

El proyecto
“Sistema de Observación Geodésico Global”
[Global Geodetic Observing System (GGOS)]
de la Asociación Internacional de Geodesia (IAG)

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PAIGH Representative of the

International Union of Geodesy and Geophysics (IUGG)



IUGG

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The International Association of Geodesy

The International Association of Geodesy (IAG) is a scientific organization within the International Union of Geodesy and Geophysics (IUGG) under the umbrella of the International Council for Science (ICSU).

The mission of IAG is the advancement of geodesy as an Earth science. It is structured into **four Commissions** and **twelve Services** for fundamental and applied research and the generation of products in support of science and society.

The **Global Geodetic Observing System (GGOS)** serves as a flagship of IAG to coordinate the geodetic research work and to represent geodesy in other sciences and in society. It was installed in 2003 and is in full function since 2005.

The International Association of Geodesy

Commissions

1 Reference Frames
Pres.: H. Drewes

2 Gravity Field
Pres.: C. Jekeli

3 Geodynamics
Pres.: V. Dehant

4 Applications
Pres.: C. Rizos

Inter-Commission-Committees

Theory, Pres.: P. Xu

Planetary Geodesy, Pres.: D. Smith

Services

IERS
Chopo Ma

IGS
J. Dow

IVS
W. Schlüter

IGFS
R. Forsberg

IGeS
F. Sanso

PSMSL
P.L. Woodworth

ILRS
W. Gurtner

IDS
G. Tavernier

BGI
J.-P. Barriot

ICET
B. Ducarme

BIPM
E.F. Arias

IBS
A. Korth

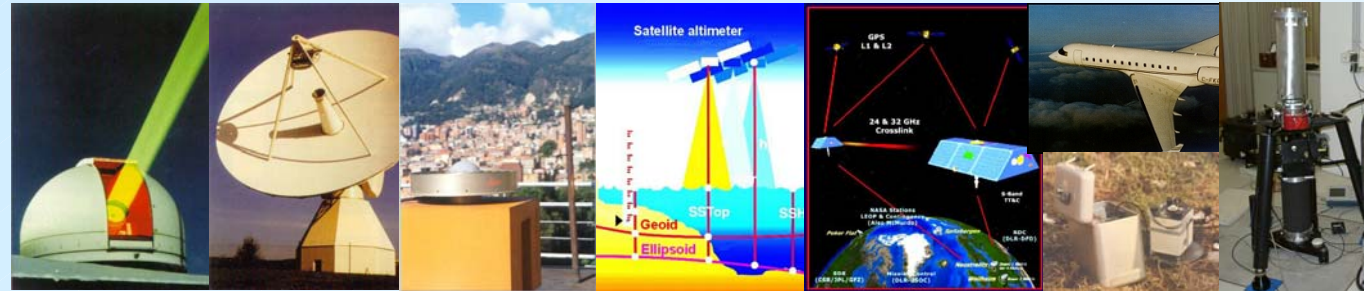
Association Project

Global Geodetic Observing System (GGOS), President: M. Rothacher

The Vision of GGOS

GGOS integrates

different techniques, models and approaches



Geometric and gravimetric techniques

in order to achieve better consistency and long-term reliability



Identical constants, conventions, models, ...

as science & infrastructure basis in Earth sciences.



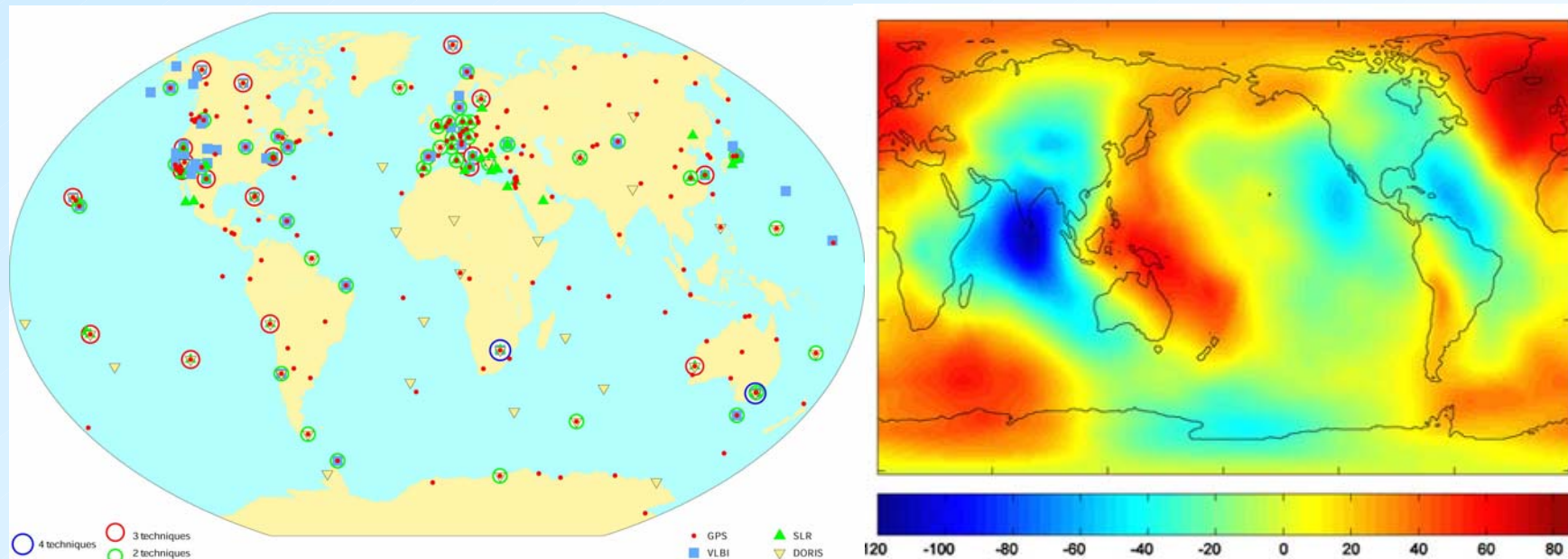
Geodynamics, Cadastre, Land Management, Astro , Navigation

