

Update on the UN Global Geodetic Centre of Excellence (GGCE)

Johannes BOUMAN, Germany

Key words: GGRF, GGCE, Geodetic infrastructure, Governance

SUMMARY

The United Nations (UN) has called for enhanced cooperation on global geodesy. In February 2015 the UN General Assembly adopted the resolution “a Global Geodetic Reference Frame for Sustainable Development” recognizing that the Global Geodetic Reference Frame (GGRF) is the foundation of every aspect of the collection and management of national geospatial information and global monitoring of the Earth. In August 2020, the UN Committee of Experts on Global Geospatial Information Management (UN-GGIM) welcomed and supported the proposal from Germany to host a Global Geodetic Centre of Excellence (GGCE), and Germany invites all member states to contribute. The Centre will provide coordination, counselling and assistance to Member States that works to sustain, enhance, access and utilize the Global Geodetic Reference Frame. Further, it will support the objectives of UN-GGIM and its Subcommittee on Geodesy. This presentation will give an overview of the UN Global Geodetic Centre of Excellence, the modalities, its current status and on the road towards developing the work plan.

Update on the UN Global Geodetic Centre of Excellence (GGCE)

Johannes BOUMAN, Germany

1. INTRODUCTION¹

The Global Geodetic Reference Frame (GGRF) is the foundation for evidence-based policies, decisions and program delivery. The GGRF underpins the collection and management of nationally integrated geospatial information and is used to monitor our dynamic Earth. It is relied upon for social, environmental and economic initiatives, Earth science, the measuring and monitoring of progress of the 2030 Agenda for Sustainable Development, the Sendai Framework for Disaster Risk Reduction, the Small Island Developing States Accelerated Modalities of Action (SAMOA) Pathway, and other global, regional and national development agenda and initiatives. The GGRF is also an essential foundation for national height systems, sustainable water management and in monitoring climate change and its consequences, such as sea-level rise, droughts, glacier and ice-sheet melting.

Recognising the growing need for a high quality and sustainable GGRF to support good decision making to an ever-increasing location-based society, with inclusive social progress, environmental sustainability and economic development, the UN General Assembly adopted resolution 69/2661 in February 2015, entitled ‘A Global Geodetic Reference Frame for Sustainable Development’. [1]

At the Ninth Session of the United Nations Committee of Experts on Global Geospatial Information Management (UN-GGIM), in 2019, the UN-GGIM Subcommittee on Geodesy (SCoG) tabled a position paper [2] proposing the establishment of a Global Geodetic Centre of Excellence (GGCE). The Committee of Experts requested that the Subcommittee on Geodesy ‘explore a number of modalities to balance the longer-term vision, stability and operational requirements of the GGRF, including the establishment of a global geodetic centre of excellence in cooperation with UN-GGIM.’ The Subcommittee was further encouraged ‘to consult further on the practical implementation of the global geodetic centre of excellence, including modalities, function, financial arrangements and programme of work, in direct coordination with UN-GGIM and in coordination with other relevant geodetic stakeholders to avoid duplication of effort.’

The position paper demonstrated that the GGRF is in acute danger of degradation, due to aging infrastructure, insufficient coordination and financing, and diminishing human capacity. The establishment of a centre with the highest expertise to oversee and facilitate the best GGRF possible was recommended as a solution to solve these challenges and as a contribution to achieving the Sustainable Development Goals.

¹ Please refer to the “Draft Concept Paper on Establishing a Global Geodetic Centre of Excellence” [3]

This paper first addresses the current challenges for a sustainable realisation and availability of the GGRF. Section 3 introduces and discusses the potential and role of a Global Geodetic Centre of Excellence (the Centre) to support in sustaining the GGRF and the current status on the way forward is highlighted in Section 4.

2. SUSTAINIBILITY AND QUALITY OF THE GGRF²

In a world increasing reliant on high accuracy measurements and location based services, the sustainability of the GGRF is more important than ever before. However, its quality, accuracy and accessibility are at risk of failure due a multitude of complex issues. These include a lack of geodetic infrastructure, poor accessibility in some regions, a reliance on in-kind contribution and insufficient collaboration and coordination. To help achieve the long-term sustainability and quality of the GGRF, five focus areas have been identified:

- 1) Governance,
- 2) Geodetic Infrastructure,
- 3) Policies, Standards and Conventions,
- 4) Education, Training and Capacity Building, and
- 5) Communication and Outreach.

2.1 Focus Areas

Sustaining the GGRF will require effort across all five focus areas:

Governance

There are many players involved in sustaining the GGRF including: Member States, UN-GGIM Regional Committees, the Private Sector and Academic Networks; the International Association of Geodesy (IAG), International Federation of Surveyors (FIG), and many more. Despite the important contributions made by these groups, there is a lack of global cooperation and coordination, in particular between Member States and between stakeholders. Geodesy and the GGRF now serve an increasing user base; however, investment in the governance, technology and people sustaining the GGRF have not kept up with demand. Given the user demand and reliance on the GGRF is anticipated to continue to grow, there is a need for improved governance to maximise the benefit of ongoing geodetic efforts, ensure coherence, and avoid duplication of effort.

