



Geodetic capacity assessment in the Americas

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Reference Frames in Practice



UN-GGIM

The resolution "A Global Geodetic Reference Frame for Sustainable Development" (A/RES/69/266) adopted by the General Assembly of the United Nations in 2015, recognizes the economic and scientific importance and the growing need to have an accurate and stable global geodetic reference frame for the Earth.

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Education Training and Capacity Building working group

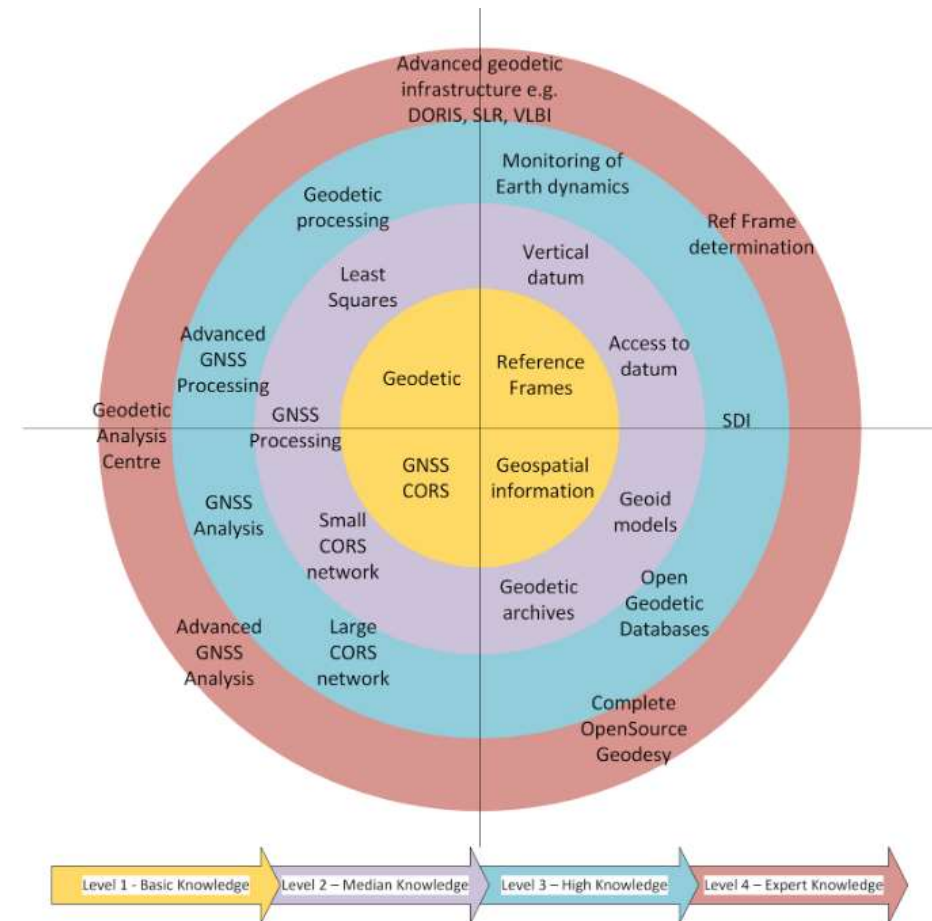
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Objectives

Survey on Development of Geodetic Capacity to assess the level of competence of the Member States and their training and education needs



Keenan, R., Craddock, A., Lilje, M., Sarib, R., & Blick, G. (2020). A Global Survey of Reference Frame Competency in terms of Education, Training and Capacity Building (ETCB): Results, Analysis and Update. Proceedings of the International Federation of Surveyors (FIG) 2020 Working Week

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Topics of the survey

- 1) Geodetic infrastructure and human resources**
- 2) Geometric Reference Frames and National densifications**
- 3) Vertical geodetic Reference Frames**

