



International Committee on
Global Navigation Satellite Systems

Global Geodetic Reference Frame GGRF & Implications for GNSS

On behalf of Gary Johnston
Chair GIAC,
Ruth Neilan
Vice Chair,
Global Geodetic Observing System
ICG-9 Prague, 10 November 2014



UN GGRF Working Group Coordination

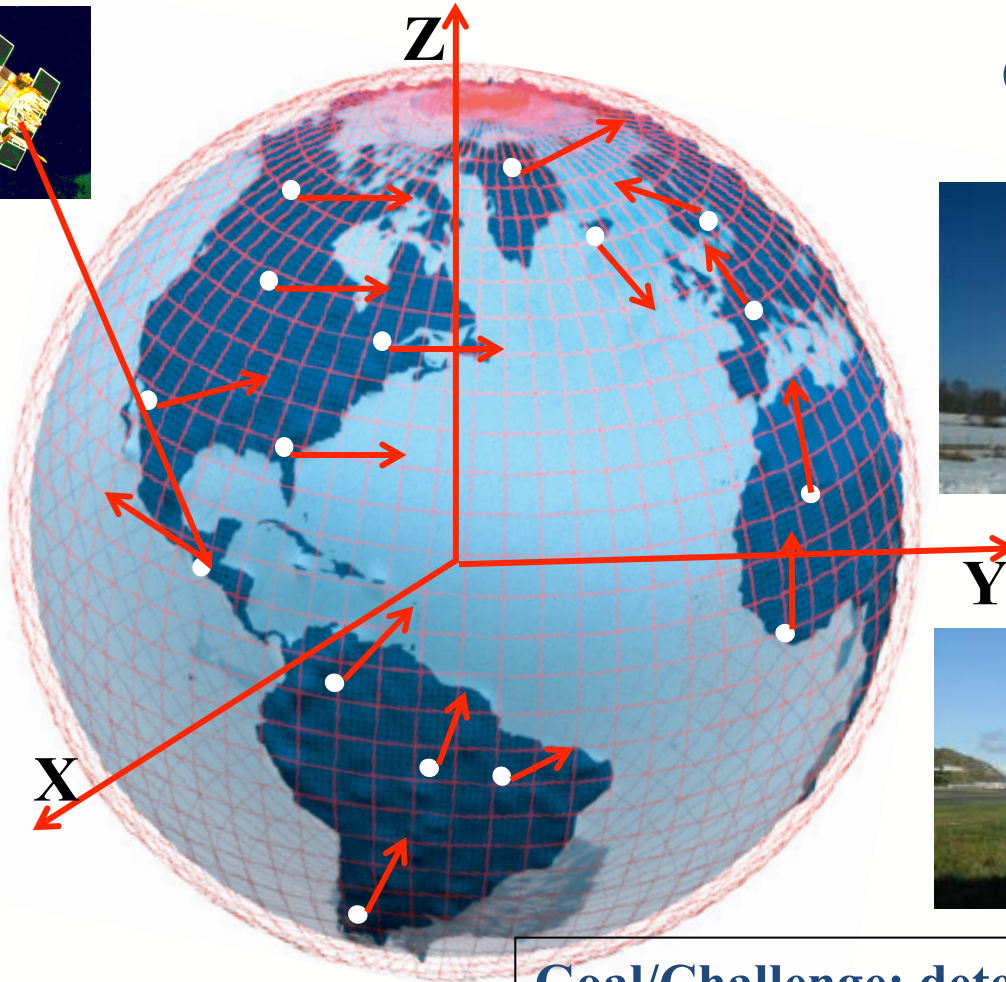
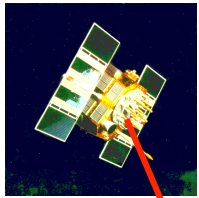
UN Committee of Experts on Global Geospatial Information Management (UN GGIM)

