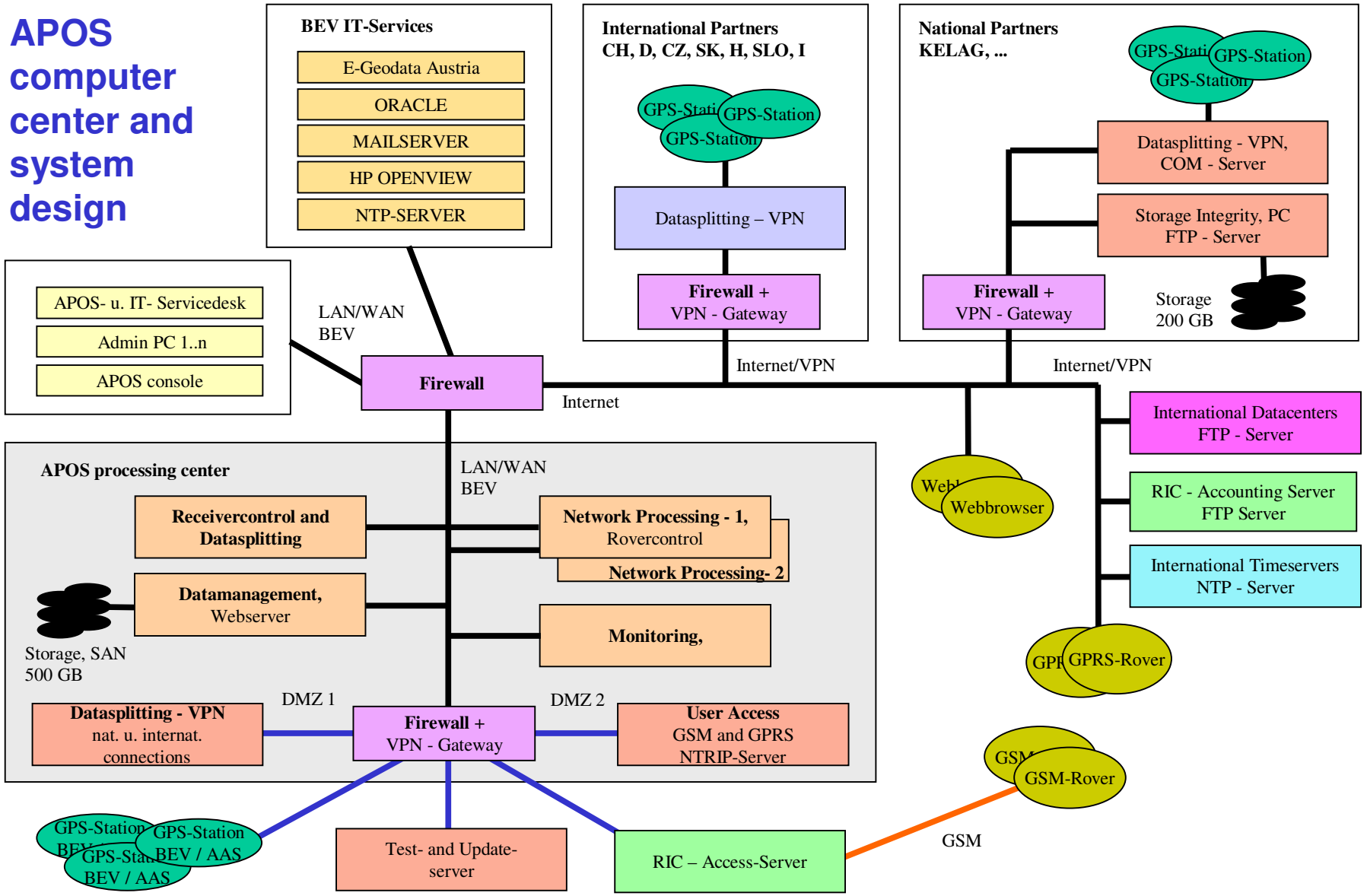
APOS – Station Database



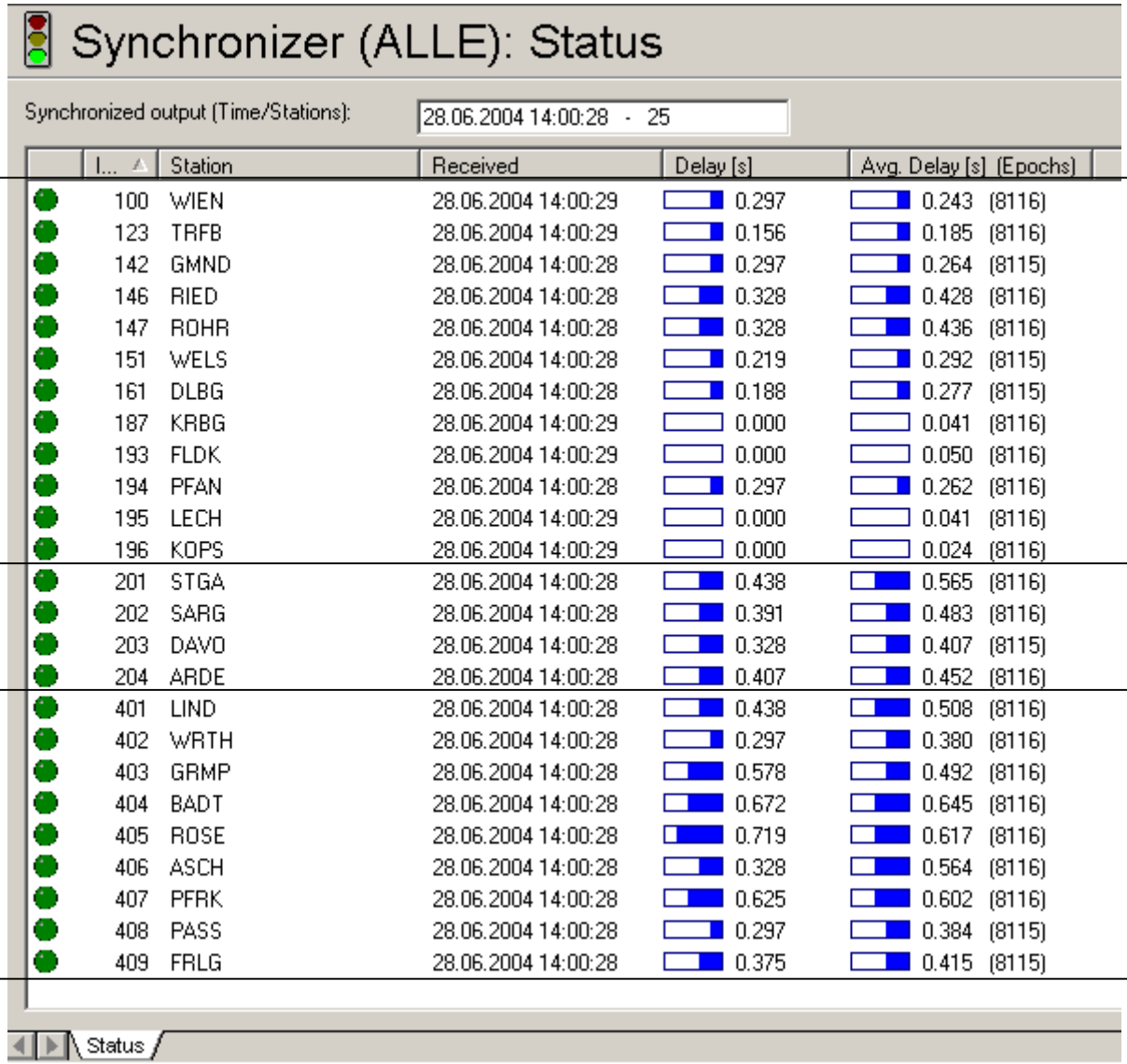
APOS Status May 2005



APOS computer center and system design



Datatransfer – Performance



Synchronizer (ALLE): Status

Synchronized output (Time/Stations): 28.06.2004 14:00:28 - 25

I...	Station	Received	Delay [s]	Avg. Delay [s]	(Epochs)
100	WIEN	28.06.2004 14:00:29	0.297	0.243	(8116)
123	TRFB	28.06.2004 14:00:29	0.156	0.185	(8116)
142	GMND	28.06.2004 14:00:28	0.297	0.264	(8115)
146	RIED	28.06.2004 14:00:28	0.328	0.428	(8116)
147	ROHR	28.06.2004 14:00:28	0.328	0.436	(8116)
151	WELS	28.06.2004 14:00:28	0.219	0.292	(8115)
161	DLBG	28.06.2004 14:00:28	0.188	0.277	(8115)
187	KRBG	28.06.2004 14:00:29	0.000	0.041	(8116)
193	FLDK	28.06.2004 14:00:29	0.000	0.050	(8116)
