

# The Federation of Astronomical and Geophysical Data Analysis Services (FAGS)

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*Towards a new structure for federating  
astronomical and geophysical analysis services*

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# FAGS White Paper (draft2; March 2007)

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- intended to provide the views of the current FAGS/ICSU interdisciplinary body on the prospects for a future federation in the framework of the new arrangements within ICSU for data coordination
- decided at the 2006 FAGS meeting
- based on outcome of the 2005 and 2006 FAGS meetings,
- reflection based on the new situation (i.e. ICSU GA, Oct 2005)
- contains input from
  - the FAGS Council membership (D. Pugh, P. Wilkinson, R. Norris, F. Clette)
  - the 3 parent international Unions (IUGG, IAU, URSI)
  - FAGS Service Directors (PSMSL, SIDC, WGMS, ISGI, ICET)in answer to a call for comments

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# Establishment and purpose of FAGS

- 1956: FAGS was established under the International Council of Scientific Unions (ICSU) , now International Council for Science
- FAGS: Federation of Permanent Services for Astronomy, Geophysics and related sciences
- Principal purpose: to encourage, the analysis of observational data likely to be of long-term value in astronomy, geophysics and related sciences.
- 2006: FAGS includes 12 Permanent Services, each operating under the authority of one or more of the interested Scientific Unions:
  - International Astronomical Union (IAU),
  - International Union of Geodesy and Geophysics (IUGG),
  - Union Radio-Scientifique Internationale (URSI).

The general tasks of the FAGS services are:

- (i) to continuously collect observations, information and data related to astronomy, geodesy, geophysics and allied sciences;
- (ii) to analyse, synthesize, and draw conclusions from them;
- (iii) to distribute data; and to publish the results obtained.


# Functions of the data analysis services

For the purpose of the statutes of FAGS, a data analysis service, shall be a scientific organization placed under the supervision of one or several Scientific unions and entrusted with some, or all, of the following tasks:

- to collect, as a continuous activity, information and observational data related to astronomy, geophysics, or related to the sciences referred to in § 1 (*i.e. previous slide*) and to put them in machine-readable form (*i.e. now web pages and ftp sites*),
- to analyse and synthesize them,
- to draw conclusions from them,
- to ensure the homogeneity of the evaluated data
- to fill gaps in the series of observations
- to revise long series of observations when appropriate
- to publish the results obtained
- to compile and distribute information important for the international scientific communities concerned
- to assist in the coordination and execution of international observational programmes
- to supply data on request

# The Current 12 Services within FAGS

Service	Title	Parent Unions	Directors
<b>BGI</b>	Bureau Gravimétrique International	IUGG	R. Biancale (interim), CNES, Toulouse, France
<b>CDS</b>	Centre de Données astronomiques de Strasbourg	IAU, URSI	F. Genova, Strasbourg, France
<b>ICET</b>	International Center for Earth Tides	IUGG	B. Ducarme, ORB, Bruxelles, Belgique
<b>IERS</b>	International Earth Rotation and Reference systems Service	IAU, IUGG	B. Richter, BKG, Frankfurt am Main, Germany
<b>IGS</b>	International GNSS Service	IUGG, URSI	R. Neilan, JPL, Pasadena, USA
<b>ISES</b>	International Space Environment Service	IUGG, IAU, URSI	D. Boteler, Ottawa, Canada
<b>ISGI</b>	International Service of Geomagnetic Indices	IUGG, URSI	M. Menvielle, CETP, Saint-Maur-les-f, France
<b>IVS</b>	International VLBI Service For Geodesy And Astrometry	IAU, IUGG URSI,	D. Behren, GSFC, Greenbelt, USA
<b>PSMSL</b>	Permanent Service for Mean Sea Level	IUGG	L. Rickards, POL, Birkenhead, UK
<b>SIDC</b>	Solar Influences Data Analysis Center	IAU, IUGG, URSI	R Van der Linden, ORB, Bruxelles, Belgique
<b>QBSA</b>	Quarterly Bulletin of Solar Activity	IUGG, IAU, URSI	K. Shibasaki, NAO, Minamimaki, Japan
<b>WGMS</b>	World Glacier Monitoring Service	IUGG	W. Haerberli, Universität Zürich, Switzerland

