

GGOS Terms of Reference
Some ideas and suggestions

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Guiding Principle:
Consistency with IAG By-Laws and GGOS 2020

IAG By-Laws define:

The Global Geodetic Observing System (GGOS) works with the IAG components to provide the geodetic infrastructure necessary for monitoring the Earth system and for global change research.

Includes implicitly a vision and a mission!

Vision of GGOS

The GGOS vision is to empower Earth science to extend our knowledge and understanding of the Earth system processes, to monitor ongoing changes, and to increase our capability to predict the future behaviour of the Earth system.

Mission of GGOS (1)

GGOS is the flagship of IAG. The development of GGOS in order to meet the requirements of scientific and societal applications of geodesy is the overarching theme for the research and science in IAG. GGOS is committed to disseminate geodetic observations and products to users inside and outside of IAG, and to support scientific and non-scientific communities with geodetic expertise. It promotes and improves the visibility of geodetic scientific research in Earth sciences and society.

The mission of GGOS is to facilitate networking among the IAG Services and Commissions and other stakeholders in the Earth science and Earth Observation communities, to provide scientific advice and coordination that will enable the IAG Services to develop products with higher accuracy and consistency meeting the requirements of particularly global change research, and to improve the accessibility of geodetic observations and products for a wide range of users.

Mission of GGOS (2)

The IAG Services, upon which GGOS is built, benefit from GGOS as a framework for communication, coordination, and scientific advice necessary to develop improved or new products with increased accuracy, consistency, resolution, and stability. IAG benefits from GGOS as an agent to improved visibility of geodesy's contribution to the Earth sciences and to society in general. The users, including the national members of IAG, benefit from GGOS as a single interface to the global geodetic observation system of systems maintained by the IAG Services not only for the access to products but also to voice their needs. Society benefits from GGOS as a utility supporting Earth science and global Earth observation systems as a basis for informed decisions.

3 Objectives of GGOS (1, overall objectives)

In order to realize its vision, GGOS has the objective to ensure the availability of geodetic science, infrastructure, and products as a basis for all global change research in Earth sciences. This implies the objective to ensure the consistent, comprehensive, and continuous monitoring of the 'three pillars of geodesy', namely *geometry and kinematic, Earth orientation and rotation*, and the *gravity field and its variability*.

3 Objectives of GGOS (2, specific goals)

In order to meet the accuracy requirements of a wide range of users, GGOS aims to integrate different techniques, different models, and different approaches and thus to achieve a better consistency, long-term stability, reliability, and the temporal and spatial resolution required for the understanding of geodetic, geodynamic and global change processes. GGOS views the Earth system as a whole by including the solid Earth as well as the fluid components and the interactions of these components, and it aims to improve the geodetic models at the level required by the observations. GGOS has the goal to ensure consistency across the 'three pillars of geodesy', as well as consistency between the different geodetic standards used in the services and the geosciences community, in agreement with the international unions and programs. GGOS targets an overall accuracy and consistency of GGOS products of the order of 10^{-9} or better. In particular, GGOS aims at maintaining the stability of the existing geometric and gravimetric reference frames by ensuring the generation of uninterrupted time series of state-of-the-art global observations related to the three pillars of geodesy.

3 Objectives of GGOS (3, applications)

GGOS and its related research and services' products will address the relevant science issues related to geodesy and geodynamics in the 21st century, but also issues relevant to society (global risk management, geo-hazards, natural resources, climate change, severe storm forecasting, sea-level estimations and ocean forecasting, space weather, and others). It is an ambitious program of a dimension that goes beyond IAG, requiring a strong cooperation within the geodetic, geodynamic and geophysical communities, and externally, to related endeavors and communities.

4 Tasks of GGOS

- List taken from GGOS 2020
- List quite long
- Consistency between GGOS ToR and GGOS 2020

4 Products of GGOS

- List taken from GGOS 2020
- List quite long
- Consistency between GGOS ToR and GGOS 2020
- Are these 'GGOS Products' or Products made available through GGOS?

6 Organizational Structure of GGOS (1)

The organizational structure of GGOS is comprised of two main parts, namely,

- (1) a steering and advisory part and
- (2) a coordination part.

In the first part, sufficient representation of the stakeholders is the guiding principle, while for the second part, coordination across the 'three pillars of geodesy' and across the IAG Services is the focus.

