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Updates on APREF/APRGP projects

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APREF Central Bureau

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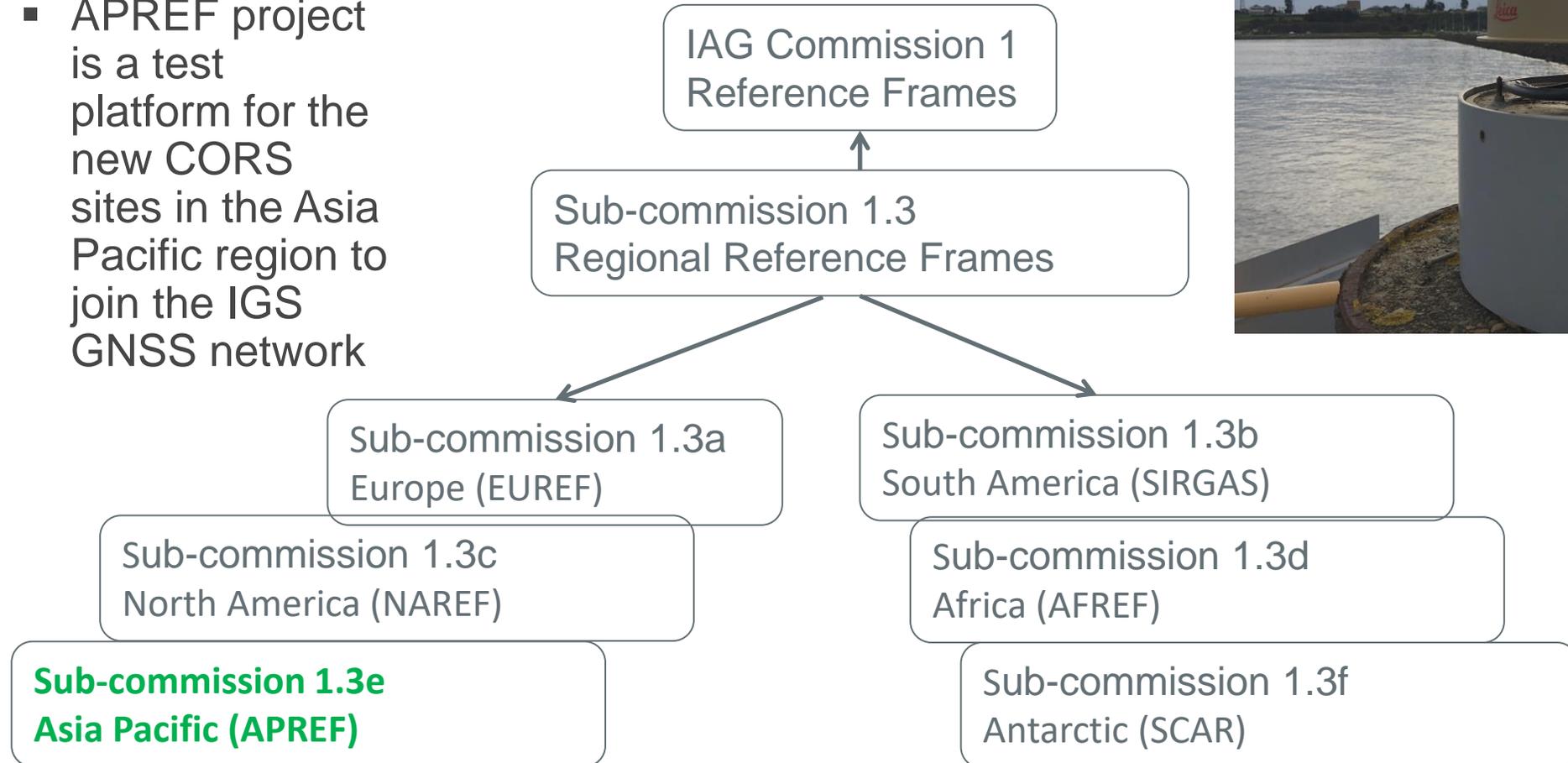
Why we need APREF and APRGP projects

- The goals of the two projects are to:
 - link regional/national geodetic datum to the ITRF;
 - provide access to the ITRF; and
 - densify the ITRF in the Asia Pacific region.
- GNSS CORS based APREF (Asia Pacific Reference Frame) project was initiated in 2010 (**13th** year in 2023)
 - Encouraging member countries to share data and join the APREF project where possible
- APRGP (Asia Pacific Regional Geodetic Project) GNSS campaign has run since 1997 (**27th** year in 2023)
 - APRGP is an annual GNSS campaign with only one week of data needed each year
 - APRGP project is for those countries unable to participate in the APREF project



