

# The Contribution to GGOS from Asian Region

Jong Uk Park & Young-Hong Shin

Space Geodesy Division, Korea Astronomy and Space Science  
Institute, Daejeon, South Korea

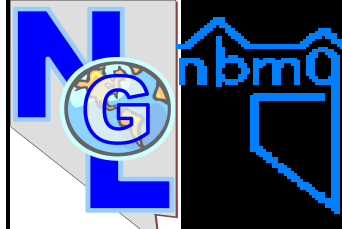
and

Hans-Peter Plag

Nevada Geodetic Laboratory, University of Nevada, Reno, USA



University of Nevada, Reno  
Statewide • Worldwide



# The Contribution to GGOS from Asian Region

- GGOS: A Brief Introduction
  - GGOS the observing system
  - GGOS: the organization
- GGOS and GEO
- GGOS and regional Asian Activities
- Mutual Benefits IAG/GGOS and the Asian Region



University of Nevada, Reno  
Statewide • Worldwide



# GGOS: A Brief Introduction

IUGG 2007:

**GGOS is the Observing System of the International Association of Geodesy (IAG): *The Global Geodetic Observing System (GGOS) works with the IAG components to provide the geodetic infrastructure necessary for monitoring the Earth system and for global change research.***

“GGOS” has two meanings:

- (1) The Observing System
- (2) The Organization

# GGOS: A Brief Introduction

## GGOS Chronology

**July 2003:** Decision of the International Association of Geodesy (IAG) to **establish** a Global Geodetic Observing System (GGOS) Project

**April 2004:** IAG becomes Participating Organization of the Group on Earth Observation (GEO), and delegates representation to GGOS

**May 2006:** GGOS becomes partner of the Integrated Global Observation Strategy Partnership (IGOS-P)

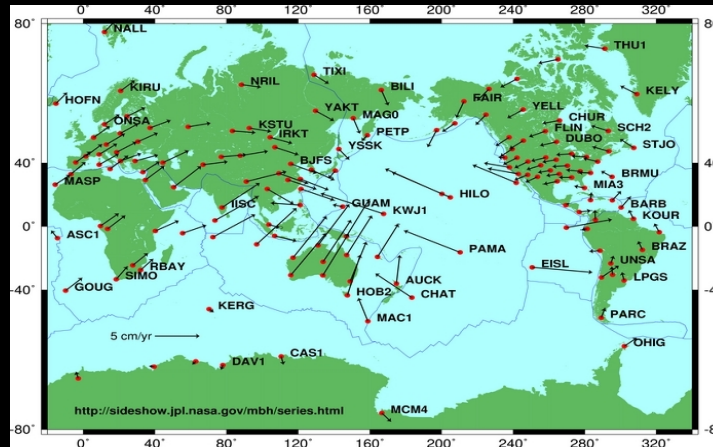
November 2007: The GEO Task 'Global Geodetic Reference Frames' proposed by GGOS was accepted as part of the GEO Work Plan 2007-2009.

**July 2007:** GGOS becomes the Observing System and a full component of the IAG

**July 2008: Call for new GGOS Components**

**September 2008: GGOS2020 Book** is almost complete, is in the review process (>200 pages)

# GGOS: The Observing System

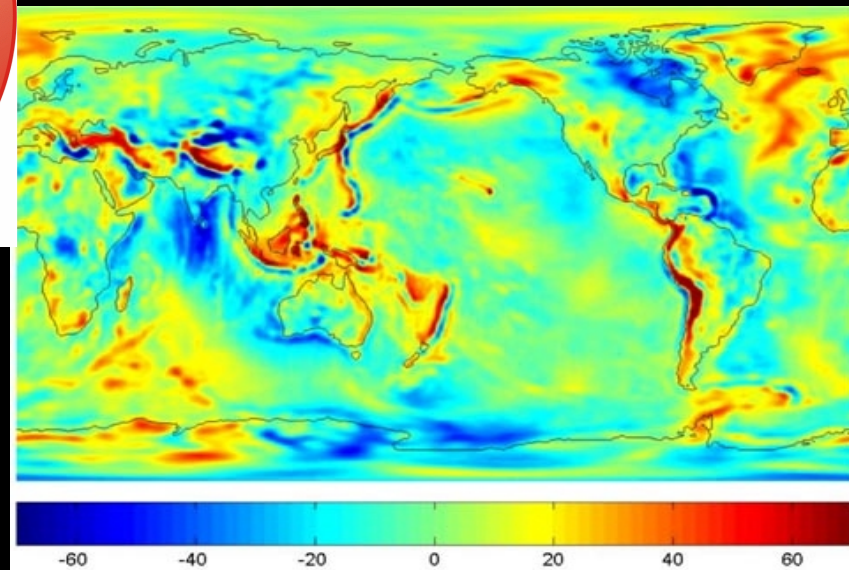
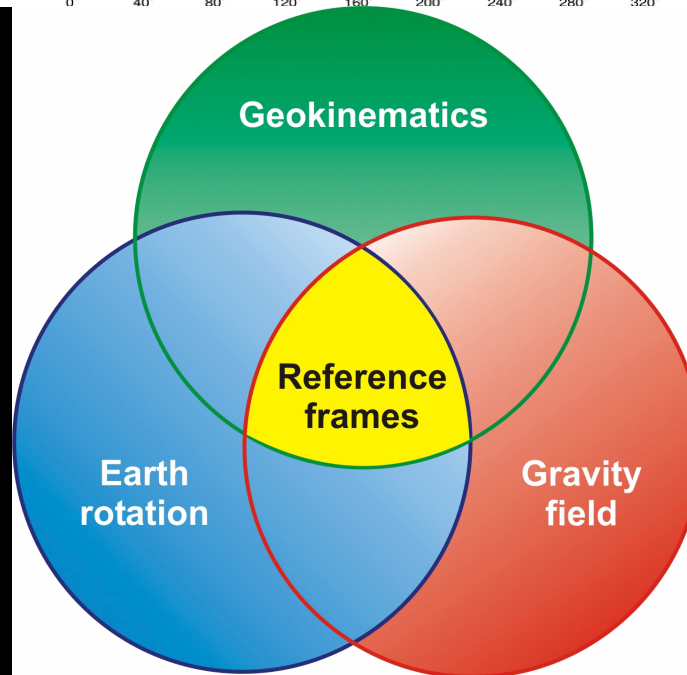