The Mission of GGOS (1)

GGOS shall ensure the consistency between all geodetic *standards, observations, models, reference frames, and all the products:*

Geometric reference frames (ITRF2000)

Gravimetric reference frames (GGM)



... and the combination of both, e.g., the globally unified height systems.

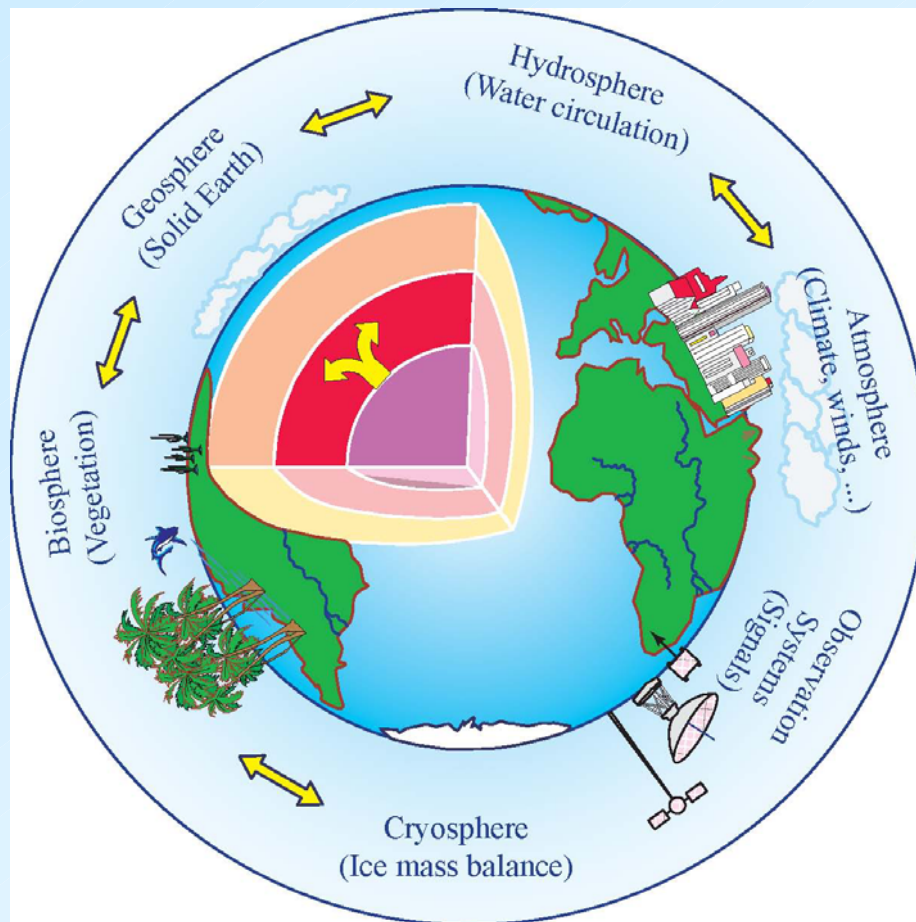
The Mission of GGOS (2)

GGOS shall improve *visibility* of geodesy in science and society.

- GGOS shall be established as an official partner in the United Nations' **Integrated Global Observing Strategy (IGOS)**.
- GGOS has become, via IAG, a participating organization in the inter-governmental **Group on Earth Observations (GEO)**.
- GGOS participated in preparing the 10 year implementation plan of a **Global Earth Observation System of Systems (GEOSS)**.
- GEO and GEOSS have got their Secretariat in 2005 in Geneva, Switzerland.

