

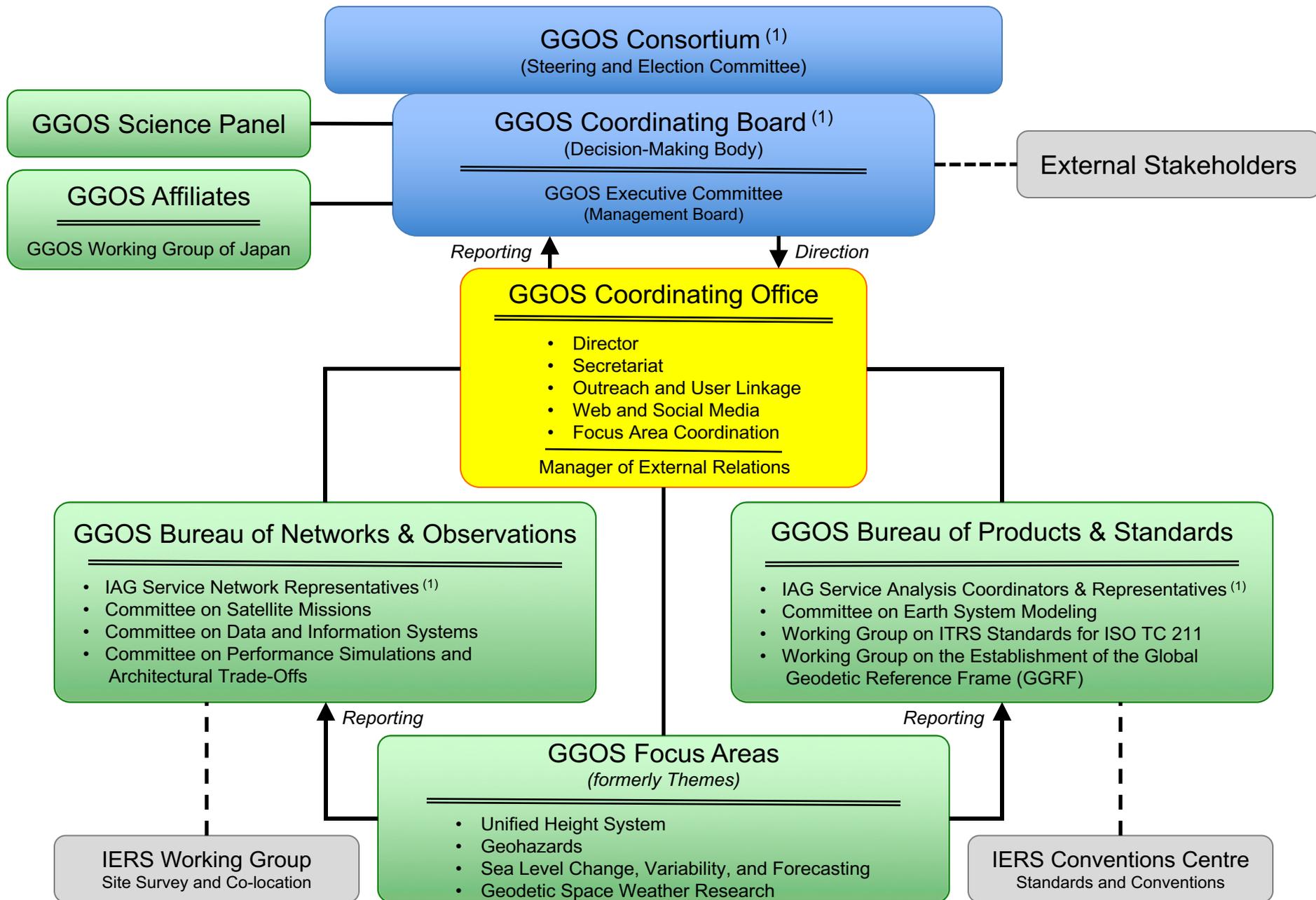
The Global Geodetic Observing System: Recent Activities

