

A new European Gravimetric (Quasi)Geoid EGG2015

Table 1. Main characteristics of EGG1997/2008/2015.

EGG1997	EGG2008	EGG2015
2,684,133 (744 sources)	Project gravity data base 5,355,206 (718 sources) 6,100,190 (766 sources)	
	Other gravity data sources 195,840 (ArcGP) 389,196 (ArcGP)	
335,124 (KMS1996)	13,222,260 (1' x 1' alt.)	13,222,260 (1' x 1' alt.)
-	120,747 (EGM2008 fillins)	120,807 (EGM2008 fillins)
3,019,257 (Total)	18,894,053 (Total)	19,832,453 (Total)
	Terrain data base 1" ... 30" resol. 1" ... 30" resol.	
7.5" ... 5' resol.	1" ... 30" resol.	1" ... 30" resol.
700 million elev.	8.3 billion elev.	8.3 billion elev.
15' x 20' RTM	15' x 20' RTM	15' x 20' RTM
	Global geopotential model EGM1996 (l _{max} =360) EGM2008 (l _{max} =360/2190) GOCO05S (l _{max} =280)	
	Computation procedure Remove-restore technique, spectral combination (1DFFT) GRS80, zero-tide system, EVRS	
	Computation grid 25° - 77°N, 35°W - 67.4°E 25° - 85°N, 50°W - 70°E 25° - 85°N, 50°W - 70°E	
	1.0' x 1.5'	1.0' x 1.0'
3,120 x 4,096 pts.	3,600 x 7,200 pts.	3,600 x 7,200 pts.

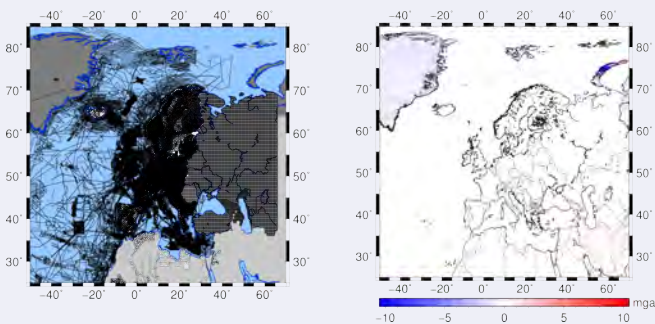


Fig. 1. Gravity data EGG2015 (left) and gravity differences EGG2015 - EGG2008 (right).

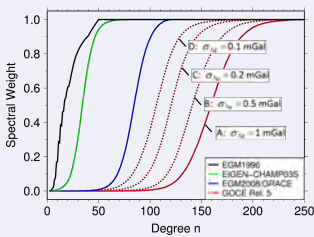


Fig. 2. Spectral weights.

- relative weighting of GOCE and terrestrial data is of vital importance
- **EGG2015:** GOCO05S + terrestrial gravity data with $\sigma_{\Delta g} = 0.2$ mGal
→ gives overall best GPS/levelling fits
- $\zeta_0^{EVRF2007} = +0.305$ m (derived from EUVN_DA and other data sets)
- $W_0^{EVRF2007} = 62,636,857.86 \pm 0.02$ m²s⁻²

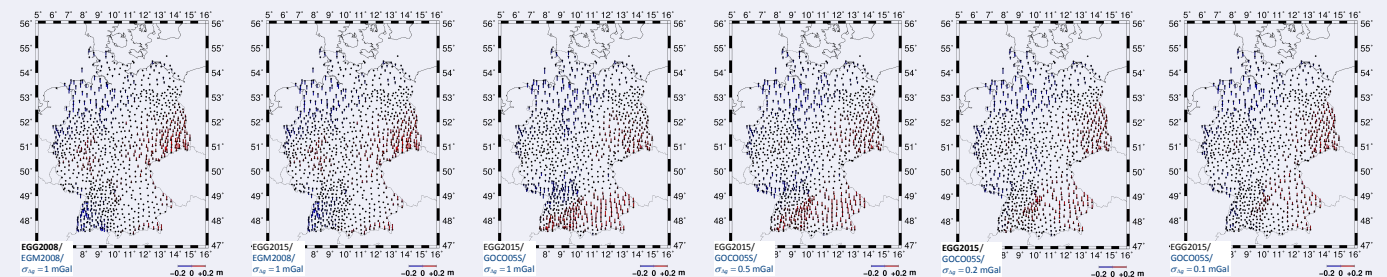


Fig. 3. Comparison of 954 GPS/levelling stations in Germany (BKG) with different EGG quasigeoid models.

