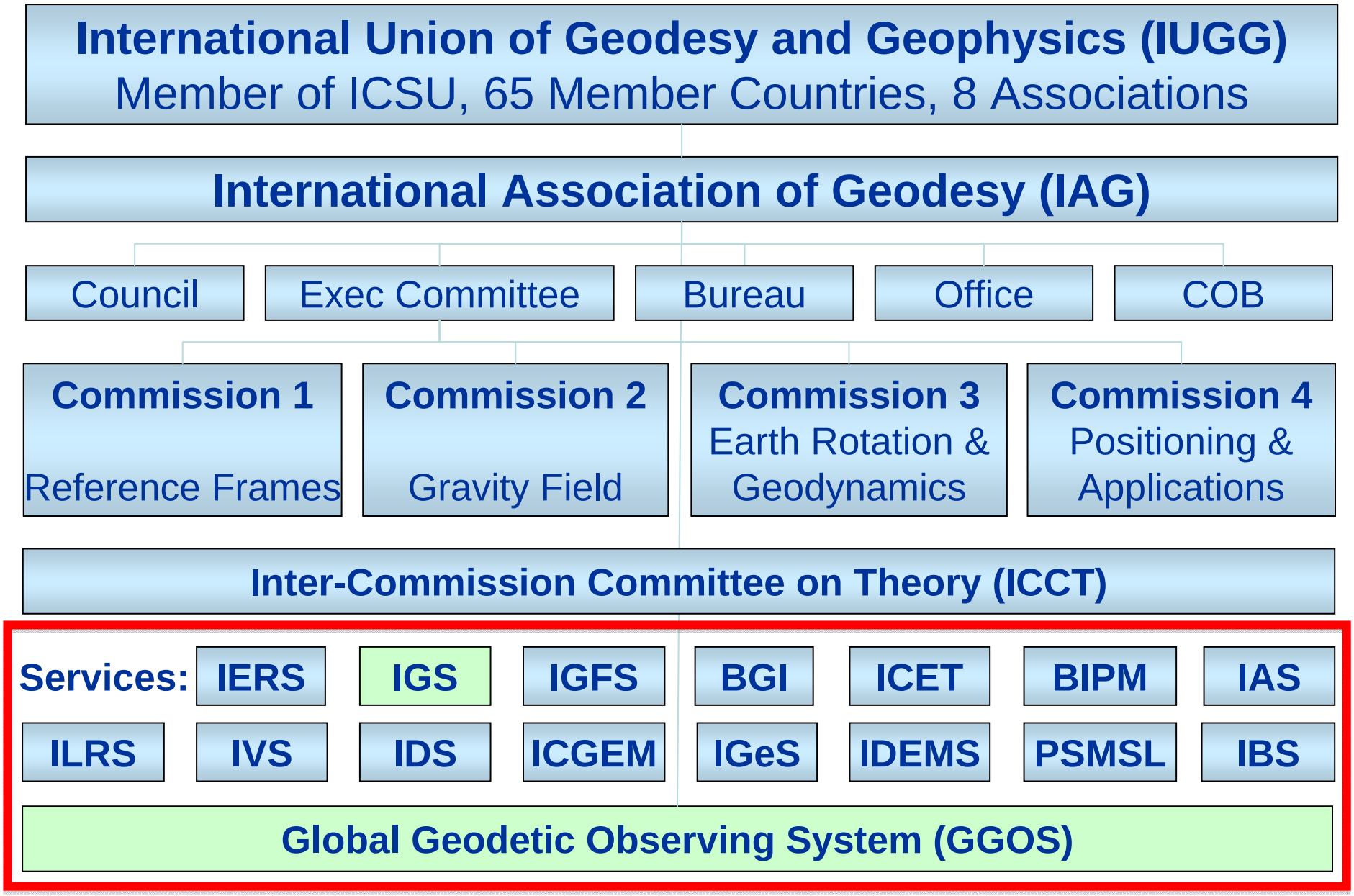
GNSS is the Core Technology to Support GGOS Applications

