

Global Geodetic Observing System (GGOS) Retreat 2008

Bertinoro, Italy

March 25, 14:00 to March 28, 2008, 13:00

Minutes (Version 0.6)

Written by

Hans-Peter Plag

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Participants:

Markus Rothacher, GFZ (*Chair, GGOS Steering Committee*)
Chris Rizos (*Delegate, Commission 4*)
Hans-Peter Plag, NBMG (*Vice-chair, GGOS Steering Committee*)
Michael Pearlman, Smithsonian (*Executive Committee; Chair, GGOS WG Network and Communications*)
Chopo Ma, GSFC (*Executive Committee; Delegate, IERS*)
Susanna Zerbini, University of Bologna (*Executive Committee*)
Rene Forsberg, Danish Spacecenter (*Delegate, IGFS*)
Erricos Pavlis, JCET/UMBC (*Delegate, ILRS*)
Mark Tamisiea, POL (*Substitute, PSMSL*)
Bernd Richter, BKG (*Chair, GGOS WG Data and Infrastructure*)
Richard Gross, JPL (*Chair, Science Panel*)
Srinivas Bettadpur, University of Texas (*Guest*)
Zuheir Altamimi, IGN (*Delegate, Commission 1*)
Graham Appleby, NERC Space Geodetic Facility (*Substitute, ILRS*)
Riccardo Barzaghi (*Substitute, IGeS*)
Dirk Behrend, GSFC (*Delegate, IVS*)
Hermann Drewes, DGFI (*Chair WG on Conventions*)
Weijun Gan, China Earthquake Administration (*Member at Large*)
Steve Kenyon (*Substitute, IGFS*)
Corinna Kroner, University Jena (*Substitute, GGP*)
Urs Marti (*Substitute, Commission 2*)
James Park (*SC Member at Large*)
Paul Poli (*Member Science Panel*)
Martin Vermeer (*Delegate, Commission 2*)
Markku Poutanen, Finish Geodetic Institute (*Delegate, Commission 2*)
Herbert Wilmes, BKG (*Guest*)
Sylvain Bonvalot, IRD (*Guest*)
N. Ravi Kumar, NGRI (*Guest*)

Agenda:

1 2008/03/25 14:00 - 14:30 Welcome and Discussion of Agenda

- *Susanna Zerbini:* Welcome
- *Markus Rothacher:* Welcome and discussion of agenda

During the Welcome, it will be explained that the Retreat has three main parts, with

1. **Setting the stage:** Summary of the status (including GGOS 2020) and presentation of white papers;
2. **Working out the future:** Breakout sessions to define the future structural elements of GGOS, the organization;
3. **Initiating action:** Summary of the results, preparation of the first steps to implementation, and recommendations to the Steering Committee;

2 2008/03/25 14:30 - 18:00 GGOS 2020 Summary

- 14:30 - 14:50 *Michael Pearlman*: Overview
- 14:50 - 15:10 *Chris Rizos*: GGOS: a service for society
- 15:10 - 15:30 *Richard Gross*: GGOS: depending on science and a service for science
- 15:30 - 15:50 *Rene Forsberg*: GGOS: a service for gravity and mass relocation
- 15:50 - 16:20 *Coffee Break*
- 16:20 - 16:40 *Paul Poli*: GGOS: a service for other sciences
- 16:40 - 17:00 *James Park and Weijun Gan*: GGOS in Asia
- 17:00 - 17:30 *Markus Rothacher*: The future GGOS as an observing system
- 17:30 - 18:00 *Hans-Peter Plag*: The future GGOS as an organization and GGOS 2020 Recommendations
- 19:00 *Ice Breaker Reception*

3 2008/03/26 09:00 - 10:30 Presentation of the White Papers

- 09:00 - 09:30 *Hermann Drewes*: Standards and Conventions in the frame of GGOS
- 09:30 - 10:00 *Michael Pearlman*: Networks and Communication in the frame of GGOS
- 10:00 - 10:30 *Srinivas Bettadpur*: Satellite Missions for GGOS
- 10:30 - 10:45 *Hans-Peter Plag and Markus Rothacher*: Charge for Breakout sessions
- 10:45 - 11:15 *Coffee Break*

4 2008/03/26 11:15 - 16:00 Breakout sessions on White Papers

- 11:15 - 13:00 We will have the following three parallel breakout sessions:
 1. *Chaired by Hermann Drewes, rapporteur Erricos Pavlis*: Discussion of white paper on Conventions and Standards
 2. *Chaired by Michael Pearlman, rapporteur Chopo Ma*: Discussion of white paper on Networks and Communication
 3. *Chaired by Srinivas Bettadpur, rapporteur Susanna Zerbinì*: Discussion of white paper on Satellite Missions
- 13:00 - 14:00 *Lunch*
- 14:00 - 15:30 Continuation of breakout sessions on White Papers
- 15:30 - 16:00 *Coffee Break*

5 2008/03/26 16:00 - 18:00 Plenary presentation and discussion of the breakout session reports

- 16:00 - 16:15 *Erricos Pavlis*: Recommendations concerning GGOS Conventions and Standards
- 16:15 - 16:30 *Chopo Ma*: Recommendations concerning GGOS Networks and Communication

- 16:30 - 16:45 *Susanna Zerbini*: Recommendations concerning GGOS Satellite Missions
- 16:45 - 17:40 Discussion
- 17:40 - 17:45 *Markus Rothacher*: Wrap-up (summary and conclusions for the day) and
- 17:45 - 18:00 *Hans-Peter Plag*: Charge for the breakout sessions on Thursday, which will built on the results of the previous breakout sessions and, if necessary focus on CfPs.
- 20:00 *Dinner*