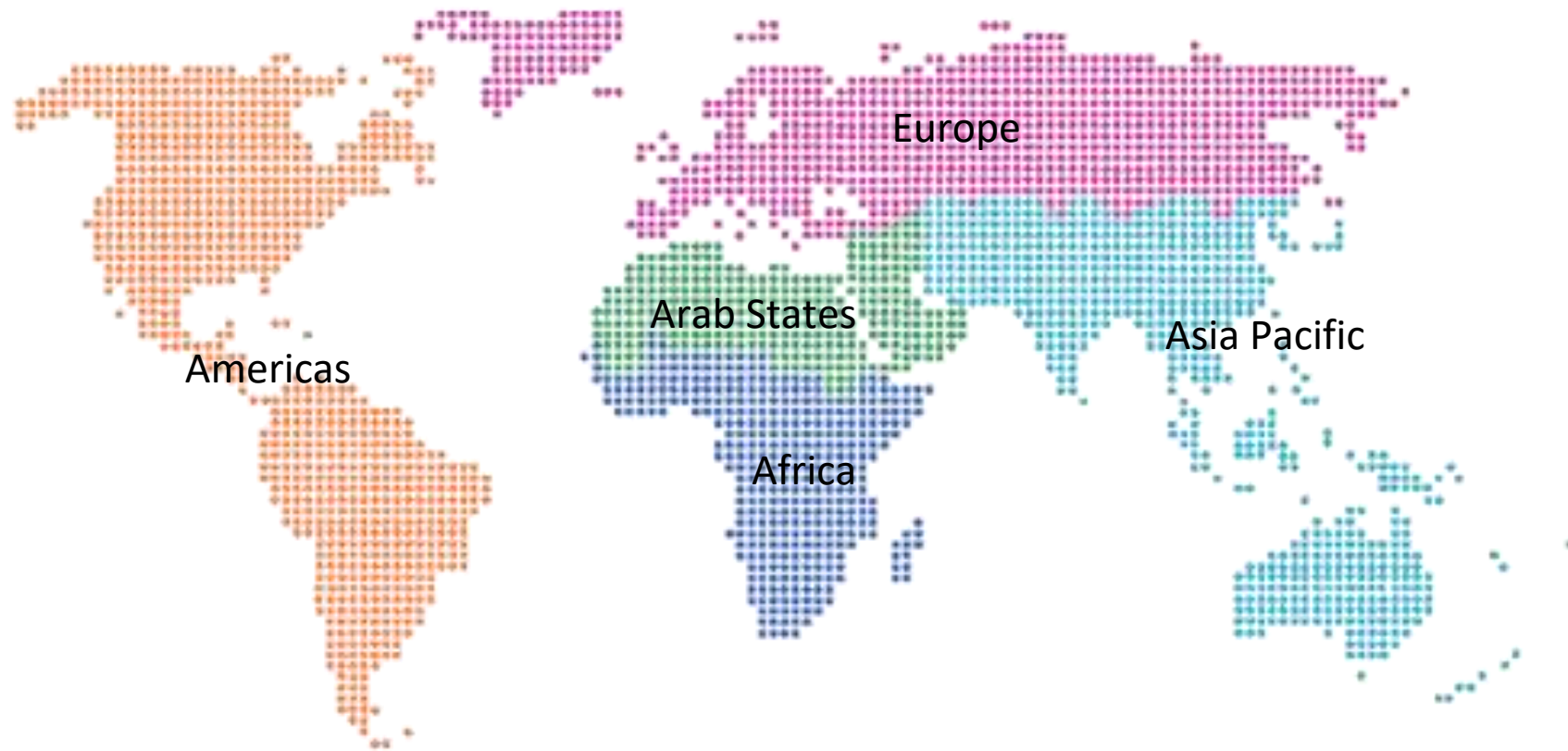
The survey closed in August 2022

