Joint UN-GGIM Subcommittee on Geodesy 5th Plenary and 3rd UN-GGCE International Advisory Committee Meeting

SUMMARY NOTES

10 to 14 March 2025
UN Campus, Platz der Vereinten Nationen 1,
53113, Bonn, Germany

Opening Remarks, Welcome, and Introductions

The joint meeting commenced with a warm welcome from Nicholas (Nick) Brown, Head of the UN Global Geodetic Centre of Excellence (UN-GGCE), who underscored the critical role of geodesy in today's world and the importance of strengthening the global geodesy supply chain for accurate and reliable satellite services which are essential for social, economic and environmental applications.

Following this, Stefan Schweinfest, Director of the Statistics Division of DESA, provided an insightful overview of the historical progress in geodesy, highlighting the significance of the *2015 UN General Assembly Resolution on Sustaining the Global Geodetic Reference Frame (GGRF).* He acknowledged the contributions of various Member States, including Norway, France, Spain, and Singapore, and commended the UN-GGCE for its impactful initiatives in a short time span, such as the Listening World Tour.

Nick then introduced Ingrid Vanden Berghe, co-chair of both the UN-GGCE International Advisory Committee (IAC) and the Subcommittee on Geodesy, who delivered the opening remarks. In her address, Ms. Vanden Berghe highlighted the increasing representation of women in geodesy-related meetings, noting that, in this meeting, 15 out of the 55 participants in attendance were women. She emphasized the importance of gender diversity in the field and the need to raise awareness of the global geodesy supply chain at a ministerial level to garner stronger governmental support.

Albert Momo (co-chair of the IAC), Fernand Bale (co-chair of the Subcommittee on Geodesy), and Johannes Bouman (co-chair of the Subcommittee) reaffirmed their commitment to supporting the geodetic community, working towards effective governance, development, and sustainability.

Actions of the UN-GGCE in the Intersessional Period and Plan of Activities for 2025

Nick outlined the work of the UN-GGCE in the past year including the 1st Joint Development Plan on Global Geodesy, Policy Briefs, UN-GGCE Partnership Program and Multilateral Memorandum of Understanding. Following this, Nick described the planned activities for 2025 including the five regional Capacity Development Workshops, the white paper on a robust Global Geodesy Supply Chain and an options paper on stronger governance arrangements for global geodesy.

In response to the presentation, the IAC and Subcommittee members expressed their gratitude for the work done over the past year and supported the planned work activities for the remainder of 2025.

When asked what the UN-GGCE could do to help Member States explain geodesy to policy makers, Victor Khoo (Singapore) emphasized geodesy's role in climate disaster mitigation, particularly in sea-level rise and integrating land and marine fields. Further, Elisabetta D'Anastasio (New Zealand) and Basara Miyihara (Japan) proposed that earthquake and volcano monitoring could be used as a justification for increased geodesy funding. They agreed to share relevant business cases with the Centre. Sharafat Gadimova from the International Committee on GNSS (ICG) also announced the availability of a paper on natural hazard monitoring, accessible on their website.

Announcement of the Multilateral Memorandum of Understanding (MMOU)

Nick announced the launch of the Multilateral Memorandum of Understanding (MMOU), with an initial 36 participants committed to enhancing global geodetic collaboration. He emphasized that the MMOU is a fundamental step towards broader international cooperation, aiming to raise awareness and promote national-level discussions on the importance of geodesy.

Introduction to the 1st Joint Development Plan for Global Geodesy

Nick introduced the 1st Joint Development Plan for Global Geodesy, developed as a result of the World Listening Tour with over 500 experts from 110 countries. This plan outlines critical actions to strengthen the global geodesy supply chain, has been translated into -six official UN languages and is available on the UN-GGCE website.

Tracking Progress through Asana

The project management tool Asana was introduced as a platform for Member States to monitor and track progress on geodetic activities outlined in the Joint Development Plan. Hannes Frings (Germany) shared his experience with Asana, appreciating its capability to categorize tasks effectively. Nick encouraged Member States to contact the UN-GGCE to receive access to the Asana platform.

Actions in the 1st Joint Development Plan for Global Geodesy

Objective 1.1: Engaging Member States in Geodesy Governance

New Zealand's Geodesy Governance Model

Elisabetta D'Anastasio (New Zealand) shared a case study on geodesy governance, focusing on the Warkworth VLBI station, which faced funding cuts in 2021 and has received at least a temporary extension to operations due to the efforts and resourcing provided by Land Information New Zealand (LINZ).

