
The International GNSS Service A Component of the Global Geodetic Observing System

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www.igs.org

United Nations International Meeting on the Applications of Global
Navigation Satellite Systems

Vienna, 12 December 2011



Overview

- IGS Overview
- Global Geodetic Observing System (GGOS)
- IGS M-GEX
- IGS Real-Time
- IGS and ICG Activities

NEWS: GGOS unanimously accepted November 8 as member of Committee on Earth Observation Satellites (CEOS)!



IAG, GGOS & IGS

- The International Association of Geodesy (IAG) represents the geosciences associated with the **geometric & gravimetric** aspects of the dynamic Earth.
- IAG is part of International Union of Geodesy and Geophysics (IUGG) & International Council for Science (ICSU). IAG is the oldest of the international scientific associations... *150yrs old in 2012.*
- IAG's Global Geodetic Observing System (GGOS) integrates all IAG Services... *to coordinate geodetic measurements, analysis and product generation to support science and society.*
- The IGS coordinates GNSS tracking, data analysis and product generation to support GGOS and other users
- Key to the IGS approach: sharing investments and operational costs by pooling the resources of many (> 200) organisations in over 90 countries to maintain an independent ground tracking network and generate high accuracy products ... ***voluntary federation, reliability through redundancy, data & products openly available to all users.***

IGS contributes the GNSS global contribution to the International Terrestrial Reference Frame (ITRF) where all regional reference frames are connected



IGS Mission

“The International GNSS Service provides the highest-quality GNSS data, products, and services in support of the Earth observations and research, positioning, navigation and timing, the terrestrial reference frame, Earth rotation, and other applications that benefit society.”

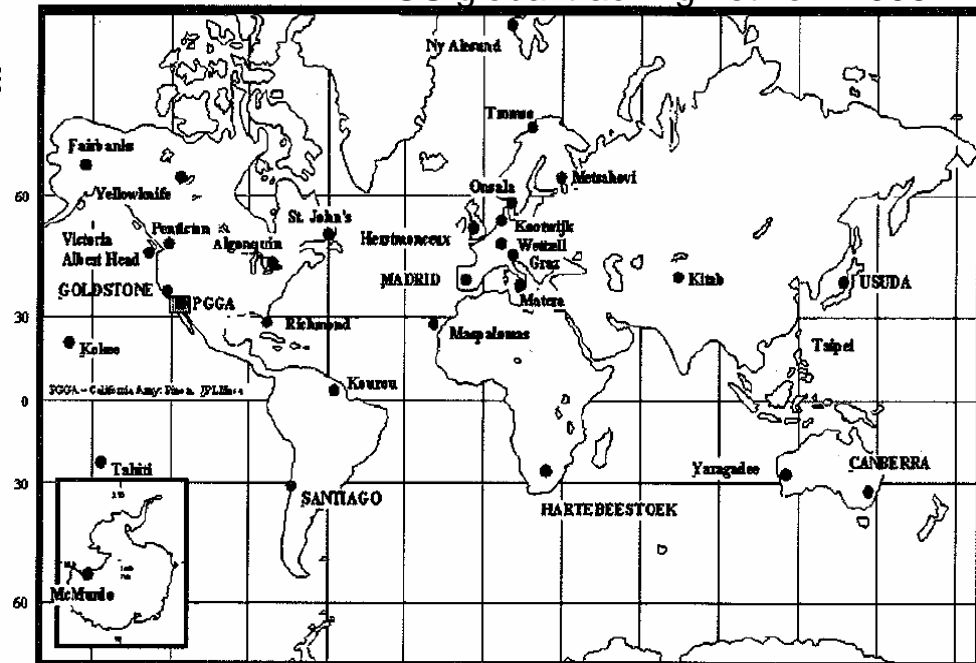
*IGS is a key component of the
Global Geodetic Observing System - GGOS*