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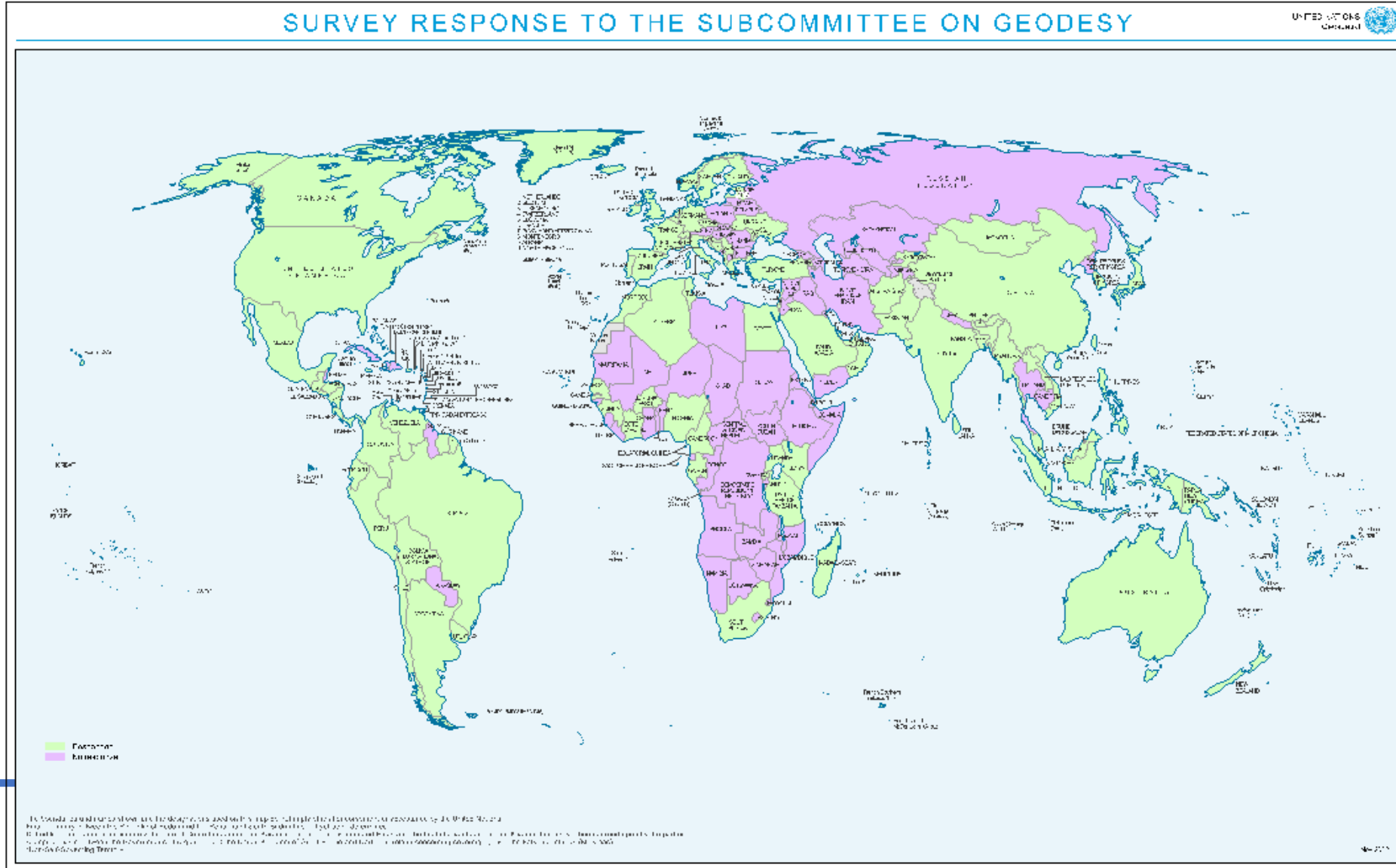


