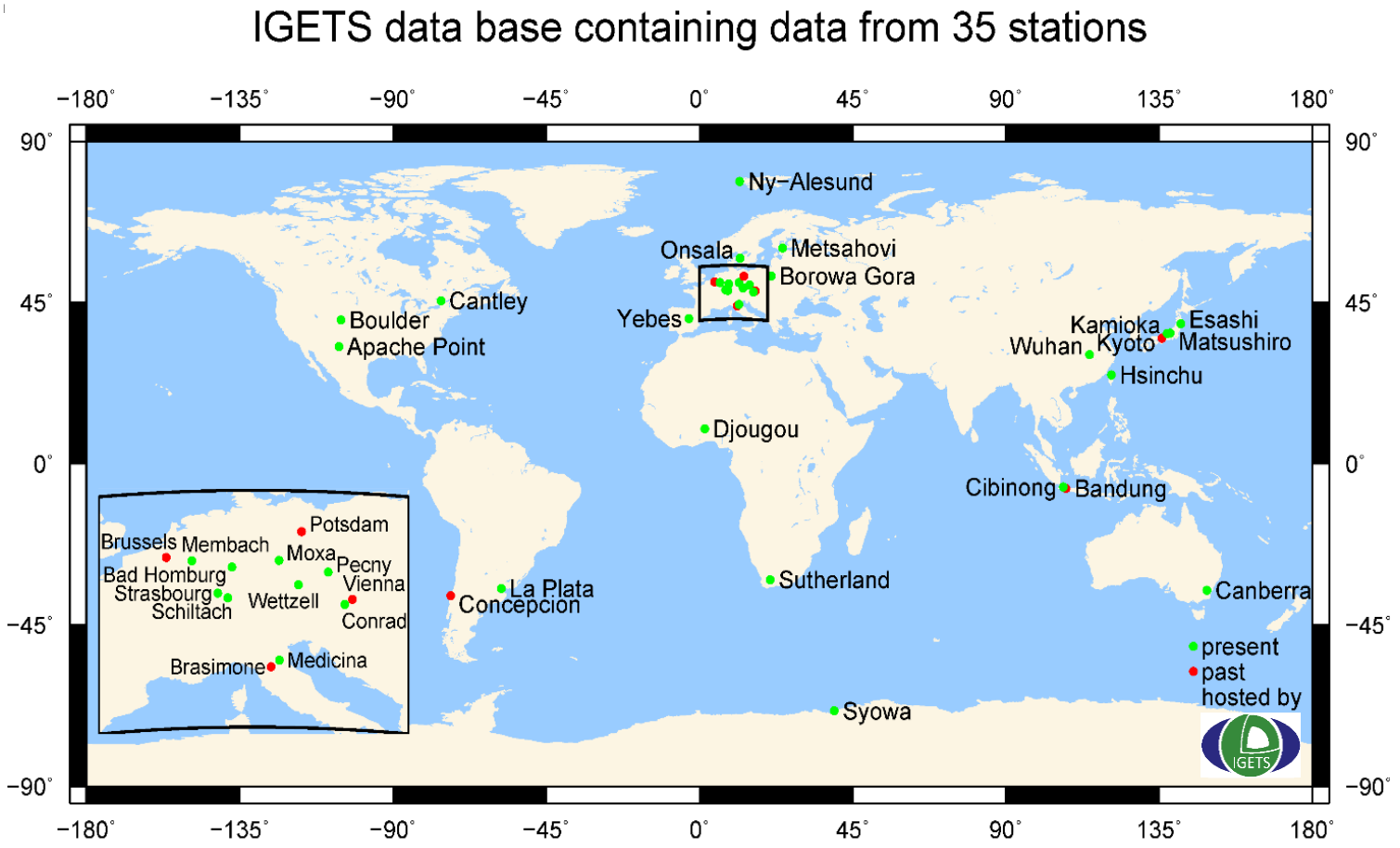
IGETS Data Base – Status Report

Christian Voigt, Christoph Förste

IGETS Business Meeting at the
European Geosciences Union General Assembly
26 April 2017

