

The IAG-Retreat 2000 in Pasadena: Preparation, Goals and Measures

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ABSTRACT

We first repeat the Goals of the *IAG Retreat 2000* taking place at *JPL* in Pasadena, February 14-16, 2000. We then review the status of IAG in the year 2000. We remind ourselves in particular of the current IAG statutes, by-laws and structure of IAG.

We give an overview of the preparation of the Retreat. We include the *tentatively final schedule*, we list all the position papers *and* we include, in tabular form, the goals and measures as proposed in the position papers.

It is planned to complete this paper by the findings of the retreat.

1. Goals and Venue of the IAG RETREAT 2000

The IAG Retreat 2000 is a three days *brainstorming event* of the IAG Review Committee and of invited speakers and participants from inside and outside IAG.

It is 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 new structure of IAG* to meet the challenges of the future.

On February 14 and in the first part of February 15 the current situation of IAG is analyzed from different stakeholders' points of view. Goals to be achieved and measures to be taken are proposed by the authors of the position papers.

A first summary and discussion session concludes the second day. Ideally one or several proposals for a mission and a new list of duties/goals etc. for the future IAG will be the result of this "first cut".

The first half of next morning is reserved to finalize this task *and* to define a new IAG structure emerging from this process. The second half of the morning will be used to come up with a list of recommendations and action items.

It will be necessary that a sub-group of the retreat participants organizes a wrap-up meeting Wednesday afternoon. The schedule is ambitious and will only work if all speakers and retreat participants are well prepared. The tentative schedule of the workshop is given in Table 1.

Date	Time	Title of Session	Author	Chair
Feb 14	8:30-10:15	What do we want to achieve?	Beutler	Schwarz
		Evaluation of Questionnaire	Feissel	Schwarz
		Coffee Break		
	10:45-12:00	Mission/Duties as proposed by the IAG Services	Kouba	Neilan
	12:00-01:30	Lunch		
	01:30-02:45	Mission/Duties as proposed by the Academic Sector	Rummel	Sanso
	02:45-04:00	Mission/Duties as proposed by Space Agencies	Wilson	Neilan
		Coffee Break		
	04:30-05:45	Mission/Duties as proposed by National Geodetic Organizations	Forsberg	Heki
Feb 15	08:30-09:45	Mission/Duties as proposed by the IUGG Sister Organizations	Dickey	Dehant
	09:45-11:00	Mission/Duties as proposed by IAU/COSPAR/AGU/EGS/...	Dehant	Dickey
		Coffee Break		
	11:30-12:45	Mission/Duties as proposed Non-US/European Countries	Manning	Fortes
	12:00-01:30	Lunch		
	02:00-03:00	Engineering in IAG Reflections on a Focus	Brunner Schwarz	Rummel Rummel
		Coffee Break		
	03:30-	New Mission, New Structure: Summary and Discussion		Mueller/Beutler
Feb 16	08:30-10:30	Proposal(s) for a new mission and structure		Mueller/Beutler
		Coffee Break		
	11:00-12:30	Recommendations and Action Items		Beutler/Mueller

Table 1: Schedule of IAG Retreat 2000

2. Current IAG Objectives and Structure

The objectives of IAG are specified in the *Geodesist's Handbook* which is printed every four years as a special volume of the *Journal of Geodesy*. The latest printed version is contained in the Geodesist's Handbook (1996). The 1999 Version is already available on the internet. In addition to these official sources of information we refer Mueller (1996) for background information.

According to Torge (1996) “*geodesy is the science of determining the size and the figure of the Earth, and its external gravity field. . . . geodesy therefore is part of the geosciences, providing significant boundary conditions for modeling the Earth's body and its dynamics, including the oceans and the atmosphere. On the other hand geodesy has strong relations to surveying and cartography, to navigation and engineering*”.

The IAG is an Association of IUGG, the *International Union of Geodesy and Geophysics*. The IUGG in turn is member of ICSU, the *International Council of Scientific Unions*. IAG also has relationships to the *International Astronomical Union (IAU)*, to the *Committee on Space Research (COSPAR)*, and to the geodesy sections of the *American Geophysical Union (AGU)* and to the European counterpart *European Geophysical Society (EGS)*. Also of interest are the relationships to the *Fédération Internationale des Géomètres (FIG)*. Table 2 lists the (potential) partner organizations of IAG.

On the administrative side we have in IAG the

- *General Assembly*, consisting of the Delegates of the Member Countries,
- the *Council of the Association* consisting of the Delegates designated for meetings of the Council and formally accredited by the Adhering Body of Member Countries,
- *the IAG Bureau* consisting of the *President*, the *First Vice-President*, and the *Secretary General*, all of whom are elected by the Council, and
- *the IAG Executive Committee* consisting of the *Bureau*, the *immediate past president*, the *Second Vice President*, and the *Presidents of Sections*.
- Honorary Presidents, honorary General Secretaries, Presidents of Commissions, Secretaries of Sections, and the Chief Editor of the Journal of Geodesy may attend any meeting of the Executive Committee with voice, but without vote.

