UN-GGIM GGRF WG and the Roadmap

• Why a GGRF is needed?
• UN GA Resolution on the GGRF
• GGRF Roadmap

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Third meeting of UN-GGIM: Arab States
Why a GGRF is needed?

Geodesy: Positioning (location-based) and quantification of Earth changes in space and time, expressed in (related to) a Global Geodetic Reference Frame (GGRF):

- Sea Level variations in space and time
- Tectonic Motion & crustal deformation
- Dislocations due to Earthquakes
- Tsunamis and Natural Hazards, rescue and safety of life
- Positioning, locations & navigations (ocean, land, air & space)
- National territory & land managements, precision agriculture, …
- Interoperability of geospatial data
What is the GGRF?

- Mainly: the International Terrestrial Reference Frame (ITRF), its access & regional densifications

- Infrastructure:
  - Geodetic observatories/instruments
  - Data Centers, Analysis Centers, Combination Centers
  - Workforces

- But also:
  - Celestial Reference Frame
  - Gravity and Height Systems
Key Points of the UN GA Resolution

• Development & sustainability of the GGRF;
• Enhance global cooperation:
  – No one country can do this alone
  – Multilateral cooperation
  – Provide technical assistance for countries in need
• Implement open sharing of geodetic data, standards and conventions, on a voluntary basis
• Commit to improving & maintaining national geodetic infrastructure ➔ Improve the GGRF
• Develop outreach programmes
Current Status of the GGRF

The currently adopted GGRF in use today:

- The International Terrestrial Reference Frame (ITRF)
- Implemented by multiple geodetic techniques
- Developed by the IAG and its technique services
- More than 600 sites globally distributed
- Based on the “best-effort” principle, for the interest of science & societal applications: ~200 institutions around the World

And at the regional/national level:

- Almost all regional, national (but also global, e.g. WGS84) reference frames are aligned to & compatible with ITRF
- Densifications by Regional/National Permanent GNSS(GPS) networks.
ITRF implementation

Observations & Data Collection

Data analysis & Product Generation per Technique

Research Groups from: NMAs, Space Agencies & Universities

Technique Unification & ITRF generation

NMAs
Space Agencies
Universities

Schematic illustration of the chains leading to the ITRF generation
Critical issues inhibiting the GGRF enhancement

• Aging geodetic instruments, inhomogeneous network distributions & poor number of high quality instruments:
  ==> * critical for the GGRF accuracy
  * need new generation systems

• Based on the “best-effort” principle
  ==> * Need high level mandate to sustain the GGRF
  * Inter-governmental cooperation => economical benefit

• Many countries have poor access to the GGRF
  ==> * provide technical assistance to countries in need & build modern geodetic infrastructure
  ==> improve interoperability of geospatial data
Current ITRF Co-location sites
Example of > 2500 GNSS Permanent Stations
UN-GGIM: GGRF: Roadmap
Main Chapters of the Roadmap

I. Executive Summary
II. Introduction and Scope of Roadmap
III. Current Situation: Status of the GGRF
IV. Geodetic Infrastructure
V. Policies, Standards and Conventions
VI. Education, Training and Capacity Building
VII. Communication and Outreach
VIII. Governance
IX. Recommendations