Structure and main objectives of the International Association of Geodesy (IAG) 2015-2019

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Secretary General
International Association of Geodesy (IAG)
Munich, Germany

Structure of the International Association of Geodesy

International Council for Science (ICSU): 142 Countries, 31 Unions

IAU | IGU | ISPRS | **IUGG** | IUGS | … | other Unions

International Union of Geodesy and Geophysics (IUGG)

IACS | **IAG** | IAHS | IAGA | IAMAS | IAPSO | IASPEI | IAVCEI

International Association of Geodesy (IAG)

Commissions

1 Reference Frames | 2 Gravity Field | 3 Geodynamics | 4 Applications

Inter-Commission Committee on Theory

Scientific Services

Geom.: IERS | IGS | IDS | ILRS | IVS

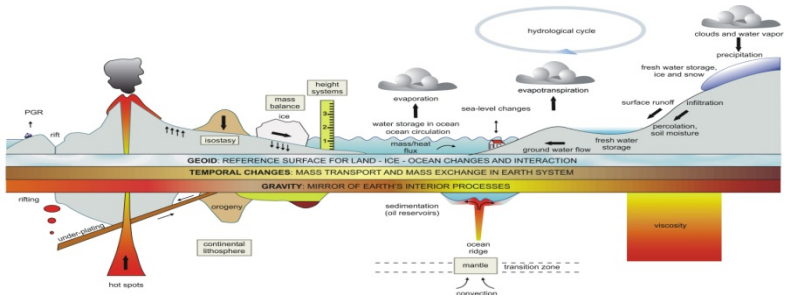
Gravity: IGFS | BGI | ICGEM | ISG | IDEMS

Combining: BIPM | IGETS | PSMSL

Global Geodetic Observing System (GGOS)

IAG Central Objective: Observation of Global Change

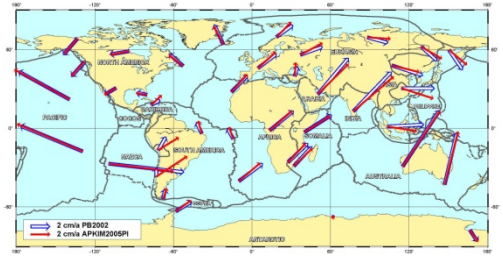
Processes in the solid Earth: geodynamics (deformation)

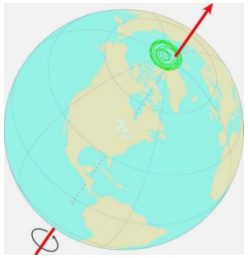


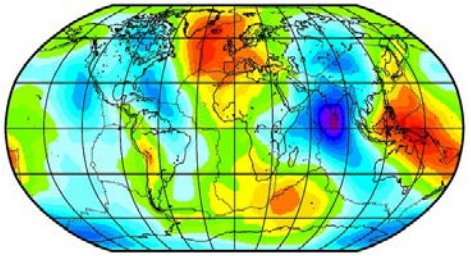
Processes in the atmosphere and hydrosphere: water cycle

deformations

variations of the rotation and the gravity field



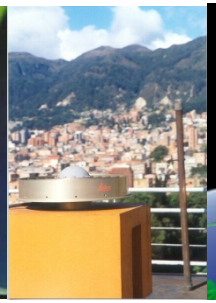


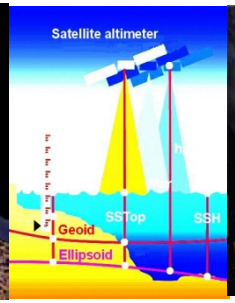


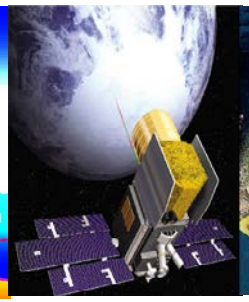
point positioning

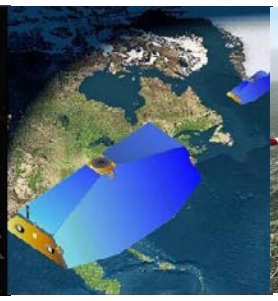
surface scanning

gravity measurement



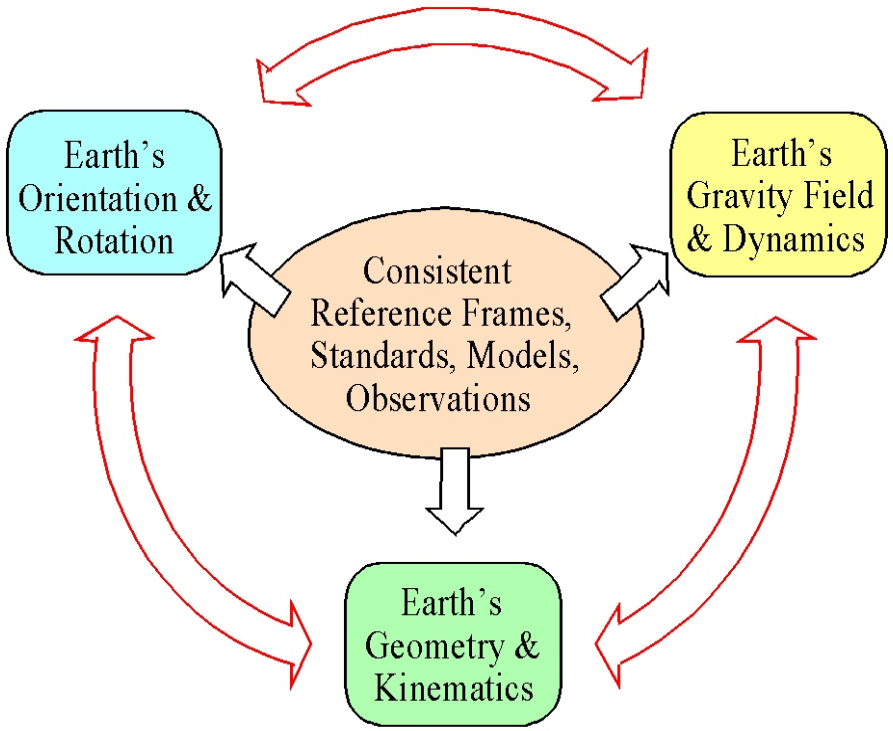






Fundamental Requirement for Monitoring Global Change

The study, understanding and modelling of the effects of the global change require precise, consistent and stable reference systems, standards and models for the three geodetic parameter groups. (Archimedes: “Give me a fixed point and I’ll move the world.”)

