The Data Base of the International Geodynamics and Earth Tide Service (IGETS)

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Introduction

The International Geodynamics and Earth Tide Service (IGETS) was established in 2015 by the International Association of Geodesy (IAG). **IGETS continues the activities of the Global Geodynamics Project** (GGP, 1997-2015) to provide support to geodetic and geophysical research activities using superconducting gravimeter data within the context of an international network. The objectives of IGETS are

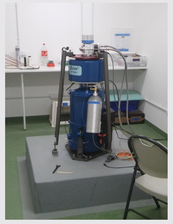
- to provide a service for continuous ground based measurements
- to monitor temporal variations of the Earth's gravity field and deformation of the Earth's surface by long term records
- using ground gravimeters, tiltmeters, strainmeters and other geodynamic sensors.

IGETS also continues the activities of the International Center for Earth Tides (ICET), in particular, in collecting, archiving and distributing Earth tide records from long series of the various geodynamic sensors.

Stations and Sensors

The IGETS data base is hosted by GFZ Potsdam and is accessible via

http://igets.gfz-potsdam.de

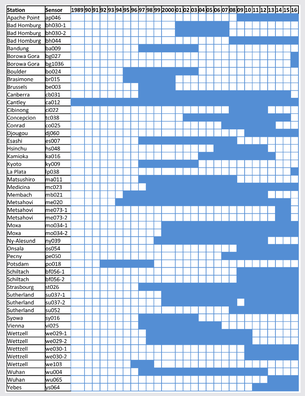


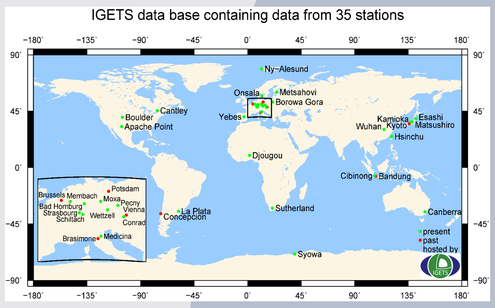
iGrav027 at Borowa Gora (left) and SG038 at La Plata (right).

Currently

- Data from 35 stations are available, globally distributed
- Provided by 25 producers
- Covering a time span of up to 20 years

Records from superconducting gravimeters made by GWR of compact (CT) and observatory (OSG) type are predominant. However, recently data from a transportable superconducting gravimeter GWR iGrav and a LaCoste & Romberg spring gravimeter were added for station Borowa Gora, Poland. Furthermore, there are some operators of iGrav and gPhone gravimeters who are willing to send their data to the IGETS data base in the near future.





Present (green) and past (red) stations of the previous GGP and the current IGETS data base (above) and time spans of data coverage (left).

How to become a producer for the IGETS data base?

Interested operators of geodynamic sensors should send an initial e-mail to the IGETS support team at GFZ: igets-support@gfz-potsdam.de

All former GGP producers can use their existing GGP accounts to send their data to the FTP server of the IGETS data base: ftp://igetsftp.gfz-potsdam.de

Data Products

Gravity and atmospheric pressure data are usually recorded with 1s sample rate. Different product levels are derived from these data:

Level 1:

Raw data as recorded without pre-processing and downsampled to 1 min resolution, after filling gaps or spikes shorter than 10 seconds by linear interpolation.

Records with 1s samples are already provided for a few stations, i.e. Apache Point, Sutherland and Yebes.

Level 2:

Pre-processed data, i.e. elimination of gaps, spikes, steps and earthquakes. These data sets are ready for tidal analysis and are provided by the station operators or by the University of French Polynesia (or by both).

Level 3: ***A new product in progress***

Residual gravity data after reducing Level 2 gravity data for modeled tidal and non-tidal gravity variations.

Tidal models are specific for each station and cover the effects of solid Earth tides and ocean loading effects and are obtained from harmonic analysis of the level 2 records.

Earth rotation effects (polar motion and length-of-day variations) are corrected based on the EOP C04 series of IERS.

