NEWSLETTER #14

7 December 2004

Prepared by Jacques Hinderer and David Crossley, August 2004.

1. Minutes of the GGP meeting, 15th International Symposium on Earth Tides, Ottawa, August 4, 2004

An afternoon session was held on Wednesday, August 4, as part of the Earth Tides Symposium. Those present were:

M. Abe *(Department of Geophysics, Kyoto U., Japan),*
Trevor Baker *(Proudman Oceanographic Laboratory, Bidston, UK),*
Machiel Bos *(DEOS, Delft, The Netherlands),*
Jean-Paul Boy *(IPG Strasbourg, France),*
Eric Brinton *(GWR Instruments, San Diego, USA),*
S. Casotto *(Department of Astronomy, U. Padova, Italy),*
David Crossley (*Dept. Earth and Atmospheric Sciences, Saint Louis U., USA),*
Nicholas d'Oreye *(Natural History Museum, Luxembourg),*
Bernard Ducarme (*Royal Observatory of Belgium, Brussels),*
Remy Ferland *(Geodetic Survey Division, NRCan, Ottawa)*
Olivier Francis, *(U. Luxembourg and ECGS, Luxembourg)*
Jun-Yi Guo *(Wuhan University, China / Ohio State U., Columbus, USA),*
Garry Haardeng-Pedersen *(U. Corner Brook, Newfoundland),*
R. Haas *(Onsala Space Observatory, Onsala, Sweden),*
Martina Harnisch *(formerly BKG Frankfurt/Potsdam),*
Gunter Harnisch *(formerly BKG Frankfur/Potsdamt),*
S. Hasan *(Department of Environmental Sciences, Wageningen U., The Netherlands),*
Joe Henton *(Geodetic Survey Division, Natural Resources, Canada),*
Jacques Hinderer (*EOST, Strasbourg, France),*
Andy Hugill *(Scintrex, Ontario, Canada),*
Yoichi Imanishi *(Ocean Research Institute, U. of Tokyo, Japan)*
Gerhard Jentzsch *(Institute for Geosciences, Jena U., Germany)*
Thomas Jahr *(Institute for Geosciences, Jena U., Germany)*
S. A. Khan (National Survey and Cadstre, Copenhagen, Denmark)
Corinna Kroner *(Institute for Geosciences, Jena U., Germany)*
Tony *Lambert (Geological Survey of Canada, Natural Resources Canada)*
Jacques *Liard (Geodetic Survey Division, Natural Resources Canada)*
Lalu Mansinha *(University of Western Ontario, Canada)*
P. Mendes (Czech Republic)
G. Mentes *(Geodetic and Geophysical Research Institute, Sopron, Hungary)*
Jim Merriam *(University of Saskatchewan, Canada),*
Jurgen Neumeyer *(GFZ Potsdam, Germany),*
K. Onoue *(Disaster Prevention Research Institute, Kyoto U., Japan)*
Spiros Pagiatakis *(York University, Ontario, Canada)*
V. Palinkas *(Geodetic Observatory, Pecny, Czech Republic)*
L. Petrov *(NVI, Inc./ NASA GSFC, USA)*
Bernd Richter *(BKG Frankfurt, Germany),*
Bernd Ritschel *(GFZ Potsdam, Germany),*
H. Ruotsalainen *(Dept. Geodesy and Geodynamics, Masala, Finland)*
Tahahiro Sato *(National Astronomical Observatory, Mizusawa, Japan),*

H. Steffen *(Institute of Geophysics, Gottingen, Germany)*
Doug Smylie *(York University, Ontario, Canada)*
Shuzo Takemoto (*Dept. Geophysics, Kyoto U., Japan),*
Heikki Virtanen, *(Finnish Geodetic Institute, Masala, Finland),*
Richard Warburton *(GWR Instruments, San Diego, USA),*
Herbert *Wilmes (BKG, Frankfurt, Germany)*
Walter Zuern *(Black Forest Observatory, Shiltach, Germany)*
Jian-Qiao Xu (*Inst. Geology and Geophysics, Chinese Acad. Sciences, Wuhan, China)*

Please let us know if any names have been omitted.

1.1 Opening Remarks

D. Crossley opened the GGP workshop by welcoming all the participants and presenting the agenda.

1.2 Review of the GGP Stations

H. Wilmes made a report for the 4 stations belonging to BKG, namely Bad Homburg (**BH**), Wettzell (**WE**), Medicina (**MC**) and Conception (**CO**). He mentioned that the remote control equipment for the CO instrument works nicely and, after a power-supply failure, the sphere could be re-centered at distance. There is now an 18 month uninterrupted series available. The dual sphere instrument in BH was started in 1999 but there are two major stops since then (de-icing problem). BH is a reference station and there are in principle 2 absolute gravimeter (AG) measurements per month; at high tide, the calibration precision can reach 1 part per mil. In WE, continuous calibration tests are performed with the moving platform.

