IGETS business meeting

Thu, 3 Aug 2017, Kobe, Japan

Hartmut Wziontek, Germany

Topics

- Overview about IGETS: structure and products
- Status of IGETS Data Base at ISDC of GFZ (C. Voigt)
- Status reports
- Discussion

International Geodynamics and Earth Tide Service (IGETS)

- Established in 2015 as an IAG service at IUGG General Assembly in Prague
- Continues the activities of the Global Geodynamics Project (GGP, 1997-2015)
- Support for geodetic and geophysical research activities using superconducting gravimeter data within an international network / collaboration
- Continues the activities of the International Center for Earth Tides

Objectives:

- Service for collecting, archiving and distributing continuous ground based measurements from gravimeters, tiltmeters, strainmeters and other geodynamic sensors.
- Monitoring of temporal variations of the Earth's gravity field and deformation of the Earth's surface by long term records

Structure of IGETS

Data Centers:

- Primary: Information System and Data Center at GFZ (Potsdam, Germany),
  Collection of gravity data (primarily SG data) of different Level
  http://igets.gfz-potsdam.de
- Secondary: École et Observatoire des Sciences de la Terre (EOST) - Université de Strasbourg, France,
  Collection of other datasets, including historical products

Analysis Centers:

- Primary: University of Polynesia (Tahiti, French Polynesia): Level 2 products
- Secondary: EOST, France: Final gravity residuals

Central Bureau:

hosted at EOST, France

http://igets.u-strasbg.fr/

IGETS Directing Board

Chair :	H. Wziontek
Director of the Central Bureau:	J.-P. Boy
Raw Data Preparation Representative:	V. Palinkas
Analysis Center Representative:	J.-P. Barriot
Data Center Representative:	C. Foerste
Network Representative:	H.-P. Sun
Scientific Product Evaluation:	B. Meurers
Members at large:	D. Crossley & J. Hinderer
Absolute Gravity database representative:	H. Wziontek
IAG Representative:	S. Pagiatakis
BGI Representative:	S. Bonvalot
IGFS Representative:	N. Sneeuw

IGETS Products

Level 1:

- Raw data as recorded without preprocessing and downsampled to 1 min,
  gaps / spikes up to 10 seconds filled by linear interpolation.
  New: Raw data with 1s sample rate

Level 2:

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

Level 3: ***in progress***

- Residual gravity data based on Level 2 reduced by:
- **Tidal models:** specific for each station from tidal analysis and ocean tide loading models, derived from 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/

L3-Products

Proposal by Jean-Paul Boy:

- Tidal model
  - Short period constituents:
    Local model from analysis
  - Long-period constituents:
    DDW99 + ocean tide model, most likely FES2014
- Atmosphere:
  - EOST Loading Service, based on ECMWF
  - Atmacs
- Global Hydrology
- [Oceanic non-tidal loading]
- Polar motion
- Not only residuals, but also all applied models are provided separately

Issues:

- Quality of L2 data, frequent gaps reported
- Discrepancy in scale factor?
  Tidal model of ICET must be known to use L2 data!
- Correction of time delay?
  Atmospheric pressure: no delay
  gravity: delay between 45 and 8 sec (iGrav shorter), to be considered in analysis!
- Atmacs: Oceans only IB, to be combined with EOST oceanic loading (e.g. MOG2D)
- Drift: Instrumental drift, by AG link to AGrav or direct data exchange for IGETS stations;
- Linear trends can be removed by user

IGETS Products and repair codes

updated from
http://www.eas.slu.edu/GGP/repaircodes.html
Feb 17, 2017

Code	Level	significance	
00	1	raw data (as recorded), decimated to 1 min	no repair prior to decimation (GGP STANDARD). short gaps or spikes shorter than about 10 sec can be filled by linear interpolation between good data points on the raw data (full signal), prior to decimation.
00	1	raw data as recorded at 1 sec, 2 sec ..	no repair, file extension “ggs”,
01	1	gaps and disturbances filled with synthetic signal	repair done on raw data, before decimation to 1 min, suggested maximum gap length 2 days
02	1	as 01 + offsets adjusted	repair done on raw data, before decimation to 1 min
11	2	gaps and disturbances filled with synthetic signal	repair done by station operator on data after decimation to 1 min
12	2	as 11 + offsets adjusted	repair done by **station operator** on data after decimation to 1 min
21	2	gaps and disturbances filled with synthetic signal	repair done by staff at **ICET***, on data after decimation to 1 min, prior to tidal analysis
22	2	as 21 + offsets adjusted	repair done by staff at **ICET***, on data after decimation to 1 min, prior to tidal analysis
h1	2	data processed by **user**	one hour data decimated from 1 min
h2	2	data processed by **ICET***	as above, but done by staff at **ICET***