presented by
Richard S. Gross

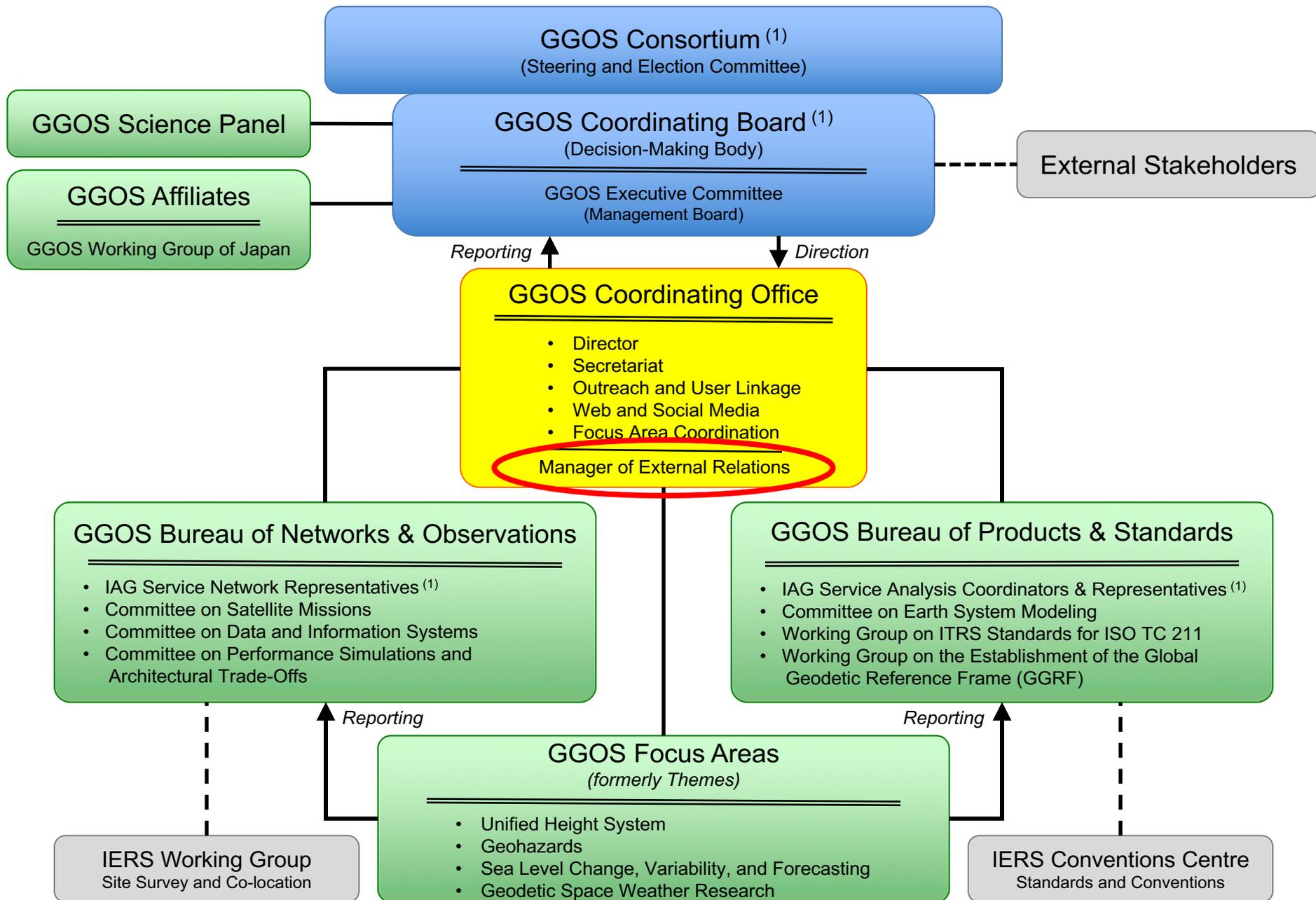
Jet Propulsion Laboratory
California Institute of Technology
Pasadena, CA 91109–8099, USA