The main challenges New Zealand has faced includes limited financial resources, dependence on government support, and a shrinking pool of technical expertise. To address these issues, New Zealand established a Position, Navigation, and Timing (PNT) Advisory Committee to help address these challenges and strengthen long-term geodetic capability.

Objective 1.2: Maintaining the Accuracy and Reliability of Geodetic Products

Examples of long-term agreements (CODE and AGGO)

Johannes Bouman (German) explained ways that the German government are collaborating to maintain the accuracy and reliability of geodetic products including co-funding the operations of the Centre on Orbit Determination in Europe (CODE) which provides critical geodetic products, including orbit determinations and Earth orientation parameters. Furthermore, the German government co-funds and jointly operates the Argentine German Geodetic Observatory (AGGO) in partnership with Argentina. Recently, funding has been secured to sustain this collaboration through 2032. A broader discussion followed on the importance of effective communication with policymakers to secure sustainable funding for geodetic programs.

ESA's long-term agreements & cooperation

Werner Enderle (European Space Agency, ESA) shared insights into the Hosting Agreements it established with countries to facilitate international cooperation without direct financial exchanges. Under these agreements, ESA provides technical equipment (such as GNSS receivers, antennas, and data access), while the Host partners are responsible for covering operational costs and providing the necessary infrastructure to support the stations. ESA currently operates 25 GNSS stations worldwide, with open access to data from most of these stations.

This generated a discussion on the challenges of ensuring the continuity of agreements and maintaining long-term partnerships. The attendees discussed challenges such as transitioning from free geospatial data to commercial models.

Objective 1.3 Decision-makers are convinced of importance of geodesy

Building the case for investment in geodesy in the Australian Government

Martine Woolf (Australia) shared the information about their success in building a strong case for investment in geodesy within government. They emphasized the importance of crafting simple and consistent narratives that avoid technical jargon while aligning proposals with key government priorities such as innovation, agriculture, or mining. Demonstrating a clear return on investment with quantitative evidence and engaging stakeholders across government, industry, and academia were also highlighted as crucial factors. Additionally, the representative of Australia stressed the need to proactively prepare funding proposals so they are ready when opportunities arise.

Participants thanked Martine for her presentation and appreciated the offer to share their materials through the UN-GGCE as a reference for others facing challenges in convincing their governments to invest in geodetic infrastructure and related activities.

Nick invited Member States to consider seconding experts in the economic field to the UN-GGCE Centre to support with cost analysis efforts.

Objective 1.5: Enhancing Public Awareness of Geodesy

Communication videos

Nick introduced a new public awareness campaign, shifting the focus from risk-based to positive messaging that highlights the critical role of geodesy in daily life. A consulting firm has been hired to develop playful short videos for social media platforms.

Feedback and Recommendations

There was a consensus on the need to differentiate audience-specific materials, tailoring content for the general public, decision-makers, and policymakers. Leveraging high-profile media coverage, such as the measurement of Mount Everest's height, was suggested as an effective strategy to gain public and political support. Additionally, collaboration with existing initiatives, such as "Get Kids into Survey", was recommended to maximize impact and avoid duplication.

Objective 2.1: Meeting Member States' Accuracy, Reliability, and Integrity Standards for Geodetic Products

Robust Global Geodetic Supply Chain and Introduction to Essential Geodetic Variables (EGVs)

Liubov Poshyvailo-Stube (UN-GGCE) presented ongoing efforts to define a robust global geodetic supply chain, highlighting both its complexity and critical importance. She also shared the results

of sensitivity studies that demonstrated the impact of a hypothetical removal of the Australian SLR stations, which are among the highest-performance SLR stations worldwide, on the global SLR network and geodetic products. Furthermore, Liubov outlined plans to quantify the socio-economic impacts of geodesy and conduct a risk assessment of the global geodesy supply chain degradation.

