

The IAG-REVIEW 2000-2001

Executive Summary

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1. Preamble

This document describes the IAG Review after the completion of the work of the IAG Review Committee. It should be viewed as the Explanatory Supplement for the new International Association of Geodesy's (IAG's) *Statutes* and *ByLaws*, which were adopted by the IAG Council at the 2001 Scientific Assembly in Budapest on September 7, 2001. The motivation for the review is developed in section 2. The essential steps of the Review process are summarized in section 3, the key elements of the new Statutes and ByLaws are contained in section 4. The continuation of the review process is briefly addressed in section 5.

2. Motivation: Geodesy - an old science with a dynamic future

Geodesy is, according to Webster's dictionary, "the branch of applied mathematics concerned with the determination of the size and shape of the Earth, and the exact position of points on its surface, and with a description of variations in its gravity field". Geodesy today is more than this! The growth of space geodesy has yielded positioning at the millimetre-level routine, enabling the detection of crustal movement and strain with unprecedented accuracy and high time resolution; the use of satellite radar measurements and improved orbit determinations have yielded images of the earth's ocean floor and tectonics at unprecedented resolution, and provided new insights to oceanography and

climatology, e.g., stunning displays of El Nino events; the utilization of GPS signals has provided new ways to map the tropospheric water vapour and ionospheric irregularities; and the development of precise kinematic positioning techniques by satellite and inertial methods have given new opportunities for a suite of remote sensing methods by radar or laser methods to support environmental and mapping sciences. Geodesy is a science used in addressing a broad range of problems, and in the future many planned developments such as the GRACE, GOCE, ICESAT and CRYOSAT satellite missions, as well as new technological developments in positioning and gravity measurement, will undoubtedly continue to broaden the field of influence of geodesy to a wide field of Earth, environmental and planetary sciences.

The traditional core of geodesy, iconized by the classical geodetic positioning and gravity networks, will see an ever increasing need for international coordination and adaptation of time-variable fundamental datums, in tune with the continuing increase in satellite positioning by GPS. The gravity field has in this way been positioned directly in the everyday user domain of this classical geodetic framework, through the need of detailed geoid models to fulfill the need for height determination. In this way, the former national systems tend to evolve towards regional and global standards.

Geodesy today and in the future requires a broad spectrum of synergistic activities, including theory, science, engineering, technology development, observation, analysis, and the development of practical-oriented services, making access to data and methodology easy and transparent across the whole spectrum of the geodetic community: national and regional survey authorities, surveys and engineering companies, research institutions, universities, and space agencies. Geodesy should in the future be seen as much more than applied mathematics and an observing system; our association, International Association of Geodesy - IAG, should address all the broad needs of the geodetic users, including promoting publications, scientific conferences and schools, and the extension of geodesy services and infrastructure to all geographical areas of the Earth.

The Statutes and Bylaws have been drafted with the above in mind. The structure and administration of the IAG described therein should accommodate the needs of many different users of geodesy, and to facilitate the cooperation and open exchange of data and methodology across the field. It should also make geodesy more visible, both among sister sciences and the public in general.

Geodesy of today is spectacular and barrier breaking. It is a fundamental science, necessary for everyday positioning and also for the improved understanding of the earth as a system as well as that of the planets.

3. The IAG Review 2000-2001

3.1 The Early Stage

In the preface to the International Association of Geodesy (IAG) Symposia, Volume 121, Prof. Klaus-Peter Schwarz states (*Schwarz, (2000a), slightly condensed version*):

The 35th General Assembly of the International Association of Geodesy (IAG) took place in Birmingham (UK) from July 19-30, 1999, in the framework of the 22nd General Assembly of the International Union of Geodesy and Geophysics (IUGG). . . . In the last of IAG-specific symposia possible changes to the current IAG structure were discussed with view to a clearer organizational profile.

Schwarz (2000a,b), Sanso (2000), Beutler (2000), Wolf (2000), Feissel (2000), and Beutler et al. (2000a) contributed to Symposium G6 which was concluded by a discussion in the plenum of the plans for an IAG review process. The plan how to perform the IAG Review, the principles to be observed, and the timeline are contained in the position paper Beutler et al. (2000a). Plan, principles, and timeline were approved by the IAG Executive Committee and the IAG Council was informed of the procedure. The procedure was endorsed by the participants of Symposium G6 in Birmingham.

