



Introduction and Welcome GGOS and the contribution of GNSS

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President of BKG
GGOS Chair**

PPP-RTK & Open Standards Symposium

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BKG Sites

**Frankfurt am Main
(Headquarter)**



Leipzig



**Geodetic Observa-
tories Wettzell and
Concepcion, Chile**

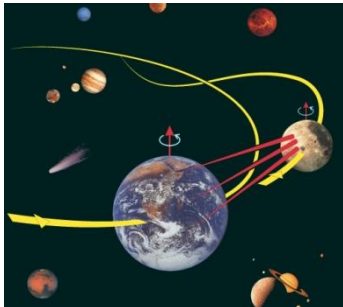




Tasks and Products

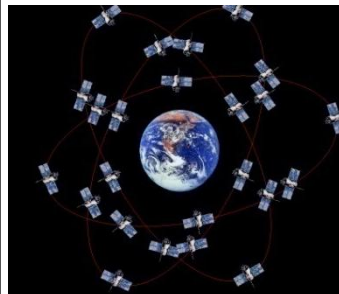
G1 - Global Reference Systems

- Central Bureau of the International Earth Rotation and Reference Systems Service (IERS)
- International VLBI Service (IVS)
- International Laser Ranging Service (ILRS)



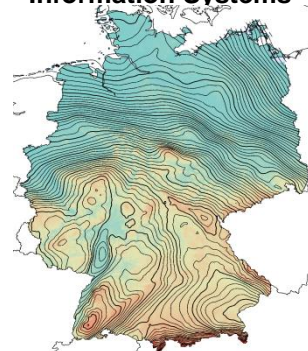
G2 - National Reference Systems Position

- GNSS RT applications
- European Reference Network/ Int. GPS/ GLONASS Service
- GREF / SAPOS Integration
- GNSS Satellite Orbits



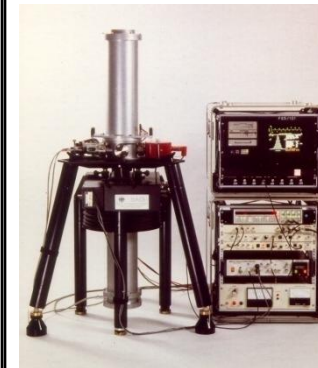
G3 - National Reference Systems Height

- GREF Network
- German/European Height Reference System
- Geoid and Gravity Field Determination
- Geodetic Information Systems



G4 - National Reference Systems Gravity

- German Gravity Reference System
- Absolute Gravity
- Super Conducting Gravimetry



G5 - Geodetic Observatory Wettzell

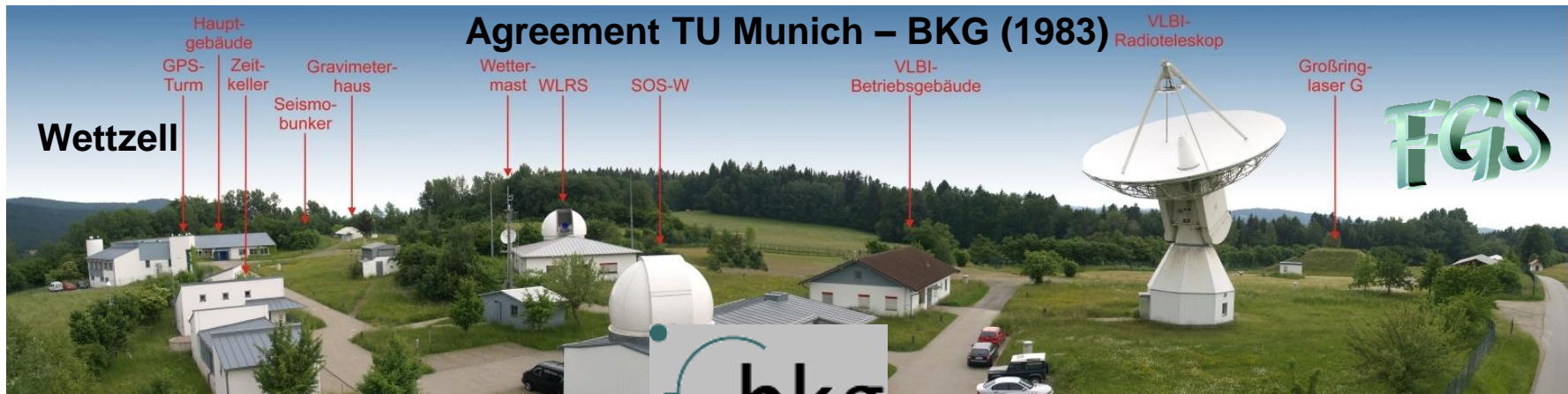
- VLBI Observation
- SLR Observation
- GPS/GLONASS Permanent Station
- Laser Gyroscope
- Local measurement data and subject-specific services