The Objectives of GGOS

GGOS shall have the *central theme* “Global deformation and mass exchange processes in the System Earth“.

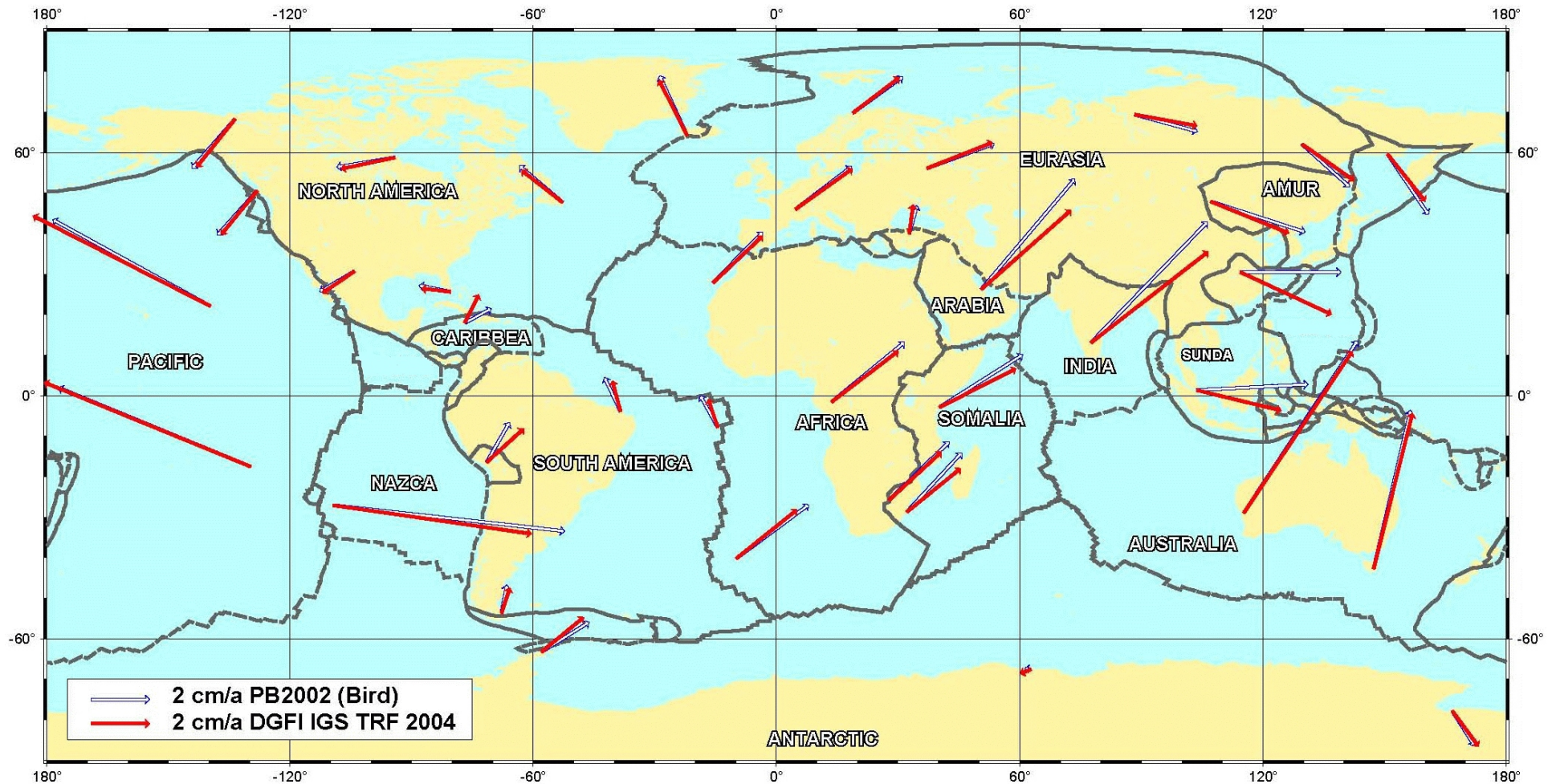


Geodesy is capable of observing deformation and mass processes:

- deformation of the **solid Earth** (geometry and kinematics);
- **water circulation** in oceans, ice covers, atmosphere, solid Earth (satellite altimetry, gravity missions, atmosphere sounding);
- **mass exchange** between the atmosphere, the hydrosphere and the biosphere (variations of Earth rotation and gravity field). GGOS

