GGP Newsletter #6 - 17 July 1998

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. zip compressed version of all files

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The First Year of GGP

GGP has now completed its first year of operation. At this time SG groups should be working hard to get the data ready for sending to the GGP data Bank at ICET, and in doing other tasks as outlined below.

The goal is to produce a continuous high quality data set of 6 years in length from at least 15 participating stations. From past experience, an SG group that fails to keep up with the data submission will soon find it more difficult to process a lot of data at once. The work that has been done in setting up GGP now depends critically on the cooperation of the SG groups. Moreover your GGP colleagues are also anxious to obtain your data and to see your participation. Finally, the scientific community at large (including some people on this mailing list) will be looking closely to see how well the GGP is being collected.

By the end of July, 1998 **the first month of data (July 1997)** must be sent to ICET in the form of gravity and pressure files, and files for the logs and auxiliary data. Individual groups have had this data for one year and now it is time to put it into the GGP Data Bank for use by any of the GGP members. Thereafter, at the end of each month of data should be sent for the preceding year on a continuing basis for the next 6 years.

It is important to emphasize that delays in submitting the data should not occur save for exceptional circumstances. If GGP is to work as planned, it must be by the submission of the data in time by all groups on a monthly basis.

Data Preparation

Though all of the information has appeared in previous Newsletters, the following is a reminder of what to do.

Essential Data

1. Note that each of the following GGP files must include a **header** which gives basic facts about the station, instrument and format. Please note carefully (from Newsletter #5) what the header should contain and be sure to provide all the

information.

2. The **gravity and pressure** data have to be decimated, without any treatment whatsoever, from their raw sampled values (at 1s, 2s, 10s ...) to samples at 1 minute, in volts. The 1 minute data should be written to a single file in GGP format. Details of the GGP format for 1 minute files can be found in GGP Newsletter #5 (p. 15 and 16). Note that some changes were made to the original proposal (Newsletter #2, modified in Newsletter # 3), so *do not use the earlier formats*.
3. The auxiliary data, **rainfall and/or groundwater** if they exist, must also be assembled in a file using GGP format. The sampling interval for these variables is to be either:

   (a) by decimation to 1 minute (if the sampling is more frequent than 1 minute), or

   (b) at 1 min or a longer sampling interval corresponding to the data acquisition rate for these data.

   There is to be no data treatment for these variables. The file structure for the auxiliary data follows that for the gravity/pressure data.

4. The **station log file** is to be supplied for the station for the month, noting all the events which might cause a problem in the data such as a helium refill, power loss, calibration experiment, computer malfunction, instrument failure, data loss, or cultural disturbance. The date of the event and a brief description should be supplied. The structure of these files should be with the same header as before, and with the appropriate date and time stamp, but with the gravity and pressure values replaced by a comment on the event in question.
5. SG groups should sent their decimation filter (from the high rate sampling to 1 min) to Olivier Francis at ICET. He will evaluate the filters and notify the groups if there any questions. If there are different filters for the gravity and pressure, these should both be sent.

Additional Data

In addition to the basic GGP data described by the files above, GGP groups are strongly encouraged to send cleaned (or fixed) data to ICET, particularly for the gravity and pressure files. This cleaned data is of two forms:

(a) Data recorded at a high sampling rate with disturbances removed prior to decimation to 1 min. This obviously is the highest quality of data that can be produced and the type that should be used for the most sensitive non-tidal analysis, or

(b) The same 1 minute data as sent to ICET, but with disturbances removed from the 1 minute samples. This is easier to do than (a) because of the smaller file sizes, but there is more data loss due to the effect of the filters. Also disturbances in the 1 min data are frequently more difficult to detect than in the high rate data.

