

SatPaths API (beta)

Geoscience Australia SatPaths API (beta)

Version

1.0.0-beta

Program

Digital Earth Australia

Resource type

Data service

Published Date

10/09/2021

View the [original metadata page](#) for the most up-to-date information on this product.

Basics

Background

Every day more than a dozen foreign-operated, public-good, non-commercial, medium to low resolution satellites fly over Australia and its territories. They cross the continent several times a day and their sensors capture images of the land and coastal waters.

Satellite overpass schedules for each spacecraft are predictable and can be calculated with a degree of accuracy. The SatPaths API provides information on which satellite sensors have and will potentially acquire data over Australia during a given date and time interval. It is important to note that actual acquisition schedules may differ from those presented by SatPaths API due to the operational limitations of the satellite.

What this product offers

Daily SatPaths API service calculates predicted schedules for flyovers over Australia for most popular public-good satellite sensors used by researchers in academia, and by public and private sector organisations. Information is delivered in GeoJSON or CSV (tabular) formats for use in third party online applications and GIS tools.

Applications

The information helps to answer three basic questions:

- what satellites are flying over Australia on a particular day, where and at what time?
- which of those satellites will potentially acquire data over the area of specific interest?; and
- which ground stations in the [ANGSTT network](#) those satellites are visible from, hence which of those stations could potentially downlink the data?

Access

Data access

Link to data	SatPaths API
Dataset technical metadata	
Code examples	Code examples
CMI RESTful node ID	670
Access constraints	SatPaths API is provided for public use.
Use constraints	Information generated by the SatPaths API is for general interest and educational purposes only. It should not be used in operational capacity. Geoscience Australia does not guarantee that the information is accurate, complete or free of errors.
Security classification	Unclassified
Update frequency	asNeeded
Product life span	01/09/2021 - 01/09/2025

Details

Technical information

SatPaths API calculates predictive schedules for flyovers over Australia and ground footprints for selected sensors (in most common mode of acquisition) on board the following non-commercial, public-good, mid to low resolution orbiting satellites operated by USGS, NASA, NOAA and ESA.

AQUA (MODIS): 2,330km swath

TERRA (MODIS): 2,350km swath

NOAA 15 (AVHRR): 2,940km swath

NOAA 18 (AVHRR): 2,940km swath

NOAA 19 (AVHRR): 2,940km swath

NOAA 20 (VIIRS): 2,940km swath

NPP (VIIRS): 3,040km swath

LANDSAT 7 (ETM+): 185km swath

LANDSAT 8 (OLI): 185km swath

LANDSAT 9 (OLI): 185km swath

SENTINEL 1A (C-SAR): 250km – Interferometric Wide Swath Mode

SENTINEL 1B (C-SAR): 250km – Interferometric Wide Swath Mode

SENTINEL 2A (MSI): 290km swath

SENTINEL 2B (MSI): 290km swath

SENTINEL 3A (SLSTR): 1,270km swath

SENTINEL 3B (SLSTR): 1,270km swath

METOP-A (AVHRR): 2,900km swath

METOP-B (AVHRR) : 2,900km swath

METOP-C (AVHRR) : 2,900km swath

Predictive schedules are calculated for seven Australian ground stations which are participating in the [ANGSTT network](#):

Alice Springs (ALS), operated by Geoscience Australia

Cleveland Bay (CFQ), operated by AIMS

Cribb Point (CPT), operated by Australian Bureau of Meteorology

Hobart (HBT), operated by CSIRO

Learmonth (LMO), operated by Australian Bureau of Meteorology

Murdoch (MUR), operated by Landgate

Shoal Bay (DAR), operated by Australian Bureau of Meteorology

The timing and footprints of satellite overpasses are calculated based on the parameters specified in a two-line element set (TLE) from [space-track.org](#).

Accuracy and limitations

Flyover schedules are only indicative of potential acquisitions and will differ from what is actually downlinked from satellites by each ground station:

- The timings and footprints are relevant for a selection of ground stations in the [ANGSTT network](#) (i.e. operating on the Australian continent only). Some ground stations are omitted, such as those operating in Antarctica.
- Satellite overpass timings and footprints are accurate only up to a few days into the future. The information should be used with caution for dates exceeding the current date by more than 10 days. However, calculations for dates in the past are accurate since they are based on the most relevant historical input parameters.
- 'Start' and 'end' times indicate the earliest and latest time a particular satellite is visible from ground stations in the ANGSTT network.
- A satellite may be visible from a particular ground station, but it does not mean the station is used for, or is capable of, transferring the data acquired by that satellite, e.g. no data from the Sentinel constellation of satellites is downloaded by the ANGSTT network of ground stations.
- Calculated 'start' and 'end' times may not precisely reflect actual acquisition schedules of individual ground stations in the ANGSTT network. The differences could be due to:
 - stations not having the capability of downlinking the data from a particular satellite
 - stations not having the capacity to downlink data from multiple satellites at the same time (hence only higher priority satellites are scheduled for downlink to a particular station)
 - ground station operators adjusting the acquisition time to accommodate satellites passing in quick succession and/or to limit data acquisition over the open ocean
 - for various operational purposes, operators specifying different parameters to those used as input into calculations in this app

- Accuracy of time-at-location calculations is generally to within a minute of actual data acquisition time for the specified location.

Quality assurance

Validation of calculated predictive schedules and ground footprints was based on sample of actual acquisition schedules published by Alice Springs, Murdoch and Hobart ground stations, and actual imagery acquired by Geoscience Australia for the purpose of generation of [DEA Hotspots](#) .

See Accuracy and Limitations section above for more limitations.

Software

SatPaths API is written in Python. Calculations are based on the [PyPredict](#) library.

Processing

Lineage

Information on start and end times for satellite flyovers, as well as position of satellites at any given time, is generated in real-time based on the most relevant two-line element set (TLE) data from space-track.org and [PyPredict](#) library with algorithms ported from Predict open source tracking and orbital prediction software (<https://www.qsl.net/kd2bd/predict.html>).

Ground footprint information is generated based on published, sensor specific swath widths, using general purpose ellipsoidal geometry spatial libraries.

Schema / spatial extent

Australia WGS84

Update frequency	asNeeded
Temporal extent	2021-02-01 01:00:00 – 2025-02-01 01:00:00
Coordinate reference system	

Media

Credits

Owner

Commonwealth of Australia (Geoscience Australia)

Subject matter experts

Geoscience Australia - Director, Operations, NEMO

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