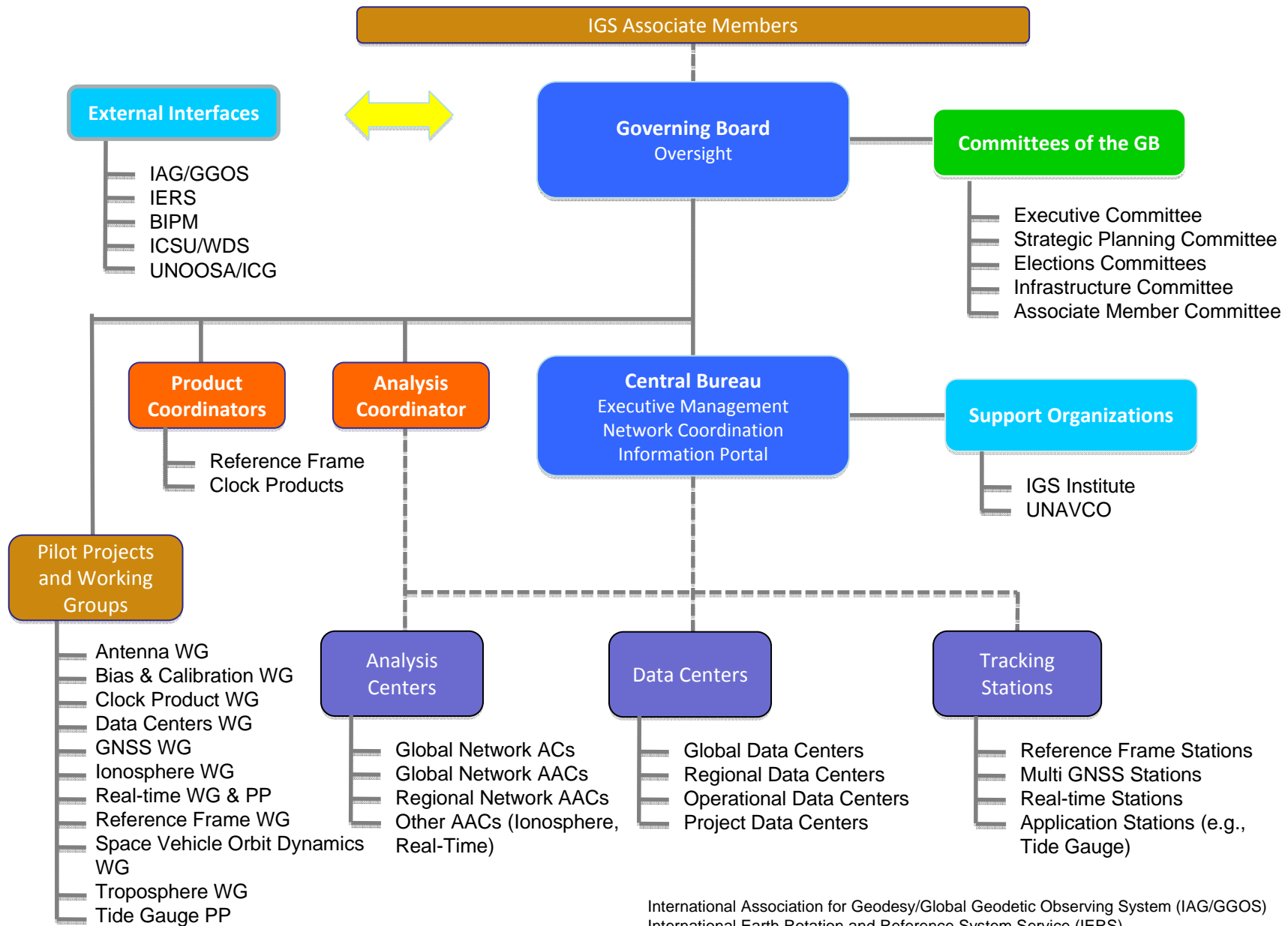


International GNSS Service (IGS)

- Potential of GPS for Geodesy, Surveying and Geodynamics was recognized in the late 1980's.
- Start of IGS Test Campaign in June 1992, *Official IAG Service since 1994.*
- Renamed "International GNSS Service" in March 2005: GPS + GLONASS
- Products:
 - Precise Orbits
 - Clock corrections & timescale
 - Station positions and velocities → ITRF
 - Troposphere parameters
 - Ionosphere maps
 - Earth orientation parameters
- GPS and GLONASS tracking & products.