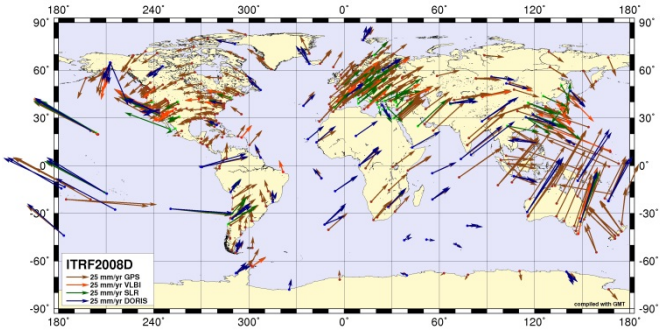


Its realisation by frames must be:

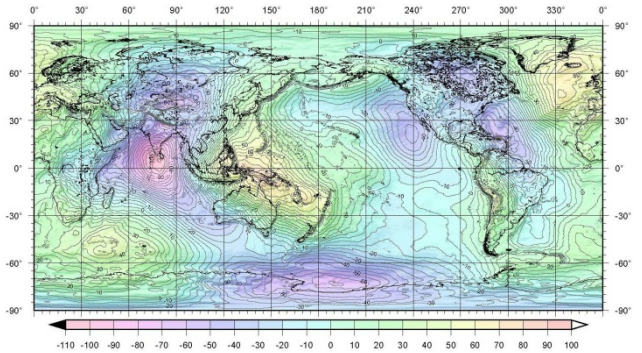
- One order more precise than the magnitude of phenomena to be analysed;
- Globally consistent and reliable (the same precision at any place of the Earth);
- Stable over long periods (the same precision at any time).

Existing and Planned Reference Systems and Frames

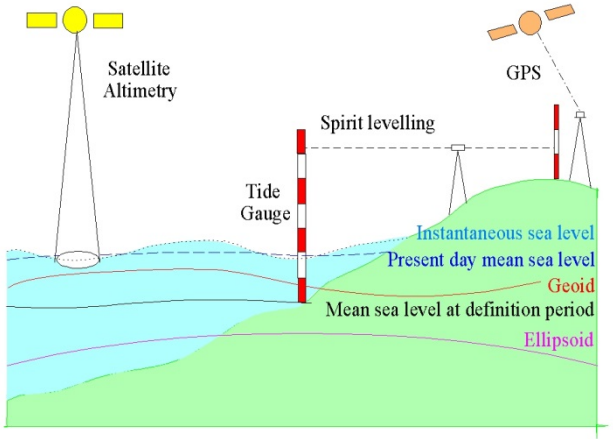
Geometry: Geometric reference **systems** define the origin, orientation and scale for position networks and their change in time. Geometric reference **frames** provide the corresponding coordinates (e.g. ITRF2008).



Gravity: Gravity reference **systems** define the level and scale of gravity values and their temporal change: in points or surficial areas. Gravity reference **frames** provide the corresponding values (e.g. IGSN1971 or the unofficial EIGEN-6C4/GGM05G/GOCO05s).



Heights: Height reference **systems** combine geometry and gravity to vertical coordinates under consideration of the gravity field. Height reference **frames** provide the corresponding (normal, orthometric) heights. At present only in local systems, not globally.



Structure and Activities of the IAG Commission 1

Reference Systems (President: Geoffrey Blewitt, USA)

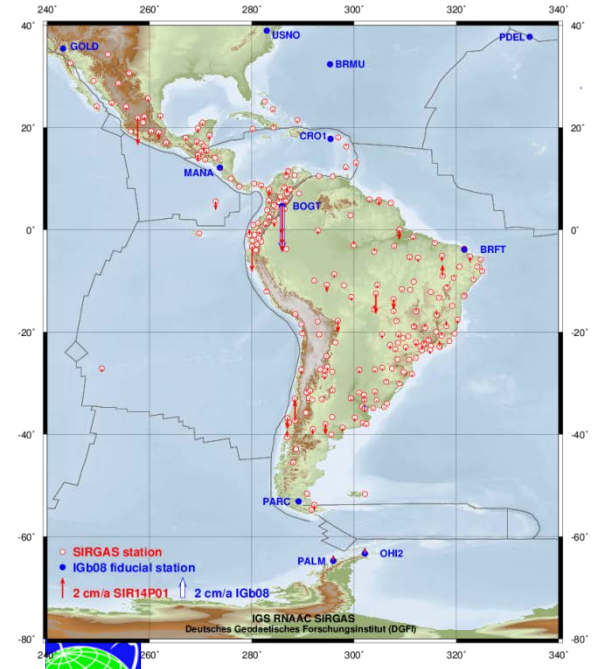
Sub-commissions (may change in four-year periods)**:**

SC 1.1: Coordination of Space techniques;