International GNSS Service
Governing Board Meeting No. 49

December 10, 2017
New Orleans, Louisiana



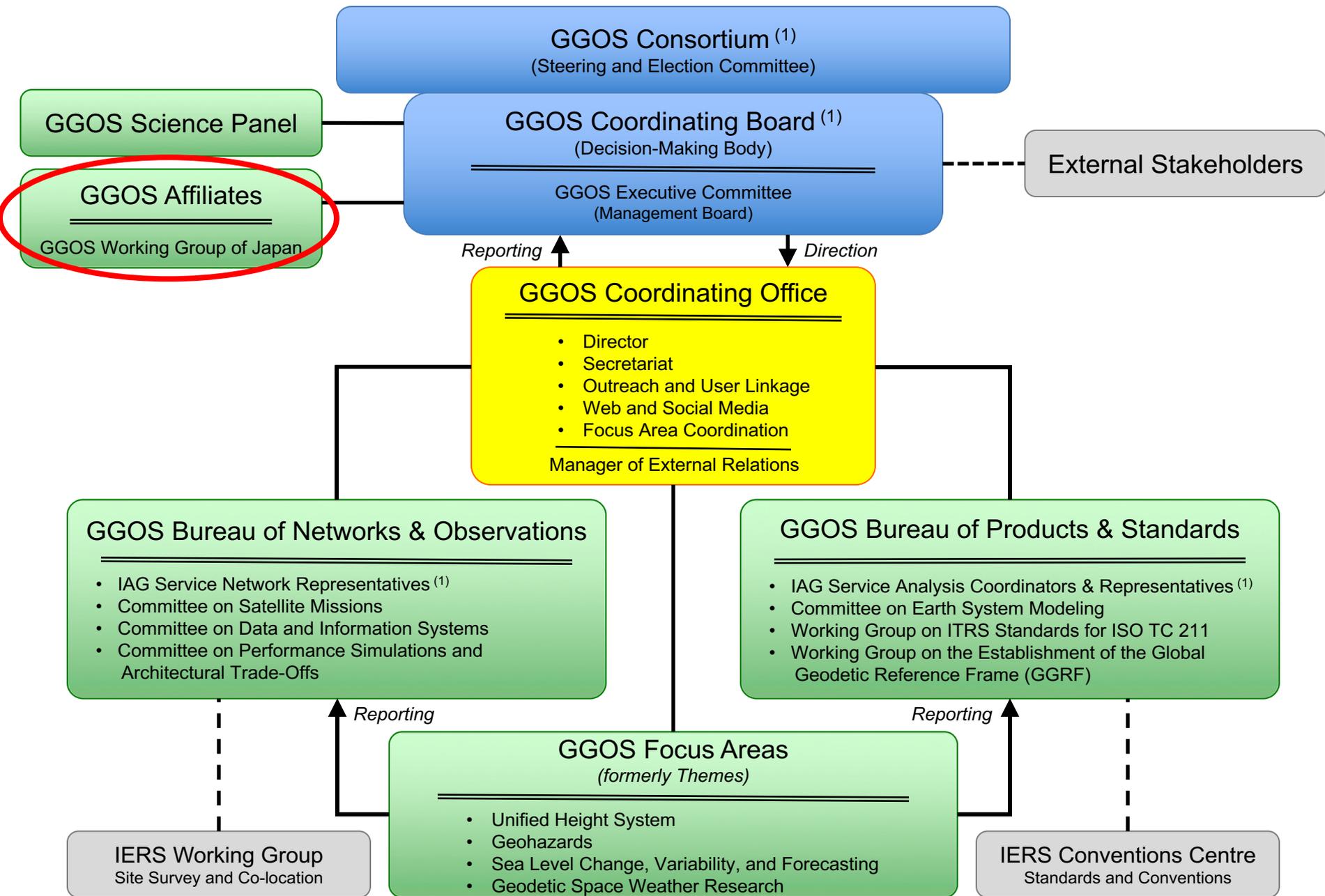
(1) GGOS is built upon the foundation provided by the IAG Services, Commissions, and Inter-Commission Committees



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Manager of External Relations

