

National Report of Germany

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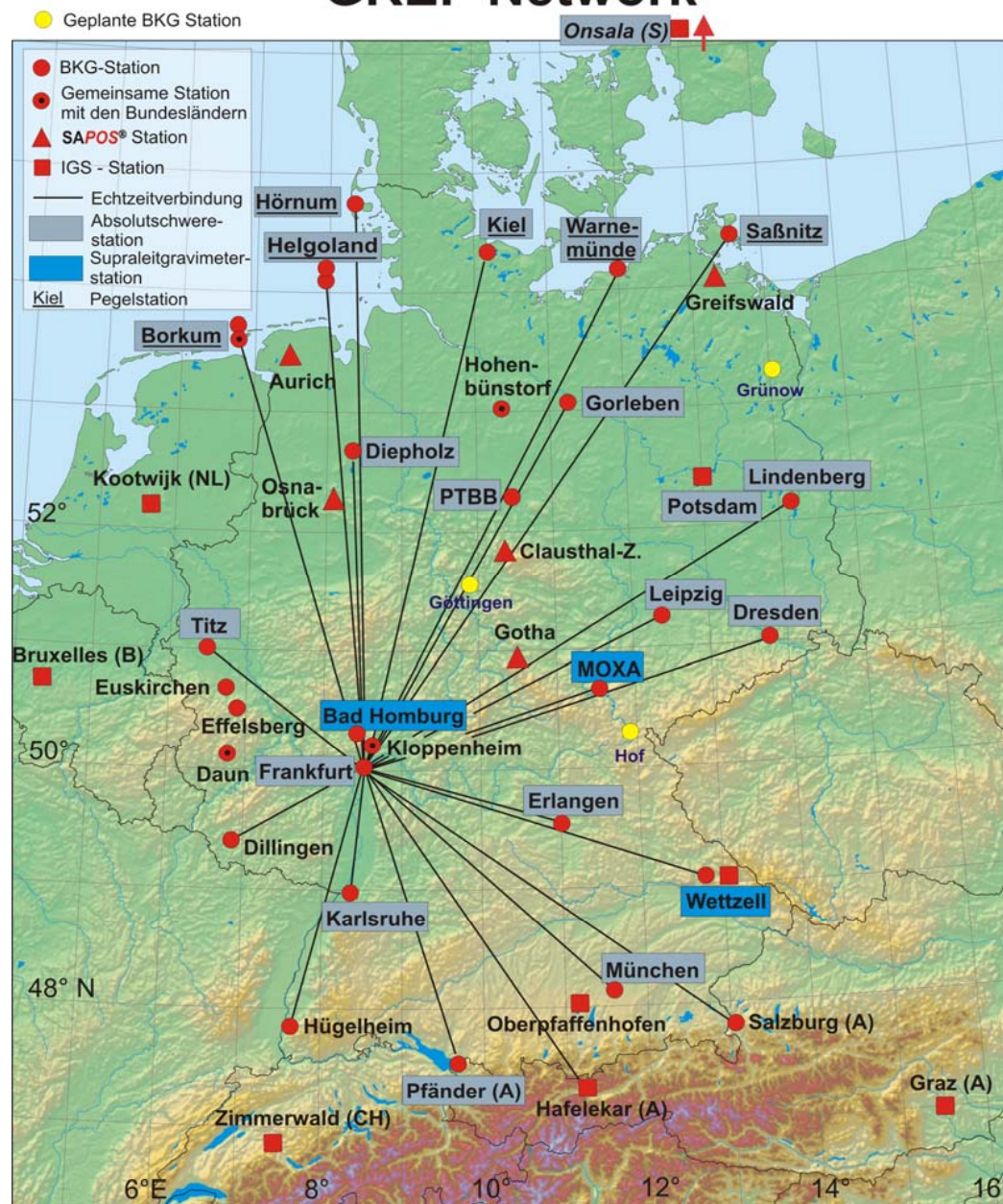
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|-----------------|---|
| SAPOS | – RTK network of NMA´s of German Länder |
| GRAF | – German integrated geodetic fundamental network |
| DHHN | – Height network combined with gravity and geometry |
| BalGRACE | – Aero-gravity measurements |



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

GRAF Network



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Densification of EUREF's Networks

Integrated German Reference Network GRAF (30 stations):