194	PFAN	28.06.2004 14:00:28	0.297	0.262	(8116)
195	LECH	28.06.2004 14:00:29	0.000	0.041	(8116)
196	KOPS	28.06.2004 14:00:29	0.000	0.024	(8116)
201	STGA	28.06.2004 14:00:28	0.438	0.565	(8116)
202	SARG	28.06.2004 14:00:28	0.391	0.483	(8116)
203	DAVO	28.06.2004 14:00:28	0.328	0.407	(8115)
204	ARDE	28.06.2004 14:00:28	0.407	0.452	(8116)
401	LIND	28.06.2004 14:00:28	0.438	0.508	(8116)
402	WRTH	28.06.2004 14:00:28	0.297	0.380	(8116)
403	GRMP	28.06.2004 14:00:28	0.578	0.492	(8116)
404	BADT	28.06.2004 14:00:28	0.672	0.645	(8116)
405	ROSE	28.06.2004 14:00:28	0.719	0.617	(8116)
406	ASCH	28.06.2004 14:00:28	0.328	0.564	(8116)
407	PFRK	28.06.2004 14:00:28	0.625	0.602	(8116)
408	PASS	28.06.2004 14:00:28	0.297	0.384	(8115)
409	FRLG	28.06.2004 14:00:28	0.375	0.415	(8115)