UN-GGIM Regional Committees



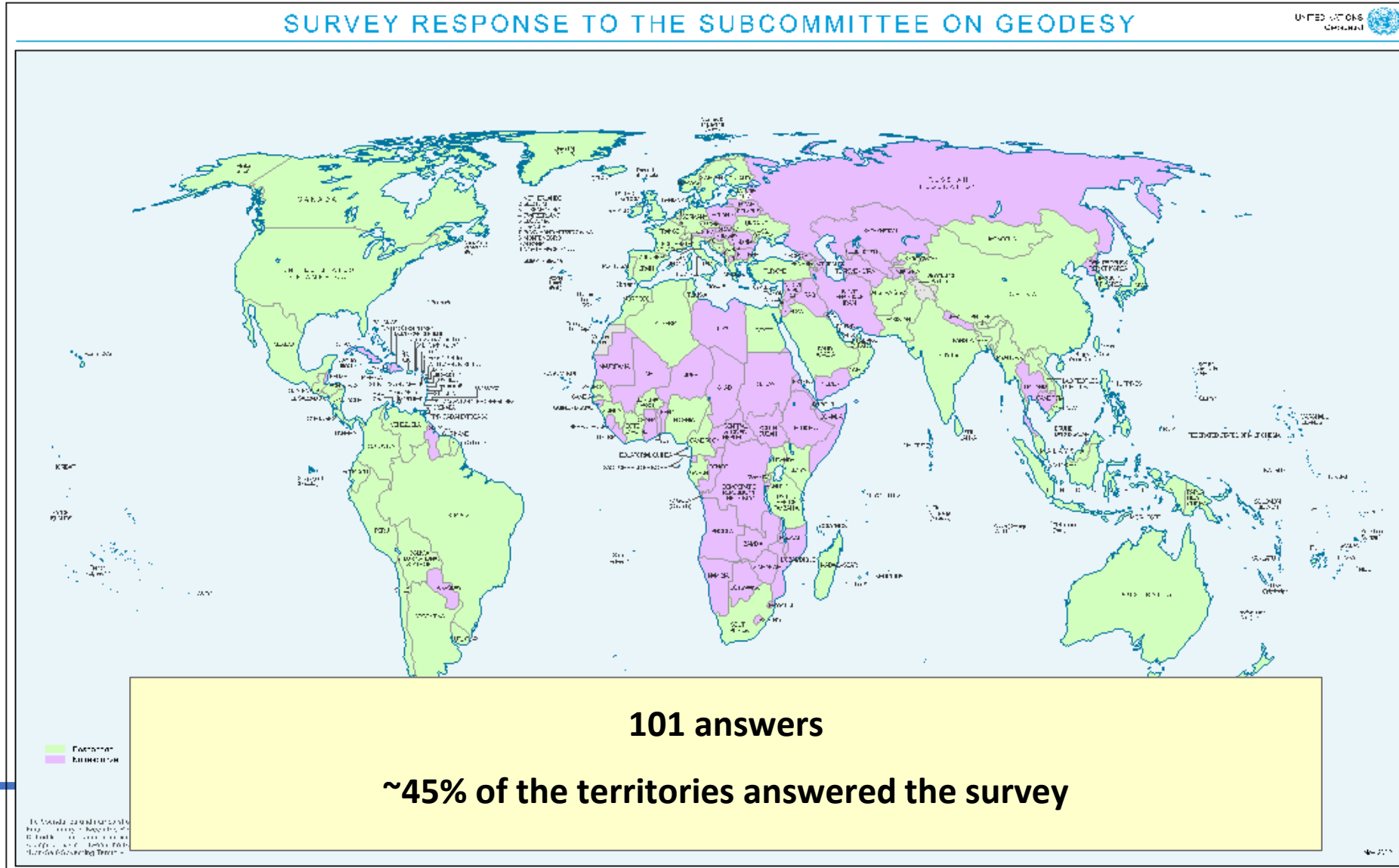
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