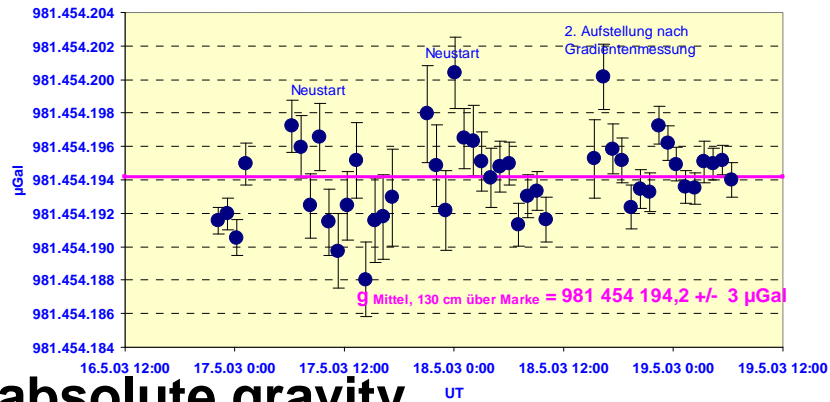
- GPS/GLONASS (25)
- Absolute gravity (19)
- Tide Gauges (6)
- superconducting gravimeter (3)
- Real-time networking (20 NTRIP)
- Local backup networks (15)