UN Economic and Social Council

- Gary Johnston, Geoscience Australia; Chair, Global Geodetic Observing System (GGOS) Inter-Agency Committee (GIAC)
- Per Erik Opseth, Statens Kartverk, Norway; Vice Chair, GIAC
- Anne Jörgenson, Statens Kartverk, Norway, GIAC Outreach
- HansJörg Kutterer, Director, BKG, Germany; Chair, GGOS
- Ruth Neilan, NASA/JPL USA; Vice- Chair GGOS; Director IGS Central Bureau
- Zuheir Altamimi, IGN France; International Association of Geodesy, IAG; International Earth Rotation and Reference Systems Service, International Terrestrial Reference Frame, IERS/ITRF
- Chris Rizos, University of New South Wales; Australia, President, International Association of Geodesy
- Greg Scott, Inter-Regional Advisor; UN GGIM, UN Statistics Division, New York

The Global Geodetic Reference Frame

Observing instruments



Goal/Challenge: determine locations & deformations with an improved precision, Everywhere & Anytime on Earth, to satisfy societal and science requirements



UN-GGIM

United Nations Initiative on
Global Geospatial Information Management

Positioning geospatial information to address global challenges

ggim.un.org

UN resolution - Global Geodetic Reference frame

- UN-GGIM recognises the growing demand for more precise positioning services, the economic importance of a global geodetic reference frame and the need to improve the global cooperation within geodesy
- The UN-GGIM decided at its 3rd session in July 2013 to formulate and facilitate a resolution for a global geodetic reference frame (GGRF)
- The Working Group on the GGRF was created in January 2014
- Draft Terms of Reference, Resolution and Concept note have been developed and submitted at WG report
- UN-GGIM 4th session August 2014, the resolution, concept note and ToR of the WG were accepted



UN-GGIM

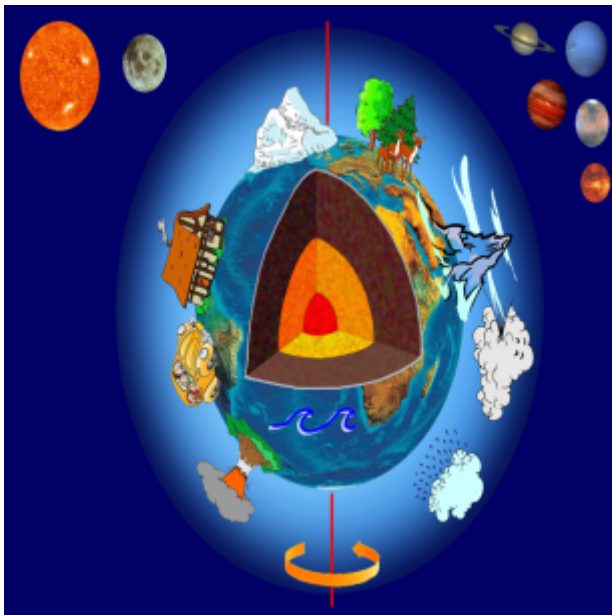
United Nations Initiative on
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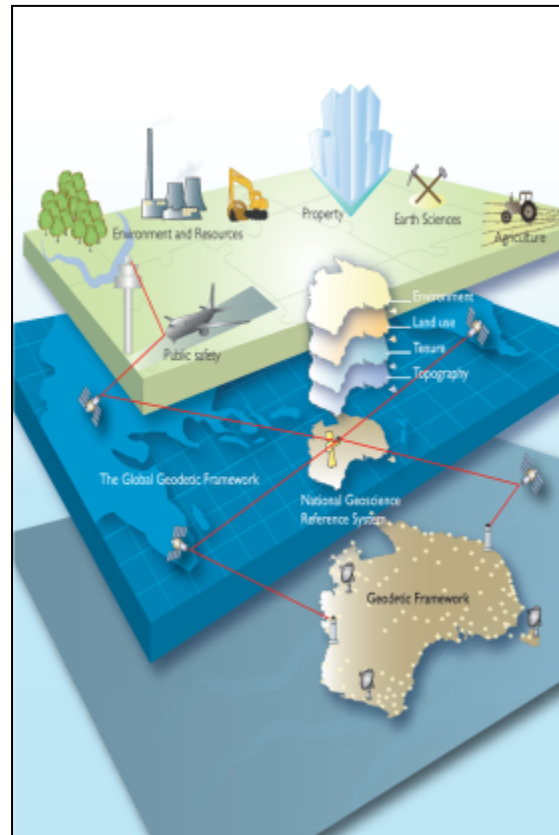
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Global Geodetic Reference Frame

