



UNITED NATIONS GLOBAL GEOSPATIAL  
INFORMATION MANAGEMENT:

SUBCOMMITTEE ON GEODESY & UN-GGIM: EUROPE

European Geodesy Forum

**Towards a Sustainable  
Global Geodetic Reference Frame:  
European Contribution**



UN-GGIM

United Nations Committee of Experts on  
Global Geospatial Information Management

Subcommittee on  
Geodesy

*Positioning geospatial information to address global challenges*

[ggim.un.org](http://ggim.un.org)



**Moderator**

**Dr. Zuheir Altamimi**

*Lead of Geodetic Infrastructure Working Group*

**Opening Address**

**Ms. Ingrid Vanden Berghe**

*Co-Chair UN-GGIM Committee of Experts*

**Mr. Tomaz Petek**

*Chair, Executive Committee of  
UN-GGIM: Europe*

**Ms. Laila Løvhøiden and Ms. Anne Jørgensen**

*Leads of the GGRF Governance &  
Communication and Outreach Working Groups*

**Mr. Mikael Lilje**

*Lead of the Education Training and Capacity  
Building Working Group*

**Mr. Johannes Bouman**

*Member of the UN-GGIM-Subcommittee on  
Geodesy*



# Webinar Agenda

- Opening address: *Ingrid Vanden Berghe & Tomaz Petek*
- Introduction and setting the context : *Zuheir Altamimi*
- Highlights of the Position Paper on Sustaining the GGRF: *Laila Løvhøiden and Anne Jørgensen*
- Highlights of the Concept Paper on Establishing a GGCE: *Mikael Lilje*
- Germany's offer to host the Global Geodetic Centre of Excellence (GGCE): *Johannes Bouman*
- Open discussions and feedback from the audience
- Summary and concluding remarks

Throughout the Webinar: Slido polls: *Carol Agius*



# Welcome address

**Welcome address by**  
**Ms. Ingrid Vanden Berghe**  
**&**  
**Mr. Tomaz Petek**



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# Introductions and setting the context

*Moderator: Zuheir Altamimi*



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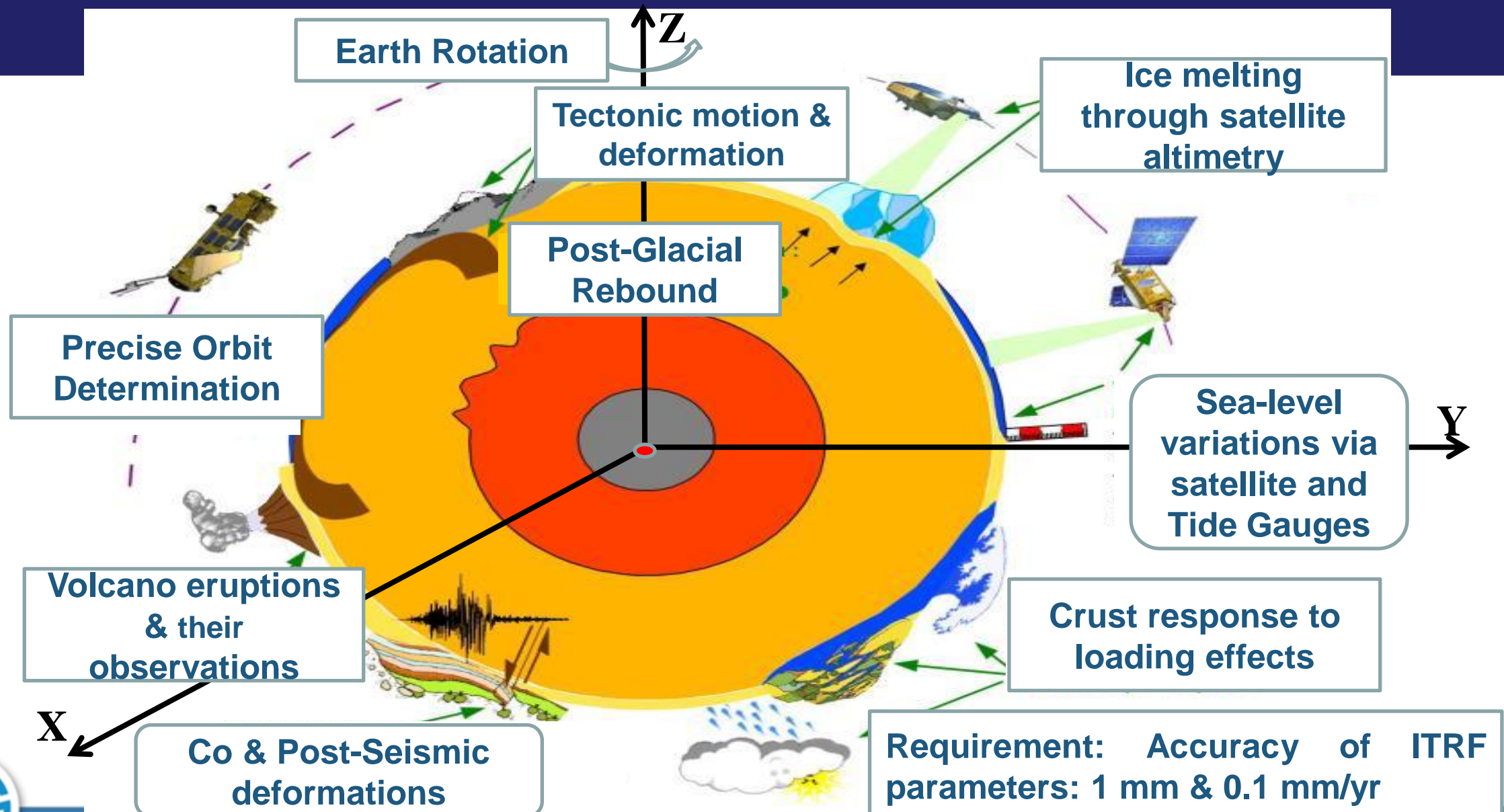
# The GGRF as defined in the road map?