Stations


IGETS data base containing data from 35 stations
−180° −135° −90° −45° 0° 45° 90° 135° 180°
90° 45° 0° −45° −90°
Ny−Alesund
Onsala
Metsahovi
Borowa Gora
Yebes
Cantley
Boulder
Apache Point
Kamioka
Esashi
Wuhan
Kyoto
Matsushiro
Hsinchu
Djougou
Cibinong
Bandung
Potsdam
Brussels
Membach
Moxa
Pecny
Bad Homburg
Vienna
Strasbourg
Wettzell
Schiltach
Conrad
Brasimone
Medicina
La Plata
Concepcion
Sutherland
Canberra
present
past
hosted by
IGETS
Syowa

Recently added stations and sensors

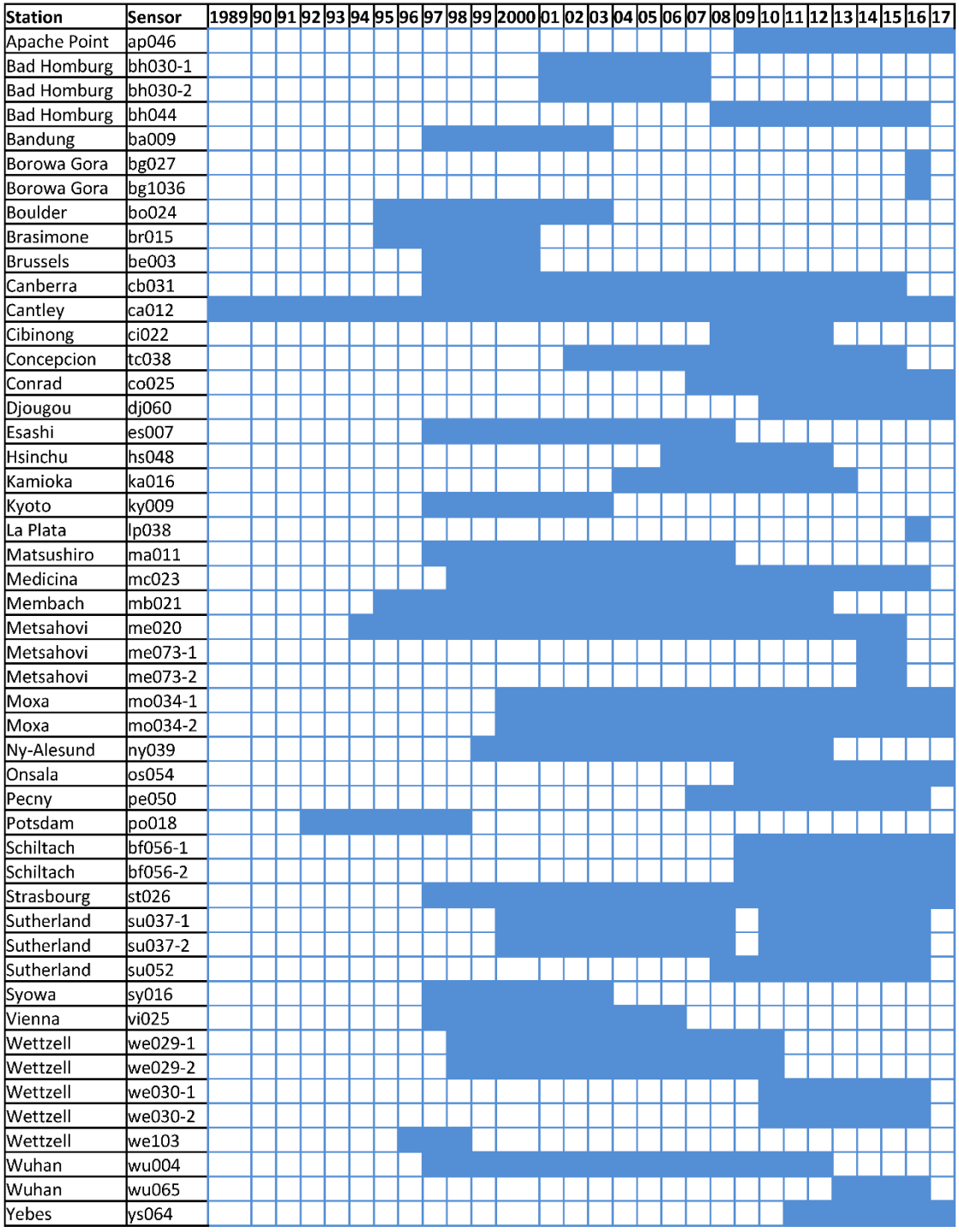
Date	Station	Sensor	Begin of data
2016-10-18	La Plata, Argentina	SG038	2016-01
2017-01-19	Borowa Gora, Poland	iGrav027, LaCoste&Romberg 1036	2016-05
2017-01-24	Wuhan, China	SG065	2013-03
2017-03-31	Djougou, Benin	SG060	2010-07