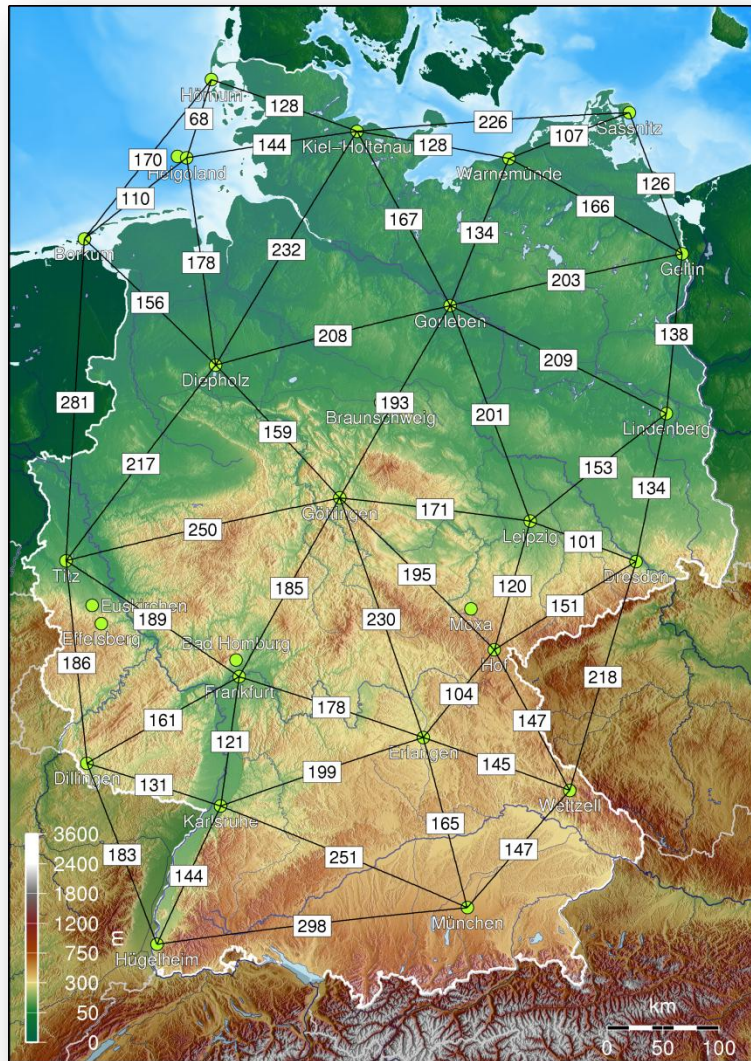
Long Term Assurance of IAG Services In our own matter – Geodetic Observatories

BKG and TU Munich consider sustainability of the IAG Services and availability of the necessary infrastructure as a key element for the long term success of geodetic services





The Integrated Geodetic Reference Network of Germany GREF



Objectives and tasks:

- Realisation and maintenance of a uniform three-dimensional spatial reference in Germany
- Integration of this system into the European Reference System and the International Terrestrial Reference System
- Supporting the Real-Time Satellite Positioning Services
- Monitoring of temporal changes at the stations
- Determination of the height reference surface



Development

- National Spatial Data Infrastructure(GDI-DE)
- GeoDatenZentrum (Web services)
- DLM-DE
- DLM modelling and visualisation (ATKIS)
- ESDI (Inspire Specifications, EuroGeographics)
- GMES, GEOSS