- The GGRF is a “Geodetic framework” within UN-GGIM context
- It includes:
  - Geodetic observatories / Networks
  - Data collection, data analysis
  - ICRF, ITRF, EOPs & Height systems
  - Work forces and product generation systems
- Recognising the growing need for a high quality and sustainable GGRF for location-based & Earth Science applications, the UN General Assembly adopted a resolution 69/2661 in February 2015, entitled ‘A Global Geodetic Reference Frame for Sustainable Development’
- But the GGRF is in danger of degradation. The IAG that provides fundamental geodetic products to society is not the owner of the geodetic infrastructure. It needs commitment by Member States, the owners, to sustain it in the long-term.
- Some illustrations follow, from the geometric part of the GGRF, the ITRF

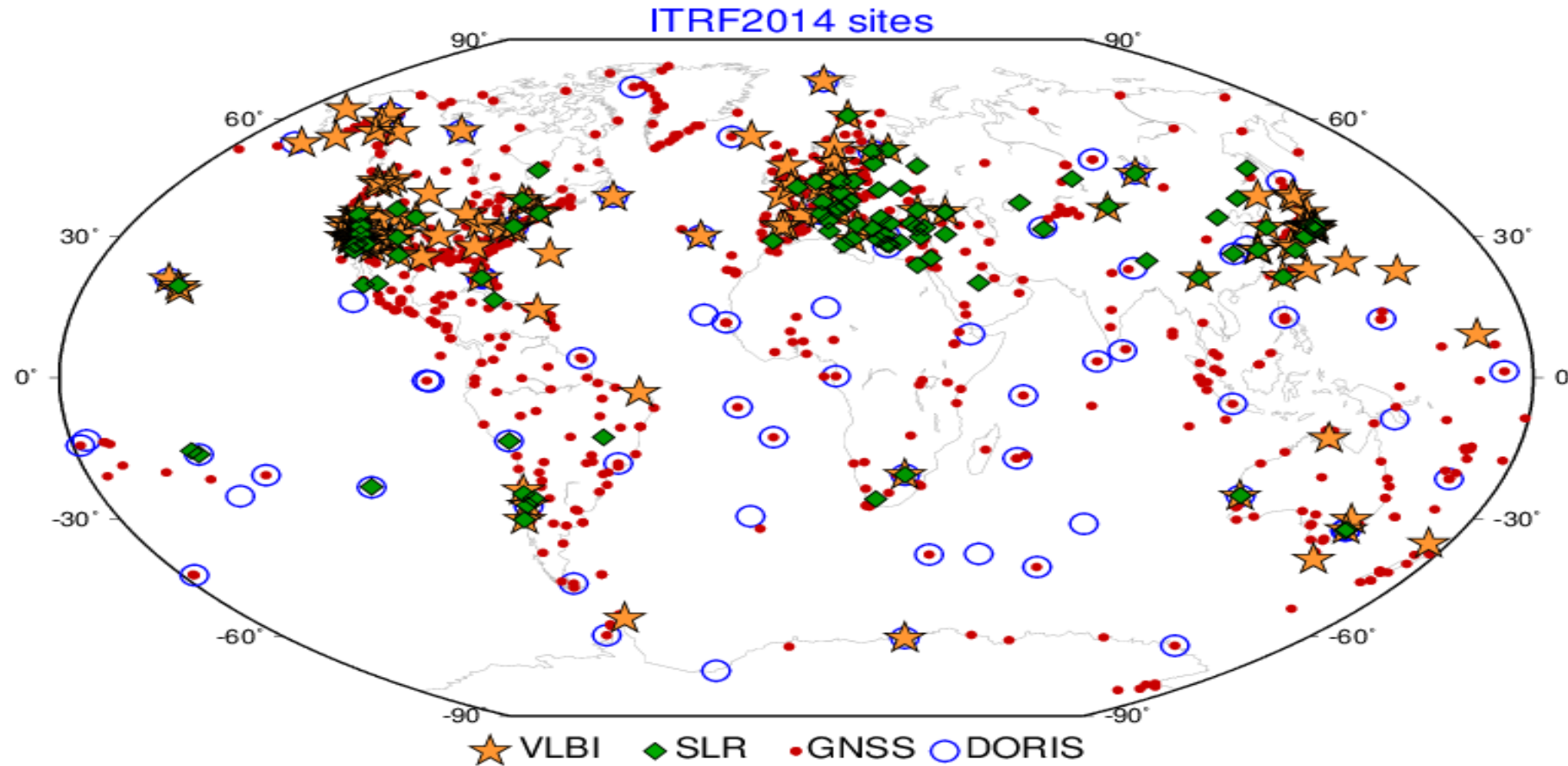




# The reference frame & Earth science applications



# Geodetic Infrastructure: our heritage since space geodesy era



SLR



VLBI



GNSS



DORIS



**BUT: only 35%** of VLBI and SLR sites are in operation today  
Most of the old decommissioned sites were of poor quality