## The 'three pillars of geodesy':

- Earth's Shape (Geokinematics)
- Earth's Gravity Field
- Earth Rotation

## Output:

- Reference Frame
- Observations of the Shape,
- Gravitational Field and Rotation of the Earth



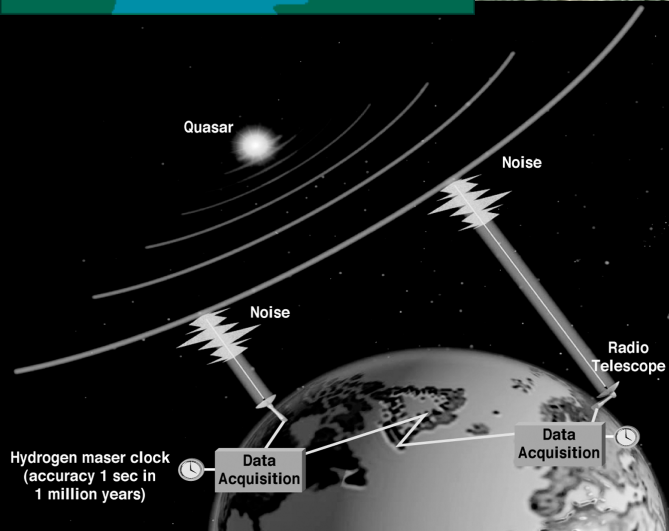
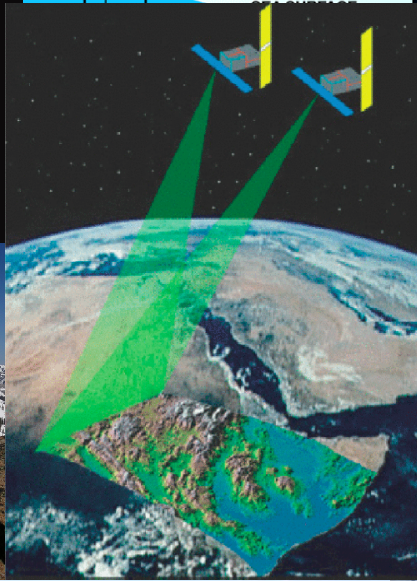
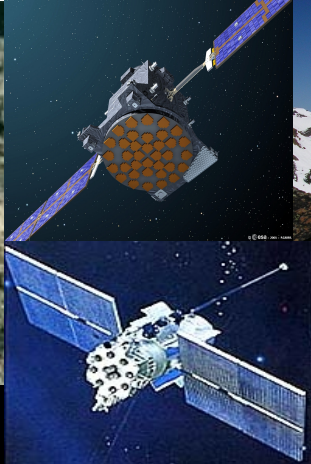
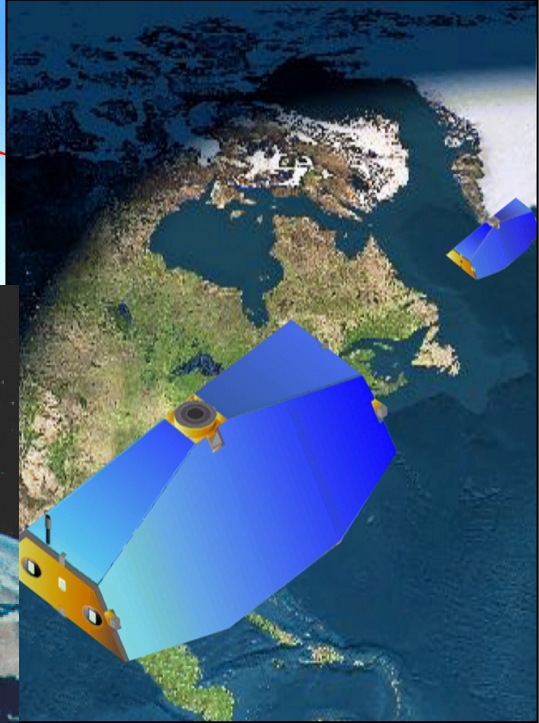
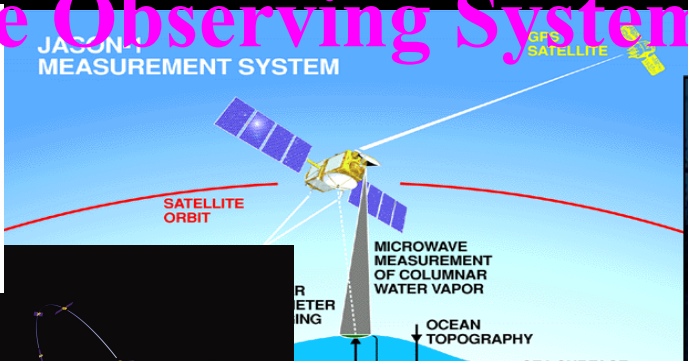
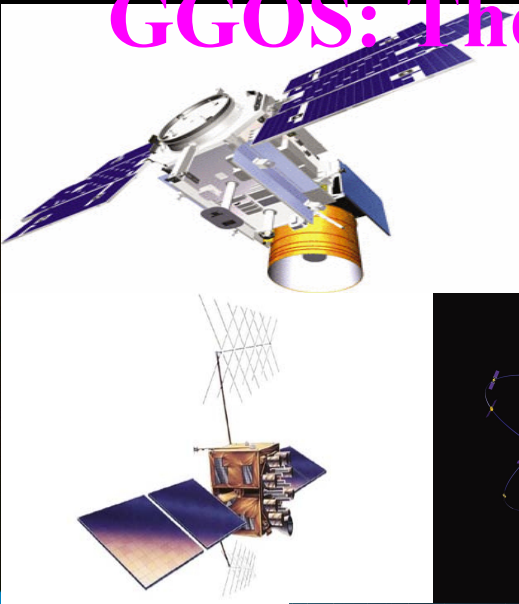
GGOS observes important characteristics of the Earth System