Production

- Small-scale map series and DLMs (furthermore DLM-DE since 2009)
- Participation in European datasets
- Supply for the federal administration with data tailored to its specific needs (i.e. house coordinates, orthoimages)
- Data distribution/customer service (GeoDatenZentrum)



GGOS Today – The Tools Observation Techniques and Products

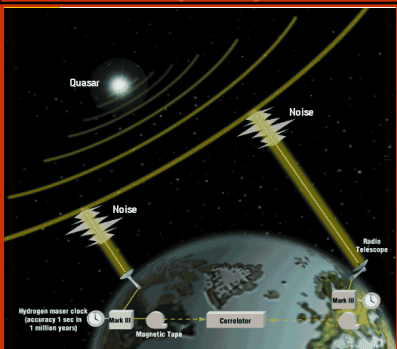


International Terrestrial Reference Frame (ITRF)

International Earth Rotation Service
(IERS)

Source Positions, Precise GPS Orbits and Clocks,
Earth Rotation Parameters, Station Coordinates

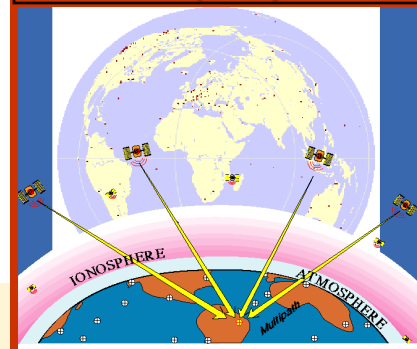
Very Long Baseline
Interferometry
(IVS)



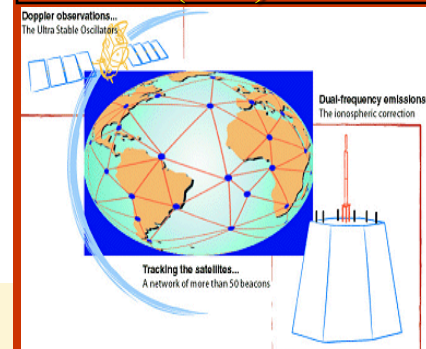
Satellite Laser
Ranging
(ILRS)



Global Navigation
Satellite Systems
(IGS)



Doppler Orbit Determination
and Radiopositioning
Integrated on Satellite
(IDS)

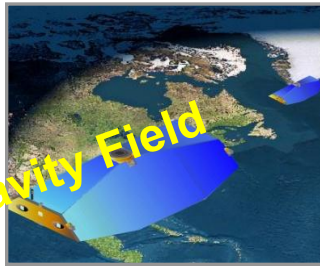




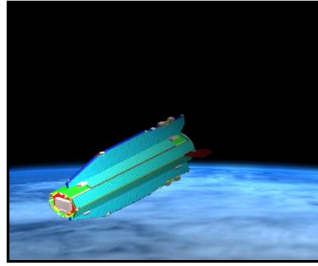
GGOS Today – The Tools Observation Techniques and Products



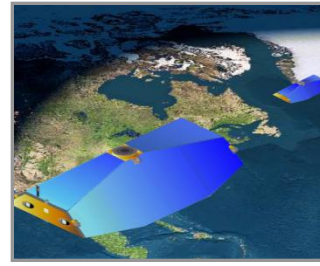
CHAMP



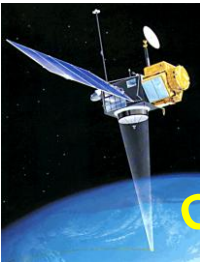
GRACE



GOCE



GRACE Follow-on ?



Topex/Pos.



JASON-1

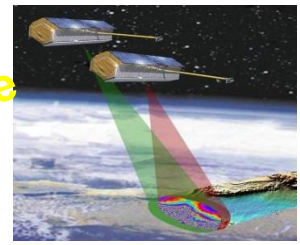


JASON-2

...

