



STAC

SpatioTemporal Asset Catalogs
and
Open-Source Software Supporting Open Science

WGISS-48, Hanoi Vietnam

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WHY??



Sign in | Facebook | Help

Search: Saint Martin

Area of Interest | Filters

Source	Collected	Area Clouds	Area Health
WV03	2018-03-08	0.2%	9.7°
WV04	2018-04-03	2.7%	19.0°
WV05	2018-04-03	0.2%	25.2°



Saint Martin, Netherlands

Source | Compare | Topology

1 Month Results

April 2018



USGS LandsatLook

Modify Images

Active Date: 07 Aug 2018 (GMT)

03 Jul 1999 | 07 Aug 2018

Video Format: Video for Windows (AVI)

Displaying 11 of 2509 images

07 Aug 2018 OLI | 31 Jul 2018 OLI
02 Aug 2018 OLI | 24 Jul 2018 OLI
01 Aug 2018 ETM+

Image Display

- Active Date Only
- Mosaic
- Dynamic Image Refresh

Image Enhancements

- None
- Percent Clip
- 3 Std. Dev. Stretch

Image Transparency

SENTINEL Hub Playground

2018-03-08 | 10%

Handing | Effects

Color

- Natural color
- Color Infrared (Vegetation)
- False color (Urban)
- Agriculture
- Vegetation indices

HARRIS GEOSPATIAL SOLUTIONS DataFinder

Phone: 1-888-666-4671 | Email: geospatial@harris.com

Welcome to the largest selection of geospatial products

Substrate | Aerial | DEM | LiDAR | Vector | Topo | Energy

Product	Product ID	Year	Health	Size	Cost
Ready to use Imagery	Digitals	2018-01-01	OK	10	10
Ready to use Imagery	Digitals	2018-01-01	OK	10	10

OpenAerialMap

Search location or coordinates

Sign In

147 images within selected grid square

St. Maarten - Luvinda 2017-09-11 / 2 cm BESUMV	Quillier Dr - Sint Maarten - NLNC 2017-09-14 / 2 cm Netherlands Red Cross
St. Maarten - Great Bay, Sonesta R. 2017-09-17 / 3 cm BESUMV	St. Maarten - Great Bay Beach 2017-09-12 / 3 cm BESUMV
St. Maarten - Dutch Quarter 2017-09-18 / 3 cm BESUMV	St. Maarten - Middle Region 2017-09-17 / 3 cm BESUMV

EARTHDATA Search

Find a DAAC

marigot

Rectangle: SW: 17.97802734375, 63.25 N

VIRGIN ISLANDS

266 Matching Collections

Sort by: Relevance

Only include collections with granules Include non-EOSDIS collections

ASTRO DIGITAL

MISSION CONTROL

VIEW KEARNEY

APR 6, 2016 - THE FUTURE

0 - 20% | 13 KM²

Preview Scenes

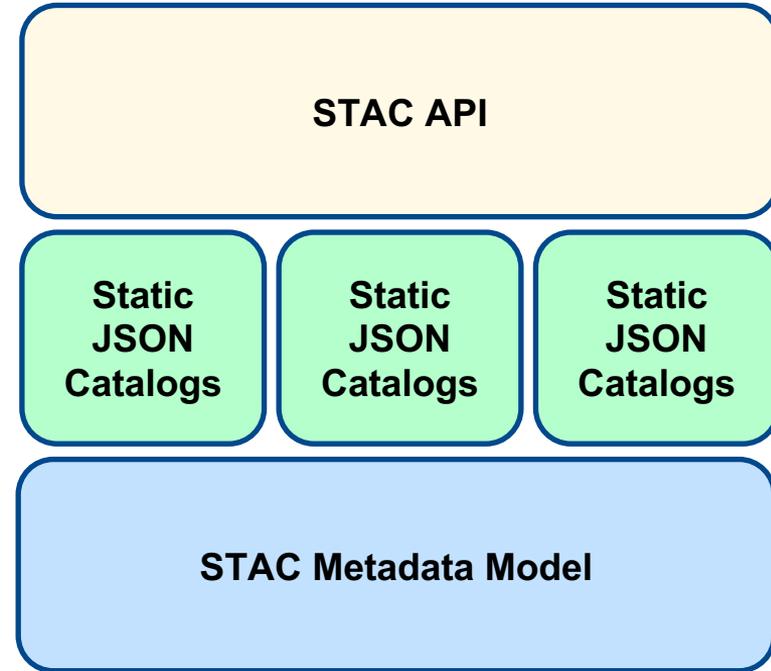
SORT BY DATE

DATE CLOUD COVER	Jul 30, 2016	8.06%
DATE CLOUD COVER	Jul 27, 2016	9.53%
DATE CLOUD COVER	Jul 17, 2016	15.39%
DATE CLOUD COVER	Jul 11, 2016	4.08%

SAINT KITTS AND NEVIS

What is it?

- JSON defined metadata for geospatial catalogs and assets
 - Focus on search and discovery
 - Simple and extensible
- Dynamic APIs
 - Searchable on arbitrary fields
- Static catalogs
 - Crawlable



What is it not?