Abbreviation	Name	Member of
IAG	International Association of Geodesy	IUGG
IASPEI	International Association of Seismology and Physics of the Earth's Interior	IUGG
IAVCEI	International Association of Volcanology and Chemistry of the Earth's Interior	IUGG
IAGA	International Association of Geomagnetism and Aeronomy	IUGG
IAMAS	International Association of Meteorology and Atmosphere Sciences	IUGG
IAHS	International Association of Hydrological Sciences	IUGG
IAPSO	International Association for the Physical Sciences of the Ocean	IUGG
IAU	International Astronomical Union	ICSU
COSPAR	Committee on Space Research	ICSU
AGU	American Geophysical Union (Geodesy Section)	—
EGS	European Geophysical Society	—
FIG	Fédération Internationale des Géomètres	—

Table 2: Partner Organizations of IAG

According to the Geodesist's Handbook (1996, p. 855) the *objectives of IAG* are as follows:

- a) *to promote the study of all scientific problems in geodesy and encourage geodetic research;*
- b) *to promote and coordinate international cooperation in this field, and promote geodetic activities in developing countries;*
- c) *to provide, on an international basis, for discussion and publication of the results of the studies, research works indicated in paragraphs a) and b) above.*

Concerning structure the Handbook (1996) specifies:

To achieve these objectives, the Association shall comprise a number of Sections, each of which deals with a distinct part of geodesy.

Commissions, Special Commissions (Scs) and Special Study Groups (SSGs) may be formed as provided in the By-Laws.

It is interesting to note that *IAG Services* are not even mentioned in this breakdown of the IAG structure. Table 3 lists the five sections of IAG and the development of their names in time, Table 4 the Commissions and Special Commissions, and Table 5 the IAG Services.

Table 3 shows that the *five section structure* goes back to 1957, the IUGG General Assembly in Toronto, which took place in the Geophysical Year and in the year of launch of *Sputnik I*. It is obvious, however, that the section definition was quite different from what it is today.

Sec	Year	Title
I	1957	Triangulation
	1971	Control Surveys
	1983	Positioning
II	1957	Precise Leveling
	1971	Satellite Surveys
	1983	Advanced Space Technology
III	1957	Geodetic Astronomy
	1971	Gravimetry
	1983	Determination of the Gravity Field
IV	1957	Gravimetry
	1971	Theory and Evaluation
	1983	General Theory and Methodology
V	1957	Geoid
	1971	Physical Interpretation
	1983	Geodynamics

Table 3: The IAG Sections

In 1960, at the IUGG General Assembly in Helsinki, the Commission on Organization, which was later on renamed to *Cassinis Committee*, was created. This committee reviews the IAG structure prior to every other general assembly and comes up with structural changes for approval by the IAG Council (see below) at the General Assemblies. In 1971, at the General Assembly in Moscow, the section definition was considerably changed. The section on *geodetic astronomy* disappeared and Section IV on *theory and evaluation* was established.

The latest major review of the section structure took place in 1983 at the General Assembly in Hamburg. According to Mueller (1996) a fine tuning took place to accommodate the fact that space techniques cut across the entire spectrum of the IAG organization.

Table 4 lists the five Commissions and five Special Commissions. Until 1983 the Commission and Special Commission presidents were not represented in the IAG Executive Committee. Since the Vienna General Assembly in 1991 they are members with voice but without vote. This latter change of the IAG statutes was motivated by the observation that a fair portion of the actual work of the IAG was performed in these IAG units.

What makes the distinction between a service and a commission? The difference resides in the keywords *products* and *user community*. The user community may be purely scientific (e.g., the geosciences community) or much broader (e.g., the entire surveyor plus the navigation community in addition to the geosciences community, as in the case of the IGS). Products may consist of time series of Earth rotation parameters, satellite orbit positions, station coordinates, tide models, etc.

Commission/Sec.	Title
X/I	Global and Regional Geodetic Networks
SC4/I	Applications of Geodesy to Engineering
VIII/II	Intl. Coordination of Space Techniques for Geodesy and Geodynamics
SC6/II	Wegener Project
SC7/II	Gravity Field Determination by Satellite Gravity Gradiometry
III/III	International Gravity Commission
XII/III	International Geoid Commission
SC1/IV	Mathematical and Physical Foundations of Geodesy
V/V	Earth Tides
VII/V	Recent Crustal Movements
SC3/V	Fundamental Constants
SC8/V	Sea Level and Ice Sheet Variations

Table 4: The Current IAG Commissions and Special Commissions (marked SC)

Table 5 illustrates that the bandwidth of IAG services is broad indeed, covering pure documentation (e.g., the IIS and the IBS) and services dealing with almost the entire range of geodesy and geodynamics (like *IERS*, *IGS*, *IGeS*, *BGI*, and *ICET*). Other services, like, e.g., the PSMSL are truly interdisciplinary in nature.