6 Organizational Structure of GGOS (2)

The first part, steering and advice, has the following key elements:

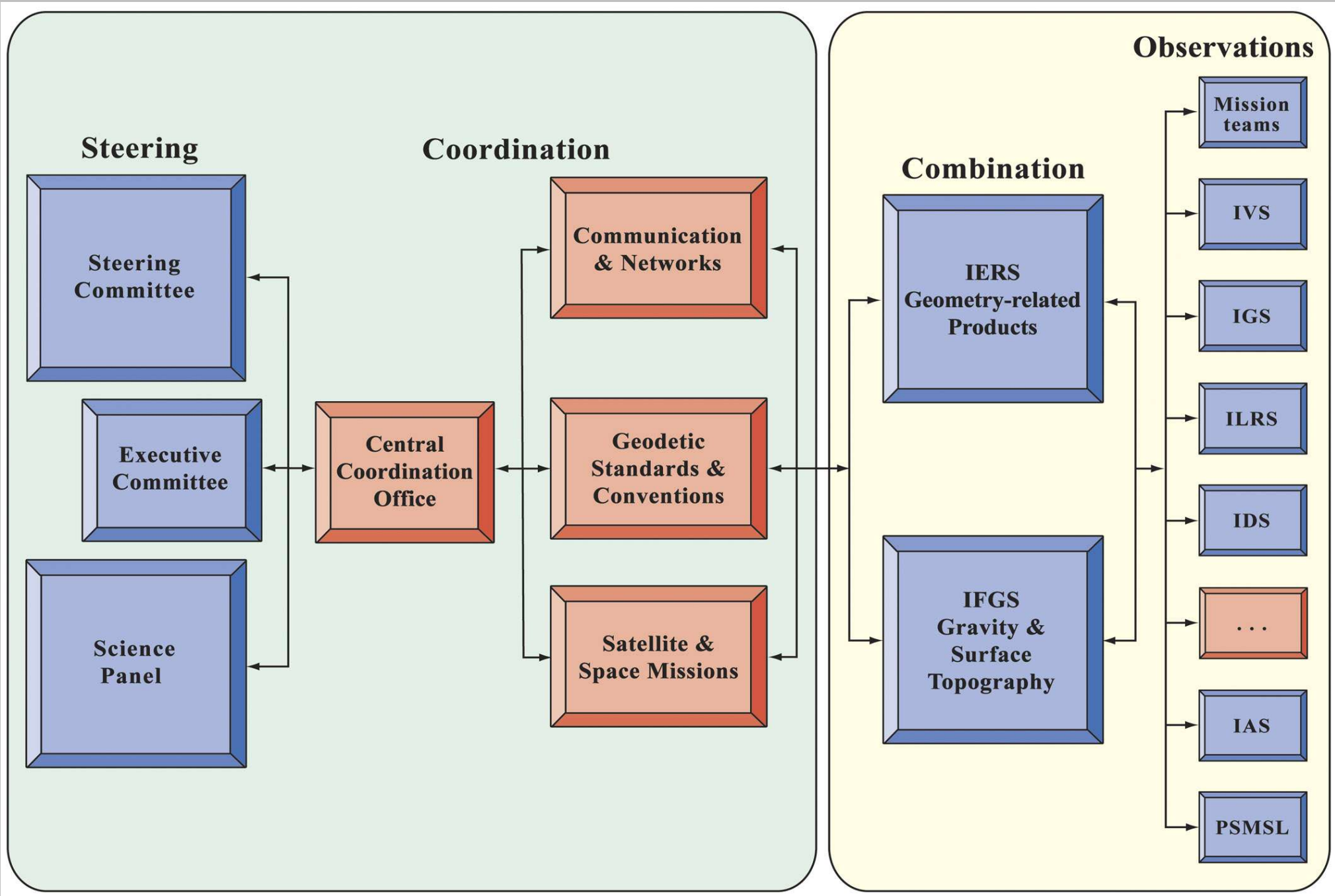
- **GGOS Steering Committee:** the central oversight entity.
- **Executive Committee:** serves at the direction of the Steering Committee to accomplish activities of GGOS between the Steering Committee meetings.
- **Science Panel:** advises the Steering Committee and represents the geodetic and geophysical community.
- **Working Groups:** address overarching issues common to several or all IAG Services, and are a mechanism to bring the various services' and commission activities together or to link the GGOS to external organizations (especially the Group on Earth Observations (GEO) and related GEO committees and working groups).

