



The International Gravity Field Service (IGFS) and its components

Riccardo Barzaghi
IGFS c/o DICA-Politecnico di Milano

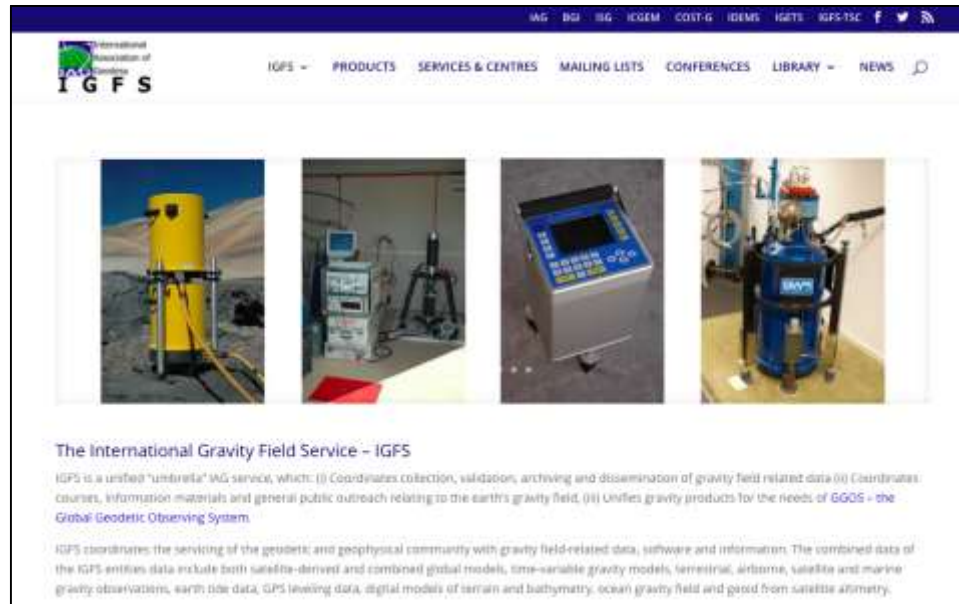
Presented by
Thomas Gruber
Technical University of Munich, Germany
Member of the IGFS Advisory Board

*GGOS Days 2019 & SIRGAS 2019
Rio de Janeiro, Brazil, 11th-14th November, 2019*

The International Gravity Field Service (IGFS)

(<http://igfs.topo.auth.gr/>)

Director : Riccardo Barzaghi - CB Director: Georgios Vergos

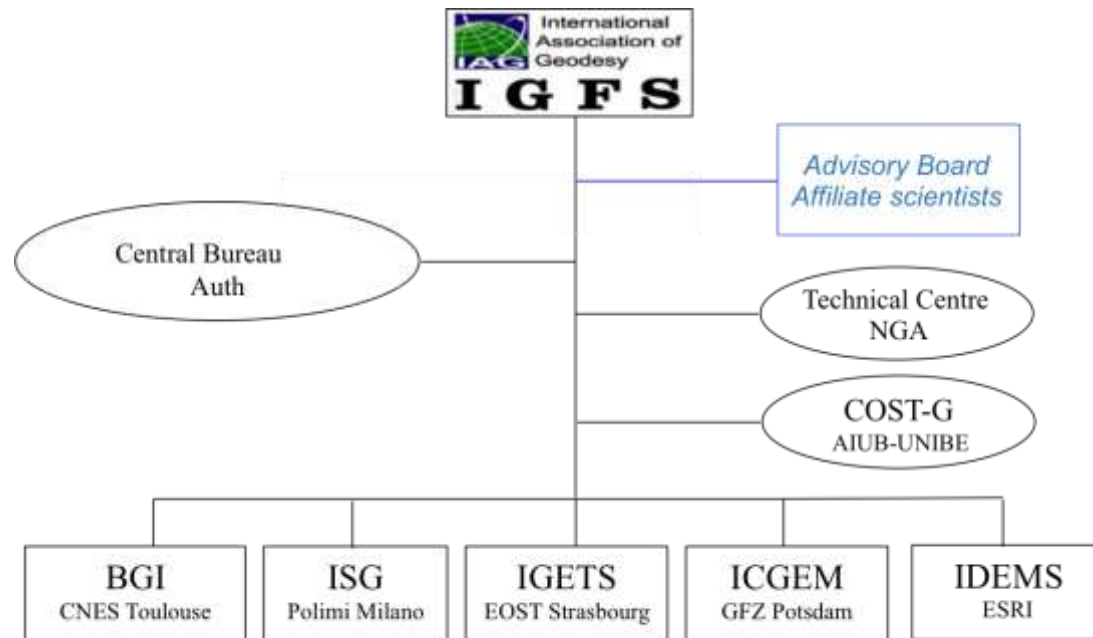


Main IGFS tasks

IGFS is an “umbrella” IAG Service which :

- Coordinates collection, validation, archiving and dissemination of gravity field related data
- Coordinates courses, information materials and general public outreach relating to the Earth's gravity field
- Unifies gravity products for the needs of GGOS

The IGFS structure



International Gravity Field Service (IGFS) – Director: R. Barzaghi

Central Bureau – Director: G. Vergos

International Gravimetric Bureau (BGI) – Director: S. Bonvalot

International Center for Global Earth Models (ICGEM) – Director: E. S. Ince

International Service for the Geoid (ISG) – President: M. Reguzzoni; Director: D. Carrion

International Geodynamics and Earth Tide Service (IGETS) – Director: H. Wziontek

International DEM Service (IDEMS) – K. Kelly

International Combination Service for Time-variable Gravity field solutions (COST-G) – A. Jäggi

The IGFS Central Bureau

The new Central Bureau was established on April 1st, 2016 (call at the beginning of 2016)

Director: Georgios S. Vergos

Scientific Consultants: Ilias N. Tziavos, Dimitrios Tsoulis, Christopher Kotsakis

Scientific Staff: Vassilios N. Grigoriadis, Dimitrios A. Natsiopoulos

Secretary: Dimitrios A. Natsiopoulos

IGFS-CB Department of Geodesy and Surveying, AUTH
Univ. Box 440, GR-54124, Thessaloniki (GREECE)

Tel: +30 2310 994366 Fax: +30 2310 995948 Mail: igfs@topo.auth.gr

Web: <http://igfs.topo.auth.gr/>

The IGFS web page



The IGFS applications front-end (g- μ eta, N- μ eta and μ eta-Locator @ IGFS web page)



IGFS-CB Online Apps

The on-line application for gravity and geoid metadata

Overall Goals

- Online application for creating metadata for gravity measurements

g-μeta

- Online application for creating metadata for geoid models

N-μeta

- Online application for discovering different type of information

μeta-Locator

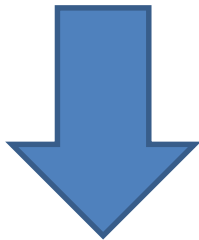
IGFS-CB Online Apps

General Setup

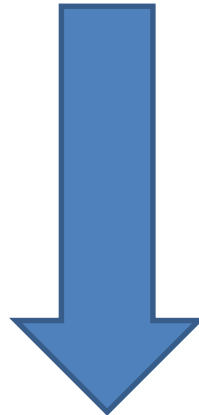
Web Server

URL: <http://igfsapps.topo.auth.gr>

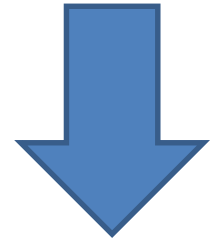
Location: Virtual Machines Host (VMWare)
of Aristotle University of Thessaloniki