Let us point out that (at least some of) the services in Table 5 are essential elements of the IAG work, but not of the IAG structure. Currently, the services are considered as elements of the sections which is why they are “only” described in the sessions sections of the Geodesist’s Handbook (1996). They are *neither* represented in the section executive committees *nor* in the IAG Executive Committee.

Service/Section	Short Title
IGS/II	International GPS Service
IVS/II	International VLBI Service
ILRS/II	International Laser Ranging Service
BGI/III	International Gravimetric Bureau
IGeS/III	International Geoid Service
IERS/V	International Earth Rot. Service
BIPM/V	International Bureau of Weights and Measures
ICET/V	International Centre for Earth Tides
PSMSL/V	Permanent Service for Mean Sea Level
IBS/—	IAG Bibliographic Service
IIS/—	IAG Information Service

Table 5: The Current IAG Services

3. The IAG Review Committee and the Preparation of the IAG Retreat 2000

The members of the IAG-Review Committee were elected/designated at the IUGG General Assembly in Birmingham. Their names, origin, and e-mail addresses are given in the first section of Table 6. Originally Georges Balmino, former Secretary General of IUGG was also member of the Committee. Unfortunately, due to internal concerns and considerations at CNES (Centre National d’Etudes

Spaciales), he had to leave the IAG Review Committee before the end of the year 1999. He was not replaced.

The IAG Review Committee started its work immediately after the 1999 IUGG General Assembly in Birmingham. It was decided to organize the *2000 IAG Retreat* to take place at JPL in Pasadena from February 14 to 16 and to invite, in addition to the Committee members, a limited number of guests from inside and outside IAG to provide lacking expertise and experience in various areas. Their names, origin and e-mail addresses are given in the second part of Table 6. Werner Gurtner from the Astronomical Institute of the University of Bern was asked to act as secretary for the Retreat and Ivan I. Mueller was asked to moderate the discussion part of the Retreat. Their “coordinates” are contained in the third section of Table 6.

Name	Country	e-mail
G. Beutler	Switzerland	beutler@aiub.unibe.ch
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R. Forsberg	Denmark	rf@kms.dk
R. Rummel	Germany	rummel@step.iapg.verm.tu-muenchen.de
F. Sanso	Italy	fsanso@ipmtf4.topo.polimi.it
K.P. Schwarz	Canada	schwarz@ensu.ucalgary.ca
J. Chen	China	jychen@sun.ihep.ac.cn
V. Dehant	Belgium	Veronique.Dehant@ksb-orb.oma.be
A. Dermanis	Greece	dermanis@olymp.ccf.auth.gr
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D. Milbert	USA	dennis@ngs.noaa.gov
R.E. Neilan	USA	Ruth.E.Neilan@jpl.nasa.gov
C. Wilson	USA	clarkw@maestro.geo.utexas.edu
W. Gurtner	Switzerland	gurtner@aiub.unibe.ch
I.I. Mueller	USA	mueller@mps.ohio-state.edu

Table 6: The IAG Review Committee, Retreat Participants, Secretary and Moderator

The IAG Review Committee identified a number *IAG stakeholder groups* and asked distinguished representatives of these groups to prepare *position papers* to be available before the IAG Retreat 2000 and to be presented at the retreat.

The following *seven stakeholder groups* were identified:

1. IAG experts (in particular from services)
2. Academic Sector (research and education)
3. National Survey or Geodetic Organizations
4. IUGG, IAU and former IUSM sister associations of IAG (i.e., geophysical societies), ISPRS, etc.
5. National or international geophysical unions, societies (AGU, EGS, ...)
6. Space agencies and international programs (NASA, ESA, COSPAR, ...)

7. developing countries resp. international (as opposed to European + U.S.) countries.

Table 7 contains the lead authors, the titles of the position papers, and the numbers of the associated stakeholder groups. The full references for the position papers are included in the reference section at the end of this overview.

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 7: Position Papers

In addition to the position papers Beutler et al. (1999), Beutler (1999), Dermanis and Sanso (1999), Schwarz (2000), Tscherning (1999) and Tscherning (2000) provided very valuable input for the authors of the position papers and to the retreat participants.

4. Summary of Goals and Measures as Contained in the Position Papers

The attempt was made to extract the goals and the associated measures to achieve these goals from the individual position papers and to present them in a comparable format. No attempt was *yet* made to identify identical or similar goals and/or measures in different position papers. This is going to be one of the ambitious tasks at the IAG Retreat 2000.

