

UN-GGIM-AP WG1 - Geodetic Reference Frame – Annual Report

Joint UN-GGIM Subcommittee on Geodesy 5th Plenary
3rd UN-GGCE International Advisory Committee
March 10-14, 2025



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UN-GGIM-AP Working Group 1 - Geodetic reference frame -

Chair

Mr. Basara Miyahara, Japan

Vice Chairs

Dr. Guorong Hu, Australia

Dr. Yamin Dang, China

Mr. Asakaia Tabu, Fiji

Mr. Upendra Nath Mishra, India

Mr. Sidik Tri Wibowo, Indonesia

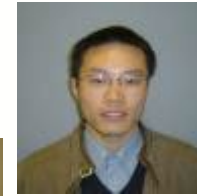
Mr. Seyed Abdoreza Saadat Mirghadim, Islamic Republic of Iran

Mr. Ahmad Sanusi bin Che Cob, Malaysia

Ms. Dalkhaa Munkhtsetse, Mongolia

Mr. Graeme Blick, New Zealand

Mr. Jongsin Lee, Republic of Korea



<- **Dr. Nic Donnelly**

<- **Ms. Seohee Park**

Members

Mr. Paulino Dacruz, Timor-Leste



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UN-GGIM-AP Working Group 1 – Focus 2022 - 2025

**UN-GGIM
Geodesy**



**International
Height Reference
Frame (IHRF)**

**Regional
Reference Frame
(APREF, APRGP)**

**Regional
Capacity
Building**



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UN-GGIM Global Geodesy

- Participate/contribute to activities of the UN-GGCE & the Subcommittee on Geodesy
 - ✓ Joint UN-GGIM Subcommittee on Geodesy 4th Plenary; 2nd UN-GGCE International Advisory Committee
 - ✓ Expert Consultation meeting on Strengthening the Global Geodesy Supply Chain
 - ✓ UN-GGCE - International Workshop on Joining Land and Sea with BIG Indonesia
 - ✓ UN-GGCE listening world tour session/ 1st Joint Development Plan
- Report the activities to the UN-GGIM-AP
 - ✓ UN-GGIM-AP 13th Plenary meeting
 - ✓ UN-GGIM-AP geodetic WG annual session



- ✓ **Act as a contact point / gateway to the global geodetic community**



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APREF webpage

Asia Pacific Reference Frame (APREF)

- Regional geodetic reference frame
- Realized by continuous GNSS observation of over **700 stations**
28 countries
- Densify ITRF and improve access to ITRF
- Data are routinely processed by 3 Local Analysis Centres*
- Station coordinates made openly available
- Joint Project with IAG Subcommittee 1.3e: Asia-Pacific

- APREF solutions have been transitioned to **ITRF2020/IGS20** since 27 November 2022 (GPS week 2238)
- Station specification is consistent to the IGS station
- Encourage countries in the region to join the network

- Report on APREF available at
<https://www.un-ggim-ap.org/wg/working-group-1-geodetic-reference-frame>

* Geoscience Australia

Office of Surveyor-General Victoria, Australia

Institute of Geodesy and Geophysics, Chinese Academy of Sciences

Geospatial Information Authority of Japan (under evaluation)



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Asia Pacific Reference Frame (APREF)