 : also WDC

# Characteristics of the FAGS Services

- A few of them: IERS, IVS, IGS consist of an international collaboration of organizations, with distributed functions, such as the *Central Bureau, Analysis Centers, Product Centers, Combination Centers*, etc, which are autonomous components.
- The activities of those services involve the voluntary contributions of many groups throughout the world, supported by their national institutions.
- There are strong interactions between some of the Services:  
IVS and IGS are *Technique Centres* for the IERS,  
ISES has an interest in ISGI and SIDC products, etc..
- Other Services are hosted by only one national organization and are therefore maintained nationally, but they are sometimes cooperating with other components in the world for providing the Service products.
- The services are independent (except from IVS and IGS, which are parts of the IERS), but ICSU and the union co-sponsors contribute to the coordinating function, which is performed by the *Council of FAGS*.
- Except from a small income from FAGS, the current FAGS Services are funded and *maintained by their host countries on behalf of the scientific community*.

# The FAGS Council and the Unions

FAGS is administered by a Council which shall meet every year

## FAGS Council

According to the FAGS statutes, the FAGS Council is composed of 2 representatives of IUGG, 2 representatives of IAU, 2 representatives of URSI, the Secretary, the past Secretary, restricted to a period of two years following his/her terms of office (if need be).

### The 2006-2008 membership

Nicole CAPITAINE (France)	IAU	<u>President</u>
Philip WILKINSON ( <u>Australia</u> )	URSI	<u>Vice-President</u>
Philip Woodworth (UK)		Secretary
<u>Niels ANDERSEN</u> (Denmark)		Past Secretary
Frederic CLETTE (Belgium)	URSI	
David PUGH (UK)	IUGG	
Ruth NEILAN (USA)	IUGG	
Ray NORRIS (Australia)	IAU	

### Current Unions General Secretaries

IAU (International Astronomical Union): Karel A. van der Hucht (Netherlands)

IUGG (International Union of Geodesy and Geophysics): JoAn Jocelyn (USA)

URSI (Union Radio-scientifique internationale) : Paul Lagasse (Belgium)

new FAGS secretary from april 2007 : Philip Woodworth (UK)

# Role and functioning of the FAGS Council

The FAGS Council is in charge of:

- approving the financial accounts and adopting the budget of the federation.
- examining the application for FAGS membership, or suggestions from Unions for withdrawal of services.
- reviewing the activity reports of the Services and checking basic criteria,
- considering possibilities of cooperation with other international organization or activity.
- distributing the grants allocated to the Services by FAGS,
- furthering the coherence between the members of the federation,
- encouraging their cooperation through a **General Committee**: Council membership, the Service Directors and Chairpersons of the Directing Boards.
- inter-acting with Services: there is one FAGS Representative (from the Council) as ex-officio member of the DB of each FAGS Service.

The role of the FAGS Council for distributing grants to the Services has largely decreased over the recent years due to the diminishing budget: originally coming mostly from ICSU, it is now coming only from the Unions and consists of an annual amount of the order of \$20 000.

# World Data Center System (WDC)

- The World Data Center (WDC) system was created to archive and distribute data collected from the observational programs of the 1957-1958 International Geophysical Year. Originally established in the **United States, Europe, Russia, and Japan**, the WDC system has since **expanded to other countries and to new scientific disciplines**.
- The WDC system now includes **~50 Centers** in 12 countries. Its holdings include a wide range of solar, geophysical, environmental, and **human dimensions data** covering timescales ranging from seconds to millennia and providing baseline information for research in many ICSU disciplines, especially for monitoring changes in the geosphere and biosphere—gradual or sudden, foreseen or unexpected, natural or man-made.
- WDCs are funded and maintained by their host countries on behalf of the international science community. They accept data from national and international scientific or monitoring programs as resources permit. All data held in WDCs must have a full open access.
- It serves the whole scientific community by **assembling, scrutinizing, organizing and disseminating data and information**

# World Data Centers versus FAGS Services

## *Differences*

- regional grouping coordination versus international coordination
- larger number of centers (50) as compared to FAGS (12)
- smaller centers (devoted to data management) versus operational services
- raw data providers versus scientific organizations in charge of analyses
- under the supervision of the WDCs Panel without the responsibility of one of the Scientific unions

## *Links*

- ICET, SIDC: FAGS Services and WDC
- ISGI, ISES, WGMS linked to WDCs  
(for Geomagnetism, Solar Terrestrial Physics, Rockets and satellites, Glaciology, etc.)