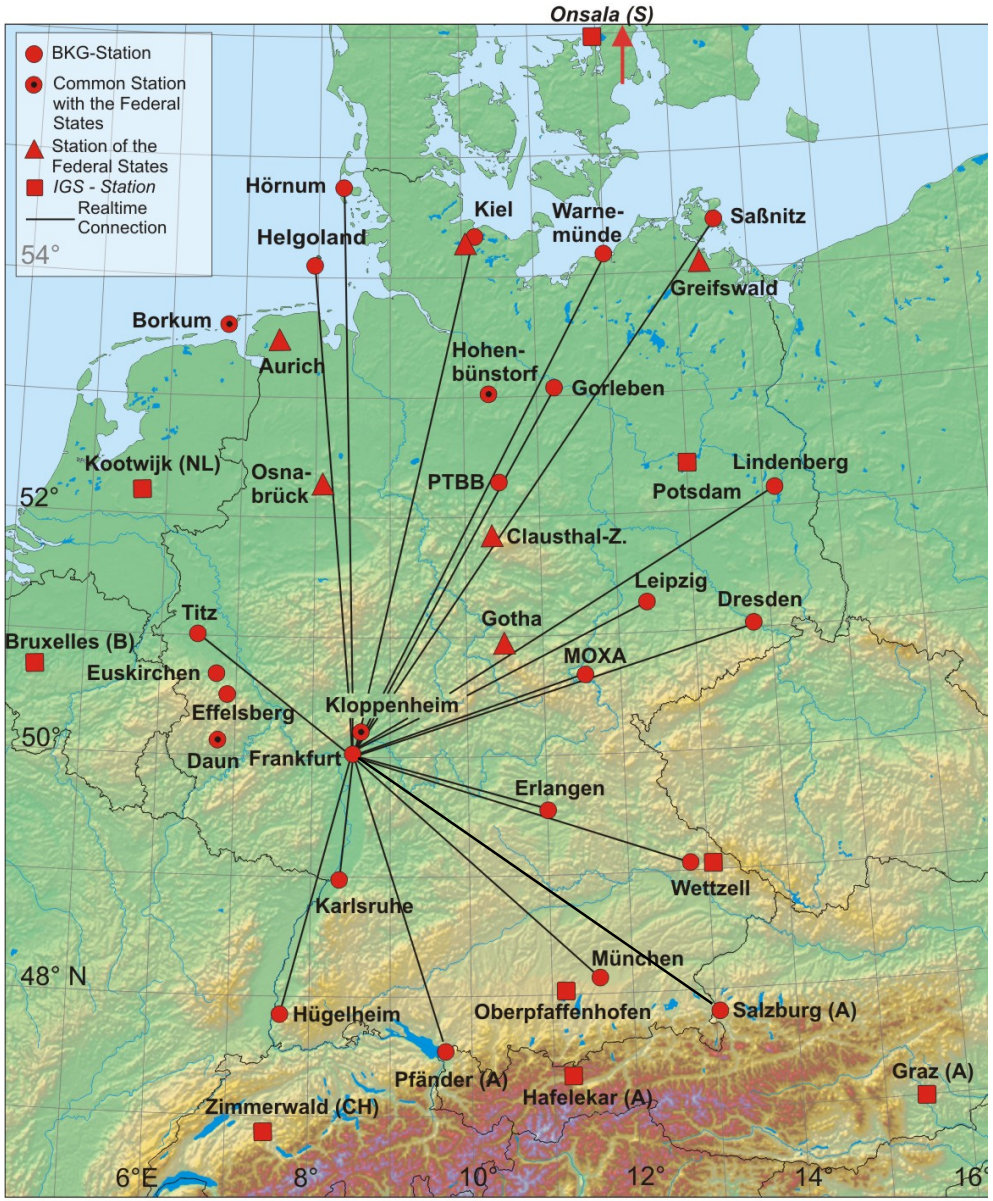
Status

APOS

AGNES/SWIPOS

SAPOS

GREF Network



Integration of APOS-Stations **Pfänder** and **Salzburg** since March 2004

<u>3 parallel Datastreams to BKG Frankfurt:</u>

1) Direct T-DSL connection to BKG

2) Direct Internet connection to BKG over BKG official Internet connection

3) Indirect using the EUREF-IP NTRIP Broadcaster