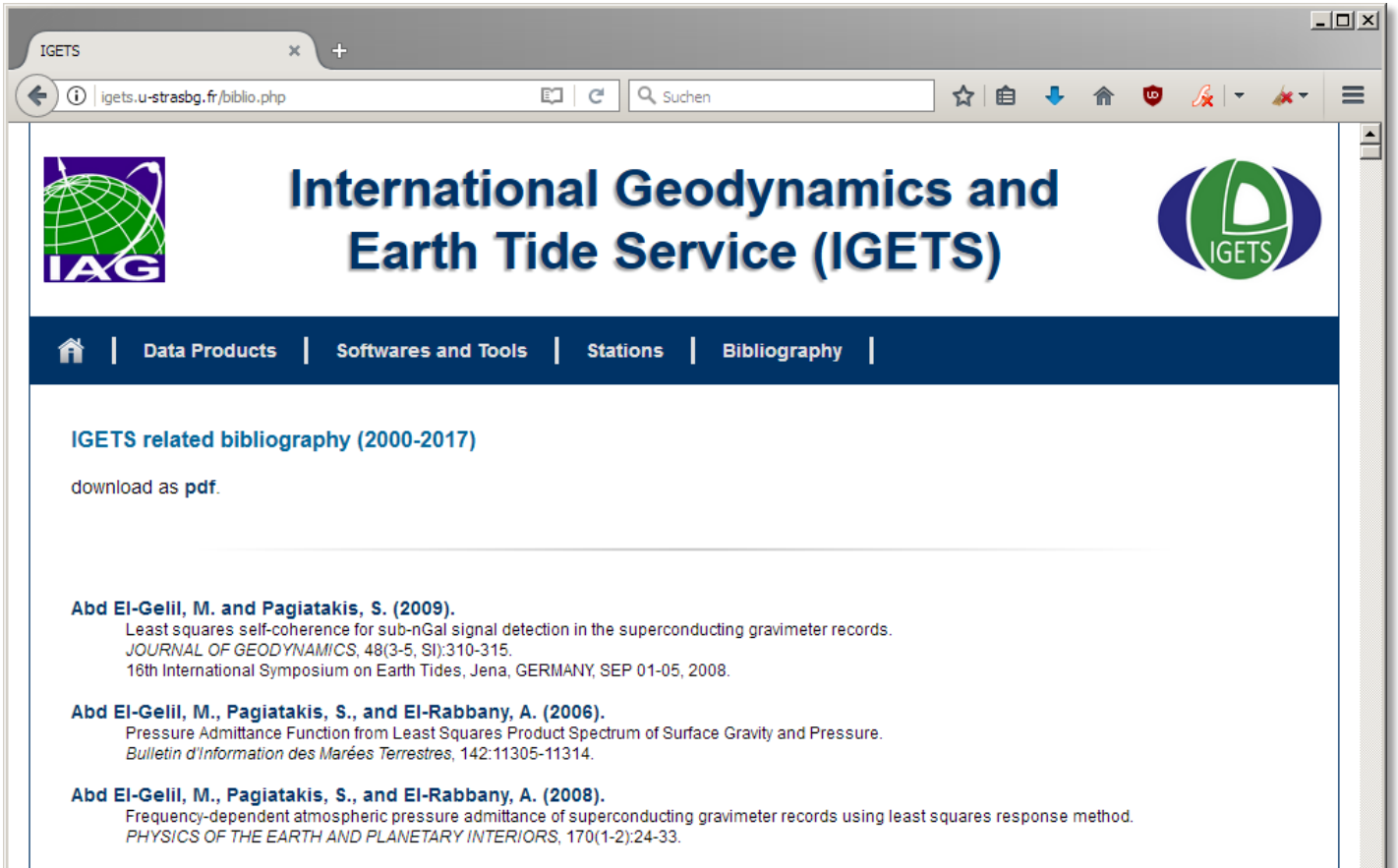
Calibration files (CAL)

