

The Global Geodetic Observing System (GGOS) of the International Association of Geodesy (IAG) - Objectives and Status -



Hermann Drewes

Deutsches Geodätisches Forschungsinstitut
München, Germany



FIG Working Week 2005 and GSDI-8
Cairo, Egypt, 16-21 April 2005

The International Association of Geodesy

The International Association of Geodesy (IAG) is a scientific organization within the International Union of Geodesy and Geophysics (IUGG) under the umbrella of the International Council for Science (ICSU).

The mission of IAG is the advancement of geodesy as an Earth science including the study of the planets and their satellites. It is structured into four **Commissions** and twelve **Services** for fundamental and applied research and the generation of relevant products in support of science and society.

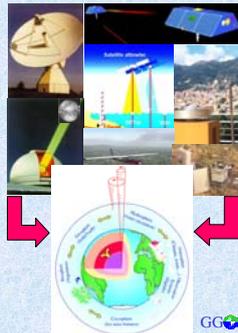
The **Global Geodetic Observing System (GGOS)** serves as a flagship of IAG to coordinate the geodetic research work and to represent geodesy in other sciences and in society.

2



The Vision of GGOS

- GGOS integrates different techniques, different models and different approaches in order to achieve better consistency, long-term reliability and understanding of geodetic, geodynamic and global change processes.



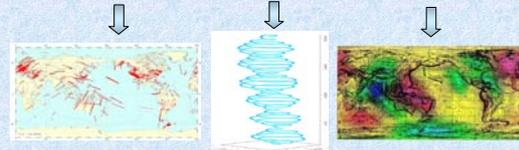
- GGOS provides the scientific and infrastructure basis for all global change research and is the bridge of geodesy to the other disciplines and application fields.

3



The Mission of GGOS

- To collect, archive and ensure accessibility of geodetic *observations and models*;
- To *identify geodetic products* and to establish the requirements concerning its *accuracy, time resolution, and consistency*;
- To ensure the robustness of the three fields of geodesy:
Earth's geometry, Earth's orientation, Earth's gravity field.



4



The Mission of GGOS (cont'd)

- To stimulate *close cooperation between IAG services*, identify *service gaps* and develop strategies to close them.

Examples of IAG *service gaps*:

- Unified global height reference system (global vertical datum),
- Vertical deformation models (tectonic, isostatic, loading, ...),
- Global sea level monitoring (satellite altimetry service),
- Free availability of terrestrial gravity data.

- To promote and improve the *visibility* of geodetic research.
- To *achieve maximum benefit* for the scientific community and for society in general.

5



The Objectives of GGOS

1. Coordination within geodesy

- GGOS aims at maintaining the stability of time series of geometric and gravimetric *reference frames*:
- ICRF, EOP, ITRF, IABGN, GGM, ...
- GGOS ensures the consistency between the different geodetic *standards* used in the geo-scientific community:
- time (TT, TCG, TCB, ...); - gravity (GM, ...); ...
- GGOS aims at improving the geodetic *models* at the level required by the observations:
- tide models, deformation models (e.g. loading), ...
- GGOS focuses on all aspects to ensure the consistency of geometric and gravimetric *products*.

6



The Objectives of GGOS (cont'd)

2. Representation of geodesy in international bodies

- IAG has become a participating organization in the inter-governmental ad-hoc **Group on Earth Observations (GEO)**.
- GEO was established by 33 nations plus the European Comm. during the Earth Observation Summit in Washington in 2003. It is the political commitment towards the development of a coordinated and sustained Earth observation system.
- GGOS shall be established as an official partner in the United Nations' **Integrated Global Observing Strategy (IGOS)**.
- IGOS is a **strategic planning process** that links research, long-term monitoring and operational programmes providing *governments with information for decision-making*.

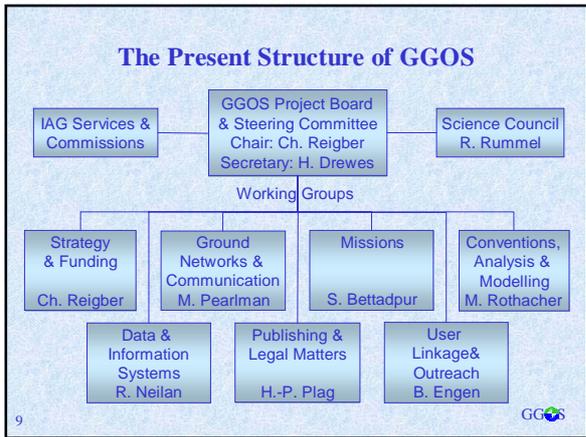
7

The Scientific Rationale of GGOS

GGOS shall have the *central theme*
“Global deformation and mass exchange processes in the System Earth“

Geodesy is capable of observing mass exchange, e.g. in hydrosphere:

8



International Projects of GGOS

- The **Inter-Service Data Integration for Geodetic Operations (INDIGO)** in support of NASA's Earth science and international user community will enable improved performance, accuracy, and efficiency by developing and providing uniform access to heterogeneous space geodetic data systems.
- The project on **Geodetic And Geohazard Observing Systems (GAGOS)** of the European Partners in GGOS (**EPIGGOS**) is to identify necessary adaptations of the existing infrastructure (incl. data management) and new deployments for the assessment of in-situ capabilities in Earth observation systems.
- Several national / multi-national projects (China, Scandinavia, ...) will improve the participation of countries in international programmes and activities.

10

Main Tasks of GGOS for Practice

Provide products as the basis for science and practice

Geodynamics, Global Change, Navigation, GIS, Engineering, ...

Consistent parameter estimation

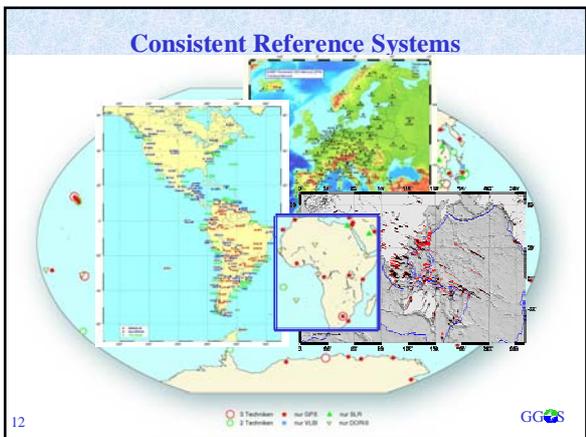
Geometry Orientation Sea Surface Gravity field

↑ **Consistent reference systems** ↑

Integration of geodetic observation techniques

geometric gravimetric

11



Urgent Need of Continental Reference Frames

- Densification of the global reference frame (ITRF) for stability of its geometry and orientation, global navigation, satellite orbit determination, ...
- Densification of the global frame for geodynamics, global change research, global data information systems, ...
- Supranational applications for geodetic survey (frontiers, natural resources, engineering structures, ...)
- Basis for consistent national datums and reference frames: cartography, GIS, navigation, ...
- Basis for consistent regional applications: cadastre, land management, engineering, traffic systems, ...

→ We need an African Reference Frame (AFREF) !

13



Conclusion

There are two principal aspects in the mission of GGOS:

1. "Internally"

To guarantee the reliability of geodetic products by ensuring the consistency of standards, parameters, models and reference systems used in the three fields of geodesy: Earth geometry, Earth orientation, and Earth gravity field.

2. "Externally"

To promote and improve the visibility of geodetic research and results, to represent geodesy in international bodies, and to achieve maximum benefit for the scientific community and for society in general.

14