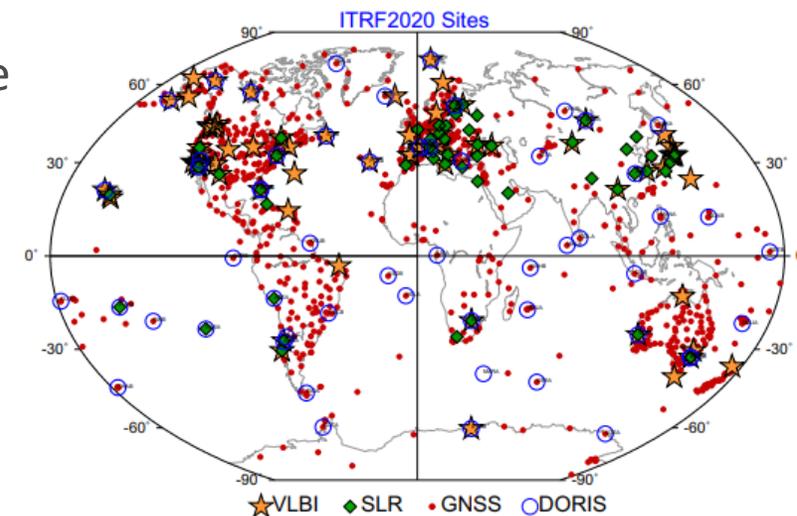
How APREF densifies the ITRF

- APREF project is a test platform for the new CORS sites in the Asia Pacific region to join the IGS GNSS network



How APREF/APRGP projects link to ITRF2020/IGS20

- Processing the APREF/APRGP GNSS network together with more than 300 IGS core sites, where data available
- Scientific software Bernese V5.2 used for both APREF and APRGP projects data processing
- Using IGS20 core sites as reference frame (IGS20 is the IGS realization of ITRF2020)
- Conforming to the IERS2010 conventions
- Accounting for solid earth tide displacements (TIDE2000) and Ocean tide loading displacements (FES2014b model)
- Troposphere corrections estimated with wet-NIELL mapping function in intervals of 1 hour
- Using absolute antenna calibration PCV models (IGS20.atx, <https://files.igs.org/pub/station/general/igs20.atx>)



Altamimi et al., 2023

The status of APREF project – Data Centre

- Accessing APREF data centre has changed since 01 Oct 2020: <https://gnss.ga.gov.au/>
- All RINEX version 2 data files on the new access points have been converted from .Z compression to .gz compression
- Moving RINEX data format from v2 to v3 with long-name conventions following IGS guidelines
- Encouraging contributions of real-time data stream to the APREF if possible
- Call for participation for new nominations of regional APREF data centres in the Asia Pacific

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Global Navigation Satellite System Data Centre

About
The Geoscience Australia GNSS Data Centre archives and distributes Global Navigation Satellite System (GNSS) data and products derived from a network of continuously operating GNSS reference stations across the Asia-Pacific region. Through this data centre GA actively supports the International GNSS Service (IGS) and the Asia-Pacific Reference Frame (APREF) project as a regional data centre.
To learn more about the GNSS network or access the various datasets available, click on the links below:

Network
View a map showing the status of the GNSS reference stations that contribute data to Geoscience Australia.

Data
Download RINEX data files that can be used to post-process GNSS data.

Streaming
Connect to a correction stream from a GNSS reference station that can be used to obtain high-accuracy positioning information in real-time.

AUSPOS
Post-process GPS data to obtain a precise coordinate using Geoscience Australia's online GPS processing service.

Metadata
View metadata associated with a GNSS reference station.

Documents
A list of user guides and technical specifications produced by Geoscience Australia.

Ginan
Ginan is an open source toolkit for creating precise point positioning (PPP) analysis products, real-time correction streams and positions.

Ginan Products
Instructions to access Ginan products.