IGS global tracking network 1993

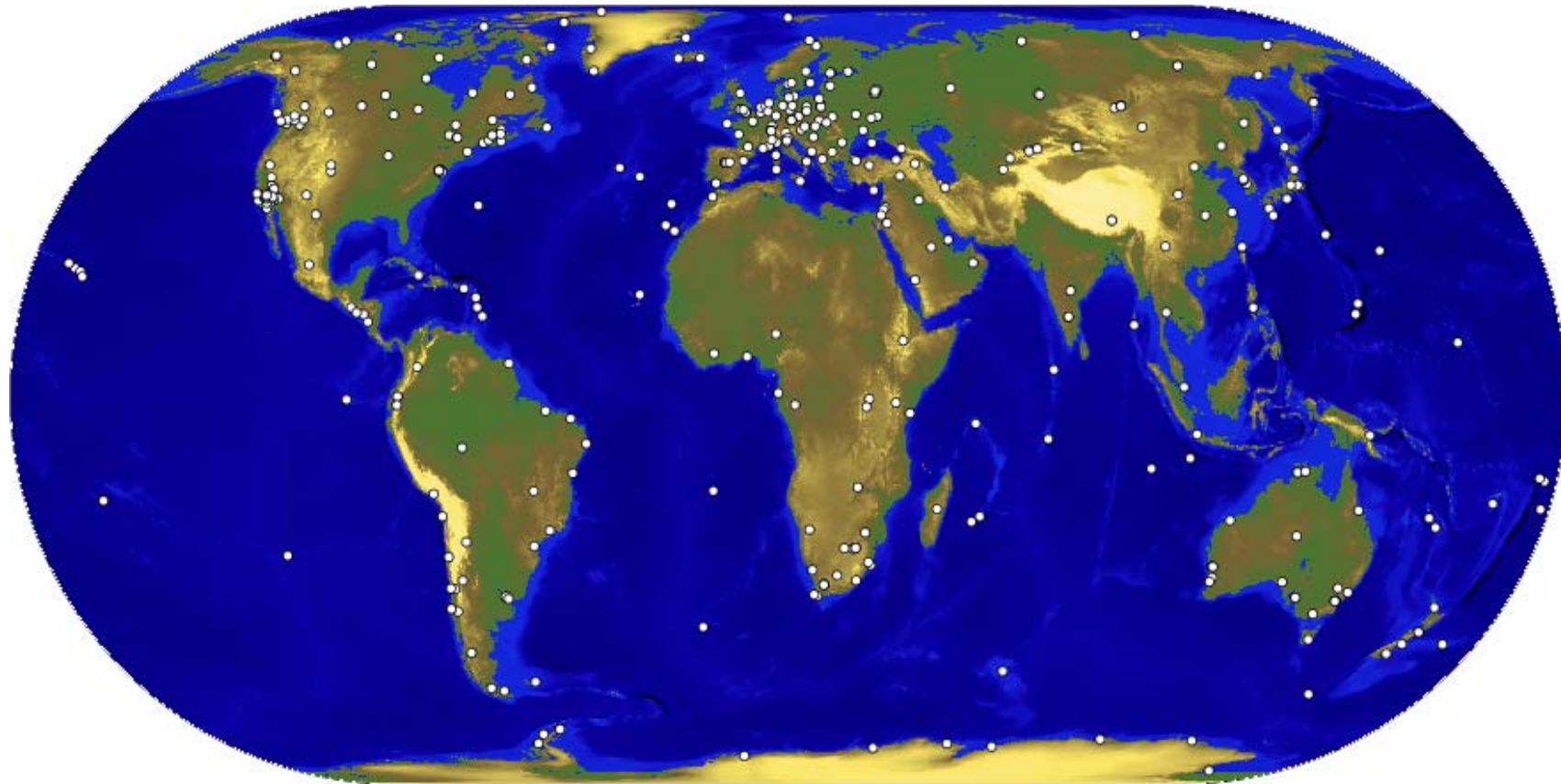




International Association for Geodesy/Global Geodetic Observing System (IAG/GGOS)
 International Earth Rotation and Reference System Service (IERS)
 Bureau International des Poids et Mesures (BIPM)
 International Council for Science/World Data Systems (ICS/WDS)
 United Nations Office for Outer Space Affairs/International Committee on GNSS (UNOOSA/ICG)
 Analysis Center (AC)
 Associate Analysis Center (AAC)