Non-tidal loading effects due to atmospheric, oceanic and hydrological mass-redistributions are reduced according to the products provided by

EOST Loading Service
http://loading.u-strasbg.fr/

Atmospheric Attraction Computation Service ATMACS
http://atmacs.bkg.bund.de/

Repair codes introduced by GGP are adopted and extended by IGETS and are part of the file name conventions and indicate the pre-processing strategies and processing levels.

Corrections of the SG **instrumental drift** based on absolute gravity measurements (Level 4 products) are **planned** for the future by linking IGETS with the International Database for Absolute Gravity Observations **AGrav** (see EGU2017-15025). IGETS stations will play an important role to establish a Global Absolute Gravity Reference System (IAG Resolution No. 2 of 2015).

In addition, IGETS established individual **calibration files** for the stations providing a systematic review of the calibration changes formerly given in the GGP file headers. These include the full history of amplitude calibration values for gravity and pressure as well as the phase calibration (time delay) for the sensors.

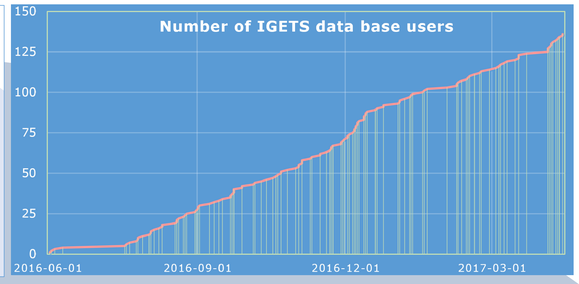
Data Availability and Access

The IGETS data sets are stored on a **FTP server** and are freely available after user registration. The number IGETS users has been rapidly increasing since the launch in summer 2016.

All relevant information are compiled in the scientific technical report (http://doi.org/10.2312/GFZ.b103-16087)

How to become a user of the IGETS data base?

The user access for browsing and downloading data from the FTP server of the IGETS data base ftp://igetsftp.gfz-potsdam.de requires a username and a password obtained by a registration procedure presupposing a valid e-mail address. The registration form can be found on the IGETS data base website http://igets.gfz-potsdam.de.



Scientific technical report on the IGETS data base (left) and the increasing number of IGETS data base users since the launch in summer 2016.

Data Publication and Citation - DOI

IGETS established the provision of digital object identifiers (DOI) for the data sets of every station. DOIs are unique and persistent identifiers used to reference and link the individual data sets. The advantages are:

- clear reference to data sets,
- enable to link scientific results with associated publications,
- standard feature in science when publishing scientific articles,
- improve access to scientific data, enhances the visibility of research data, encourage new research to be conducted, and foster scientific cooperation.

Level 1 data: DOI assigned for each station, i.e. one for all sensors of a station referencing the station operators. The DOIs of the Level 1 data sets resolve to DOI landing pages with an overview of the station and the data. The first DOI assigned data sets are the Level 1 data sets from Sutherland and Potsdam in the original DOI version 001:

Förste, C., Voigt, C., Abe, M., Kroner, C., Neumeyer, J., Pflug, H., Fourie, P. (2016) Superconducting Gravimeter Data from Sutherland – Level 1. GFZ Data Services. http://doi.org/10.5880/igets.su.l1.001

Neumeyer, J., Dittfeld, H.-J., Pflug, H., Voigt, C., Förste, C. (2017) Superconducting Gravimeter Data from Potsdam - Level 1. GFZ Data Services. http://doi.org/10.5880/igets.po.l1.001

Level 2 and Level 3 data: DOI are assigned for all IGETS stations in total, i.e. one DOI for all data sets.

Outlook and Discussion

At the IGETS business meeting at the EGU General Assembly 2017 on

Wednesday, 26 April 2017, from 17:30 to 19:00, Room 2.83,

information about recent changes of the IGETS database and the structure of current and future products are given. Several aspects of IGETS are discussed and short status reports of the contributing station operators are presented. All interested EGU participants are welcome.

You are invited!

Are you operating ground gravimeters, tiltmeters or strainmeters? You are cordially invited to join IGETS! Major benefits are a long term storage, an increased visibility and use of your data as well as a proper data citation by DOI assignments of each data sets!