Minimum
downtime



Automatic backup



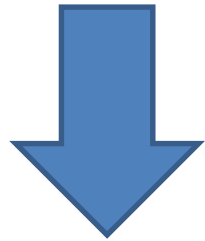
Constantly
monitored
for threats

IGFS-CB Online Apps

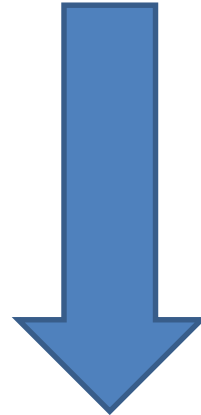
General Setup

Web Server

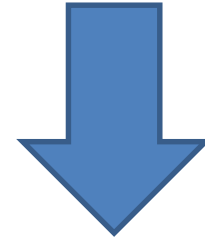
Open Source Free Software



Low-cost
solution



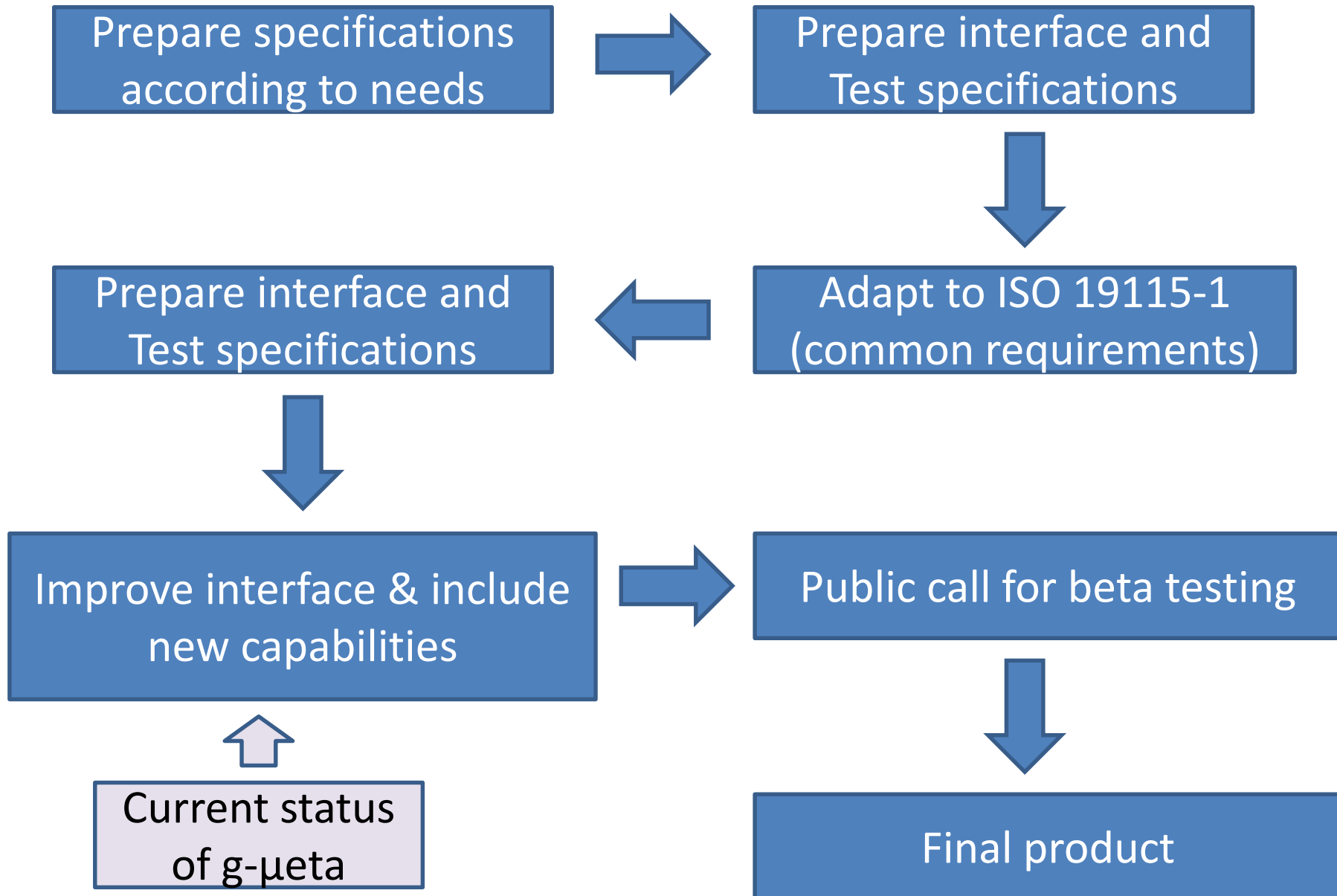
Reliable



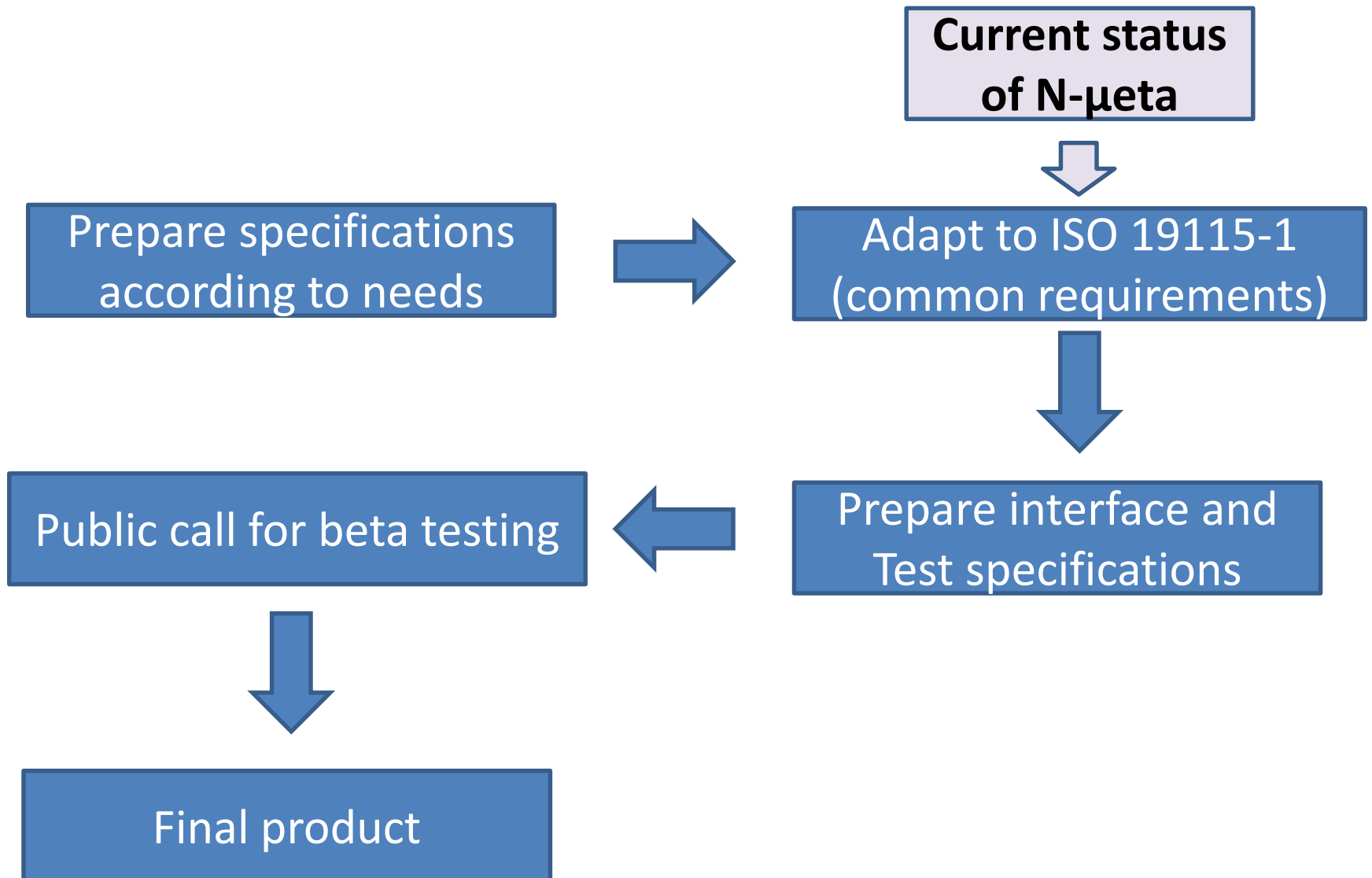
Endorsed by
users

all logos are trademarks of their respective owners

Development roadmap (g-μeta)



Development roadmap (N-μeta)



Development roadmap (μeta Locator)

**Avoid
overlapping
of existing
services**

Request feedback from
available IGFS data
providers (e.g., BGI)

Current status
of μeta-Locator

Design and implement
test interface

Request feedback from
IGFS

Assert service quality



Current progress (g-µeta) – Available Categories (1/3)