Chris Rizos

President, IAG

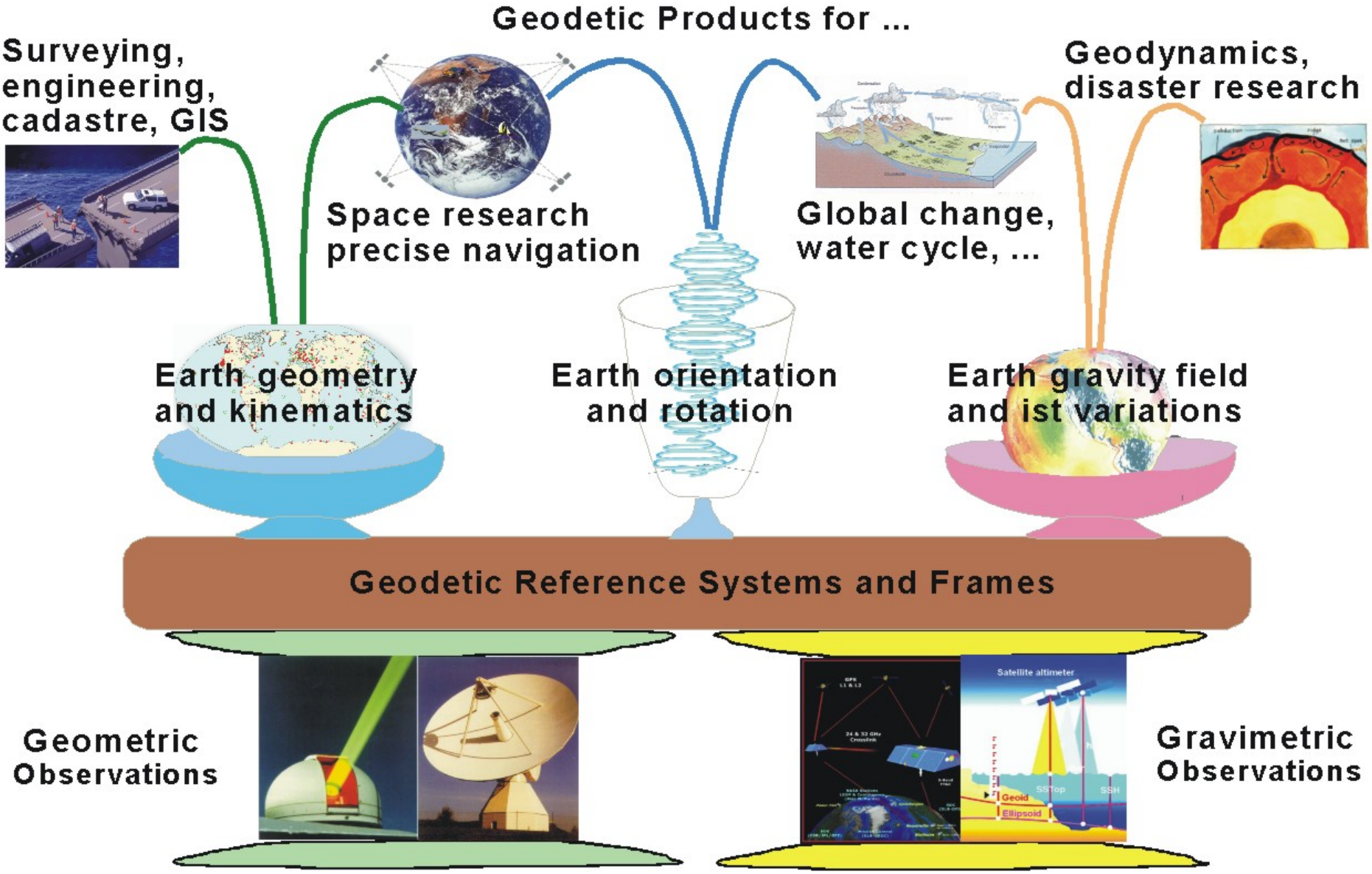
IAG Structure



Global Geodetic Observing System

- GGOS links all components of the IAG, *e.g. Services, Commissions, ICCT, etc.*
- GGOS is the combined global geodetic infrastructure, *i.e. physical, IT & analysis components.*
- GGOS products include individual service products that have been “value-added”, *e.g. WHS, time series, etc*.
- GGOS will support long term geodesy goals, *e.g. stable reference frames.*
- GGOS seeks integrated modelling of all observations, *so as to improve geodetic parameter estimation for earth science*.
- GGOS will provide single “portal” for users, *i.e. a “one stop shop”*.

Global Geodetic Observing System