## *Current status*

- the variation between individual FAGS services or between individual WDCs is as large as between FAGS services and WDC centers

# Committee on Data for Science and Technology (CODATA)

- CODATA is an interdisciplinary Scientific Committee of the International Council for Science (ICSU),
- CODATA was established in 1966 by ICSU to promote and encourage, on a world-wide basis, the compilation, evaluation and dissemination of reliable numerical data of importance to science and technology.
- CODATA works to improve the quality, reliability, management and accessibility of data of importance to all fields of science and technology.
- CODATA is concerned with all types of data resulting from experimental measurements, observations and calculations in every field of science and technology, including the physical sciences, biology, geology, astronomy, engineering, environmental science, ecology and others. Particular emphasis is given to data management problems common to different disciplines and to data used outside the field in which they were generated.

# CODATA objectives

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- The **improvement of the quality and accessibility of data**, as well as the methods by which data are acquired, managed, analysed and evaluated, with a particular emphasis on developing countries
- The **facilitation of international cooperation among those collecting, organizing and using data**
- The promotion of an increased awareness in the scientific and technical community of the importance of these activities
- The **consideration of data access and intellectual property issues**

# The international services within the IAG

- × IERS (International Earth Rotation and Reference Systems Service)
  - × IGS (International GNSS Service)
  - ILRS (International Laser Ranging Service)
  - × IVS (International VLBI Service for Geodesy and Astrometry)
  - IGFS (International Gravity Field Service):
  - IDS (International DORIS Service)
  - × BGI (Bureau Gravimétrique International)
  - IGeS (International Geoid Service)
  - × ICET (International Centre for Earth Tides) (Belgium)
  - × PSMSL (Permanent Service for Mean Sea Level)
  - BIPM (Bureau International de Poids et Mesures -time section)
  - IBS (IAG Bibliographic Service)
- × : FGS Services
- : similar to IVS and IGS: IERS Technique Center
- : similar to BGI
- : coordinates the servicing of the geodetic and geophysical communities with gravityfield-related data, software and information (BGI, IGeS, ICGEM, IDEMS)

# The Global Geodetic Observing System (GGOS)

serves as a flagship of IAG to coordinate the geodetic research work and to represent geodesy in other sciences and in society



- basic component of GEOSS, providing the accurate geodetic reference frame required by
- all other systems and valuable observations of the Earth's geometry, gravity field and rotation and their changes over time.
- as a first step, the 2007-2009 GEO working plan includes the task "Global Geodetic reference frames".

# FAGS views on the future federation (1)

*Need for a Federation of astronomical and geophysical analysis services within ICSU*

- Astronomical and geophysical permanent services **add critical value to the interpretation of data and information**. The importance of these services is fundamental to the Unions.
- Significant advantages could result if a federation of such services **worked to achieve common goals, and to represent and defend the common interests of the data services**.
- The principal purpose of the Federation is **to encourage**, through the allocation of financial support and in other appropriate ways, **the analysis of observational data likely to be of long-term value in astronomy, geophysics and related sciences**.
- The current FAGS services to society **fulfil principal objectives of ICSU**. They are now a vital part of wider Governmental and societal interest.
- It is essential that the Services contributions be acknowledged and supported by a prestigious international organization, such as ICSU. **An ICSU Federation of Services should consolidate astronomical and geophysical regimes**.