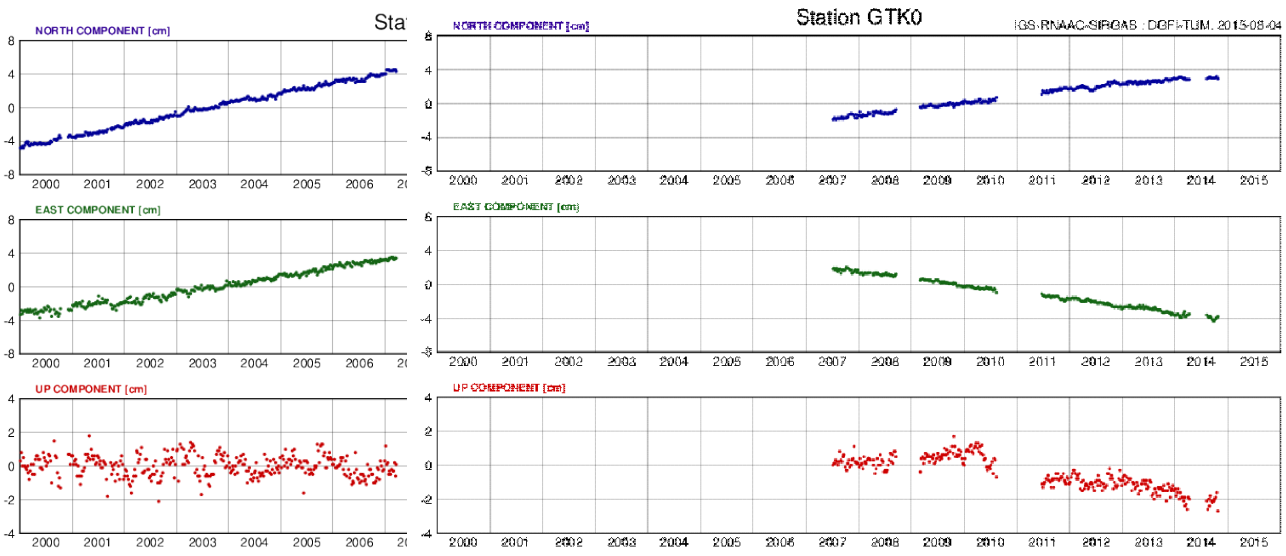
SC 1.2: Global Reference Frames;

SC 1.3: Regional Reference Frames (e.g. SC 1.3b: SIRGAS);

SC 1.4: Interaction of Celestial and Terrestrial Reference Frames.



Example of the results: SC 1.3b (www.sirgas.org)



Structure and Activities of the IAG Commission 2

Gravity Field (President: Roland Pail, Germany)

Sub-commissions (may change in four-year periods):

SC 2.1: Gravimetry and gravity networks;

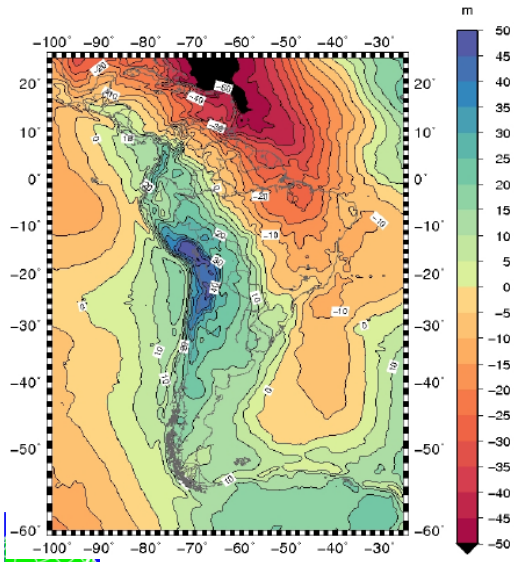
SC 2.2: Spatial and temporal gravity field and geoid modelling;

SC 2.3: Dedicated satellite gravity missions;

SC 2.4: Regional geoid determination (e.g. SC 2.4b and SC 2.4c);

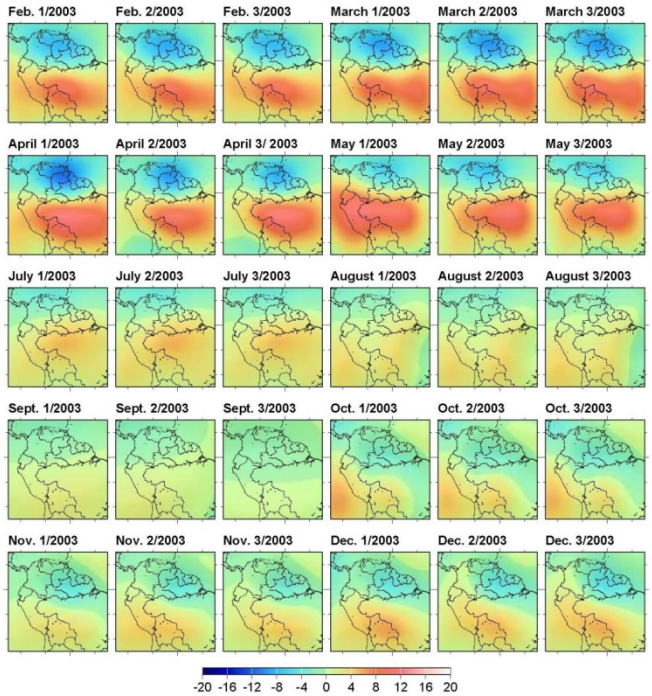
SC 2.5: Satellite altimetry;

SC 2.6: Gravity and mass displacements.



Example of results:
SC 2.2 Time series of GRACE gravity →

← SC 2.4b Geoid of South America and the Caribbean



Structure and Activities of the IAG Commission 3

Earth Rotation and Geodynamics (President: Manabu Hashimoto, Japan)

Sub-commissions (may change in four-year periods)**:**

SC 3.1: Earth tides and geodynamics;

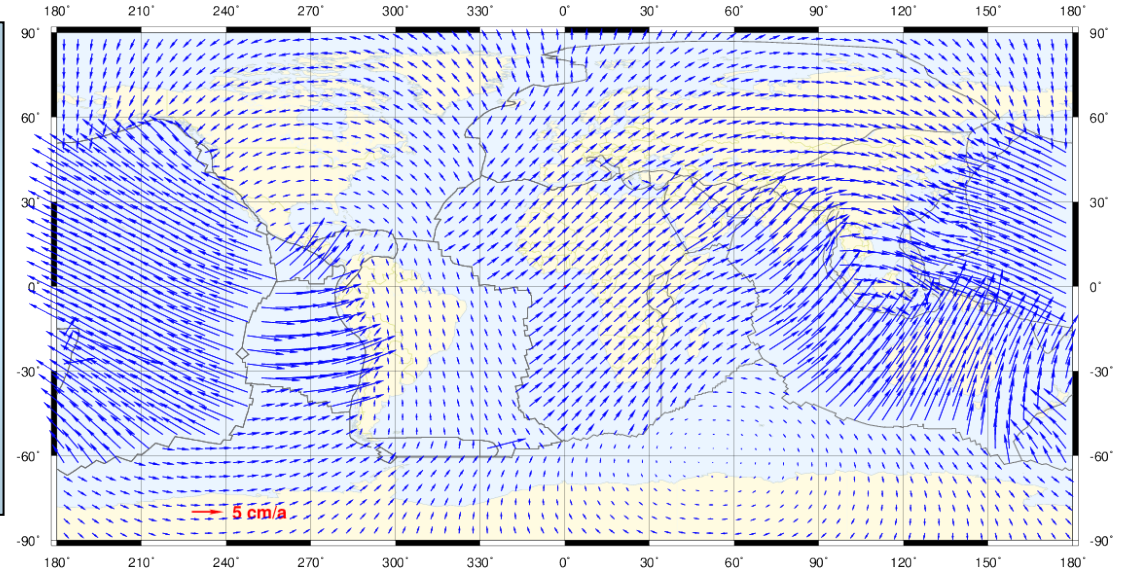
SC 3.2: Crustal deformation;

