



Galileo

Geodetic

Service

Provider

- Prototype -

Project description

The Galileo Geodetic Service Provider (GGSP) is a project fully funded by the Sixth Framework Programme for Research and Technological Development of the European Union. 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 highly precise and stable GTRF which will be the basis for all Galileo products and services. 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.

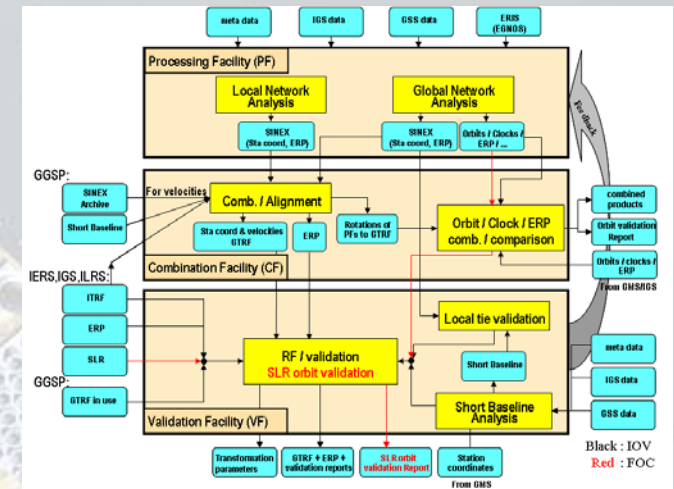
Objectives

The GGSP project started in July 2005 and is finalized 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, clock corrections and Earth Rotation Parameters
- ◆ Outreach and applications in geodesy
- ◆ Recommendations for the implementation and operation of the permanent Geodetic Reference Service Provider (GRSP)

External and internal GGSP Interfaces

For the realisation of the GTRF several external inputs are needed. The main interfaces for the GGSP are with the Galileo Mission Segment (GMS) and the Services of the International Association of Geodesy (IAG), e.g., the International GNSS Service (IGS), the International Earth Rotation and Reference Systems Service (IERS) and the International Laser Ranging Service (ILRS). The GMS is responsible for providing access to the Galileo Sensor Station (GSS) data. IGS stations will serve to increase the density of the GSS station network and thereby strengthen the overall network solution.

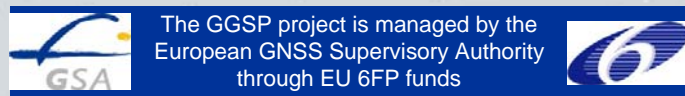


Three Processing Facilities (PF), using different software packages, implemented a global network analysis to derive the products (see section “Products”) on a weekly basis.

The Combination Facility (CF) combines the network solutions and aligns the combined solution to ITRF to generate the GTRF.

The Validation Facility (VF) is responsible for the validation of the weekly solutions of the PF and of each new GTRF realisation.

Beyond this, the Data Collection and Control Facility (DCCF) and the Archiving and Dissemination Facility (ADF) support all activities.

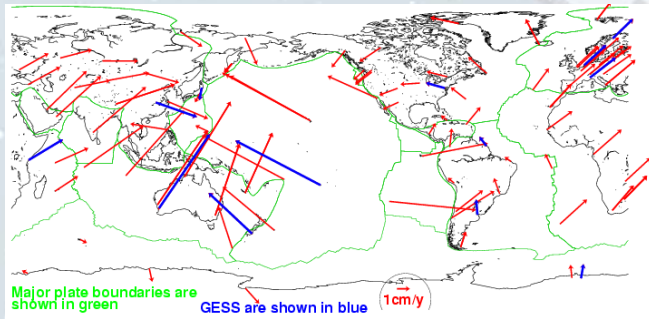


GTRF realisation

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).

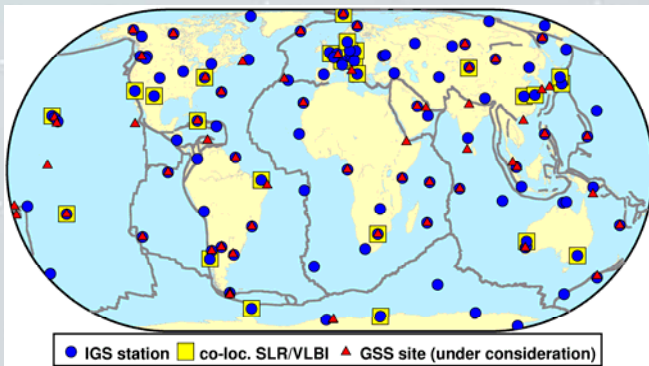
The GTRF station coordinates shall be identical to the ITRF station coordinates within a tolerance of 3 cm (at 95 % confidence level) for all station markers that appear in both frame realisations.