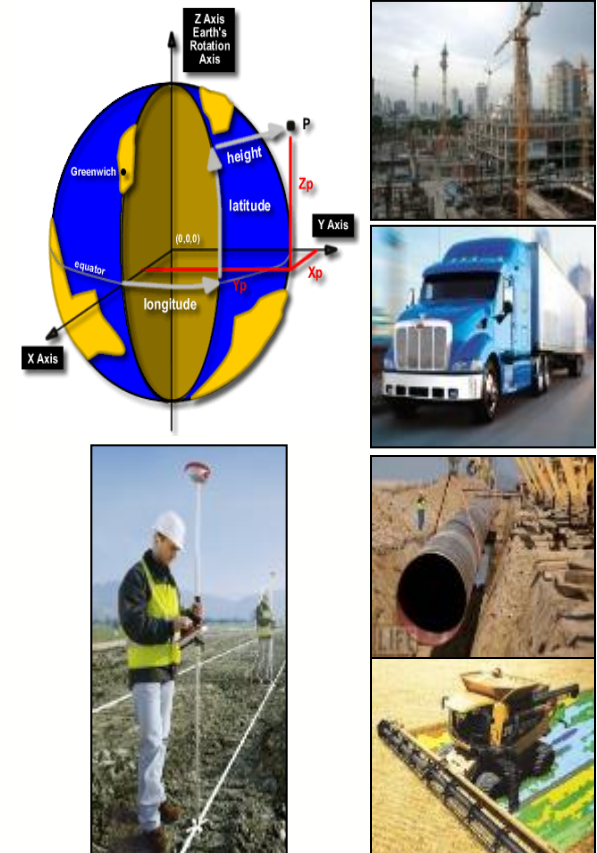
Earth System Science



Location Information



Societal Applications



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Why is it important ?

- Enables a better understanding of the world we live in
- Facilitates better decision making
- Enables much more sustainable management and development of earth resources
- Allows for safer air, land and sea navigation
- Enables spatial data interoperability
- Creates efficiencies in many industries and societal endeavours



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Questionnaire (100+ responses)

- 88% of responses indicated that the data, products and services of the international global geodetic community (e.g. ITRF, IGS orbits,...) were either critical or had high importance in their country
- Only 61% of responding countries are willing/able to freely share GNSS data to the global community



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Resolution: Global Cooperation

- Develop a global geodetic roadmap for the GGRF
- Global cooperation in providing technical assistance in geodesy for those countries in need to ensure the development, sustainability and advancement of a GGRF
- Implement open geodetic data sharing
- Improve and maintain national geodetic infrastructure
- Enhanced multilateral cooperation that addresses infrastructure gaps and duplications globally
- Improved Outreach to make the GGRF more visible and understandable to society



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Recommendations - Accepted

- Note the efforts of the working group and endorse the Terms Of Reference
- Endorse the intent of the draft resolution and concept note
- Encourage the working group, with assistance from the secretariat, to progress the resolution to ECOSOC and the GA
- Encourage members to seek mission support for the progression
 - Referred to UN ECOSOC and next to the GA



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Resolution Summary (1) - Draft

