

IGFS

International Gravity Field Service (IGFS)

web: TBD

chair: **Rene Forsberg** (Denmark)

Objectives

IGFS is a unified Service which will take care as far as possible of data collection, validation, archiving and dissemination, as well as software collection, evaluation and dissemination for the purpose of determining, with various degrees of accuracy and resolution, the surface and gravity potential of the Earth or any of its functionals. The necessary temporal variations will also be studied. The determination of such a surface, from both the physical (geoid) and the geometrical (DTMs) viewpoints, is part of the field of action of the new Service.

The data include primarily satellite-derived global models, terrestrial, airborne, satellite and marine gravity observations, GPS leveling data, digital models of the terrain, bathymetry, and dynamic height models of the ocean derived from satellite altimetry. It has to be stated that the collection, analysis, and reduction of radar altimetric data might be the object of other Services within or outside IAG and therefore it does not belong to IGFS, although the products of such an analysis (e.g., global SST models, tidal models, etc.) are indeed of interest to IGFS, together with their various representations and uses.

The software collected and validated by IGFS includes but is not limited to: general purpose pre-processing and validation of data; construction, manipulation and combination of global gravity models; calculus of the gravity fields of various types of bodies, e.g., the topographic masses; calculus of the geoid and of related height datums; calculus of altimetry-derived gravity anomalies; computation of tidal effects.

Structure

The Service is organized by means of the following structure:

- Advisory Board,
- Centres
- Individual members or affiliates.

The Advisory Board is composed of:

- The Directors (or their delegates) of each of the Centres of IGFS
- The Presidents (or their delegates) of the IAG Commissions related to the Service work, as well as a representative of the IAG E.C.; and
- Two members appointed among the affiliates.

The Advisory Board

- Coordinates the overall scientific strategy of the Service in relation to the global IAG strategy
- Coordinates the joint activity of the Centres,
- Suggests the participation of the Service in large international projects or establishes its own projects,
- Coordinates the participation of affiliates in activities of the Service and their relation to the Centres,
- Presents to the E.C. proposals for associating new Centres to the Service.
- Elects the IGFS affiliates upon nomination by one of the Centres or by three other affiliates.

The Advisory Board is in charge four years between the IUGG General Assemblies; the old Advisory Board renews the affiliates list before the General Assembly; the new affiliates elect their representatives to the new Advisory Board, which takes over after the General Assembly.

The starting list of Centres and Affiliates of IGFS is determined according to section 7 (Start up and provisory rules).

The Advisory Board nominates a President to stay in charge for four years, as well as one possible representative to the Executive; the President is then appointed by the IAG Executive Committee; the eventual representative to the Executive is appointed by the Council. Furthermore, the Advisory Board elects a Secretary and its representatives to other IAG bodies.

The Advisory Board meets at least once a year, also exploiting all modern communication technology. It makes decisions by majority vote; it can also vote by e-mail.

The Advisory Board reports to the relevant commissions and to the IAG E.C. through its representatives according to the general IAG bylaws.

IGFS Centres:

Structures that, by exploiting funds, manpower and resources provided by any national or international entity, are committed to producing services and products in the area of gravity field and surface of the Earth research and to the IAG community at large, adopting rules as specified in the IAG bylaws.

The Centres are entitled to act within IGFS under the IAG flag, are determined by the IAG E.C., on request of the A.B.

The Centres will have their own governing bodies, nominated according to internal rules, also taking into account the interests of the supporting entities. In particular, each governing body will have a responsible person that will be called Director, elected according to internal rules.

Centres will maintain a list of data and products, providing them to the general public according to their policy of dissemination; they will deliver Services in the form of data archiving and supply, software testing and availability, training in the use of hardware and software and data analysis and interpretation, measurement campaigns as well as large computations in the framework of projects of international relevance. In particular, data exchange and mutual support between Centres should be visibly facilitated and pursued as a consequence of the participation in a unified IAG Service.

IGFS affiliates:

Are individual scientists wishing to contribute to the Service activities. They are the natural channels relating national agencies, national research groups and the general IAG activities in the area of gravity field and surface of the earth services.

Affiliates participate in the life of IGFS and in particular they are informed of new events and ongoing activity through publications and web news. Affiliates elect their representatives in the IGFS Advisory Board.

Affiliates are normally attached to the activities of one specific Centre, although they can participate in more than one of them.

The association is concretized through data and software exchanges, participation of affiliates to the organization of training courses, reviewing of publications of the Service, and participation in specific scientific projects of international relevance.

Relation between IGFS, the Centres and IAG

The IGFS Centres are expected to work on the basis of some support provided by sources external to IAG. In addition, already existing Centres have to report to other scientific structures, external to IAG, because their activities are wider in scope and interest than those related to Geodesy. Consequently, we cannot expect that IGFS Centres will be as a whole depending only on the internal IAG structures and Executive Committee. For instance, the Directors of the Centres have to be freely elected according to internal rules, since the supporters might require having a voice on that point. The same reasoning holds for the specific use of funds.