For the initial GTRF realisation approx. 100 IGS stations plus 13 Galileo Experimental Sensor Stations (GESS) were used in a campaign-like analysis.



Preliminary velocity estimates for the GESS and the used IGS stations derived from the latest GTRF realisation

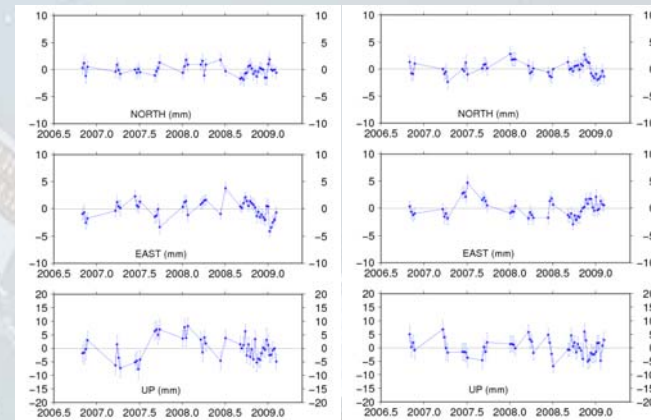
The GGSP tasks comprise specification for the GTRF implementation, datum definition and analysis strategy for GTRF derivation and maintenance over time.



Final GTRF station locations under consideration including potential Galileo Sensor Stations (GSS)

Products

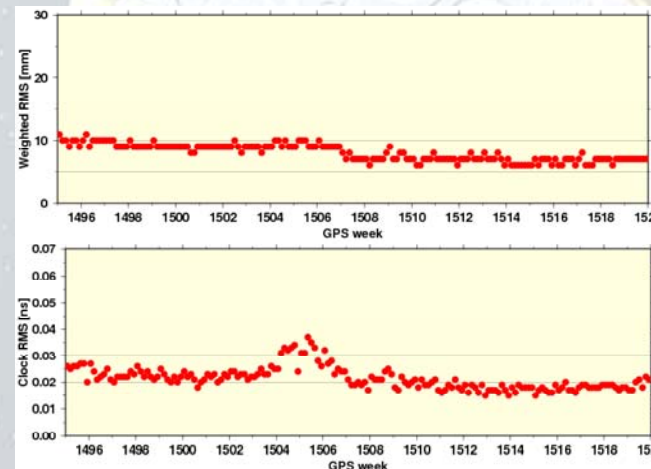
The primary task of the GGSP is to provide station coordinates and velocities for the GSS.



De-trended coordinate time series for GESS located in Mizusawa (left) and in Dunedin (processing started campaign-like, permanent since GPS week 1495)

Furthermore, the GGSP will include the generation of other precise products needed by the advanced Galileo geodetic user community to get full access to the GTRF. These products will at least comprise

- ◆ Precise Galileo Satellite Orbits
- ◆ Precise Galileo Satellite Clock Corrections
- ◆ Earth Rotation Parameters (ERPs)
- ◆ GTRF data and meta data



Agreement of GGSP orbit and clock correction solutions with the IGS final products

Consortium

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

- ◆ Helmholtz-Zentrum Potsdam DEUTSCHES GEOFORSCHUNGSZENTRUM (GFZ), Germany
<http://www.gfz-potsdam.de>
- ◆ Astronomisches Institut der Universität Bern (AIUB), Switzerland
<http://www.aiub.unibe.ch>
- ◆ Bundesamt für Kartographie und Geodäsie (BKG), Frankfurt, Germany
<http://www.bkg.bund.de>
- ◆ European Space Operations Centre (ESOC), Darmstadt, Germany
<http://www.esa.int/SPECIALS/ESOC>
- ◆ Institut Géographique National (IGN), Saint-Mandé, France
<http://www.ign.fr>
- ◆ Natural Resources Canada (NRCAN), Ottawa, Canada
<http://www.nrcan-rncan.gc.ca>
- ◆ Wuhan University (WHU), China
<http://www.whu.edu.cn/en/index.html>

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