6 2008/03/27 09:00 - 14:00 Breakout sessions on future GGOS components and functions

- 09:00 - 13:00 We will have the following five parallel breakout sessions:
 1. *Chaired by Dirk Behrend, rapporteur Bernd Richter*: Coordinating Office
 2. *Chaired by Hermann Drewes, rapporteur Erricos Pavlis*: Bureau on Conventions and Standards
 3. *Chaired by Michael Pearlman, rapporteur Chopo Ma*: Bureau on Networks and Communication
 4. *Chaired by Srinivas Bettadpur, rapporteur Hans-Peter Plag*: Bureau on Satellite Missions
 5. *Chaired by Rene Forsberg, rapporteur Steve Kenyon*: IGFS role and procedures
- 13:00 - 14:00 *Lunch*

7 2008/03/27 14:00 - 18:00 Plenary session: Presentation of the breakout session reports, discussion on future components

- 14:00 - 14:30 *Presented by rapporteur nn and chaired by Hermann Drewes*: GGOS entity for Conventions and Standards
- 14:30 - 15:00 *Presented by rapporteur Chopo Ma and chaired by Michael Pearlman*: GGOS entity for Networks and Communication
- 15:00 - 15:30 *Presented by rapporteur Hans-Peter Plag and chaired by Srinivas Bettadpur*: GGOS entity for GGOS Satellite Missions
- 15:30 - 16:00 *Coffee Break*
- 16:00 - 16:30 *Presented by rapporteur Steve Kenyon and chaired by Rene Forsberg*: IGFS role and procedures
- 16:30 - 17:00 *Presented by rapporteur Bernd Richter and chaired by Dirk Behrend*: GGOS Coordinating Office
- 17:00 - 18:00 *Chaired by Markus Rothacher*: Calls for Participations (Coordinating Office, GGOS Portal, others)

8 2008/03/28 09:00 - 11:00 Plenary session: Preparation of the GGOS Stakeholder Conference

- 09:00 - 09:10 *Chris Rizos, Michael Sideris, Gerhard Beutler*: The stakeholder conference: the view from IAG and IUGG
- 09:10 - 09:20 *John Dow, Chopo Ma et al.*: The stakeholder conference: the view from the services

- 09:20 - 09:30 *Richard Gross, Paul Poli et al.*: The stakeholder conference: the view from the sciences
- 09:30 - 09:40 *Weijun Gan, James Park, Markku Poutanen, Susanna Zerbini et al.*: The stakeholder conference: the view from the regions
- 09:40 - 09:50 *Hans-Peter Plag, Bernd Richter, Susanna Zerbini et al.*: The stakeholder conference: the view from outside
- 09:50 - 10:00 *Michael Pearlman*: The stakeholder conference: the practical options
- 10:00 - 10:15 *Chaired by Markus Rothacher*: Discussion and definition of the goals for the stakeholder conference
- 10:15 - 10:30 *Chaired by Chris Rizos*: Discussion of program, participation, and committees of the stakeholder conference
- 10:30 - 11:00 *Coffee Break*

9 2008/03/28 11:00 - 12:30 GGOS TOR: Necessary changes, vision, mission and tasks

- 11:00 - 12:00 *Chaired by Michael Pearlman*: The GGOS vision and mission
- 12:00 - 12:30 *Chaired by Markus Rothacher*: Other ToR changes

10 2008/03/28 12:30 - 13:00 Closing session

- 12:30 - 12:40 *Hans-Peter Plag*: Summary of Action Items
- 12:40 - 12:50 *Markus Rothacher*: Concluding statement
- 12:50 - 13:00 *Susanna Zerbini*: Farewell

2008/03/25 14:00 - 14:30 Welcome and Discussion of Agenda

Susanna Zerbini opened the meeting at 14:25 and welcomed the participants. She gave some background on the venue, which is an old castle. Hans-Peter Plag also welcomed all participants on behalf of Markus Rothacher, who was delayed due to air traffic problems. He explained the general setting of the meetings, which is structured in three parts:

1. **Setting the stage:** Summary of the status (including GGOS 2020) and presentation of white papers;
2. **Working out the future:** Breakout sessions to define the future structural elements of GGOS, the organization
3. **Initiating action:** Summary of the results, preparation of the first steps to implementation, and recommendations to the Steering Committee

There were no comments on the agenda. The opening session concluded with a introductory round.

2008/03/25 14:30 - 18:00 GGOS 2020 Summary

- *Michael Pearlman, Overview:* Michael Pearlman gave an overview of the GGOS 2020 Reference Document (see [presents/pearlman_ggos2020.pdf](#)). He pointed out that the document emphasizes the need to nurture the relationship to other organizations, in particular the relation to GEO, to which GGOS is intimately bound. Another point to be emphasized is the fact that GGOS is being built on the IAG Services, which are doing the heavy lifting, while GGOS is refortifying the mission of these Services. There will also be a second document, the GGOS 2020 Strategy Document, which will be more directed towards decision makers

He summarized the key points:

- long-term operational "core" infrastructure;
- User requirements are demanding;
- full exploitation of the potential required;
- going to take a lot of convincing of funding agencies and also users.