1.Metadata Reference Information

Metadata Creation Date and Creator Information

Metadata Constraints

Metadata Prototype Information

2.Identification Information

Citation

Description

Status

Points of Contact

Keywords

Spatial Domain

Constraints and Security Information

Current progress (g-μeta) – Available Categories (2/3)

3. Distribution Information

Distributor

Standard Order Process

4. Standards and Conventions

General Standards and Conventions

Earth's Gravity Field Permanent Tide System

Earth Orientation Parameters Specifications

Tidal Conventions

Station Coordinates and Corrections (for absolute gravity)

Current progress (g-μeta) – Available Categories (3/3)

5.Data and Data Quality Information

Attribute Accuracy

Logical Consistency

Completeness Report

Data Distribution

Gravity Data (type&accuracy)

Time Period of Content

Position and Height Accuracy

Current elements comply with ISO 19115-1

Vergos GS, Grigoriadis VN, Barzaghi R, Carrion D (2017) IGFS metadata for gravity. Structure, build-up and application module. IAG Symposia. DOI: https://doi.org/10.1007/1345_2018_38

IGFS&GGOS

- IGFS representatives attended GGOS meetings:

- ✓ GGOS Days Meetings, Frankfurt, Germany (October 21st-23rd, 2015)
- ✓ GGOS Days Meetings, Cambridge, USA (October 24th-27th, 2016)
- ✓ GGOS Bureaus meetings held in San Francisco (during AGU 2015, 2016)
- ✓ GGOS Bureaus meetings held in Vienna (during EGU 2016, 2017)

- IGFS participates into the activities of the GGOS Focus area on “Unified Height System” for establishing the IHRS/IHRF

- IGFS is participating in the definition of the Essential Geodetic Variables (gravity)

Joint IGFS&IAG-Commission2 scientific meetings

The 1st Joint IGFS and IAG-Commission 2 meeting

GGHS2016

Thessaloniki, Greece, September 19-23, 2016

(LoC: Aristotle University of Thessaloniki)



The 2nd Joint IGFS and IAG-Commission 2 meeting GGHS2018

Copenhagen, Denmark, September 17-21, 2018

(LoC: DTU Space)



The 3rd Joint IGFS and IAG-Commission 2 meeting GGHS2020

Austin, Texas, September 2020

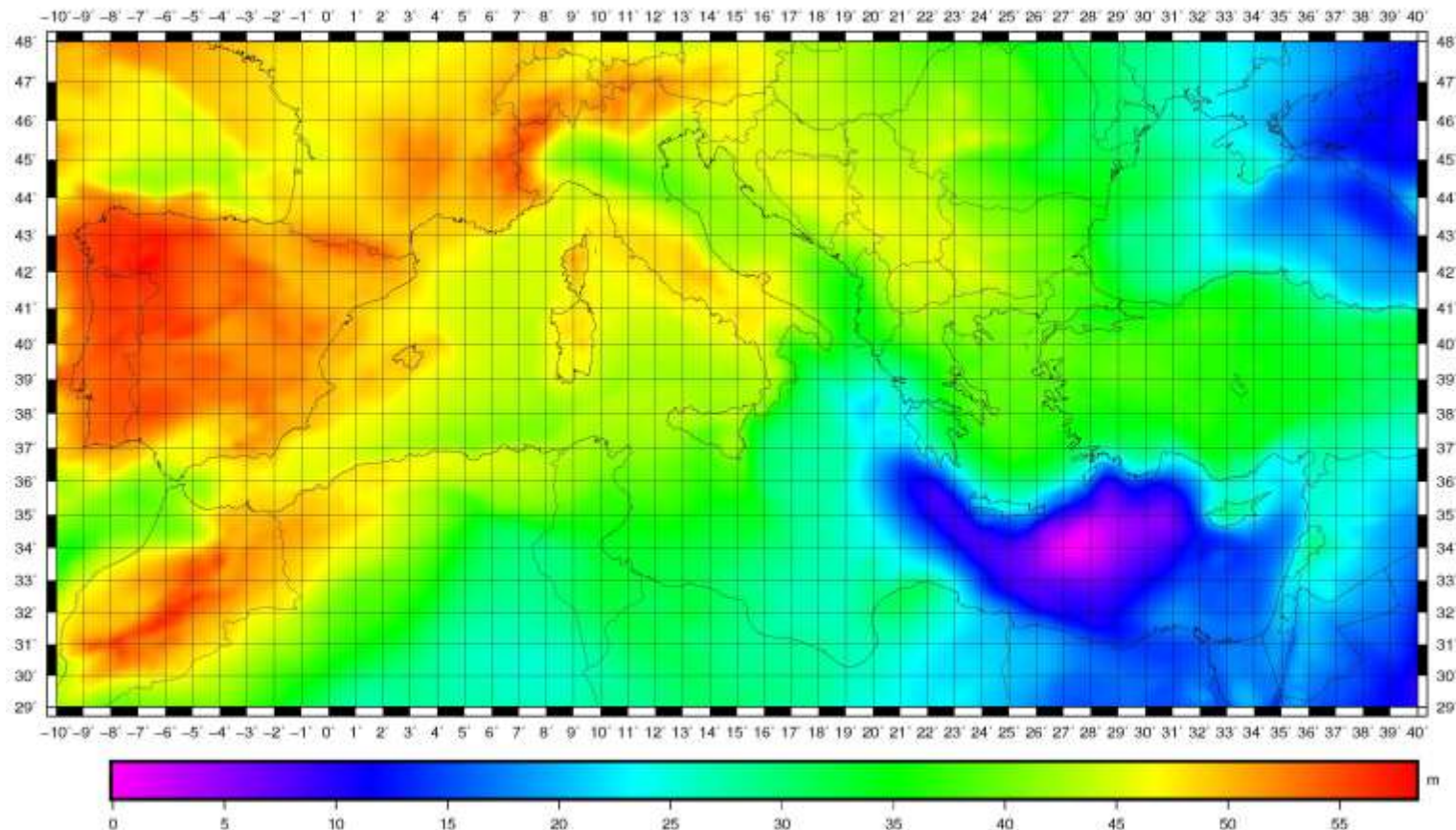
(LoC: UT)

GGHS scientific topics

- 1) Current and future satellite gravity missions
- 2) Global gravity field modelling
- 3) Local/regional gravity field modelling
- 4) Absolute, Relative and Airborne Gravity - observations and methods
- 5) Height systems and vertical datum unification
- 6) Satellite altimetry and applications
- 7) Mass transport and climate-relevant processes

The IGFS GEOMED2 project

IGFS has proposed and managed the GEOMED2 Project that started in 2015 and will close at the end of 2019. The project is based on the cooperation between IGFS related Services (BGI, ICGEM, ISG) and other scientific institutions in the Mediterranean area



Main activities of the Gravity Services

Bureau Gravimétrique International (BGI)

(<http://bgi.obs-mip.fr>)

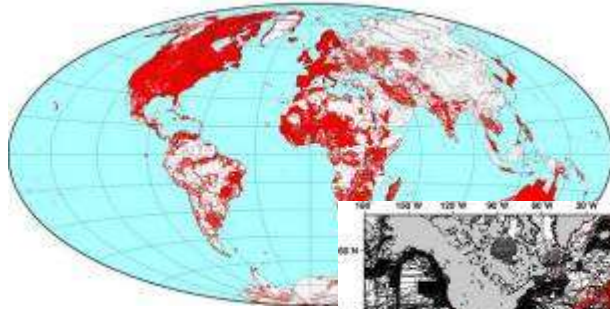
Director : Sylvain Bonvalot



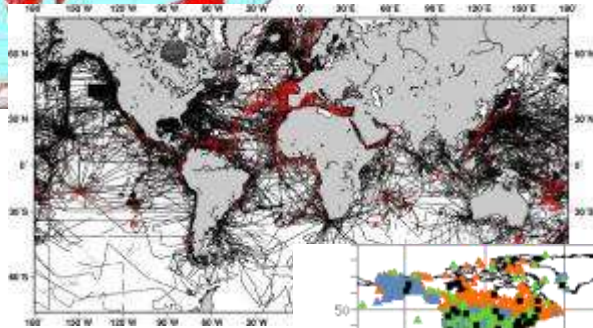
Main BGI tasks

- To collect, on a world-wide basis, all gravity measurements and pertinent information about the gravity field of the Earth
- To compile and store them in a computerized data base
- To redistribute them on request to a large variety of users for scientific purposes.