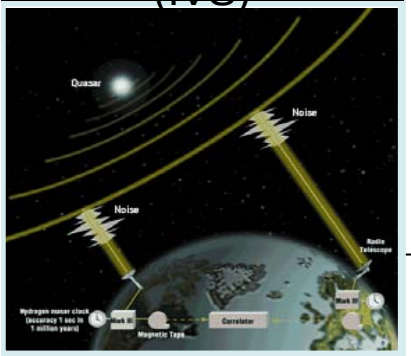


International Terrestrial Reference Frame (ITRFxx)

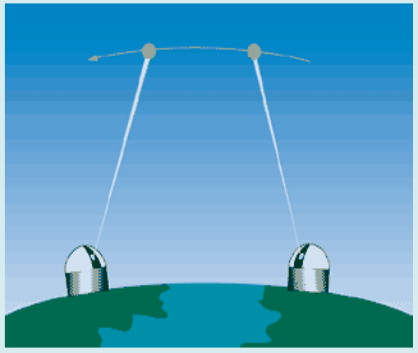
International Earth Rotation and Reference Systems Service (IERS)

Radio source positions, precise GNSS orbits and clocks, Earth orientation parameters (EOP), station coordinates and velocities

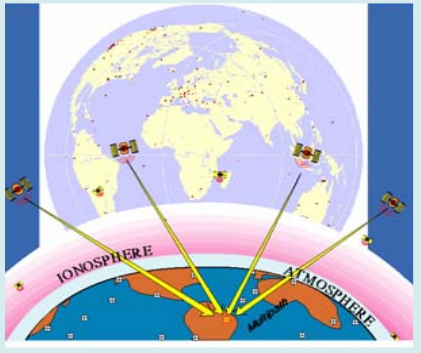
Very Long Baseline Interferometry (IVS)



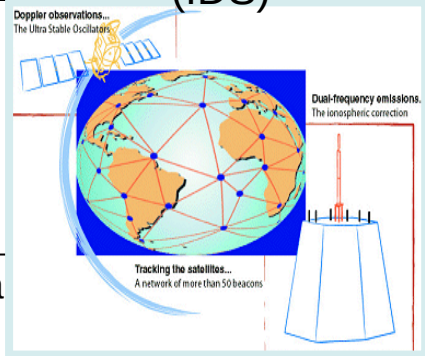
Satellite Laser Ranging (ILRS)



Global Navigation Satellite Systems (IGS)



Doppler Orbit Determination and Radiopositioning Integrated on Satellite (IDS)



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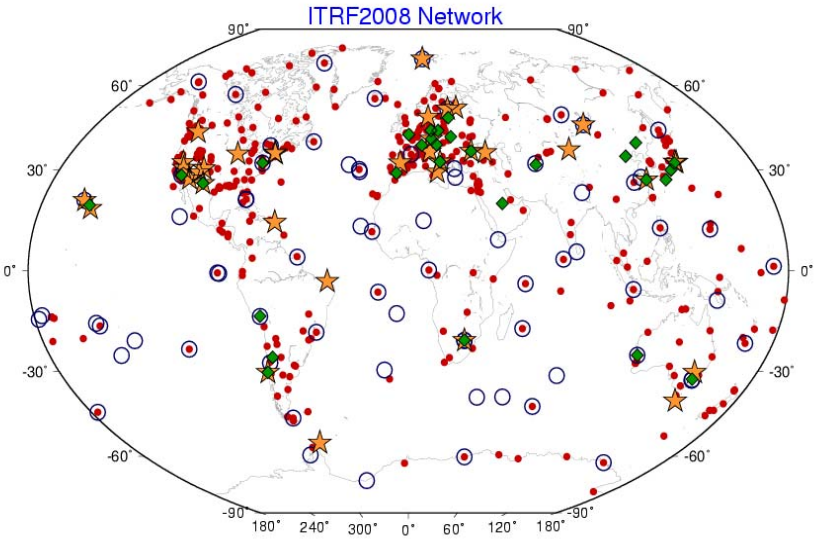
International Terrestrial Reference System (ITRS)

