

IAG and GALILEO-Science Events in 2009

G. Beutler

Astronomical Institute, University of Bern

Member of IAG Executive Committee

IGS Governing Board

GSAC (ESA)

**National Space-Based Positioning, Navigation, And
Timing (PNT) Advisory Board**

Hilton Alexandria Old Town

1767 King Street, Alexandria VA, USA 22314

November 5-6, 2009

International Association of Geodesy



IAG and Galileo Science-related Events

- **The IAG Scientific Assembly in 2009**
- **2nd International Colloquium on Scientific Aspects of the Galileo Program in Padua and the GSAC**
- **The Frankfurt Meeting on GGOS**

IAG Scientific Assembly 2009

The IAG scientific assembly (quadrennial event) took place Aug 31 to Sep 4 in Buenos Aires, Argentina.

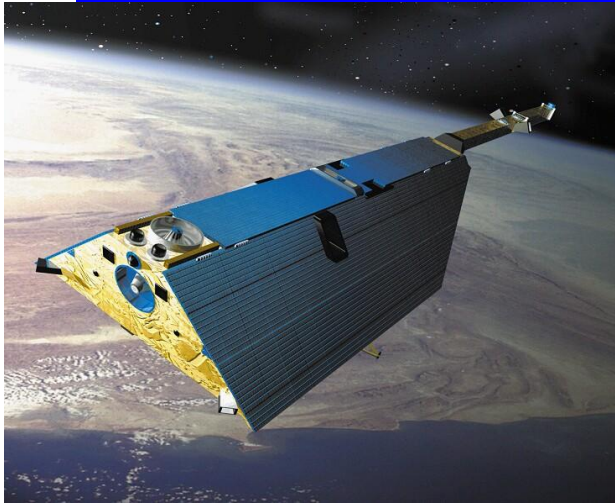
- **Gravity field determination,**
- the establishment of **reference frames** (global, regional),
- positioning and navigation,
- propagation of electromagnetic signals through the Earth's **atmosphere,**
- **geodynamcs** and
- the establishment of IAG's Global Geodetic Observing System (**GGOS**)

were the major issues – and GPS plays a key role in all of them.

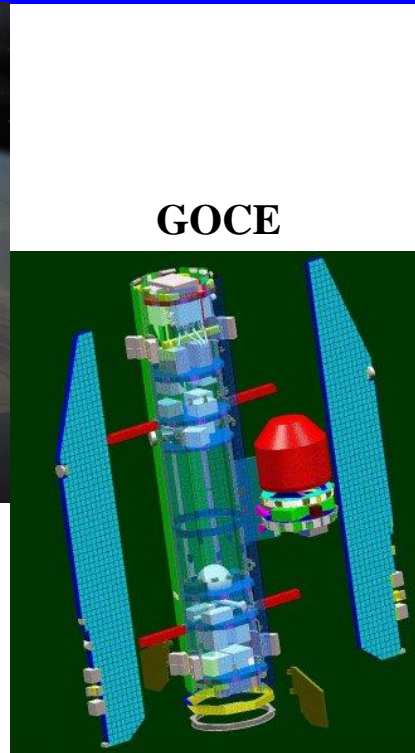
International Association of Geodesy



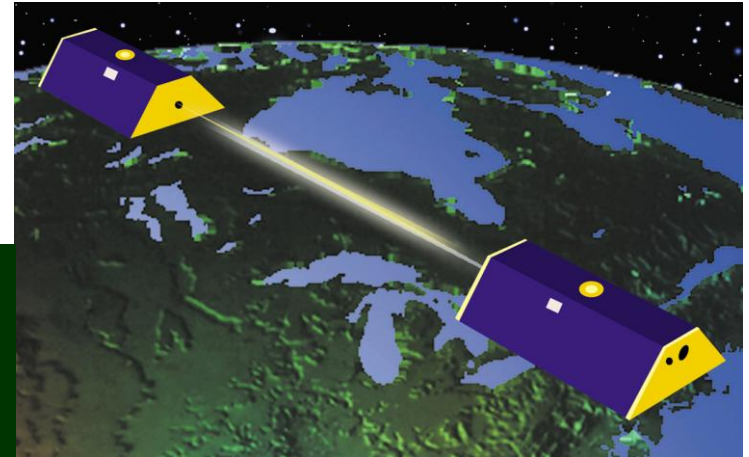
Gravity field determination



CHAMP



GOCE



GRACE A and B

CHAMP (left) determines the gravity field from kinematic positions established with a spaceborne GPS receiver, GRACE (right) uses in addition μm -precise inter-satellite distances, GOCE (center) the measurements of a so-called gradiometer – in addition to GPS.