IGS Tracking Network

- Over 380 active global tracking stations



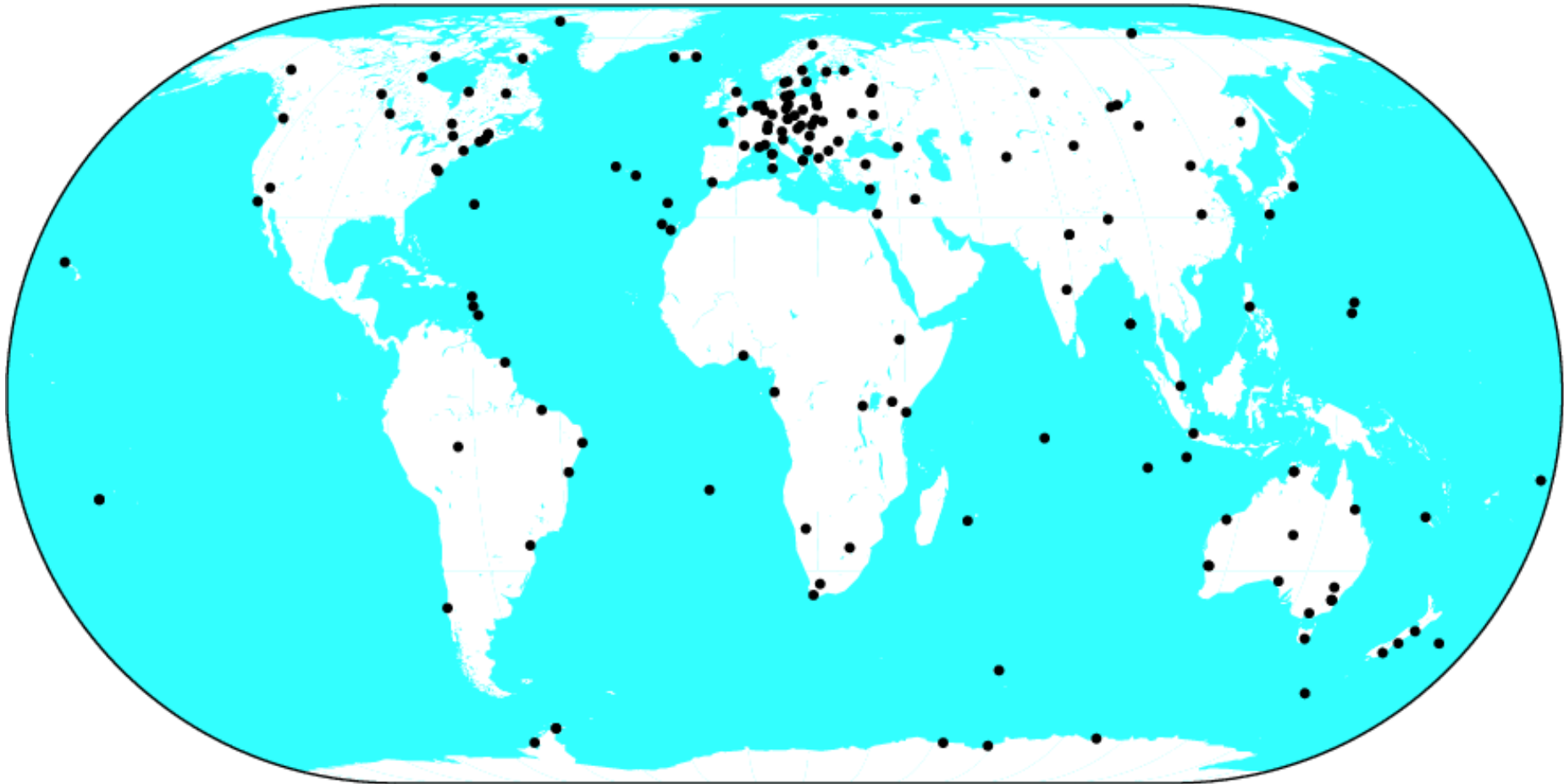
GMT 2011 Oct 31 16:47:30



<http://igs.org>



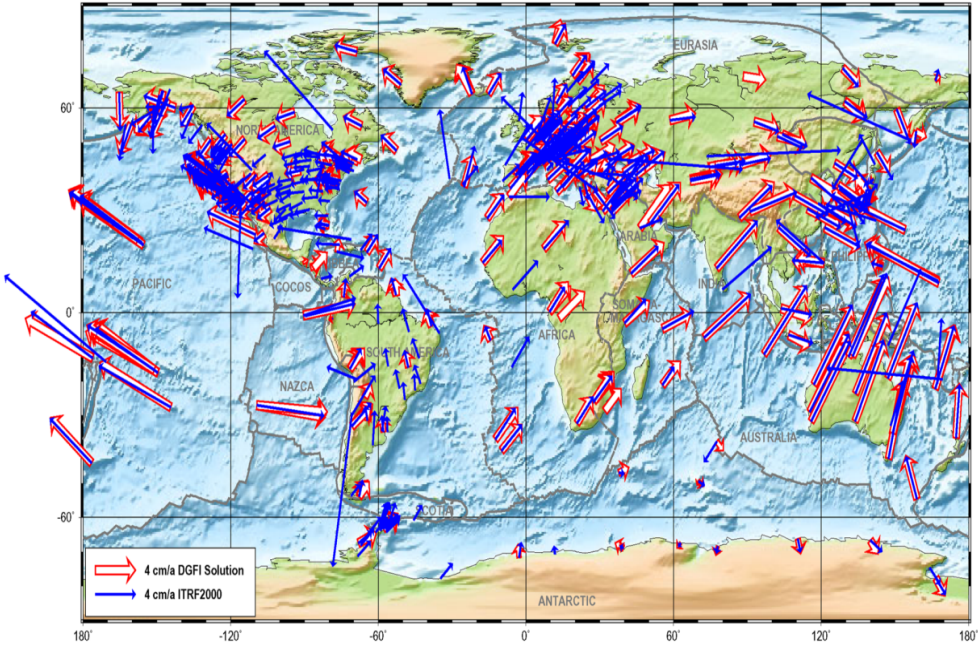
IGS Multi-GNSS Network: GLONASS + GPS



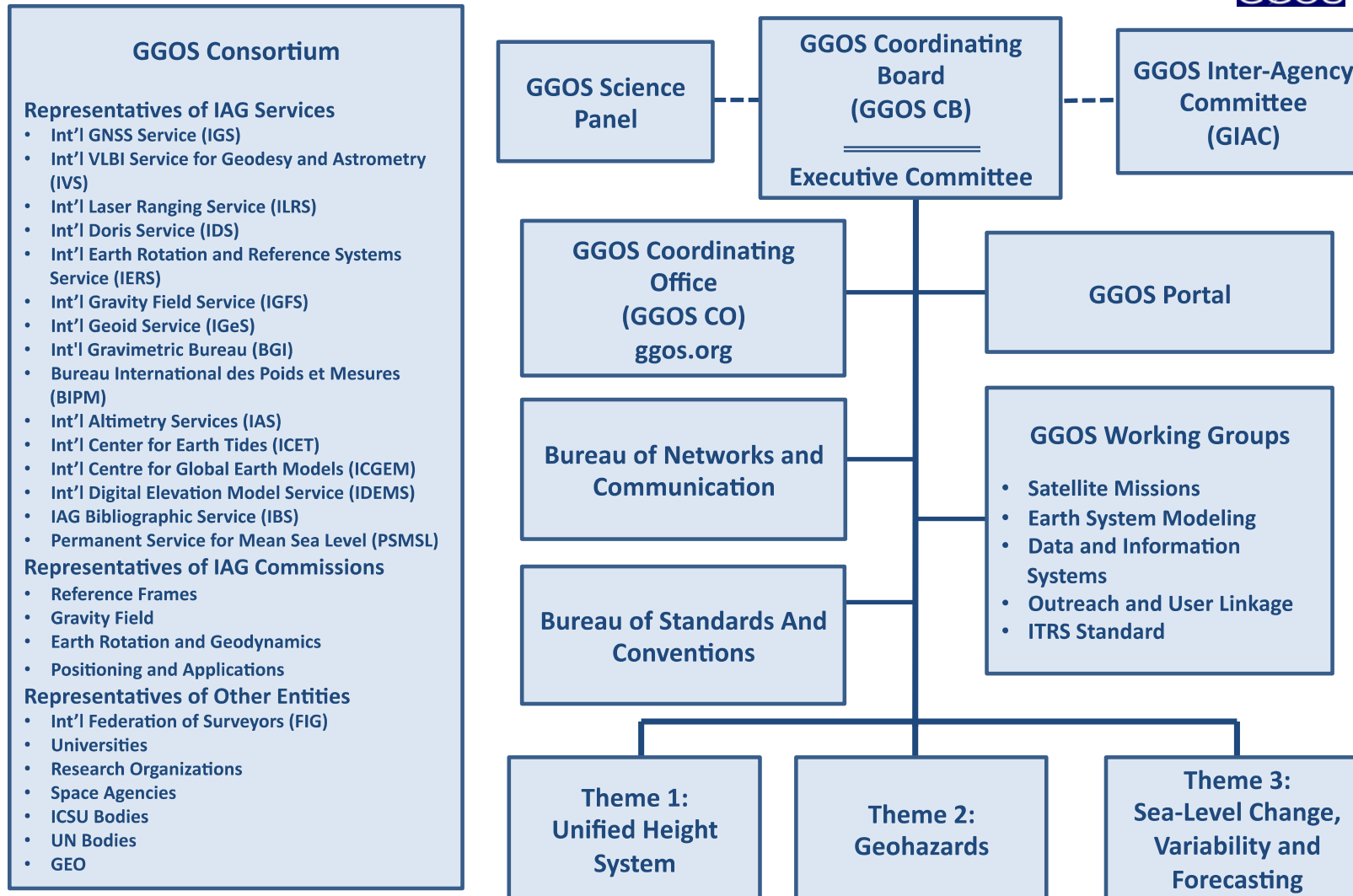
Why GGOS?