- *Chris Rizos, GGOS: a service for society :* Chris Rizos summarized Chapter 4 of the GGOS 2020 Reference Document (see [presents/rizos_ggos2020.pdf](#)). He made the point that geodesy is important for society but at the same time its contributions are very often not well known. Thus, geodesy has a "selling" problem, and so does GGOS. In order to get national support, the selling problem needs to be solved. Beyond its important role for global change science, geodesy is justified by its fundamental role for (1) Geospatial Information, and (2) Position-Navigation-Timing. With these roles, geodesy is underpinning the modern, spatially-enabled society, including modern government functions such as e-government, emergency management, land-use planning, global change monitoring. As a consequence more tracking stations for GNSS will be implemented, and GGOS/IAG has to ensure that they are available for dual use. Transition from a pictorial Earth to a digital Earth, as exemplified by google earth, requires geodesy.
- *Richard Gross, GGOS: depending on science and a service for science:* Richard Gross presented an overview of geodesy's contribution to science and its dependence on science (see [presents/gross_ggos2020_science.pdf](#)). Starting with the three pillars he introduces the phenomena as well as the observing techniques in these pillars. He highlighted the importance of the reference frame by showing that the sea level rise signal is of the same order as the uncertainty in reference frame on satellite altimetry. Understanding the causes of the observed variations is supported by looking at the consistency of the observed signals in the three pillars. For degree 2, currently, good agreement is found between sine terms, but less for the cosine terms. GGOS will contribute to understanding these findings through improved reference frames, more ground measurements, improved gravity fields. However, the main contribution may come through elimination of inconsistencies and strengthening the solutions. This will require common standards. GGOS can also start to provide unified models, in analogy to the meteorological and oceanographic communities. GGOS should provide dynamic Earth models. This could be the foundation of a scientific vision. Applications could be real-time GPS for tsunami warning system (Blewitt et al., 2007). He also mentioned the GREAT project, which is an example for cooperation of geodesy, oceanography and decision-making.
- *Rene Forsberg, GGOS: a service for gravity and mass relocation:* Rene Forsberg summarized the status of IGFS and its relation to GGOS. (see [presents/forsberg_ggos2020_gravity.pdf](#)). IGFS is built upon contributions from a number of individual services. The web site of IGFS

gives an overview, while the details are available on the pages of these services. The activities of IGFS include a number of past and future meetings, as well as working groups on absolute gravimetry and evaluation of new ultra-high resolution gravity field models. Service activities include schools, a joint bulletin, a new Arctic gravity model, and global DEM. There is a 5' gravity and geoid height model available. Gravity changes from GRACE are currently in research stage with large difference between models. It will take considerable time until models can be combined into operational models. With respect to gravity field "products" for GGOS, it is essential to limit these products to globally relevant quantities. These could include consistent global gravity field models. Mean gravity fields today have an accuracy that requires to attach an epoch to them.

- *Paul Poli*, **GGOS: a service for other sciences:** Paul Poli started his presentation (see [presents/poli_ggos2020_others.pdf](#)) by emphasizing the need to build a bridge to other sciences, and contribute to a better understanding of the global water cycle, climate variations, atmospheric vertical coupling up to the ionosphere, and the interactions between the various Earth system components. He then explained in more detail the geodetic contribution to sensing of the atmosphere, where GNSS results have started to be used for operational weather forecasting. However, there is still a need to educate the potential users on how to use the geodetic products. GGOS could help to have more data in NRT available (a role for the BNC), to promote relevant missions (a role for the BSM) and to work towards a framework for easy data processing. With respect to synchronization, standardization of data processing, he recommended working with a similar WG of WMO, NASA, NOAA, EUMETSAT. He asked whether there should be a GNSS Sounding Working Group (GS-WG) inside GNSS.

GGOS also could provide the reference for geo-locating all sensors. There is a communication channel between IUGG and WMO concerning reference frames, and GGOS could act as the point of contact for this communication. In a more general sense, GGOS could also provide the reference for gravity field and geoid. There is a wide gap between coordinates used in atmospheric models and ITRS and GGOS could work to bridge this gap.

- *James Park*, **GGOS in Asia:** In his overview, James Park started with general facts on Asia (see [presents/park_ggos2020_asia.pdf](#)), demonstrating the importance and complexity of the area. Also in geodesy this is visible: For GNSS there are more than 2500 tracking stations, 67 IGS sites, and three future GNSS systems are under development.

For the implementation of GGOS in Asia, it is important to promote GGOS in Asian countries. Unified local systems based on GGOS architecture could be a way to achieve this.

- *Weijun Gan*, **GGOS and GPS in Asia:** gave an overview on GPS networks in some of the Asian countries (see [presents/gan_ggos2020_gps_asia.pdf](#)). The crustal velocity field is rather well known in China based on the about 2300 GPS continuous and campaign tracking stations. In addition, there are about 100 absolute gravity stations. Also the neighbouring countries are developing GPS networks, although the number of stations is very variable. As a future GGOS activity, all GNSS data can be combined to get dynamic crustal motion maps in a common reference frame.
- *Markus Rothacher*, **The future GGOS as an observing system:** Markus Rothacher repeated the important fact that GGOS has two different means, namely the organization and the actual infrastructure (see [presents/rothacher_ggos2020_design.pdf](#)). He explained the future structure

of the system, which is more than observing infrastructure and includes also data analysis, combination, and portal. Briefly introducing the five levels, he showed the many existing networks. He stated that about 40 core stations are needed, with the exact number still under discussion. With respect to the LEO satellite missions, the need for continuous missions was pointed out. But also new missions are needed, including constellations and co-location of micro satellites. Near-real time data transmission and processing is important. For GNSS the future development will lead to more than 100 satellites. He also mentioned a few planetary missions. With respect to data flow and the GGOS Portal, Markus Rothacher emphasized the trend and need towards real time provision of data and products, and the importance of a common data flow for the various components. With respect to data processing and analysis, he saw the need to develop fully automated processing, as well as full reprocessing capabilities. For combination, a combination of all data at observation level may be required in order to reduce inconsistencies. He used a tsunami early warning system as an example of the necessity of combination of different observations and to illustrate the complexity. The necessity to develop an Earth system model and to link this to the reference frame was emphasized.