Delays direct: **0.2-0.3 Sec.**
Delays EUREF-IP Caster: **0.4-0.5 Sec.**

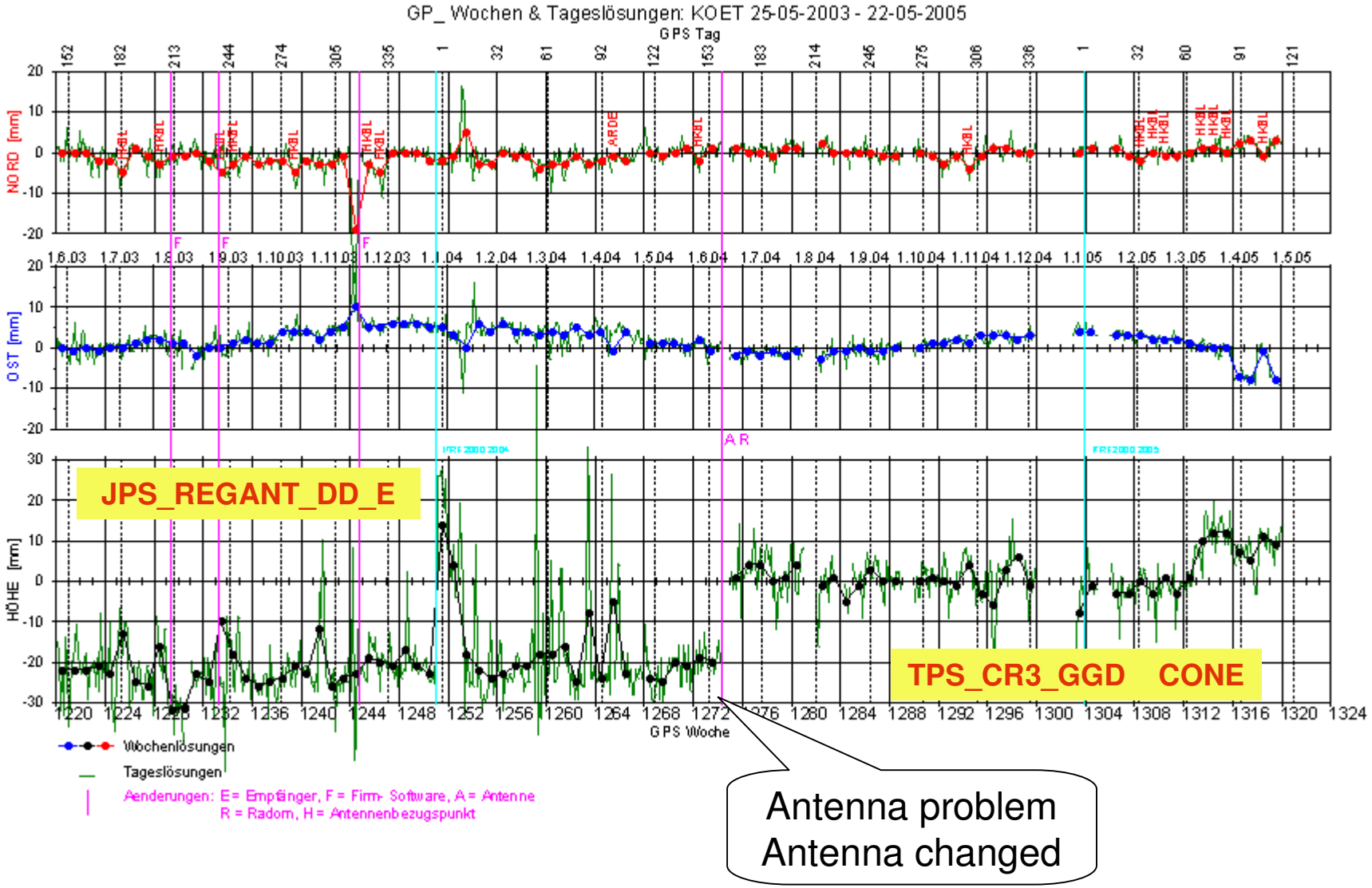
Processing strategy

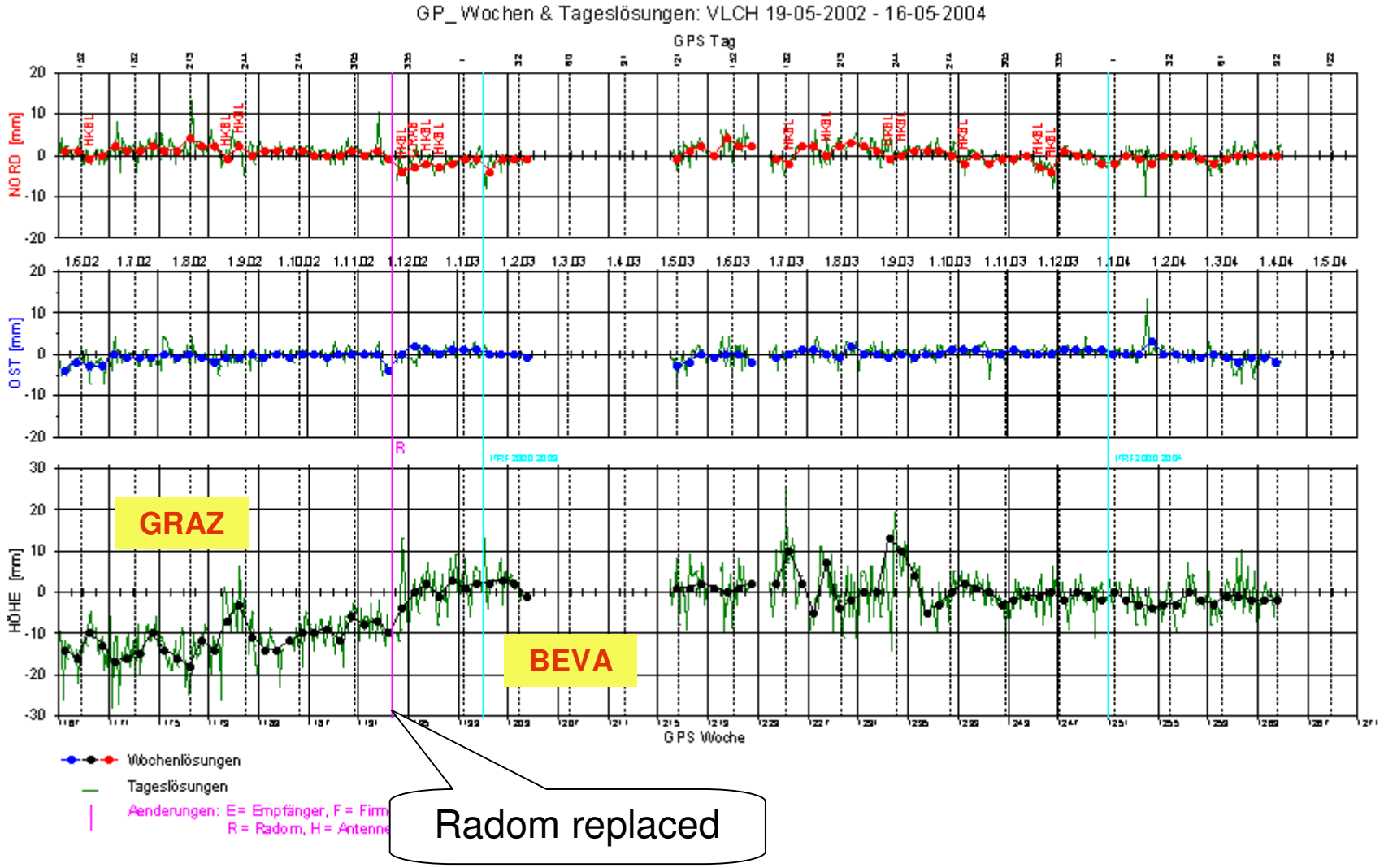
- Realtime network solution of all connected stations
- Virtual reference station (VRS) concept
- Relative antenna calibrations (IGS phase file)
- RINEX-Storage