SG038 at La Plata

iGrav027 at Borowa Gora

Temporal coverage

- 35 stations
- 49 sensors
- time spans of 20 years and more (Cantley)



GFZ
Helmholtz Centre
POTSDAM

New data sets

Level	Files	Content
1	GGP	1 s gravity and pressure data (Apache Point, Djougou, Strasbourg, Sutherland and Yebes)
1	CAL	One calibration file for each sensor according to IGETS conventions (Apache Point and Sutherland)

Data Publication and Citation with DOIs

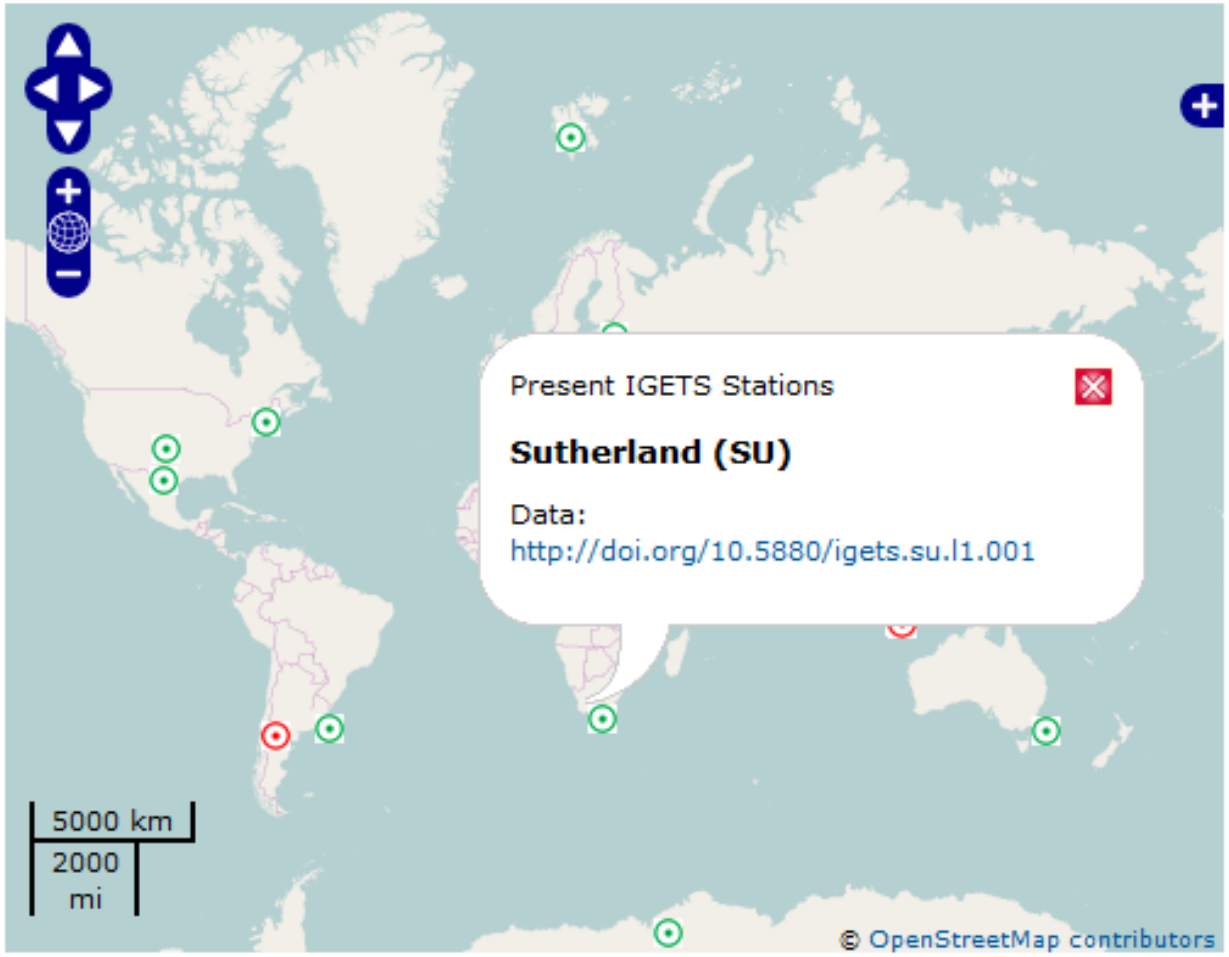
First DOI (Digital Object Identifier) assignments established for the Level 1 data sets of Sutherland and Potsdam:

