### **National Report of Germany**

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Deutschland, AdV

**EUREF Symposium 2007, London** 

SAPOS - RTK network of NMA's of German Länder

GREF – German integrated geodetic fundamental network

DHHN – Height network combined with gravity and geometry

**BalGRACE** – Aero-gravity measurements



# Satellitenpositionierungsdienst der deutschen Landesvermessung Einführung von GPS/GLONASS-Referenzstationen 2006 realisiert 1 2007 in Umsetzung € 2009-2011 in Planung nicht festgelegt

# GNSS-Referenzstationen Satellite Positioning Service SAPOS®

- RTK network of NMA's of German Länder
- 250 permanently operated GPS reference stations
- For surveying and cadastre and also other applications
- Central Bureau SAPOS® is the relevant contact agency for SAPOS® users operating in Germany
- Development of the SAPOS GPS station network to GPS/GLONASS

#### **GREF Network** Geplante BKG Station Onsala (S) BKG-Station Gemeinsame Station mit den Bundesländern SAPOS® Station IGS - Station Echtzeitverbindung Hörnum 🌘 Absolutschwere-Warne-Saßnitz Helgoland Supraleitgravimeter-Kiel Pegelstation Greifswald Borkum Hohen-Aurich bünstorf Grünow Gorleben Diepholz Lindenberg Kootwijk (NL) Osna-PTBB Potsdam > 52° bruck Clausthal-Z. Leipzig Dresden Titz Gotha Bruxelles (B) MOXA **Euskirchen Bad Homburg** Effelsberg Kloppenheim 50% Hof Daun Frankfurt Erlangen Dillingen Wettzell Karlsruhe München 48° N Salzburg (A) Oberpfaffenhofen' Hügelheim Graz (A) Pfänder (A) Hafelekar (A) Zimmerwald (CH)

### Densification of EUREF's Networks

**Integrated German Reference Network GREF (30 stations):** 

- GPS/GLONASS (25)
- Absolute gravity (19)
- Tide Gauges (6)
- superconducting gravimeter (3)
- Real-time networking (20 NTRIP)
- Local backup networks (15)

Integration of several stations in to EPN, ECGN and

Combination with 20 SAPOS stations as basis for SAPOS monitoring (DREF Online)

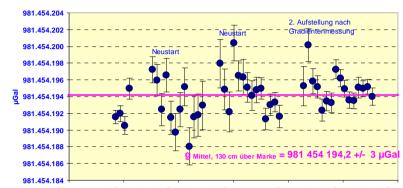
**GREF** 

IGS TIGA PP ECON

#### **BfG**

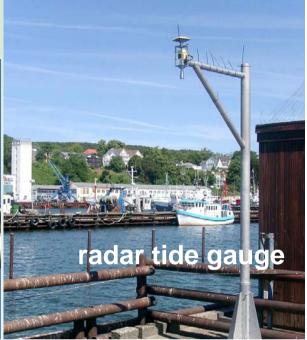
### **Stations Sassnitz and Helgoland**

Absolute Schweremessung mit FG5-301 in Sassnitz, 16.-19. Mai 2003



16.5.03 12:00 17.5.03 0:00 17.5.03 12:00 18.5.03 0:00 18.5.03 12:00 19.5.03 0:00 19.5.03 12:00 absolute gravity

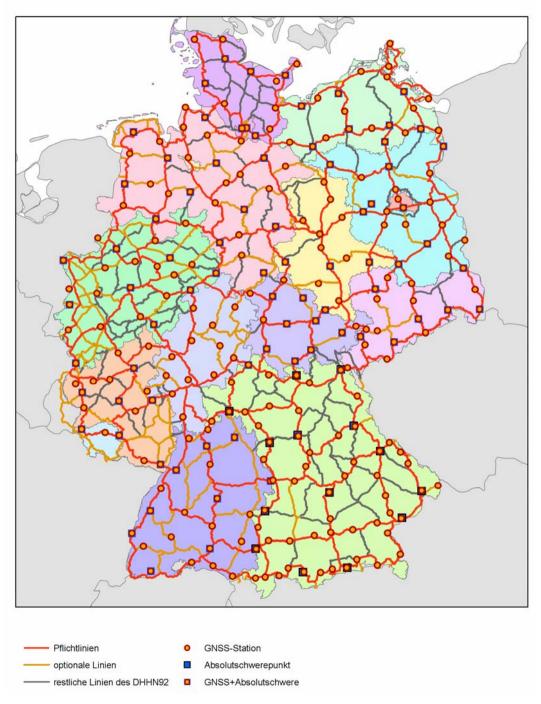








Stand April 2007 AdV



#### DHHN -

## Height network combined with gravity and geometry

### **Measurements between 2006-2011**

- 18000 km levelling
  (80% of 1st order network)
- 200 GNSS stations
- 100 abs. Grav.

#### **BalGRACE 2006**

During October 2006 the Geodynamics Department of the Danish National Space Center (DNSC) in cooperation with Bundesamt für Kartographie und Geodäsie (BKG) carried out an extensive airborne gravity and laser scanner campaign (BalGRACE) in the Baltic region using a King Air aircraft belonging to COWI A/S, Denmark.