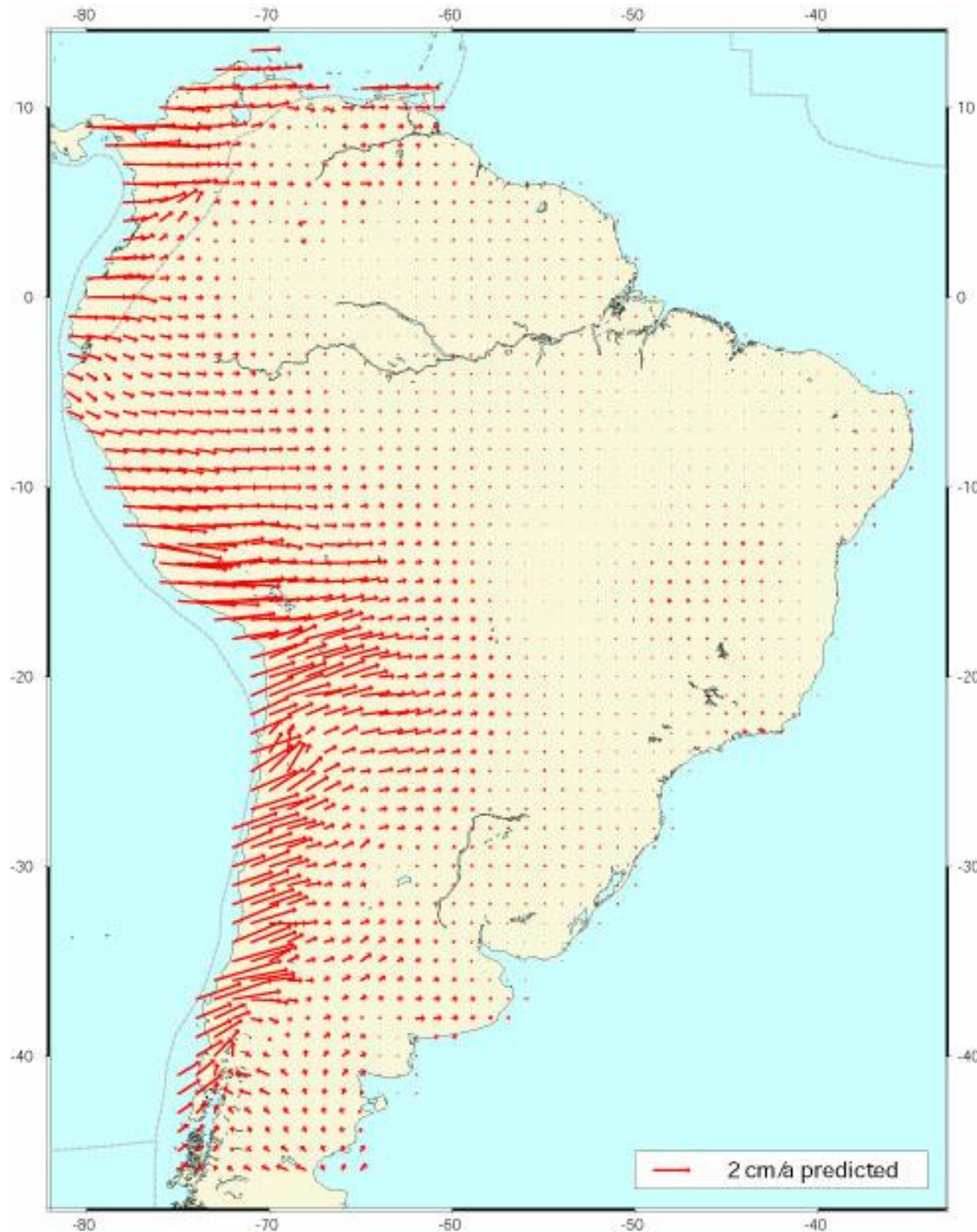
Effects on the Solid Earth (Geosphere) (1)