- 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

When using the dataset please cite it as follows
Foerste, 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

```
Filename            : IGETS-SG-MIN-su037-1-20161200.ggp
Station             : Sutherland, South Africa
Instrument          : GWR D037_L
```

Data Publication and Citation with DOIs



DOI landing page for Sutherland

- **data download**
- **link to data base report**
- **reference to related publications**
- **introduction**
- **contact**
- **official keywords and meta data**
- **geographical position**

Dataset

Superconducting Gravimeter Data from Sutherland - Level 1

Released

Cite as:

Copy citation to clipboard

Förste, Christoph; Voigt, Christian; Abe, Maiko; Kroner, Corinna; Neumeyer, Jürgen; Pflug, Hartmut; Fourie, Piet (2016): Superconducting Gravimeter Data from Sutherland - Level 1. V. 001. GFZ Data Services. http://doi.org/10.5880/igets.su.l1.001

Data Files

Data download via ftp://igetsftp.gfz-potsdam.de (registration required)
IGETS Website

License: CC BY 4.0

Data Description

Voigt, Christian; Förste, C.; Wziontek, Hartmut; Crossley, David; Meurers, Bruno; Pálinkáš, Vojtech; Hinderer, Jacques; Boy, Jean-Paul; Barriot, Jean-Pierre; Sun, Heping; (2016): Report on the Data Base of the International Geodynamics and Earth Tide Service (IGETS); GFZ German Research Centre for Geosciences. https://doi.org/10.2312/GFZ.b103-16087

Related Work

Referenced by

Kroner, C., Werth, S., Pflug, H., Güntner, A., Creutzfeldt, B., Thomas, M., ... Charles, B. (2011). Signals of Mass Redistribution at the South African Gravimeter site SAGOS. International Association of Geodesy Symposia, 305–313. doi:10.1007/978-3-642-20338-1_37

Kroner, C., Thomas, M., Dobslaw, H., Abe, M., & Weise, A. (2009). Seasonal effects of non-tidal oceanic mass shifts in observations with superconducting gravimeters. Journal of Geodynamics, 48(3-5), 354–359. doi:10.1016/j.jog.2009.09.026

Chen, X., Kroner, C., Sun, H., Abe, M., Zhou, J., Yan, H., & Wziontek, H. (2009). Determination of gravimetric parameters of the gravity pole tide using observations recorded with superconducting gravimeters. Journal of Geodynamics, 48(3-5), 348–353. doi:10.1016/j.jog.2009.09.020