- Full-fledged metadata standard
- Single source of truth
- Covering *all* kind of datasets
- Seriously - **not a** replacement for ISO 19115, OGC CSW, ...



Radiant Earth
Foundation

EARTH IMAGERY FOR IMPACT



Element 84



MAXAR
TECHNOLOGIES



developmentSEED



THE CLIMATE
CORPORATION



HARRIS®



Australian Government
Geoscience Australia



Google Earth Engine



SpaceNet™



See the Earth as it could be.



The specification

- Catalogs

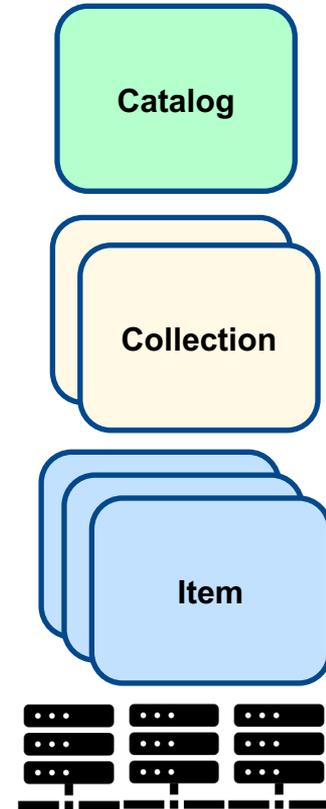
- There's always a root catalog
- Contains other catalogs and collections

- Collections

- Can contain other catalogs (called sub-catalogs) to group Items further
 - e.g., For Landsat-8 there might be sub-catalog by Landsat Path and Row
- Ultimately contains Items which are similar in some way(s)
 - e.g., same instrument, same region containing data from different instruments, etc.

- Items

- A single scene or set of datafiles for a specific location at a specific date and time (when and where)



STAC Ecosystem



<https://github.com/radiantearth/stac-spec/blob/master/implementations.md>

```
1 {
2   "type": "Feature",
3   "id": "LC80190232015097LGN00",
4   "geometry": {
5     "type": "Polygon",
6     "coordinates": [
7       [
8         [
9           -76.61570759444504,
10          52.43864121143704
11        ],
12        [
13          -76.6585808927941,
14          52.35408793014861
15        ],
16        [
17          -76.73673489501518,
18          52.19995522778887
19        ],
20        [
```

STAC URL



Paste your code on the left to validate



Planet Disaster Data (planet-disaster-data)

Version 1.0.0

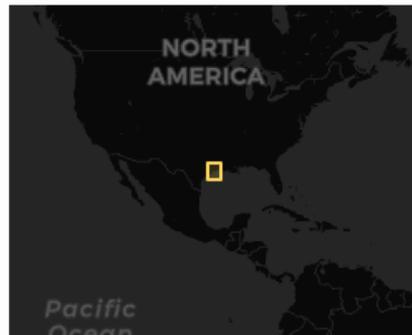
  <https://storage.googleapis.com/pdd-stac/disasters/catalog.json>

[Planet Disaster Data](#) makes imagery available directly to the public, volunteers, humanitarian organizations, and other coordinating bodies in support of the International Charter for Space and Major Disasters. Data is released for individual disaster events, providing a 30 day window pre- and post-disaster. Imagery is provided under Creative Commons licenses, free of charge, with either CC-BY-SA or CC-BY-NC.

Catalogs	
Title	
Hurricane Harvey	

<https://github.com/radiantearth/stac-browser>

<https://github.com/kbagg/ggis-stac-browser>



Provider

[Planet Disaster Team](#) <disaster-team@planet.com> (*producer, licensor*)

STAC 0.6.0

Version

Keywords disaster, open

License [CC-BY-SA-4.0](#)

Temporal 8/28/2017, 11:00:00

Extent AM - now

Going Deeper...



sat-utils

<https://github.com/sat-utils>



sat-api

<https://github.com/sat-utils/sat-api>

- STAC dynamic API reference implementation
- Node library for a (STAC) API
- Deploy your own API:
 - <https://github.com/sat-utils/sat-api-deployment>
- Crawl existing static STAC catalogs to index
- Keep up to date by subscribing to STAC SNS topics