GGOS observes the temporal variation of the Earth shape, gravity field, and rotation.



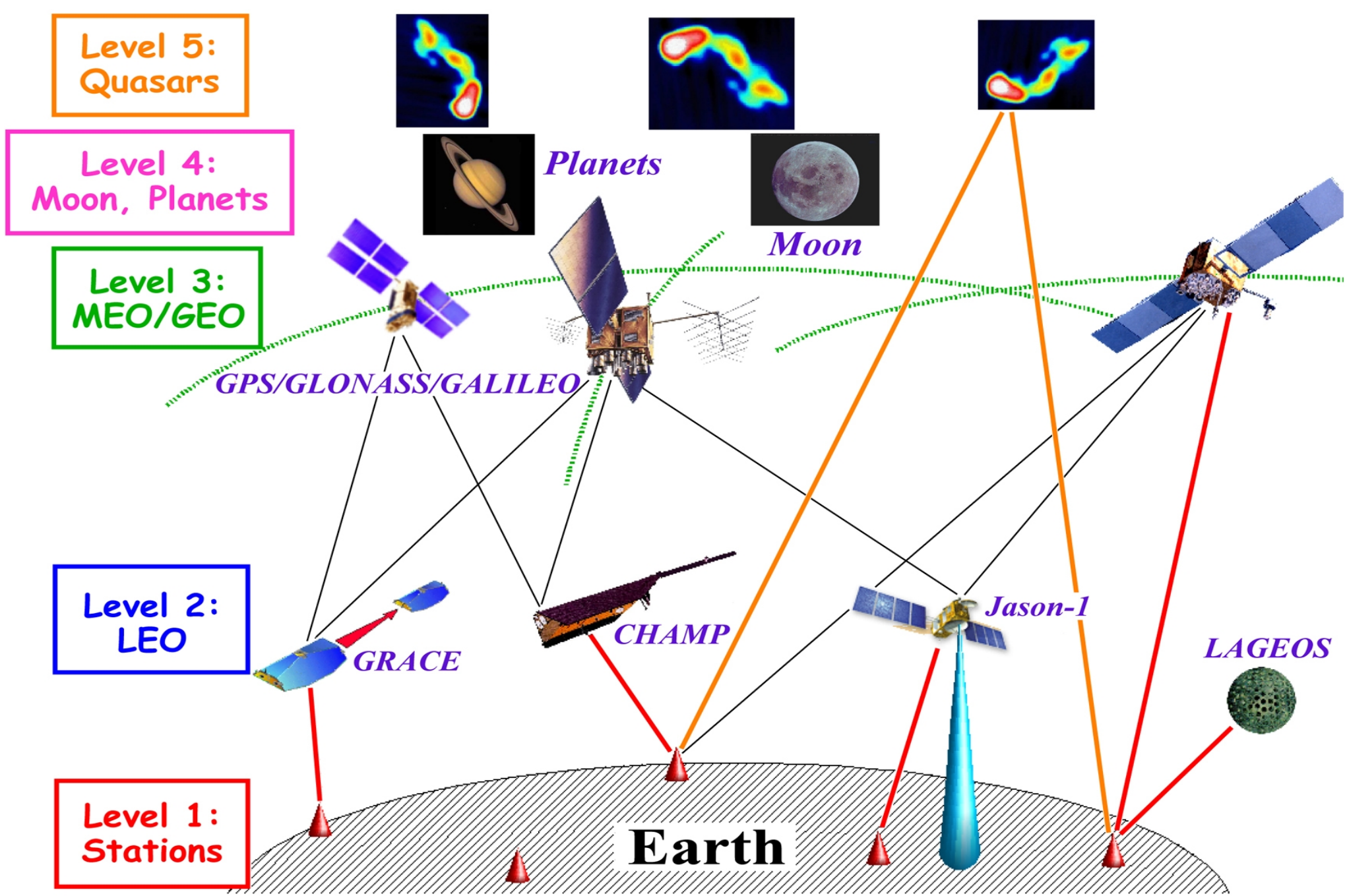


# GGOS: The Observing System





# GGOS: The Observing System



# GGOS: The Organization

## GGOS Shareholders

Geometry

**IERS: International Earth Rotation and Reference Systems Service**

**IGS: International GNSS Service**

**IVS: International VLBI Service**

**ILRS: International Laser Ranging Service**

**IDS: International DORIS Service**

Gravimetry