6 Organizational Structure of GGOS (3)

The second part, coordination, consists of four entities, namely:

- **Central Coordinating Office:** supports the Executive Committee, Steering Committee and Science Panel administratively and runs the day-to-day business.
- **Coordination and Networks entity:** facilitates the overall planning and coordination of the geodetic networks and the data communication.
- **Geodetic Standards and Conventions entity:** maintains geodetic standards and orchestrates the consistency of conventions across the three pillars of geodesy and across all IAG Services, and ensures that the standards and conventions are in agreement with the similar standards and conventions of relevant organizations.
- **Satellite and Space missions entity:** proposes, plans, and promotes satellite and space missions as required in order to achieve the objectives and goals of GGOS and works closely with relevant organizations, in particular the space agencies, for the implementation of these missions.

6 Organizational Structure of GGOS (4)



7 Steering, Advising and Administration

7.1 Steering Committee

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The chair of the GGOS Steering Committee (denoted in the following as GGOS Chair) is elected according to the By-Laws of IAG. The two Vice-Chairs of the GGOS Steering Committee are elected by the Steering Committee. The Vice-Chairs are elected for staggered terms of two years. The Vice-Chairs can be re-elected.

8 Coordination

8-1 Central Coordination Office

The Central Coordinating Office performs day-to-day activities in support of GGOS, and ensures coordination of the activities of the various components. It supports the Executive Committee, the Steering Committee and the Science Panel through administration of activities, including the preparation and documentation of meetings. It ensures information flow from these entities to the coordination entities and maintains a documentation of the GGOS activities.

This office will manage specific assistance functions that enhance the coordination across all areas of GGOS, including inter-services coordination and support for workshops.

The Office also maintains an extensive overview of internal and external GGOS users and supports GGOS outreach activities, including those to potential new users. As part of these activities, the Central Coordinating Office lends special support to the GGOS WG on GEO representation and any GGOS outreach and user linkage groups or WGs.

8-2 Communication and Networks

The GGOS Communication and Networks entity is responsible for the design and continuous improvement of the GGOS network, including the geometry, collocation, and communication links. This entity periodically assesses the network, identifies gaps, proposes augmentations and technological upgrades, and monitors the impact of network changes on products.

8-3 Geodetic Standards and Conventions

The Geodetic Standards and Convention entity of GGOS provides standards and conventions and strongly encourages compliance to quality assurance (validation, calibration, ensure the 1 part per billion [ppb] level) through increased interaction of the GGOS components, especially the services. The entity maintains definitions of a unique celestial reference system, a unique terrestrial reference system, a unique geodetic reference system, and a unique gravity reference system, as well as definitions of all the physical and mathematical models needed to analyze GGOS observations.

The entity carries out its work in close connection to relevant organizations such as IAG, IAU, FIG, as well as the national mapping authorities.

8-4 Satellite and Space Missions

The GGOS Satellite and Space Missions entity proposes geodetic (and geodesy related) space missions (including geodetic missions to the Moon and other planets) with the goal to ensure uninterrupted series of geodesy-related space missions to observe the time-varying gravity field, the time-varying sea-, ice-, and land-surface topography, and to maintain the geometric and gravimetric reference frames. The entity works with the GGOS Science Panel to develop the scientific rationale for these missions. The entity works in collaboration with the major space agencies towards implementation of the missions. The entity maintains a web site with information of all upcoming and planned missions.

9 Users

GGOS serves a wide range of users inside and outside of GEO. Inside IAG, the IAG Services, Commissions, Study-Groups, and individual scientists benefit from GGOS. In its development, GGOS provides a general research theme for IAG.

With the products made available through GGOS, it serves Earth scientists in general and supports Earth Observation. These products also support many non-scientific applications in society at large.

10 External relations

GGOS must be recognized by partners outside IAG including governments, inter-governmental organizations and non-governmental organizations (e.g, UNESCO, UNEP, FAO, UNOOSA, IOC, GEO, ICSU, IGOS-P, WCRP, IGBP, GEWEX, GOOS, GTOS, GCOS, CEOS, FIG, etc.), as geodesy's most important contribution to Earth sciences. For this purpose, contacts have to be established and/or maintained with these organizations. Relations to those institutions and organizations maintaining infrastructure that contributes to GGOS, such as national mapping authorities, space agencies, and CEOS, are of particular importance.

IAG is a Participating Organization of GEO. GGOS acts on behalf of the IAG in GEO and actively contributes to GEOSS.