- Realised and maintained by ITRS Product Centre of the IERS.
- Its realisation is the “International Terrestrial Reference Frame" (ITRF).
- Set of station positions and velocities, estimated by combination of VLBI, SLR, GPS and DORIS individual TRF solutions.
- Based on Co-location sites.

Adopted by IAG & IUGG in 1991 and 2007 for all Earth Science Applications



Available: ITRF88,…, 2000, 2005
Latest : ITRF2008
Coming: ITRF2013

http://itrf.ign.fr

Current Space Geodesy Networks for ITRF

VLBI

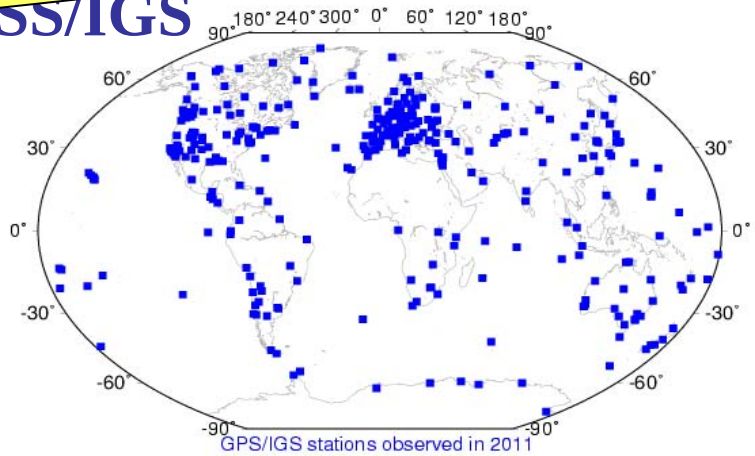
SLR

GNSS technology & IGS products crucial to ITRF definition & to its **relevance**...

By virtue of ease-of-connection to it anywhere on Earth using precise GNSS positioning techniques