- *Acknowledging* that the Global Geodetic Reference Frame depends on participation from countries all around the globe, and the need to take action to strengthen international cooperation;
- *Endorses* decision 3/102: Global Geodetic Reference Frame of the Committee of Experts of UN-GGIM on the work of its third session; that the Committee of Experts of UN-GGIM establish a Working Group, with equitable regional representation, to develop a global geodetic roadmap that addresses key elements of the Global Geodetic Reference Frame development and sustainability;
- *Encourages* Member States and relevant international organizations to enhance global cooperation in providing technical assistance, especially for capacity development in geodesy for developing countries, to ensure the development, sustainability and advancement of a Global Geodetic Reference Frame;
- *Urges* Member States to implement open sharing of geodetic data, standards and conventions to contribute to the global reference frame and regional densifications through relevant national mechanisms and intergovernmental cooperation, and in coordination with the International Association of Geodesy;

Resolution Summary (2) - *Draft*

- *Invites* Member States to commit to improve and maintain appropriate national geodetic infrastructure as an essential means to enhance the Global Geodetic Reference Frame;
- *Invites* Member States to have multilateral cooperation that addresses infrastructure gaps and duplications towards the development of a more sustainable Global Geodetic Reference Frame;
- *Invites* Member States to develop outreach programs that make the Global Geodetic Reference Frame more visible and understandable to society;
- *Recommends* this resolution further to the General Assembly for endorsement

Summary

- Apprise UN OOSA & ICG-9 of complimentary & synergistic activities within UN ECOSOC
- Importance of the global geodetic reference frame – multi-geodetic techniques
 - SLR, VLBI, DORIS, GNSS
 - Vector survey ties between ground systems
- GNSS is the technique that permits users to readily access the reference frame, the ITRF
- Seek ICG-9 joint statement of support for the resolution



Back-up

DRAFT (1) – Final Report due Dec'14

A. Draft resolution for adoption by the Council

The Committee of Experts on Global Geospatial Information Management recommends to the Economic and Social Council the adoption of the following draft resolution:

A Global Geodetic Reference Frame for Sustainable Development

The Economic and Social Council

Reaffirming the purposes and principles of the Charter of the United Nations,

Reaffirming also General Assembly resolution 54/68 of 11 February 2000 endorsing "The Space Millennium: Vienna Declaration on Space and Human Development", which included, inter alia, key actions to improve the efficiency and security of transport, search and rescue, geodesy and other activities by promoting the enhancement of, universal access to and compatibility of space-based navigation and positioning systems, including Global Navigation Satellite Systems (GNSS),

Reaffirming further General Assembly resolution 57/253 of 20 December 2002, in which the United Nations endorsed the Plan of Implementation of the World Summit on Sustainable Development ("Johannesburg Plan of Implementation" 4 September 2002), and means of implementation which included, inter alia, strengthening cooperation and coordination among global observing systems and research programmes for integrated global observations, taking into account the need for building capacity and sharing of data from ground-based observations, satellite remote sensing and other sources among all countries,

Reaffirming General Assembly resolution 66/288 of 27 July 2012, in which it endorsed the outcome document of the United Nations Conference on Sustainable Development, entitled "The future we want", which recognizes the importance of space-technology-based data, in situ monitoring and reliable geospatial information for sustainable development policymaking, programming and project operations,

Noting resolution 2011/24 taken by the Economic and Social Council at its 47th plenary meeting in New York on 27 July 2012, in which it: established the United Nations Committee of Experts on Global Geospatial Information Management (UN-GGIM); encouraged Member States to hold regular high-level, multi-stakeholder discussions on global geospatial information, including through the convening of global forums, with a view to promoting a comprehensive dialogue with all relevant actors and bodies; and emphasized the importance of promoting national, regional and global efforts to foster the exchange of knowledge and expertise, to assist developing countries in building and strengthening national capacities in this field,

Matters calling for action by the Economic and Social Council or brought to its attention

E/2014/ E/C.20/2014/****

DRAFT (2) – Final Report due Dec'14

E/2014/** E/C.20/2014/**

2

Noting also resolution 1 adopted by the nineteenth United Nations Regional Cartographic Conference for Asia and the Pacific¹ in Bangkok, Thailand on 1 November 2012 which, realizing the need to improve the sustainability and capability of the Global Geodetic Observing System (GGOS), and the need to encourage and support the adoption of the International Terrestrial Reference Frame (ITRF) as the foundation reference frame, urged UN-GGIM to consult with Member States to adopt and sustain the Global Geodetic Reference Frame (GGRF) and provide a road map for its implementation, and to participate in and make commitments to the Global Geodetic Observing System to ensure its long-term sustainability,

