

# GGOS Bureau of Products and Standards: Recent activities and future plans

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## Introduction

The Bureau of Products and Standards (BPS) is a key component of the Global Geodetic Observing System (GGOS) of the International Association of Geodesy (IAG). The BPS keeps track and fosters homogenization of adopted standards and conventions across all IAG components and supports the IAG in its goal to provide consistent science data products describing the geometry, rotation and gravity field of the Earth. Figure 1 illustrates the integration of the different observation techniques to determine consistent geodetic parameters as the basis for a better understanding of geodynamic processes and a reliable quantification of climate change phenomena (e.g., sea level rise, ice melting, global water cycle).

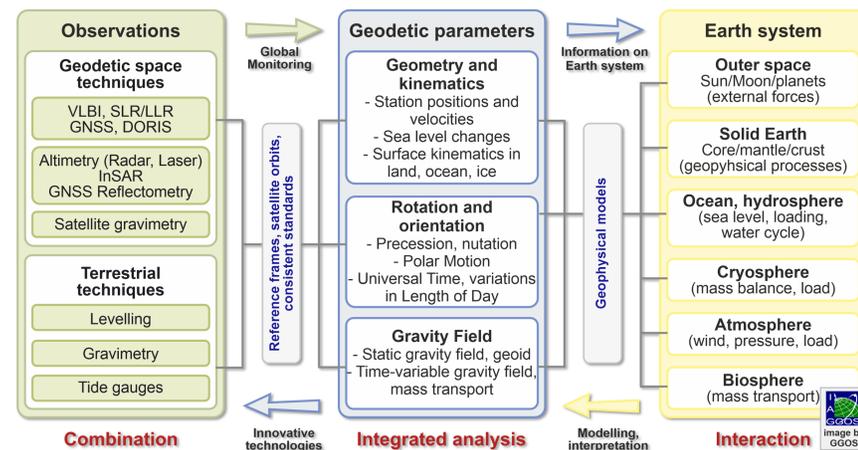


Figure 1: Integration of geodetic observation techniques into consistent parameters for Earth system research.

## BPS organizational structure

The BPS is chaired by DGFI-TUM and jointly operated with TUM's Chair of Astronomical and Physical Geodesy. Further involved partners are GFZ (German Research Centre for Geosciences, Potsdam) and DLR (German Aerospace Centre, Oberpfaffenhofen).

The following GGOS components are associated to the BPS:

- Committee “Contributions to Earth System Modeling”, Chair: Maik Thomas, GFZ, Germany
- Committee “Definition of Essential Geodetic Variables”, Chair: Thomas Gruber, TUM, Germany
- Working Group “Consolidation of a best estimate GRS based on the adopted  $W_0$  of the IHRF”, Chair: Urs Marti, swisstopo, Switzerland

## BPS activities

Key tasks of the BPS are to:

- act as contact and coordinating point for homogenization of IAG standards and products;
- keep track of adopted standards and conventions across all IAG components, and provide recommendations to resolve inconsistencies;
- regularly update the inventory of standards and conventions used for the generation of IAG products to incorporate the latest developments;
- interact with all IAG components and external stakeholders in the field of standards and conventions (e.g., IAU, ISO, OGC, CODATA, UN-GGCE);
- act as IAG representative to the ISO Technical Committee (ISO/TC 211);
- foster the development of integrated products required for Earth sciences and societal needs;
- contribute to the definition of Essential Geodetic Variables (EGVs);
- contribute to the mapping of the global geodesy supply chain for the generation of geodetic products (with the UN-GGCE and IAG Services);
- contribute to GGOS outreach activities (e.g., generation of user-friendly descriptions of geodetic products, social media posts, brochures, videos) and to the development of the GGOS Portal (together with the GGOS Coordinating Office).

## Description and promotion of geodetic products

In collaboration with other IAG and GGOS components, the BPS has created user-friendly descriptions for geodetic products, which have been implemented at the GGOS website. An example is shown in Fig. 2.