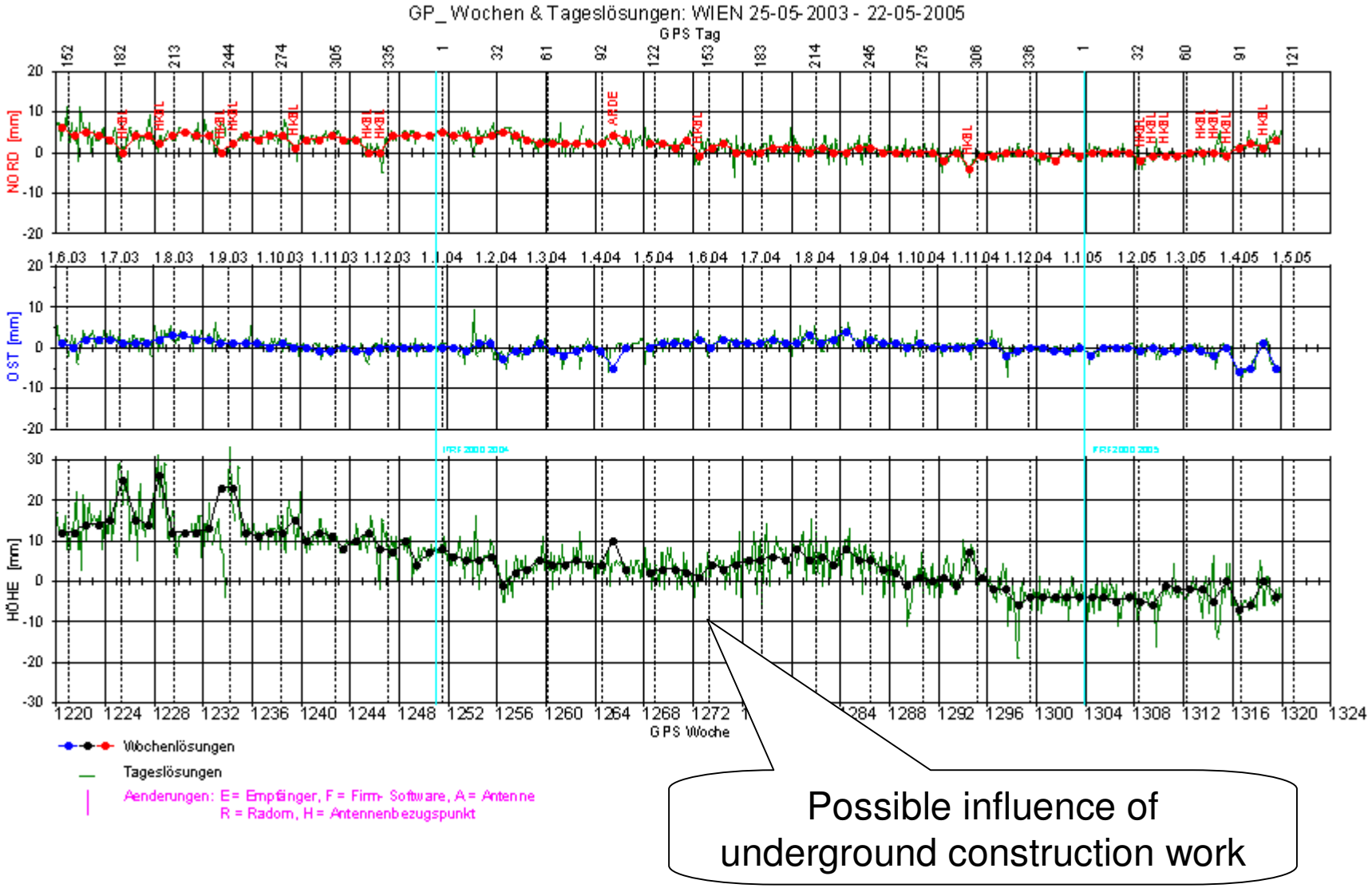
Services

- User access via GSM(CSD) and GPRS(NTRIP)
- VRS-RTK: cm accuracy -> Cadaster
- VRS-DGPS: dm accuracy
- DGPS broadcast: submeter accuracy
- RAW data streaming of single permanent stations
- Postprocessing: RINEX and VRS-RINEX

