



International GPS Service (IGS)

web: igsb.jpl.nasa.gov

Chair of the Governing Board: **John Dow** (Germany)

Director of the Central Bureau: **Ruth Neilan** (USA)

Overview

The Global Positioning System (GPS) provides unprecedented potential for precise ground and space based positioning, timing and navigation anywhere in the world. Extremely precise use of GPS, particularly for Earth Sciences applications, stem largely from activities of the International GPS Service (IGS). More than 200 organizations in 80 countries contribute daily to the IGS, which is dependent upon a cooperative global tracking network of over 350 GPS stations, as counted in October 2003. Data is collected continuously and archived at distributed Data Centers. Analysis Centers retrieve the data and produce the most accurate GPS data products available anywhere. IGS data and data products are made accessible to users reflecting the organizations' *open data policy*. The IGS is a successful international scientific federation and a model of international cooperation. IGS is proud to be a recognized scientific service of the International Association of Geodesy since 1994 and a member of the Federation of Astronomical and Geophysical Data Analysis Services (FAGS) since 1996.

IGS Mission 2002-2007

The International GPS Service is committed to providing the highest quality data and products as the standard for global navigation satellite systems (GNSS) in support of Earth science research, multidisciplinary applications, and education. These activities aim to advance scientific understanding of the Earth system components and their interactions, as well as to facilitate other applications benefiting society.

Long-Term Goals and Objectives

- Provide the highest quality, reliable GNSS data and products, openly and readily available to all user communities.
- Promote universal acceptance of IGS products and conventions as the world standard.

- Continuously innovate by attracting leading-edge expertise and pursuing challenging projects and ideas.
- Seek and implement new growth opportunities while responding to changing user needs.
- Sustain and nurture the IGS culture of collegiality, openness, inclusiveness, and cooperation.
- Maintain a voluntary organization with effective leadership, governance, and management.

IGS History

A number of factors led to the formation of the IGS. By the late 1980's many geodynamics and geodetic organizations recognized the potential of GPS. GPS was used for scientific research applications (e.g., earthquake studies, fault motion, plate tectonics) and many investigators realized the many benefits of this affordable technology. The motivating goal for the solid Earth sciences was millimeter level positioning in support of science anywhere in the world. However, a single civil organization could not assume the capital investment and recurring operations costs for such a globally based system. At this point international groups considered joint partnerships for collecting data and making observations, developing cooperative approaches and defining standards ensure that the activities would be driven by science requirements.

The idea for an international GPS service began to crystallize at the 1989 International Association of Geodesy (IAG) Scientific Assembly in Edinburgh, UK. It was here that people recognized that a standardized civilian system for using GPS would be beneficial to all. Subsequently a planning committee was established within IAG to transform this recognition into action and agreement.

In 1991 a Call for Participation was organized by this IAG Planning Committee, seeking participants and contributors who would help develop the 'proof of concept' for an international service in form of a demonstration campaign. It requested interested groups to assume the roles of station operations, networks, data centers, analysis centers, and a Central Bureau for coordination of the activity. The

response was overwhelming and the project was organized by a Campaign Oversight Committee. The pilot activity took place from June to September 1992 and was highly successful, demonstrating IGS viability. The IGS was officially established as an IAG international service on January 1, 1994.

Products, Achievements and Key Activities

The IGS, as a completely voluntary organization, continues to operate the global civilian GPS tracking system for science and research. Since the pilot project in 1992 the network has grown from approximately 30 permanent GPS stations to more than 300; and the accuracy of the IGS orbits has improved an order of magnitude, from 50 cm to less than 5 cm. The IGS continues developing and improving traditional products such as orbits, clocks, station positions and velocities, as well as fostering projects and working groups that produce additional data products, such as precipitable water vapor (PWV) a valuable input into weather forecasting; and total electron content (TEC) useful for ionospheric space weather research. IGS projects and working groups are dependent upon the infrastructure of the IGS for science applications and include:

IGS Projects	Purpose
IGS Clock Products	Global sub-nanosecond time transfer, joint with the Bureau International des Poids et Mesures (BIPM)
Low Earth Orbiter (LEO) Pilot Project	Orbit determination of LEO satellites that carry on- GPS receivers board precise (CHAMP, SAC-C, GRACE, Jason, etc.)
International GLONASS Service Pilot Project (IGLOSS-PP)	Include data from the Russian GLONASS system into the IGS processes, producing GLONASS orbits, clocks, station positions, etc.
Tide Gauge Benchmark Monitoring Project	Monitor long-term sea-level change, attempt to de-coupling crustal motion/subsidence at coastal sites from their tide gauge records
IGS Working Groups	
IGS Reference Frame Working Group	Global reference frame, Earth orientation, station positions and velocities determined by GPS
Ionospheric Working Group	Ionospheric science research, Global ionospheric maps
Atmospheric Working Group	Water vapor in atmosphere can be estimated from the delay encountered by the GPS signal, useful parameters for weather forecasting
Real-Time Working Group	Investigate methods for IGS real-time network operations
Global Navigation Satellite	Determine actions necessary for

Systems (GNSS)	IGS to co-opt new GNSS systems, European Union Galileo system
Data Center Working Group	Address all issues related to data retrieval, access, and archive

A more detailed description of the components, structure of the IGS and how it works can be found here: <http://igs.cb.jpl.nasa.gov/overview/pubs.html> in the publication *IGS Strategic Plan 2002-2007*

Summary

Through the IGS contributing organizations, its 100+ associate members, hundreds of participating scientists and engineers, and the many respective sponsoring agencies, the IGS operates a collective system that has provided geodetic reference data and related products of enormous benefit to solid earth science research.

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