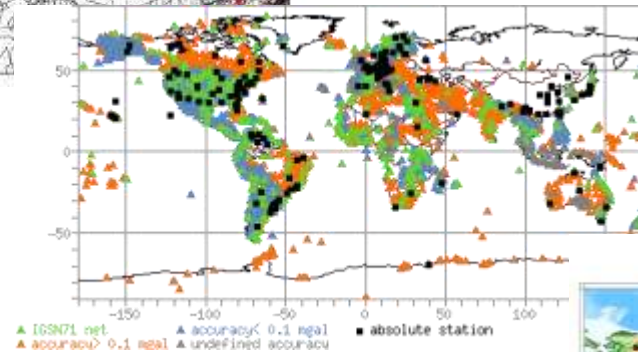
The gravity database at BGI



Relative land gravity measurements
(2,3 millions of data)



Relative marine gravity measurements
(10,5 millions of data)



Reference stations
(>4500 stations)

Absolute gravity measurements

Absolute gravity stations worldwide



selected data as provided by
• ICGA • AGraw BRIGBQ
(courtesy S. Karjane)

The new International Gravity Reference System

BGI & IGETS Services
(existing databases in cooperation with BKG)

Providing a **long term & precise absolute gravity reference** at given stations (time variable gravity field)

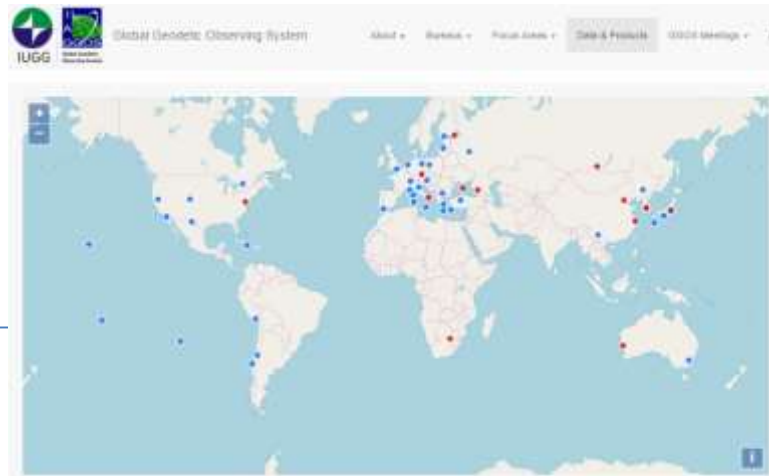
- **Reference stations** with continuous monitoring (Superconducting or Quantum Gravimeter) preferred but no exclusive
- Should also includes
- ✓ **GGOS Core stations** : Link to space geodetic techniques (GNSS, SLR; VLBI)
- ✓ **Comparison sites**: with extended facilities for instrumental comparisons (meter traceability)

Providing a **worldwide infrastructure of absolute gravity values** (static gravity field)

- **Global dense network of AG stations** needs for referencing relative land & marine surveys
- **Progressive replacement of the IGSN71** (mostly based on relative measurements)
- Advantage of **increasing facilities for field AG measurements** (Ex: A10, Quantum ?)
- Expected support and collaboration from National agencies

Absolute gravity monitoring : where ?

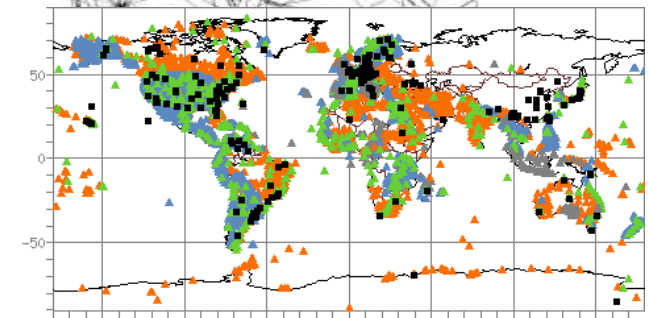
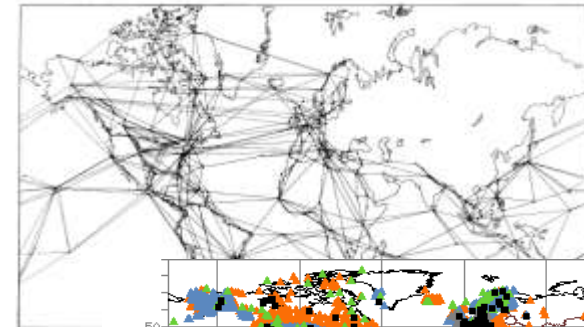
- ✓ AG/SG stations (cf. IGETS/GGP)
- ✓ Selected “Core” stations (cf. GGOS)



Absolute gravity values : where ?

- ✓ Increasing number of field measurements (cf. BGI/BKG Agrav database)
- ✓ Increasing accuracy and accessibility w.r.t. IGSN71 network

AGrav: Absolute Gravity Database - Meta-Data



▲ IGSN71 net ▲ accuracy < 0.1 mgal ■ absolute station
▲ accuracy > 0.1 mgal ▲ undefined accuracy

International Centre for Global Earth Models (ICGEM)

(<http://icgem.gfz-potsdam.de/home>)

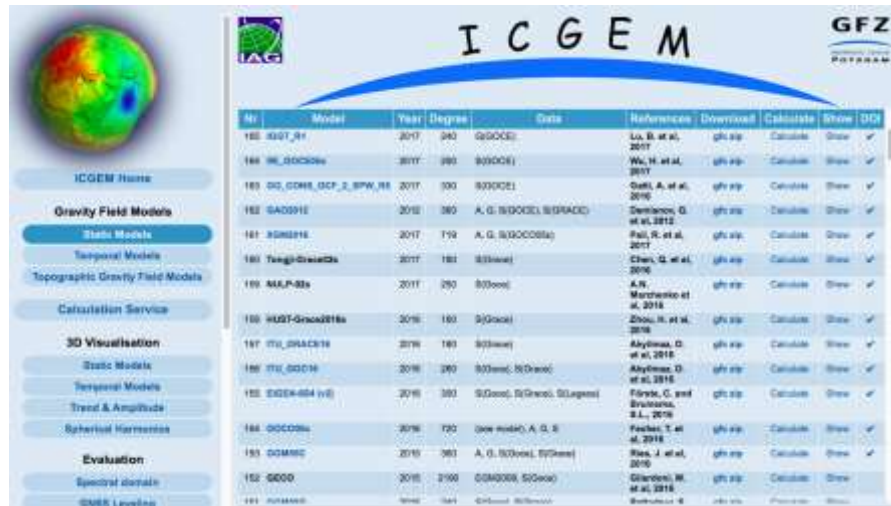
Director : Elmas Sinem Ince



Main ICGEM tasks

- To collect and long-term archiving of existing global gravity field models
- To use standardized format in storing the models
- To develop tools for the visualization of the models
- To compute solutions from dedicated time periods (e.g. monthly GRACE models)
- To develop web-interface to calculate gravity functionals from the spherical harmonic models on selectable grids/user defined points
- To evaluate the global geopotential models

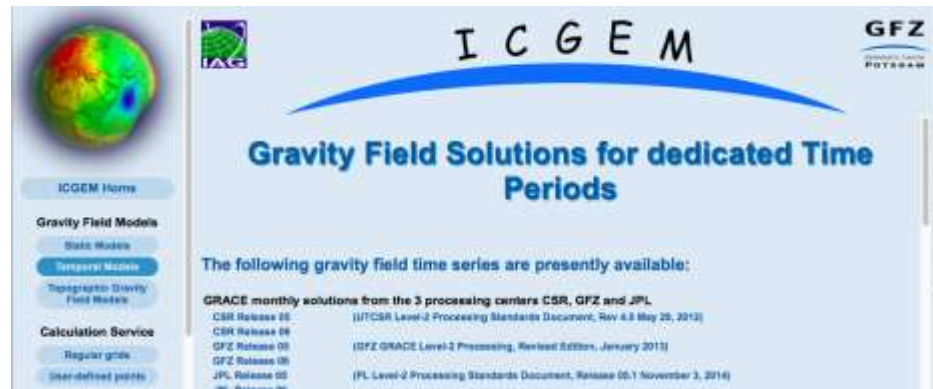
The available GGM at the ICGEM database



The screenshot shows the ICGEM website with a sidebar on the left containing navigation links: ICGEM Home, Gravity Field Models, Static Models, Temporal Models, Topographic Gravity Field Models, Calculation Service, 3D Visualisation, Static Models, Temporal Models, Trend & Amplitude, Spherical Harmonics, Evaluation, Spectral domain, and GNSS Levelling. The main content area displays a table of 175 static gravity field models.