The information in Table 8 reflects the conclusions stemming from the evaluation of the questionnaire sent out and analyzed by *Martine Feissel*, Table 9 summarizes the essentials of the position paper by Kouba, Feissel, and Neilan (2000). In Tables 10 and 11 we find the conclusions of the position paper by Reiner Rummel (speaking for the academic sector), in Tables 12 and 13 those of the position paper by Rene Forsberg (geodetic agencies' point of view). Tables 14 and 15 reflect Jean Dickey's analysis of the IUGG sister associations, in Tables 16 and 17 we find the considerations concerning other than-IUGG-associations like IAU, COSPAR, AGU, EGS, etc. Table 18 summarizes the space agencies' point of view. Tables 19 – 22 eventually give a very detailed overview of other than US or European regions' needs and points of view as prepared by John Manning.

All goals are labeled by the name of the lead author plus a number for the goal, all measures by the lead author, the number of the goal it is associated with and the number of the measure. This system should make it relatively easy to analyze the findings of the position papers and to come up with combinations.

Author	Goal	#	Measure	#
Feissel	Improve the situation of information systems by enlarging the Scope of Journal of Geodesy	1	New Editorial Board	1.1
	Improve the situation of information systems by enhancing Bibliographic Service	2	Working Group	2.1
	Involvement of countries with little resources for geodesy regarding observing Systems	3	Projects	3.1
	Involvement of countries with little resources for geodesy by transfer of knowledge and know-how	4	Project	4.1
	Play a meaningful role in Global References	5	Form a new Section from current Sections 1 and 5 (part)	5.1
	Play a meaningful role in Gravity Field and Geoid	6	Form a new Section from current Section 3 and Commissions 5 and 13	6.1
	Play a meaningful role in Observing Systems and Space Missions	7	Form a new Section from current Section 2 including CSTG	7.1
	Play a meaningful role in Geodesy and Earth Sciences	8	Form a new Section from current Section 5 (part) and External ties	8.1
	Play a meaningful role in Modelling and Data Analysis Techniques	9	Form a new Commission	9.1
	Improve the National Representation/links within IAG	10	Working Group	10.1
	Enhance Role of Services in IAG	11	Incorporate Services in Section Organizing Committees	11.1
	Reorganize ICET, BGI, IGeS	12	Form a Project	12.1
	Study need/feasibility for an Altimetry Service	13	Working Group	13.1
	Study the Need for / Role of FAGS	14	Joint Working Group	14.1
	Study the Role of IAG in Applications of Geodesy to Engineering	15	Create a Working Group	15.1

Table 8: Goals and Measures as Proposed by Feissel

Author	Goal	#	Measure	#
Kouba	Enhance Role, Relevance and Membership	1	Define a Mission Statement	1.1
			Define farsighted Charter from New Mission	1.2
			Define New Organization, which may be reviewed and adjusted periodically to fit the mission, charter, current R&D advances	1.3
	Coordination Role	2	Define a new organization, e.g., with only 3 sections (Reference Systems, Advanced Space Methods, Gravity Field)	2.1
			Improve publications by focused JoG publications (dedicated issues), by a new rapid (electronic) journal	2.2
			Enhance coordination mandates of existing services and joint Commissions (CSTG, IERS) and/or create new joint Commissions or Services (with meteorology, oceanography, metrology, atmospheric physics, FIG, ION, etc.). Promote ITRF (e.g., as an SI Standard)	2.3
	Improve Role of Services within IAG	3	Review with the goal to consolidate, merge IAG Services (e.g., Gravity Service)	3.1
			Consider Service Representation to IAG Executive Committee (e.g., from each group of Services associated with each proposed IAG Section)	3.2
			Review and reduce the number of Special Study Groups. Encourage multidisciplinary SSGs and Special Commissions (SCs) in close association with specific IAG Service Working Groups and/or Pilot Projects	3.3
	Maintain and Enhance Global Infrastructure	4	Promote and coordinate activities to maintain and improve global geodetic reference systems as pioneered by the IAG Services	4.1
			Actively support and facilitate efficient use of state-of-the-art instrumentation and homogeneous coverage for the monitoring of global phenomena. Encourage station collocation of different techniques and monitoring networks	4.2
			Encourage and coordinate regional and national programs to densify the global spatial infrastructure particularly in not so well developed parts of the world	4.3