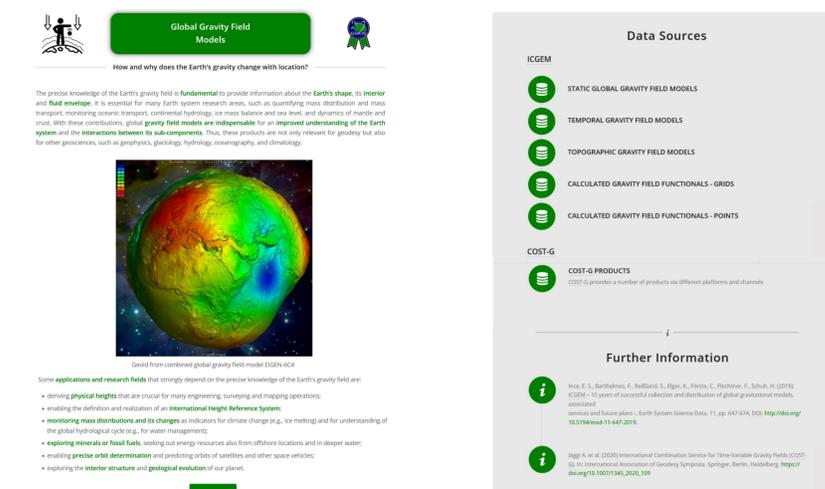


Figure 2: Description of global gravity field models (www.ggos.org, screenshot taken on 2024-04-05).

## Definition of Essential Geodetic Variables

Within the geoscientific community, the GCOS (Global Climate Observing System) and GOOS (Global Ocean Observing System) have defined Essential Climate and Ocean Variables (ECVs/EOVs). In a similar way, GGOS is working on the definition of essential variables that are crucial to characterize the geodetic properties of the Earth and that are needed to understand the dynamics of the Earth system in all its components and their interplay (Fig. 3). It is proposed to name these variables **Essential Geodetic Earth Observation Variables (EGVs)**. A draft white paper with the definition of such EGVs provides the proposed concept (Gruber et al. 2024):

- An EGV is a high-level variable or a group of linked variables that critically contribute to characterize the geometric and physical shape of the Earth and its orientation in space.
- The classification defines for each EGV the domain (**Global, Land and Ocean**), the subdomain (**Geometry or Physical Shape of the Earth**), the scientific area, an EGV steward, and the related geodetic products contributing to the EGV.
- An example for an EGV are **Global Reference Frames** with the contributing products **CRF** (Celestial Reference Frame), **GRF** (Gravity RF), **HRF** (Height RF) and **TRF** (Terrestrial RF).

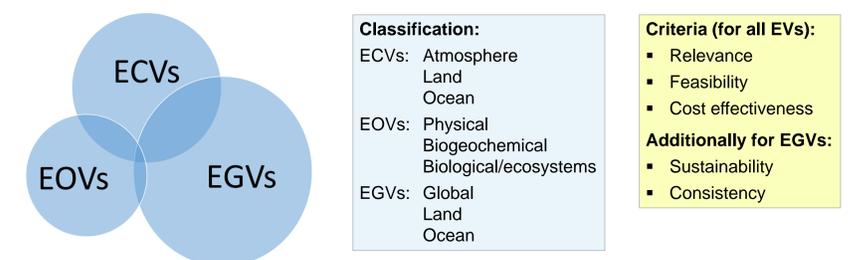


Figure 3: Classification and criteria for Essential Variables (EVs). Since the different observing systems GGOS, GCOS and GOOS observe components of the same Earth, there are common EVs (e.g. sea level).

## The way forward – next steps:

- Internal review of the draft white paper by the GGOS Science Panel and Governing Board
- Interaction with IAG, UN-GGCE and the broader geoscientific community
- Definition of requirements for EGVs
- Need assessment and gap analysis
- Generation of fact sheets for EGVs

## Reference

Gruber T., Angermann D., Sánchez L.: White Paper: Definition of Essential Geodetic Earth Observation Variables (EGVs), under review within GGOS.

