Australian Government
Geoscience Australia

Procedure for becoming an APREF station

Document Status	FINAL
Document Reference	D2019-81528
Document Version No.	3.1
Document Sponsor	Anna Riddell (Chair of the APREF Central Bureau)
Approved by	Ryan Ruddick (Section Director – GII)
Responsible Official	Mohammad Choudhury
Date Effective	8 August 2019
Next Review Date	1 July 2025

Document Information

Revision History

Version	Issue	Date	Author	Amendment
1	0	01/01/11	Ryan Ruddick	New Document Guidelines for APREF Station Operators
2	0	09/11/15	Ryan Ruddick and Anna Riddell	Major Revision Guidelines for APREF Station Operators
3	0	12/08/19	Ryan Ruddick	Major Revision Including name change.
3	1	06/05/24	Mazher Choudhury	Update Change in APREF Steering Committee

Approvals

Name	Signature	Date	Version	Issue
Ryan Ruddick		12/08/19	3	0
Ryan Ruddick		06/05/24	3	1

Distribution

Name	Date	Version	Issue
Made available on GA webpage via FTP link.		3	1

Contents

Glossary

APREF	Asia-Pacific Reference Frame
Central Bureau	The Central Bureau (CB) coordinates the 'day-to-day' functions. This includes ensuring that APREF products are made available to the global geodetic community. Geoscience Australia is currently functioning as the APREF CB.
Data Centre	The APREF data centre is responsible for maintaining a local archive of GNSS data and providing online access to these data for the community. Geoscience Australia is currently the only APREF data centre.
DOMES	Directory of MERIT Sites Historically the DOMES numbering system was designed at the start of the MERIT campaign in the early 1980s. Since 1988, a DOMES number has been issued to all stations that contribute to the ITRF.
GNSS	Global Navigation Satellite System
IERS	International Earth Rotation and Reference System Service
IGS	International GNSS Service
ITRF	International Terrestrial Reference Frame
Station Operator	May be a person or organisation who operates a GNSS reference station or a network of GNSS reference stations.
Station Owner	May be a person or organisation who owns a GNSS reference station or a network of GNSS reference stations.
Tier 1	Tier 1 GNSS reference stations require high stability monuments to support geoscientific research and global reference frame definition. These sites are established to support the IGS and other equivalent high accuracy networks.
Tier 2	Tier 2 GNSS reference stations are generally built to the same specification as Tier 1 stations. They are established to support the definition and maintenance of the NGRS. They provide a tie between International Terrestrial Reference Frame and the national geodetic datum.

Tier 3	Tier 3 GNSS reference stations require stable monuments and are usually established by state and territory governments, local councils and commercial operators to deliver real-time positioning information. These stations provide access to datum rather than define it.

Section A: Document Overview	
1	**Introduction**
1.1	**Background**
(a)	The broad objective of the Asia-Pacific Reference Frame (**APREF**) project is to create and maintain a densely realised and accurate geodetic framework, based on continuous observation and analysis of Global Navigation Satellite System (**GNSS**) data. The project addresses issues associated with the definition, realisation and maintenance of the APREF. In the short-term, the APREF project: • Will encourage sharing of GNSS data from GNSS reference stations in the region. • Develop an authoritative source of coordinates, and their respective velocities, for geodetic stations in the Asia-Pacific region. In the longer term, the APREF project: • Will develop and maintain the APREF Permanent GNSS Network, in close cooperation with the International GNSS Service (**IGS**). • Improve the contribution of APREF stations to the International Terrestrial Reference Fame (**ITRF**). • Provide more infrastructure to support geodetic projects. • Establish a dense velocity field model in Asia and the Pacific for scientific applications and long-term maintenance of the APREF. • Organise regular symposia addressing activities carried out at national and regional level related to the work and the objectives of the APREF project.
1.2	**Scope**
(a)	To provide guidance on the process of contributing a GNSS reference station to the APREF project.

Section B: Procedures for Becoming an APREF Station	
2	**Station Specifications**
2.1	**Desired Specifications**
(a)	If possible, APREF Stations should meet the standards of the International GNSS Service (**IGS**). https://igs.org/documents/#guidelines
2.2	**Minimum Specifications**
(a)	At a minimum, Station Operators should ensure that their station meets or exceeds the criteria for a Tier 3 station as described in the **Specifications for Positioning Australia GNSS Reference Stations**. https://www.ga.gov.au/scientific-topics/positioning-navigation/geodesy/asia-pacific-reference-frame
3	**Station Identification**
3.1	**Station Identification Code**
(a)	All APREF Stations are identified using a unique nine-character abbreviation (e.g. ALIC00AUS). The first four character should be globally unique. This code is when referencing the stations data and metadata. Allocated station codes are listed at: http://sopac-csrc.ucsd.edu/index.php/sitelogs/ ftp://igs-rf.ign.fr/pub/DOMES/codomes.snx The APREF CB will undertake a final check before accepting the station.
3.2	**Station Marker Number (Optional)**
(a)	If the station will contribute to the IGS network or meets the requirements of a Tier 1 or Tier 2 station as described in the **Specifications for Positioning Australia GNSS Reference Stations** then the Station Operator should request a DOMES number from the International Earth Rotation and Reference Systems Service (**IERS**). To request an IERS DOMES number follow the link below: https://itrf.ign.fr/en/network/domes/request Stations that are proposed without an IERS DOMES number will be allocated an APREF number on acceptance by the APREF CB.