Plate kinematics



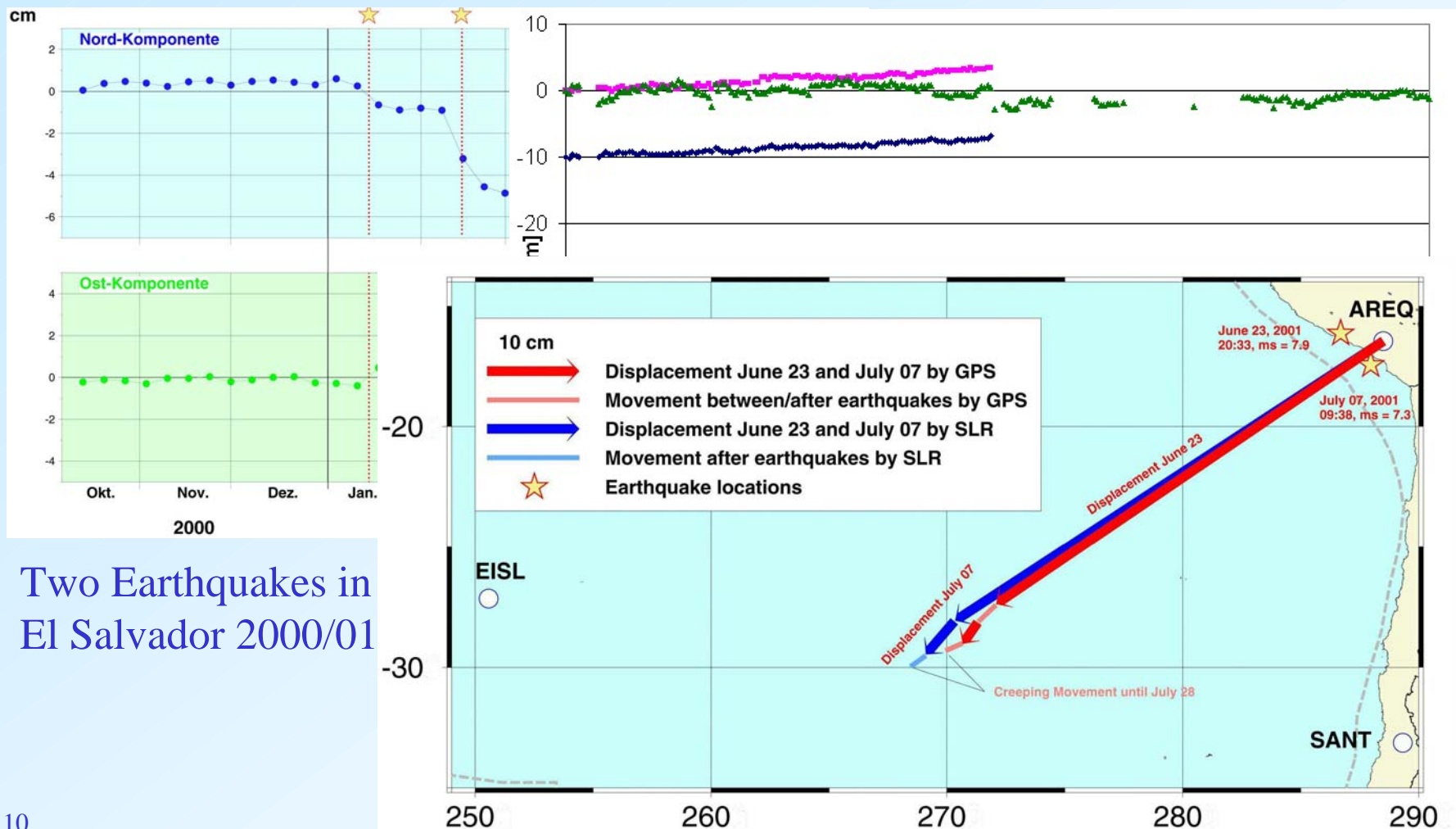
Effects on the Solid Earth (Geosphere) (2)

Crustal deformation in
South America (SIRGAS)
(Drewes/Heidbach, 2005)



Effects on the Solid Earth (Geosphere) (3)