J. Hinderer reported on the Strasbourg (**ST**) station. There is now a continuous series available from summer 1996 till now. There are regular AG measurements (more than 50 altogether) and a permanent GPS receiver was installed in 1999. Water table level is also continuously measured and uploaded to the GGP database, as well as log files.

For Boulder (**BO**) station, **D. Crossley** reported that the instrument has stopped this year because of a computer hardware failure. The NOAA people will try to reload a new data system to restart as soon as possible. He also mentioned that the SG plays (or should play) an important role for all the validation tests performed at TMGO by Micro-g Solutions after repair or maintenance of the AG.

For the Cantley station (**CA**), **J. Merriam** indicated that there is a trouble free series available from 1997 till now. AG/SG calibration tests have shown that the scale facto is stable with time.

T. Sato reported on 4 stations: **SY** (Syowa), **NY** (Ny-Alesund), **CB** (Canberra) and **ES** (Esahi). Station CB was hit by bush fires in June 2002 but the gravimeter was not damaged. Due to high seismic activity in Japan, there have been several interruptions in the ES series. The Arctic measurement in NY still continues, leading to a fairly long record now available. The SY instrument was replaced in February 2004 by a new model after a 10-year recording period (two

DVDs were kindly provided by Prof. Shibuya for distribution at the ET meeting). The old instrument will be transferred to a new station Kamioka **(KA)** in central Japan where there is an extensive underground facility to detect neutrinos from space. The gravimeter mounting system has been changed from a top mount to use of bottom feet.

S. Takemoto reported on an accident that lead to the 'death' of the Bandung (**BA**) instrument in March 2004. The cause is not yet clear and could be either to a vandalism act or flooding, with the latter seeming most likely. Takemoto showed many interesting pictures of the damage, indicating the unique severity of the disturbance to the dewar. This instrument will be restarted at a new location in Indonesia (near Djakarta). S. Takemoto insisted on the continued need to have at least one instrument (within GGP) located near the equator.

Y. Imanishi reported on the Matsushiro (**MA**) station and emphasized the quality of the data with a 4-year record free from steps, unfortunately stopped recently by a strong thunderstorm. Following the observation of strange tilt oscillations, an experiment will be conducted to cause artificial tilt in order to better understand the relation between tilt and gravity. R. Warburton emphasized the need to record both tilt power and tilt balance to understand what is going on. E. Brinton also added that the new GWR data system has 36 channels available and that these two specific signals should be continuously recorded and monitored.

B. Ducarme reported on the Membach (**MB**) station where there has been no major problem. This stations is a Belgian fundamental station and hence regular AG measurements are also available.

H. Virtanen reported on the Metsahovi (**ME**) station indicating that the initial levitation is still kept and that environmental data are available.

For the Moxa (**MO**) station , **C. Kroner** indicated that the meter is working fine ; AG measurements are performed by BKG and a permanent GPS station was installed recently.

Concerning the Sutherland station (**SU**), **J. Neumeyer** indicated that no major problem has to be reported for this dual sphere instrument. Calibration was obtained from a parallel recording with a FG5 as well as with a JILAG-5.

Bernard Meurers was not present from the team operating the Vienna (**VI**) station, but it is known that this station has recently stopped and will be restarted outside Vienna in an underground site called CONRAD.

The representative of the Wuhan **(WU**) station made a short report and indicated that this meter is regularly calibrated with AG measurements thanks to collaboration between China and Japan.

Station **WA** (Walferdange) is now up and running with a renovated compact instrument, and **O. Francis** said they were waiting a few months before sending data to ICET to make sure there were no other obvious problems with the data. Thenceforth WA would be sending data to ICET as a member of the GGP database.

1.3 GGP Agreements

1.3.1 Data Delay

D. Crossley reminded the SG Groups that the time delay for the 1min GGP samples upload to the database has now been reduced *from 12 to 6 months*, and consequently this makes the data open to the public *within a 1 year delay*. As before, twice these time limits is allowed for the SY station in Antarctica. ICET / GFZ needs to adjust the file permissions accordingly on the database.

Action Item #1 → B. Ducarme and B. Ritschel (ICET / GFZ) should check that the file permissions agree with these modified access times for users of the ICET online database.

