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Modernization of the German height reference frame DHHN 2011



Stand April 2010

Linien Netzerneuerung DHHN

- restliche Linien des DHHN92

GNSS-Station
GNSS+Absolutschwere

The Project

2006

- Decision about instructions for levellings, GNSS observations and absolute gravity measurements
- Start of precise levellings

2008

 GNSS campaign including 250 field stations (GNSS/levelling stations) and additional 250 reference stations

2009 - 2010

 Absolute gravity measurements at 100 GNSS/levelling stations

January 2011

 Current extent of levellings 21 000 km of about 27 000 km



DHHN 2006-2011 - Modernization of the 1. Order leveling network

Progress of measurements in the DHHN



- 14 000 km leveling originally planned
- Project was extended to 27 000 km
- 23 000 km completely observed
- Finishing of the measurements 2012
- 250 GNSS stations
- 100 absolute gravity stations

German Combined Quasigeoid 2005/2010

Requirements on the AdV Quasigeoid:

- Fitting the reference systems utilized in Germany (normal heights in the DHHN92 and ellipsoidal coordinates in the ETRS89)
- Usable for height determination by means of SAPOS (SAPOS diagnosis adjustment)
- Computation of normal heights without additional correction areas
- Improvements in the mountain regions as compared with the previous SNG01 version
- Joint solution by BKG and IfE (two different program systems and model approaches, quality assurance)





Data sets for geoid modelling



<u>Germany</u> DGM – D-25 25 m x 25 m <u>Europe</u> Euro DEM 50 m x 50 m <u>Sea areas</u> GEBCO



900 GPS/levelling points (at present DHHN 1992, ETRS89/2000)

600 000 point gravity anomalies (GRS80)



600 000 point gravity anomalies airborne gravity data: BalGrace,NorthGrace, AlpinAero



GNSS points DHHN



Difference GNSS/levelling DHHN to GCG05





Comparison of the gravity field models of the GOCE time wise approach with the GCG05



The short-wave (high-frequency) geoid variations were filtered out with a Gaussian filter with filter width of 400 km.



- The Geodetic Observatory Wettzell of the BKG is a principal cornerstone for the services of the International Association for Geodesy (IAG) and therefore also for the global, European and German reference systems for position, height and gravity.
- Contributions to IVS, IGS, ILRS, IERS, IGFS
- Development of IVS2010 specification Twin Radio Telescope
- Together with the Forschungseinrichtung Satellitengeodäsie (Satellite Geodesy Research Facility) of the Technical University München, this observatory has operated for more than 30 years.



Realisation of IVS2010 specification Twin Radio Telescope