Table 9: Goals and Measures as Proposed by Kouba, Feissel, Neilan

Author	Goal	#	Measure	#
Rummel	Improve Visibility	1	Establish Global Integrated Geodetic&Geodynamic Observing System (GIGGOS)	1.1
			Get GIGGOS adopted by UNESCO&ICSU, like GOOS and others	1.2
			The services jointly -as a network- form the structure for the implementation of GIGGOS (like the WCRP and its sub-structures)	1.3
			Engage into the scientific use of future space missions such as CHAMP, GRACE, GOCE, CRYOSAT, ICESAT etc. as part of GIGGOS	1.4
			Find a joint formula with AGU and EGS	1.5
			Establish closer ties between the services and IAG and geodesy	1.6
	Integrate Applied Geodesy	2	Seriously study whether IAG should only be open to geodesy as oriented towards Earth sciences or also be open to applied geodesy (role of IAG versus the role of FIG, ISPRS, etc.)	2.1
			Depending on the outcome, establish a programme in the areas of engineering surveying/geodesy, geo-informatics and navigation	2.2
	Analysis of the Current Structure	3	Think of ways to run efficiently the sections/commissions, the services and a large programme (like GIGGOS) in parallel (three layers?)	3.1
			Analyze whether the current five sections are still appropriate, e.g., in view of the prominent role of space techniques in geodesy	3.2
			Establish clear IAG rules for the establishment, evaluation and termination of services. Give services a more prominent role in IAG	3.3
			Let the services form a network - together with the bureau and with JoG. This network could form the professional basis of IAG. It could carry joint responsibilities.	3.4
			Streamline the structure: less sub-structures (see comment of CCT), less meetings, more focus	3.4

Table 10: Goals and Measures as Proposed by Rummel (part 1)

Author	Goal	#	Measure	#
Rummel	IAG as a focus for brilliant young scientists	4	Make IAG scientifically attractive through its prominent role in Earth system studies (GIGGOS) and through its exciting other projects (satellite missions, planetary projects, airborne techniques, applied geodesy a.s.o.)	4.1
			Get young scientists involved in international research projects (such as GIGGOS)	4.2
			Give young scientists a more prominent role in IAG (joint ventures with AGU and EGS, internet, job market, invited papers, workshops)	4.3
			Let it be our joint responsibility to make JoG our common scientific platform	4.4
	Let us maintain and foster jointly assets: the currently available institutions, university departments, university programs, observatories	5	GIGGOS could provide long-term support of our observatories (SLR, VLBI, LLR). Add also applied component.	5.1
			Investigate the total geodetic university system: structure, goals, research, number of students, number of staff, job market, prospects	5.2
			Do the same with research institutions	5.3

Table 11: Goals and Measures as Proposed by Rummel (part 2)

Author	Goal	#	Measure	#
Forsberg	Put more weight on IAG services	1	Make information data available online and with minimal delay through the internet, using available standard formats and protocols such as the World Wide Web	1.1
			Establish new services (or upgrade existing) to cover whole span of geodesy (e.g.: geodynamics service; bibliographic/abstracts service ...)	1.2
			Main services to issue regular recognized/mildly reviewed "Bulletins" where regional and case study contributions are welcome (as done currently for BGI and IGeS)	1.3
			Continue and enhance informational service to the average, working geodesist through dedicated talks and at meetings, especially at the regional level	1.4
			Make sure IAG services feel strong link to IAG through direct links to executive committee, so that services to maximum degree broadcast "we are IAG"	1.5
	Increasing IAG involvement in regional projects and cooperations	2	Organize IAG so that regional cooperations get a natural link into IAG. E.g.: expand regional project groups/centers under services; encourage activity of regional sub-commissions	2.1
			IAG take active role to initiate projects in areas with need of more basic data (e.g., Arctic and Antarctica), and actively support and revitalize projects in developing regions (e.g, South America and Africa)	2.2
			Set up schemes for endorsing international projects as "IAG projects" (e.g., set up principles for open cooperation, data dissemination etc., reporting schemes)	2.3
			Anchor existing larger projects (e.g., Asia-Pacific Space Geodesy Project, Wegener Project, Baltic Sea Level Project, ...) well into IAG structures with a long-term perspective in mind	2.4
			Establish international resource of instruments (and know-how), to be temporarily available for projects initiated by developing countries (i.e., establish IAG "loan programme" in cooperation with major geodetic research centers/agencies)	2.5
			Establish a formalized hardware service of phased-out hardware, which might still be useful for educational purposes and developing countries	2.6

Table 12: Goals and Measures as Proposed by Forsberg (Part 1)

Author	Goal	#	Measure	#
Forsberg	Increase IAG role in professional education and training	3	Continue tradition with IAG schools and expand to include all areas of geodesy[LPSF2]. Need, e.g., for regular, regional GPS processing schools under IAG umbrella. Make long-term plan allowing planning of training of national survey geodesists and Ph.D. students	3.1
			Secure economic resources and grants to allow geodesists from economically less-favored agencies to participate. Make priority for developing nations[LPSF3]	3.2
			Encourage regional activities by providing grant assistance, and establish pool of experienced international teachers, willing to travel and use time	3.3
			Expand IAG software services in connection with schools	3.4
	Strengthen IAG role in marine geodesy	4	Establish serious IAG activity in definitions of boundaries and problems related to the UN "Law of the Sea", start school activities in cooperation with IHO, to satisfy need of especially many smaller countries	4.1
	Establish a more distinct IAG "membership"	5	Establish active "institutional memberships" for national organizations (with fees to aid in providing travel funding for economically less favored agencies[LPSF4]?)	5.1
			Establish regular personal membership of IAG with a regular newsletter etc. (follow a little in the footsteps of American Geophysical Union[LPSF5])	5.2