- Information on scale factor and time delay in separate file, not in header of each file
- Provides history of different calibration values
- Update without changing the header information in data files
- All IGETS user are requested to compile and send calibration files

```
Filename            : IGETS-SG-CAL-ap046-20160900.cal
Station             : Apache Point, New Mexico, USA
Instrument          : GWR OSG 046
Author              : Tom Murphy (tmurphy@physics.ucsd.edu)
each line gives the date and any updated value such as gcal, pcal, the time lag,
their standard deviations and 'applied since' date. the format is (a8,6f10.3,5x,a8)
yyyymmdd gcal(nm/s^2/V); std; pcal(hPa/V); std;   time lag(s); std;   applied since
C*******************************************************************************
20110801  -793.28      0.041     1.000     0.001     1.540     0.010     20110801
99999999
20131120  -940.18      0.121
20140910  -939.97      0.084
20140910  -940.04      0.069     1.000     0.001     1.540     0.010     20131120
20141205                                             1.320     0.015
20141205  -940.04      0.069     1.000     0.001     1.320     0.015     20141205
.....
99999999
```

Bibliography

- List of publications related to IGETS available at the IGETS-web page: http://igets.u-strasbg.fr/biblio.php
- Updates to be sent to Jean-Paul Boy: jeanpaul.boy@unistra.fr



Topics

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- **Status of IGETS Data Base at ISDC of GFZ (C. Voigt)**
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Discussion

Open topics after the Vienna meeting:

- Delivery of calibration files
- Documentation of step corrections: format, interval or single points in time
- Correction of time delay
- Data submission to FDSN/IRIS
- Documentation of Filters

Offsets, Calibration and Gravity Correction Function

- Calibration File: Not provided yet by all users!
  - Scale factor
  - Time delay

  Documentation of any changes / new / best estimates
- Documentation of offset corrections:
  - B. Ducarme: ***jumplist*** file
  - Alternative: simple table

  Important to be documented, scale factor dependent!
- Gravity Correction Function
  - Tides from analysis depend on calibration! Significant tidal residuals after change of calibration parameters (scale and time delay) → Tidal corrections scaled back? How to apply time delay?
  - Record not stationary without correction
  - Loss of coherence with local air pressure record