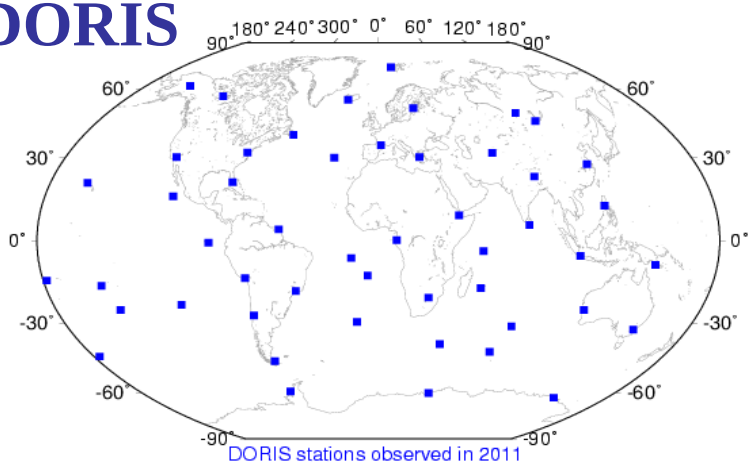
SLR stations observed in 2011

GNSS/IGS



GPS/IGS stations observed in 2011

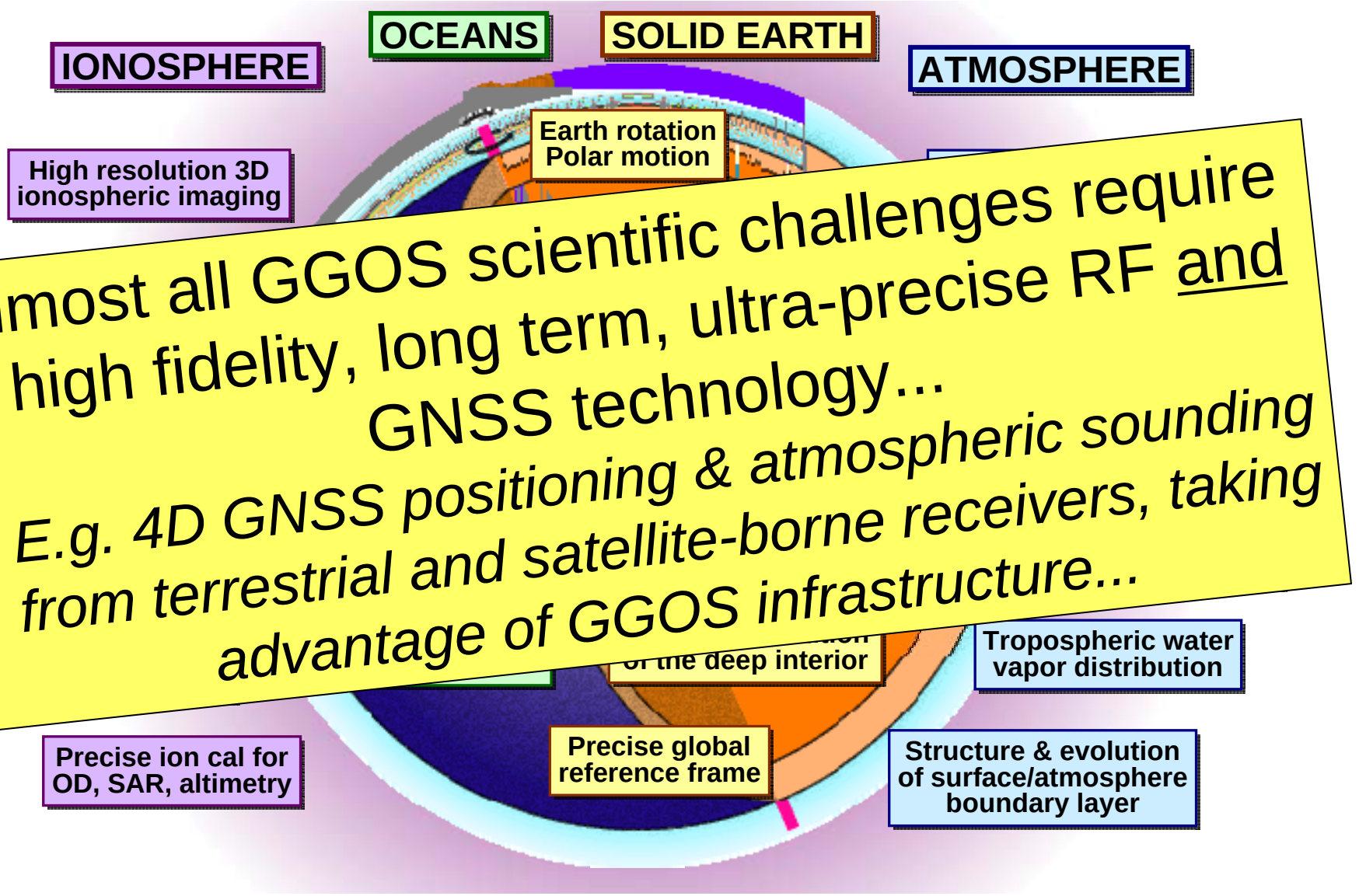
DORIS