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# Risk of degradation

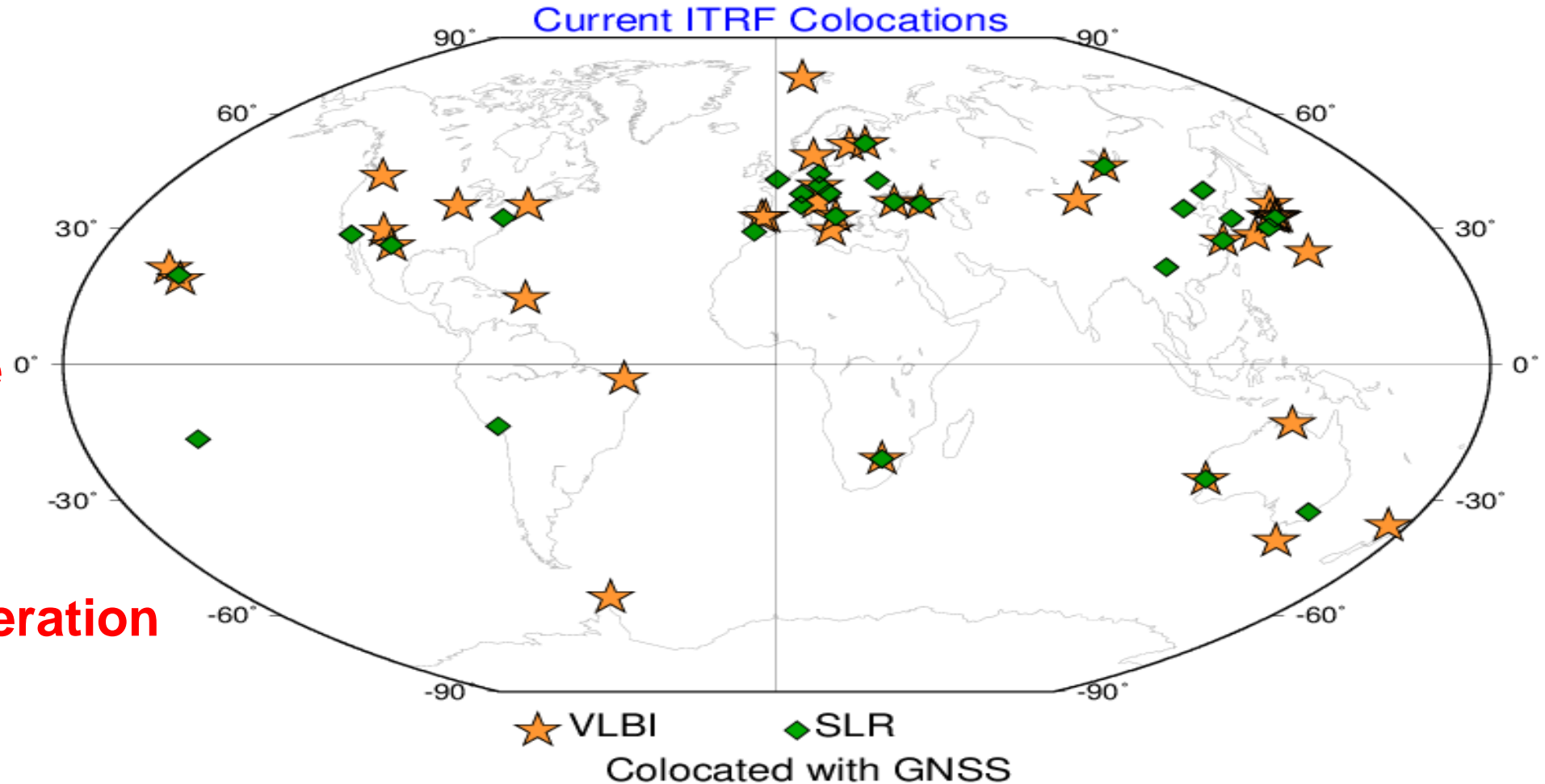
SLR 30 sites



VLBI 44

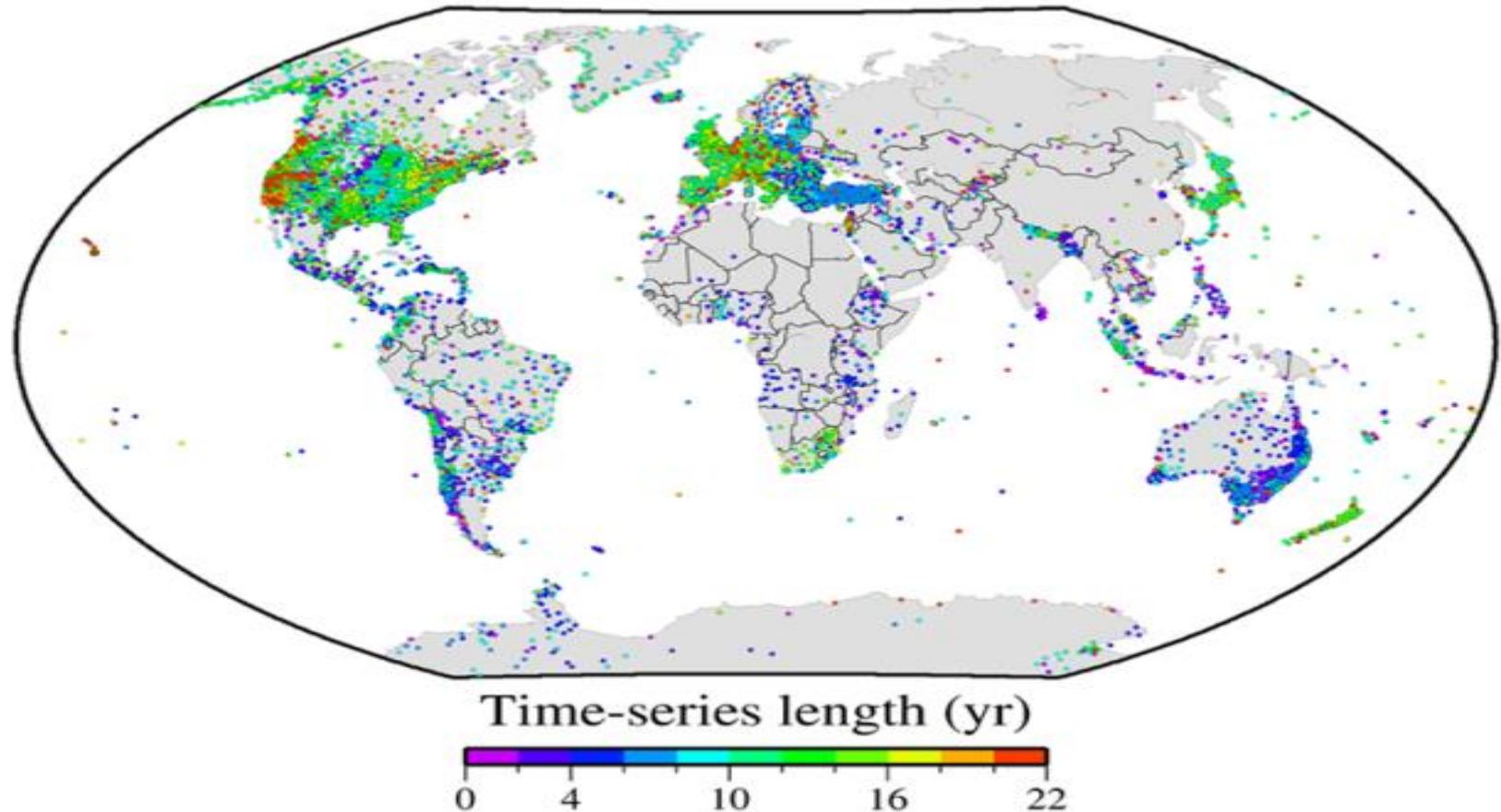


- **SLR & VLBI are fundamental**
- **Poor/uneven distribution**
- **> 50 % old-generation systems**



# Access to the GGRF/ITRF via GNSS

- Open Data Sharing is fundamental to enable positioning & science applications
- Gaps in Africa, East and South East Asia & South America
- Some empty areas does not mean no GNSS stations  
But data is not shared