Rosat, S., & Hinderer, J. (2011). Noise Levels of Superconducting Gravimeters: Updated Comparison and Time Stability. Bulletin of the Seismological Society of America, 101(3), 1233–1241. doi:10.1785/0120100217

Neumeyer, J. (2010). Superconducting Gravimetry. Sciences of Geodesy - I, 339–413. doi:10.1007/978-3-642-11741-1_10

Find More Research Data

http://bib.telegrafenberg.de/finden/datenbanken/forschungsdaten/

Abstract

An 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) between 1997 and 2015 to provide support to geodetic and geophysical research activities using superconducting gravimeter (SG) data within the context of an international network. As part of this network, the South African Geodynamic Observatory Sutherland (SAGOS) was established by the GFZ German Research Centre for Geosciences during the years 1998 and 2000 based on an Agreement on Cooperative Activities between the National Research Foundation (NRF) and GFZ signed in August 1998. Continuous time-varying gravity and atmospheric pressure data from the SGs at SAGOS are integrated in the IGETS data base hosted by GFZ.

The SAGOS observatory is located at the site of the South African Astronomical Observatory (SAAO) approximately 350 km northeast of Cape Town (longitude: 20.81 E, latitude: 32.38 S, height above MSL: 1755 m). The operation and maintenance of the SAGOS instrumentation is jointly done by staff of SAAO and GFZ. The shortest distance to the South Atlantic coastline is approximately 200 km. The area is located in a tectonically quiet zone far away from the African rift. Geologically, the setting is a huge dolerite plateau with a several kilometres thick layer of dolerite. This bedrock allows a good coupling of the SG pillars to the ground. The environment is a remote area with no industry and low seismicity. The climate at this place is determined by the border between summer and winter rainfall zones so that temperature fluctuations are not too rough. The observatory is built into the ground to protect it against environmental effects like strong winds and temperature changes. All rooms are thermally insulated. An air-conditioning system controls the temperature inside the measurement chamber, which is equipped with three concrete pillars embedded into the dolerite bedrock. Two of the pillars are constructed for SGs or other geophysical instruments. The third pillar is dedicated for absolute gravimeters for the calibration of the SGs. In the vicinity of the observatory four further pillars were set up for various other geodetic antennas and instrumentation.
SAGOS is a high precision geodynamic observatory comprising space techniques and ground instruments. Presently, the observatory is equipped with two SGs manufactured by GWR Instruments (SG D037 and SG 052). The time series of gravity and barometric pressure from the dual sensor gravimeter SG D037 starts in February 2000 and is interrupted from July 2008 to November 2009 due to an upgrade of the electronics package. The time series of SG 052 begins in August 2008 without interruption. Both SGs are active and the time series are kept up to date regularly with a time delay of a few months. The time sampling of the raw gravity and barometric pressure data of IGETS Level 1 is 1 minute. Starting in January 2016, raw data with a time sampling of 1 second is provided additionally. For a detailed description of the IGETS data base and the provided files see Voigt et al. (2016, http://doi.org/10.2312/GFZ.b103-16087].
In addition, SAGOS is equipped with auxiliary data supporting the interpretation of the SG measurements, which is, however, not provided in the IGETS data base due to their complexity. These are a local network of hydrological and meteorological sensors as well as a permanent GNSS (Global Navigation Satellite Systems) station as a core station of the International GNSS Service (IGS) with the ID SUTM.