DORIS stations observed in 2011

Illuminating the Earth With GNSS

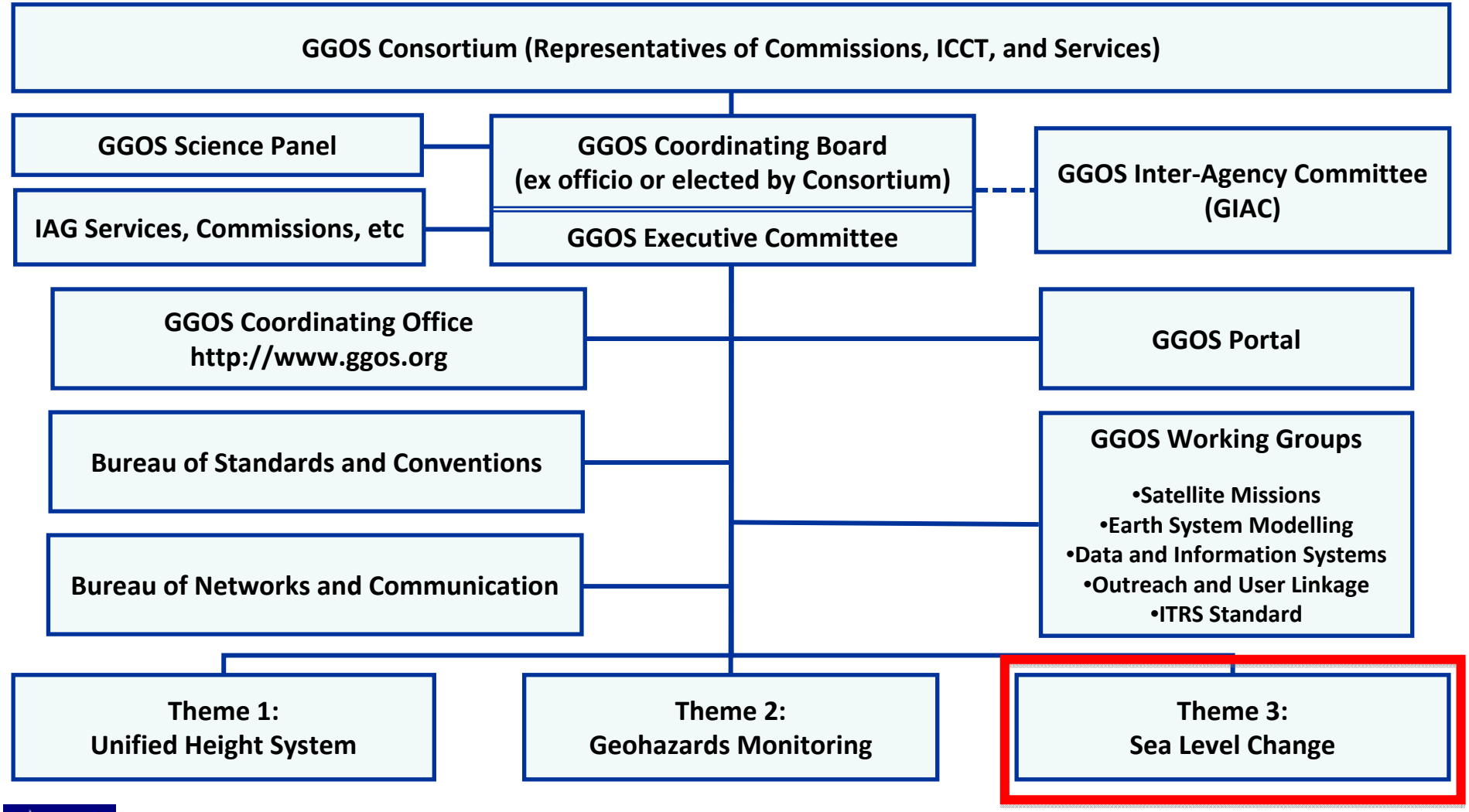
Scientific Drivers – Extending the Reference Frame to Multiple Applications