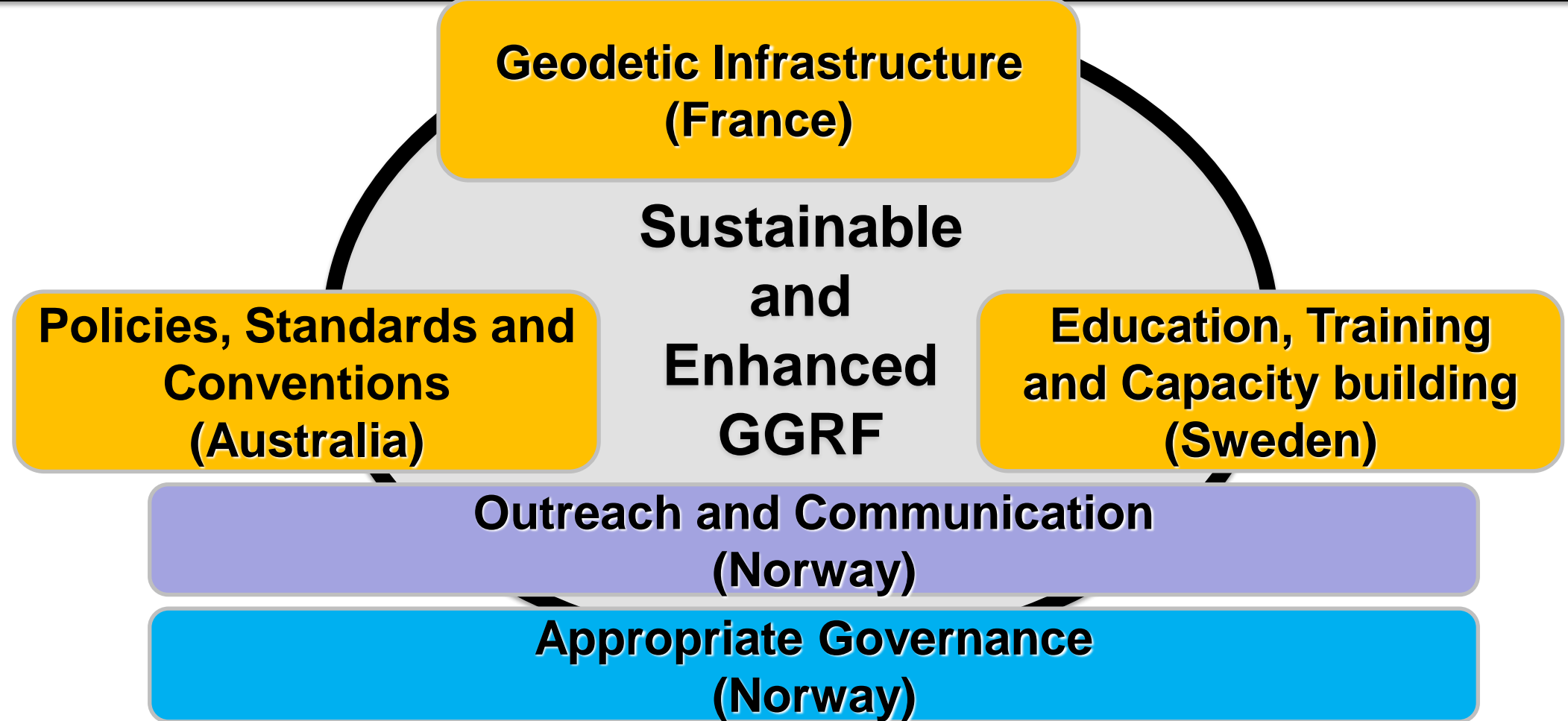


*Blewitt, G., W. C. Hammond, and C. Kreemer (2018), Harnessing the GPS data explosion for interdisciplinary science, Eos, 99, <https://doi.org/10.1029/2018EO104623>*



# Subcommittee on Geodesy: VISION

An accurate, sustainable and accessible Global Geodetic Reference Frame to support science and society



# GGRF Priorities?

Two identified Priorities:

1. Ensure the long-term Sustainability and accuracy of the GGRF to meet science and societal requirements, by sustaining its geodetic infrastructure.
2. Ensure accurate access to the GGRF by all Member States. This includes Capacity Building, Data Sharing, Standards and Conventions, but also regional and national geodetic infrastructure to allow accurate access to the GGRF, mainly using GNSS technology.

==> The Global Geodetic Center of Excellence (GGCE) is needed to help addressing the two priorities.