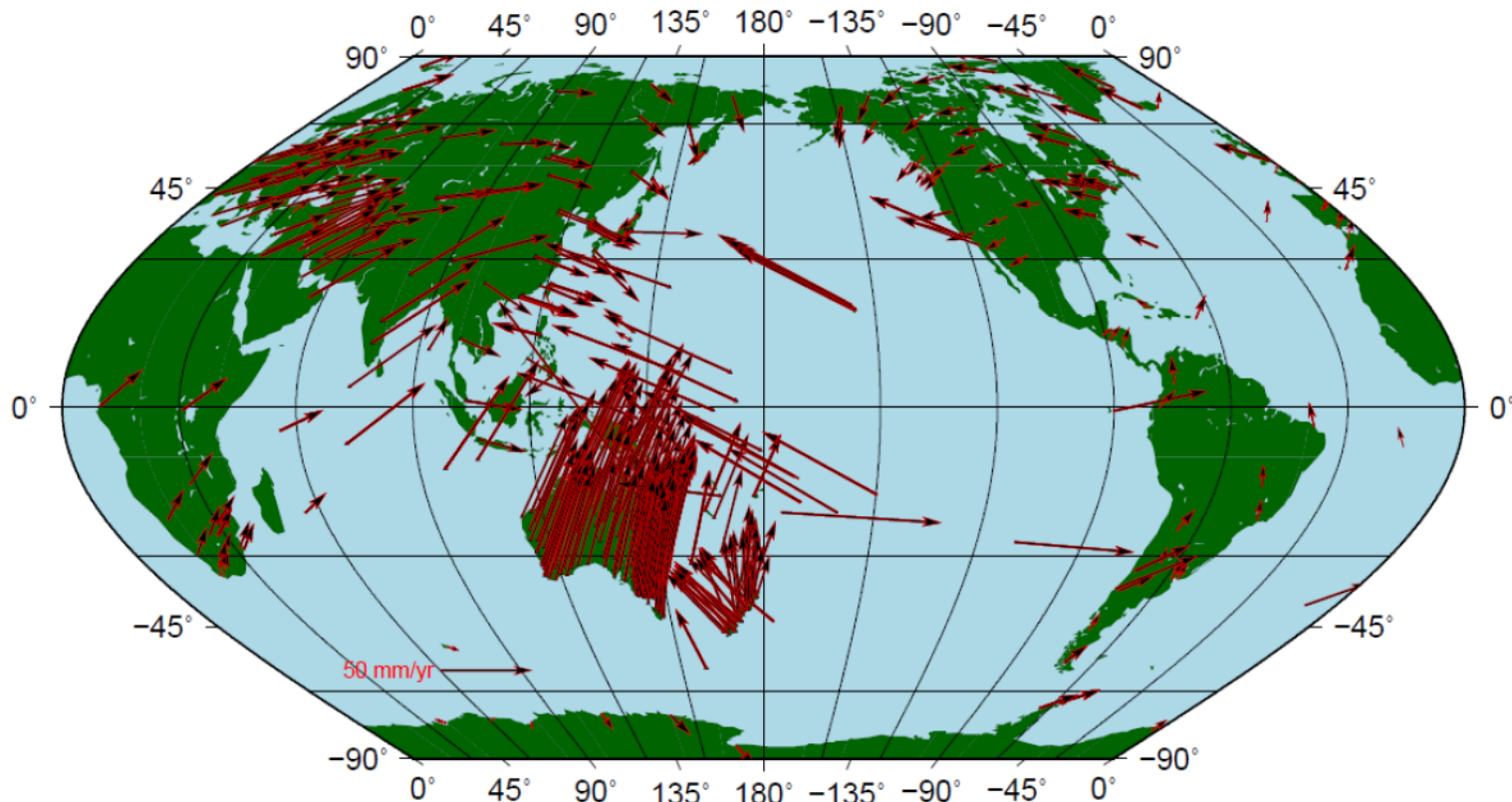


Figure 1. The distribution of APREF CORS network along with the IGS core stations. The arrows represent the GPS-derived velocity field.

G. Hu, M. Moore and J. Dawson (2019): Report on the Asia Pacific Reference Frame (APREF) Project



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Asia Pacific Regional Geodetic Project (APRGP)



APRGP2023

- Annual GNSS campaign
- Densify ITRF and improve access to ITRF
- Data are analysed by Geoscience Australia
- Analysis report is distributed each year

- **APRGP2023:** 10 to 16 September 2023
- Processed by Guorong Hu, Geoscience Australia
- Participation from Brunei, India, Korea (Republic of), Laos, Mongolia, Philippines, Singapore, Tonga and Vietnam
- Final report is available at UN-GGIM-AP website

- **APRGP2024:** 8 to 14 September 2024
- Under processing by Guorong Hu, Geoscience Australia



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Asia Pacific Regional Geodetic Project 2023

