AGrav: An international database for absolute gravity measurements

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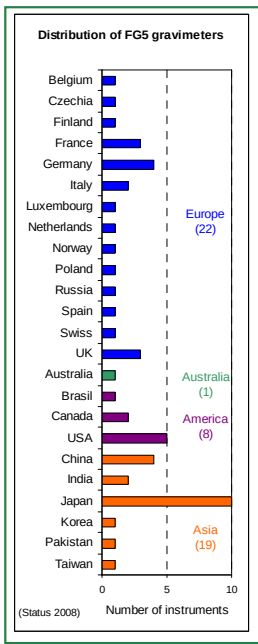
Summary:

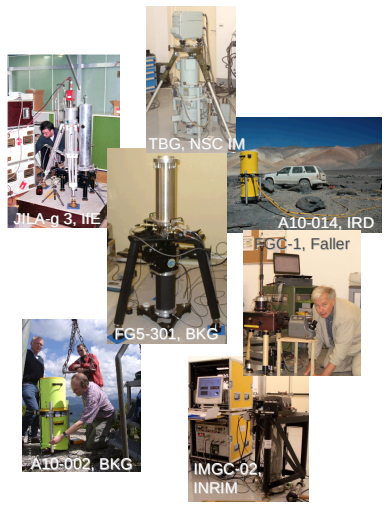
The steadily growing number of absolute gravimeters and absolute gravity measurements all over the world emphasizes the demand of an overview about existing locations, observations, instruments and institutions involved. As a contribution to IGFS, a relational database was designed and implemented in a joint development of BKG and BGI and is in operational status now.

Two objectives are aimed at: With freely available meta-data and contact details, the database gives an overview about existing stations and observations, serves as a platform for multidisciplinary cooperation and allows for coordination of forthcoming measurements. Furthermore, an exchange of gravity values and processing details between contributing groups or international projects is possible, assuring long term availability of the data. Prospectively, the database will contribute to the realization of an international gravity reference and serve as a basis for geophysical interpretation of absolute gravity on a global scale.



Steadily Growing Number of Absolute Gravimeters…

Different types of Absolute Gravimeters



Need for a global database for absolute gravity measurements:

- Free exchange of meta-data:
  Who measured where and when?
- Sharing gravity values among contributing groups
- Long-term availability of measurements and results
- Definition of standards for data exchange

AGrav - Absolute Gravity database

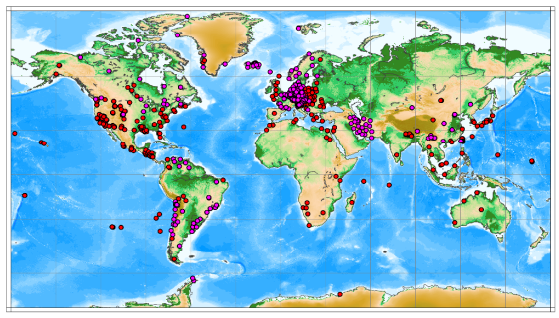
Official database of BGI, two mirrored servers

BGI Toulouse (France): http://bgi.dtp.obs-mip.fr

BKG Frankfurt (Germany): http://agrav.bkg.bund.de

… and Absolute Gravity Measurements Worldwide!

Absolute gravity stations worldwide



Objectives

1.) Exchange of **meta-data**:
- ***Who measured where and when?***
  - institutions involved and instruments used,
  - existing locations and observation epochs
- provision of contact information
- coordination of forthcoming measurements
- platform for multidisciplinary cooperation

2.) Share of **processing details and results** (including gravity values):
- among contributing groups or international projects only, no public access
- data inventory
- long term availability of the data
- time series

Different Information Levels

To respect **data property**
⇒ different levels of information are distinguished:

(1) Only station location (coordinates, point on the map) no information about measurements

(2) Station location and observation epochs: database users can get in contact with the data owner

(3) Station location, observation epochs and processing results:
external users: gravity values with *reduced* resolution of 1 mGal only
contributing users: complete results are visible
data owner: keeps control over submitted data, editing possible

Data Exchange Format

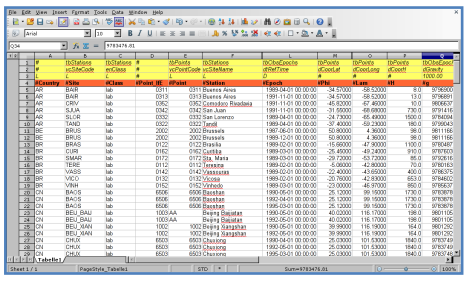
1.) Meta-information:
- location: site name, coordinates
- instrument: type, serial number
- period of the observation

2.) Observation and processing details:
- gravity value and error estimates
- gravity gradient and reference height
- parameters for reduction models