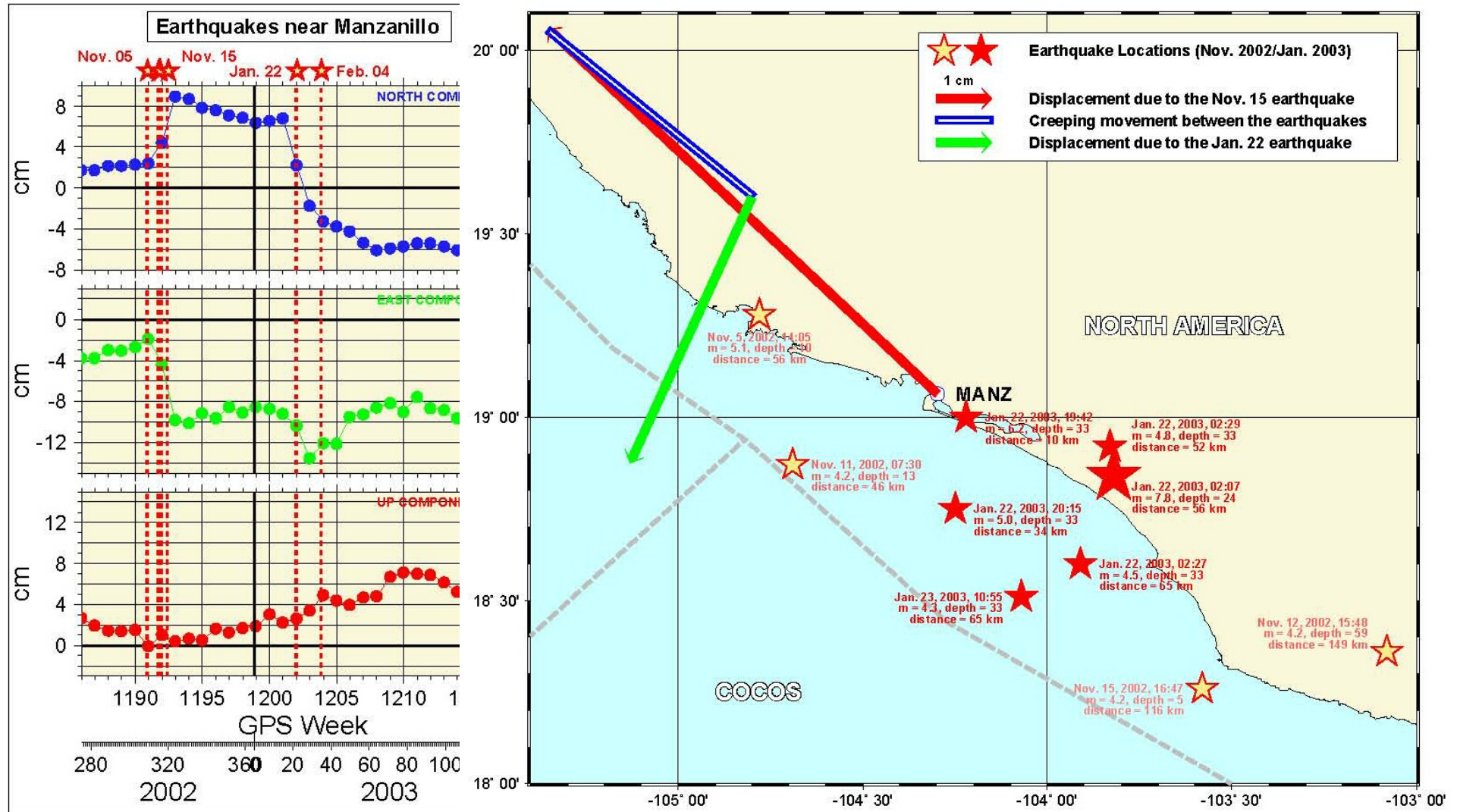
Co-seismic displacements



Two Earthquakes in El Salvador 2000/01

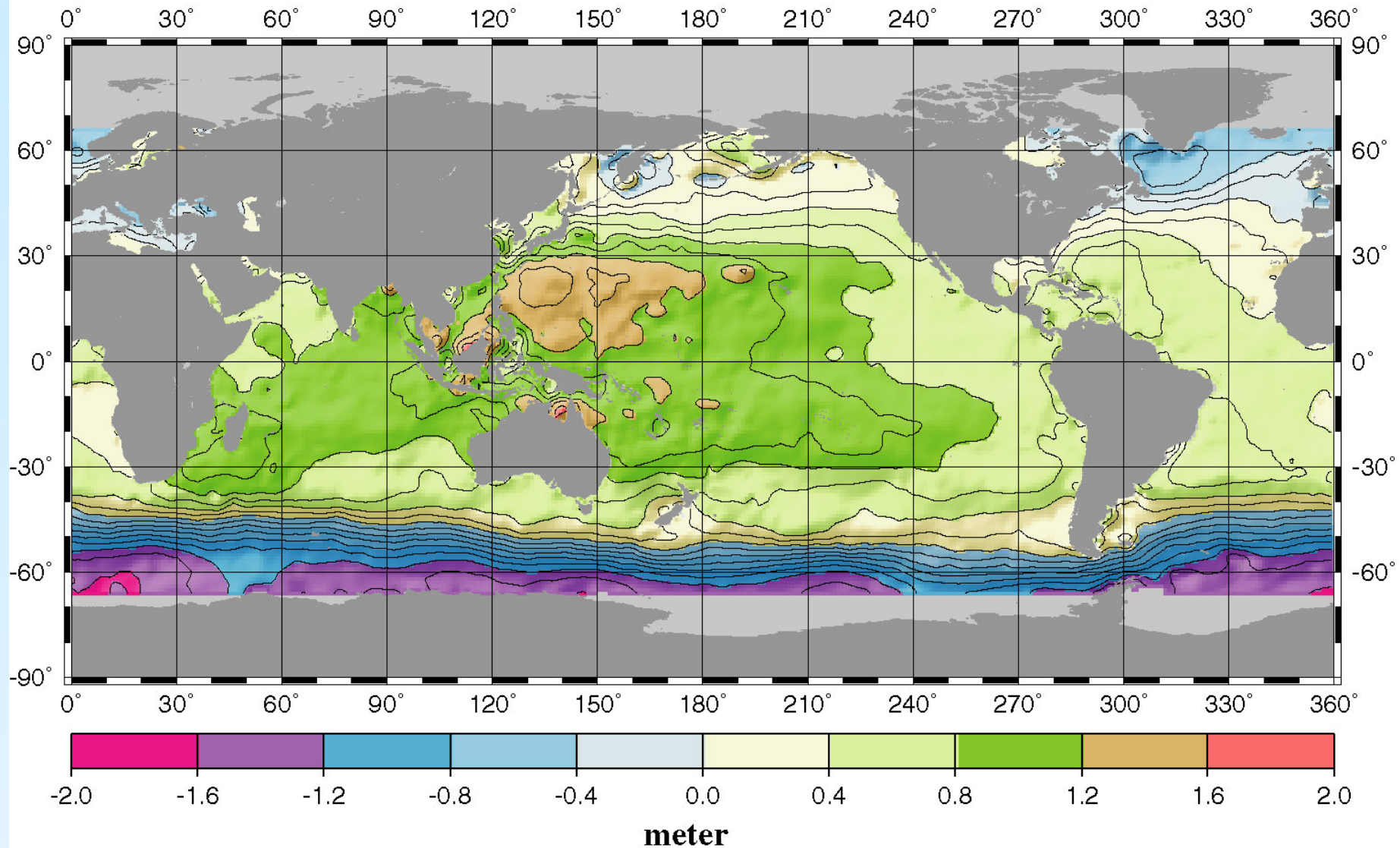
Effects on the Solid Earth (Geosphere) (4)