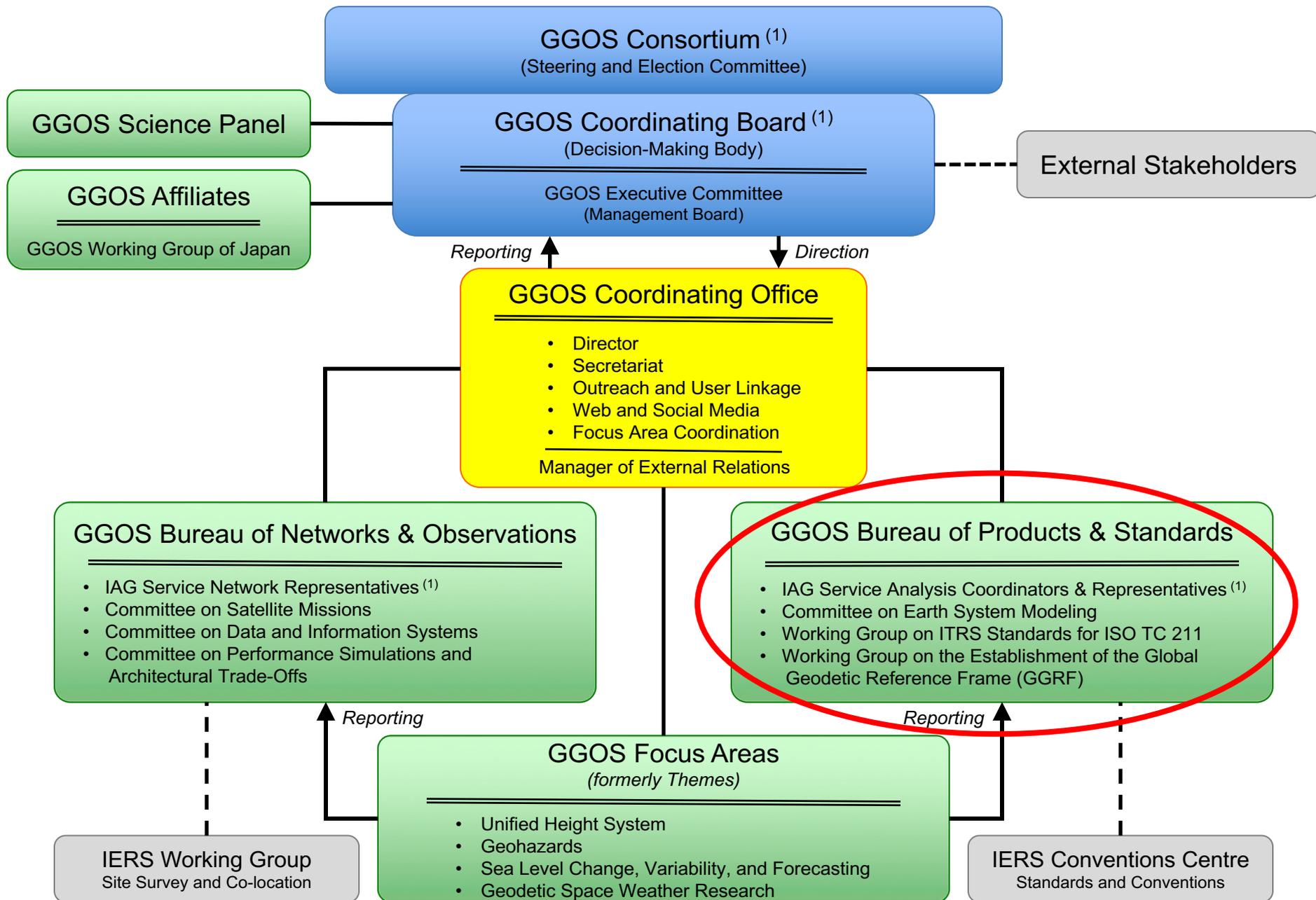
- Expanding involvement in external organizations
 - Group on Earth Observations (GEO)
 - GGOS Chair appointed to GEO Programme Board for 2018-2020
 - Committee on Earth Observation Satellites (CEOS)
 - Limited participation at present
 - Should be expanded to complement GGOS participation in GEO
 - UN-GGIM Subcommittee on Geodesy
 - Will establish an Intergovernmental Organization (IGO) on global geodesy (UN Specialized Agency?)
- Requires better approach to managing activities
 - Past approach rather *ad hoc* in nature
 - Volunteer-based
 - Little long-term stability in representation
- Position of Manager of External Relations created
 - To coordinate GGOS engagement with external organizations
 - Resides within GGOS Coordinating Office
 - Appointed by GGOS Chair subject to approval by GGOS Coordinating Board
 - Member of Coordinating Board and Executive Committee