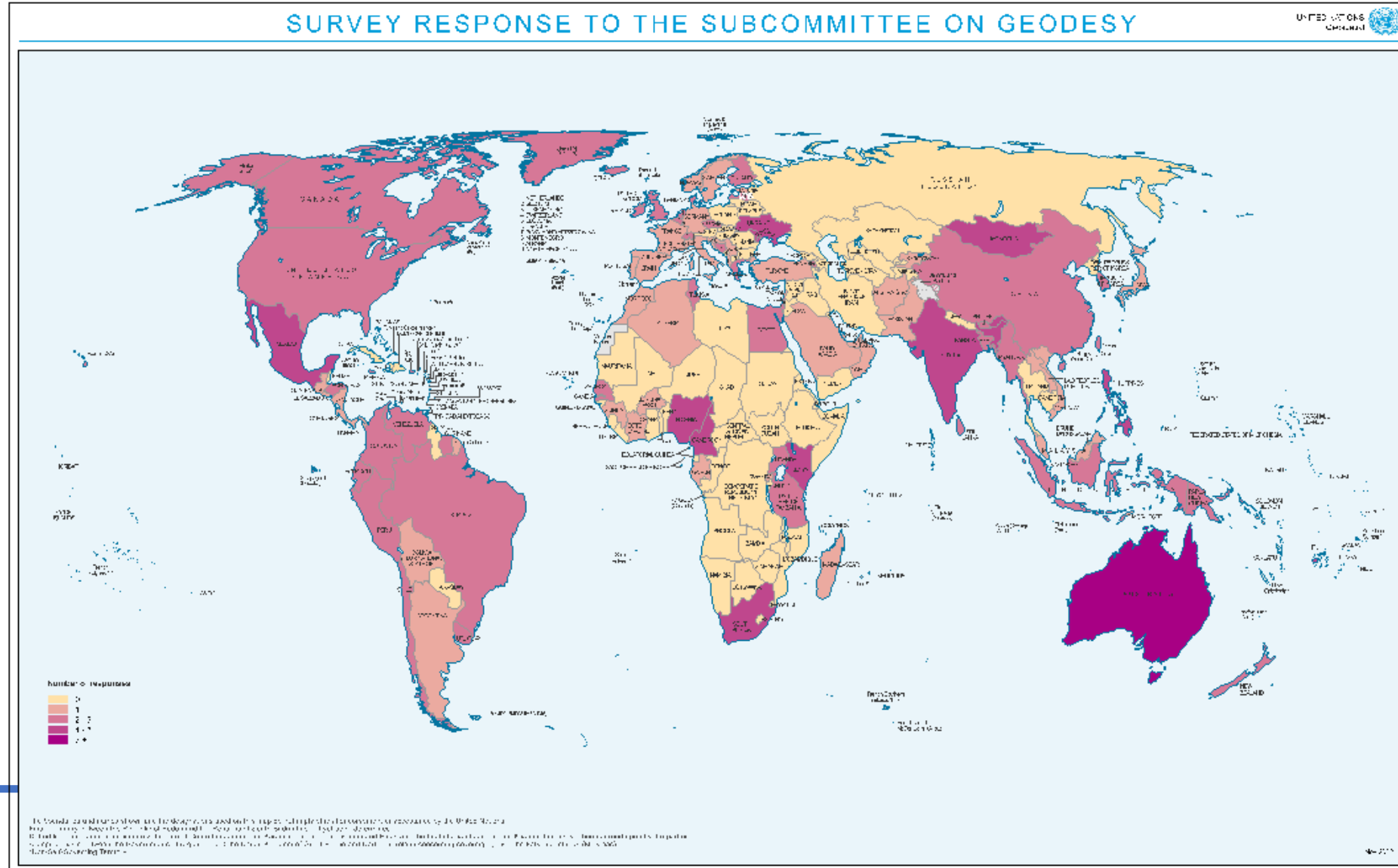
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Participation