Integration of several stations in to EPN, ECGN and

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

Stations Sassnitz and Helgoland

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



GNSS

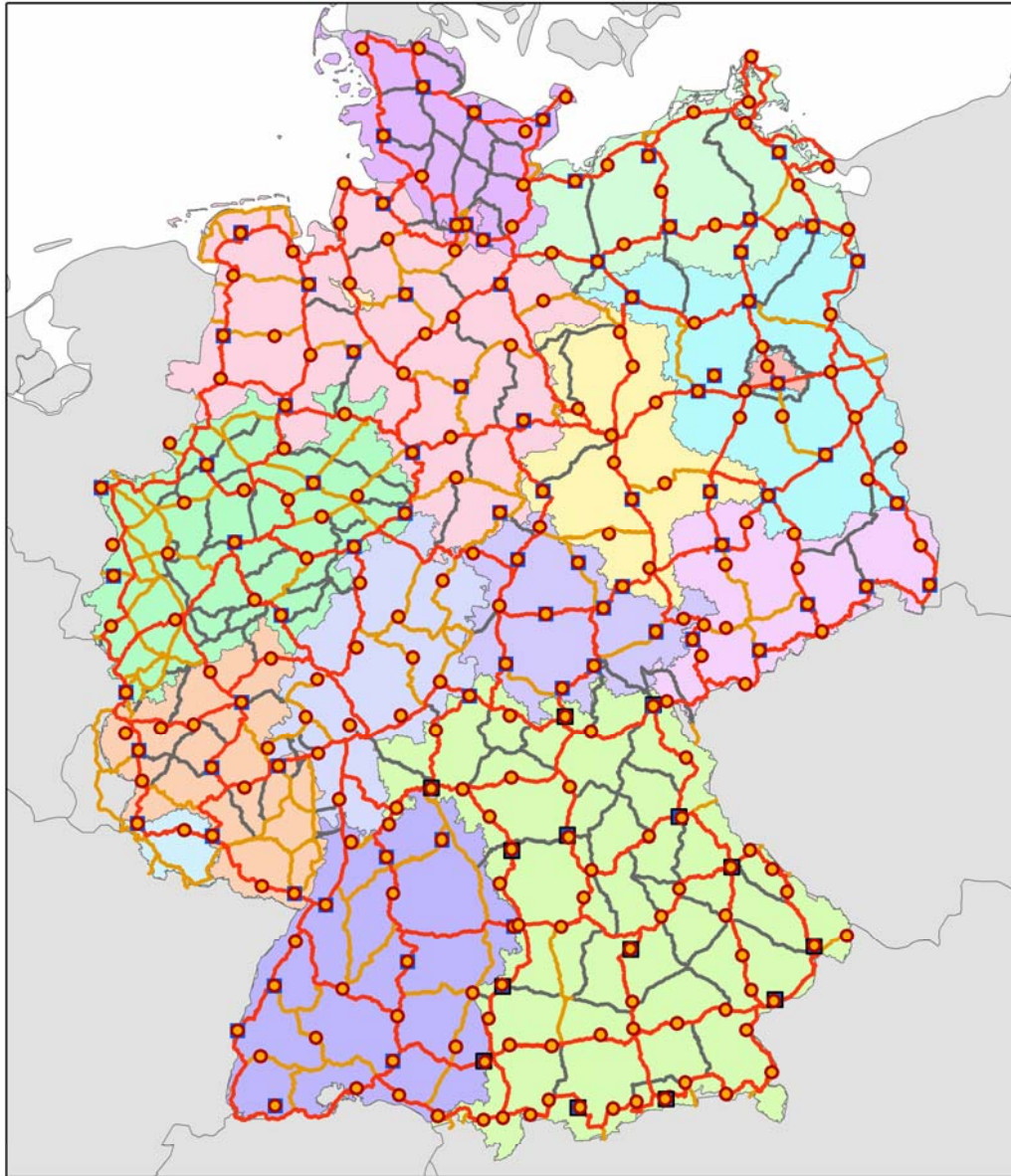


radar tide gauge



GPS/GLONASS





- | | |
|-------------------------------|-----------------------|
| — Pflichtlinien | ● GNSS-Station |
| — optionale Linien | ■ Absolutschwerepunkt |
| — restliche Linien des DHHN92 | ■ GNSS+Absolutschwere |

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.**

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.