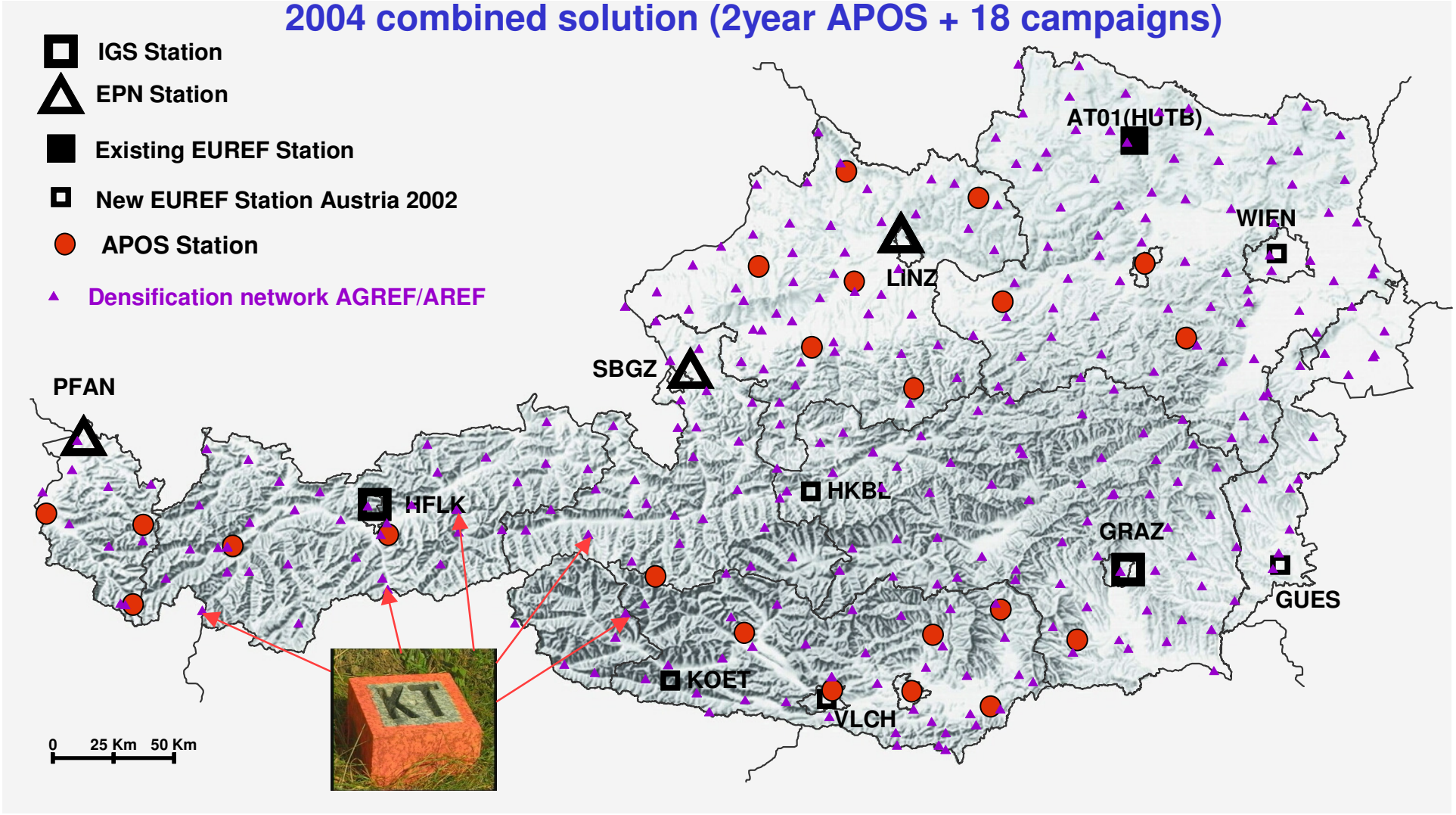
Quality control and monitoring



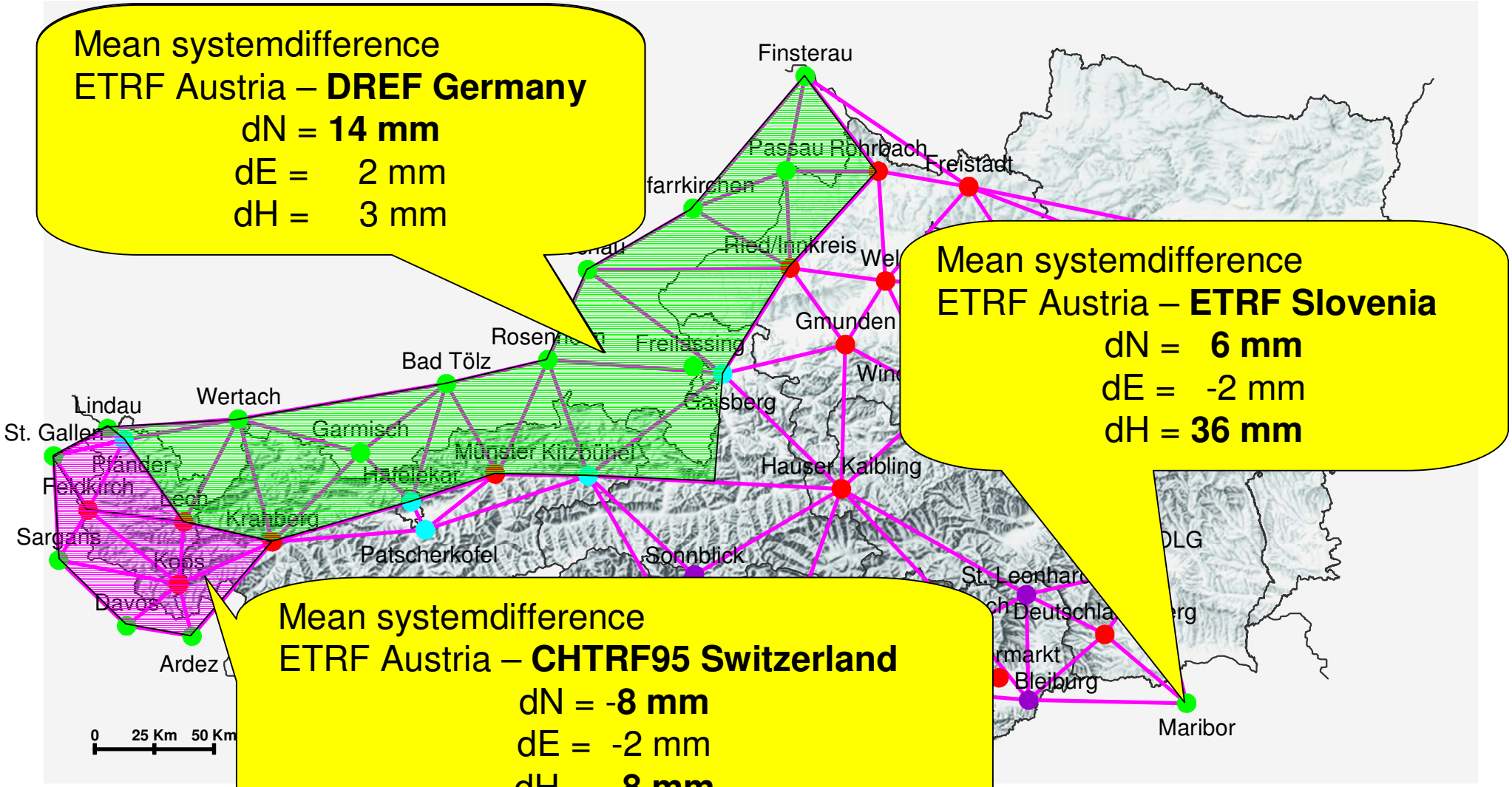

GP_Wochen & Tageslösungen: VLCH 19-05-2002 - 16-05-2004
GPS Tag
NORD [mm]
OST [mm]
HÖHE [mm]
GRAZ
BEVA
GPS Woche
Wochenlösungen
Tageslösungen
Aenderungen: E= Empfänger, F = Firm
R = Radom, H = Antenne
Radom replaced