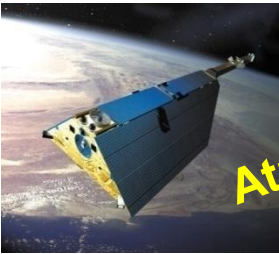


TerraSAR-X

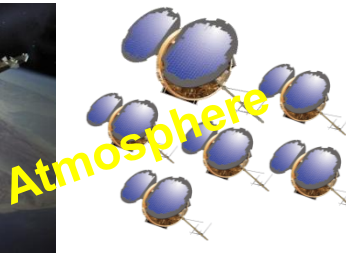


TanDEM-X

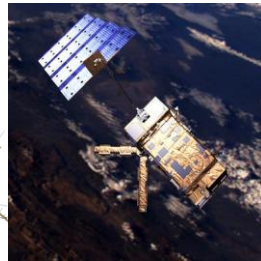
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CHAMP

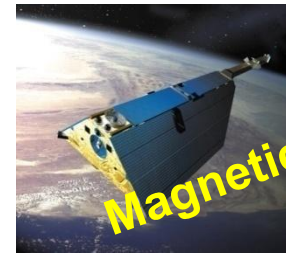


COSMIC



MetOp

...



CHAMP



SWARM

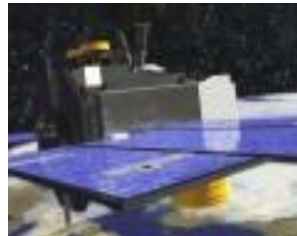
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IceSat-1