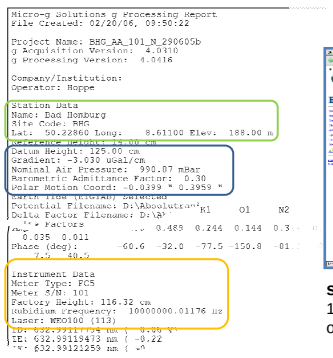
Two solutions

a) Simple table:
- Minimum information included (primarily meta-data)
- May contain gravity value, but no processing details
- Upload by database operator only
  mailto: agrav@agrav.bkg.bund.de

b) "project"-files created by g · Software (Micro-g LaCoste):
- Standard processing software for FG5 and A10 gravimeters
- Simple text format, can be adopted with little effort



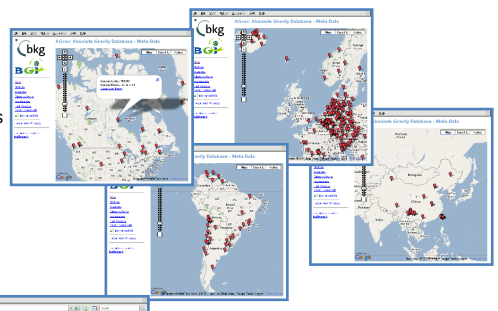
Example: table with JILAG-3 observations of IfE Hannover (L. Timmen)



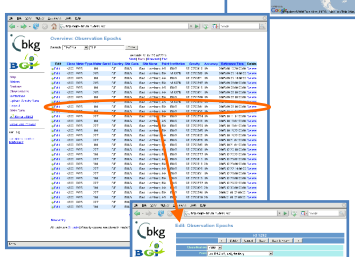
Cutout of project file

Web-based User Interface

Front-page
- Map integrated, showing station locations
- Two "views" to data:
  - meta-data: free access
  - complete data:
    restricted to contributing groups



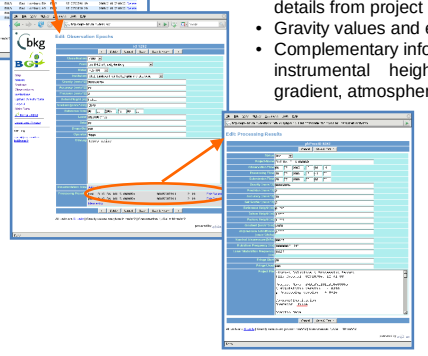
List View
- Overview based on selected information shown as table
- Sorting by different columns possible
- Search function implemented
- Links to detailed information / edit view



Details / Edit View
- Detailed description
- All fields for a particular record
- Related tables in list view

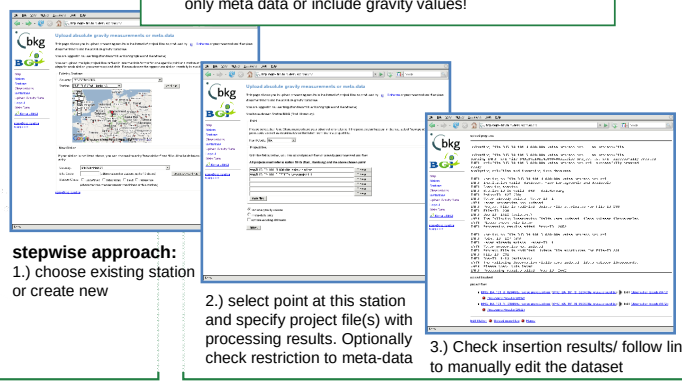
Meta-data:
- Details only, without editing capabilities
- Links to related tables instead

Full access:
- Editing possible
- Permissions: read for all / write for owner



Processing results
(extended functionality)
- Automatic extraction of observation details from project files.
- Gravity values and error estimates
- Complementary information e.g. instrumental height, gravity gradient, atmospheric correction

Web-form to upload new or to update existing data.
- Upload of project files directly by the user: data remain under control of the user, the user may decide to submit only meta data or include gravity values!

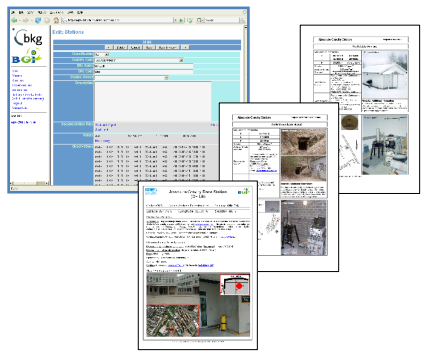


stepwise approach:
1.) choose existing station or create new

2.) select point at this station and specify project file(s) with processing results. Optionally check restriction to meta-data

3.) Check insertion results/ follow links to manually edit the dataset

Supplemental information
upload and link of documents like station descriptions in arbitrary formats (pdf, jpeg) to respective datasets



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