SC 3.3: Earth rotation and geophysical fluids;

SC 3.4: Cryospheric deformation;

SC 3.5: Tectonics and earthquake geodesy.

Example of results:
SC 3.2 Crustal deformation model based on geodetic observations and structure from a geophysical plate Model (Bird 2003).



Structure and Activities of the IAG Commission 4

Positioning and Applications (President: Marcelo Santos, Canada)

Sub-commissions (may change in four-year periods)**:**

SC 4.1: Alternatives and backups to GNSS;

SC 4.2: Geodesy in geospatial mapping and engineering;

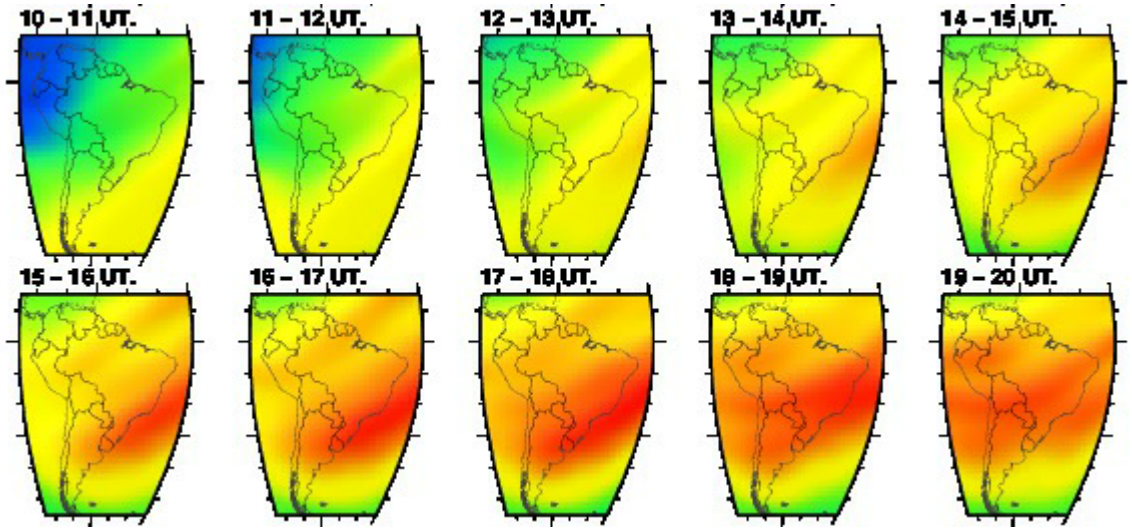
SC 4.3: Remote sensing and modelling of the atmosphere;

SC 4.4: Applications of satellite and airborne imaging systems;

SC 4.5: High-precision GNSS algorithms and applications;

SC 4.6: GNSS-reflectometry and applications

Example of results:
SC 4.3: Ionosphere by hour (www.sirgas.org)



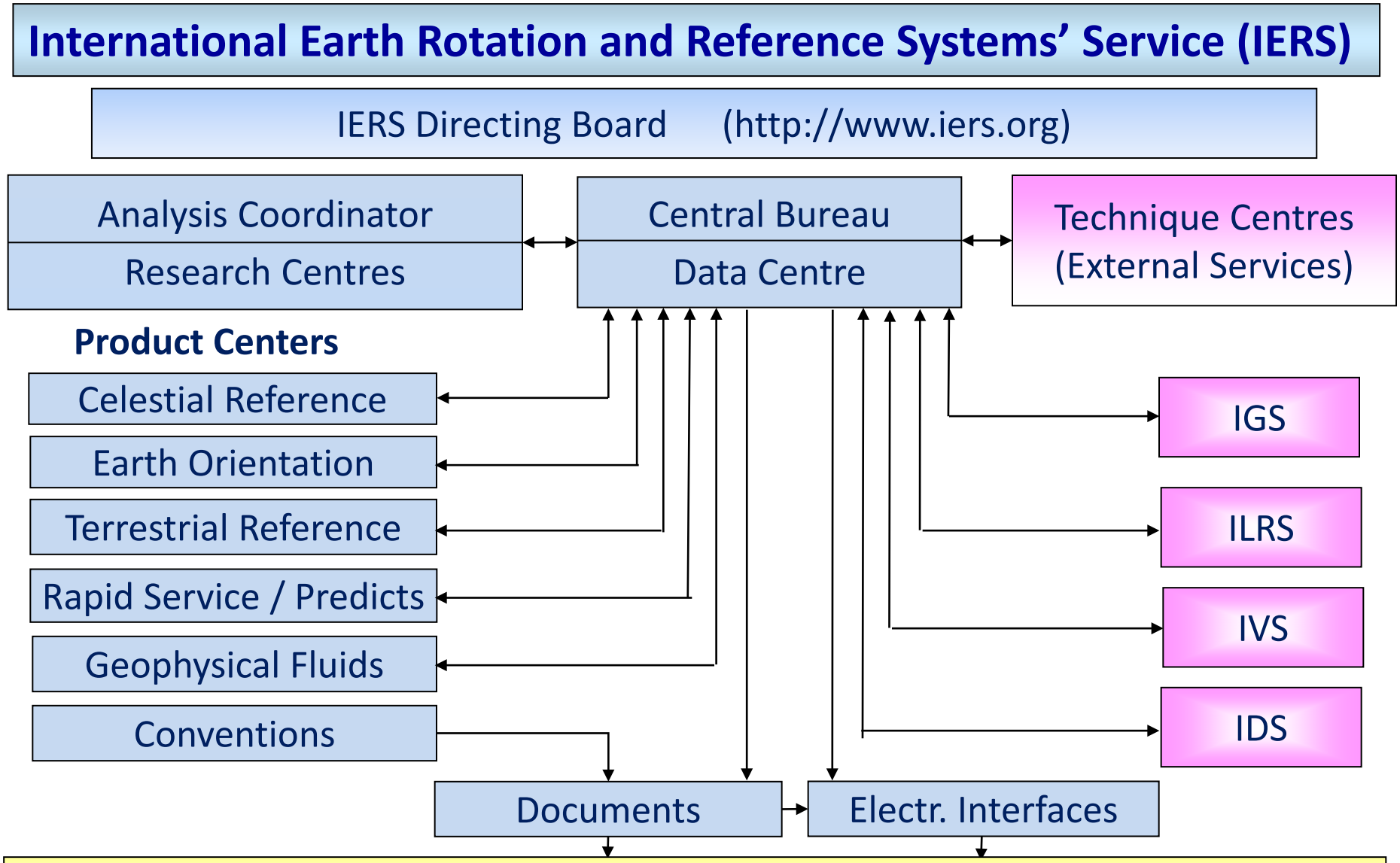
Structure of the Inter-Commission Committee on Theory