Nr	Model	Year	Degree	Date	References	Download	Calculate	Show	DOI
182	IGOT_R1	2017	240	IGOT01	Lo, B. et al., 2017	gfs zip	Calculate	Show	✓
184	IG_GOC09a	2017	240	IGG001	Wu, H. et al., 2017	gfs zip	Calculate	Show	✓
183	IG_GOC09a_OCF_2_SF01_R1	2017	300	IGG001	Goffe, A. et al., 2016	gfs zip	Calculate	Show	✓
152	IGAD0911	2016	240	A, G. IGAD0911/IGAD0911	Swenson, G. et al., 2012	gfs zip	Calculate	Show	✓
181	IGR0911	2017	719	A, G. IGAD0911	Fall, R. et al., 2017	gfs zip	Calculate	Show	✓
180	Tugay-Gowatla	2017	181	IGG001	Chen, G. et al., 2016	gfs zip	Calculate	Show	✓
179	MAP-02a	2017	250	IGG001	A.R. Marchenko et al., 2016	gfs zip	Calculate	Show	✓
150	IGOT-Grow0911a	2016	180	IGG001	Zhou, H. et al., 2016	gfs zip	Calculate	Show	✓
147	IG_GOC09a	2016	180	IGG001	Akylunas, D. et al., 2016	gfs zip	Calculate	Show	✓
146	IG_GOC09a	2016	240	IGG001/IGG001	Akylunas, D. et al., 2016	gfs zip	Calculate	Show	✓
135	IGG04-004 (v1)	2016	300	IGG001/IGG001/IGG001	Filipovic, C. and Brundage, S.J., 2016	gfs zip	Calculate	Show	✓
184	GOC09a	2016	720	IGG001/IGG001/IGG001	Fischer, T. et al., 2016	gfs zip	Calculate	Show	✓
143	GGM09C	2016	360	A, G. IGAD0911/IGG001	Ries, J. et al., 2016	gfs zip	Calculate	Show	✓
152	GGM09	2016	2100	IGG001/IGG001/IGG001	Gruber, M. et al., 2016	gfs zip	Calculate	Show	✓
141	IGG04-004	2016	360	IGG001/IGG001/IGG001	Brundage, S.J. et al., 2016	gfs zip	Calculate	Show	✓

A screenshot of the list of available static gravity fields (175 models)



The screenshot shows the ICGEM website with a sidebar on the left containing navigation links: ICGEM Home, Gravity Field Models, Static Models, Temporal Models, Topographic Gravity Field Models, Calculation Service, Regular grids, User-defined points, 3D Visualisation, Static Models, Temporal Models, Trend & Amplitude, Spherical Harmonics, Evaluation, Spectral domain, and GNSS Levelling. The main content area displays 'Gravity Field Solutions for dedicated Time Periods' and lists available time series.

The following gravity field time series are presently available:

- GRACE monthly solutions from the 3 processing centers CSR, GFZ and JPL
 - CSR Release 05 (JITCSR Level-2 Processing Standards Document, Rev 4.8 May 29, 2012)
 - CSR Release 06 (JITCSR Level-2 Processing Standards Document, Revised Edition, January 2013)
 - GFZ Release 05 (IGFZ GRACE Level-2 Processing, Revised Edition, January 2013)
 - GFZ Release 06 (JPL Release 05 (JPL Level-2 Processing Standards Document, Release 05.1 November 3, 2014)

A screenshot of the list of the computed time varying solutions (e.g monthly solutions)



The screenshot shows the ICGEM website with a sidebar on the left containing navigation links: ICGEM Home, Gravity Field Models, Static Models, Temporal Models, Topographic Gravity Field Models, Calculation Service, 3D Visualisation, Static Models, Temporal Models, Trend & Amplitude, Spherical Harmonics, Evaluation, Spectral domain, and GNSS Levelling. The main content area displays a table of topographic gravity fields.

We kindly ask the authors of the models to check the links to the original websites of the models from time to time. Please let us know if something has changed.

More information on the Topographic Gravity Field Models can be found here.

The table can be interactively sorted by clicking on the column header fields (Nr, Model, Year, Degree, Date, Reference).

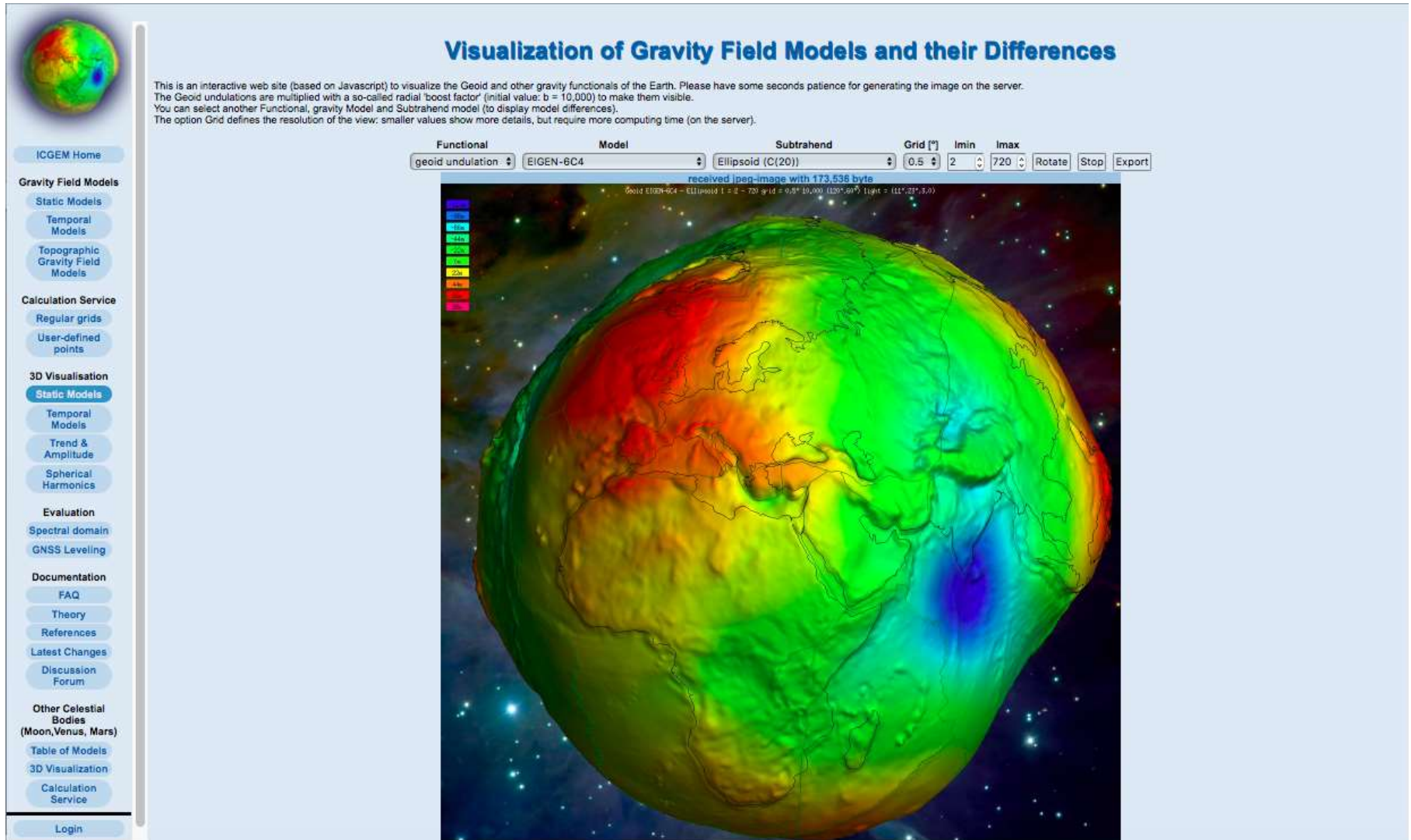
Nr	Model	Year	Degree	Date	Reference	Download
1	IG_GLL_IGT2012	2012	2190	Topography	Cloosmann, S.J. and C. Hill (2012)	gfs zip
2	IG_GLL_IGT2012_plusG0900	2012	2190	Topography	Cloosmann, S.J. and C. Hill (2012)	gfs zip
3	RW_TOPO_2012	2012	1800	Topography	Gruber et al., (2014)	gfs zip
4	RW_IG04_2012	2012	1800	Topography	Gruber et al., (2014)	gfs zip
5	RW_IG04_2012	2012	1800	Topography	Gruber et al., (2014)	gfs zip
6	RW_TOPO_2012_plusG0900	2012	1800	Topography	Gruber et al., (2014)	gfs zip
7	RW_IG04_2012_plusG0900	2012	1800	Topography	Gruber et al., (2014)	gfs zip
8	RW_IG04_2012_plusG0900	2012	1800	Topography	Gruber et al., (2014)	gfs zip
9	RW_TOPO_2012	2012	2190	Topography	Gruber et al., (2014)	gfs zip
10	RW_TOPO_2012	2012	2190	Topography	Gruber et al., (2014)	gfs zip
11	RW_TOPO_2012_plusG0900	2012	2190	Topography	Gruber et al., (2014)	gfs zip
12	RW_TOPO_2012_plusG0900	2012	2190	Topography	Gruber et al., (2014)	gfs zip
13	IG_GLL_IGT2014	2014	2190	Topography	Roser et al., (2014)	gfs zip
14	IG_GLL_IGT2014_plusG0900	2014	2190	Topography	Roser et al., (2014)	gfs zip
15	IG_GLL_IGT2014	2014	2190	Topography	Roser et al., (2014)	gfs zip
16	IG_GLL_IGT2014_plusG0900	2014	2190	Topography	Roser et al., (2014)	gfs zip
17	IG_GLL_IGT2014_IG04	2014	2190	Topography	Roser et al., (2014), Roser, M. (2017)	gfs zip
18	IG_GLL_IGT2014_IG04_plusG0900	2014	2190	Topography	Roser et al., (2014), Roser, M. (2017)	gfs zip