Dataset Contact

Voigt, Christian; GFZ German Research Centre for Geosciences, Potsdam, Germany; christian.voigt(_at_)gfz-potsdam.de

Keywords

Superconducting gravimetry, Earth tides, Geodynamics, IGETS, International Geodynamics and Earth Tide Service, geophysics, geodesy, hydrology

GCMD Science Keywords

EARTH SCIENCE > SOLID EARTH > GRAVITY/GRAVITATIONAL FIELD > GRAVITY

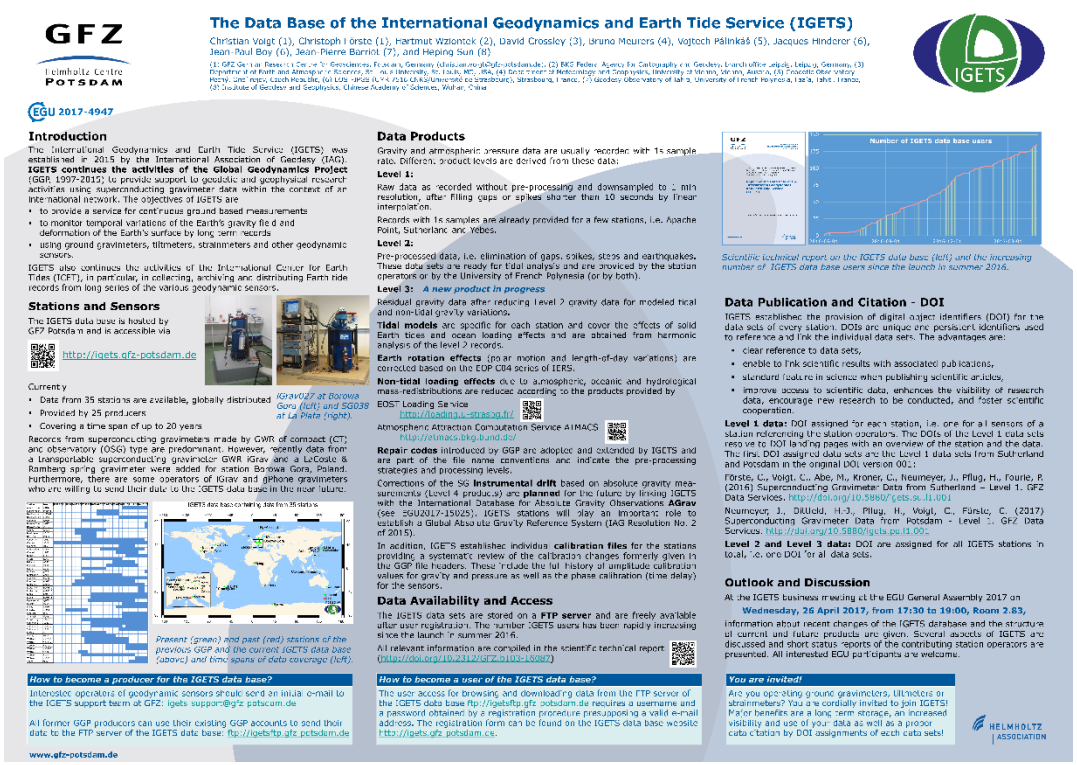
More Metadata

iso19115: view inline / download xml
datacite: view inline / download xml
dif: view inline / download xml
escidoc: view inline / download xml

Location

Click/hover over markers or bounding boxes to see related details. Click/hover over details to see related marker or bounding box.

Documentation



GFZ Helmholtz Centre Potsdam

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

Christian Voigt (1), Christoph Förste (1), Hartmut Wziontek (2), David Crossley (3), Bruno Meurers (4), Vojtech Pálinkáš (5), Jacques Hinderer (6), Jean-Paul Boy (6), Jean-Pierre Barriot (7), and Heping Sun (8)

(1) GFZ German Research Centre for Geosciences, Potsdam, Germany (voigt@gfz-potsdam.de), (2) BKG Federal Agency for Cartography and Geodesy, Branch Office Leipzig, Leipzig, Germany, (3) Department of Earth and Atmospheric Sciences, Saint Louis University, St. Louis, MO, USA, (4) Department of Meteorology and Geophysics, University of Vienna, Vienna, Austria, (5) Research Institute of Geodesy, Topography and Cartography, Czech Academy of Sciences, Ondřejov, Czech Republic, (6) EOST - IPGS (UMR 7516 CNRS/Université de Strasbourg), Strasbourg, France, (7) Geodesy Observatory of Tahiti, University of French Polynesia, Faa'a, Tahiti, France, (8) Institute of Geodesy and Geophysics, Chinese Academy of Sciences, Wuhan, China

IGETS

EGU 2017-4947

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 Bad Homburg (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 local 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 AIMACS
http://aimacs.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 SGD2017-15025). IGETS stations will play an important role to establish a Global Absolute Gravity Reference System (IAG Resolution No. 2 of 2015).