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National Positioning Infrastructure

About Layers Location Search Data & Publications

2000 km

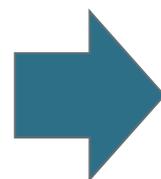
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The status of APREF project - Analysis

- Currently three Local Analysis Centres (LACs) of APREF project:
 - Geoscience Australia (Aus);
 - Department of Environment, Land, Water and Planning, Victoria, Australia (Vic)
 - The Institute of Geodesy and Geophysics, Chinese Academy of Sciences (IGG)
- We welcome more LACs joining the APREF project

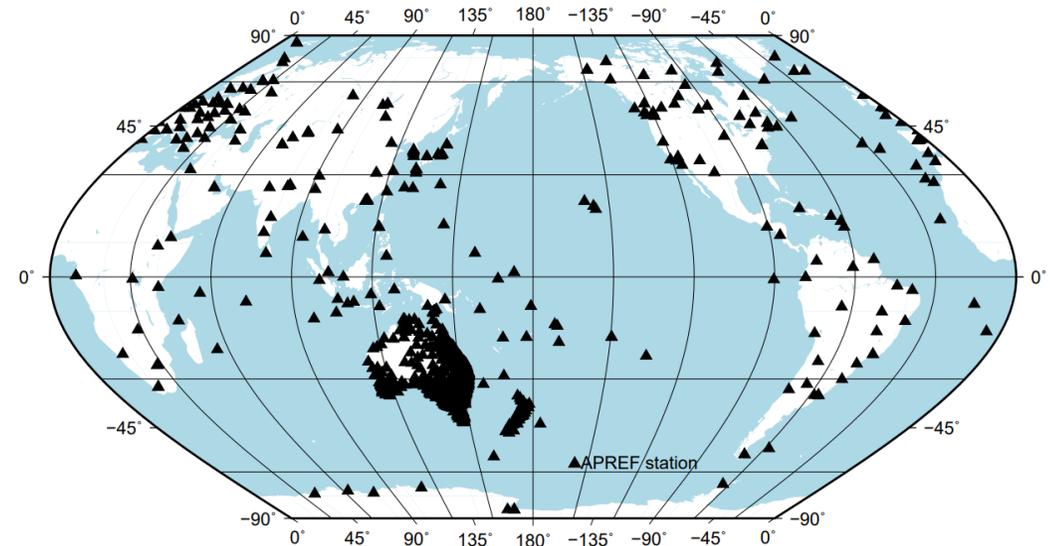
The comparison of the LACs solutions with the published IGS weekly solutions for common IGS stations for the GPS week 2274 (06 Aug – 12 Aug, 2023)



Solutions of LACs	Number of common IGS stations	Weighted RMS (mm)		
		North	East	Up
AUS	175	1.2	1.3	8.5
VIC	31	1.8	0.9	0.8
IGG	201	0.5	0.5	6.3