Geodetic Infrastructure

The GGRF Resolution invites Member States to engage in multilateral cooperation that addresses infrastructure gaps and duplications towards the development of a more sustainable global geodetic reference frame. The term Geodetic Infrastructure refers to the instruments, technology, data, data repositories, analysis, human resources, products and services required to observe and model the dynamic Earth. All these components are owned, operated and

² Please refer to “Position Paper on Sustaining the Global Geodetic Reference Frame” [4]

funded by a mix of Member States and organizations. To improve the accuracy of, and access to, the GGRF, there is a need for higher quality instruments, more instruments to improve access, and sustainable funding for analysis and product generation.

Policies, Standards and Conventions

The GGRF Resolution urges Member States to implement open sharing of geodetic data, standards and conventions to contribute to the global reference frame. Appropriate policies, standards and conventions are fundamental to ensuring the robustness and sustainability of the GGRF. Furthermore, geodetic data currently rates poorly on the Findability, Accessibility, Interoperability and Reusability (FAIR) scale, being inconsistent across fields of geodesy and Member States.

Education, Training and Capacity Building

The GGRF Resolution encourages Member States and organizations to enhance global cooperation in providing technical assistance, especially for capacity development in geodesy for developing countries, with the aim of ensuring the development, sustainability and advancement of a global geodetic reference frame. A lack of geodetic capability hinders a country's development and sustainability. In all GGRF activities, thought needs to be given to education, training and capacity building to ensure Member States have sovereign competency and that they can realize the benefits of working in the GGRF.

Communications and Outreach

The GGRF Resolution invites Member States to develop outreach programmes that make the global geodetic reference frame more visible and understandable to society. Geodesy often suffers from being a science which is difficult to describe. If decision makers and donors do not understand the value of an investment in the GGRF, then they are unlikely to prioritize GGRF investments above other initiatives. There is a strong need to raise the general awareness around the value proposition of geodesy and the GGRF.

2.2 Challenges

The sustainability and quality of the GGRF, and its continual accessibility, have significant and cascading economic, environmental and societal implications. Some of the challenges currently faced are described below.

Lack of redundancy

The development and sustainability of the GGRF is dependent on the contributions from Member States and organisations; many of which are provided in-kind, and on a best-effort basis. The geodetic infrastructure which supports a myriad of societal, economic and environmental applications is therefore fragile and not sustainable. If, for some reason, some key agencies or organisations cease their GGRF contributions and activities, it not only degrades the GGRF but also jeopardizes the activities of industry, science and society that are dependent on the availability of the GGRF.

Need for global coordination

Member States, organisations and industries play a role in providing access to, and accuracy of, the GGRF through the development and maintenance of infrastructure, undertaking geodetic data collection, processing, and product analysis, and the provision of education, training and capacity development. As the GGRF has grown from being a scientific endeavour to an important foundation for good policy and decision making, the geodetic community requires long-term financing and improved global coordination to maximize the benefits of the work being done, and to limit duplication of efforts. To address this, coordinated efforts must be initiated to enhance operational capacity, capability and research related to the GGRF.

Low benefits realisation of education, training and capacity development

The education, training and capacity building (ETCB) efforts by Member States, institutions and organisations have been substantial over the years. However, recent surveys and assessments of responses by Member States indicate that most countries still require additional capacity development to make the best use of the GGRF, and to also play a role in its ongoing sustainability. This is largely due to lack of geodetic knowledge and/or capacity in some regions and countries.

3. THE GLOBAL GEODETIC CENTRE OF EXCELLENCE³

To sustain the GGRF, the Subcommittee has proposed establishing a United Nations Global Geodetic Centre of Excellence and was encouraged by UN-GGIM at its Ninth Session to consult further on the practical implementation of the Centre [5], including modalities, function, financial arrangements and programme of work. At the 10th Session Germany presented a proposal to host a Global Geodetic Centre of Excellence (GGCE), which was welcomed and supported by the United Nations Member States. This section introduces and discusses the potential and role of a Centre to support sustaining and ensuring the quality of the GGRF considering the challenges and growing reliance on the GGRF.

3.1 Role of the Global Geodetic Centre of Excellence

The role of the Centre is to assist in sustaining the GGRF by implementing operational paragraphs of UN General Assembly resolution 69/266. Among other activities, the Centre will do this by developing a work plan. This can be paraphrased as:

- enhance global cooperation and coordination across Member States and relevant geodetic stakeholders to maximise the benefit of ongoing geodetic efforts, ensure coherence, and avoid duplication of effort.
- strengthen geodetic infrastructure
- assist Member States in making their geodetic data Findable, Accessible, Interoperable and Reusable in line with standards, policies and conventions.