Cryosat-2



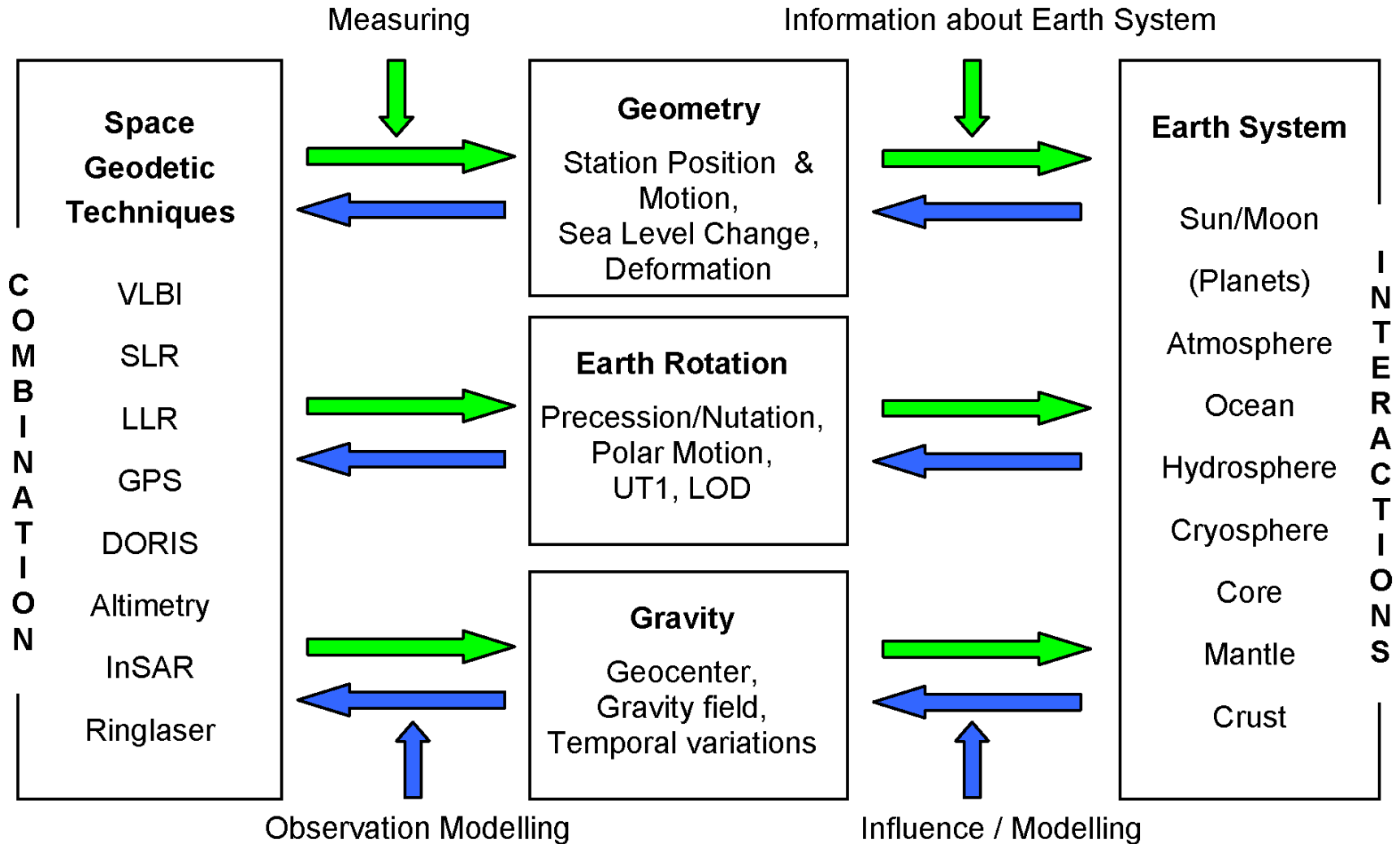
IceSat-2

...

... and new mission concepts,
satellite constellations, micro-
satellites, ...



GGOS Background A Systematic View





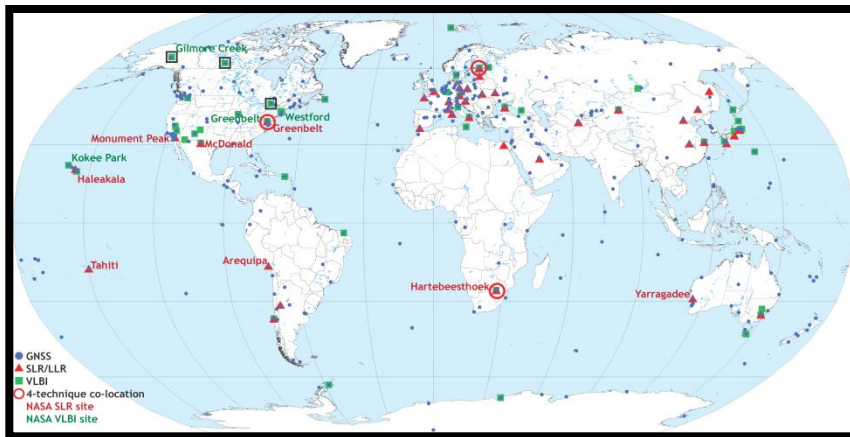
GGOS and the IAG Services

Next Generation GGOS Network



Current space geodesy network co-locations

- 2 sites with 4 techniques
- 16 sites with 3 techniques
- 62 sites with 2 techniques



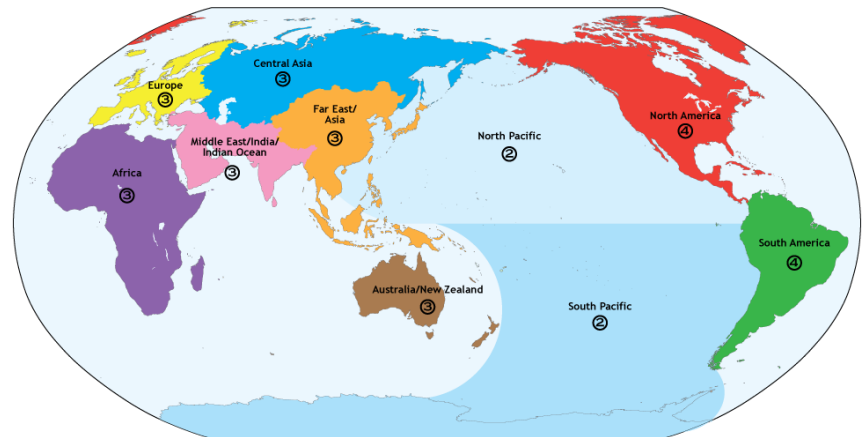
The Global Geodetic Network does not meet current GGOS requirements.