- *Hans-Peter Plag*, **The future GGOS as an organization and GGOS 2020 Recommendations:** Hans-Peter Plag started his presentation with an overview of the main points of Chapter 10 (see [presents/plag_ggos2020_orgrecom.pdf](#)). He pointed out that this chapter describes the organizational components of GGOS, underlines the need to build GGOS on the heritage of existing services and infrastructure, and makes comments on organizational issues. However, it does not explicitly address the underlying "business" model for GGOS. Based on a discussion in a recent review of the *Earth System Science Partnership* (ESSP), he introduced four different potential business models and showed their application to GGOS. He found the so-called "Flagship model" most appropriate for GGOS. He stated that for the rest of the Retreat, it would be helpful to have a clear idea of the business model that GGOS and the IAG components have in mind for the organizational aspects of GGOS.

Hans-Peter Plag then presented tables of the recommendations of the various chapters as collected in Chapter 11 of the GGOS 2020 Reference Document. These recommendations address framework conditions for GGOS, the required infrastructure, organizational issues and future developments of methodology.

In the subsequent discussion, Chris Rizos agreed that an explicit business model for GGOS would be very helpful and valued the presented alternatives, but he found it premature to make a decision on the business model here and now. This view was supported by Michael Pearlman who also emphasized the need to go back to the Services and ask them for their view. Bernd Richter asked whether the ESSP review came up with conclusions concerning the business model, and Hans-Peter Plag reported that the general conclusion was that the ESSP had been too weak in the past leading to too little visibility and a "stronger" business model was recommended as a basis for increased visibility. Applying this to GGOS, where visibility is also an issue, would favor the Flagship model for GGOS.

2008/03/26 09:00 - 10:30 Presentation of the White Papers

Markus Rothacher opened the session, welcomed everybody back and explained that after the presentation of the three white papers on the new components, these papers would be further discussed in breakout sessions.

- *Hermann Drewes*, Standards and Conventions in the frame of GGOS: Hermann Drewes presented the white paper on a future *Bureau of Standards and Conventions* (BSC, see [SC_WG_Position_Paper.pdf](#) and his presentation [presents/drewes_sc_white_paper.pdf](#)). He reviewed the term Standards and gave a number of examples of what standards are in the frame of geodesy. He mentioned international organizations of standardization, and requested that GGOS works close with these organizations. Currently, relations are between IAG and these organizations, but in future this may be transferred to GGOS. He envisioned that GGOS may become an IAG entity for standards. An issue for GGOS would be to ensure that geodesy uses SI units and is more visible through clear units. Cooperation with BIPM is important. The US National Institute of Standards and Technology (CODATA) is responsible for fundamental physical constants and relations to NIST and CODATA are important. Relevant resolutions come from IUGG and IAG, and the BSC would have to relate to these resolutions. Hermann Drewes listed a few of the most relevant resolutions and emphasized strongly the need for GGOS to interact with the Executives and Councils of IUGG and IAG in order to ensure appropriate future resolutions.

Hermann Drewes then progressed to conventions and explained that a convention is a set of agreed, stipulated and generally accepted norms, standards and roles. He introduced the synopsis of BSC Terms of Reference, with tasks of the BSC including monitoring adherence to standards, resolutions and conventions, control of main data sets, compare data sets, and review standards, conventions and resolutions in order to keep them up-to-date. Examples of urgently needed resolutions include one on a unified global height system, a standard atmosphere (for geometric and gravimetric use), standards for hydrology.

With respect to membership, he suggested representatives of each IAG Service, each commission, the inter-commission on theory, as well as representatives of external entities adopting standards and conventions. In addition, national and regional representatives should be included.

The BSC should report regularly to the IAG Executive Committee and council. He also suggested regular contacts with other components involved in standards and conventions, including the analysis groups, and regular meetings.

In conclusion, he considered the BSC as crucial for GGOS and IAG in providing reliable and consistent geodetic products. Finally, he presented a number of immediate steps to be addressed by the BSC.

Bernd Richter commented that BIPM was mentioned as a IAG service but it is more, and Hermann Drewes agreed. Hans-Peter Plag commented on the importance of reaching a unified height system, also in the context of GEO. He pointed out that all new components would have to report to the GGOS Steering Committee in addition to the Committees and Councils mentioned in the presentation, and Hermann Drewes agreed to this. Asked by Hans-Peter Plag whether the BSC could be fully virtual or whether there should be physical location with a secretariat, Hermann Drewes expressed the opinion that a central location is needed but not sufficient, since the membership he sketched would sum up to some 15 people. Markus Rothacher also commented on the question of the form of the new components and asked to focus on this question during the breakout sessions.

- *Michael Pearlman*, Networks and Communication in the frame of GGOS: Markus Rothacher presented the key points of the white paper on a *Bureau for Networks and Conventions* (BNC, see [GNC_WG_Position_Paper.pdf](#)). He started by reviewing the mission of the current WG with

the same title (see his presentation available as [presents/pearlman_nc_white_paper.pdf](#)). The membership of the BNC would be comparable to the current WG membership. High-level tasks of the BCN could be similar to those of the WG, which include inter-service communication, ground network and data product information base, model development for network analysis. Markus Rothacher then reported on the current WG status in terms of work done with respect to information data base, future network design, dissemination of the terrestrial reference frame, monitoring of inter-technique ties at co-location sites, data communications. He concluded with the recommendation to transition the WG into a Bureau.