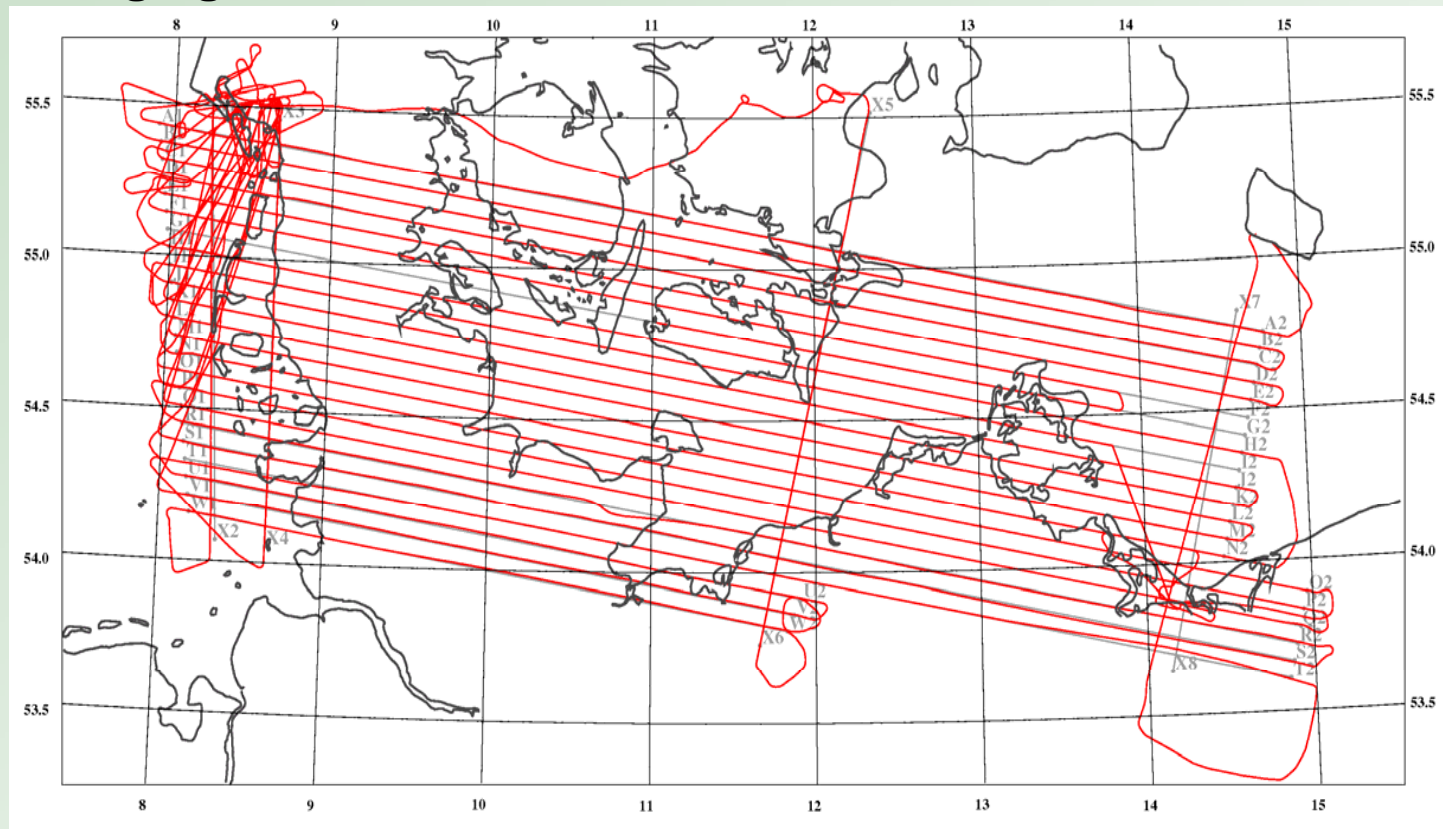
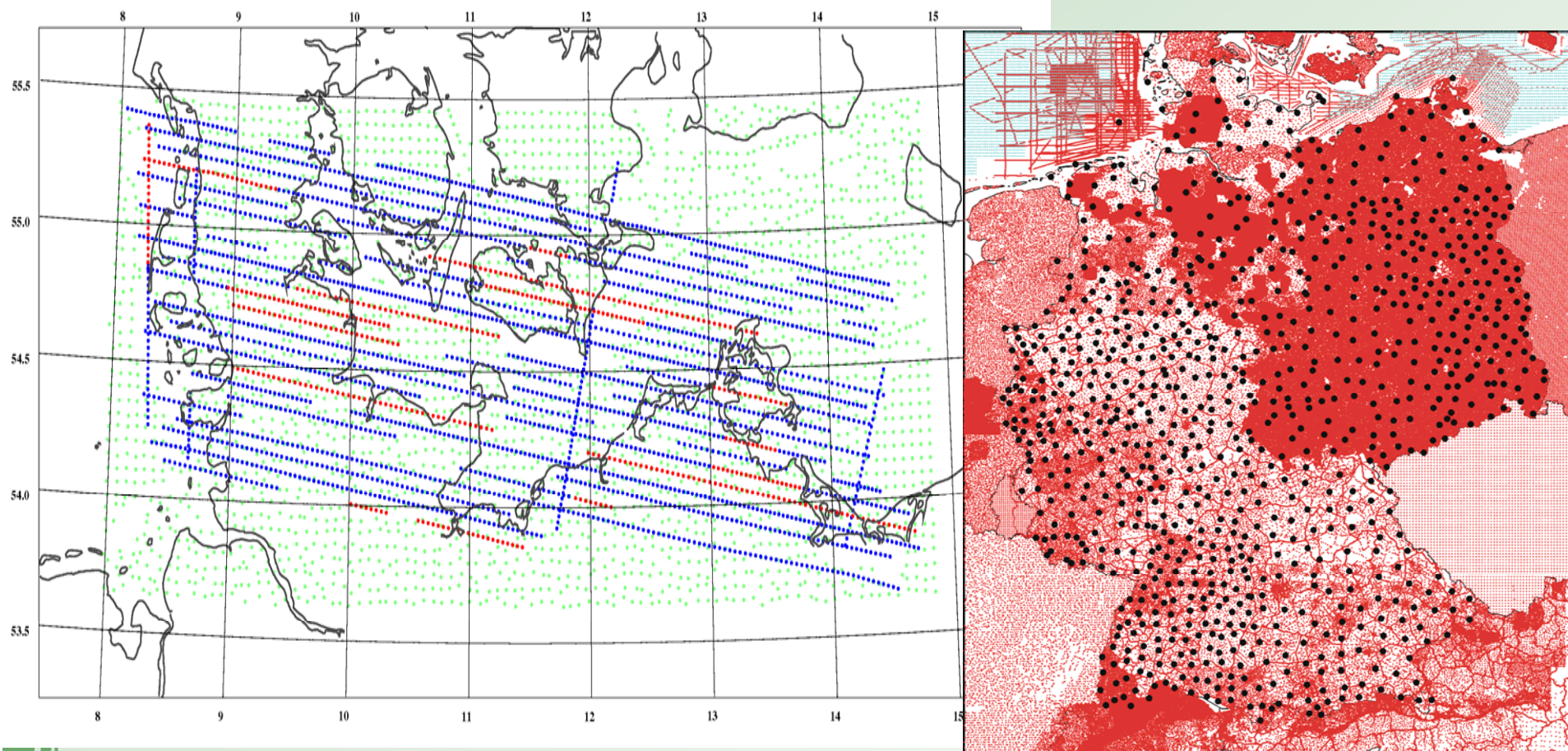