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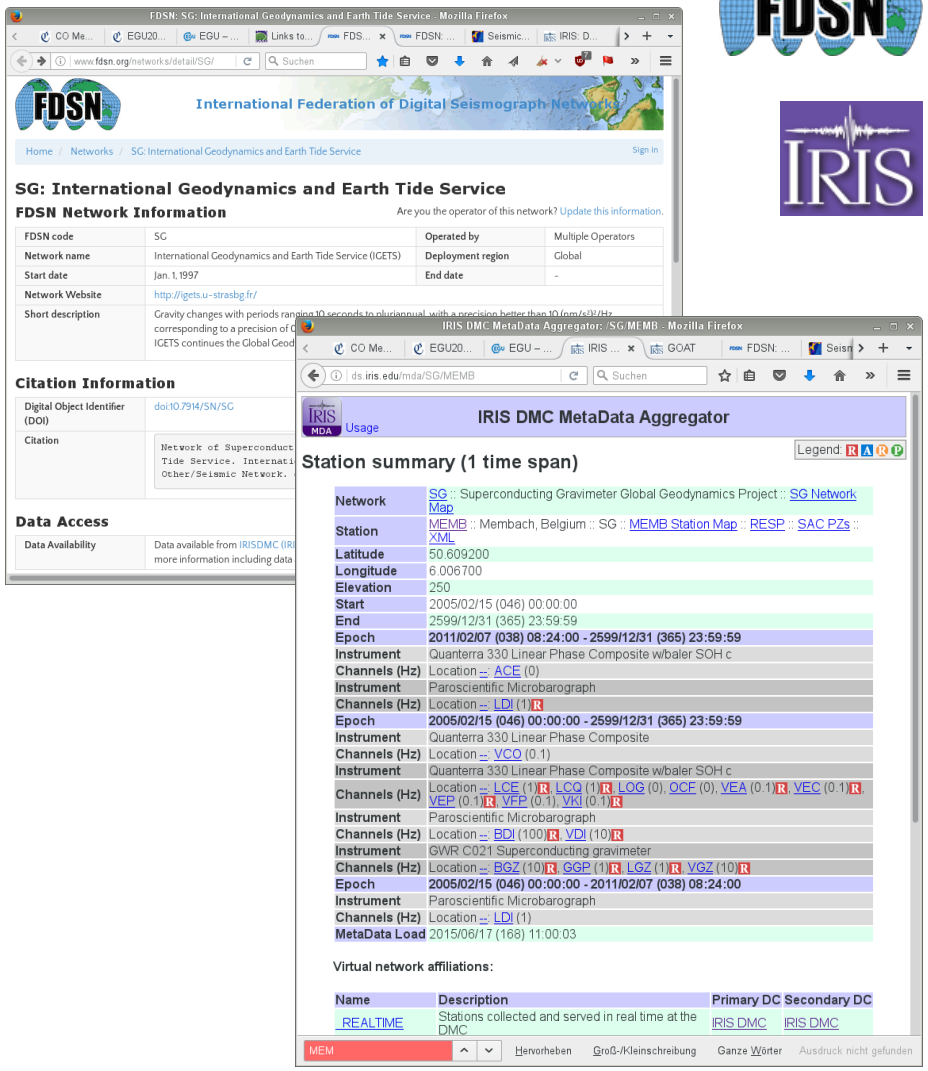
20140910  -940.04      0.069     1.000     0.001     1.540     0.010     20131120
20141205                                             1.320     0.015
20141205  -940.04      0.069     1.000     0.001     1.320     0.015     20141205
.....
99999999
```

Start	End	Step	Uncertainty		Comment
2007 02 27 11 25 20	2007 02 27 11 29 00	9.93	0	#	
2007 05 09 07 55 00	2007 05 14 21 49 00	7.90	1	#	Eichung/Abbau Eichplattform
2007 05 21 13 48 00	2007 05 24 20 08 00	-5.00	1	#	Gradientenmessung
2007 05 30 11 24 00	2007 06 04 17 16 00	15.70	1	#	Anbau Eichplattform/Eichung
		18.60			
2007 05 09 08 27 00	2007 05 14 21 52 00	7.50	1	#	Anbau Eichplattform/Eichung
2007 05 21 13 49 00	2007 05 24 20 06 00	-4.61	1	#	Gradientenmessung
2007 05 30 11 24 00	2007 06 04 17 15 00	-18.01	1	#	Eichung/Abbau Eichplattform
		-15.12			
2008 02 21 10 55 10	2008 02 21 12 37 30	-9.66	0	#	Gewichte auf Stativ??
2009 09 16 17 17 30	2009 09 16 17 17 40	-54.20	2	#	Warburton, Arbeiten an GEP
					New Remote card and UIPC
2010 05 31 12 56 20	2010 05 31 12 57 10	-119.12	1	#	2.50
2010 06 02 06 29 40	2010 06 03 05 10 40	-1225.00	2	#	Stromausfall
2010 09 02 06 06 30	2010 09 03 06 12 00	18.89	2	#	
2012 11 29 07 04 50	2012 11 29 07 05 10	-1.18	0	#	Fahrzeug Ankunft
2012 11 29 08 08 20	2012 11 29 08 09 30	-0.43	0	#	Fahrzeug Ankunft
2012 11 29 09 58 40	2012 11 29 10 04 00	0.43	0	#	Fahrzeug Abfahrt
2012 11 30 13 41 40	2012 11 30 13 42 00	1.18	0	#	Fahrzeug Abfahrt
2015 02 19 09 09 40	2015 02 19 09 10 10	-37.10	10	#	massive Vereisung entfernt

IRIS (Incorporated Research Institutions for Seismology)
FDSN (International Federation of Digital Seismograph Networks)

- Only three stations:
  MEMB (high rate), ST, YS (not active)
- Correction of FDSN entry for network SG requested
- Conversion to MiniSEED?
- Transfer function: How to derive poles/zeros?
  Nominal values of analogue filter?
- Simple way to provide 1s-Daten?



Documentation of Filters

- Filter characteristics:
  - Tide
  - GGP-filters,
  - iGrav/iOSG
- Numerical filters at the old GGP website?