21 Member States responded the survey, representing **~58% of the UN-GGIM Americas Regional Committee**



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Preliminary results

The survey revealed that most Member States have implemented a national geometric reference frame that is connected to ITRF. Only 1 State reported that it still has a local horizontal datum in its territory. The progress in this direction is closely linked to the expansion of the geodetic infrastructure in the Americas. The growing number of GNSS Continuously Operating Reference Stations (CORS) has made the transition to geocentric reference frames possible. However, the distribution and density of GNSS CORS networks is not homogeneous throughout the region.

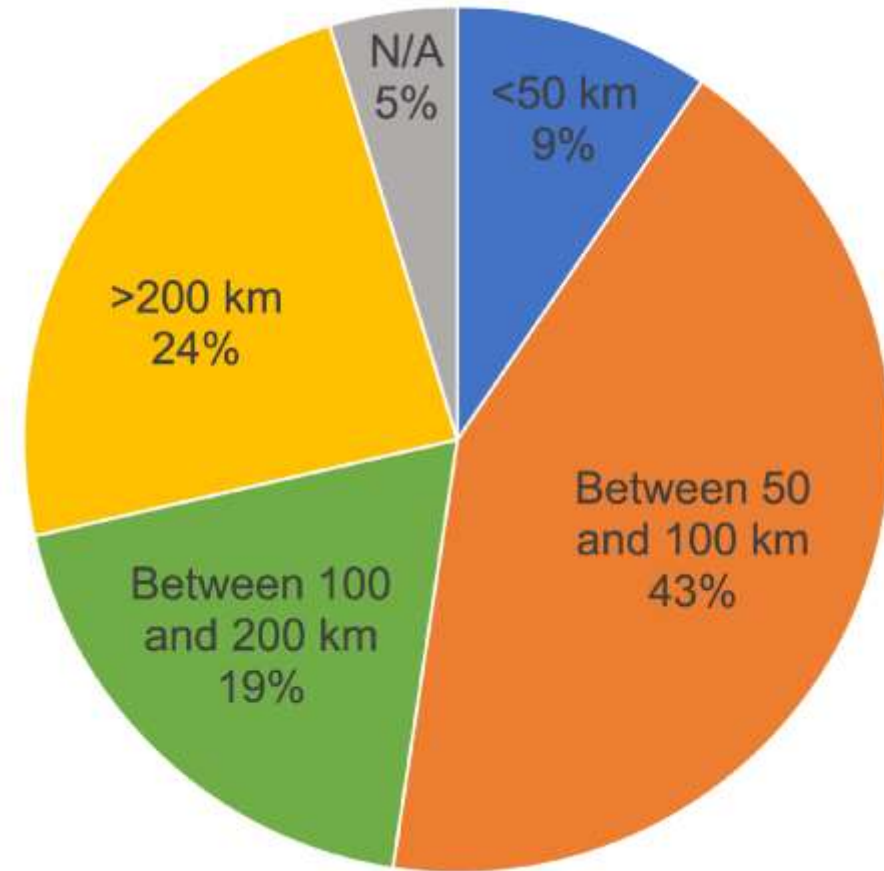
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Average distance between CORS

More than 40% of the Member States reported an average distance between CORS ranging between 50 km and 100 km, and almost 25% declared a distance between CORS greater than 200 km. Meanwhile, only 9% of States responded that their CORS are located at less than 50 km of each other.



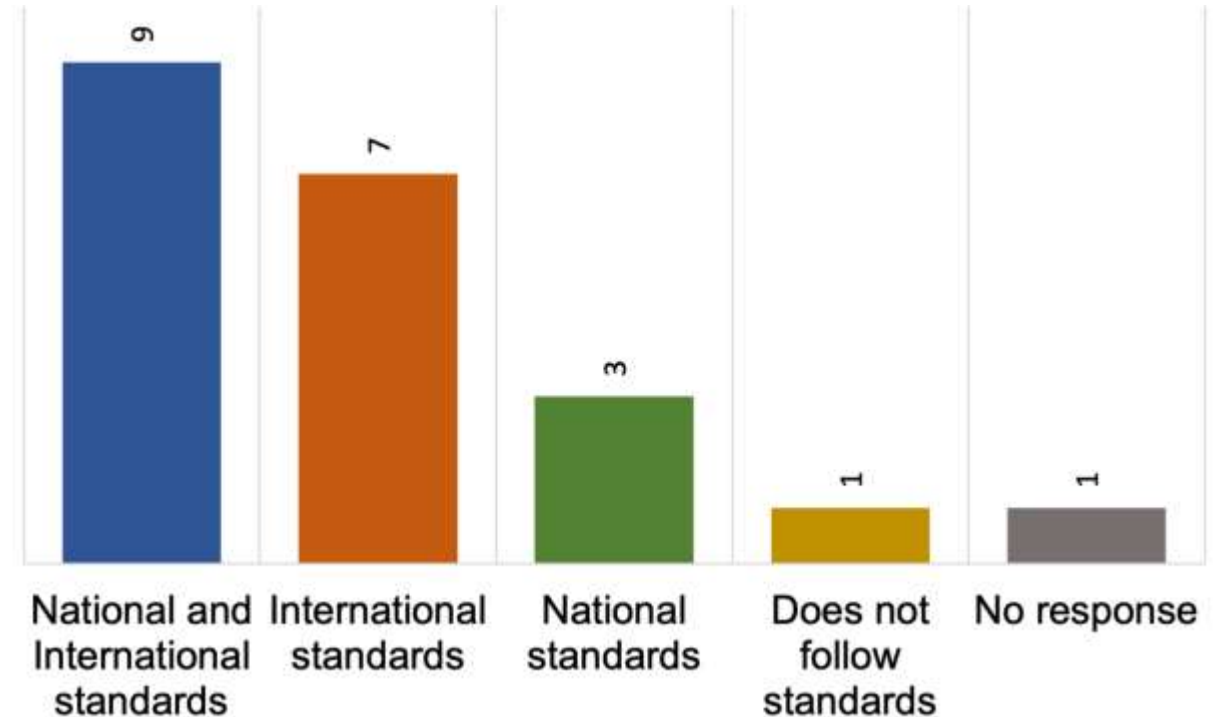
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CORS monumentation standards

Almost 75% of the Member States claim to have the capacity to build and maintain continuous GNSS stations, meaning that 25% need assistance and should be prioritized in the next training on the subject. In terms of monuments, 20% of the Member States stated that they have followed standards for some stations but not for all.



