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# **SentinelSat Documentation**

*Release 0.7*

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Sentinelsat makes finding and downloading Copernicus Sentinel satellite images easy.

It offers an easy to use command line interface.

```
sentinel search --sentinel2 --cloud 30 user password search_polygon.geojson
```

and a powerful Python API.

```
from sentinelsat.sentinel import SentinelAPI, get_coordinates

api = SentinelAPI('user', 'password')
api.query(
    get_coordinates("search_polygon.geojson"),
    producttype="SLC",
    orbitdirection="ASCENDING"
)
api.download_all()
```



## 1.1 Installation

Sentinelsat depends on [homura](#), which depends on [PycURL](#). When the dependencies are fulfilled install with `pip install sentinelsat`.

### 1.1.1 Unix

#### Ubuntu

```
sudo apt-get install build-essential libcurl4-openssl-dev python-dev python-pip
```

#### Fedora

```
sudo yum groupinstall "Development Tools"  
sudo yum install libcurl libcurl-devel python-devel python-pip
```

### 1.1.2 Windows

The easiest way to install pycurl is with [pycurl wheels](#) provided by Christoph Gohlke

```
pip install pycurl.whl
```

or with `Conda` [<http://conda.pydata.org/docs/>](http://conda.pydata.org/docs/)'\_

```
conda install pycurl
```

### 1.1.3 OSX

TODO: How to install on OSX.

### 1.1.4 Tests

```
git clone https://github.com/ibamacsr/sentinelsat.git
cd sentinelsat
pip install -e .[test]
export SENTINEL_USER=<your scihub username>
export SENTINEL_PASSWORD=<your scihub password>
py.test -v
```

### 1.1.5 Troubleshooting

The download from Scihub will fail if the server certificate cannot be verified because no default CA bundle is defined, as on Windows, or when the CA bundle is outdated. In most cases the easiest solution is to install or update `certifi`:

`pip install -U certifi` You can also override the the path setting to the PEM file of the CA bundle using the `pass_through_opts` keyword argument when calling `api.download()` or `api.download_all()`:

```
from pycurl import CAINFO
api.download_all(pass_through_opts={CAINFO: 'path/to/my/cacert.pem'})
```

## 1.2 Command Line Interface

Sentinelsat's CLI is divided into two commands:

- `sentinel search` to query and download a number of images over an area
- `sentinel download` to download individual images by their unique identifier

### 1.2.1 Quickstart

A basic search query consists of a search polygon as well as the username and password to access the Scihub.

```
sentinel search [OPTIONS] <user> <password> <geojson>
```

Search areas are provided as GeoJSON polygons, which can be created with [QGIS](#) or [geojson.io](#). If you do not specify a start and end date only products published in the last 24 hours will be queried.

Start and end dates refer to the acquisition date given by the *beginPosition* <<https://scihub.copernicus.eu/userguide/3FullTextSearch>> of the products, i.e. the start of the acquisition time.

### Sentinel-1

Search and download all Sentinel-1 scenes of type SLC, in descending orbit for the year 2015.

```
sentinel search -s 20150101 -e 20151231 -d \
-q 'producttype=SLC, orbitdirection=Descending' \
-u 'https://scihub.copernicus.eu/dhus' <user> <password> <poly.geojson>
```

Download a single Sentinel-1 GRDH scene covering Santa Claus Village in Finland on Christmas Eve 2015.

```
sentinel download --md5 -u 'https://scihub.copernicus.eu/dhus/' <user> <password> a9048d1d-fea6-4df8
```



## Sentinel-2

Search and download Sentinel-2 scenes for January 2016 with a maximum cloud cover of 40%.

```
sentinel search -s 20160101 -e 20160131 --sentinel2 --cloud 40 <user> <password> <poly.geojson>
```

Download all Sentinel-2 scenes published in the last 24 hours.

```
sentinel search --sentinel2 <user> <password> <poly.geojson>
```

### 1.2.2 sentinel search

```
sentinel search [OPTIONS] <user> <password> <geojson>
```

Options:

-s	-start	TEXT	Start date of the query in the format YYYYMMDD.
-e	-end	TEXT	End date of the query in the format YYYYMMDD.
-d	-download		Download all results of the query.
-f	-footprints		Create geojson file search_footprints.geojson with footprints of the query result.
-p	-path	PATH	Set the path where the files will be saved.
-q	-query	TEXT	Extra search keywords you want to use in the query. Separate keywords with comma. Example: 'producttype=GRD,polarisationmode=HH'.
-u	-url	TEXT	Define another API URL. Default URL is 'https://scihub.copernicus.eu/apihub/'.
	-md5		Verify the MD5 checksum and write corrupt product ids and filenames to corrupt_scenes.txt.
	-sentinel1		Limit search to Sentinel-1 products.
	-sentinel2		Limit search to Sentinel-2 products.
-c	-cloud	INT	Maximum cloud cover in percent. (Automatically sets -sentinel2)
	-help		Show help message and exit.

Query parameters:

ESA maintains a [list of valid search keywords](#) to query the SciHub.

### 1.2.3 sentinel download

```
sentinel download [OPTIONS] <user> <password> <productid>
```

Options:

-p	-path	PATH	Set the path where the files will be saved.
-u	-url	TEXT	Define another API URL. Default URL is 'https://scihub.copernicus.eu/apihub/'.
	-md5		Verify the MD5 checksum and write corrupt product ids and filenames to corrupt_scenes.txt.

## 1.3 Python API

### 1.3.1 Quickstart

```
# connect to the API
from sentinelat.sentinel import SentinelAPI, get_coordinates
api = SentinelAPI('user', 'password', 'https://scihub.copernicus.eu/dhus')

# download single scene by known product id
api.download(<product_id>)

# search by polygon, time, and SciHub query keywords
api.query(get_coordinates(map.geojson), \
          "20151219", date(2015, 12, 29), \
          keywords={"platformname": "Sentinel-2", \
                   "cloudcoverpercentage": "[0 TO 30]"})

# download all results from the search
api.download_all()

# GeoJSON FeatureCollection containing footprints and metadata of the scenes
api.get_footprints()
```

Valid search query keywords can be found at the [ESA SciHub documentation](#).

### 1.3.2 API

## 1.4 Indices and tables

- [genindex](#)
- [modindex](#)
- [search](#)