# Addressing the issues

UN-GGIM Committee of Experts 10<sup>th</sup> Session | August 2020

- **Draft Position Paper on Sustaining the Global Geodetic Reference Frame**
  - Long term plan which aims to address deficiencies in:
    - Geodetic Infrastructure; Governance; Communications and Outreach; Education, Training and Capacity Building; and Policies, Standards and Conventions
  - <http://ggim.un.org/meetings/GGIM-committee/10th-Session/documents/DRAFT-Position-Paper-on-Sustaining-the-GGRF-20200806.pdf>
- **Draft Concept Paper on Establishing a Global Geodetic Centre of Excellence:**
  - **Functions of the GGCE**
  - Part of the long-term plan
  - Mechanism for Member States to contribute
  - <http://ggim.un.org/meetings/GGIM-committee/10th-Session/documents/DRAFT-Concept-Paper-on-GGCE-20200806.pdf>
- The two papers were available at the UN-GGIM website since the 10<sup>th</sup> Session and the broad consultation started October 09, 2020.





# Highlights of the Position Paper on Sustaining the GGRF

*Laila Løvhøiden and Anne Jørgensen*



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# The Position Paper on Sustaining the GGRF

“A long-term strategy and action plan to realise the call by the UN General Assembly in its resolution of 2015 to develop a common global geodetic reference frame.”

His Excellency Ambassador Peter Thomson  
UN Secretary-General's Special Envoy for the Ocean  
Global Geodesy Ambassador



UN General Assembly 2015. Photo: Kyoung-Soo Eom



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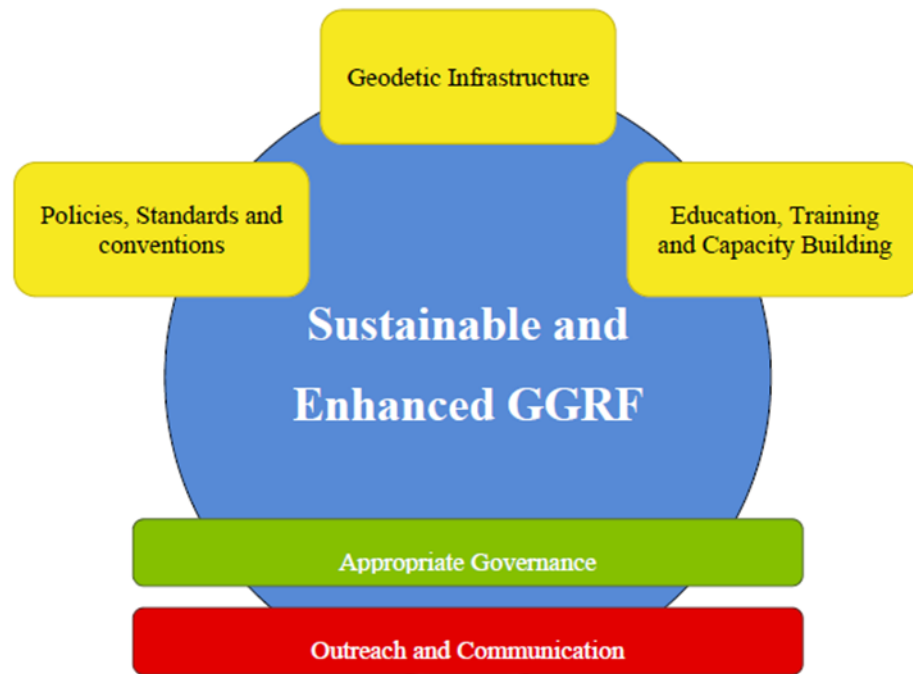
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# Position Paper on Sustaining the GGRF



- Builds on the ninth session position paper on governance arrangements for sustaining the GGRF
- Provides a plan to help achieve the long-term sustainability and quality of the GGRF by delivering improvement in five focus areas



# Highlights of the Position Paper on Sustaining the GGRF

## Challenges



Ny-Ålesund. Photo: Bjørn-Owe Holmberg

- Lack of redundancy and sustainability in geodetic infrastructure, analysis and product services
- Poor accessibility in some regions
- Reliance on in-kind contribution
- Insufficient collaboration and coordination
- Insufficient funding, capacity and capability
- Difficult to attract new resources from Member States to implement GGRF work packages internationally



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# Alignment of work plan - Europe

## GOVERNANCE

1. Develop a concept paper on the establishment of the GGCE
2. Ensure that short, medium and long-term goals exist for the five focus areas
3. Assist Member States in identifying their geodetic needs, and pathways to meet these needs in line with the Integrated Geospatial Information Framework (IGIF)

## GEODETTIC INFRASTRUCTURE

1. Undertake a user requirements study to define what geodetic infrastructure is required
  - *NOTE: This study should build on the geodetic infrastructure questionnaire completed by IAG Services in 2019/2020.*
2. Develop, implement and communicate a Global Geodesy Development Plan in cooperation with relevant stakeholders





# Alignment of work plan - Europe



Photo: Anne Jørgensen

## POLICIES, STANDARDS AND CONVENTIONS

1. Develop and assist with implementing a data-sharing strategy and promote making geodetic data FAIR
2. Work with Member States to apply standards, policies and conventions for the generation of consistent geodetic products for the GGRF
3. Publish authoritative reference system definitions and transformations in the ISO Geodetic Registry and other such registries