- Old equipment
- Poor network Distribution
- Poor co-location of techniques
- Large systematic observational errors
- Need 100 times improvement in measurement accuracy

GGOS target network design

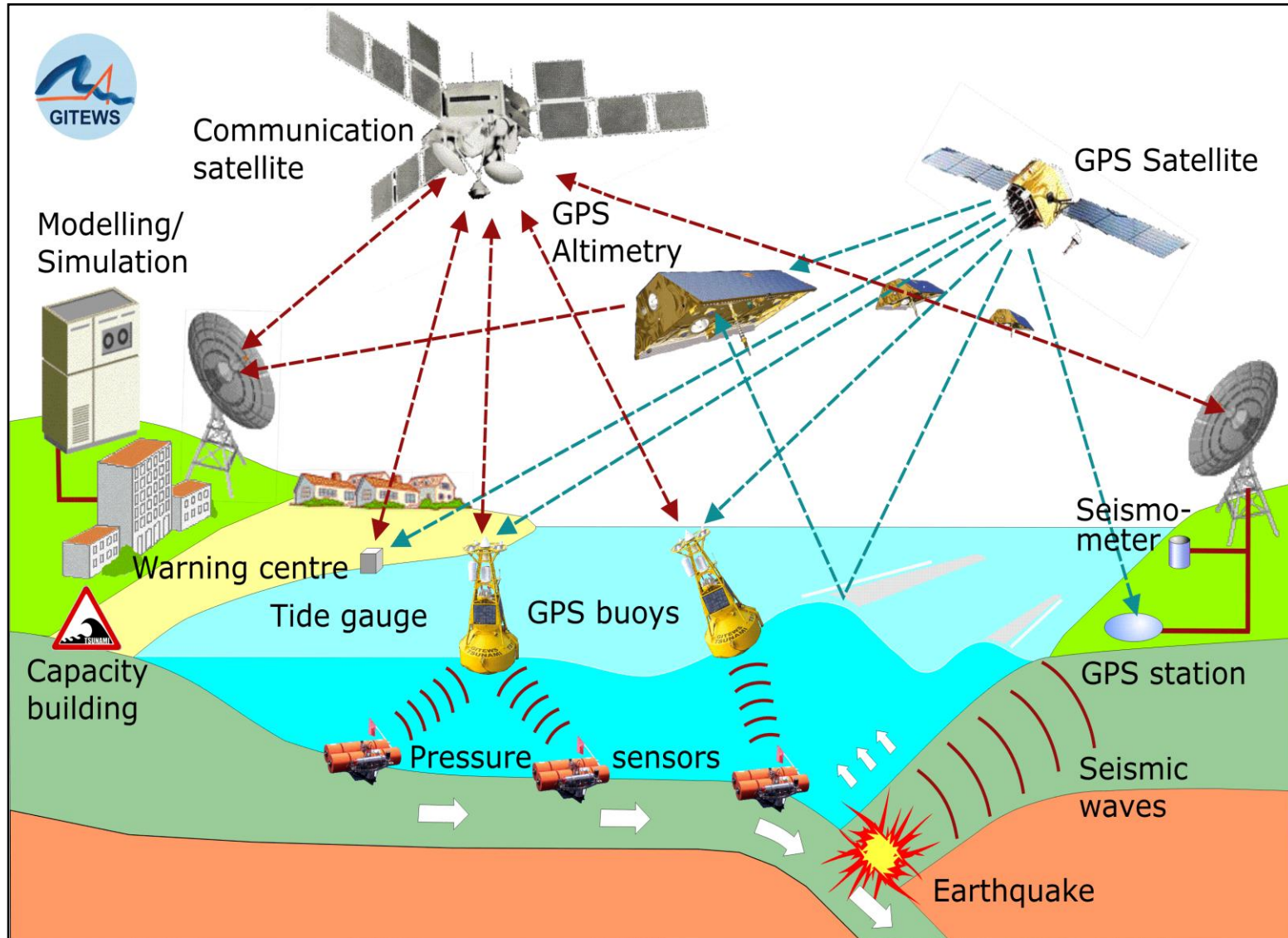
- 30 globally distributed, multi-technique co-located ground stations
- 4 techniques/site

GEO Sub-task DA-09-02c



GGOS Member States with Core site activities:

- | | |
|---------------|--------------|
| United States | Germany |
| China | Korea |
| Australia | Russia |
| New Zealand | India |
| Saudi Arabia | South Africa |
| Spain | |





- Improved infrastructure ⇒ GGOS Core Network
- Closer cooperation ⇒ GGOS and IAG Services
- Operational mode ⇒ GGOS Products
- Better visibility ⇒ GGOS Themes