1.3.2 Data Repair Codes

B. Ducarme reminded the group that the ICET procedure to process the raw GGP samples, i.e. the data repair procedure, is aimed at tidal studies and hence may not be appropriate for long-term investigations (presumably due to the removal of offsets). He proposed that a correcting function is also added to the 1 min corrected sample file.

Action Item #2 → We suggest that B. Ducarme could provide a sample of this correcting function for the SG groups to discuss and possibly adopt.

1.4 Talk of C. Kroner

Corrina Kroner presented an interesting talk on the analysis of data from the two–sphere instrument in Moxa. This is included in the conference proceedings of the Earth Tides Symposium (to be published in 2005).

1.5 GGP and Long Period Seismology

J. Hinderer presented a talk showing recent results in the long period seismic frequency band that clearly shows the excellent quality of SG data with respect to long period seismometers. He especially pointed out the first discovery by Rosat et al. (2003) of the 3 singlets of the spheroidal mode ${}_2S_1$ that is the first overtone of the Slichter mode (translation of the inner core). He commented on the recent interest of the seismological community to have access our data and that there is hence an opportunity for us to send rapid data (1, 2 or 10 sec) to IRIS. A number of questions arose, among them should we -

- send the data in a continuous way or only after major earthquakes?
- use the SEED format, and if so how are we to convert our data?
- send the data directly by FTP to IRIS or via ETGGP as a community product?

- further filter the data to remove long period components (longer than, say, 11 hours)

The benefits for our project would be to promote the instrument (SG), to enlarge our network (GGP) and to enhance our visibility among Earth sciences.

A discussion on the new aspect of the GGP followed. W. **Zuern** indicated that, in addition to gravity pressure data have to be sent, together with the poles and zeros of the filter. **D. Crossley** added that this should not be too difficult for the stations equipped with a GGP1 or GGP2 filter designed by GWR. The importance of the log files or station book was emphasized several times in the discussion, especially in the context of steps present in the data. **J. Merriam** questioned the expectation of IRIS in terms of time delivery and **D. Crossley** answered that IRIS would like to have access to the GGP data as soon as possible.

Concerning the question of how to transfer GGP rapid data to IRIS or ETGGP, several members said that they need help to convert the data to the SEED format in use in seismology. **D. Crossley** replied that IRIS is willing to help as much as possible in this respect, especially by providing conversion codes. **B. Ritschel** indicated that in his opinion it is better to first transmit to ETGGP which would be willing (at GFZ) to convert the data to the SEED format and forward them to IRIS. The general opinion was to proceed to an overall agreement to send this type of data to a seismological center, but some important details need first to be clarified.

Action Item #3 → D. Crossley will discuss the proposal with IRIS and seek some clarifications on data transfer before a questionnaire is sent to SG groups. The meeting with IRIS is scheduled for the AGU Fall Meeting, Dec 11-18.

1.6 GGP as a Repository for AG Data

J. Hinderer presented the present situation of the AG measurements archiving procedure and he also indicated the opinions of several members who are in close contact with this type of data. Two main objectives could be identified:

1. the calibration of the SG. For this purpose it is better to have access to the uncorrected AG drop values even though hourly set values might also be used. Normally, however, the calibration is the responsibility of the owner of a given instrument and users should take the scale factor value listed in the header of the GGP files.

2. the long term evolution of gravity as checked by episodic AG measurements. These values are usually set values corrected for time-variable geophysical processes (solid earth and ocean tides, air pressure, polar motion) and are necessary to determine the instrumental drift of the SG and hence are necessary to determine the long-term trend in gravity at the GGP station.

A number of contradictory opinions were emitted and no final satisfactory conclusion could be reached. J. Hinderer indicated that this initiative is based on the willingness of the members

without any strict requirement. AG data are useful data when studying long term changes at any station and there is presently no data center which takes care of them. The natural location is of course BGI but the requirements are rather important and might not help in encouraging people to send their AG data in a very near future. Moreover, we are only interested in AG measurements at the GGP stations while BGI is aiming to more general data (any station) with other objectives (final archiving, geodetic information) than ours.

1.7 Next GGP Meeting

D. Crossley proposed the Vienna EGU meeting in 2005 for our next GGP meeting and nobody opposed this proposal.

The meeting was adjourned at 6 pm and the talk to be given by B. Ritschel et al. was scheduled for the following day. This talk will again be part of the conference proceedings.

Action Item #4 → A questionnaire on this issue will be sent to the appropriate people making AG measurements at the SG sites