Table 13: Goals and Measures as Proposed by Forsberg (Part 2)

Author	Goal	#	Measure	#
Dickey	Define the major foci of IAG research and services for the next decade	1	Which IAG activities are unique and which require major interaction with other ICSU members or affiliates?	1.1
			Which sister organizations (stakeholders) are important for the growth of the IAG?	1.2
			Which aspects of science and/or engineering do we want to emphasize?	1.3
	Provide interdisciplinary links and interactions with other associations based on Goal 1	2	Develop and participate in: Joint Working Group (JWG), e.g., IAG/IAPSO JWG on Geodetic Effect on Non-tidal Ocean Processes Commissions (i.e., SEDI, Study of the Earth's Deep Interior)	2.1
			Sponsor Joint Interassociation Symposia at IUGG General Assemblies, e.g., satellite altimetry, crustal deformation and Earth rotation studies	2.2
			Sponsor General Assemblies with other Associations in scientifically interesting locations, e.g., with IAVCEI near Mt Etna or the Big Island, Hawaii, e.g., with IAPSO in an island or coastal location (e.g. Great Barrier Reef), e.g., with IASPEI in an active seismic area	2.3
			Sponsor joint workshops with other Associations, e.g., IAPSO/IAMAS Melbourne 1997, e.g., a joint IAG/IAPSO Workshop to be held in conjunction with the next IAPSO General Assembly, Mar del Plata, Argentina, October 21-28,2001, on "Gravity, Geodesy and the Ocean circulation as inferred from altimetry"	2.4
			Sponsor a joint program of Summer Schools with ISPRS (and perhaps FIG)	2.5

Table 14: Goals and Measures as Proposed by Dickey (Part 1)

Author	Goal	#	Measure	#
Dickey	Provide needed data and services to the other associations	3	Establish services that support the broad scientific community, e.g., IERS and IGS among others	3.1
			Establish joint services to meet the common needs of crossing cutting groups, e.g., Permanent Service for Mean Sea Level (IAG/IAPSO)	3.2
			Establish links with other communities to learn their needs, e.g., IGS with the ionosphere community (associated with IAGA)	3.3
			Actively promote IAG services to the sister organizations (both those on the geophysics side and those on the geomatics side)	3.4
			Provide real-time GPS information	3.5
	Provide the infrastructure / reference frames /constants needed by the IUGG and IAU	4	Establish constants (jointly with IAU and IUGG sister associations)	4.1
			Establish International Terrestrial Reference Frame	4.2
			Promote densification of the ITRF to government agencies	4.3
			Establish International Celestial Reference Frame (joint with IAU)	4.4

Table 15: Goals and Measures as Proposed by Dickey (Part 2)

Author	Goal	#	Measure	#
Dehant	Provide the needed infrastructure, reference frames, constants, conventional models needed by the IAG, IAU, COSPAR and the international science community	1	Establish constants (jointly with IAU)	1.1
			Establish International Terrestrial Reference Frame	1.2
			Establish International Celestial Reference Frame (joint with IAU)	1.3
			Establish conventional models (joint with IAU)	1.4
			Establish joint resolutions or exchange resolutions about these subjects	1.5
	Provide interdisciplinary links and interactions with IAU, COSPAR and the international science community	2	Develop and participate in Joint Working Group (JWG), e.g., WG on 'Non rigid Earth Nutation Theory'	2.1
			Sponsor / co-sponsor joint symposium with IAU and COSPAR, e.g., Polar Motion Meeting (Italy, September 1999, 100th Anniversary of the Chandler Wobble)	2.2
			Encourage and publicise special sessions at the IAU, IAG, COSPAR meetings at the boundary between these bodies. E.g., next COSPAR meeting Special Session on 'Earth Rotation Interdisciplinary Topics shared by Astronomers, Geodesists and Geophysicists	2.3
			Encourage and participate in Special Study Groups or joint WGs addressing questions particularly interesting for the Services. E.g., JWG on 'Non Tidal Ocean Processes' addressing a question which will help the special bureau for the Ocean, within the GGFC of the IERS	2.4
	Serve as "mother body" (support/sponsor) for geodesy sections within EGS, AGU and other continents scientific communities	3	Encourage and publicise special geodesic sessions at the AGU and/or EGS Meetings. Such special sessions might focus on an IAG SSG/Commission related topics. E.g., Special Sessions (Fall AGU) related to geodesy as 'The Interdisciplinary impact of Space Geodesy in the new millennium'	3.1