Georges Balmino, Gerhard Beutler (chair), Fritz Brunner, Jean Dickey, Martine Feissel, Rene Forsberg, Reiner Rummel, Fernando Sanso and Klaus-Peter Schwarz were appointed by the IAG Executive Committee as *IAG Review Committee* Members in Birmingham. Due to CNES-internal reasons Georges Balmino could not participate in the Committee. He was replaced by Ivan Mueller in the year 2000. Members and e-mail addresses of the IAG Review Committee are given in Table 2, Appendix A.

The IAG Review Committee had a first organizational meeting after the closing session of symposium G6 in Birmingham, a business meeting in San Francisco (attached to the AGU Fall Meeting) and a third meeting on February 13 as the final preparation step of the Retreat. The main events of the review are contained in Table 1. The IAG Review Committee decided that the *IAG Retreat 2000* should be held early in 2000 with the main goal to develop a proposal for a new IAG mission, new IAG objectives, and, eventually, for a new IAG structure.

Date	Event
Oct 1998	IAG Section II Symposium in Munich
Jul 1999	IUGG General Assembly in Birmingham
Dec 1999	Review Committee Meeting in San Francisco
Feb 2000	IAG Retreat 2000 in Pasadena
Apr 2000	IAG Executive Committee Meeting in Nice
Jul 2000	IAG Review Committee Meeting in Calgary
Dec 2001	Review Committee Meeting in San Francisco
Mar 2001	IAG Bureau Meeting in Como
Mar 2001	IAG Executive Committee Meeting in Nice
Sep 2001	IAG Council Meeting in Budapest

Table 1: The IAG Review 2000-2001: Chronicle of Events

Martine Feissel composed an IAG-Questionnaire and conducted a poll concerning the expectations of the IAG “customers” or “stakeholders” concerning the new IAG (see Feissel (2000b)).

3.2 The IAG Retreat 2000

The *IAG Retreat 2000* took place February 14-16, 2000 and was hosted by the Jet Propulsion Laboratory (JPL) in Pasadena. It was a three days *brainstorming event* of the IAG Review Committee and of invited speakers and participants from inside and outside IAG. It was the declared goal of the Retreat to

- analyze the current situation of IAG,
- define the future goals of the Association,
- specify the measures to be taken to achieve these goals, and to
- draft a new structure of IAG to meet the challenges of the future.

The IAG Review Committee identified seven *IAG stakeholder groups* and asked distinguished representatives of these groups (see Table 3) to write position papers before the IAG Retreat 2000 for presentation, discussion, and review at the Retreat:

- a) IAG experts (in particular from IAG Services)
- b) Academic Sector (research and education)
- c) National Surveys and Geodetic Organizations
- d) IUGG, IAU and former IUSM sister associations of IAG (i.e., geophysical societies), ISPRS, etc.
- e) National or international geophysical unions, societies (AGU, EGS, ...)
- f) Space agencies and international programs (NASA, ESA, COSPAR, ...)
- g) Developing countries resp. international (as opposed to European and North American) countries.

3.3 Goals of IAG as identified at the IAG Retreat 2000

The goals and measures identified by the Retreat Participants as the key elements for the new IAG all stem from the position papers (including the IAG Poll). This list, as summarized in (Beutler et al., 2000b), was approved by all Retreat participants at the Retreat. It was subsequently distributed by e-mail and not disputed. The general consensus emerged that

- the new IAG structure must be simpler,
- IAG services should be given better visibility in IAG,
- IAG services should be represented in the new IAG Executive Committee,
- IAG should do its best to preserve, maintain, and improve the global geodetic infrastructure needed in modern global geodesy and geophysics,

- publication and communication should be improved to include also applications,
- the IAG role in professional education should be enhanced,
- IAG visibility in related sciences, in international organizations and in the society in general should be improved, and that
- IAG presence in developing parts of the world should be significantly improved.

3.4 The Road from the IAG Retreat to the IAG Scientific Assembly 2001 in Budapest

The conclusions in (Beutler et al., 2000b) were presented to the IAG Executive Committee Meeting in Spring 2000 in Nice (see Table 1). Few Commissions should cover the entire field of geodesy, the established IAG Services, a new Communication and Outreach Branch, and possibly 1-2 IAG projects should reside on the same level of the new IAG hierarchy. First ideas concerning the names of the new Commissions and their work were presented.

It was recommended that there should not be a Commission dedicated to Theory. Theory rather should be dealt with within the Commissions. The mentioned structure elements should be represented in the newly composed IAG Executive Committee. It was moreover recommended to implement an individual IAG membership.

These findings were basically accepted and endorsed by the IAG Executive. A major modification concerned the establishment of an *Inter-Commission Committee on Theory*. This Committee should be closely linked to the rest of the IAG structure and allow it to deal with those parts of theory which are not addressed within the Commissions.