ICCT (President: Pavel Novak, Czech Republic)

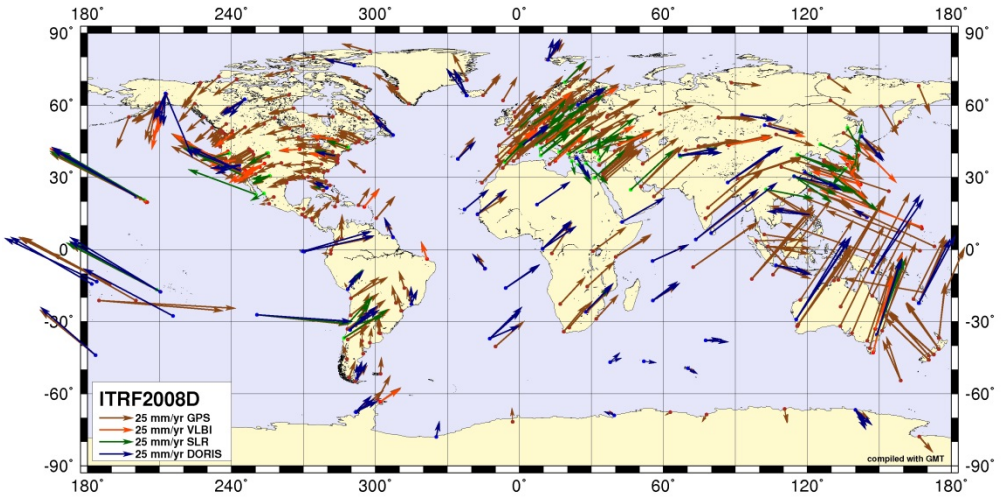
Joint Study Groups (together with Commissions, GGOS and Services)**:**

JSG 0.1: Application of time series analysis in geodesy
JSG 0.2: Gravity field modelling in support of height system realization
JSG 0.3: Comparison of methodologies in regional gravity field modelling
JSG 0.4: Coordinate systems in numerical weather models
JSG 0.5: Multi-sensor combination for the separation of geodetic signals
JSG 0.6: Applicability of current GRACE solution strategies to the next generation of inter-satellite range observations
JSG 0.7: Computational methods for high-resolution gravity field modelling and nonlinear diffusion filtering
JSG 0.8: Earth system interaction from space geodesy
JSG 0.9: Future developments of ITRF models and their geophysical interpretation

Structure of the major IAG Services (1)