Markku Poutanen asked about a potential overlap between the BSC and the BCN in terms of standardization of stations, but Michael Pearlman considered conditions at stations too diverse to be easily standardized. Hermann Drewes pointed out that many institutions don't have the means to determine the local ties themselves, so the BCN should include an entity to coordinate or direct the determination. Michael Pearlman responded that this would be a question of resources, which has been a problem over the last few years. Markus Rothacher reminded that IGS has a network coordinator, and asked whether this could be a model for the transition of the WG, or why a Bureau is needed. Michael Pearlman considered a coordinator not sufficient but stated that the BCN would have to rely heavily on the services and their network coordinators, who should in fact be members of the Bureau. He could, however, not see a chance for full time positions for the Bureau members. Zuheir Altamimi voice the opinion that getting the core stations established is the fundamental contribution of GGOS, and Michael Pearlman commented that this is a selling problem. Chopo Ma asked whether the BCN should be involved in the selling, but Michael Pearlman saw this more as a task for higher levels of GGOS. Markus Rothacher pointed out that GGOS is already having an impact on infrastructure development but posed the question whether more dedicated persons for this selling task would be needed.

- *Srinivas Bettadpur*, Satellite Missions for GGOS: Srinivas Bettadpur presented the main issues related to a future *Bureau on Satellite and Space Missions* (BSSM, see [SMB_wp2008_0-1.doc](#)). He introduced the target audience, the purpose of the White Paper, and discussed the direction in which the effort is heading (see his presentation available as [presents/bettadpur_sm_white_paper.pdf](#)). He also introduced some new points that resulted from the discussions during the previous day. He warned the participants of the breakout session that it would be a failing not to think big.

Richard Gross pointed out that convincing the committees that drive the space agencies, such as the Decadal Study and the new upcoming committee in the U.S. This view was supported by several participants, who emphasized the importance of the science committees of the space agencies but also acknowledged regional differences in the processes that lead to satellite missions.

- *Hans-Peter Plag and Markus Rothacher*, Charge for Breakout sessions: Markus Rothacher presented the questions to be addressed by the breakout sessions and reviewed the material to be considered (see [presents/rothacher_bo1_charges.pdf](#)).

2008/03/26 11:15 - 16:00 Breakout sessions on White Papers

- There were the following three parallel breakout sessions:
 1. *Chaired by Hermann Drewes, rapporteur Erricos Pavlis*, Discussion of white paper on Conventions and Standards:

2. *Chaired by Michael Pearlman, rapporteur Chopo Ma*, Discussion of white paper on Networks and Communication:
3. *Chaired by Srinivas Bettadpur, rapporteur Susanna Zerbini*, Discussion of white paper on Satellite Missions:

2008/03/26 16:00 - 18:00 Plenary presentation and discussion of the breakout session reports

- *Erricos Pavlis*, Recommendations concerning GGOS Conventions and Standards: Erricos Pavlis presented the answers to the question posed (see [presents/pavlis_rapport_1.pdf](#)). As conclusion, the Bureau should be established, with well specified tasks, through a CfP when the GGOS EC decided.
- *Chopo Ma*, Recommendations concerning GGOS Networks and Communication: Michael Pearlman presented the report of this breakout session (see [presents/pearlman_rapport_1.pdf](#)). Main discussion appears to have been on role and contents.
- *Susanna Zerbini*, Recommendations concerning GGOS Satellite Missions: Susanna Zerbini presented the results of the breakout session (see [presents/zerbini_rapport_1.pdf](#)).
- Discussion:
- *Markus Rothacher*, Wrap-up (summary and conclusions for the day): Markus Rothacher gave his opinion of the process, stating that the long discussions in the breakout sessions are tedious but necessary. He summarized the tendency of all three groups as being towards bureaus with a small dedicated staff and resources supported by advising groups. He also pointed out that if each entity is named "Bureau", then we have to ensure that they are rather similar in structure, type of mission, and tasks; otherwise, naming something very different the same would cause confusion.
- *Hans-Peter Plag*, Charge for the breakout sessions on Thursday: Hans-Peter Plag asked the participants whether the program should continue as planned for the next day or whether some of the breakout groups had reached a status not requiring the full Thursday for further discussions. The CN and SC groups stated that they had already reached far and decided to join the group on the CO and IGFS the next day. The SM group stated that the discussions needed to continue the next day. Thus, for Thursday morning, three breakout session were agreed on SM, CO and IGFS. The IGFS group would use the same questions posed to the other groups as starting point but modify them appropriately for the IGFS. Hans-Peter Plag suggested to review the status of the discussions after the morning coffee break on Thursday and then to decide how to continue. This was accepted.

2008/03/27 09:00 - 14:00 Breakout sessions on future GGOS components and functions

- There were the following three parallel breakout sessions in the morning.
 1. *Chaired by Dirk Behrend, rapporteur Bernd Richter*: Coordinating Office
 2. *Chaired by Srinivas Bettadpur, rapporteur Hans-Peter Plag*: Bureau on Satellite Missions

3. *Chaired by Rene Forsberg, rapporteur Steve Kenyon: IGFS role and procedures*

- After these breakout sessions, there was a plenary meeting to review the status and to decide the further process: For the CNB group Michael Pearlman stated that more time is needed for the CfP. Srinivas Bettadpur explained that the SMB group had answered all questions, but had identified some questions for the plenary, in particular the questions of the continued existence of GGOS working groups in parallel to the new bureaus and the initiation of ad hoc working groups under the bureaus. Hermann Drewes stated that the SCB group also needs some more time to work on the CfP. Steve Kenyon reported that the IGFS is ready to deliver its report. For the CO group, Dirk Behrend stated that the group definitely needs more time to sort out some issues.