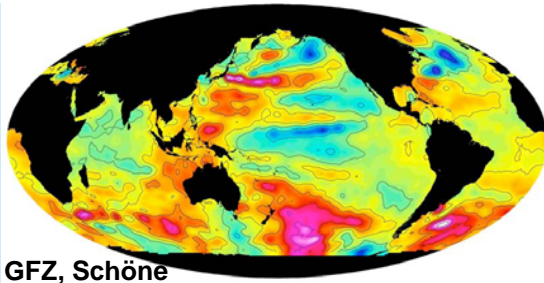
Processes: Millions of Years ↔ Fractions of Seconds



Global Geodetic Observing System



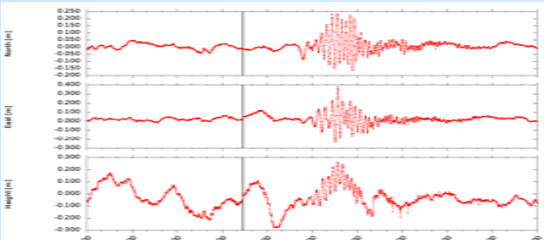
Challenges for Planet Earth Monitoring



GFZ, Schöne

Sea Level: Altimetry

- **Reliable detection of small, long-term trends:** long time series from reprocessing of ground / satellite data

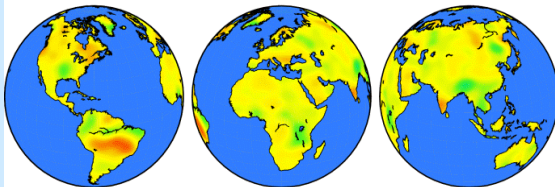


GFZ, Bartsch

Earthquake: GPS, Seismology

- **Fast event detection and quantification:** Real-time processing for early warning systems (tsunami, slides, earthquakes, ...)

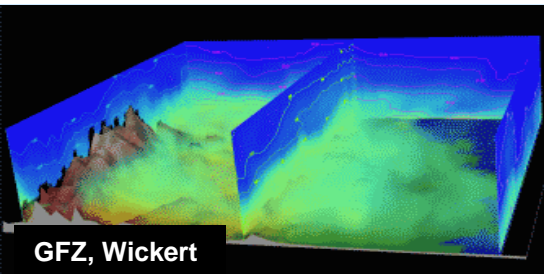
Global Water Cycle from GRACE JAN-2006



GFZ, Schmidt

Water Cycle: GRACE

- **Integration and Separation:** Sensor combinations; separation of signals with complementary data



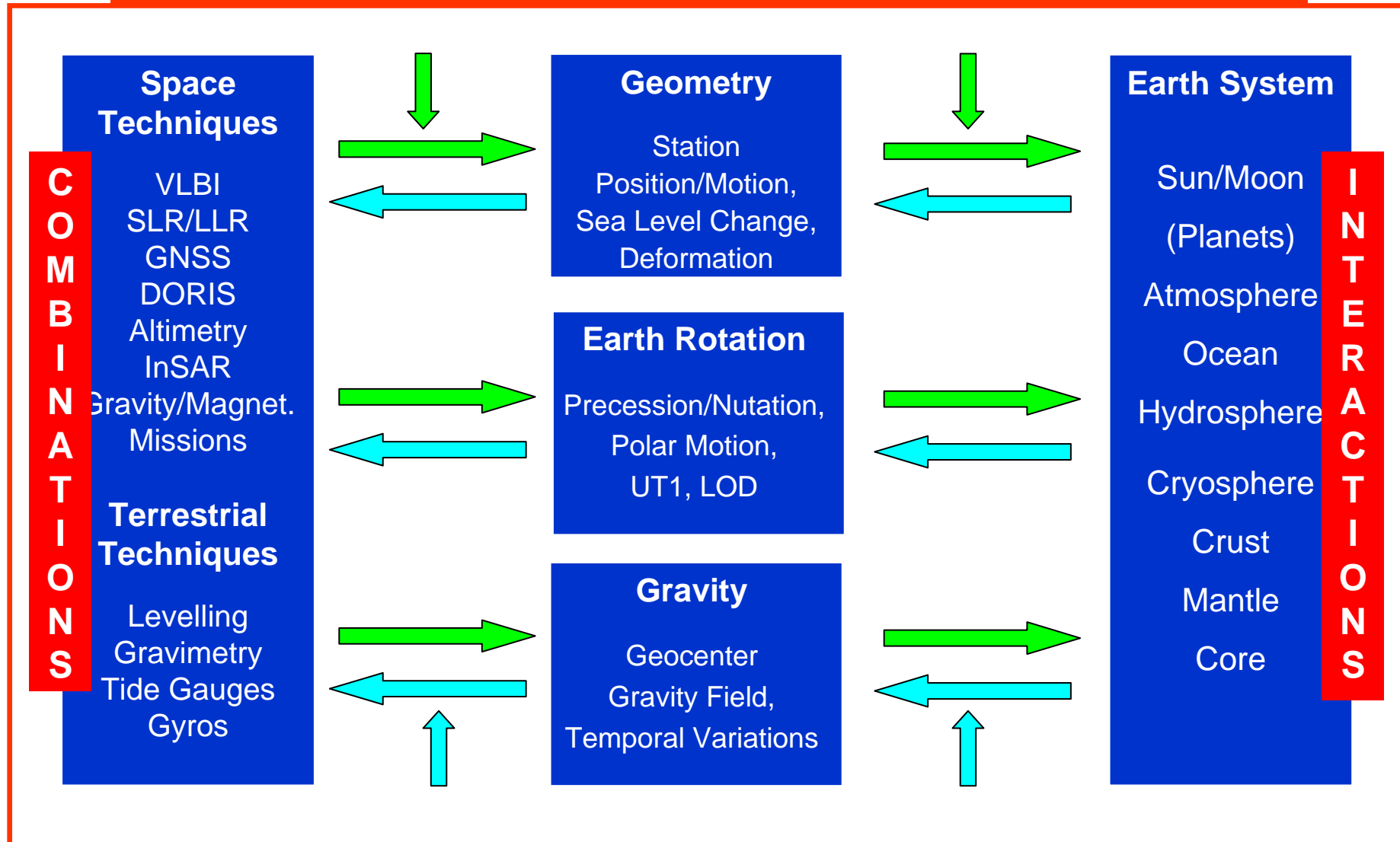
GFZ, Wickert

Water Vapor: GPS / VLBI

- **Information exploitation:** portals, up-to-date methods of visualization, information/knowledge management