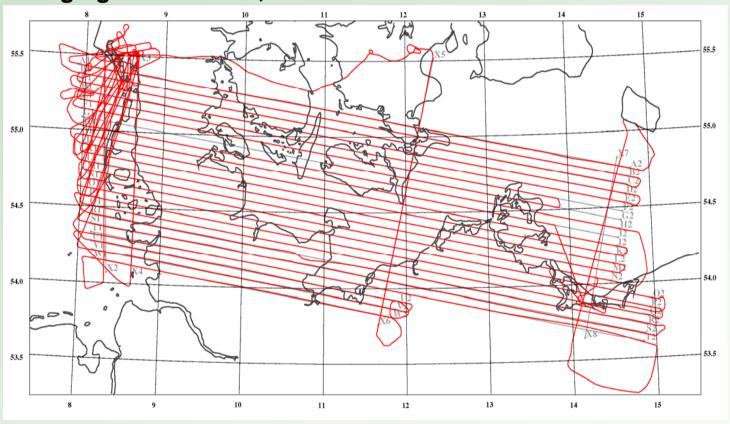


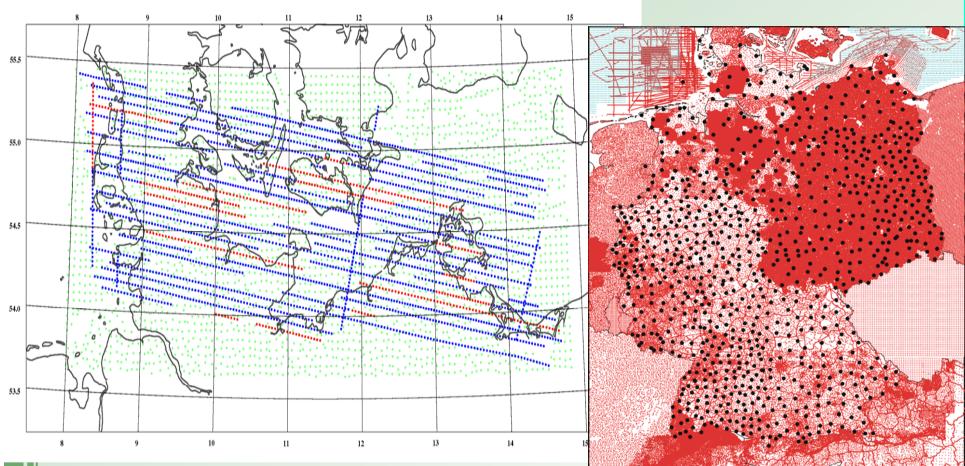
Fig. 32. Flight tracks flown during the airborne gravity and lidar campaign (BalGRACE), October 2006Principle of freeboard determination. The conversion of freeboard, F, to thickness, T, is approximately a constant (~6.0 in April/May – Wadhams et. al., 1992) depending on densities and snow depth, S.

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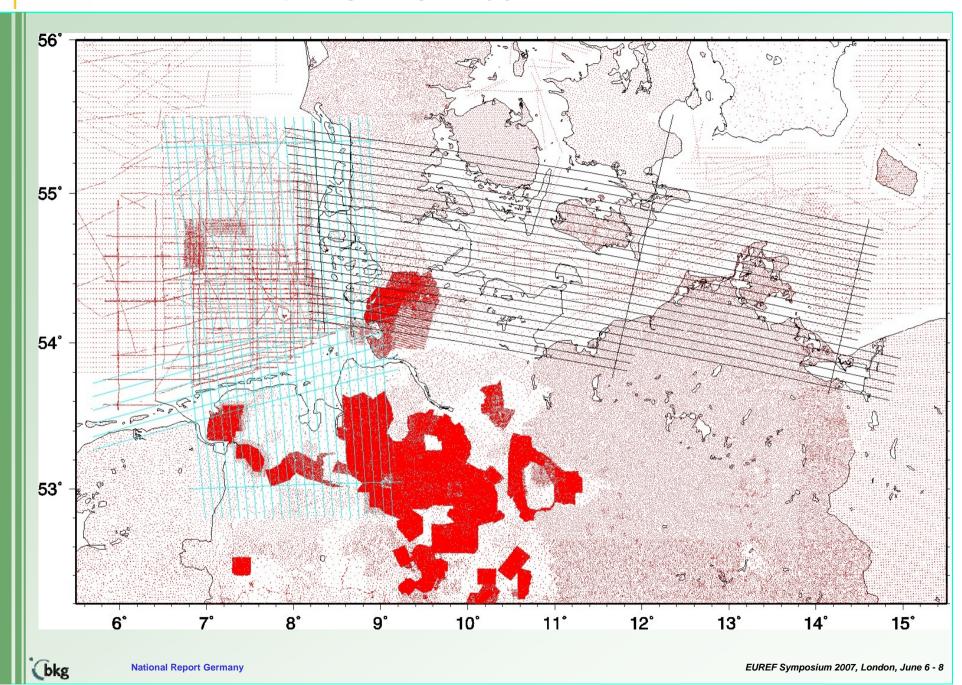
#### **BalGRACE**



Data coverage. Shown with blue airborne data classified handene terrestrische Messungen with low turbulence, with red medium-turbulence airborne, and with green combined land- and marine surface data used for collocation combined data set.



#### **NorthGRACE 2007**





#### **Outlook**

- Test implementation of AG database will be continued at BKG in June 2007, ECGN Aug. 2007, global end 2007
- A closer integration of AG owners into the common reference system is expected by the realisation of the regional comparison stations