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# Alignment of work plan - Europe

## EDUCATION, TRAINING AND CAPACITY BUILDING

1. Conduct reference frame competency and educational needs assessments
2. Develop a capacity development program based on UN Development Program guidelines, and in alignment with the IGIF Strategic Pathway 8: Capacity and Education
3. Develop a Geodesy “Thematic Layer” for the IGIF
4. Develop collaborative arrangements or agreements with scientific institutions/ academia/ government to develop and deliver geodesy ETCB resources
5. Develop an ETCB “resource hub” as a sub-section of the Subcommittee on Geodesy webpage with technical training materials and other relevant capacity building information, sourced from ETCB contributors around the world



# Alignment of work plan - Europe



## COMMUNICATION AND OUTREACH

1. Develop and implement a communication and outreach strategy
2. Create strategic messages, develop communications methods including social media, in accordance with UN-guidelines and practice
3. Select five critical user requirements and demonstrate how geodesy can play a key role in resolving / achieving change. e.g. measuring sea level change



# Slido poll

*Carol Agius*



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# Highlights of the Concept Paper on Establishing a GGCE

*Mikael Lilje*



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# Background to Concept Paper

The Subcommittee on Geodesy was requested at the ninth session (2019) of UN-GGIM to

- ‘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.’
- ‘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 Role of the Centre

The role of the Centre is to assist in sustaining the GGRF. 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.
- support education, training and capacity building
- improve communication and raise awareness



# Operating Framework of the GGCE (1/3)

- Memorandum of Understanding between the United Nations and host Member State(s), who are also donors.
- 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:
  - A Federated Centre (preferred option) – multiple Member States to co-host the Centre.
  - Single host country where the only donor is the host country



# Operating Framework of the GGCE (2/3)

- The United Nations will establish a Trust Fund in accordance with prevailing rules, guidelines and practices of the United Nations
- The management and operation of the Centre will be fully funded through a multi-year voluntary contribution from the host/donor Member State(s) through the aforementioned Trust Fund



# Operating Framework of the GGCE (3/3)

- developing a work plan aligned with the work packages identified of the Position Paper
  - Enhance global cooperation and coordination across Member States and relevant geodetic stakeholders
  - Strengthen geodetic infrastructure
  - Assist Member States in making their geodetic data FAIR
  - Support ETCB
  - 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.





# GGCE – Strategic Plan 2021-2030

(Annex in the draft Concept Paper)

## **Mission**

To assist Member States and geodetic organizations coordinate and collaborate to sustain, enhance, access and utilize the Global Geodetic Reference Frame (GGRF).

## **Vision**

To help develop an accurate, accessible and sustainable Global Geodetic Reference Frame to support science and society.

## **Strategy**

The objectives of the Centre are to assist Member States fill some of the critical capability and capacity gaps across the five focus areas.



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# GGCE : Germany's Offer

- Germany announced its plans to host the Global Geodetic Centre of Excellence in Bonn, with funding for an initial five year period.
- There are on-going opportunities for other Member States to contribute to the Centre

<http://ggim.un.org/meetings/GGIM-committee/10th-Session/documents/GGCE%20Offer%20Germany%2027July2020.pdf>.

*Johannes Bouman*



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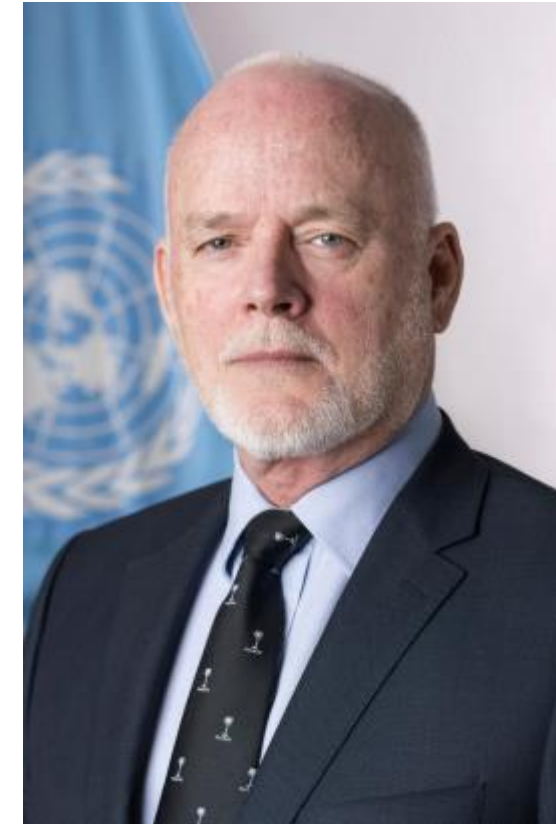
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# Highlights of the Concept Paper on establishing a Global Geodetic Centre of Excellence

“I applaud the Government of Germany for its formal offer to host and establish a Global Geodetic Centre of Excellence at the United Nations Campus in Bonn. A decisive step taken in the spirit of the 2015 UN resolution and I’m confident it will result in the enhancement of multilateral cooperation in the development of a more sustainable global geodetic reference frame.”