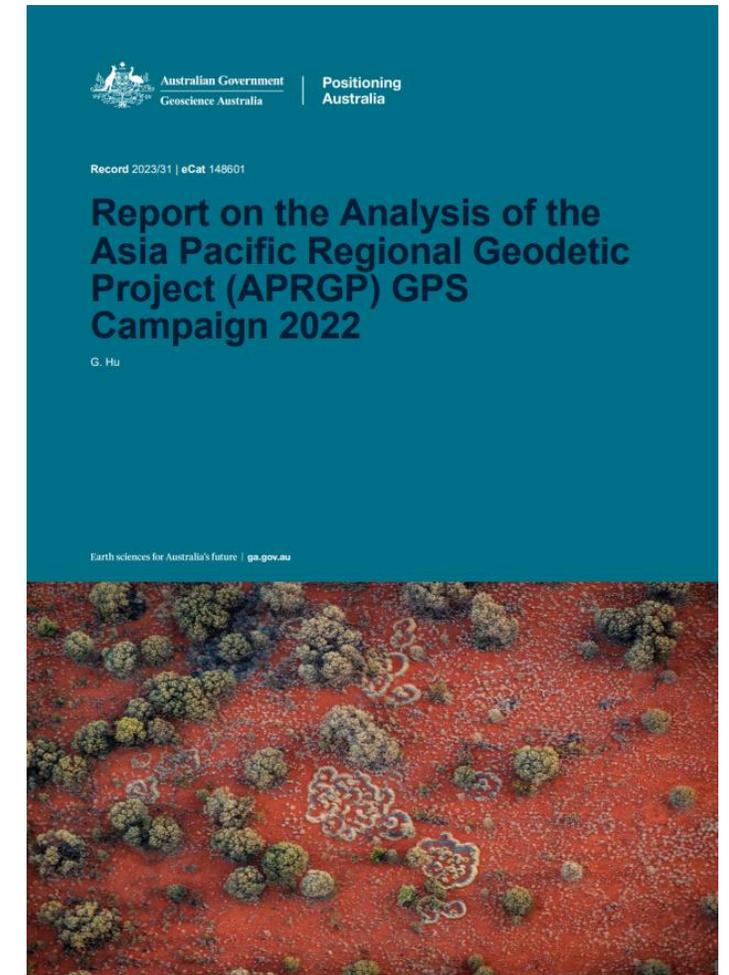
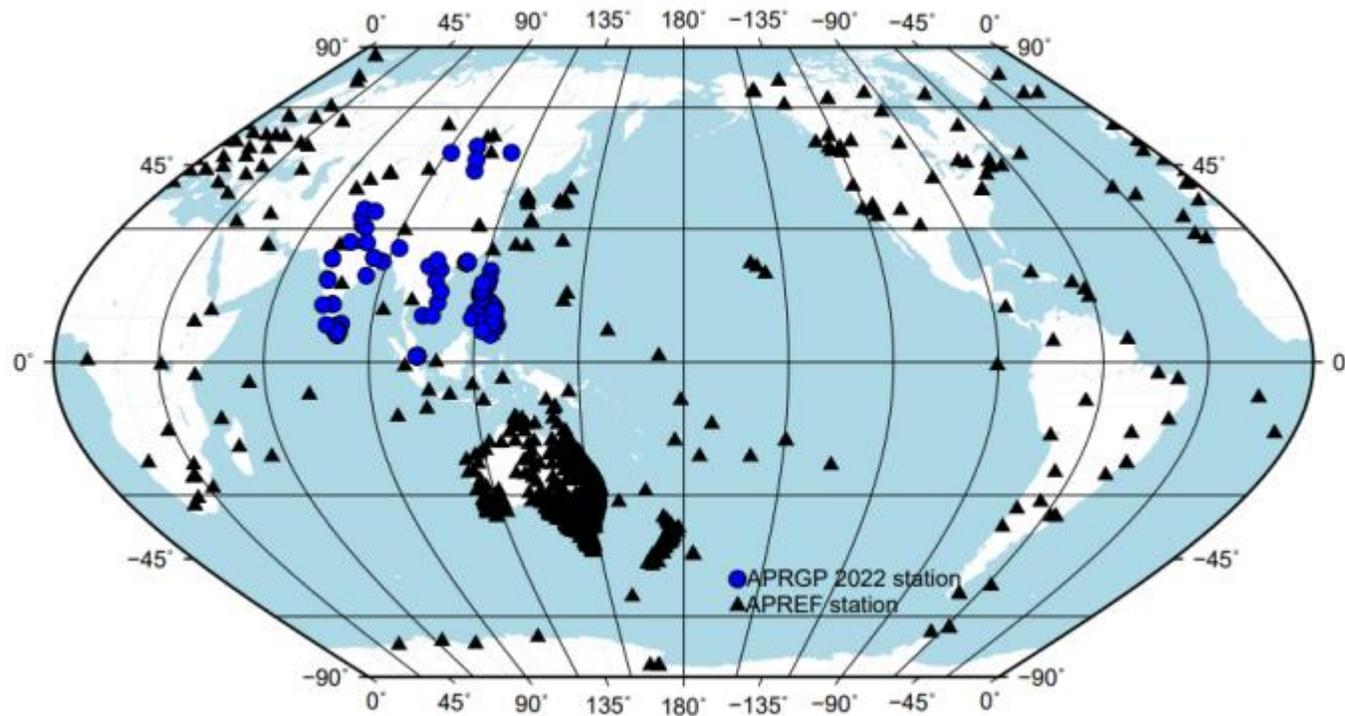
The status of APREF project - Products

- ~1050 stations in the APREF weekly routine analysis including ~332 IGS20 core sites (as of Oct 2023)
- time series plots via the link: <https://portal.ga.gov.au/persona/pa>, using search function to find the site, then click "Coordinate Timeseries"
- the weekly solutions in SINEX format for the APREF sites from the link: [https://ga-gnss-products-v1.s3.amazonaws.com/index.html#public/\(gpsweek\)](https://ga-gnss-products-v1.s3.amazonaws.com/index.html#public/(gpsweek))



APRGP GNSS 2022 campaign

- APRGP 2022 campaign ran from 11 September to 17 September 2022
- Data contributions from seven countries and regions
- Analysis report of 2022 GNSS campaign published and circulated