Table 16: Goals and Measures as Proposed by Dehant (Part 1)

Author	Goal	#	Measure	#
Dehant	Serve as "mother body" (support/sponsor) for geodesy sections within EGS, AGU and other continents scientific communities	3	Serve as a bridge between the different continental geodesy sections. E.g., share information about continental campaigns, share information about special sessions at meetings, etc.	3.2
			Serve as a bridge between the different continental geodesy sections. E.g., share information about continental campaigns, share information about special sessions at meetings, etc.	3.2
			encourage special joint symposia, sessions between the different continental geodesy sections. E.g., the AGU/EGS already has special joint symposia on an annual basis that alternates between the EGS Annual and the Spring AGU Meetings	3.3
			Provide links and information on the different websites e.g. links between IAG website and AGU/EGS website, information on the Special Sessions etc	3.4
	Provide needed data and services to the other associations	4	Establish services that support the broad scientific community. E.g., IERS and IGS among others	4.1
			Establish links with other communities to learn their needs. E.g., IVS links the IAU	4.2
			Use existing data centers to support help to the users. E.g., tidal corrections can be provided by ICET	4.3
	Provide interdisciplinary links and interactions with IUGG, EGS, AGU and other continental scientific communities	5	Encourage and publicise special sessions at the IUGG, AGU and/or EGS Meetings. E.g., Special Sessions (Fall AGU) related to the IERS New Bureau on Geophysical Fluids	5.1
			Encourage joint-associations WGs, e.g. Gross' JWG on ocean addressing a question which will help the special bureau for the Ocean, within the GGFC of the IERS	5.2
			Encourage existing interdisciplinary projects or interdisciplinary associations, e.g., GGP (Global Geodynamics Project) or SEDI (Study of the Earth Deep Interior)	5.3

Table 17: Goals and Measures as Proposed by Dehant (Part 2)

Author	Goal	#	Measure	#
Wilson	Users of services and products will know the IAG and space agency connection with the data products	1	Simplify the organization chart, making services a central part of IAG Make IAG the international authority on position and time Engage national geodetic agencies in IAG Use www to track product users and report to contributors for their own purposes, such as accounting for the impact of their work	1.1 1.2 1.3 1.4
	Public recognition of the IAG and its connection with space activities	2	Make effective use of the www in public education at all levels, as well as for professional and scholarly purposes	2.1
	Help NASA and other agencies strengthen international ties	3	IAG promotes GPS stations for science, services, infrastructure IAG develops connections with UN and related international activities. IAG coordinates international space geodesy observing programs via services. IAG develops a 'space mission' section to coordinate international missions	3.1 3.2
	IAG is the source for documentation, standards for software, models and products	4	Use www as the authoritative source for such information Embrace IERS and other 'standards' as IAG standards Continue refinements of ITRF and its publication	4.1 4.2 4.3
	Free and open access to all geodetic data	5	IAG engages national surveys in its structure and promotes this policy IAG works with other agencies concerned with this problem	5.1 5.2

Table 18: Goals and Measures as Proposed by Wilson

Author	Goal	#	Measure	#			
Manning	Promote geodetic activities in developing countries on a regional basis	1	Hold an annual meeting/symposium/workshop in each of Africa, South America and Asia or Pacific regions	1.1			
			Establish individual contact for each country within regions to encourage participation	1.2			
			Examine direct versus indirect regional representation of government agencies and university institutes for developing nations	1.3			
			Consider working jointly with FIG in geodetic application training for developing countries	1.4			
			Facilitate and fund attendance at major conferences, workshops	1.5			
		2	Promote increased membership and involvement from countries in the Asia Pacific region particularly from the Pacific group of nations	Determine current membership status of each country and develop a contact list for possible recruitment	2.1		
				Hold a regional meeting on regional GPPS densification amongst Pacific nations in conjunction with SOPAC during 2000	2.2		
				Follow up membership with individual countries	2.3		
				Extend IAG communication by means of printed newsletters on global activities as well as on the Internet	2.4		
				Facilitate regional IAG newsletters in Asia Pacific; South America; Africa	2.5		
				3	Promote further international cooperation with other bodies at both the scientific and practical levels	Support the geodetic network activity of the PCGIAP Geodesy Group in the Asia Pacific and the resident SIRGAS group in South America	3.1
						Establish a coordinating mechanism for the African continent with national bodies for a continental framework, possibly through a central Geodetic Institute located at Hartebeesthoek	3.2
						Establish coordinating groups with other communities such as Meteorology, GIS , and other Geophysical bodies	3.3
						Establish appropriate reporting/support links with APSG on Geodynamics in Asia Pacific region	3.4

Table 19: Goals and Measures as Proposed by Manning (Part 1)