Co-seismic displacements



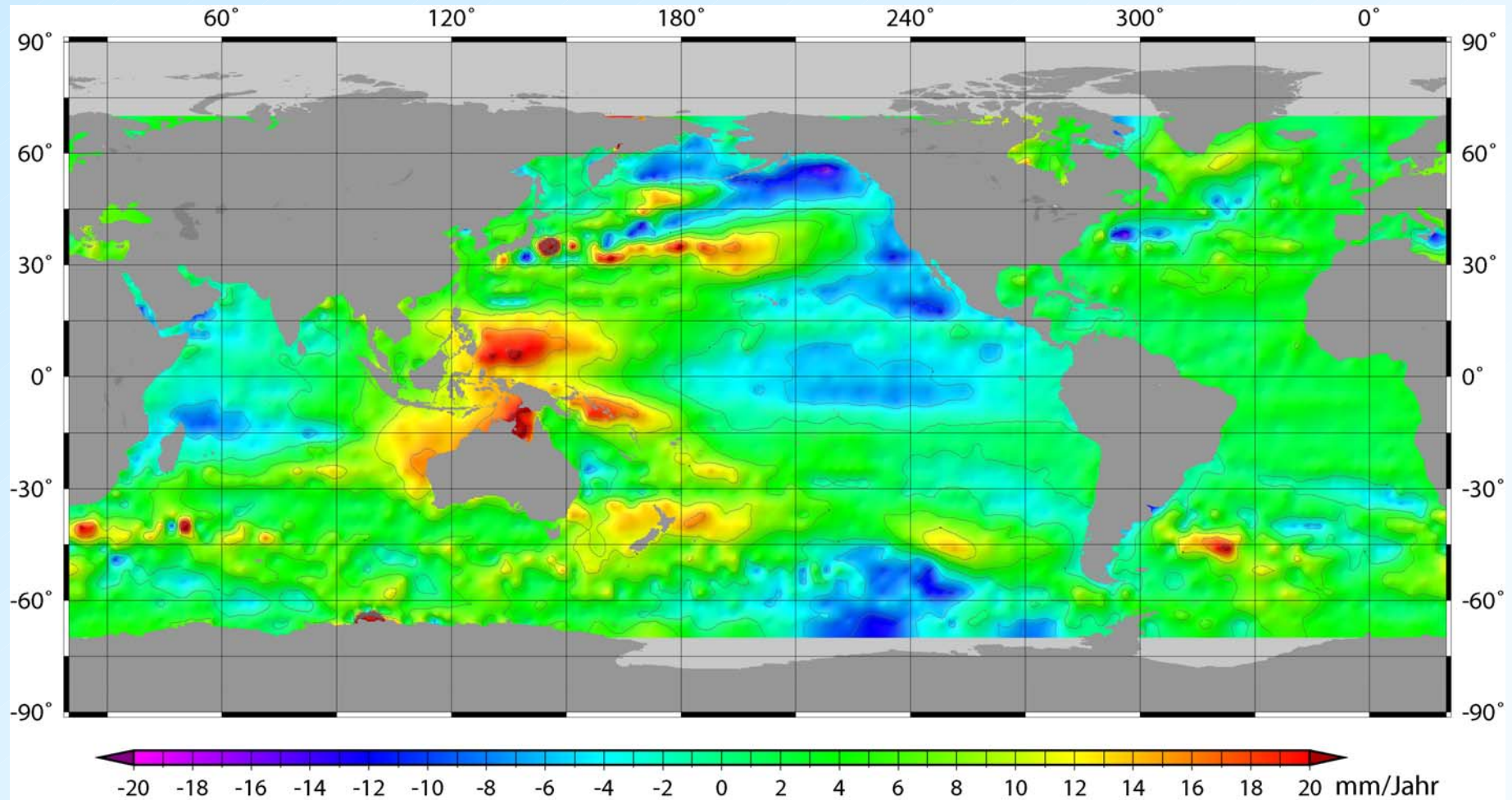
Effects on the Oceans (1)