- Should we set up a wiki?

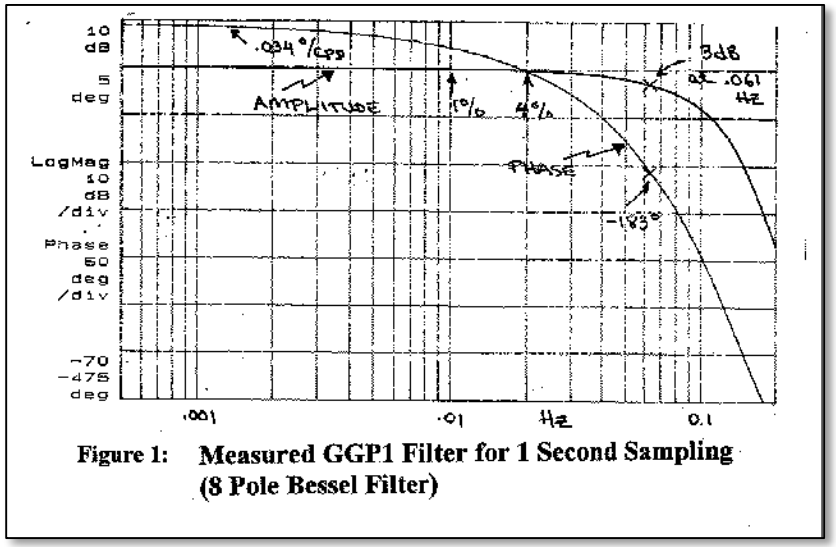


Figure 1: Measured GGP1 Filter for 1 Second Sampling (8 Pole Bessel Filter)

Updated Version of ETERNA ET34-ANA-V60

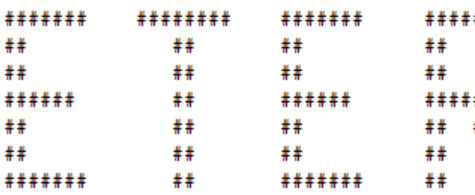
- No update of Eterna 3.4 package since 1997, DOS binaries not executable on Windows 7+
- Initiative by K. Schüller (HYCON) in 2014: Updated version with new features based on source code of version 3.4

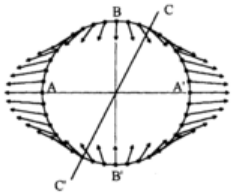
New Features (selected):

- Hypothesis free modelling of the higher degree of the tidal force development (TGP V3-V6)
- Integrating the DDW-H and DDW-NHi Earth models in addition to WDZ up to degree 6
- Fully integrating degree 1 tidal potential.
- Modelling physical regression processes by time-lagged impulse response functions (frequency dependent transfer function)
- Modelling of additional harmonics of tidal and non-tidal origin by an iterative feed-back analysis procedure
- Spectral information derived from the autocovariance function of the residuals
- Redesign of the stochastical model now fully based on least squares and statistical theory
- Binaries 32- and 64-bit MS-Windows compatible with Vista, 7, 8, 10, based on FTN95 from Silverfrost

ETERNA – Earth Tide Analysis and... | Advanced Calibration Method...

http://ggp.bkg.bund.de/eterna/





HOME NEWS ABOUT

The enhanced Earth Tide Analysis and Prediction Program ET34-ANA-Vmn

Introductory remarks by

Klaus Schueller, Research Initiative for Tidal Analysis (RITA)

The objective of this initiative is to acknowledge and preserve the extraordinary intellectual and technical work of my colleague and friend Prof. Dr.-Ing. habil. Hans-Georg (Schorsch) Wenzel who passed away a long time ago.
Therefore, the intention is to maintain and enhance a comprehensive and sustainable platform for Earth tide analysis which will meet the nowadays requirements of the tidal user community all over the world.

Search

Search

News

Maintenance update for ET-ANA-V52 available!

Coming soon: Version ET34-ANA-V60

Download of Version ET34-ANA-V52 available!