GP_ Wochen & Tageslösungen: WIEN 25-05-2003 - 22-05-2005
GPS Tag
NORD [mm]
OST [mm]
HÖHE [mm]
GPS Woche
Wochenlösungen
Tageslösungen
Aenderungen: E= Empfänger, F = Firm- Software, A = Antenne
R = Radom, H = Antennenbezugspunkt
Possible influence of underground construction work

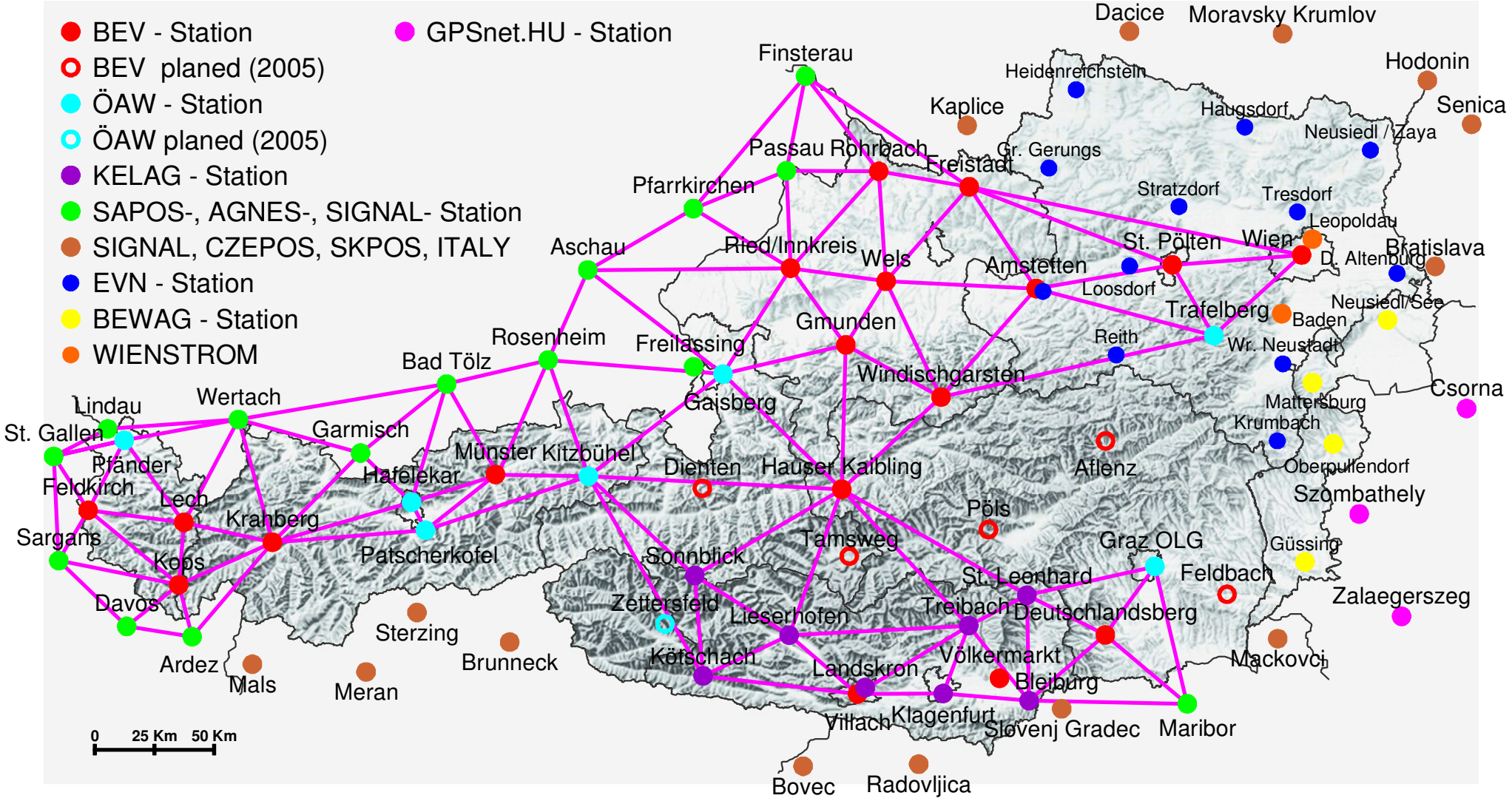
Reference frame and datum definition
ETRF89 Austria 2002 solution
2004 combined solution (2year APOS + 18 campaigns)



Seamless cross border realtime systems



APOS Planned 12/2006



The next steps

- Finish installation of new APOS computer center
- Final marketingstrategy, productdefinition and pricing
- Access Server installation
- Test of NTRIP-Server
- Start of **Operational Phase expected: 01. 08.2005**
- Complete station segment (~50 stations in Austria, ~25 international stations)
- APOS covering whole austrian country: End of 2006
- Investigate in antenna calibrations


Thank you for your attention!