GGOS: Monitoring and Modelling the Earth's System

Reference frames: highest accuracy and long-term stability

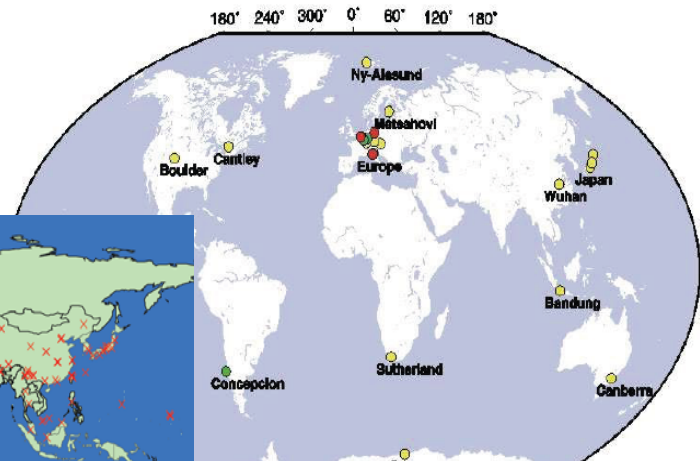


Ground-Based Component of GGOS

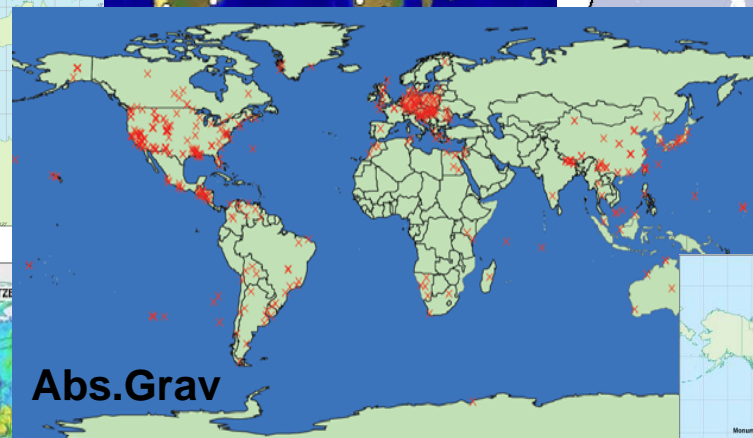
VLBI



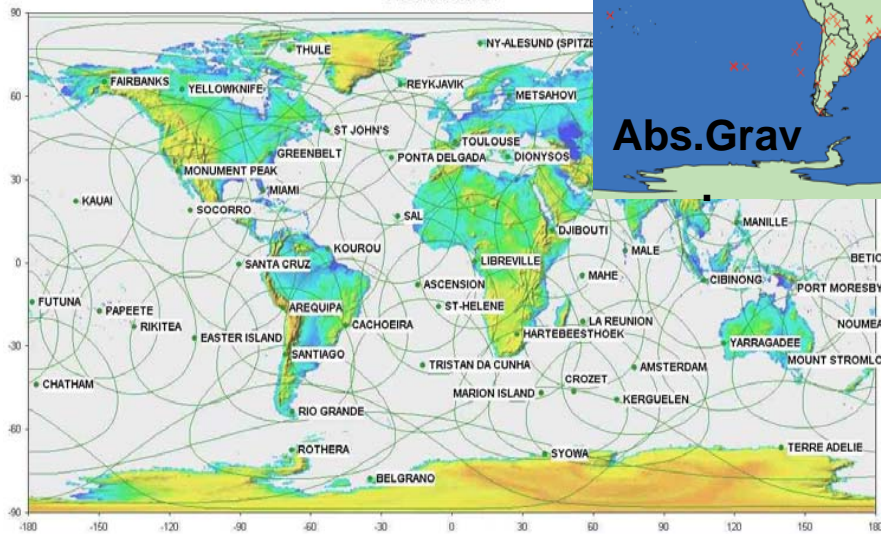
GPS



Sup.Grav.