**IGFS: International Gravity Field Service**

**BGI: Bureau Gravimetricque International**

**IGeS: International Geoid Service**

**ICET: International Center for Earth Tides**

**ICGEM: International Center for Global Earth Models**

Ocean

**PSMSL: Permanent Service for Mean Sea Level**

**IAS: International Altimetry Service (in preparation)**

Std

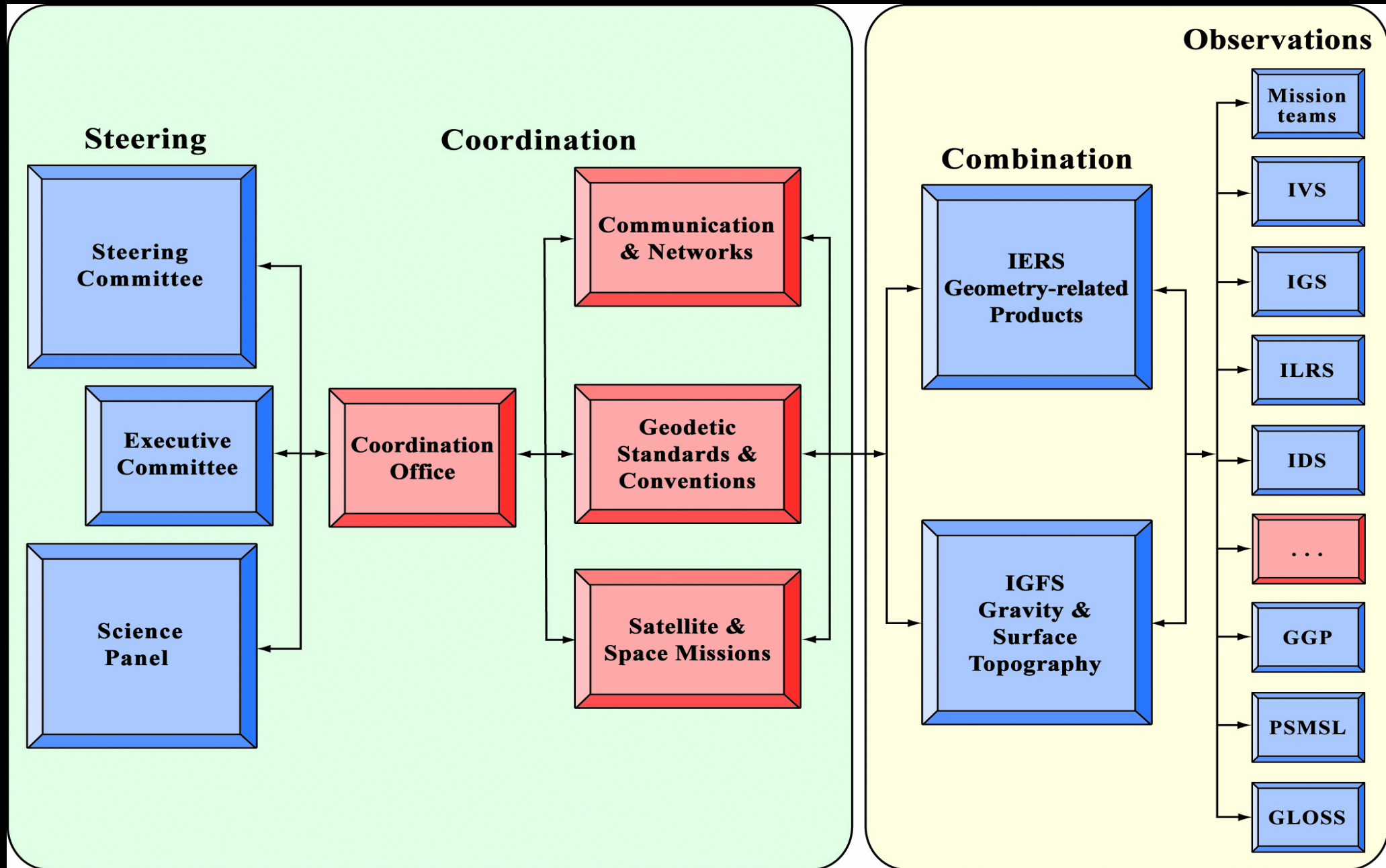
**BIPM: Bureau International des Poids et Mesures**

**IBS: IAG Bibliographic Service**



# GGOS: The Organization

## Structure of GGOS



# GGOS: A Brief Introduction

GGOS observes with many techniques different parameters of one unique Earth system.