A screenshot from the table of topographic gravity fields in the website (18 models)

Discussion Forum

GGM computation on a given grid

The 3D visualization tool



EIGEN-6c4 model undulation (m)

International Service for the Geoid (ISG)

(<http://www.isgeoid.polimi.it>)

President : Mirko Reguzzoni Director: Daniela Carrion



Main ISG tasks

- To collect geoid estimates worldwide and to disseminate them among the scientific community
- To collect, test and, when allowed, to distribute software for the geoid determination
- To conduct researches on methods for the geoid determination
- To organize schools on geoid determination
- To disseminate special publications on geoid computations (e.g. lecture notes of the schools)
- To support Agencies or scientists in computing regional geoids

The local/regional geoid repository

- Almost 200 models are currently available in the ISG repository
- Each model has a dedicated webpage with some information

South America (GEOID2015)

Authors: D. Blitzkow, et al. Created: 2015 Resp: A.C.O.C. de Matos
Status: PUBLIC

Description:
The new South America geoid model has been computed on a 5' x 5' grid, by the remove-compute-restore technique using 947,953 point gravity data (free-air gravity anomalies), the SAM3s_v2 DTM for the computation of terrain correction and other topographic and atmospheric effects. The mean free-air gravity anomaly (FA) in a 5' grid over continent was derived from the complete BA (FA over the ocean obtained from satellite altimetry model DTU10). The short wavelength component was estimated with FFT technique using the modified Stokes integral through spheroidal Molodenski-Meissl kernel modification. The reference field used was EIGEN-6C4 up to degree and order 200. The computed points are in a grid of 5' x 5' covering the area from 56.9583333° S to 14.9583333° N in latitude, and from 94.9583333° W to 30.0416667° W in longitude. The geoidal heights are referred to WGS84. Data are stored in grd format, i.e. parallelwise from N to S and W to E. (N° values in lat = 864, N° values in long = 780, total number of data = 673920).

References:
D. Blitzkow, A.C.O.C. de Matos, G. do Nascimento Guimaraes, M.C. Pacino, E.A. Lauria, M. Nunes, C.A. Correia e Castro Junior, F. Flores, N.O. Guevara, R. Alvarez, J.N. Hernandez (2016). *Gravity and geoid model for South America*. EGU General Assembly 2016, Geophysical Research Abstracts, Vol. 18, EGU2016-1626.

Web of Science ID:
DRCI.DATA2016029012462778

[Retrieve file](#) [Retrieve file ISG format](#) [Send email](#)

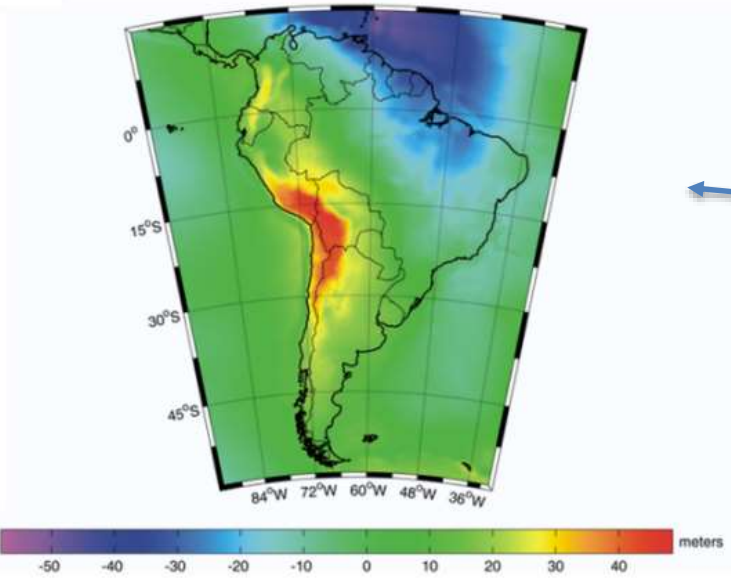
Authors, year, distr. policy

Short description

Bibliographic reference

Web of Science index

Download and email links



Model visualization

Geoid models for South America



Continental

South America	Blitzkow et al.	2010
South America (GEOID2015)	Blitzkow et al.	2015

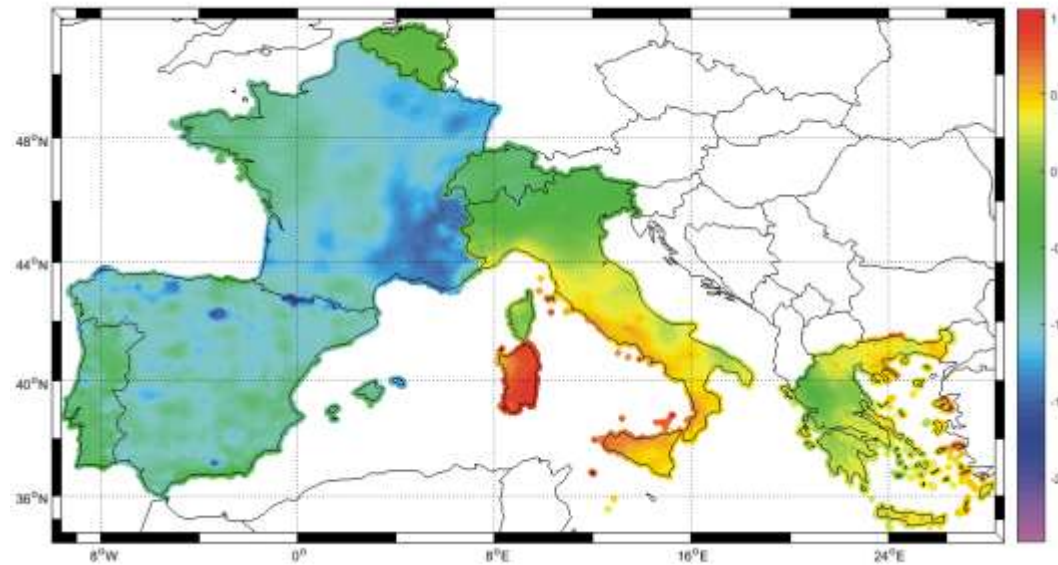
National

Argentina (GAR)	Corchete & Pacino	2007
Argentina (GEOIDEAR16)	Pinon et al.	2016
Bolivia (BOLGEO)	Corchete et al.	2006
Brazil (MAPGEO2004)	Blitzkow et al.	2004
Brazil (MAPGEO2010)	Blitzkow et al.	2010
Brazil (MAPGEO2015)	Blitzkow et al.	2015
Colombia (GEOCOL2004)	Sánchez	2004
Uruguay (URUGEOIDE2000)	Subiza Piña	2000
Uruguay (URUGEOIDE2007)	Subiza Piña	2007