³ Please refer to „Position Paper on Sustaining the Global Geodetic Reference Frame” [4]

- support education, training and capacity building
- improve communication and raise awareness

By fulfilling these roles, the Centre would address many of the critical gaps in capacity and capability across the five focus areas.

3.2 Functional Arrangements

The Centre will be established and operationalized through a Memorandum of Understanding (MoU) between the United Nations and one or more host Member State(s), who are also donors. This MoU would be established in accordance with Host Country Agreement/s (HCA) between the United Nations and the Government/s of the host Member State/s. In this regard, the United Nations will establish a Trust Fund for this project in accordance with prevailing rules, guidelines and practices of the United Nations.

The Centre will be established and operated as a United Nations Centre, and will therefore be led and managed by the United Nations via well-established mechanisms. A range of operational models are available including:

- Single centre hosted by one Member State as the only donor, or
- A Federated Centre – multiple Member States to co-finance or co-host the Centre.

Currently, it is planned to host the GGCE in Bonn, Germany. In addition, an in-kind contribution of Norway is foreseen. The Subcommittee strongly encourages any Member State interested in contributing to the Centre, no matter how small, to discuss options with the UN-GGIM Secretariat about how to be involved.

The operational model will require, in coordination with relevant geodetic stakeholders, the establishment of a steering committee (to assist with governance of the Centre), and an advisory committee (to provide scientific and operational guidance). Furthermore, the Centre will have a framework plan, operational budget, governance, management and funding arrangements.

3.3 Framework plan and operational budget

The details of the framework plan, including the operational budget, will be subject to the provisions in the MoU between the UN and the donor Member State/s. The operational budget covers the costs of the establishment of the Centre for the initial period of the operation of the Centre, in line with existing United Nations procedures.

Acknowledging that the Global Geodetic Reference Frame depends on the participation of countries all around the globe, and the need to take action to strengthen international cooperation, the Centre overarching goal is to deliver a programme of work to achieve the long-term sustainability and quality of the GGRF.

4. CURRENT WORK TOWARDS THE ESTABLISHMENT OF THE GGCE

Currently (April 2021), the negotiations between the UN and Germany on the Agreement on the Operationalisation of the UN GGCE are well under way. The establishment of the GGCE is planned for 2021. One of the first actions of the GGCE will be to develop a programme of work. In order to ensure coherence and avoid duplication of effort, consultation will be made in direct coordination with the Committee of Experts and relevant geodetic stakeholders, including the IAG, FIG, and the regional geodetic committees of the UN-GGIM.

For the Global Geodetic Reference Frame to be sustainable, all countries need to play a role. In this spirit all Member States are invited to contribute to the Global Geodetic Centre of Excellence as it will cater for multiple contributors and partners including multiple sources of funding as well as in-kind contributions.

ACKNOWLEDGEMENT

This paper heavily relies on the Draft Concept Paper on Establishing a Global Geodetic Centre of Excellence [3] and the Position Paper on Sustaining the Global Geodetic Reference Frame [4].

REFERENCES

- [1] UN General Assembly resolution on GGRF, 2015: https://ggim.un.org/documents/A_RES_69_266_E.pdf
- [2] GGRF Position Paper on Governance, 2019: http://ggim.un.org/meetings/GGIM-committee/9th-Session/documents/GGRF_Position_Paper2019_24July_web.pdf
- [3] <https://ggim.un.org/meetings/GGIM-committee/10th-Session/documents/DRAFT-Concept-Paper-on-GGCE-20200806.pdf>
- [4] <https://ggim.un.org/meetings/GGIM-committee/10th-Session/documents/DRAFT-Position-Paper-on-Sustaining-the-GGRF-20200806.pdf>
- [5] <https://ggim.un.org/meetings/GGIM-committee/9th-Session/documents/GGIM9-report-e.pdf>

BIOGRAPHICAL NOTES

Dr. Johannes Bouman is Head of the Department Geodesy at the German Federal Agency for Cartography and Geodesy (BKG). He has a MSc in Geodesy from Delft University of Technology (Delft, the Netherlands) in 1993, and got his PhD also from Delft University of Technology in

2000. After previous stations at SRON Netherlands Institute for Space Research, the German Geodetic Research Institute (DGFI-TUM), and the Institute of Geodesy at Leibniz University Hannover, he has been working at BKG since 2016.

CONTACTS

Dr Johannes Bouman
Bundesamt für Kartographie und Geodäsie
Richard-Strauss-Allee 11
60598 Frankfurt am Main
GERMANY
Tel. +49 69 6333206
Email: johannes.bouman@bkg.bund.de
Web site: www.bkg.bund.de

Update on the UN Global Geodetic Centre of Excellence (GGCE) (11226)
Johannes Bouman (Germany)

FIG e-Working Week 2021
Smart Surveyors for Land and Water Management - Challenges in a New Reality
Virtually in the Netherlands, 21–25 June 2021