Each Centre has, therefore, to be considered as part of an IAG Service in that, for all its geodetic activities, it fully subscribes to the general IAG rules and regulations. The link of the Centres to IAG is through the Advisory Board, which is then a full IAG body and, accordingly, will have for instance a President elected by the Executive. This structure then provides the necessary flexibility to allow the Centres to act autonomously for part of their activities, while providing connection (information, advice, general rules, etc.) for the part of IAG Service.

The activities of each Centre will be reviewed annually by the IAG E.C. It is, therefore, mandatory that each Centre prepare and submit an annual report. IAG reserves the right to disassociate itself from the a Centre if the relationship does not prove to be beneficial to both parties.

Data and products of the Centres

IGFS will make a special effort in trying to convince all national and international institutions holding data on the gravity field and the surface of the Earth to make them widely available. It is with pleasure that in the past several years we observed a positive trend in this direction. Naturally, this does not eliminate the necessity that data and software be kept at different levels of classification, according to the will of the source and to the special agreements with the Centres receiving them. In this respect, each Centre will follow its own regulations although an

effort will be made to make them as uniform as possible. For instance, software should be available to a community as large as possible, especially for scientific projects. All the data actually residing in the Centres will be handled according to the agreements previously signed.

To be more specific, the products of the new service can be divided into several categories:

- Validated data, distributed according to their specific rules.
- Validated software packages and their documentation, serving specific purposes.
- Support to international or national institutions in conducting their projects.
- Tutorials to train young scientists and members of national institutions in the various aspects of the gravity field activity.
- Dissemination of knowledge through publications.

Publication policy

It is clear that IGFS Centres need a Bulletin as a tool to provide information to the scientific community at large on the actual status of the Service, on the archiving of data, software facilities, schools, etc.

The actual situation is that BGI, IGeS and ICET have their own Bulletins. It is the intention of BGI and IGeS to unify their Bulletins and have a publication of two issues per year. As for the content, it is important to keep a reviewed section in the Bulletin, which allows the publication of valid technical papers (i.e., good but not necessarily adding any methodological improvement), with emphasis on relevant recent projects and results. The ICET Bulletin for the moment will continue as it is, though it will contribute news and information to the BGI/IGeS Bulletin.

The problem of electronic publication will be studied and implemented as soon as possible.

Schools

Among the Services provided by IGFS, there are tutorials and technical schools. This didactic work has to have an applied character, and it is important that only widely acceptable, proven techniques be taught. It is important as well that all different ideas from various research Centres be represented in both courses and books of the Service. Particular efforts should be made to bring the courses to developing countries, as a contribution of the Service to the diffusion of IAG. There is an opportunity that BGI and ICET could run joint courses, as well as IGeS and NIMA. Other combinations of tutorials will also be studied.

Start up centers and provisory rules

The actual list of existing Centers of IGFS is BGI, IGeS, and ICET. They have expressed, by contributing to the actual proposal for the creation of the IGFS, their will to join the new Service as well as the acceptance of these rules. The three Directors will then be included in the new Advisory Board.

Two new Centers have been created, to become part of IGFS. Second IGeS Centre at NIMA (St. Louis) is established (contact person: S.Kenyon - kenyon@nima.mil), which will cooperate with the IGeS Centre at PoliMi (Milano), particularly on large continental projects, with data, expertise and manpower. The NIMA IGeS Centre will also provide continuity to the important project of determining global gravity models combining terrestrial and satellite observations (EGM series) and will support the educational IGeS activities.

Second, a new Centre for Global Gravity Models at GFZ (Potsdam) is established with the purpose of collecting all existing global gravity models, validating and distributing them, providing the geodetic community with the necessary software for their manipulation and use in different applications (contact person: P. Schwintzer - psch@gfz-potsdam.de). In addition, this Centre, in cooperation with BGI, will continue its work on the estimation of combined Global Models (GRIM series) and will also contribute to the IGeS schools.

In addition contacts are positively going on with the Faculty of Computing Sciences & Engineering of the De Montfort University (contact person: Dr. Philippa Berry - Pamb@dmu.ac.uk) to establish a new center to provide local and global DTMs.

Implementation

Present status is that a preliminary list of affiliates has been set up which actually includes:

Barriot, J.Pierre (France), Ducarme, Bernard (Belgium), Kenyon, Steve (USA), Schwintzer, Peter (Germany) Berry, Philippa (UK), Blitzkow, Denizar (Brazil), Denker, Heiner (Germany), Duquenne, Henri (France), Forsberg, René (Denmark), Featherstone, W.E. (Australia), Gil, Antonio J. (Spain), Kearsley, W. (Australia), Lemoine, F. (USA), Marti, Urs (Switzerland), Merry, Charles (South Africa), Milbert, Dennis (Australia), Pavlis, N. (USA) Sideris, Michael (Canada), Smith, Dru (USA), Tscherning, C.C. (Denmark), Tziavos, I. (Greece), Veronneau, Marc (Canada)

with the addition of the Directors of the Centers.

Election is actually in place to appoint the two members at large that will seat in the IGFS Advisory Board.