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GGOS Affiliate

- National or regional organization
 - That coordinates space-geodetic activities there
- Established to increase participation in GGOS
 - Particularly from under-represented areas
 - Africa, Asia, South and Central America
- Is a component of GGOS
 - With representation on Consortium and Coordinating Board
 - Each GGOS Affiliate has 1 representative to Consortium
 - Collectively they have 2 representatives to Coordinating Board
- First GGOS Affiliate
 - GGOS Working Group of Japan
 - Established in 2013; Chair: Toshi Otsubo of Hitotsubashi University, Japan
 - Provides forum for multi-technique, space-geodetic discussions within Japan
 - Strives to improve quality of observations & encourage collaboration in Japan
- Encourage others to become GGOS Affiliates
 - Particularly important for nations/regions where multiple agencies own space-geodetic equipment



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Essential Geodetic Variables

- **Observed variables**
 - Crucial to characterizing geodetic properties of Earth
 - Key to sustainable geodetic observations
 - Positions of reference objects (ground stations, radio sources), EOPs
 - Gravity measurements (ground-based, space-based)
- **Assign requirements to each EGV**
 - Accuracy, spatial and temporal resolution, latency, stability, ...
- **Derive requirements**
 - On EGV-dependent products (TRF, CRF, ...)
 - On infrastructure (observing systems)
- **Can be used to update GGOS2020 book**
 - Bottoms-up approach to deriving requirements
 - Complements top-down approach used in GGOS2020 book (user needs)
- **Establish Panel within GGOS BPS**
 - To create list of EGVs, assign requirements to them, etc.
 - Panel will include representatives of
 - IAG Services, Commissions, Intercommission Committees, GGOS Focus Areas

Markus Rothacher (GGOS Chair), Achim Helm (GeoForschungsZentrum Potsdam)
Ruth E. Neillan (GGOS Vice-Chair) (Jet Propulsion Laboratory)
Hans-Peter Plag (GGOS Vice-Chair) (University of Nevada)

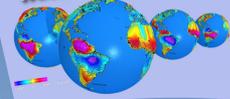


New Orleans 2005 Hurricane

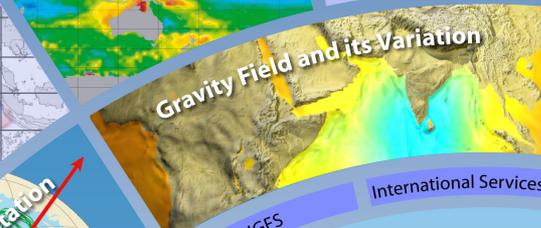


Elbe 2002 Flood

Water Storage Change



Sea Level Change



Gravity Field and its Variation



Sumatra 2004 Tsunami

Kobe 1995 Earthquake



Disaster Monitoring

Deformations



Earth Orientation and Rotation



International Services

Global Geodetic Observation System (GGOS)

GPS, GLONASS, Galileo

Satellite Altimetry (JASON)

Geodetic Space Techniques

Satellite-to-satellite tracking (GRACE)

Atmospheric Sounding (CHAMP)



Satellite Laser Ranging



Tsunami Detection (GPS Buoy)



St. Helens 1980 Eruption

Atmospheric Sounding

Geometry and Kinematics



Kainaman 2004 Mudflow

Surveying



VLBI



IAG Services are based on more than 400 global observation stations