In addition, IGETS establishes 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 establishes 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 00.1:

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,

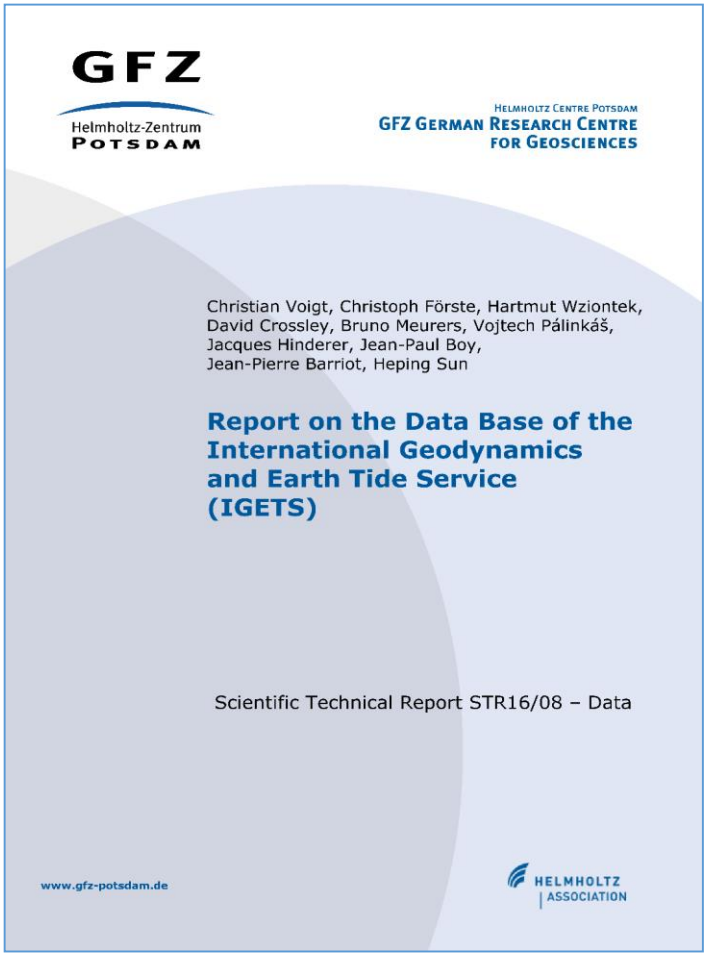
information about recent changes of the IGETS database and the structure of current and future products are given. Several aspects of IGETS are discussed and short status reports of the contributing station operators are presented. All interested EGU participants are welcome.

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!

HELMHOLTZ ASSOCIATION

www.gfz-potsdam.de



GFZ Helmholtz-Zentrum Potsdam

HELMHOLTZ CENTRE POTSDAM
GFZ GERMAN RESEARCH CENTRE FOR GEOSCIENCES

Christian Voigt, Christoph Förste, Hartmut Wziontek, David Crossley, Bruno Meurers, Vojtech Pálinkáš, Jacques Hinderer, Jean-Paul Boy, Jean-Pierre Barriot, Heping Sun