Detlef Angermann (TUM, Germany) provided an overview of Essential Geodetic Variables (EGVs), which are being defined by the Global Geodetic Observing System (GGOS) and aim to enhance the visibility of geodesy and support systematic Earth observations. He explained that 18 EGVs have been defined, categorized under global, land, and ocean domains, and linked to essential climate and ocean observation variables. The discussion also addressed the distinction between "variables" (measurable quantities) and products derived from the variables, emphasizing the need for clear communication. He outlined the next steps, which include gathering broader community feedback and defining specific requirements. for the observation, accuracy, frequency, and metadata standards associated with each Essential Geodetic Variable.

The presentations were followed by a workshop on the user requirements, strengths and weaknesses of the Global Geodesy Supply Chain, where participants worked in group activities.

Objective 2.2: Strengthening Global Geodesy Supply Chain Governance

Participants assessed non-material elements such as systems, processes, and workforce, focusing on their impact on geodetic product quality, accuracy, and latency. Discussions highlighted the challenge of defining operational requirements, particularly for positioning and navigation, while timing needs are more clearly established. Current assessments allow for qualitative analysis, but there is no robust method to quantitatively measure uncertainty within the global geodetic supply chain.

Martine Woolf (Australia) mentioned the "System of Systems" approach, and Nick informed participants that a consultant is currently assisting with its development. He also stated that a System of Systems Framework will be delivered. Johannes Bouman (Germany) suggested simulations as a method to systematically assess these impacts and align infrastructure development with accuracy and service requirements.

Regarding enhancing visibility, several suggestions were made, including creating awareness through global campaigns, Google ads, OpenStreetMap collaborations, and commemorative initiatives like UN stamps.

Nick provided an overview of governance models, highlighting the World Meteorological Organization (WMO) as a potential example for structuring an International Geodesy Organization.

The need for sustainable funding was emphasized, with Member States encouraged to consider bilateral or multilateral agreements to formalize resource commitments.

Objective 2.4: Implementing Open Data Sharing and Protecting the Radio Frequency Spectrum

Nick explained that the UN-GGCE is working on the development of a policy brief relating to the importance of protecting radio frequency spectrum for VLBI observations. He noted that the draft will be circulated to members for feedback, encouraging input to refine and strengthen the document.

Werner Enderle (ESA) highlighted the work of the ICG Frequency Protection Working Group.

Sandra Bolanos (Canada) noted that spectrum protection efforts are already well-integrated within the industry in their country, and multiple government briefings have taken place to ensure ongoing awareness.

Elisabetta D'Anastasio (New Zealand) referenced New Zealand's National Risk Register, where GPS-related risks are documented. She suggested that incorporating geodetic risks into national risk registers could help secure stronger policy support.

Johannes Bouman (Germany) explained that under German law, the Wetzell Geodetic Observatory has been classified as critical infrastructure.

5th Plenary Meeting of the Subcommittee on Geodesy

Welcome, Introductions, and Organization of Work

The co-chairs of the Subcommittee informed about the Bureau Membership. Members are elected every two years for four-year terms. The co-Chairs also explained that Sergio Cimbaro (Argentina) stepped down from the Bureau. Gustavo Caubarrere (Uruguay) was selected by the Subcommittee to fill the vacancy.

The co-Chairs explained how the Subcommittee is supporting various activities, including organizing regional meetings, translating documents, and circulating drafts among Member States. The sub-committee also engaged in Joint Development Plan, Multilateral Memorandum of Understanding, and Joining land and sea integration projects.

Capacity Development Discussion

The geospatial community faces challenges in attracting and retaining professionals due to low awareness, competition from other fields, and salary constraints, particularly in developing regions. To address these issues, proposed solutions include developing structured mentoring and internship programs, creating targeted capacity-building materials, and establishing regional cooperation to share expertise and infrastructure.

Regional Geodesy Working Group Updates

Arab States: Key objectives such as fostering collaboration, sharing best practices, and increasing awareness of unified geodetic reference frames were highlighted. Ongoing efforts include developing a reference document, compiling geodetic infrastructure data, and enhancing regional communication platforms. Additionally, steps are being taken to integrate the Arab Geodetic Reference Frame (ARABREF) into the International Association of Geodesy (IAG). The presentation underscored the need for stronger participation from Arab countries in geodetic data sharing. Expanding training programs was also emphasized as a priority to build expertise and strengthen geodetic capabilities across the region.