Noting further decision 3/0122 adopted by the Committee of Experts on UN-GGIM at its third session in Cambridge, United Kingdom on 26 July 2013, in which the Committee agreed that actions be taken to facilitate the submission of a resolution to be tabled at the 2013-14 session of the UN General Assembly to seek support and commitment at the highest level, and requested the Secretariat to establish a Working Group, with equitable regional representation, to develop the conceptual note and draft text of a UN General Assembly resolution through an open and inclusive process,

Recognizing the importance of international cooperation, as no one country can do this alone, to realize the Global Geodetic Reference Frame and services to underpin Global Navigation Satellite Systems technology and provide the framework for all geospatial activity, as a key enabler of spatial data interoperability, disaster mitigation and sustainable development,

Recognizing further the economic and scientific importance of and the growing demand for an accurate and stable Global Geodetic Reference Frame for the Earth, that allows the inter-relationship of measurements taken anywhere on the Earth and in space, combining geometric positioning and gravity field related observations, as the basis and reference in location and height for geospatial information, which is used in many Earth Science and societal applications, including sea-level and climate change monitoring, natural hazard and disaster management, and a whole series of industrial applications (including mining, agriculture, transport, navigation, construction) where precise positioning introduces efficiencies,

Recognizing also the extraordinary achievements made by national mapping and space agencies, geodetic commissions, research organizations and universities, and other international organizations such as the International Federation of Surveyors (FIG), building upon initiatives of the International Association of Geodesy (IAG), representing the global geodetic community, in measuring and monitoring changes in the Earth's system on a best-effort basis, including the development of the currently adopted International Terrestrial Reference Frame,

Recognizing further the investments of Member States in developing satellite missions for positioning and remote sensing of the Earth, supporting a range of scientific endeavors that improve our understanding of the "Earth system" and underpin decision making, and recognizing that the full societal benefits of these investments are only realized if they are referenced to a common Global Geodetic Reference Frame at the national, regional and global level,

¹ E/CONF.102/8 2 E/2013/46

E/2014/** E/C.20/2014/**

Recognizing, with appreciation, that some Member States are already implementing open geodetic data sharing mechanisms for the benefit of realizing, improving and accessing the Global Geodetic Reference Frame at the national, regional and global level;

Acknowledging that the Global Geodetic Reference Frame depends on participation from countries all around the globe, and the need to take action to strengthen international cooperation;

Endorses decision 3/102: Global Geodetic Reference Frame of the Committee of Experts of UN-GGIM on the work of its third session; that the Committee of Experts of UN-GGIM establish a Working Group, with equitable regional representation, to develop a global geodetic roadmap that addresses key elements of the Global Geodetic Reference Frame development and sustainability;

Encourages Member States and relevant international organizations to enhance global cooperation in providing technical assistance, especially for capacity development in geodesy for developing countries, to ensure the development, sustainability and advancement of a Global Geodetic Reference Frame;

Urges Member States to implement open sharing of geodetic data, standards and conventions to contribute to the global reference frame and regional densifications through relevant national mechanisms and intergovernmental cooperation, and in coordination with the International Association of Geodesy;

Invites Member States to commit to improve and maintain appropriate national geodetic infrastructure as an essential means to enhance the Global Geodetic Reference Frame;

Invites Member States to have multilateral cooperation that addresses infrastructure gaps and duplications towards the development of a more sustainable Global Geodetic Reference Frame;

Invites Member States to develop outreach programs that make the Global Geodetic Reference Frame more visible and understandable to society;

Recommends this resolution further to the General Assembly for endorsement.