Earthquake Data

To date few SG groups have made the effort to send earthquake data to ICET. In order to reduce the work this requires, we have decided to request at this time data for only one earthquake, as an experiment. The earthquake, which is the largest in terms of seismic moment since the start of GGP, is the following one in the Balleny Islands Region:

Year	Month	Day	Orig Time	Lat	Long	Depth (km)	Mag (HRV)	DC Moment
1998	03	25	031225.07	-62.88	149.53	29	8.1	1.7×10^{21} N m

The format for sending this data is given in Newsletter #5. You should send 10 days of data beginning with the day that includes the origin time and the data should be the raw data (1s, 2s, ...).

Data Submission

Both GGP data and earthquake data should be sent to ICET by ftp in the following way:

GGP Data		Earthquake Data	
address	ftpserver.oma.be	address	ftpserver.oma.be
login:	*your ICET username*	login:	anonymous
password:	*your ICET password*	password:	*your email address*
directory	*directory will be assigned*	directory:	/pub/astro /ggp/bigquakes

If you need to get your ICET user name and password, please contact Olivier Francis (*francis@oma.be*)

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Data Repair Codes

(a) No repair

Code	significance
00	raw data, decimated but untreated

(b) Repair done on raw data, before decimation to 1 min

Code	significance
01	gaps and disturbances filled with synthetic signal
02	as 01 + offsets adjusted

(c) Repair done on data after decimation to 1 min

Code	significance
11	gaps and disturbances filled with synthetic signal
12	as 11 + offsets adjusted

(c) One hour data, decimated from 1 min

Code	significance
h1	data processed by ICET
h2	data processed by user

1 minute Data

This is a slight modification of the table from Newsletter #4.

Line	Text (a20)	Parameter 1	Parameter 2
Line 1:	Filename	[name of file] (a20)	
Line 2:	Station	[name of station] (a20)	
Line 3:	Instrument	[name of instrument] (a20)	
Line 4:	Phase Lag (deg/cpd)	[phase lag] (f10.4)	[error] (f10.4)
Line 5:	N. Latitude (deg)	[latitude] (f10.4)	[error] (f10.4)
Line 6:	E. Longitude (deg)	[longitude] (f10.4)	[error] (f10.4)
Line 7:	Height (m)	[height] (f10.2)	[error] (f10.4)
Line 8:	Gravity Cal (ugal/V)	[g calibration] (f10.4)	[error] (f10.4)
Line 9:	Pressure Cal (mbar/V)	[p calibration] (f10.4)	[error] (f10.4)
Line10:	Author	[email address of author] (a40)	
Lines 11	*other information*		

C****	*end of header*		

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data should be sampled from the gravity GEP outlet (if not available from the tide GEP outlet) and (c) that the antialiasing filter should be designed by GWR. This last point has been discussed and proposed by several other individuals.

The question of 1s versus 10s sampling rate has been actively discussed by a number of individuals, including Mansinha, Crossley, Richter, Z\"urn and Hinderer. The consensus seems to be forming that a 10s sampling rate is sufficient for all geophysical purposes (including normal mode studies), provided that a suitable anti-aliasing filter can be designed that does not cut off frequencies of seismological interest.

There is no *a priori* reason for every GGP group to record the gravity at the same rate or through the same filter, provided the resulting 10s data (GGP Raw Data for seismic studies) and 1m data (GGP Data for all other studies) are produced to a consistent standard (i.e. signal to noise ratio, frequency band). However there would be some benefit to the having a standard 10s anti-aliasing filter, designed by GWR that satisfied the scientific goals of GGP.

[**Note Added**:] *This has already been proposed and discussed with GWR, (see elsewhere).*

Data Exchange Format

It is **agreed:**

1. Bearing in mind the need to balance the large amount of Raw Data collected by the GGP versus the need to allow flexibility in future processing, 1 min samples of gravity and local atmospheric pressure should be the standard GGP data for exchange.
2. Separate files for each calendar month should be prepared as follows :
    a. FILE 1 - date, time, gravity, pressure (each minute)
    b. FILE 2 - date, time, water level, rainfall, tilts, temperature, humidity (each minute, or as available)
    c. FILE 3 - date, time, log file information (giving all the known disturbances, He refills, gaps etc., as necessary)
3. All times are to be quoted as UTC (including leap seconds). All variables are to be quoted in the units in which the measurements are made, with the appropriate calibration factors given.
4. Usually the signals are recorded in volts. For other purposes, the units to be adopted are mgal (gravity), mbar (pressure), m (rainfall, water level), °C (temperature) and SI for all other variables. The three data files for each month, as defined above (FILES 1-3), constitute the definition of GGP Data.