Europe: Europe focused on the connection with EUREF and related technical organizations. Some of the key challenges facing the Europe region include unifying the European Terrestrial Reference System (ETRS89) and addressing related challenges both on technical and political level. Given the significant number of established geodetic organizations active in the Europe region, the importance of communication and collaboration was emphasized. Finally, the presentation referred to the difficulties in finding political support at different levels.

Africa: The speaker highlighted the continent's vast geographic area (about 30 million km²) and diverse population distribution. Despite significant potential and increasing foreign investment, several challenges persist:

- Fragmented GIS infrastructure, with only three countries officially using modern systems
- Limited access to extensive and publicly available geospatial data
- Historical geospatial data is often missing or poorly preserved, complicating modernization efforts
- Financial constraints and political instability make it difficult to maintain geospatial data and infrastructure

Asia-Pacific: Japan presented progress on the Asia-Pacific Reference Frame (APREF) and GNSS campaigns aimed at improving access to global reference frames. Key updates included:

- A successful transition to ITRF 2020, enhancing station coordination and sustainable operational practices.
- Ongoing challenges in maintaining GNSS networks sustainably and securing continued investment.
- Workshops and regional cooperation initiatives focused on disaster risk reduction, particularly for earthquakes and tsunamis.
- Capacity-building activities remain highly active, with strong engagement and notable support from the Indian government.

Americas: SIRGAS' coordination with IAG, PAIGH, and UN-GGIM to support regional geospatial efforts was highlighted. Key achievements like numerous successful workshops, symposiums, and training events, with high attendance and strong regional engagement were highlighted.

UN-GGIM Subcommittee on Geodesy Partners' Updates

- **UNOOSA** facilitates international space cooperation under Committee on the Peaceful Uses of Outer Space (COPUOS). It provides access to space-based data and training, support for disaster management initiatives and workshops on GNSS and space weather impacts.
- **IGS & ICG** Working Groups focus on GNSS interoperability and compatibility, spectrum protection, geodetic reference frame development and IGS operates 515 GNSS ground stations in 116 countries.
- **IAG** The International Association of Geodesy (IAG) is a scientific organization dedicated to advancing the field of geodesy, which is the science of measuring and understanding

the Earth's geometric shape, orientation in space, gravity field, and how these change over time.

- **FIG** The International Federation of Surveyors (FIG) is a global organization that represents surveyors and geospatial professionals. It promotes the disciplines of surveying, geomatics, geoinformatics, and land management by setting international standards, facilitating knowledge exchange, and advocating for best practices in land administration, mapping, and spatial data infrastructure.
- **NASA Space Geodesy Program** focuses on VLBI and SLR network modernization, deployed new VLBI antennas in Maryland, Hawaii, Texas, and Brazil and lunar geodesy efforts are expanding under Artemis & CLPS programs.

Recommendations for Organizing Regional Workshops

- Topics should include governance, capacity development, standards, communication strategies, and technical aspects.
- Clearly communicate why geodesy modernization is necessary and its practical applications.
- Ensure simultaneous translation, provide translated materials in advance, and use native speakers as translators to enhance accessibility.

There was also time allocated to breakout sessions, where the regional Working Group had time for discussions.

AI applications for geodesy

The group discussed various AI-related initiatives in geospatial applications. Artificial intelligence is being increasingly utilized for prediction and monitoring tasks, offering improvements over traditional statistical methods. A notable example is the GGOS Focus Area 'Artificial Intelligence for Geodesy (AI4G)', which promotes the development and integration of AI techniques to enhance the analysis and interpretation of geodetic data, including time series analysis, anomaly detection, and parameter estimation.

Upcoming Reports and Meetings

A summary report on the Global Geodetic Reference Frame is due by 2 May, with the full report to be submitted by 30 June for the 15th session. Background documents should be submitted by 11 July. Reports from subcommittees will be drafted, circulated, and reviewed prior to submission to the UN-GGIM, for the 15th UN-GGIM Session.

Side Events for the 15th UN-GGIM Session

A 10-year anniversary session commemorating the General Assembly resolution 69/266, 'A Global Geodetic Reference Frame for Sustainable Development' was proposed. Logistical challenges, including limited room availability and funding constraints, need to be considered.

Closing Remarks

Nick summarized the key messages from the discussions and expressed appreciation for the participant's active engagement throughout the week. He also extended special thanks to Stefan Schweinfest for his role in establishing the UN-GGCE in Bonn.