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

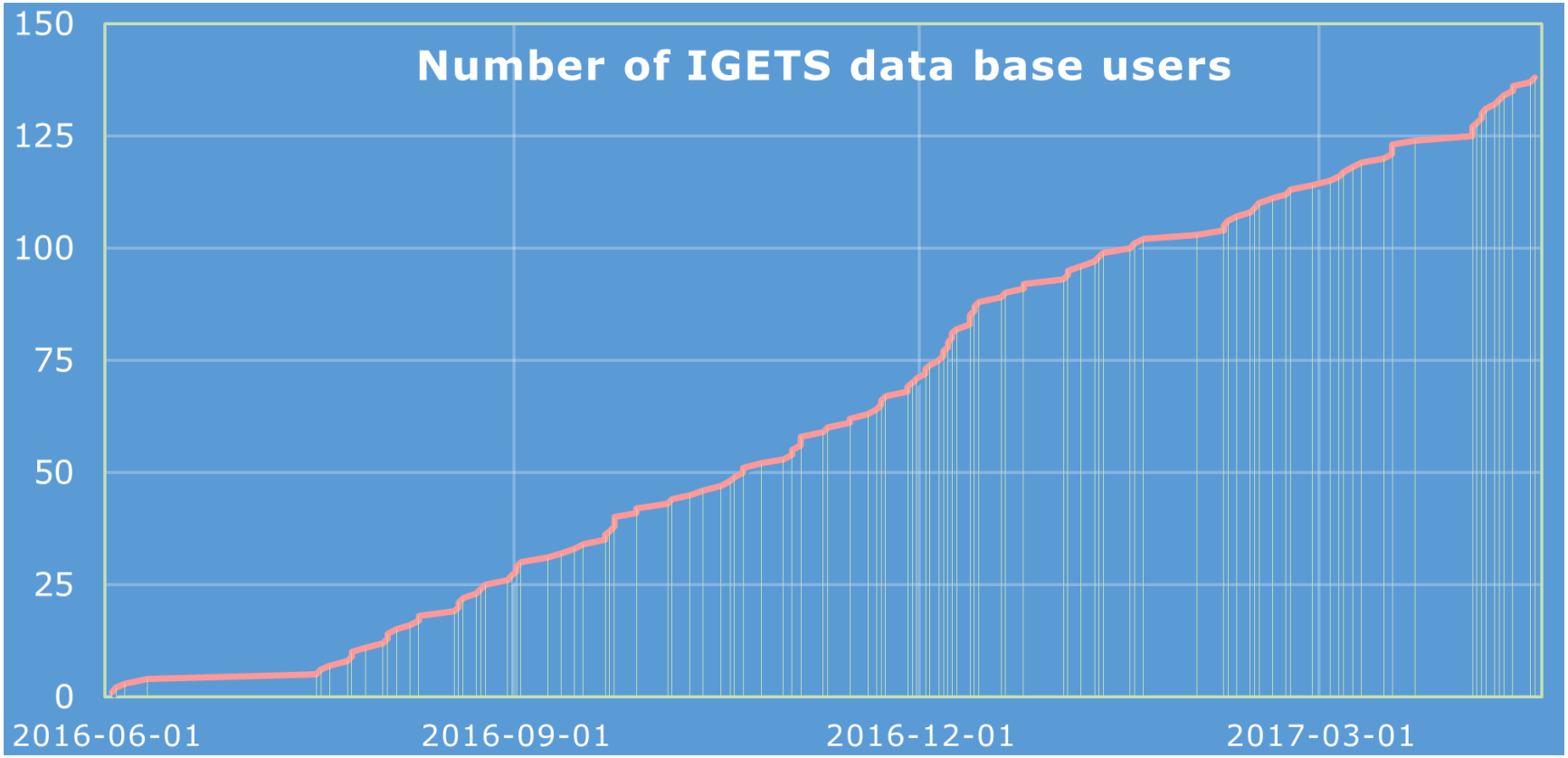
Scientific Technical Report STR16/08 – Data

www.gfz-potsdam.de

HELMHOLTZ ASSOCIATION

Poster EGU2017-4947 and
GFZ Scientific Technical Report
both available in "Documentation" of
http://igets.gfz-potsdam.de

User statistics



138 users at 2017-04-18 (1 user registration every 2 days)