Fig. 32. Flight tracks flown during the airborne gravity and lidar campaign (BalGRACE), October 2006 Principle of freeboard determination. The conversion of freeboard, F , to thickness, T , is approximately a constant (~ 6.0 in April/May – Wadhams et. al., 1992) depending on densities and snow depth,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

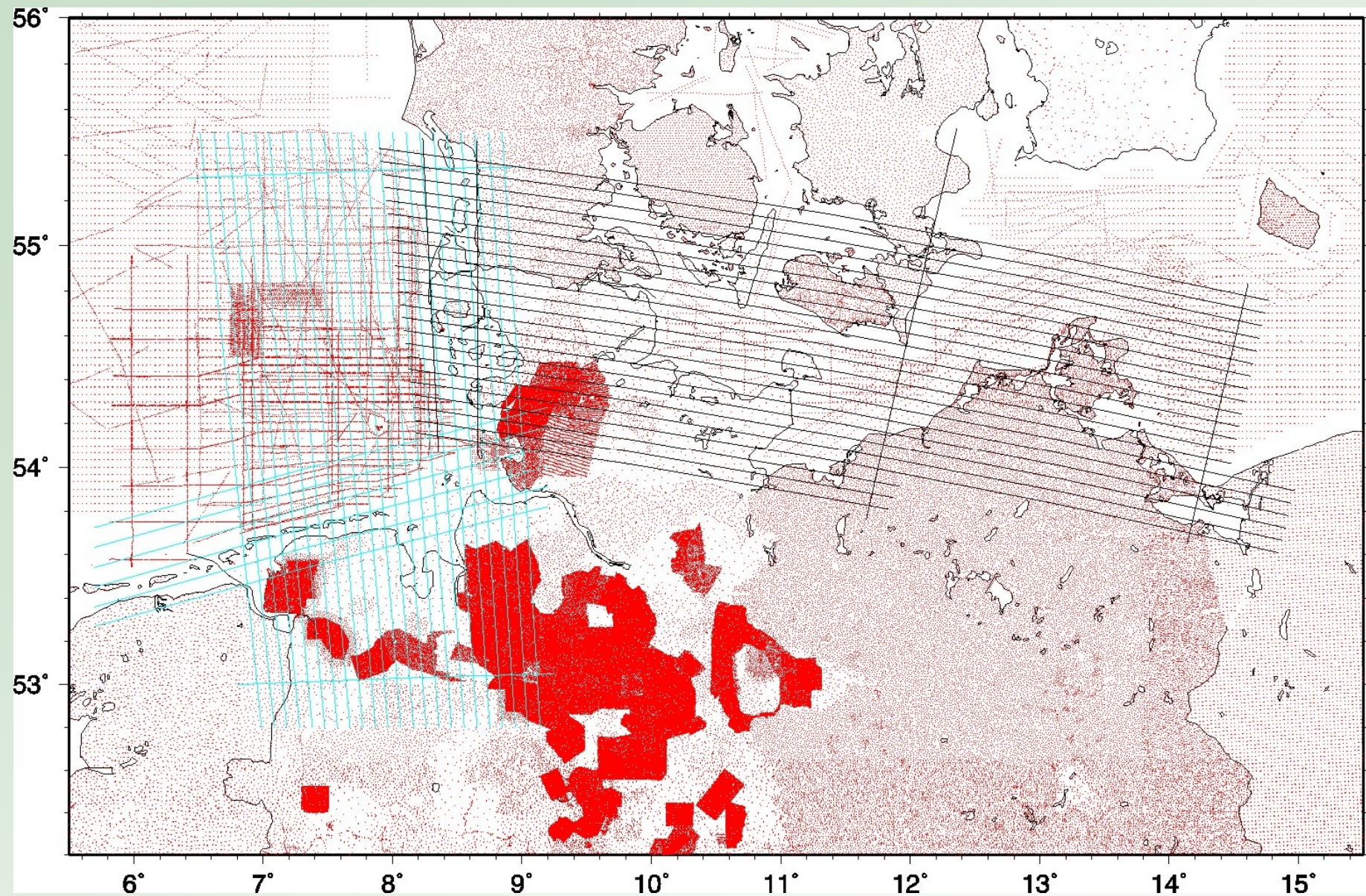


Data coverage. Shown with blue airborne data classified with low turbulence, with red medium-turbulence airborne, and with green combined land- and marine surface data used for collocation combined data set.

Bestehende terrestrische Messungen

NorthGRACE 2007

AdV



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**