Bernd Richter asked whether the calls should ask for a limited time. Michael Pearlman responded that the bureau activities need to be long-term, which at could be translated into e.g. five years. Richard Gross asked what would be the procedure at the end of such a term. Markus Rothacher explained that we might face two principle situation, one being that either the host institution might not be able to commit for another term, or the work of the bureau might not be satisfactory, and in these cases, the GGOS SC would needs to have the option to reissue a CfP. The other might be that the bureau is working fine and the institution is willing to recommit, and in this case, continuation should be more or less automatic. However, the details needs to be considered carefully.

Markus Rothacher proposed to discuss the general issues immediately. He first asked what the bureaus should look like. Michael Pearlman stated that the CNB should consist of a small permanent staff including a head, and should be responsible for some operational work. However, these tasks might also be integrated with the CO. The CNB has a lot of tasks requiring different expertise, and therefore would need to initiate WGs. He emphasized the importance of a liason with and support from the relevant services and commissions. Richard Gross asked how the bureau links to the WG. Michael Pearlman replied that the WG would be gone and fully transitioned into the Bureau. This triggered Hans-Peter Plag to caution the the participants not to call a call a WG-type activity a bureau. A Bureau should have a more formal membership, while a WG is far more relaxed. Richard Gross asked what the tasks for the Bureau would be, if the WG was to continue. Bernd Richter commented that it may be too early to set up a CNB. Markus Rothacher requested that the bureaus should be restricted to the secretariat function, with the head of each bureau being the chair of the associated WG. Subsequently, several models were discussed, with small bureaus initiating WGs, WGs and bureaus in parallel, etc. Hermann Drewes supported the view that a bureau should have a small dedicated staff and a host institution that committed to provide the resources. A WG could be more flexible. Hans-Peter Plag recalled the organizational diagram provided in Chapter 10 of the Reference Document, and based on that diagram, Markus Rothacher and Hans-Peter Plag agreed that the bureaus should mainly have an coordination function. Bernd Richter emphasized the need to specify the tasks of the bureau in the CfP, so that an institution would know what to commit to. Hans-Peter Plag supported this request and made clear that the CfP is not a Call for Participation but rather a Call for Proposals, which requires clear specifications of the tasks.

Summarizing the situation, Michael Pearlman suggested that each group should sit together and break the tasks into those that are for the bureau and those that should remain with the WG. This was accepted.

2008/03/27 14:00 - 18:00 Plenary session: Presentation of the breakout session reports, discus-

sion on future components

- GGOS entity for Conventions and Standards: Hermann Drewes presented the draft CfP for a CSB (see [presents/drewes_cfp.pdf](#)). There was a long discussion on the details and the draft was modified considerably. The head of the CSB should be a member of the Steering Committee, and for that, the GGOS ToR need to be adopted.
- GGOS entity for Networks and Communication: Michael Pearlman presented the draft CfP for a CNB (see [presents/pearlman_cfp.pdf](#)). Here, too, there was a long discussion concerning details of the tasks and organization of the bureau. The head of the CNB should be a member of the Steering Committee, and for that, the GGOS ToR need to be adopted.
- GGOS entity for GGOS Satellite Missions: Susanna Zerbini presented the answers to the questions, which were updated and included now a detailed description of the anticipated tasks (see [presents/zerbini_rapport_2.pdf](#)).
- IGFS role and procedures: Steve Kenyon presented the summary of the IGFS breakout-sessions (see [presents/kenyon_IGFS.pdf](#)). A CfP for a CB is planned to be issued after the GGEO 2008.
- GGOS Coordinating Office: Bernd Richter presented the draft CfP for the CO (see [presents/richter_co.pdf](#)). There was some discussion about several details, which impacted the draft.
- Calls for Proposals: Markus Rothacher opened the general discussion on all CfPs. Concerning proposal evaluation, Bernd Richter suggested that in order to avoid conflicts of interest an evaluation committee be established that would judge and rank the proposal and provide the ranking list to the Steering Committee. Hans-Peter Plag supports this idea and emphasized that, judges should not come from an institution that submitted a proposal and should not be on the Steering Committee.

Michael Pearlman ask how high up in an institution's hierachy a proposal should be signed. Markus Rothacher responded that the signature should be coming from an official high enough to actually commit resources.

With respect to the CfPs, the following action items were agreed after some discussion:

Action Item GGOS-R2008-1: Markus Rothacher will ensure that the introductory part and the closure part for the Calls for Proposals for the new GGOS components is iterated in the EC, finalized and send to those responsible for the CfPs. ***Responsible: Markus Rothacher, Deadline: 2008-05-01.***

Action Item GGOS-R2008-2: Michael Pearlman will finalize the Call for Proposals for the Bureau for Networks and Communication (BNC) together with others, and he will ensure that this CfP is consistent with the other CfPs as well as the proposed changes of the GGOS ToR. ***Responsible: Michael Pearlman, Deadline: 2008-05-31.***

Action Item GGOS-R2008-3: Hermann Drewes will finalize the Call for Proposals for the Bureau for Standards and Conventions (BSC) together with others, and he will ensure that this CfP is consistent with the other CfPs as well as the proposed changes of the GGOS ToR. ***Responsible: Hermann Drewes, Deadline: 2008-05-31.***