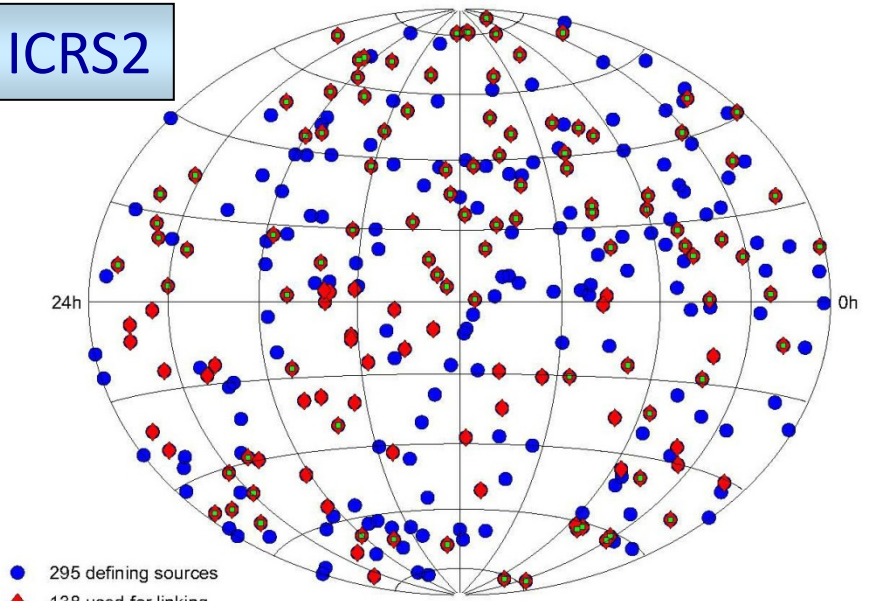


Example of IERS Products: Reference Systems

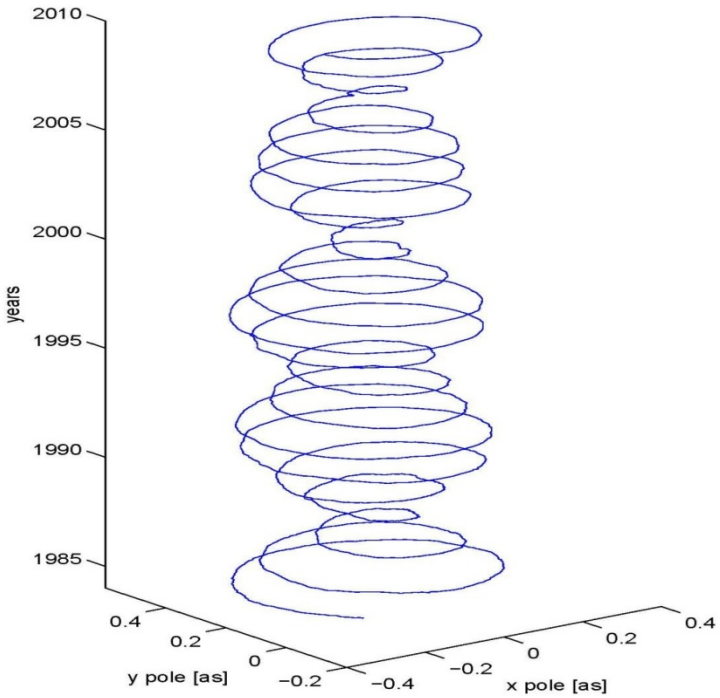


ITRF2008

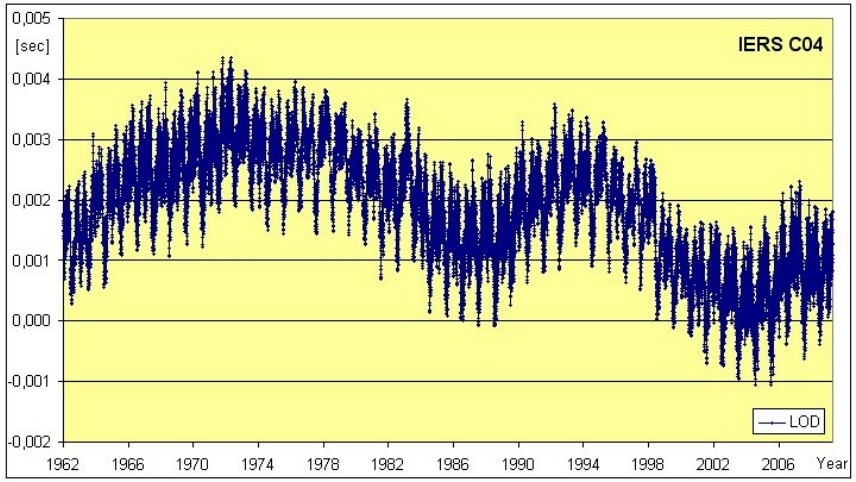
ICRS2



LOD



Polar Motion



Structure of the Major IAG Services (2)

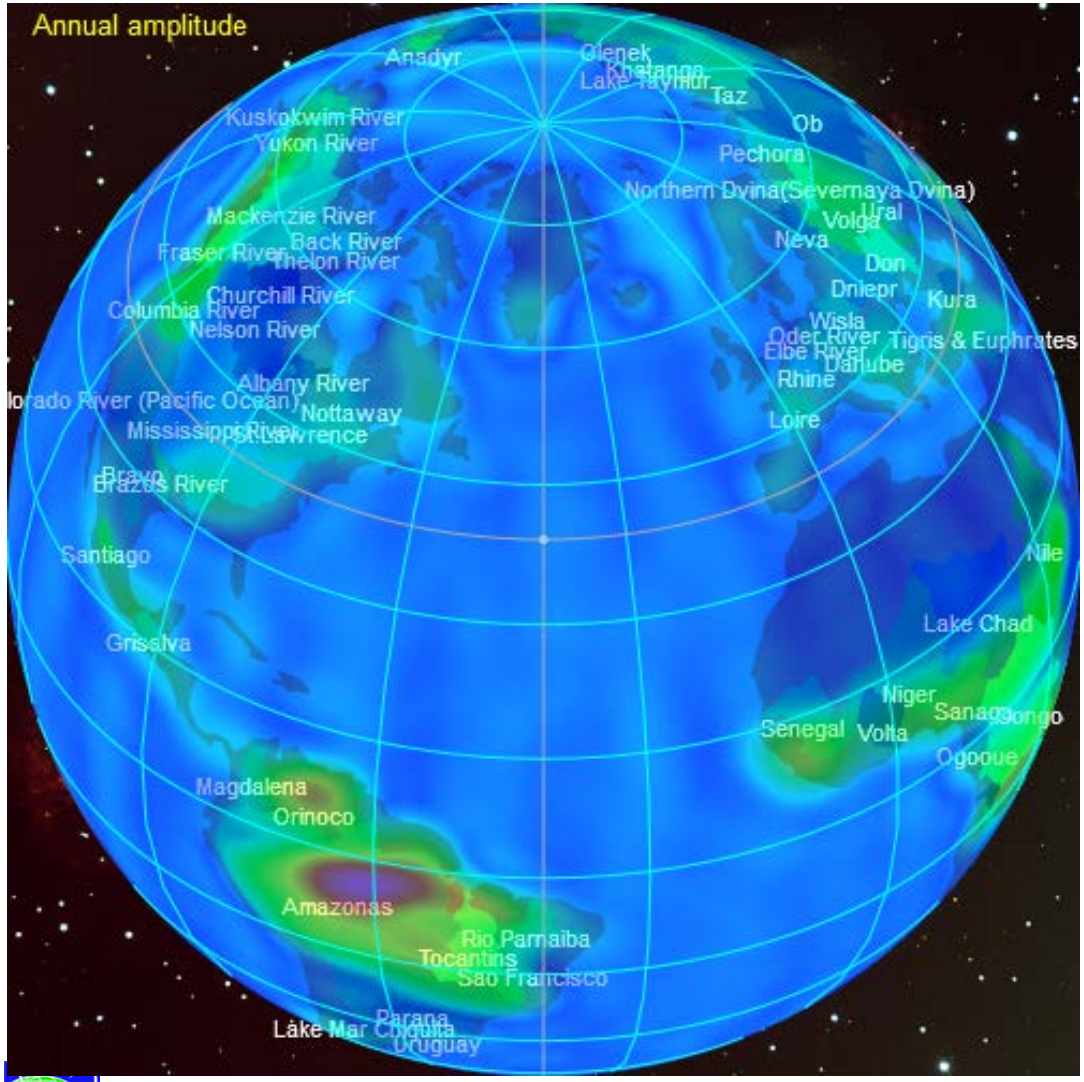
International Gravity Field Service (IGFS) (www.igfs.net)