His Excellency Ambassador Peter Thomson  
UN Secretary-General’s Special Envoy for the Ocean  
Global Geodesy Ambassador



Credit: UN Photo/Mark Garten



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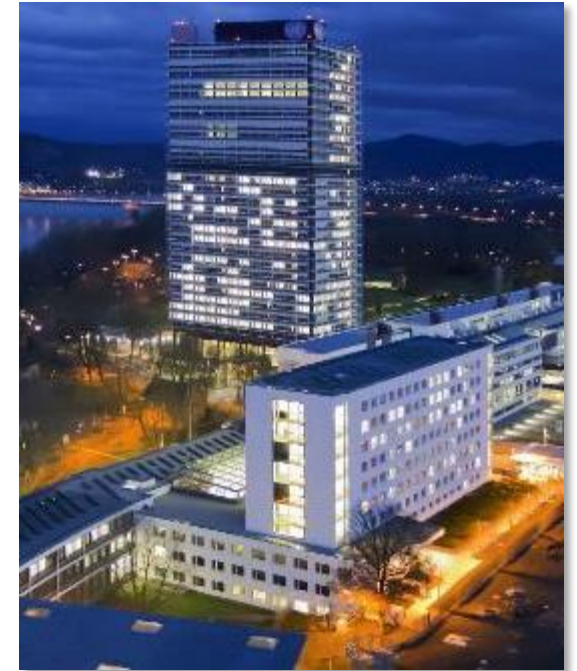
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# Establishment of the GGCE in Germany

- Located at the UN Campus Bonn
  - Financed and supported by BKG
  - Supported with virtual secondment by Norway
  - Steering Committee (UN DESA + Germany)
  - Technical Advisory Committee (SCoG, IAG, FIG, Space Agencies, ...)
- } ~ 6 FTE



UN Campus Bonn; Source: Press office of the city of Bonn



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# How the GGCE may support the GGRF ?

MoU / agreements with GGCE or enabled through the GGCE

- Example: BKG and TU Vienna have an MoU to collaborate on VLBI correlation. Others may be interested to become a partner as well.
  - Letter of Collaboration, to be approved by the GGCE Steering Committee
  - Extension: Distributed Correlator, model agreement that could be signed by MS, institutes
- Trust Fund
  - Multiple Member States donate a smaller or larger amount of money
  - Distributed Correlator is (partially) financed through Trust Fund
- Letters of Collaboration / Trust Fund could also be used to sustain contributions to the IAG Services, contribute to ETCB, etc.





# How the GGCE may support the GGRF

## Critical Infrastructure

- European Commission / Department of Homeland Security, USA:  
*GNSS (GPS, Galileo, ...) have become primary source of precise position and timing information, critical to safe operation of a number of critical infrastructures like the power grid, telecom networks, financial systems, etc.*
- National positioning services: on-going considerations that these are a critical infrastructure themselves
- Geodetic Observatory Wettzell (GOW) is part of the German critical infrastructure:
  - Essential to Galileo, Earth Orientation Parameters
  - Implies that other geodetic observatories, downstream data analysis, ..., are critical infrastructures



# How the GGCE may support the GGRF

## Critical Infrastructure

- Advantages and disadvantages
  - Audits, paper work, IT security measures, construction measures (UPS, ...), etc.
  - Contributes to GGRF sustainability & visibility and political relevance
- Possible roles of the GGCE
  - Enhance international cooperation
  - Sharing information and experience
  - Support the development of strategies for CI implementation
  - Support coordination among domestic agencies



# What's next?

## Next Steps

- Negotiations on a
  - 'Agreement' (streamline the tasks for the GGCE Bonn)
  - 'Verbal Notes' (agree upon the infrastructure on the UN campus)
- Develop participation of other partners in the GGCE

Negotiations between the German Federal Government and the United Nations began in autumn 2020

**There are on-going opportunities for other Member States to contribute to the Centre**



# Slido poll

*Carol Agius*



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# Next steps: Preparation for the 11<sup>th</sup> Session

- **Consultation & Feedback on:**
  - **Position Paper on Sustaining the Global Geodetic Reference Frame**
  - **Concept Paper on Establishment of the Global Geodetic Centre for Excellence**
  - **Both Papers are available on the UN-GGIM website under 10th Session documents.**
  - **The Subcommittee will be accepting feedback until tomorrow, June 24, 2021.**
  - **The final drafts for endorsement by the UN-GGIM Committee of Experts will be posted at the UN-GGIM website by end of July.**



# Open discussions and feedback from the audience

*Moderator: Zuheir Altamimi*



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# Summary and concluding remarks

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