Author	Goal	#	Measure	#
Manning	Establish a <i>practical geodesist</i> element	4	Cooperate with other land related agencies	4.1
			Establish a bilateral agreement with FIG for joint workshops and training for users of space geodesy products	4.2
			Establish by lateral agreement with Digital earth, Global mapping and Global Spatial data infrastructure programs	4.3
	Provide Better integration of IAG services	5	Establish a peak service council body within IAG structure	5.1
			Facilitate interaction and joint workshops of related services	5.2
			Develop a more even distribution of information and products from each service	5.3
			Further assist with development of weaker services along the lines of IERS and IGS	5.4
	Establish better links with existing groups undertaking regional studies	6	Ensure that all activity is reported to appropriate area in IAG	6.1
			Provide special assistance from service groups as required	6.2
			Examine suitability of links to regional groups such as the Asia Pacific bodies of PCGIAP, APSG, Geodysea, WING and PLUME projects	6.3
			Refresh links to bodies in Africa and South America	6.4
			Establish APSG as a sub commission within IAG structure similar to WEGENER	6.4
			Develop further involvement in the SIR-GAS project	7
	Increase IAG representation in South America	7.1		
	Coordinate the integration of Central and North American countries, along with the ones located in the Caribbean Sea	7.2		
	Develop resourcing strategies for an extended project	7.3		

Table 20: Goals and Measures as Proposed by Manning (Part 2)

Author	Goal	#	Measure	#
Manning	Resolve anomalies in geodetic connections at collocated sites	9	Establish task force to undertake cooperative geodetic connections between local sites firstly VLBI/SLR then SLR/GPS and DORIS	9.1
			Develop test and endorse methodologies to reduce observations from telescope/antenna	9.2
			Post details on a reference web site	9.3
	Improved Regional Geoid determinations	10	Design terrestrial gravity upgrade using new absolute gravity technology	10.1
			Incorporate space gravity data	10.2
			Facilitate aerogravity in specific areas eg Antarctica, Amazon region in South America or other "black holes"	10.3
	Support an enhanced ITRF	11	Resolve anomalies between individual global technique solutions	11.1
			Use verified local geodetic connections to improve combined solutions	11.2
			Research and eliminate epoch steps in ITRF towards a dynamic solution	11.3
			Support the work of the IERS groups	11.4
Develop An enhanced universal vertical reference frame	12	Establish and support the work of the specialist IERS group 12.1	12.2	
		Develop methodologies to best connect individual local vertical datums to this surface		
		Design a practical global reference		12.3
	Establish an integrated global observation network	13	Design an optimum and practicable global network	13.1
			Develop an implementation strategy to build a network based on existing observing sites supplemented by new sites	13.2
			Develop strategies for resourcing installation at difficult sites and arranging communication links	13.3
			Facilitate local participation in maintaining local sites	13.4
	Develop an enhanced surface geodynamics model for complex micro-plates in the Asia Pacific region	14	Facilitate a precise framework of permanent geodetic observatories	14.1
			Encourage survey campaigns to examine plate edge collisions	14.2
			Identify extent of micro plate activity	14.3
			Determine hierarchy of hazards zones arising from regional surface Geodynamics	14.4

Table 21: Goals and Measures as Proposed by Manning (Part 3)

Author	Goal	#	Measure	#
Manning	Definitive monitoring of sea level rise across the Pacific	15	Support the extended work of the existing special commission as a cooperative project with other organizations involved in sea level	15.1
			Facilitate access to tide gauge information from all sites	15.2
			Establish GPS receivers with data communication to a central data centre in near real time	15.3
			Extend role of PSMSL in relation to GPS meta data for collocated sites	15.4
	Research use of active GPS permanent reference station networks as the basis for regional and metropolitan spatial reference infrastructures	16	Investigate the design and implementation of multi transmitting base stations to develop the spatial reference infrastructure	16.1
			Develop quality assurance procedure for operating the spatial reference infrastructure	16.2
			Develop quality standards and quality indicators associated with the position determined	16.3
			Publish position quality standards and definition of positional accuracy indicators for implementation in the industry	16.4
	Involve regional participation in new satellite space missions	17	Facilitate ground truthing of satellite mission data from global network as required	17.1
			Use regional observation and ground truthing data to support satellite sensing for profiling, gravity, and sea level	17.2
			Facilitate local persons involvement with P. Is in new space missions eg CHAMP or ICESAT	17.3
	Coordination of Geodesy and Geophysical aspects of research in Antarctica	18	Examine reporting links from Antarctic research areas to IUGG	18.1
			Develop bilateral agreement with other relevant bodies	18.2
			Develop a gravity plan in order to produce a decimeter geoid of the Antarctic continent	18.3
			Produce an improved Geoid of Antarctica	18.4

Table 22: Goals and Measures as Proposed by Manning (Part 4)

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