Elevation 12°

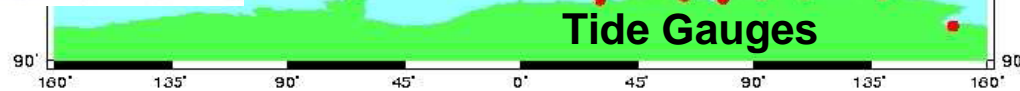


Abs.Grav



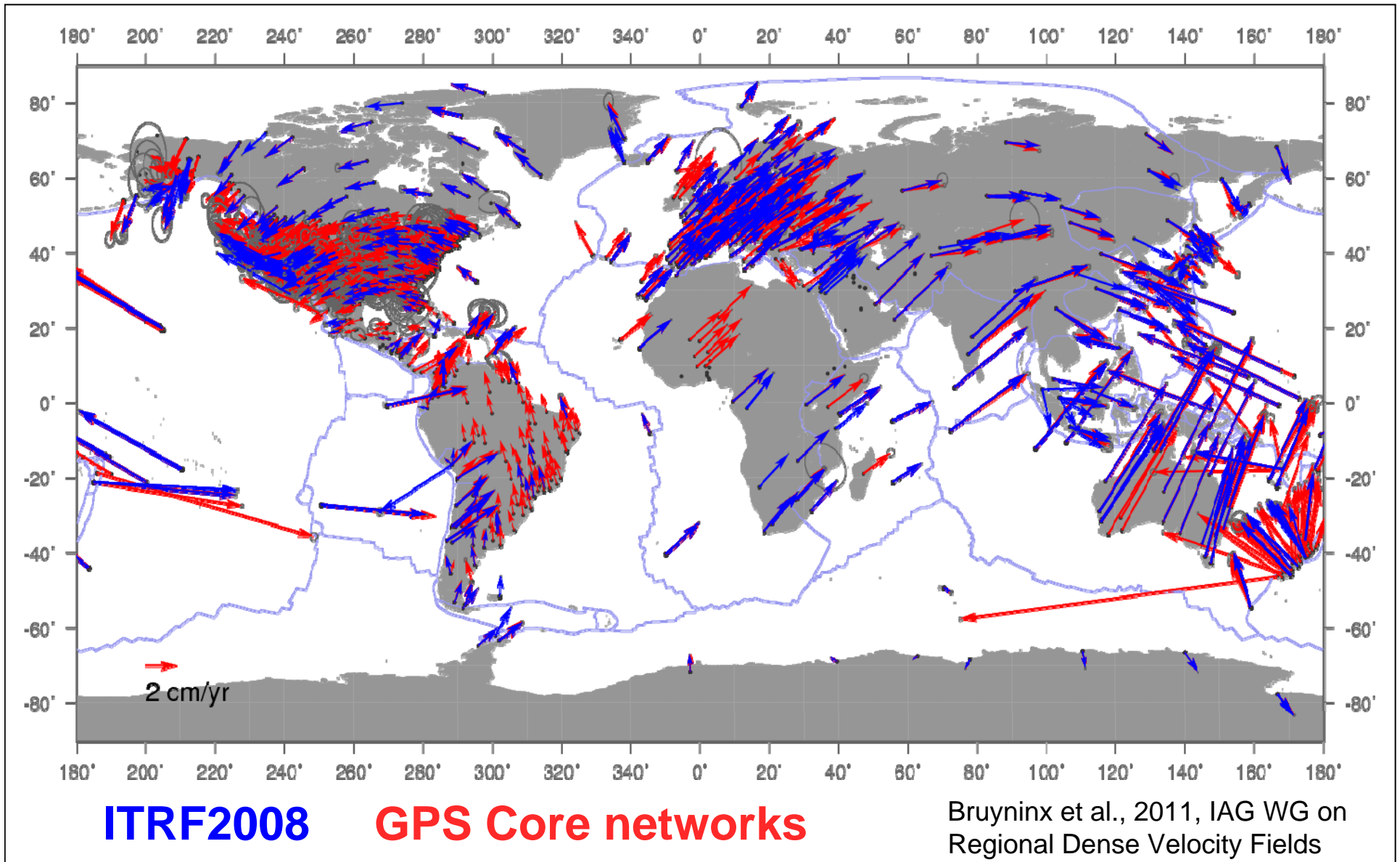
SLR/LLR

DORIS



Tide Gauges

The Global Picture: Global Velocity Field



IGS & Regional Reference Frames

- IGS contributes the GNSS global contribution to the International Terrestrial Reference Frame (ITRF) since 1990's, providing the global grid to connect all regional reference frames and GNSS applications – alignment to the ITRF
 - All observations in a common, robust reference frame
 - Currently ITRF08
 - Next ITRF 2013, full reprocessing 1995 to date
- Supporting and cooperating with Unification of African Reference Frames (AFREF) since 1999 –
 - Africa has 50+ national reference frames and datums
 - Continental reference frame allows cross-border, international & intra-Africa development
 - Support development of transformations between GNSS and national datums
- Strong Liaison with International Federation of Surveyors (FIG) working with many National Mapping Agencies (NMA)
 - FIG / IAG / UNOOSA Rome 2012 ***Technical Seminar on Reference Frames in Practice*** on 4-5 May



IGS – Multi-GNSS Global Experiment *M-GEX*

- Motivation
 - New and modernized systems and signals upcoming or available
 - Receivers have multi-GNSS capabilities
 - IGS must prepare for incorporation of new GNSS
- Goal
 - Experiment to operate an expanded network of new receivers capable of tracking new signals in addition to GPS & GLONASS
 - Support & coordinate with Multi-GNSS Asia (MGA) activities
- Tasks
 - Set-up tracking network of Multi-GNSS equipment
 - Make tracking data publicly available
 - Experiment with data flow and signals, qualify equipment, signals, ...
 - Upgrade IGS network to Multi-GNSS
 - Generate Multi-GNSS products



M-GEX

- More than 100 GNSS satellites will be available in the near future
- Not only more satellites, but also more and better signals, better clocks
- Heterogeneous system of satellite systems and heterogeneous user equipment – interoperability, compatibility, interchangeability
- IGS is preparing for incorporation of new systems and signals into routine operations
- M-GEX Call for Participation – Experiment from February through August 2012, continuing observations encouraged:
 - Seeking groups for tracking, archiving, analyzing of new signals
 - Interested groups can join at anytime
- First results at [IGS Workshop in Olsztyn, Poland, 23–27 July 2012](#)



IGS Real-Time Pilot Project

- Real-time product generation is part of IGS Strategic Plan
- Infrastructure
 - More than 120 active real-time stations
 - Data streaming using NTRIP
 - Close link to RTCM
- Analysis
 - 6 real-time analysis centers
 - Real time clock combination
- Future
 - Include new systems and signals – M-GEX
 - Real-time service – To be announced soon
 - Satellite clock corrections, orbits, ionosphere corrections
 - Zero-difference Ambiguity resolution



IGS & ICG Activities

- IGS & IAG members of the GNSS Action Team since 2001; Associate Member of ICG since its establishment
- IGS and IAG and the International Federation of Surveyors (FIG) Co-chairs the ICG working group on Reference frame, Timing and Applications, with Bureau of Weights and Measures (BIPM):
 - Task Forces established in 2008, ICG-3
 - Reference Frames
 - Timing
 - To facilitate GNSS providers experts to engage with the international community represented by IGS, IAG, FIG and others, with a goal of improved inter-operability, and common understanding of these fundamental elements of GNSS – Reference Frame and Timing
- IGS M-GEX endorsed by ICG at ICG-6 in Tokyo



Thank-you





International GNSS Service

Formerly the International GPS Service

About IGS	Data & Products	Tracking Network	Pilot Projects & Working Groups	Calendar	
MAIL	FAQ	Publications	Organization	FTP	Site Index

The International **GNSS** Service (IGS), formerly the International GPS Service, is a voluntary federation of more than 200 worldwide agencies that pool resources and permanent GPS & GLONASS station data to generate precise GPS & GLONASS products. The IGS 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. Currently the IGS includes two GNSS, GPS and the Russian GLONASS, and intends to incorporate future GNSS. You can think of the IGS as the highest-precision international civilian GPS community.

