PRODUCT DATA SHEET

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Orbit and Clock Data (SP3-d file)

Summary

Geoscience Australia's (GA) Ginan Analysis Centre Software (ACS) calculates GNSS satellite orbit and clock data based on the GNSS observables captured by both GA's continuously operating reference station (CORS) network covering Australia, New Zealand and the South Pacific and a network of international stations. This precise orbit and clock data is available from GA in the IGS SP3-d file format.

SP stands for Standard Product and since the first file specification SP1 was first released in 1985 the standard has been expanded and improved. Now it can hold data on satellites from all the GNSS constellations and augmentation services.

Data in the SP3-d file can be used to determine the precise orbital position of a satellite at any given time which when post processed with GNSS observation data can increase the accuracy of derived position data.

The SP3-d file format definition document which details the SP3-d file format and contents is available from the IGS Formats and Standards page: https://files.igs.org/pub/data/format/sp3d.pdf

Access

Geoscience Australia offers orbit and clock data in the form of an SP3-d file [1].

Users can freely access these files at https://data.gnss.ga.gov.au/docs/home/index.html with documentation on how to obtain them at https://geoscienceaustralia.github.io/ginan/resources/GinanProductsStreamsAccess20220422.pdf

Methods include sftp and AWS s3.

Technical details

Positioning Australia SP3-d Orbit Products	
Versions	Rapid and Ultra-Rapid
Products Released	One Rapid Product daily Four Ultra-Rapid Products daily
Release Times	Rapid: 1700 UTC Ultra-Rapid: 0300, 0900, 1500, 2100 UTC
Constellations Covered	GPS (in future will include Galileo, GLONASS, BeiDou and QZSS)
Data Source	RINEX format Phase and Pseudorange observations from a globally distributed network of GNSS receivers soured from Geoscience Australia's (GA)

	CORS stations and others from the International GNSS Service (IGS) network [4]. Earth orientation data from the International Earth Rotation and Reference Systems service's (IERS) daily final values [5].
Filenames	The SP3-d products follow the IGS Long Product Filename convention, detailed in this document: http://acc.igs.org/repro3/Long_Product_Filenames_v1.0.pdf An example of a filename is given below: GAG0OPSULT_20220600600_01D_15M_ORB.sp3 Use the table below for a break-down of this filename:

GAG0OPSULT_20220610600_01D_15M_ORB.sp3		
Code	**Meaning**	**Value**
GAG	Analysis Centre	Geoscience Australia Ginan
0	Version Number	Version 0
OPS	Campaign Type	Operational
ULT	Solution Type	Ultra-Rapid (RAP: Rapid, FIN: Final)
20220610600	Datetime of Initial Epoch YYYYDOYHHmm	Year: 2022, Day-of-year: 061, Time: 0600 UTC
01D	Length from Initial Epoch in File D-Day, H-Hour, M-Minute, S-Second	1 Day (24 hours)
15M	Epoch Length – Amount of Time between each record	15 Minutes
ORB	File / Product Type	Orbital
.sp3	File Extension	SP3 file

File Specification History

SP stands for Standard Product and the first file specification SP1 was first released in 1985 by Benjamin Remondi working for the US National Geodetic Survey. At the time the only satellite-based navigation constellation in operation was the US Global Positioning System (GPS) and SP1 was focussed on being a means of distributing precise GPS orbit data.

Since 1985 the file specification has undergone many revisions to enhance the data it can contain. In 2016 the SP3-d specification was released. This format supports:

- Satellite identification numbers from all the global navigation satellite systems (GNSS) and satellite-based augmentation systems (SBAS) currently in operation, and up to 999 individual satellites,
- Precise orbit details but also clock corrections,
- Clock event and orbit manoeuvre flags,
- More generous space for comments.

For more information on the SP3-d format please refer to [1] and [3]. For more information on the history of the SP format please refer to [1] and [2].

Quality Assurance

On a daily basis GA assesses the quality of the precise orbit and clock data by comparison with other independent sources. For further details on quality monitoring please contact GA at clientservices@ga.gov.au.

Terms of Use

GA provides precise orbit and clock data in SP3-d format free of charge but on an “as is” and “with all faults” basis without any warranty whatsoever. GA does not warrant that the precise orbit and clock data shall meet any requirements or expectations or be fit for any intended purposes.

GA assumes no responsibility for errors or omissions in the contents of the Service and reserves the right to make additions, deletions, or modification to the contents on the Service at any time without prior notice.

GA does not guarantee the accuracy, relevance, timeliness, or completeness of any information or data available through the Service or on linked external websites.

References

[1] The Extended Standard Product 3 Orbit Format (SP3-d), 21 February 2016, Steve Hilla, National Geodetic Survey, National Ocean Service, NOAA, Silver Spring, MD 20910, USA.

[2] NOAA Technical Report NOS 133 NGS 46, Extending the National Geodetic Survey Standard GPS Orbit Formats, Benjamin W. Remondi, Rockville, MD, November 1989

[3] ACS Orbits and Clocks Data SP3-d file Quick Reference, Rupert Brown, FrontierSI for Positioning Australia, 1 February 2021: https://geoscienceaustralia.github.io/ginan/resources/SP3-dQuickReferencev01.pdf

[4] https://igs.org/network/

[5] https://datacenter.iers.org/data/latestVersion/finals.daily.iau2000.txt