Sea Surface Topography from Satellite Altimetry



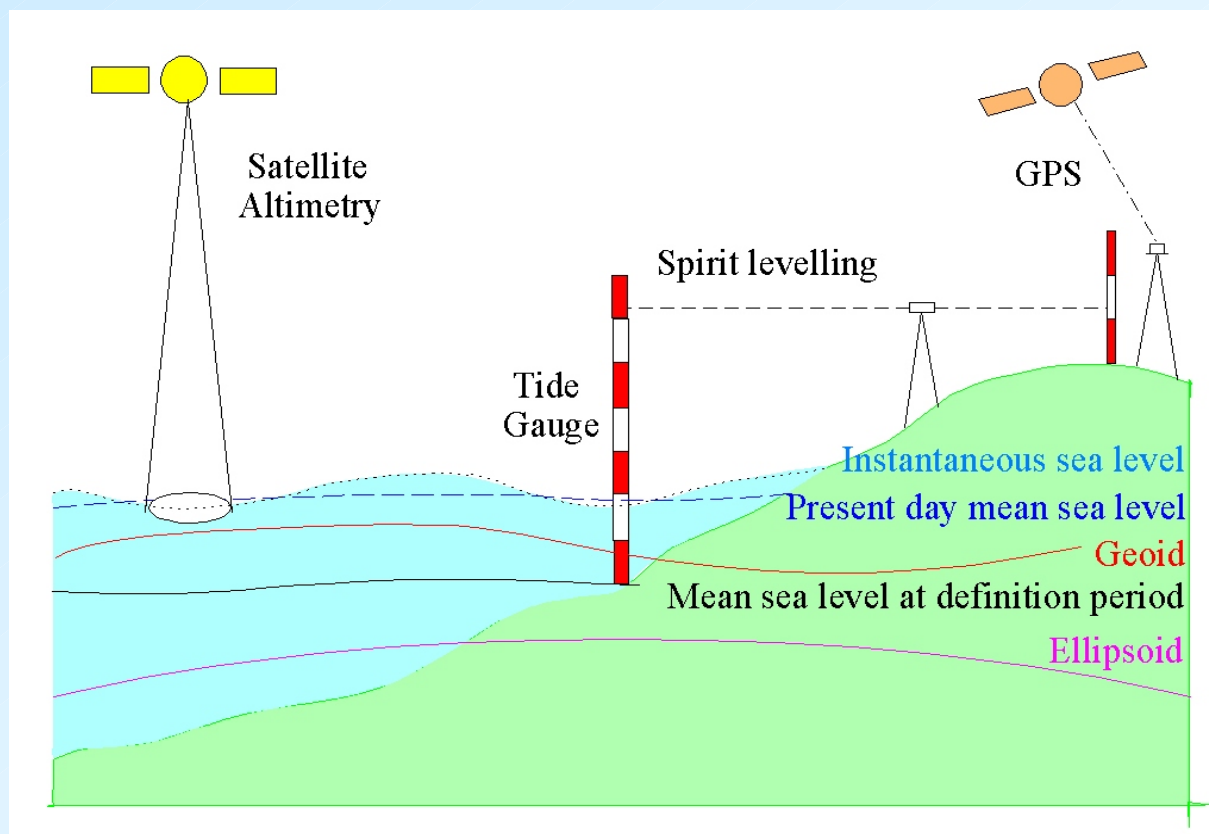
Effects on the Oceans (2)

Sea Level Changes from Satellite Altimetry 1992 - 2002



Combination of Geodetic Observations of Solid Earth and Oceans: Height Systems

Height systems are defined by the mean sea level at an arbitrarily selected tide gauge over an arbitrarily selected time period.



The sea level changes geographically and with time.

Therefore, the height systems referring to different tide gauges have different levels.

Only the combination of levelling, gravity and sea level allows a unified height system.

Requirements for Height Systems

Physical height systems are a basic geodetic product for many applications, e.g., navigation, engineering, water supply, ...

The global unification of height systems of all countries is a major objective of geodesy in general and of GGOS in particular.

The unification requires geometric and gravimetric information: sea level at tide gauges, spirit levelling, and gravimetry.

The adjustment of all available data has to be coordinated in an international cooperation.

The collaboration of all countries is solicited and appreciated for the benefit of science and society.

Conclusion

- GGOS has the mission to guarantee the reliability of geodetic products by ensuring the consistency of standards, models, parameters, and reference systems.
- The **horizontal** component is well done in the Americas by SIRGAS. The **vertical** component is quite a bit behind the requirements of practical applications:
 - ± 50 cm for air navigation (worldwide),
 - ± 10 cm for large area water supply (national),
 - ± 1 cm for engineering (regional, trans-national).
- The collaboration of all American countries for unification of the height systems is solicited.

Thank you!