The IAG Executive Committee asked the IAG Review Committee to continue with the Review process and to take into account the recommendations of the Executive Committee. The Committee was in particular asked to

- develop a plan for individual membership,
- draft Terms of Reference for Services, Commissions, and Outreach Branch,
- clarify the role of methodology and theory in the new organization,
- come up with a list of Commissions, and
- draft new IAG Statutes and By-Laws.

With the exception of the draft versions for the new Statutes and ByLaws, the IAG Review Committee addressed and settled these issues at its Sunday meeting in Calgary (on the weekend preceding the IAG/KIS GGG-2000 Symposium in Banff). This was only possible thanks to an intensive preparation by e-mail. Based on the minutes of this meeting and based on “documents of understanding” concerning the new IAG structure, developed, reviewed and revised by e-mail in the two months following the Calgary meeting, Ivan Mueller came up with a first draft for the new IAG Statutes and ByLaws

in fall 2000. The draft documents were reviewed at the San Francisco meeting of the IAG Review Committee and revised in the review process conducted by Ivan Mueller in the January-February 2001 time frame.

4. Key Elements of the new Statutes and Bylaws

The complete information concerning the proposed new mission, the objectives, and the new structure are contained in the two documents *Statutes*, *ByLaws*, available in electronic version through the IAG homepage (<http://www.gfy.ku.dk/iag/>). Let us quote the IAG mission statement and the IAG objectives as they were eventually accepted by the IAG Executive Committee at its meeting on March 30/31, then by the IAG Council at its meeting of September 7, 2001 in Budapest.

The **Mission** of the Association is the advancement of geodesy, an earth science that includes the study of the planets and their satellites. The IAG implements its mission by advancing geodetic theory through research and teaching, by collecting, analyzing, and modeling observational data, by stimulating technological development and by providing a consistent representation of the figure, rotation, and gravity field of the earth and planets and their temporal variations.

The IAG shall pursue the following **objectives** to achieve its mission:

- a) Study, at the highest possible level of accuracy, all geodetic problems related to the following:
 - Definition, establishment, and maintenance of global and regional reference systems for interdisciplinary use.
 - Rotation of the Earth and Planets.
 - Positioning and deformation studies.
 - Gravity field determination.
 - Ocean and sea level.
 - Time transfer.
 - Signal propagation through the planets' atmospheres
- b) Support the maintenance of geodetic reference systems for continuous, long-term observations and archival of results.
- c) Provide observational and processed data, standards, methodologies, and models in a form that maximizes the broadest possible range of research and application.
- d) Stimulate development and take advantage of emerging space and other technologies to increase the resolution and accuracy of geodetic data and products in order to advance geodetic and interdisciplinary research.

- e) Initiate, coordinate, and promote international cooperation and knowledge exchange through symposia, workshops, summer schools, training courses, publications, and other means of communication.
- f) Foster the development of geodetic activities and infrastructure in all regions of the world, taking into consideration the specific situation of developing countries.
- g) Collaborate with the international science and engineering community in supporting the application of geodetic theory and techniques and the interpretation of results.
- h) Cooperate with national and international agencies in establishing research goals, missions, and projects.

Structure.

It was proposed and subsequently agreed that the Association's structure shall comprise of a small number of components: Commissions, Services, IAG Projects and a Communication and Outreach Branch. Sub-components, such as Sub-commissions, Commission Projects, Inter-commission Committees, and Study Groups may be formed as well.

Eventually, it was decided that the following Commissions should be set up:

Commission 1: Reference Frames

Commission 2: Gravity Field

Commission 3: Earth Rotation and Geodynamics

Commission 4: Positioning and Applications.

Commissions, Services, the Communication and Outreach Branch, and the IAG Project(s) are the key components of the new structure. They are represented through their presidents in the IAG Executive Committee.

Inter-Commission Committee(s).

The IAG Executive Committee asked the review committee to study the possibility to set up an Inter-commission Committee on Theory. The review committee found that it should address this problem from a more general point of view. It decided *not* to implement concrete requests into the Statutes and ByLaws, but rather to allow for the creation of such components in the Statutes and ByLaws. The IAG Council approved the Statutes and ByLaws in September 2001 in Budapest including the establishment of the Inter-Commission Committee on Theory and the establishment a planning committee for the realization of the *Integrated Global Geodetic Observing System (IGGOS)* in 2003.

Individual Membership.

In an attempt to strengthen the relation of IAG to individual scientists and vice versa the new Statutes and ByLaws allow for an individual membership. It is the Review Committee's and the Executive Committee's opinion that – at least in the long run – the individual membership should replace the associate membership. The IAG Executive

Committee, at its meeting on March 30/31 2001, addressed this issue and proposed to replace the Associate membership by a *Candidate Membership*. The designation makes it clear that the *individual membership* is the normal membership. This view was supported by the IAG Council, as well.