# FAGS views on the future federation (2)

## *The role of a renewed Federation of astronomical and geophysical analysis services*

- Federating services in order to help them in having the **largest worldwide basis**, in **funding** and in **optimizing their operation**.
- Stressing the **importance for the Unions of the role of astronomical and geophysical services for researches** in many fields of astronomy and geophysics,
- Providing a **stronger sense of purpose** among all the contributing services.
- **Providing an umbrella organisation enabling recognition of the service** by a prestigious body such as ICSU (as at present). This would be strengthened by ensuring that **membership is not automatic, but would be contingent on achieving some defined minimum standard of service provision**.
- Providing a **framework within which Services are approved and assessed for scientific relevance and output**. Approval as a FAGS Service means international recognition, which in turn can consolidate national support.
- Providing a **single central body** for people seeking advice and policy on issues such as **intellectual property, open access**,
- Bringing together appropriate independent services to **consider general and specific matters related to data and information collection, analysis, archiving, generation of information products, and access to and cross-connections among the various data banks**.
- Establishing a forum for its member services to **compare notes and practices, establish best practice, and share tools and processes where possible**.
- **Providing a web page** that would act as a **portal** to its member services' web pages, as well as providing information about the Federation to stakeholders and potential stakeholders
- Acting as a **clearing-house and repository for standards, formats, ontologies, metadata**, that might be common to its member services.
- Acting as a **communication link to CODATA**

# FAGS views on the future federation (3)

## *Changes of the renewed Federation with respect to FAGS*

- **Others Services could be introduced** and would greatly augment the collective value of a Federation. The Federation should encourage other Service to join it.
- The Federation should **develop collaborations with potential ICSU partners**. An option could be to **strengthen the inter-connections between FAGS and WDCS**, or even more **to merge the two systems**, bearing in mind that providing raw data or data that result from detailed and sophisticated validation and analyses, require different expertise and different levels of funding.
- The structure of the Federation should be **such that the Service Directors are largely involved** in discussing and selecting the actions to be taken, **the Service Boards much more visible** than it is currently with FAGS, **shift the emphasis of the FAGS meetings to a Service Directors** (or a General Committee meeting), rather than the Council meeting.
- The Federation should **consolidate its strengths nearer the head** of the body and **develop a stronger public image**, for instance by proposing international standards and procedures for homogenisation between FAGS services and services from potential ICSU partners (information society, Earth observation, ...).
- It is vital that the Federation **develops an out-reach programme**: a new centre could be created just for outreach and promotion.
- The Federation needs to seek ways of **increasing the weight and impact of its prime Website**.
- There should be a **better interface with GEOSS** and a better ability to contribute to the development of GEOSS. This will give access to an intergovernmental recognition possibly via ICSU promotion.
- The **annual Service reports to the Council could be valuable documents** for providing regular Service visibility updates.
- The Federation should play a **key role in the forthcoming International Polar Year (IPY)**.

# Possibilities for a renewed Federation

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- Introduce other services in order to cover all the big topics of astronomy and geophysics
- Call from the Unions for becoming a service of the federation
- Ask the services to make a new application
- Encourage small services to merge in order to address a larger field (Atmosphere, Gravity, Solar environment, ....)
- Coordinate with a renewed set of WDCs
- Not too many services in order to be able to review their activities

# Possibilities for additional Services (see Annex 1)

## *Appendix A: Additional Services that could be included in an expanded Federation of Services*

Suggested by the International Association of Geodesy (Please see <http://www.iag-aig.org> for details)

- LAG Bibliographic Service (IBS)
- International Gravity Field Service (IGFS)
- International Centre for Global Earth Models (ICGEM)
- International Geoid Service (IGeS)
- International Doris Service (IDS)
- International VLBI Service for Geodesy and Astrometry (IVS)
- The International Laser Ranging Service (ILRS)
- Bureau International des Poids et Mesures (BIPM) - Time Section
- International Altimetry Service (IAS) a joint service with IAPSO

Suggested by the Union Commission on Geophysical Risk and Sustainability

- World Stress Map Service (<http://www.world-stress-map.org/>) - a fundamental database for Earth System Management. It is a standard global stress compilation of recent tectonic stress data.
- International Seismological Center (<http://www.isc.ac.uk/>) - a non-governmental organisation charged with the final collection, analysis and publication of standard earthquake information from all over the world.