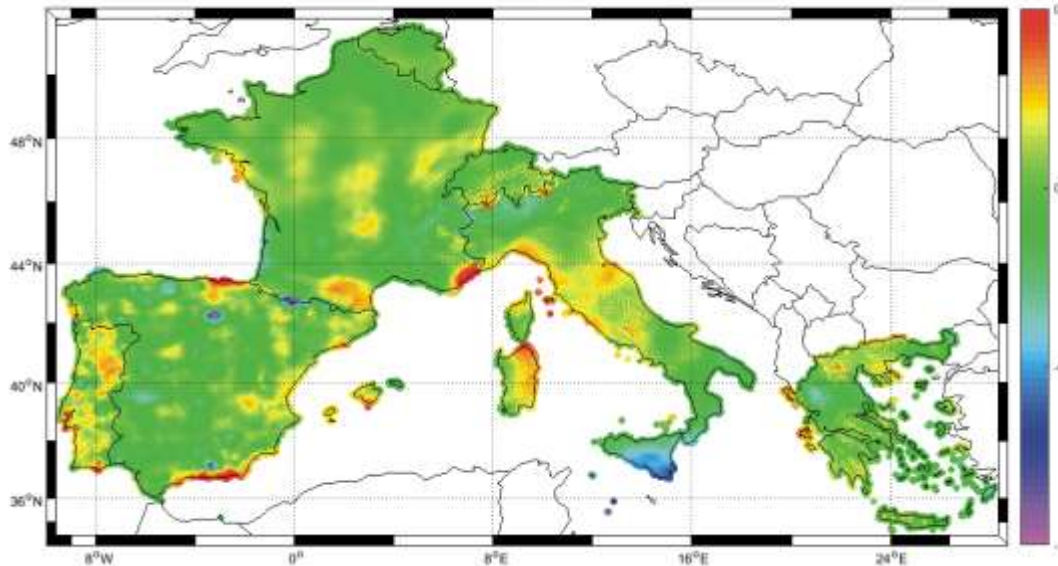
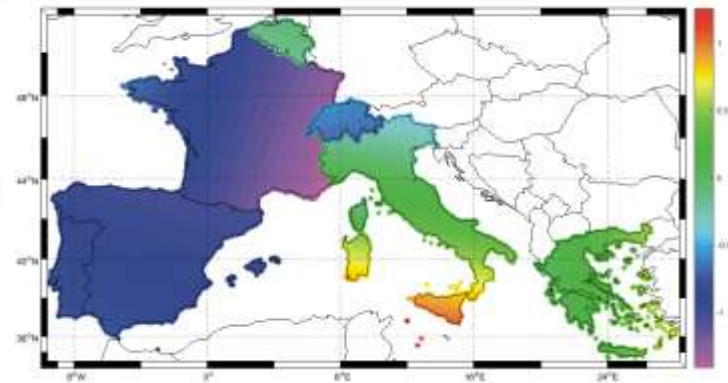
Regional

Santa Fe Province - Argentina	Cornero et al.	2018
Sao Paulo State - Brazil (GEOID-SP)	Guimarães et al.	2014
Tierra del Fuego	Gomez et al.	2014

Merging national geoid estimations



national geoid models residuals w.r.t. a global satellite-only model before applying the de-trending procedure, i.e. as they are stored in the ISG archive (units in m).



residuals after the de-trending procedure (units in m).

The geoid schools and the training courses

- The First International School for the determination and use of the Geoid was organized in Milan (Italy) in 1994. Since then many other editions of the School followed
- The last one was organized in Ulaanbaatar (Mongolia) in 2016.

Year	1994	1997	1999	2000	2002	2005	2006	2008	2009	2010	2013	2016
Location	Italy	Brazil	Italy	Malaysia	Greece	Hungary	Denmark	Italy	Argentina	Russia	Ecuador	Mongolia
N°Students	34	31	23	41	30	49	24	25	23	15	15	30
N°Countries	17	13	12	13	13	19	15	12	5	5	9	10



Milan, Italy, 1994



Ulaanbaatar, Mongolia, 2016

- In addition to the International Geoid School, ISG gives support to institutions and scientists by organizing, on request, specific training courses on geoid computation held at Politecnico di Milano

International Geodynamics and Earth Tide Service (IGETS)

(<http://igets.u-strasbg.fr>)

Director: Hartmut Wziontek



Main ICET tasks

- To monitor temporal variations of the Earth gravity field through long-term records from ground gravimeters, tiltmeters, strainmeters and other geodynamic sensors
- To continue the activities of the Global Geodynamic Project, to provide support to geodetic and geophysical research activities using superconducting gravimeter data within the context of an international network for field gravimetry, absolute gravity measurements and for tilt measurements
- To continue the activities of the International Center for Earth Tides

Data and products at IGETS

i) Several SG data are available at ISDC at GFZ:

- Raw gravity and local pressure records sampled at 1 or 2 seconds, in addition to the same records decimated at 1-minute samples

(Level 1 products)

- Gravity and pressure data corrected for instrumental perturbations, ready for tidal analysis

(Level 2 products)

- Gravity residuals after particular geophysical corrections (including solid Earth tides, polar motion, tidal and non-tidal loading effects)

(Level 3 products)

- Corrected gravity data (Level 2) can also be found at Univ. of French Polynesia, along with the Bulletin d'Information des Marees Terrestres at <http://www.bim-icet.org/>.

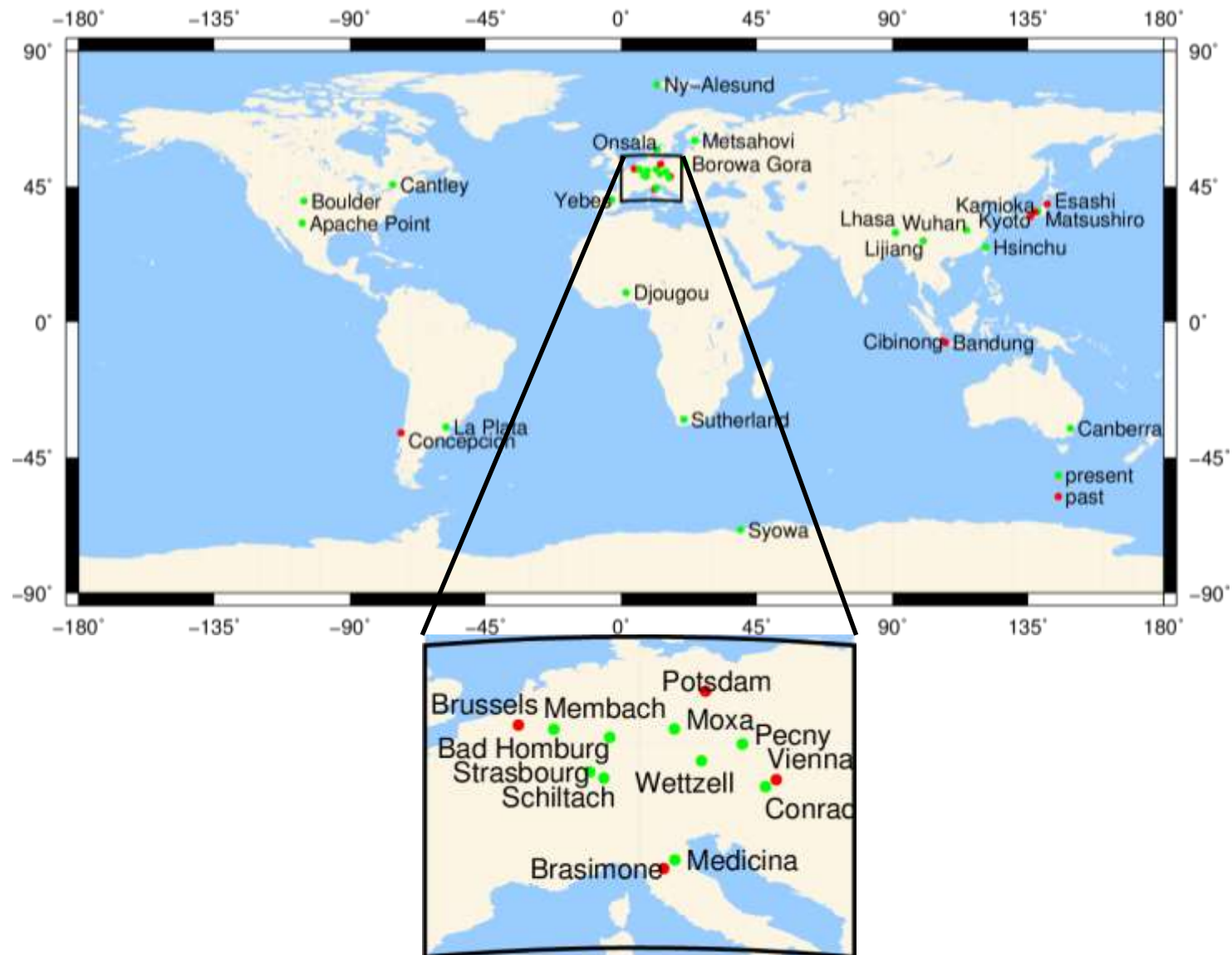
ii) SG data for major Earthquakes (minute and second sampling)

