



The Global Geodetic Observing System: Meeting the Requirements of a Global Society on a Changing Planet in 2020

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plus many others**



Time Schedule

GGOS 2020

- Request for Strategy paper of the GGOS Steering Committee in April 2006
- First draft Reference document available on October 5, 2006 for GGOS Workshop
- January/February 2007: reviewer team established
- February 2/17 Versions 0.15/0.16, respectively
- GGOS Retreat and GGOS 2020 SWT Meeting, February 19-22, 2007, Oxnard, California
- Strategy and Reference documents available in March 2007
- Hearing phase, including GEO, IGOS-P, IUGG, national authorities and space agencies
- Final documents available for IUGG, July 2-13, 2007, Perugia, Italy



Expected Output

GGOS 2020

- Two documents needed:
 - **Strategy document:** short document for politicians, decision makers, funding agencies
 - **Reference document:** long, comprehensive document with all the user requirements and details of GGOS in 2020 mainly for those actually doing the work
- Draft Reference document: A lot of work still to be done: fill gaps, make it consistent, no repetitions, ...

Key points:

- qualitative and quantitative tables of user requirements
- Intensive and extensive discussions needed concerning the future structure and characteristics of GGOS



Contents

GGOS 2020

1. Introduction
2. The ways, means, and achievements of geodesy: The historic perspective
3. Observing a dynamic planet: Geodesy's contribution to science
4. Earth observation: Serving the needs of an increasingly global society
5. Geodesy's contribution to the functioning of a modern society
6. Geodesy: foundation for exploring the planets, the solar system and beyond
7. Integrated user requirements and functional specifications for the GGOS
8. The future geodetic reference frame
9. The future Global Geodetic Observing System (GGOS)
10. Towards GGOS in 2020
11. Recommendations



Writing Team

GGOS 2020

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- Chapter 11: All lead authors



1. Introduction

GGOS 2020

- The Challenge: Living on a changing, dynamic planet: *a limited planet, both with respect to resources and the capacity to handle interference with processes from a growing force, the goal to achieving sustainable development, the need for Earth observation*
- The potential: geodesy's contribution to a global society: *metrological basis, three pillars, mass monitoring system (to be added: what geodesy does already today)*
- The observing system: The current development of the Global Geodetic Observing System: *brief introduction of GGOS*
- The strategy: where to go from now: *Introduction of the GGOS 2020 Process and explanation of the report structure*



2. The ways, means and achievements of geodesy

GGOS 2020

- Geodesy: a very old and fully modern science
- The changing objects of geodesy: A brief history
- The tools and products of modern geodesy
- Determination and monitoring of the reference frames
- Observing Earth's shape: the geometric tools
- Observing Earth's gravity field: the gravimetric tools
- Observing Earth's rotation
- Indispensable for modern geodesy: Accurate time
- Ensuring consistency of the observations of geometry, gravity field, and rotation
- Collateral observations and applications (*atmosphere, ionosphere, tide gauges, time transfer*)



4. Earth observation: GGOS 2020

Serving the needs of an increasingly global society

Goal: Understanding the requirements of nine Societal Benefit Areas (SBA) of GEO



Serving the needs of an increasingly global society

- The current and future framework of global Earth observations
- **Disasters:** Reducing loss of life and property from natural and human-made disasters
- (*)**Health:** understanding environmental factors affecting human health and well being
- **Energy Resources:** improving management of energy resources
- **Climate change:** Understanding, assessing, predicting, mitigating, and adopting to climate variability and change
- **Water:** Improving water resource management through better understanding of the water cycle
- **Weather:** Improving weather information, forecasting, and warning
- **Ecosystems:** Improving the management and protection of terrestrial, coastal, and marine ecosystems
- **Agriculture:** Supporting sustainable agriculture and combating desertification
- **Biodiversity:** Understanding, monitoring and conserving biodiversity



4. Earth observation: GGOS 2020

Serving the needs of an increasingly global society

Specific Topics addressed in the Chapter:

- **Disasters:** earthquakes, volcanoes, landslides, tsunamis, storms, subsidence, floods
- **Energy resources:** wind, subsidence, geothermal
- **Climate change:** ocean and atmospheric circulation
- **Water:** sea level, fresh water resources, lakes, streams, ground water, ice, dams, water mass redistribution, soil moisture
- **Weather:** enhancing prediction tools, extreme events, space weather
- **Ecosystems and Carbon cycle:** Land cover (forests, desertification), wetlands
- **Land use:** agriculture & irrigation, deforestation, desertification, erosion/deposition, urbanization



11. Recommendations

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Preliminary Recommendations:

- Framework conditions
- Infrastructure
- Products
- Organizational
- Specific actions

Relevant for

- CEOS
- IGOS-P
- GEO



11. Recommendations

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Framework conditions:

- transition from research to operational
- sufficient infrastructure and human resources
- international agreement on reference frame



11. Recommendations

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Infrastructure:

- Operational mass transport monitoring through gravity missions (GRACE-type, others?)
- Satellite altimetry
- More satellite laser ranging (both ground stations and LAGEOS-type satellites)
- abs. grav. at a global network of reference sites
- Integration InSAR and GNSS
- filling of spatial gaps in the ground networks
- operational core: to build up and maintain the minimally necessary infrastructure as an operational core of an Earth system service (ice sheet and sea level, hazards and disasters, water cycle, climate, and resource management).



11. Recommendations

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Products:

- improved reference frame definition and monitoring
- real-time access to the reference frame
- Earth system service (mass fluxes, surface deformations, rotation in terms of related dynamics)
- GNSS seismology
- ...



11. Recommendations

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Organizational:

- GGOS under a joint IAG/UNESCO body or a joint Steering Committee
- International body for geodesy (International Geodetic Commission).

Specific actions:

- consider a resolution recommending to the GEO member countries to maintain, and if necessary, increase their support of the operational maintenance of the necessary infrastructure in the light of the importance of the geodetic reference frame for Earth observation.
- ...