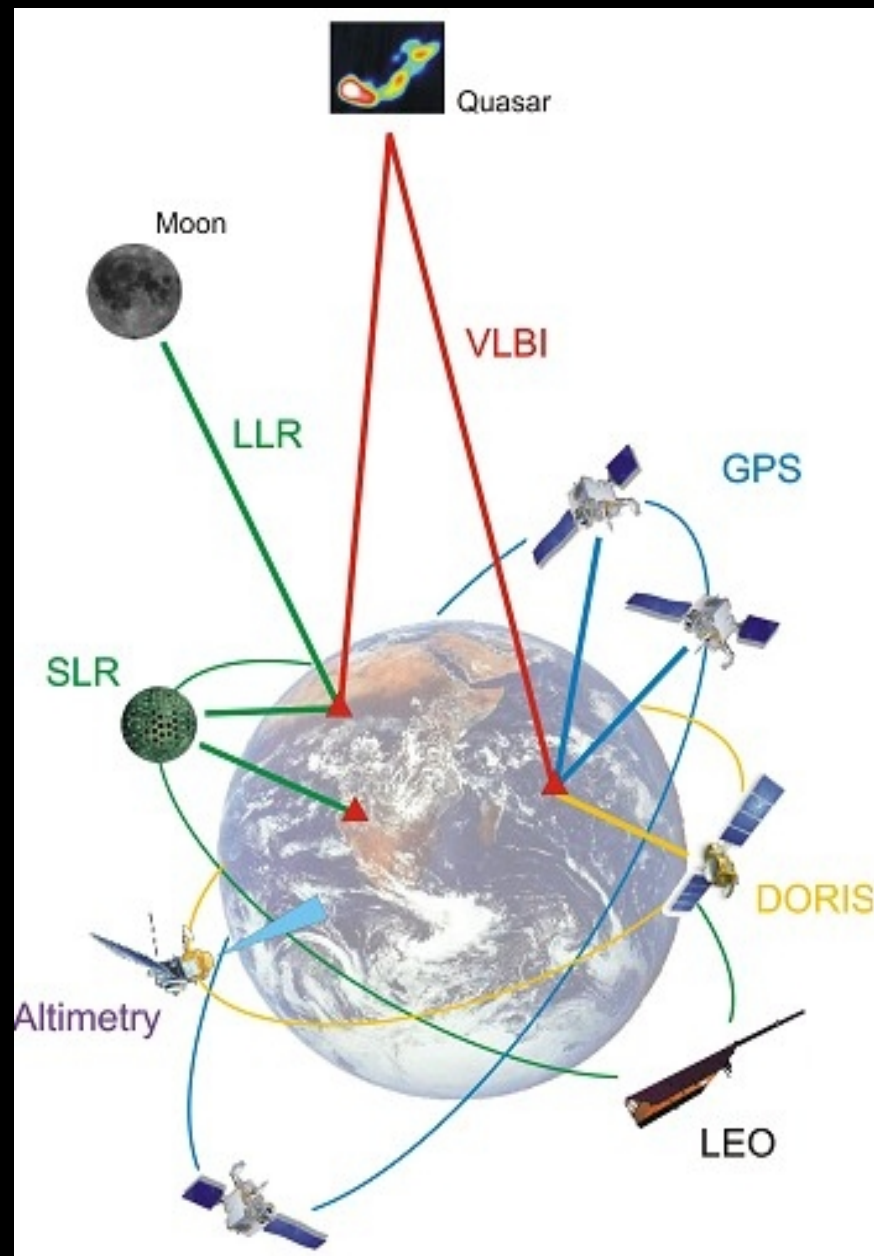
GGOS aims to extract (small) signals of global change and Earth system processes signals from the observations: **accuracy of < 1 ppb.**

Challenges:

- Consistency of the three pillars;
- Global change and geohazards-related effects are small;
- Reference frame needs to be available anywhere, any time.

Solution: Integration of

- Systems,
- Observations,
- Analysis, and
- Geodetic and physical models (conventions)



# GEO and GEOSS: A Brief Introduction

**2002: World Summit on Sustainable Development in Johannesburg, South Africa:**

*Urgent need for coordinated observations of the state of the Earth*

**June 2003: G8 Meeting in Evian:**

*re-emphasizes the importance of Earth Observations*

**July 2003: First Earth Observation Summit (EOS-I) in**

**Washington, DC with 33 Countries+EC and 21 international Organisations:**

- *Establishes the ad hoc Intergovern. Group on Earth Observation (ad hoc GEO)*
- *Task of ad hoc GEO: initial 10 year Implementation Plan by February 2005*

**April 2004: EOS-II in Tokyo, 43 Countries + EC plus 25 international organisations:**

- *Adopts the 'Framework Document', which defines nine societal benefit areas for Earth observations*