Almost all GGOS scientific challenges require high fidelity, long term, ultra-precise RF and GNSS technology…

E.g. 4D GNSS positioning & atmospheric sounding from terrestrial and satellite-borne receivers, taking advantage of GGOS infrastructure…

Global Geodetic Observing System



Example of Complexity of Data & Missions:

Sea Level Change & Ice-Mass Balances

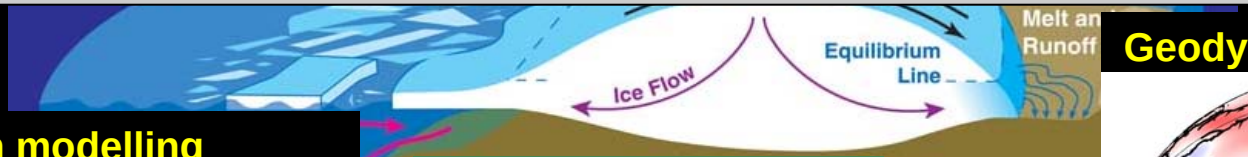
Altimetry missions

Data processing

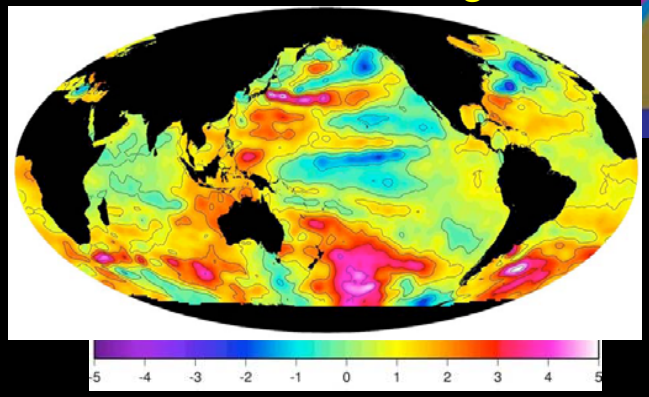
Gravimetry missions

Such complexity requires the coordination of several geodetic technologies & services…

integrated to generate "high level products" that science and society can directly use…



Ocean modelling



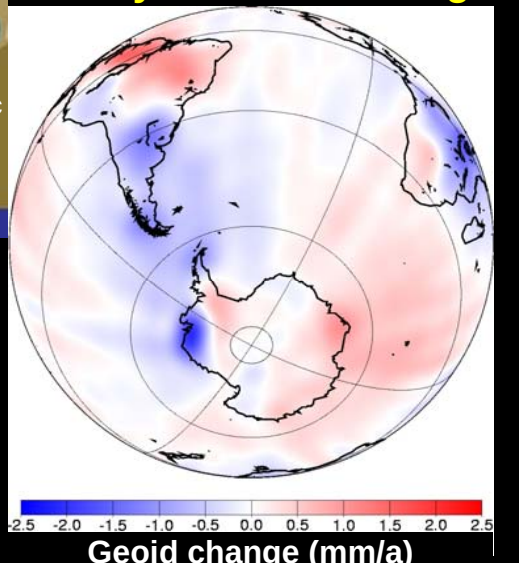
Sea-level change (mm/a)

Terrestrial networks

Tide gauge **GPS**

Glacial-isostatic adjustment

Geodynamic modelling



Geoid change (mm/a)

Global Geodetic Observing System

- Vision: *continuous, synoptic, high-accuracy Earth Observing System that can monitor geometric & gravimetric effects in 4D.*
- The goal of GGOS: *improve the accuracy, resolution, reliability & timeliness of geodetic products by an order of magnitude by end of decade.*
- Operationalise “millimetre-geodesy” in order to monitor faint global change & geodetic signatures.
- Support centimetre-level Precise Positioning GNSS for geoscience & geospatial applications.
- 1mm accuracy Reference Frame, & stability of 0.1mm/yr.
- GNSS is the key space geodesy technology to deliver GGOS’s vision.

Thank You!

IAG

150th Anniversary

1862-2012