The IGFS is the central organisation for five Services:

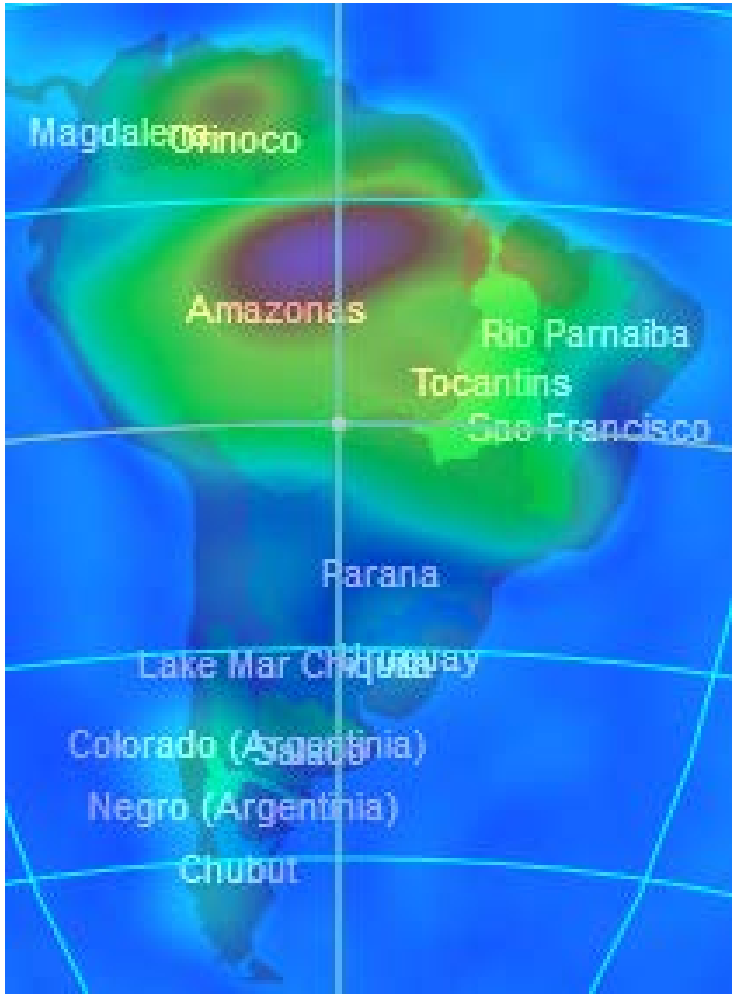
- BGI (Bureau Gravimetrique International), Toulouse, France, collects and archives gravimetric data;
- ICGEM (International Center for Global Earth Models), Germany, collects, archives, and analyses global gravity models;
- IDEMS (International Digital Elevation Model Service), TBD, collects and archives Earth topography models;
- IGETS (International Geodynamics and Earth Tide Service), France, collects and archives data and models for geodynamics studies;
- ISG (International Service for the Geoid), Milano, Italy, collects and archives regional geoid computations.