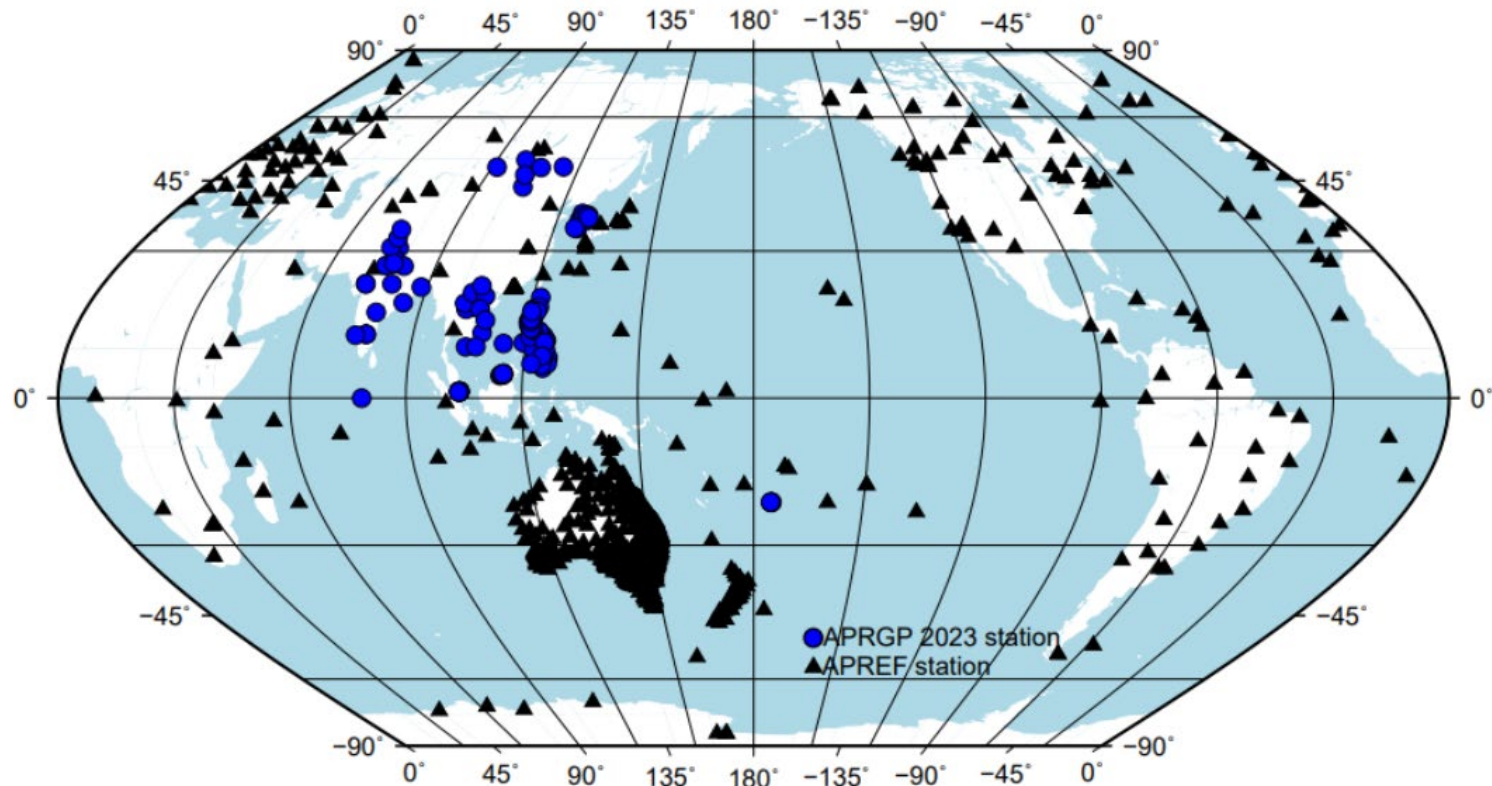


Figure 1 APRGP stations in the APRGP 2023 GPS campaign analysis along with the APREF stations and IGS stations, blue circles are APRGP campaign sites, and black triangles are APREF stations.

G. Hu: Report on the Analysis of the Asia Pacific Regional Geodetic Project (APRGP) GPS Campaign 2023



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International Height Reference Frame (IHRF)

- **IAG Workshop on Asia Pacific Gravity, Geoid and Height System**
 - ✓ 6-8 November 2024 @ Manila, Philippines
 - ✓ Gravity, DEMs, geoid modelling, GNSS/leveling, altimetry, Height System in Asia-Pacific, gravity application to hazards and climate change, gravity and GGRF
 - ✓ Presentation on IHRF and its coordination centre by the chair of IHRF



IGS Workshop 2024 <<https://iagworkshop2024.dge.upd.edu.ph/>>



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Capacity Development Workshop on Sustainable Operation of GNSS CORS Network

- Half day workshop on November 27, 2024
- Co-organized by UN-GGIM-AP/IAG/FIG/SoI
- Approximately 300 participants from 40 countries



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Capacity Development Workshop on Sustainable Operation of GNSS CORS Network

Presentations

- Country cases (Australia, India, Japan, New Zealand, Tonga)
- Support to GNSS CORS capacity development by international bodies (UN-GGIM-AP (APREF), IAG, IGS, FIG)
- 1st Joint Development Plan for Global Geodesy (UN-GGCE)



FIG Romanian Surveying Week 2024

- 23 - 26, October, 2024, Bucharest, Romania
- Encompassed
 - The International Symposium "Geo-Provi 2024"
 - The FIG Young Surveyors European Meeting
 - FIG Commission B Workshop
 - European Group of Surveyors (EGOS) Workshop
- Leading experts from academic, industry, and government who explored current developments in geodesy, cadastral work, property valuation, and land management.