International Association of Geodesy



Gravitaty field determination

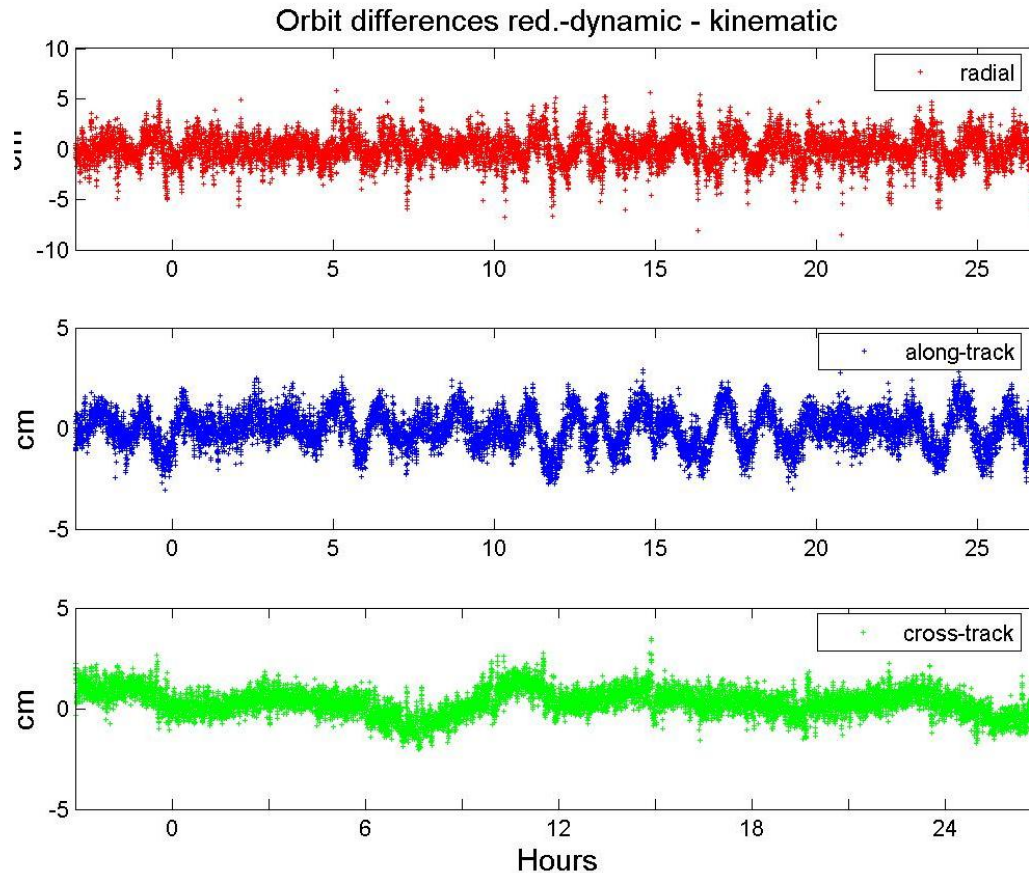


Protagonists of the missions: CHAMP: Christoph Reigber, GRACE: Byron Tapley & Ch. Reigber, GOCE: Reinhard Rummel