Example of IGFS Products: Global Gravity Field Models

Annual amplitudes of the gravitation potential variations

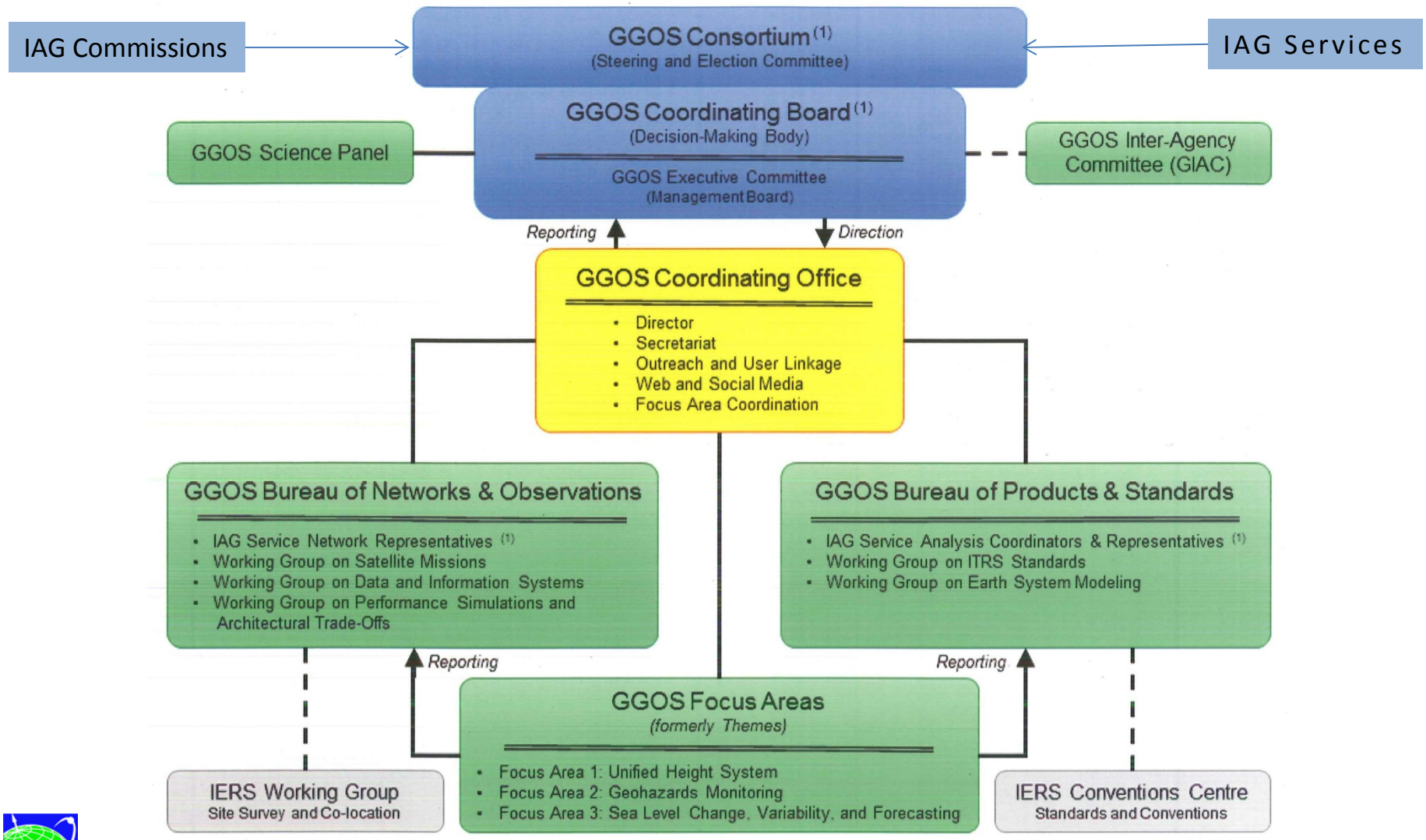


http://icgem.gfz-potsdam.de/ICGEM/



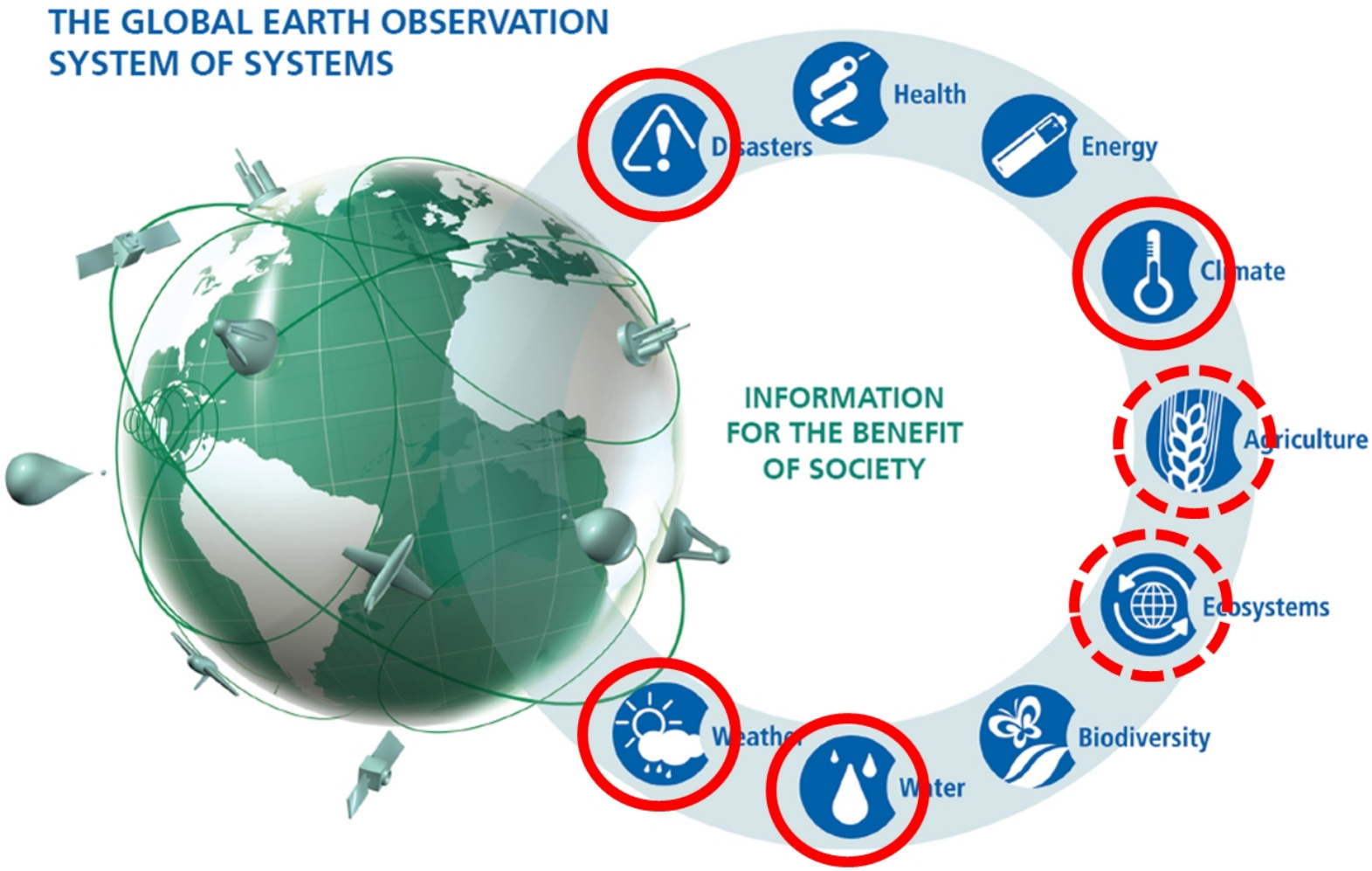
The Global Geodetic Observing System (GGOS)

GGOS (Chair: Hansjörg Kutterer (Germany)



GGOS Mission

GGOS shall benefit science and society by providing the foundations upon which advances in Earth science and applications are built.



Conclusions

- The International Association of Geodesy (IAG) collects, analyses, models and interprets observation data, stimulates technological development, and provides a consistent representation of the figure, rotation and gravity field of the Earth and their temporal variations.
- The work is based on a voluntary, unpaid cooperation of member countries and individual scientists in Projects, Study and Working Groups of IAG Commissions, Inter-Commission Committee, Services and the Global Geodetic Observing System.
- All countries are invited to become members of the IUGG, and all scientists worldwide are invited to become individual members of the IAG (150 USD/4 years). Students are free of charge and may apply for travel awards for participation in symposia.
- Please visit IAG's Websites (www.iag-aig.org or iag.dgfi.tum.de).
- Thank you very much for your attention!