iii) ATMACS, Atmospheric Attraction Computation Servics at BKG

iv) mGlobe Matlab/Octave toolbox for computation of global hydrological, atmospheric and non-tidal ocean loading effects

v) EOST loading service (displacements, gravity, tilts)

IGETS SG data base containing data from 37 stations

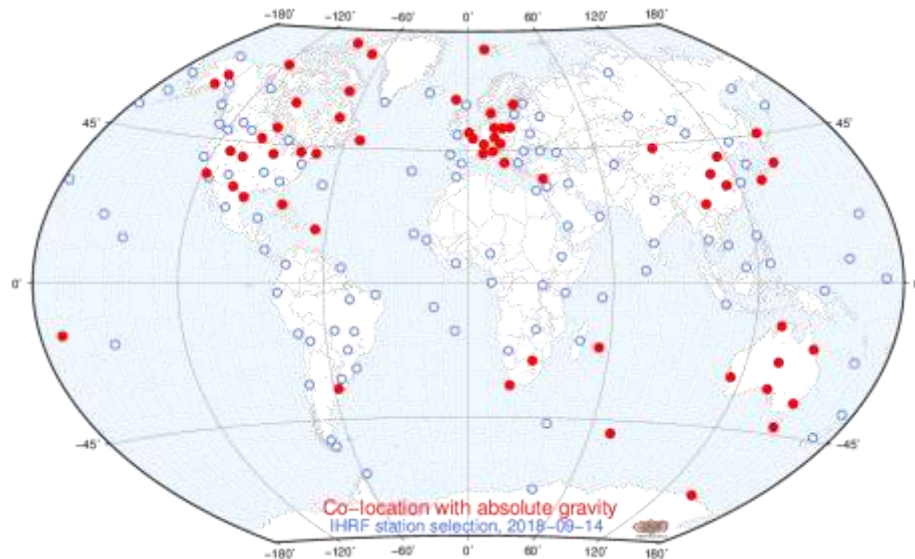
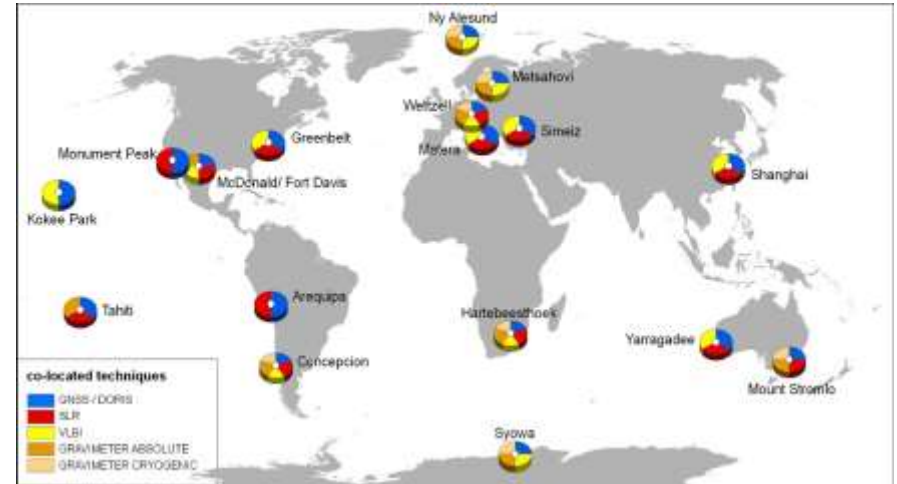


Links of Reference Stations with IGETS, GGOS and IHRF

IGETS: links to stations with AG



GGOS: links to space geodetic techniques



IHRF: links with the height system

International Digital Elevation Model Service (IDEMS)

(<https://idems.maps.arcgis.com/home/index.html>)

Director: Kevin Kelly



Main IDEMS tasks

- To provide a focus for distribution of data and metadata about digital elevation models (DEMs)
- To provide spherical-harmonic models of Earth's global topography
- To provide lunar and planetary DEM
- To provide relevant software for managing DEMs and related datasets.

Data and products at IDEMS

- Compilation of available national elevation data sets with information on data resolution, methods used for DEM generation and links to providers
- Generation and dissemination of spherical-harmonic models of Earth's global topography and bathymetry
- Compilation of geodesy relevant DEMs studies
- Extension of the focus from Earth to Moon and terrestrial planets through compilation of information on available planetary topography models.
- Website managing in order to separate regional DEMs and global DEMs
- Ongoing updates of existing DEMs

Data and products at IDEMS

Geodesy Relevant DEM and BTM Studies

Panoramica

Contenuto

Membri

🔍 Cerca contenuti del gruppo

☰ Elenco

☰ Titolo

🔍 Filtro

Filtri

▼ Tipo Argomento

Mappe

Layer

Scene

Applicazioni

Strumenti

File

> Posizione

> Data di modifica

> Tag

1 - 6, totale: 6



DEM and BTM Research Papers

📄 PDF di [chirt_IDEMS2](#)

Compilation of selected DEM and BTM (bathymetry) research papers relevant to geodesy. The list include papers on SRTM, ASTER, TanDEM-X and ALOS DEM and BTM with focus on the model generation, performance, accuracy and pitfalls.

Data creazione: 21 set 2016 Aggiornamento: 15 mag 2019 Conteggio visualizzazioni: 112



Digital Terrain Models, C. Hirt (2015)

📄 PDF di [chirt_IDEMS2](#)

Digital terrain models reference work entry in the Encyclopedia of Geodesy.

Data creazione: 26 ott 2016 Aggiornamento: 26 ott 2017 Conteggio visualizzazioni: 56



Global Geospatial Data from Earth Observation (2016)

📄 Document Link di [kkelly_IDEMS](#)

Overview paper on the status of global topography models.

Data creazione: 26 ott 2016 Aggiornamento: 12 set 2017 Numero di download: 19



International Combination Service for Time-variable Gravity Field Solutions (COST-G) (<https://cost-g.org>)

Chair: Adrian Jäggi



Main COST-G tasks

The International Combination Service for Time-variable Gravity Fields (COST-G) is the Product Center of the International Gravity Field Service (IGFS) for time-variable gravity fields. COST-G provides consolidated monthly global gravity models in terms of spherical harmonic (SH) coefficients and thereof derived grids by combining solutions from individual Analysis Centers (ACs).

Recent Activities

- COST-G is currently working on the extension of combined GRACE monthly gravity field solutions (and also on combined Swarm monthly gravity field solutions)
- In January 2019 COST-G met in Bern at ISSI to further coordinate its upcoming activities.
- Preliminary combined solution presented at IAG/IUGG, Montreal (G03, July 14th)