APRGP GNSS 2023 campaign

- APRGP 2023 campaign ran from 10 September to 16 September 2023
- As of 10 October 2023, data contributions received from the following countries and regions: Korea, Laos, Mongolia, Singapore, and Vietnam.
- Ensuring sending right metadata in particular antenna type and antenna heights information
- Confirming right RINEX name convention and format when submitting data, otherwise no solutions in the analysis report
- Cut off data contributions at the end of Feb 2024

How to access APREF/APRGP data and products

- Annual APRGP campaign solutions in SINEX format are available from the link: <https://ga-gnss-products-v1.s3.amazonaws.com/index.html#public/APRGP/>
- Annual APRGP campaign analysis reports are available from the link: <https://www.un-ggim-ap.org/wg/working-group-1-geodetic-reference-frame>
- APREF data are available <https://data.gnss.ga.gov.au/docs/home/index.html> , details on how to access the data can be found at <https://data.gnss.ga.gov.au/docs/>
- APREF solutions can be found from the link: <https://ga-gnss-products-v1.s3.amazonaws.com/index.html#public/> (gps week)
- For more information on APREF project, please refer to: <http://www.ga.gov.au/scientific-topics/positioning-navigation/geodesy/asia-pacific-reference-frame>

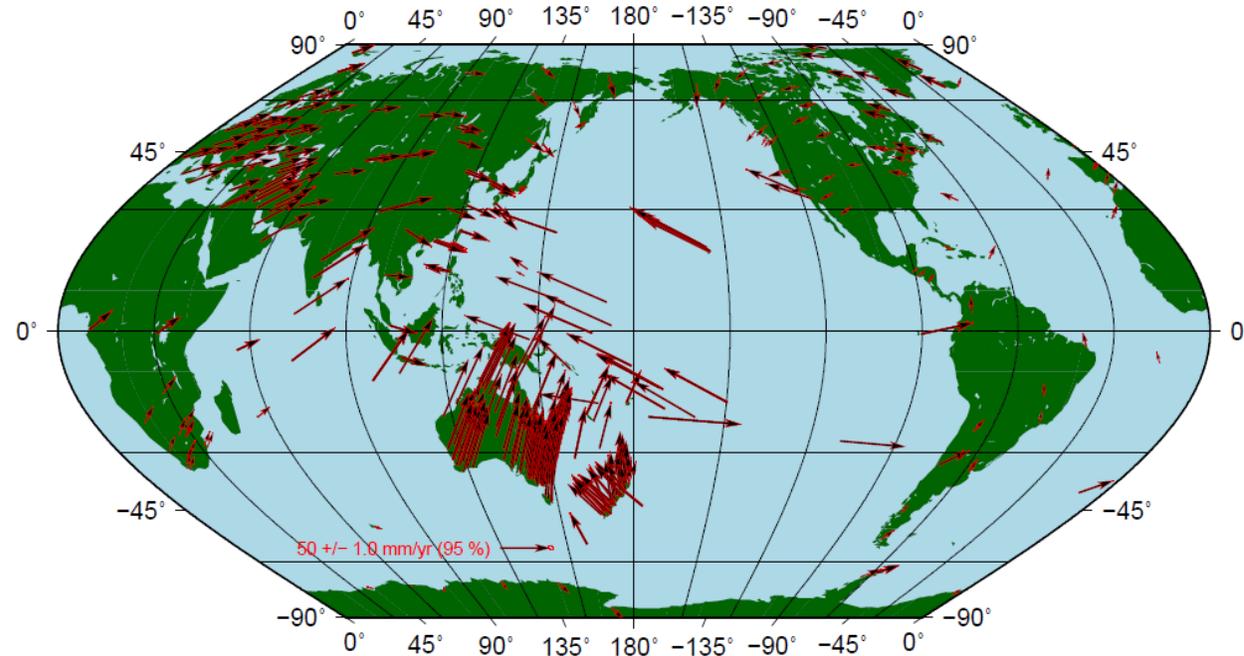
Challenges

- Issues remain regarding free and open access to data for many Asia-Pacific countries
- APRGP data sets from some countries NOT meet RINEX standards, which may need technical training under the capacity building program of UN-GGIM-AP
- Need to identify additional analysis centres
 - limited redundancy with only 3 analysis groups

Call to Action

The APREF Central Bureau

- Welcomes new site additions to APREF
- Encourages data sharing, in particular, contributions of real-time data to APREF
- Encourages member states to consider becoming a regional data centre or local analysis centre
- Encourages member states to participate in the annual APRGP campaigns if they are not able to participate in APREF





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Any feedback/questions?

Further information

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