Action Item GGOS-R2008-4: Srinivas Bettadpur will finalize the Call for Proposals for the Bureau for Satellite and Space Missions (BSSM) together with others, and he will ensure that

this CfP is consistent with the other CfPs as well as the proposed changes of the GGOS ToR. *Responsible: Srinivas Bettadpur, Deadline: 2008-05-31.*

Action Item GGOS-R2008-5: Dirk Behrend will finalize the Call for Proposals for the GGOS Coordination Office together with others, and he will ensure that this CfP is consistent with the other CfPs as well as the proposed changes of the GGOS ToR. *Responsible: Dirk Behrend, Deadline: 2008-05-31.*

Action Item GGOS-R2008-6: Bernd Richter will finalize the Call for Proposal for the GGOS Web Portal (as part of the CfP for the CO) together with others, and he will ensure that this CfP is consistent with the other CfPs as well as any proposed changes of the GGOS ToR. *Responsible: Bernd Richter, Deadline: 2008-05-31.*

Action Item GGOS-R2008-7: Markus Rothacher will ensure that the Calls for Proposals are iterated in the GGOS Steering Committee, finalized by the GGOS EC, and widely published in the geodetic community, with the deadline for proposal submission being set to October 1, 2008. *Responsible: Markus Rothacher, Deadline: 2008-07-01.*

Action Item GGOS-R2008-8: The Executive Committee will establish a list of independent evaluators for the proposals submitted in response to the Call for Proposals and submit this list for endorsement to the Steering Committee. *Responsible: Executive Committee, Deadline: 2008-06-30.*

Action Item GGOS-R2008-9: Michael Pearlman will check all Call for Proposals asked for in AIs GGOS-2008-2 to -6 for consistency with each other. *Responsible: Michael Pearlman, Deadline: 2008-06-30.*

Action Item GGOS-R2008-10: Rene Forsberg will finalize the Call for Proposals for the Central Bureau of the IGFS together with others, and he will ensure that this CfP is widely published in the geodetic community *Responsible: Rene Forsberg, Deadline: 2008-06-30.*

2008/03/28 09:00 - 11:00 Plenary session: Preparation of the GGOS Stakeholder Conference

- Hans-Peter Plag provided some introductory comments in order to ensure that the terms stakeholder and stakeholder conference were well understood (see [presents/plag_stakeholder.pdf](#)). He identified the that the goals of the session were to agree on specific goals for the Stakeholder Conference, to decide of whom to include from the broader list, and to decide on where and when to hold the Conference;
- Chris Rizos presented the view of IAG (see [presents/rizos_stakeholders.ppt](#)). With respect to potential goals, he identified an official launch of GGOS, a briefing of stakeholders and shareholders, a GGOS Rallying Call, and a GGOS Outreach activity. As possible solutions he identified separate stakeholder and shareholder conferences. He suggested to have a shareholder conference in 2009 together with the IAG Scientific Assembly and requested a strong IAG involvement in the planning of such an event. He considered a stakeholder conference to be just the start of outreach. GGOS and IAG outreach should not be seen as different, and it would be important that everyone in GGOS and IAG participates in outreach activities.
- Chopo Ma presented the view of IERS (see [presents/ma_stakeholder.pdf](#)). He focused on the value of GGOS as an outreach entity to decision makers, an interface to GEO and other organizations, for the development of new funding models and an Earth science rationale, for the

coordination of user feedback, the unification of systems, as an operational forum for services, and for the provision of additional resources, and he used this to motivate potential participation in the Stakeholder Conference. Susanna Zerbini emphasized the importance of a focus on education as a preparation of the future.

- Richard Gross presented the view from the sciences ([presents/gross_poli_stakeholder.pdf](#)). He identified promotion of GGOS to science as important and suggested to use the conference also as a place to advocate for improved access to data. The conference could help to facilitate communication and coordination. Paul Poli identified the operational sciences including GEO, WMO, ICO, ICAO, IATA, and instrument manufacturers, as an important stakeholder group, and emphasized the importance to insist on the fact that geodesy is the foundation particularly for increased and improved use of GNSS. For research sciences, he looked at the entities for which geodesy is essential, and provided a list including, AIP, AGU, EGU, AMS, WWF. With respect to these stakeholders, it would be important for GGOS to insist on free access to NRT data. Hans-Peter Plag pointed out that it would be important to make clear to some scientific fields that GGOS depends on them in order to improve our products and service, and mentioned the example of an Earth system model needed to improve the analysis and interpretation of geodetic observations.

- Weijun Gan presented his view on Chinese participation in the Stakeholder Conference and stated that China would participate with two to five persons ([presents/gan_stakeholder.pdf](#)). He also saw a chance that GGOS would become as important as IGS, and considered the Stakeholder Conference as a great chance to publicize GGOS. He provided a list of the key GGOS stakeholders in China.

James Park identified the Stakeholder Conference as a chance to define contact points, and a first step towards a round table and task force under the BCN. He considered the idea of the Stakeholder Conference positively as a means to promote the mission and function of GGOS and its contribution to GEOSS/GEO. Chris Rizos asked whether the round table could be started earlier during AOGS.

Markku Poutanen introduced NGOS (see [presents/poutanen_stakeholder.pdf](#)) and emphasized the difficulties in convincing the community of the need for such systems. The Stakeholder Conference would be useful to emphasize the contributions of and requirements for GGOS.