**February 2005: EOS-III in Brussels:**

- *Adopts the 10 Year Implementation Plan for a Global Earth Observation System of Systems (GEOSS)*
- *Establishes the Group on Earth Observation (GEO) with the task to implement GEOSS*

**July 2003: GGOS is established by IAG and IUGG**

**IAG joins GEO as Participating Organisation**

# GEO and GEOS: A Brief Introduction



UN Millennium  
Development Goals

Keep the promise  
Millennium Development Goals

2015

## THE Global Earth Observation System of Systems



## Millennium Development Goals for 2015:

- Eradicate Extreme Poverty and Hunger
- Achieve Universal Primary Education
- Promote Gender Equality and Empower Women
- Reduce Child Mortality
- Improve Maternal Health
- Combat HIV/AIDS, Malaria and other Diseases
- Ensure Environmental Sustainability
- Develop a Global Partnership for Development



# GGOS and GEO

## Link between IAG/GGOS and GEO

IAG Participating Organization in GEO

IAG Lead Organization for one GEO Task

IAG delegated representation in GEO to GGOS

GGOS Working Group on GEO Relations (*Chair: H.-P. Plag*)

- Members: Delegates to GEO Committees (two or more per Committee)

Mission:

- promote the work of GGOS and IAG in GEO
- foster the contribution of GGOS to GEOSS
- ensure adequate representation of GGOS and IAG in all GEO Committees and the relevant Teams of GEO Work Plan Tasks
- facilitate informed decision by GEO with respect to geodetic issues,
- ensure effective information flow between GGOS/IAG and GEO;
- emphasise interoperability of GGOS with GEOSS as a prerequisite for utilizing the full benefit of GGOS for Earth observation.

# GGOS and GEO

## Contribution to GEO Work Plan

### **GEO: Task AR-07-03: Global Geodetic Reference Frames**

- (1) Understand the user requirements of the nine SBAs in terms of access to a global reference frame (accurate positions) AND geodetic observations;*
- (2) Improve the framework conditions for the maintenance of the geodetic infrastructure, support for transition research to operational.*

(Point of Contact: H.-P. Plag)

### **Main Deliverable of the Task:**

- The Global Geodetic Observing System: Meeting the Requirements of a Global Society on a Changing Planet in 2020 (**GGOS 2020**)
  - Deliverable of Task AR-07-03
  - Community study aimed at (1); five chapters on observational requirements;
  - Scientific rationale for the future development and implementation of GGOS

-

# GGOS and GEO

## Contribution to Communities of Practice (CoP)

Geohazards CoP: GEO/GGOS Workshop: *The GGOS Contribution to GEOSS and an Observing System for Geohazards and Disaster Prevention*, November 5-6, 2007, Frascati, Italy.

Coastal Zone CoP (CZCP): GEO Workshop Series: *GEOSS Support for Decision-Making in the Coastal Zone: Managing and Mitigating the Impacts of Human Activities and Natural Hazards in the Coastal Zone*  
First Workshop: *Observing System Requirements for Managing and Mitigating the Impacts of Human Activities and Coastal Inundation in the Mediterranean Region*, June 9-13, 2008, Athens, Greece.

Water Cycle CoP: GEO/GGOS sponsored IGCP 565 Project: *Developing the Global Geodetic Observing System into a Monitoring System for the Global Water Cycle*, First Workshop: December 11, 2008, San Francisco.

# GGOS and GEOSS

## GEO/GGOS Workshop Conclusions:

The global geodetic reference frames, ITRF and ICRF, and Earth rotation parameters are indispensable for Earth observations and their accuracy is a key limiting factor.