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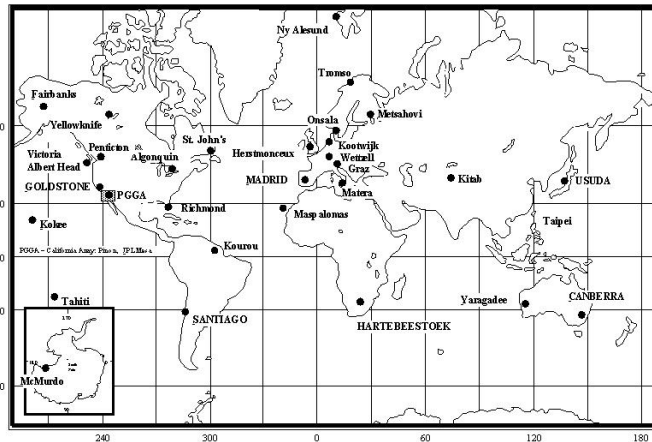
DRAFT (3) – Final Report due Dec'14

Global geodetic reference frame

The Committee of Experts:

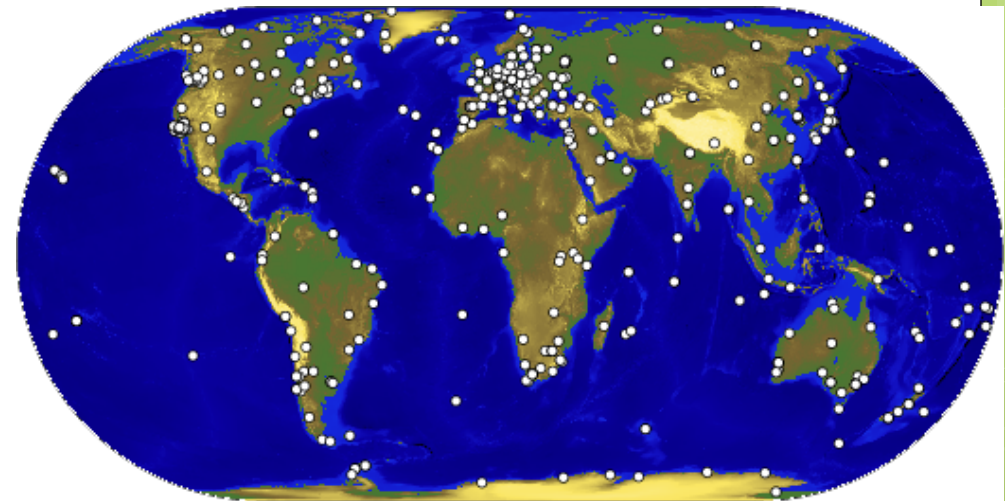
- (a) Took note of the report prepared by the Working Group on the Global Geodetic Reference Frame, and thanked the members for their significant leadership and work accomplished in a short period of time.
- (b) Underlined once again the importance of a widely accepted global geodetic reference frame and stressed its many uses for science, social and economic development and disaster risk reduction and management.
- (c) Endorsed the Working Group's Terms of Reference and associated Concept Note as amended.
- (d) Adopted the draft Resolution on a Global Geodetic Reference Frame for Sustainable Development as amended, requested the Secretariat to refer the Resolution to ECOSOC for endorsement and further referral to the UN General Assembly, and also gratefully noted the commitment of Member States to provide support in this process.
- (e) Acknowledged the offer of continuous support and cooperation by Member States, especially in the important area of capacity building.
- (e) Agreed to enlarge the Working Group for broader regional representation, requested the continuation of its activities on the development of a Roadmap for the Global Geodetic Reference Frame, and to report back to the Committee at its next session.

International GNSS Service – *IGS Celebrate 20 years!*



IGS

INTERNATIONAL
GNSS SERVICE



- IGS 1994 - 23 stations
- IGS 2014 - 400+



IGS

Workshop 2014
June 23-27
Pasadena, California, USA

Celebrating 20 Years of Service
1994 ☆ 2014

Image: 20 Years of Orbit Solutions vs. Weighted RMS

- Mountains behind Los Angeles?
- See IGS.org for all presentations & videos

Final Orbits (AC solutions compared to IGS Final)

