



Galileo Geodetic Service Provider - Prototype -



Project

The Galileo Geodetic Service Provider (GGSP) is a project fully funded by the Sixth Framework Programme of the European Community. The goal of the GGSP is to build up a prototype for the development of the Galileo Terrestrial Reference Frame (GTRF) and the establishment of a service with products and information for the potential users.

The main function of GGSP is the realisation of a precise and stable GTRF. The GTRF will be the basis for all Galileo products and services, serving both the Galileo Core System (GCS) as well as the Galileo User Segment. This implies that the GGSP should enable all users of the Galileo System to rapidly access the GTRF with the precision required for their specific application. In addition, the GGSP will ensure the adherence to the defined standards of all its products and educate users about the usage and realisation of the GTRF.

Objectives

The GGSP project started in July 2005 and is expected to finish in May 2009. The main outputs of the GGSP prototype are:

- Consolidation of GGSP Prototype (specification, definition and planning phase)
- Realisation of the GTRF
- Validation of the GTRF
- Maintenance of the GTRF
- Validation of satellite orbits, clocks and Earth Rotation Parameters
- Outreach and applications in geodesy
- Recommendations for the implementation and operation of the permanent GGSP

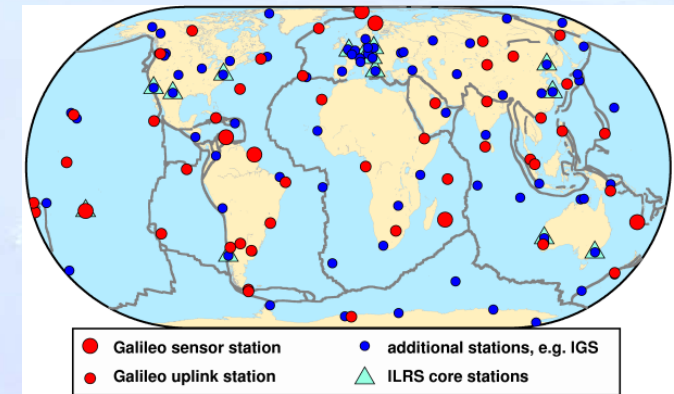
GTRF

A Terrestrial Reference System (TRS) is a spatial reference system co-rotating with the Earth in its diurnal motion in space. In such a system, positions of points anchored on the Earth's solid surface have coordinates which undergo small variations with time, due to geophysical effects (tectonic or tidal deformations). A Terrestrial Reference Frame (TRF) is a set of physical points with precisely determined coordinates in a specific coordinate system (Cartesian, geographic, mapping etc.) attached to a TRS. Such a TRF is a realisation of the TRS.

The GTRF is designed to be compatible with the International Terrestrial Reference Frame (ITRF) and will therefore be a realisation of the International Terrestrial Reference System (ITRS).

The GTRF station coordinates shall be identical to the ITRF station coordinates within a tolerance of 3 cm (at 95 % confidence level) for all station markers that appear in both frame realisations.

The GGSP tasks comprise specification for the GTRF implementation, datum definition and analysis strategy for GTRF derivation and maintenance over time.



Example of possible station locations under consideration

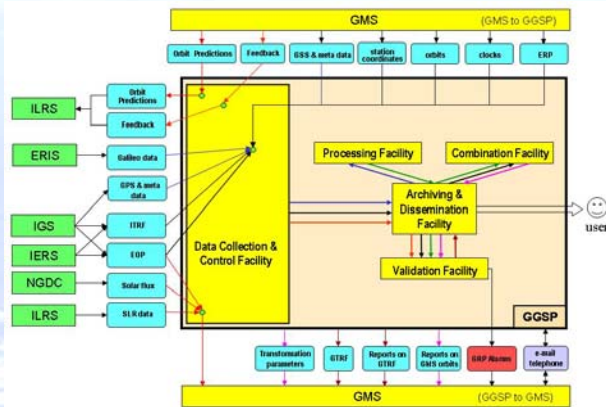


The GGSP project is managed by the European GNSS Supervisory Authority through EU 6FP funds



Key GGSP Linkages

For the realisation of the GTRF several external inputs are needed. The main interfaces for the GGSP are with the Galileo Mission Segment (GMS), the International GNSS Service (IGS) and the International Earth Rotation and Reference Systems Service (IERS). The GMS is responsible for providing access to the Galileo Sensor Station (GSS) data, both the station meta data as well as the Galileo/GPS observations. IGS stations are used to enable the expression of the GSS station coordinates in the ITRF. In addition, the IGS stations will serve to increase the density of the GSS station network and thereby strengthen the overall network solution.



Products

The prime task of the GGSP is to provide station coordinates and velocities for the GSSs. Furthermore, the GGSP responsibilities will include the generation of other precise products that are needed by the advanced Galileo geodetic user community to get full access to the GTRF. These products, generated simultaneously with the GTRF activities performed within the GGSP, will at least comprise

- Precise Galileo Satellite Orbit Estimates
- Precise Galileo Satellite Clock Estimates
- Earth Rotation Parameters (ERPs)
- GTRF data and information to the users

Users

There are a wide range of users, user groups and user communities of Global Navigation Satellite Systems (GNSSs) such as Galileo. These users need knowledge about the inherent reference frame as the basis of all Galileo services and applications.

Among the potential users of the GGSP are:

- Geodetic users, such as
 - IAG services IGS, IVS, ILRS, IDS and IERS
 - Regional organisations
 - National Mapping Geodetic and Surveying Agencies
 - Differential correction services
 - Civil engineering
 - GIS companies
- Scientific users, in the areas of e.g.
 - Geosciences, seismology etc.
 - Deformation monitoring, geodynamics
 - Oceanography, hydrology
 - Climate research and meteorological services
 - Natural hazards
- Application users, in the fields of e.g.
 - Navigation (road, aviation, maritime etc.)
 - Technology
 - Recreation and tourism

Consortium

The consortium created for the establishment of the GGSP Prototype brings together European and non-European experts in the field of geodesy from:

- GeoForschungsZentrum Potsdam (GFZ), Germany
- Astronomisches Institut der Universität Bern (AIUB), Switzerland
- Bundesamt für Kartographie und Geodäsie (BKG), Frankfurt, Germany
- European Space Operations Centre (ESOC), Darmstadt, Germany
- Institut Géographique National (IGN), Paris, France
- Natural Resources Canada (NRCan)
- Wuhan University (WHU), China

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