International Association of Geodesy

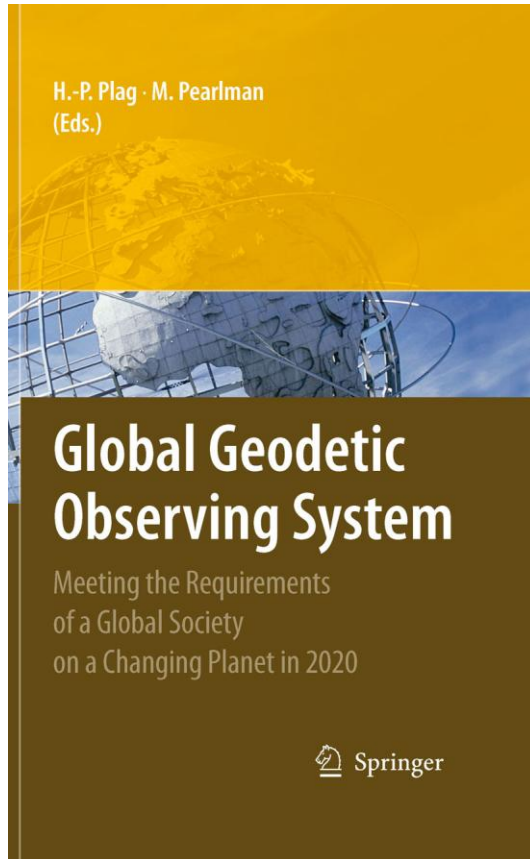


Gravity field determination



Accuracy of GPS-derived kinematic GOCE orbit of the GOCE science orbit (by AIUB/HPF from ESA, with permission).

GGOS Mission



GGOS is

- the **global observing system of the IAG**,
- its **flagship** component that advances the use of geodetic observing methods for Earth system and planetary science and applications.

GGOS accomplishes its mission by **defining the geodetic infrastructure** that is needed to meet scientific and societal requirements,

- by advocating for the establishment and maintenance of this geodetic infrastructure,
- by coordinating interaction between the IAG Services, Commissions, and stakeholders,
- by improving the quality of and accessibility to geodetic observations and products, and
- by educating the scientific community about the benefits of geodetic research and the public about the fundamental role that geodesy plays in society.

International Association of Geodesy



GGOS: The near future: 2009-....

Prof. Dietmar Grünreich, President of the Federal Agency for Cartography and Geodesy (BKG) invited the key agencies contributing to the IAG services and GGOS components for a conference on Nov 2-3 2009 to Frankfurt to

- sign up to the GGOS concept laid down in GGOS 2020 document,
- take note of the situation created by the GGOS CfP and to develop a strategy to fill the GGOS gaps
- to consider the creation of an Intergovernmental Committee for GGOS to take over political responsibility for the GGOS long-term stability

It goes without saying that the **scientific home of and the scientific responsibility for GGOS must remain at IAG.**

International Association of Geodesy



Galileo Science-related Events



**2nd International Colloquium on
*Scientific Aspects of the Galileo
Program* (3 days, parallel sessions)**

Sessions:

Ionosphere, Clocks

Remote Sensing, Relativity

Troposphere, Time

Geodesy, Advanced Topics

More information:

<http://www.congrex.nl/09c10/>

International Association of Geodesy

Galileo Science-related Events



**2nd International Colloquium on
*Scientific Aspects of the Galileo
Program* (3 days, parallel sessions)**

Round table:

Community anxious to get GIOVE obs

**Research related to GALILEO space
clocks, multi-GNSS, real time satellite
clocks/ephemerides, satellite/receiver
antenna issues, independent orbit
validation should be stimulated.**

**SLR reflectors will be on Galileo
spacecrafts of IOV and FOC phases.**

International Association of Geodesy

Galileo Science-related Events

GSAC stands for Galileo Science Advisory Committee. The members of GSAC shall -

Recommend improvements to Galileo and EGNOS for scientific applications

Maintain a GNSS Science Opportunity Document (SOD), highlighting scientific priorities

Support the preparation of announcements of opportunity (AO) for scientific studies

Advise on the use of Galileo and EGNOS data for scientific applications.

Consider and review ESA-furnished documents related to the scientific use of GNSS signals

International Association of Geodesy



Galileo Science-related Events

- **The members of the GSAC are appointed by the ESA Director General upon recommendation of the ESA member countries.**
- **The Committee has a Chair (one of its members) and a Secretary (from ESA).**
- **Secretary: Dr. Bertram Arbesser-Rastburg.**
- **The GSAC was created in fall 2008 and met three times since.**
- **Third meeting took place October 13, 2009 in Padua**
- **A GSAC web-page is under construction.**

Frankfurt GGOS Meeting

The major GGOS funding agencies and IAG/GGOS develop a strategy to preserve and improve global geodetic infrastructure.

Results of the meeting on November 2-3:

- The **GGOS2020** document is adopted as the **reference** for all GGOS-related activities.
- The **IAG services' products** also labeled **GGOS products**
- Decision to create **GGOS Intergovernmental Committee (GIC)** (first step Inter-agency agreement)
- **GIC** will be represented **in** the top level **GGOS Governing Entity** (requires revision of GGOS structure)
- **Frankfurt declaration** adopted.