Developing the new IAG Statutes and ByLaws

The draft Statutes and ByLaws dated April 2, 2001 were the versions accepted by the IAG Executive Committee at its meeting end of March 2001 in Nice. They are based on the March 1 versions of the same documents, as they were delivered by the IAG Review Committee to the IAG Secretary General. The modifications made by the Executive were mostly of a minor nature. This underlines the quality of work performed by the IAG Review Committee, a fact that was very much appreciated and acknowledged by the IAG Executive Committee.

Statutes and ByLaws were reviewed between April and August 2001 by the wider IAG community. Based on the comments received and based on the discussions at the IAG Council meeting in Budapest revised versions of Statutes and ByLaws were produced and made available shortly after the Budapest Scientific Assembly by the IAG Secretary General. Both documents are available through the IAG homepage (<http://www.gfy.ku.dk/iag/>).

5. The Road to Sapporo 2003

The IAG Council approved at its reunion on September 7, 2001 in Budapest the new IAG Statutes and ByLaws. The IAG Executive Committee expressed in Budapest its wish to implement the new structure on the occasion of the IAG/IUGG General Assembly 2003 in Japan. The following specific tasks were identified:

- The existing structure has to be mapped into the new one.
- The Inter-Commission Committee on Theory has to be set up.
- The IAG project on global observing systems has to be initialized.
- A Call for Proposals for the new Communication and Outreach Branch has to be issued.

These tasks are as demanding as the first phase of the IAG Review and there is only a short time span for their completion. It was clear that a Committee would have to coordinate the tasks listed above. Two alternatives were considered: Either the IAG Review Committee would be given this new task, or a new Committee would have to be set up in Budapest.

In view of the fact that these new tasks are quite different from the preceding review work and require detailed knowledge of the currently existing structure, the IAG Executive Committee decided on March 31, 2001 that a new Committee, named *Preparation Committee for the Implementation of new IAG Structure* should be formed in September 2001 in Budapest to tackle these problems. The Executive decided furthermore,

that this Committee should be led by Gerhard Beutler, to guarantee continuity, and that it should include the five IAG Section Presidents of IAG. These proposals were fully supported by the IAG Council at its meeting in Budapest.

In view of the strategy chosen it was only logical that the IAG Executive Committee had to dissolve the *IAG Review Committee* on March 31, 2001. The chair of the Review Committee, writing these lines, is on one hand sad to report this development, on the other hand he is proud of the Committee's achievements which were fully endorsed by the IAG Executive Committee and IAG Council.

Acknowledgements

This report covers two years of intensive work of the IAG Review Committee, a very concentrated effort of the participants of the IAG Retreat 2000, a constructive interaction with the IAG Executive Committee, and innumerable contacts and consultations with colleagues working in the field. The Review Committee wishes to thank all individuals having contributed to this constructive effort.

It expresses its thanks in particular to the invitees of the IAG Retreat 2000, to the authors of the position papers presented there (see Table 3), to Prof. Werner Gurtner, the secretary of the IAG Retreat 2000 and to Prof. Robert Weber, the secretary of the IAG Review Committee meeting in San Francisco in December 2001.

The chairman of the IAG Review Committee wishes to express his gratitude to all members of the IAG Review Committee for their excellent work, in particular to Ivan Mueller for conducting the editing and reviewing process of the new IAG Statutes and ByLaws, and to Jean Dickey and Rene Forsberg for their inspiring thoughts reproduced in section 2 of this report.

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Table 2: The IAG Review Committee

Stakeholder	Lead Author	Title
1.-8.	M. Feissel	Report on the Poll about the Role of IAG
1.	J. Kouba et al.	The IAG Mission, Role and Organization from the Perspective of IAG Services
2.	R. Rummel	IAG's Mission/Duties from the Research and Education (Academic Sector) Point of View
3.	R. Forsberg	IAG Missions and Duties from the National Agencies Point of View
4.	J. Dickey	IAG-2000: A Vision towards the Future, Links with IUGG Sister Organizations
5.	V. Dehant	IAG Polling about the Role and Activities of IAG. Special Target IAU, COSPAR, AGU and EGS
6.	C. Wilson	IAG's Mission and Duties from the Space Agency Point of View
7.	J. Manning	IAG: A non-US/non European perspective: Mission/Duties from a Stakeholder Group's Point of View

Table 3: Position Papers at the IAG Retreat