- With respect to the outside world, Hans-Peter Plag put emphasis on outreach to demonstrate GGOS' contribution, but also requested a focus on the development of active links to the relevant organizations. The Conference should help to answer questions of where GGOS should be represented, how the links could be established and maintained. Susanna Zerbini added that showing our contributions in a way understood by others is important.
- Michael Pearlman explained CEOS (see [presents/pearlman_stakeholder.pdf](#)), and pointed out that a co-location with the CEOS Plenary meeting in November in South Africa would be a good option. Hans-Peter Plag presented the various GEO option (see [presents/plag_geo_stakeholder.pdf](#)) and identified a Workshop on GEOSS Architecture on Dec. 6-7, 2008 in London and the GEO/IGOS Symposium, which is anticipated for the time frame October 2008 to February 2009, as potential events for co-location. As main goals he saw outreach and linkage. Bernd Richter added that more than one stakeholder conference is needed and suggested that one of them should have a focus on architecture. Bernd Richter also suggested that GGOS aims to get funds for (small) reception-type events focused on specific groups, for

example, at the AGU and EGU meetings. As a summary of the discussion, it was suggested that Markus Rothacher follows up a co-location of a stakeholder event with the CEOS meeting, while Hans-Peter Plag would follow up similar events at the GEO/IGOS symposium and the December GEO Workshop in London.

2008/03/28 11:00 - 12:30 GGOS TOR: Necessary changes, vision, mission and tasks

- Michael Pearlman reviewed the present situation concerning the vision and mission statements in the ToR and emphasized the need to come to more concise statements (see [presents/pearlman_vision.pdf](#)). Hans-Peter Plag made some comments on the term "vision statement" (see [presents/plag_vision.pdf](#)) and showed a modified version of the vision statement he had provided to SC12. He emphasized that the vision statement should focus on who/what we want to be in the future, while the mission statement should describe of who we are and why we are here. He pointed out that the participants should come up with a recommendation on whether GGOS should have a vision statement or not.
- Michael Pearlman organized the discussion around the words that should appear in the vision. The collection of words requested for the vision included: Geodesy, geodetic measurements, basis/foundation, society, planet/earth (system), and prediction. Concerning the mission statement, the word collection included for the question who we are IAG Services and IAG Observing System, and for the question why we are here, the words integrate, what geodesy is, promote system view, and better products. The vision statement provide by Srinivas Bettadpur shortly after the 12th SC meeting was read (*The vision of GGOS is to establish a common, stable and unified geodetic basis for observations of long-term global change for scientific and societal benefit based on accurate and sustained measurement of the shape, orientation and gravity of the Earth.*) Richard Gross also read his version of the mission statement (*The mission of GGOS is to promote the application of geodetic Earth observation methods to the solution of Earth Science problems. GGOS accomplishes its mission by defining the geodetic infrastructure that is needed to meet scientific and societal requirements, by advocating for the establishment and maintenance of this geodetic infrastructure, by coordinating interaction between the IAG Services and Commissions, by improving accessibility to geodetic observations and products, and by educating the scientific community about the benefits of geodetic research and the public about the role that geodesy plays in society.*). It was decided that two small bubble groups should finalize the wording for the two statements (with Hans-Peter Plag, Srinivas Bettadpur and Steve Kenyon in the vision bubble group and Richard Gross, Erricos Pavlis, and Markus Rothacher in the mission bubble group). The action items that resulted were **Action Item GGOS-R2008-11: Hans-Peter Plag will finalize the GGOS vision statement together with Srinivas Bettadpur and Steve Kenyon *Responsible: Hans-Peter Plag, Deadline: 2008-03-31.***
- **Action Item GGOS-R2008-12: Richard Gross will finalize the GGOS mission statement together with Erricos Pavlis *Responsible: Richard Gross, Deadline: 2008-03-31.***
- Markus Rothacher presented the necessary ToR changes. He mentioned that the vision and mission statements would be updated according to the result of the bubble groups. With respect to the names for the new components, it was agreed to call them consistently Bureau for Network and Communication (BNC), Bureau for Standards and Conventions (BSC), Bureau for Satellite and Space Missions (BSSM), and Coordination Office (CO). The heads of these bureaus are called directors and it is anticipated that they become members of the the Steering Committee.

- Markus Rothacher pointed out that the other parts of the ToR including objectives and tasks need to be adopted to the change made on the vision and mission statements and the new components added.

2008/03/28 12:30 - 13:00 Closing session

- Hans-Peter Plag summarized the Action Items of the Retreat decided upon during the discussions. In addition to the actions items agreed upon, two AIs related to the preceding discussion on the ToR changes were added:

Action Item GGOS-R2008-13: Markus Rothacher together with the GGOS EC will draft the updated ToR for iteration with the GGOS SC. **Responsible: Markus Rothacher, Executive Committee, Deadline: 2008-07-01.**

Action Item GGOS-R2008-14: Markus Rothacher will ensure that the updated ToR are iterated with the SC and EC and put to vote to the SC. **Responsible: Markus Rothacher, Deadline: 2008-09-15.**

After that, the list of actions items resulting from the Retreat was

Action Item GGOS-R2008-1: Markus Rothacher will ensure that the introductory part and the closure part for the Calls for Proposals for the new GGOS components is iterated in the EC, finalized and send to those responsible for the CfPs. **Responsible: Markus Rothacher, Deadline: 2008-05-01.**

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- In his concluding statement, Markus Rothacher stated that the Retreat was a successful meeting with many productive discussions, and the results appear to be a major steps forward. He thanked Susanna Zerbini for the organization of the meeting and the very nice place, Hans-Peter Plag and Michael Pearlman for the work put into GGOS 2020, and all participants for the very active contributions during the Retreat.
- Susanna Zerbini thanked everybody for the contributions leading to progress, and hoped to see the GGOS Community again in Bertinoro for further successful meetings.