   [**Note Added:**] *Peters (NOAA) suggests rainfall in cm, does anyone have strong opinions on this?*
5. That considering the widespread use and availability of the ETERNA program for tidal analysis (Wenzel, 1994b), the ETERNA, or more precisely the PRETERNA, data format (Wenzel, 1994a) should be adopted for data exchange as outlined by Wenzel (1994c). In this format, for example the gravity and pressure data (FILE 1) would appear as:

```
Header information
(station parameters, comments and parameters of the data
acquisition, scale factors, etc.)
C*****************************************************
date time gravity (volts) air pressure (volts)
yyyymmdd hhmmss ggg.gggggg ppp.pppppp
```

   As indicted by Wenzel (1994b) "Step corrections (to be added to all subsequent data of the channel) may be input via a code 77777777 in columns 1..8 and a data gap may be input via a code 66666666 in columns 1..8. The end of the data series is marked by a 99999999 in columns 1..8". (Further details can be obtained from the GGP Secretariat or G. Wenzel).
6. GGP participants should make available the GGP Raw Data to other GGP participants, when (see below), and if so requested.

It was **left unresolved** (a) the exact format for each data file, including headers and (b) the medium (INTERNET, diskettes, etc.) by which the exchange should take place.

Data Availability

It is **agreed** that GGP Data (both 1 min and 10s, if requested) should be available to other GGP Participants within 1 year of its collection.

It was **left unresolved**:

(a) the extent to which data repair was to be performed on the Raw Data prior to decimation to 1 minute, or on the data repair to be performedreport here the current results:

Code	Instrument	Location	Current Drift in mgal, linear (yr^{-1}) or T in days

BO	GWR CO24	Boulder, USA	8
CB	GWR CO31	Mt. Stromlo, Australia	$-3.8 \times e^{-(T/16)}$
MB	GWR CO21	Membach, Belgium	< 1
ME	GWR T020	Metsahovi, Finland	< 1
PO	GWR T018	Potsdam, Germany	5.5
ST	GWR C026	Strasbourg, France	5
SY	GWR T016	Syowa, Antarctica	$-12.3 \times e^{(-T/78)}$
VI	GWR CO25	Vienna, Austria	3
WE	GWR CO23	Wettzell, Germany	8

Ocean Loading

ICET has computed and distributed Ocean Loading parameters for all the GGP stations for waves M2, N2, K2, S2, K1, O1, P1, and Q1. This information was distributed at the Earth Tides meeting in Brussels in July 1997. If you need this information for your station, please contact Olivier Francis (*francis@oma.be*)

GWR Announces a New Instrument

Most of you know that GWR is promoting a new instrument that is designed for remote monitoring and operation via modem. Based on a more powerful cryo-cooler the instrument, which has a 25l dewar, needs no helium refills at all! The instrument performance is identical to the Compact Tidal Gravimeter, with the same low drift rate and high sensitivity. The new instrument can be fitted with two spheres for improved monitoring and removal of spikes and offsets.

Station Reports

We will be happy to include any reports you may wish to send us concerning your station.

ME, Metsahovi, Finland

T020 has been working well for 1997. The Data Acquisition System has been upgraded to QNX 2.20 and the new GWR filter card installed. The phase lags (see *Phase Calibration*) have been determined for the old card (17.04 sec) and for the new card (9.41 sec). The new card has extended the gravity signal to 3-4 sec period and helped in studies of microseismicity. Groundwater in a nearby well has been measured in the past manually once a week; now a new pressure sensor is installed with a sampling of 1 min for the water level.

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