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UN-GGIM-AP Working Group 1: Geodetic Reference Frame

Annual session at 13th Plenary of UN-GGIM-AP

- 15 participants from 12 countries and IAG
- Report of WG1, focus of WG1 for coming year
- Country report from WG members: Australia, Brunei, Bhutan, China, India, Republic of Korea, Singapore, Thailand, Timor-Leste
- Findings on common interests and challenges:
 - ✓ Strong needs to capacity development on height system especially modernized geopotential height system (IHRF)
 - ✓ Development of GNSS CORS network in the member countries is progressing, but still many challenges on stable CORS network operation and services
 - ✓ Continuous investment is necessary for the operation of geodetic infrastructure, and outreach to raise awareness on the value of geodesy as critical social infrastructure is a key to realize sustainable geodetic infrastructure



UN-GGIM-AP Working Group 1: Geodetic Reference Frame Resolution to 13th Plenary of UN-GGIM-AP

Recommendations

- a. **Contribution to the GGRF** through close collaboration with the Subcommittee on Geodesy and GGCE
- b. Support the adoption of **ITRF**
- c. Support national **GNSS, SLR, and VLBI infrastructure**
- d. Work with **IAG/FIG**
- e. Sharing of geodetic data openly and freely
- f. Developing and sharing **real-time geodetic observations**, communications and analysis to support DRR
- g. Participation to **APREF** by sharing data of national CORS
- h. Participation to **regional initiatives to enhance utilization of geodetic data and techniques for DRR** (i.e. GTEWS Oceania)
- i. **Development of technical capabilities** in GNSS processing, Geoid determination, crustal dynamics and deformation modelling, etc.
- j. Support participation of geodetic experts to **regional geodetic forums**

Chapter 4 – UN-GGIM-AP 13th Plenary Resolution

https://un-ggim-ap.org/sites/default/files/media/docs/Resolution%20of%2013th%20Plenary%20meeting%20UN-GGIM-AP_clean.pdf



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GTEWS Oceania

- Initiative to implement GNSS Early Tsunami Warning System in Oceania
- Will provide regional geospatial monitoring with a focus upon the accurate timely prediction and detection of tsunamis using a real time GNSS network and analysis systems
- UN-GGIM-AP adopted resolutions in 2023 & 2024 to encourages the Member States participate in using GNSS to augment existing regional tsunami systems
- The Pacific Geospatial and Surveying Council will host **the GTEWS Oceania 2025 Implementing Workshop - Suva, Fiji in November 2025**

For more details, review the Presentation of Folau and D'Anastasio

(UN-GGIM-AP Workshop on Geodetic Reference Frames and Applications for Disaster)

[https://docs.google.com/presentation/d/1_smN5w-](https://docs.google.com/presentation/d/1_smN5w-UU_E88qjwqJ9vxnOIDgQoG6cx/edit?usp=drive_link&ouid=115161095341660637784&rtpof=true&sd=true)

[UU_E88qjwqJ9vxnOIDgQoG6cx/edit?usp=drive link&ouid=115161095341660637784&rtpof=true&sd=true](https://docs.google.com/presentation/d/1_smN5w-UU_E88qjwqJ9vxnOIDgQoG6cx/edit?usp=drive_link&ouid=115161095341660637784&rtpof=true&sd=true)



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Capacity Building Opportunities in 2025-

- Organize capacity development events in the region together with IAG, FIG and other stakeholders
- Seminar, workshop and session at the UN-GGIM-AP Plenary in 2025
- Participate in geodetic capacity development events
 - ✓ FIG technical seminar “Reference Frame in Practice” in Brisbane on April 2025
 - ✓ PGSC meetings (ex. GETWS Oceania meeting in Suva, 2025)
 - ✓ Subcommittee on Geodesy and Global Geodetic Center of Excellence meeting in Bonn, Germany in March 2025
- Reach out global gravity/geoid community for further opportunities of capacity development in height systems



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Thank you !



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