Whenever your use of IGS data or products results in a publication, please include a **citation**.

What's new: Updated: October, 2011.

- [IGS M-GEX - Call for Participation - New Information](#)
 - [IGS M-GEX Response Form](#)
 - [IGS-CB NTRIP Caster](#)
- [IGS Workshop on GNSS Biases 2012](#)
 - [2012 IGS Workshop](#)
- [JAXA M-GEX - Call for Participation](#)
 - [IGS08 Realization adopted](#)
 - [IGS 2010 Workshop Summary Recommendations](#)
 - [IGS 2010 Workshop Presentation Videos](#)
- [IGS Strategic Implementation Plan - 2011](#)

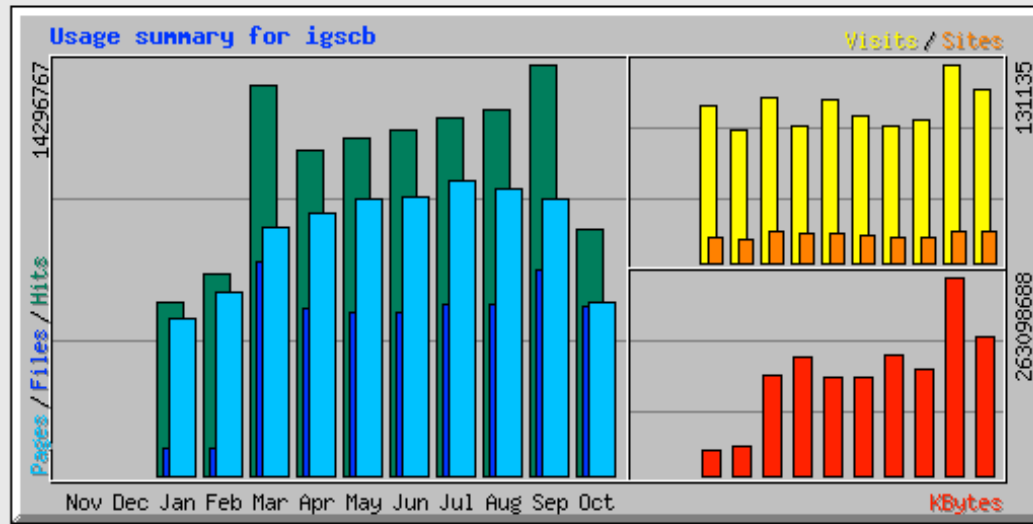
General GPS/GNSS questions?

Please visit [resource links](#)

This web site is part of the IGS Central Bureau Information System (CBIS), providing both IGS member organizations and the public with information about the IGS organization, the IGS network of stations, and IGS data & data products (such as precise ephemerides).



IGS Website Statistics Oct 2011



Summary by Month										
Month	Daily Avg				Monthly Totals					
	Hits	Files	Pages	Visits	Sites	KBytes	Visits	Pages	Files	Hits
Oct 2011	285309	196612	201221	3802	20736	185217739	114067	6036640	5898374	8559290
Sep 2011	476558	238363	319890	4371	20078	263098688	131135	9596722	7150899	14296767
Aug 2011	410472	191385	320355	3051	17355	140214209	94593	9931024	5932936	12724646
Jul 2011	401477	193104	329926	2892	16720	160123530	89662	10227715	5986234	12445814
Jun 2011	400188	188008	322021	3245	17927	129374321	97369	9660641	5640257	12005653
May 2011	378963	182934	309703	3495	18913	130284558	108362	9600810	5670976	11747856
Apr 2011	377459	192850	303389	3003	19511	157967640	90114	9101678	5785521	11323773
Mar 2011	438044	239941	278969	3538	20572	132749818	109704	8648058	7438186	13579364
Feb 2011	249195	33606	226587	3126	15739	38498528	87535	6344444	940995	6977471
Jan 2011	193589	30245	177057	3326	17188	33323674	103116	5488779	937624	6001262
Totals						1370852705	1025657	84636511	51382002	109661896

Extra Slides



Activities & Concept

- Support to new GGOS structure and new Chair
 - Acting Vice-Chair of GGOS (Neilan)
 - Lead of GGOS Science Panel (Gross)
- Facilitated GGOS strategic retreat for developing mission, vision, goals and objectives
- Led significant revision of the GGOS Terms of Reference and reorganization adopted by IAG during IUGG, July 2010
- Supporting GGOS visibility at the GEO Plenary, Istanbul this month
 - Official delegate of IAG GGOS
 - Exhibit material and handouts
- Planning meeting with other entities especially ILRS and IVS
- Embrace & support the GGOS Network and Communications Bureau activities to a greater extent
 - Very relevant to SGP and developing partners for NASA
 - Promoting common standards, configurations and approach with GGOS partners



<http://igs.geolinks.org/>



[Home](#) [MGEX](#) [IGS](#)

Welcome to IGS Form Submission

Posted on **October 14, 2011**

ARCHIVES

- **October 2011**

The following forms are available:

- [IGS MGEX Call for Participation](#)
 - [Add Additional MGEX Site](#)
- [IGS Associate Members Registration](#)

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