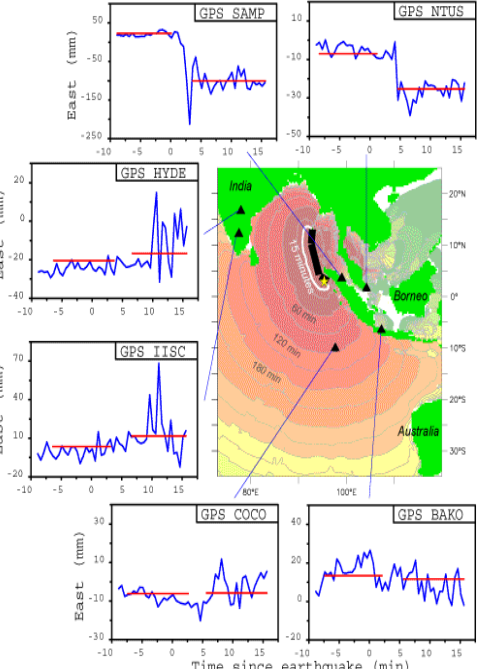
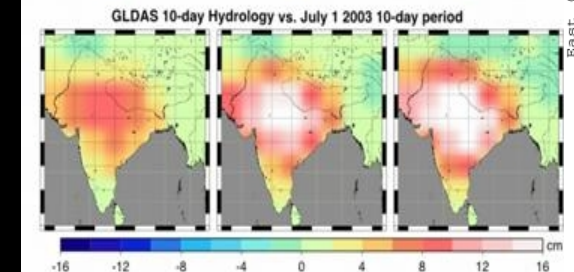
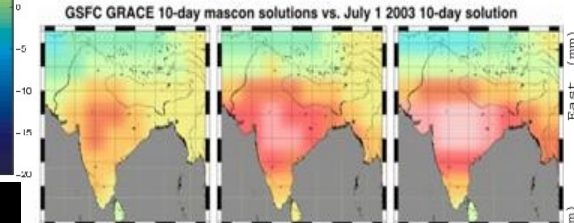
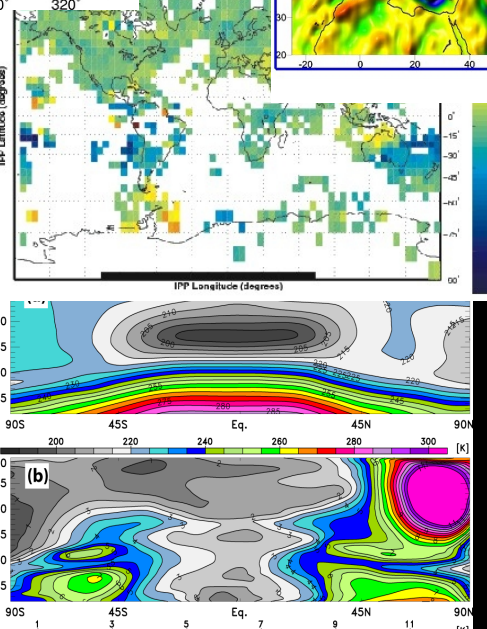
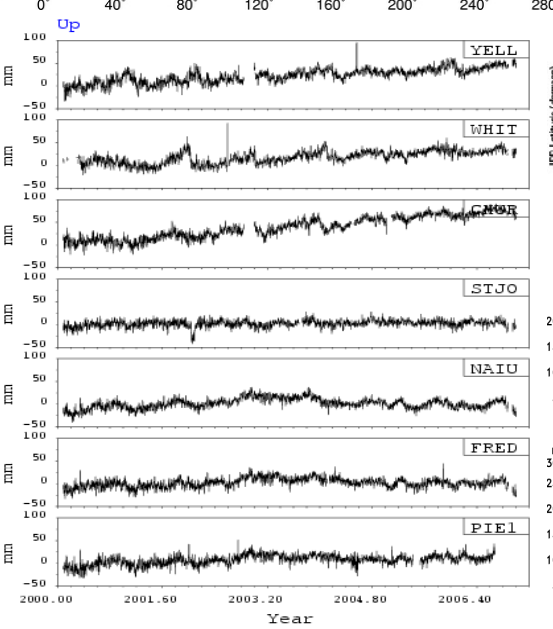
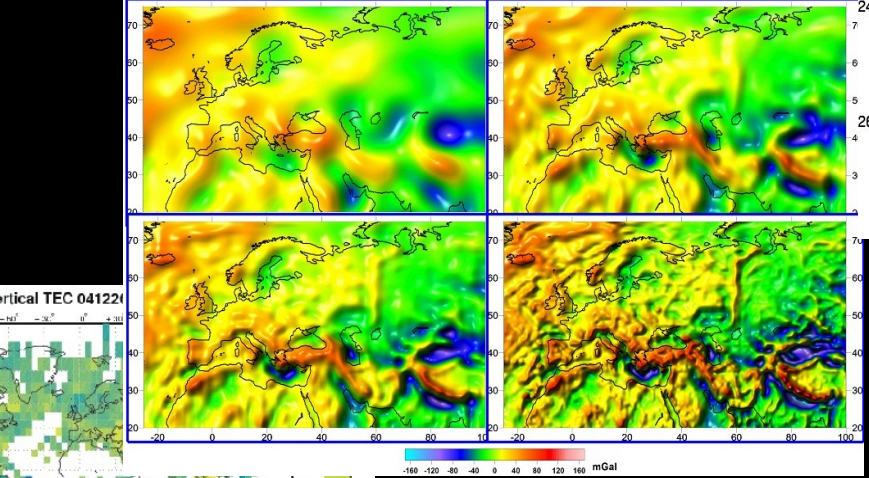
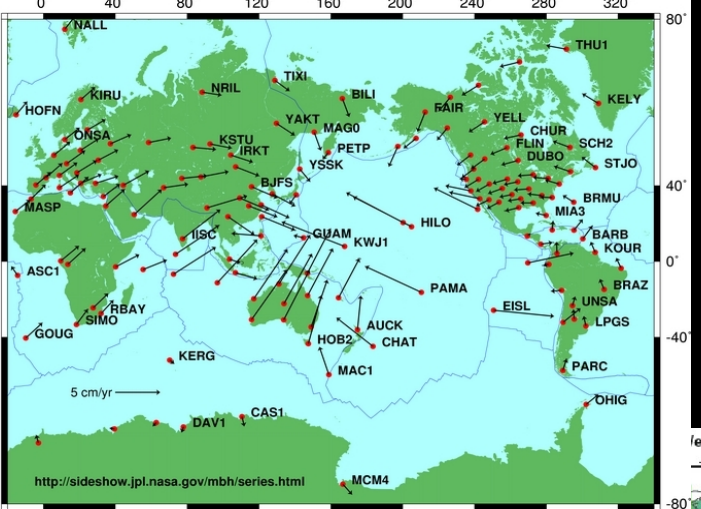
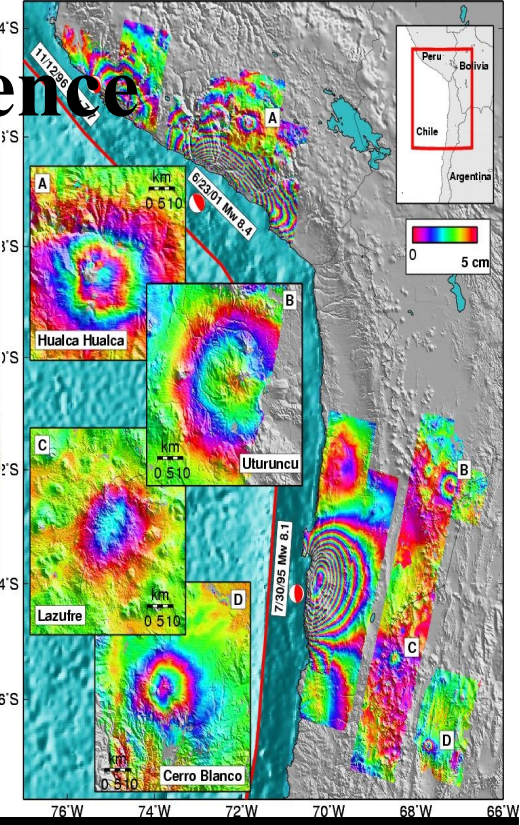
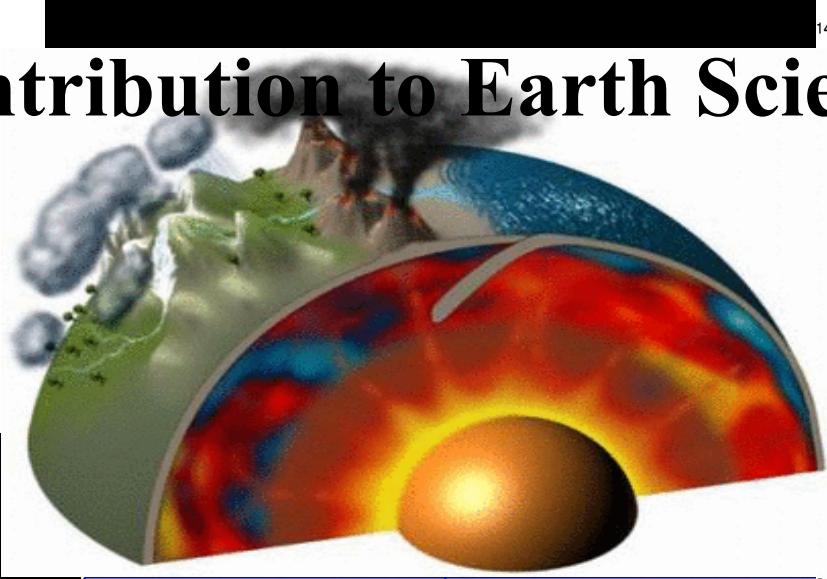
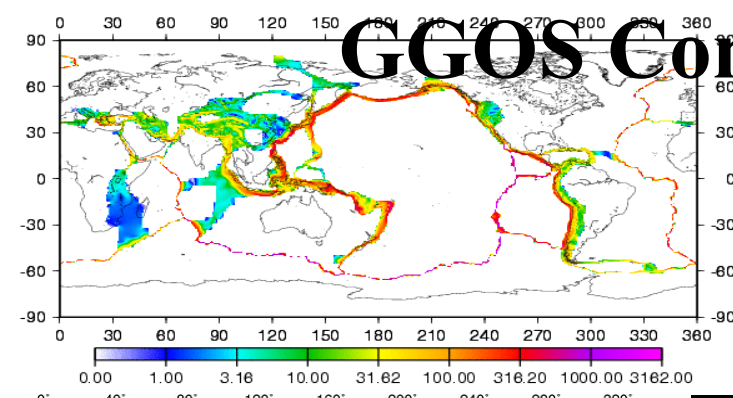
Global geodetic infrastructure, in particular GGOS, is a core element in the global Earth observation system of systems

### With respect to Geohazards:

- **Geodetic observations and products play a crucial role** in all aspects of disaster prevention and mitigation, including risk assessment and the monitoring of hazardous situations for early warning systems.
- **Geodetic Observations** have:
  - already transformed our **understanding of geohazards,**
  - started to **contribute to early warning,**
  - opened up **new scientific frontiers.**



# GGOS Contribution to Earth Science



# GGOS and Asian Activities

## Summary of relevant activities ...

### Asian Contribution to GGOS:

- ...

- ...

### Expectations to GGOS:

- ...

- ...

# Mutual Benefits IAG/GGOS and Asian Region

## **IAG/GGOS provide:**

- crucial expertise;
- the metrological basis for Earth observations;
- observations pivotal for many Earth science studies and applications.

## **Asian Countries provides:**

- infrastructure and observations
- ...