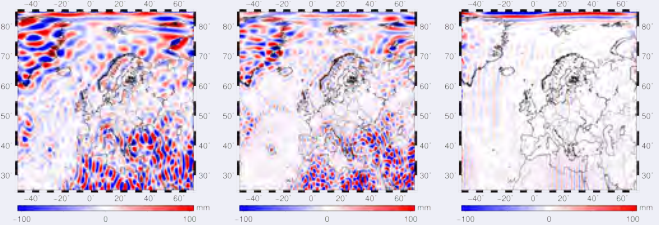


Fig. 4. EGG quasigeoid differences

- EGG2015/GOCO05S/0.2mGal - EGG2008 (left),
- EGG2015/GOCO05S/0.2mGal - EGG2015/GOCO05S/1.0mGal (middle), and
- EGG2015/GOCO05S/1.0mGal - EGG2015/GOCE-DIR/1.0mGal (right).

Table 2. Comparison of GPS/levelling data sets with different EGG quasigeoid models.

Quasigeoid	Mean	RMS	Min.	Max.
<i>FRG2011 GPS/levelling data (BKG, 954 pts.)</i>				
EGG1997/EGM1996/1.0mGal	+0.441	0.094	-0.197	+0.322
EGG2008/EGM2008/1.0mGal	+0.296	0.027	-0.069	+0.079
EGG2015/EGM2008/1.0mGal	+0.297	0.027	-0.068	+0.083
EGG2015/GOCO05S/1.0mGal	+0.306	0.031	-0.082	+0.091
EGG2015/GOCO05S/0.2mGal	+0.304	0.027	-0.078	+0.079
EGG2015/GOCO05S/0.1mGal	+0.302	0.025	-0.074	+0.070
<i>Bulgarian EUVN_DA GPS/levelling data (26 pts.)</i>				
EGG1997/EGM1996/1.0mGal	+0.453	0.093	-0.171	+0.222
EGG2008/EGM2008/1.0mGal	+0.377	0.078	-0.111	+0.166
EGG2015/EGM2008/1.0mGal	+0.366	0.073	-0.082	+0.167
EGG2015/GOCO05S/1.0mGal	+0.353	0.028	-0.057	+0.077
EGG2015/GOCO05S/0.2mGal	+0.357	0.031	-0.073	+0.059
EGG2015/GOCO05S/0.1mGal	+0.359	0.040	-0.083	+0.076
<i>EUVN_DA GPS/levelling data (Kenyeres et al. 2010, UK & Italy excl., 1139 pts.)</i>				
EGG1997/EGM1996/1.0mGal	+0.359	0.161	-0.599	+0.636
EGG2008/EGM2008/1.0mGal	+0.302	0.076	-0.302	+0.391
EGG2015/EGM2008/1.0mGal	+0.303	0.075	-0.291	+0.399
EGG2015/GOCO05S/1.0mGal	+0.305	0.071	-0.271	+0.391
EGG2015/GOCO05S/0.2mGal	+0.305	0.072	-0.259	+0.396
EGG2015/GOCO05S/0.1mGal	+0.305	0.072	-0.254	+0.398

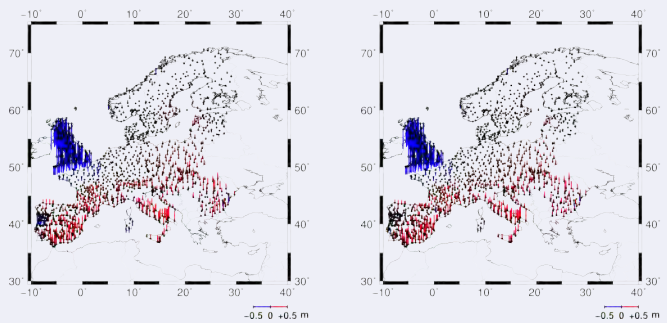


Fig. 5. Comparison of EUVN_DA GPS/levelling stations (Kenyeres et al. 2010) with EGG2008 (left) and EGG2015 (right) quasigeoid models.