Section B: Procedures for Becoming an APREF Station	
4	**Official Request**
4.1	**Participation in APREF**
(a)	To participate in the APREF project, organisations should first write a letter of intent to: **APREF Central Bureau** **Dr Anna Riddell** **Position Australia** **Geoscience Australia** The letter can be received via email to: **gnss@ga.gov.au**
4.2	**Propose an APREF Station**
(a)	Station Operators, who have are participating in the APREF project, can propose new stations for inclusion into the network via email to: **gnss@ga.gov.au** **Subject: Proposed APREF Station** The email should state: • A long-term commitment (at least 2 years) to operate the station. • The chosen four-character identification code. • Digital photos of the station. • The receiver and antenna type using standard names. • The planned data products (RINEX daily files are the minimum requirement). • Any restrictions to be placed on the data products. **Unless otherwise stated it is assumed that all data products will be open access.** • If the Station Operator is not the Station Owner, then a signed letter of consent should be issued by the Station Owner for a secondary party to submit on their behalf.
(b)	The APREF CB aims to process requests for new stations within 14 days of receipt of request. Once the request has been processed the Station Operator will be contract via email with further instructions.

Section B: Procedures for Becoming an APREF Station	
5	**Metadata Submission**
5.1	**Site Log Files**
(a)	Accepted stations are invited to submit their complete metadata records. Metadata will be accepted via: • The Geoscience Australia GNSS Site Manager. https://gnss-site-manager.geodesy.ga.gov.au • IGS style site log files. • GeodesyML site log files. To use the Geoscience Australia GNSS Site Manager, Station Operator are required to have an individual account. The APREF network operations team will provided account details and submission instructions.
(b)	After initial submission of the metadata, it is requested changes be made using the Geoscience Australia GNSS Site Manager.
6	**Data Submission**
6.1	**RINEX Daily Files**
(a)	Accepted stations are invited to submit RINEX daily files to one or more APREF data repositories Data submission will be accepted via: • Pushing to a secure API (https). • Pushing to a secure FTP server (sftp). Both methods require the Station Operator to have an individual account. The APREF network operations team will provided account details and submission instructions.
6.2	**Real-time Data Stream (Optional)**
(a)	Geoscience Australia hosts a regional IGS real-time GNSS data broadcaster. All APREF stations are welcome to contribute RTCM data streams to this caster for distribution through the region. If you would like to contribute data please send a request to: **gnss@ga.gov.au** **Subject: APREF real-time station**

Section B: Procedures for Becoming an APREF Station	
	The email should contain: • The station nine-character identification code. The APREF network operations team will respond with submission details.
7	**Subscribe to the Mailing List**
7.1	**APREF Stations Mailing List**
(a)	The APREF Stations mailing list is used to ensure all participants are aware of important information relating to the APREF network or APREF data centre(s). Geoscience Australia currently uses the AUSCORS mailing list to notify users of information. Station Operators can subscribe the mailing list by sending an email to: **gnss@ga.gov.au** **Subject: Subscribe to APREF Mailing List**
8	**Other Information**
8.1	**Request a Regulation 13 Certificate (Optional)**
(a)	Station contributing to the APREF project that are contained within Australia's marine jurisdiction (within 200 nautical miles of Australia) and its external territories are eligible for a Certificate of Verification of a Reference Standard of a Position-Measurement in Accordance with Regulation 13 of the National Measurement Regulations 1999. To request a Regulation 13 Certificate a letter should be sent to: **Laboratory Contact** **Position Australia** **Geoscience Australia** **GPO Box 378** **Canberra ACT 2601** The letter can be received via email to: **dl-Reg13@ga.gov.au** **Subject: Request for Regulation 13 Certificate** The letter should include:

Section B: Procedures for Becoming an APREF Station	
	(a) The number of stations that you require certificates for and their four-character identifier codes. (b) Name, address and contact details for the person making the request. If you are not the Station Owner then a signed letter of consent for a secondary party to submit should be provided. More information on Regulation 13 Certificates can be found at: https://www.ga.gov.au/scientific-topics/positioning-navigation/geodesy/regulation-13-certificates