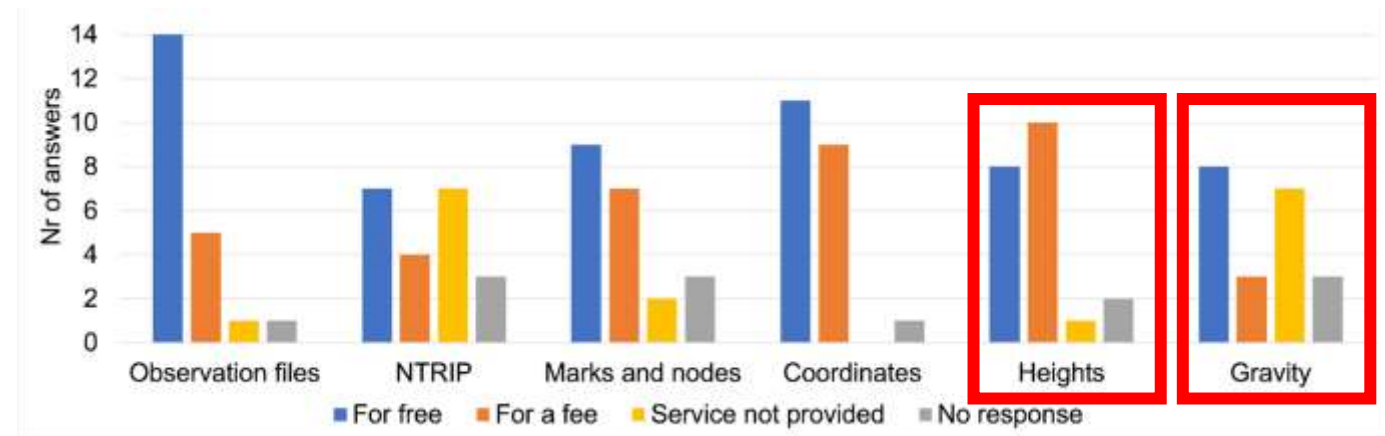
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Services that the Member States provide

Regarding geodetic and/or positioning services provided to the public, the results show that DGNSS (GNSS observation files) is the most common service offered for free, in line with the global trend. However, other essential products, such as coordinates and heights, are only offered for a fee in a large number of Member States.



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FAIR principles

FAIR data is data that is Findable, Accessible, Interoperable and Reusable (Wilkinson et al., 2016). Member States were asked about FAIR principles in their vertical RF data. Around 50% of Member States believe that their national vertical RF currently follows all four FAIR principles. On the other hand, almost 15% state that their vertical RF follows the principles of Findability and Accessibility, and almost 10% of States acknowledged that their vertical RF data is only Findable.

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Vertical Reference Frames

- Tide gauges remain the most common origin for vertical datums in the Americas today
- Only 1 country (Canada) does not link its vertical datum to a tide gauge.
- When asked if the definition of the vertical datum included gravity observations, 8 Member States answered “No”, 7 answered “Yes”, 3 reported not to be sure and 3 provided contradictory answers.

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Access to the vertical datum

Of the 19 Member States that responded this specific question, only 6 reported that the vertical datum is openly accessible online. Therefore, in most Member States, the vertical datum can only be accessed upon request, either online (5 States) or on paper (8 States).

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Conclusions

- The high level of participation evidences the willingness of the Member States of the Americas to collaborate and work together to advance geodetic capabilities in the region.
- This survey has highlighted the heterogeneity between the different States in terms of standards as well as geodetic infrastructure. Unifying monumentation standards for CORS should be a priority in the future.
- It is important to continue encouraging participation in surveys like this one, since they are useful governance tools and instruments to develop public policies to boost the geodetic capacity in the Americas.

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¡Muchas gracias!
Thank you!