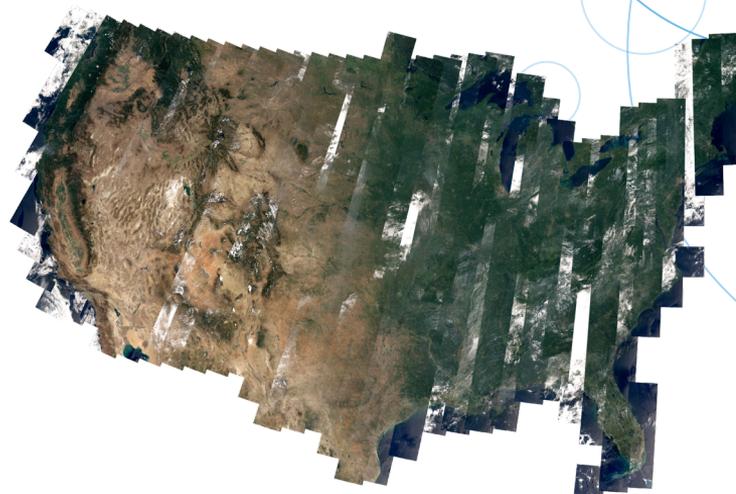


Earth Search

<https://earth-search.aws.element84.com/stac>

Public Search and Discovery API for Earth on AWS Datasets

- Central search catalog and standardized metadata
- Single API that allows searching of STAC metadata for all Earth on AWS datasets
- Powered by sat-api (<https://github.com/sat-utils/sat-api>)
- Backed by an ElasticSearch index
- Initial datasets:
 - Sentinel-2
 - CBERS-4
 - Landsat-8



Landsat-8

Landsat is perhaps one of the most oft-cited and used EO datasets because of its historical archive (Landsat-8 was launched in 2013, but the entire Landsat archive goes back to 1982, with some caveats).

CMR STAC API

API on top of NASA's [Common Metadata Repository \(CMR\)](#) that follows the exciting upcoming [SpatioTemporal Asset Catalog \(STAC\)](#) and [Web Feature Service 3.0 \(WFS\)](#) specifications.

We saw that these developing APIs are going to make geospatial data easier to access for everyone with the simplicity REST + JSON. Connecting these specifications with the CMR exposes thousands of collections with 300M+ granules of NASA data through an easy to use API.

We're excited about the future of these APIs and improving geospatial data access and usability. [Contact us](#) to find out more and make suggestions.

[CHECK OUT CMR STAC API](#)

STAC API integrated with OGC Web Feature Service proxy Metadata Repository 0.5.1 OAS3

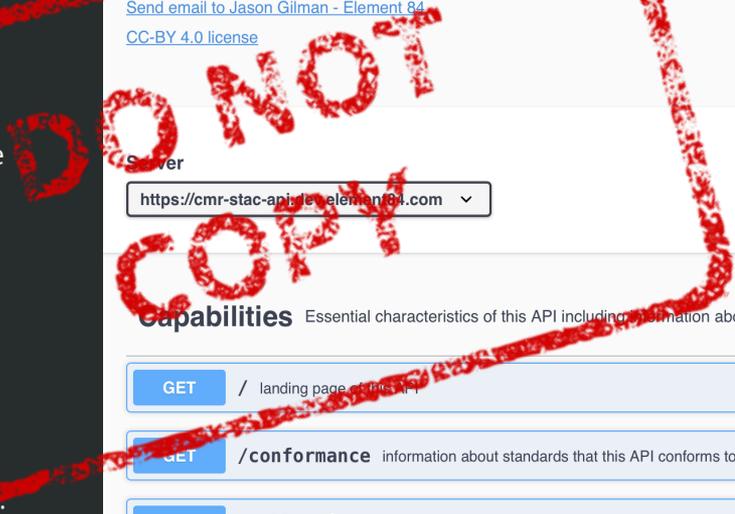
<https://cmr-stac-api.dev.element84.com/docs/swagger.yaml>

This is an implementation of the SpatioTemporal Asset Catalog API that also implements the OGC Web Feature Service 3.0 specification as a proxy for the

[Jason Gilman - Element 84 - Website](#)

[Send email to Jason Gilman - Element 84](#)

[CC-BY 4.0 license](#)



Server

Capabilities Essential characteristics of this API including information about the data.

- GET** / landing page of this API
- GET** /conformance information about standards that this API conforms to
- GET** /collections Describe the feature collections in the dataset.
- GET** /collections/{collectionId} describe the {collectionId} feature collection

Features Access to data (features).

GET /collections/{collectionId}/items retrieve features of feature collection {collectionId}

Creating STAC Metadata



sat-stac

<https://github.com/sat-utils/sat-stac>

- Python library for creating or working with STAC catalogs, collections, and items
- Used for creating existing catalogs, such as
 - <https://landsat.stac.cloud>
 - <https://sentinel.stac.cloud>
 - <http://cbers.stac.cloud/>
- See the Jupyter Notebook tutorials

sat-stac-sentinel

<https://github.com/sat-utils/sat-stac-sentinel>

- Sentinel-2(a/b), Sentinel-1 coming
- Index Sentinel scenes on AWS
- Transform Sentinel metadata to STAC (tileInfo.json -> STAC)
- Deployed Lambda function for real-time publishing new Sentinel scenes as STAC

Using STAC and Cloud Optimized Data

The image features a solid green background. In the upper right corner, there are several white decorative elements: a large circle, a smaller circle overlapping its bottom edge, and a vertical line of three even smaller circles. A thin white line also curves across the top right edge of the frame.

sat-search

<https://github.com/sat-utils/sat-search>

- Python library for searching STAC compliant endpoints
- Command Line Interface (CLI) as a general purpose tool
- Save search results to be loaded and used later
- Download specific assets from all items
- Specify specific band colors to download those bands
 - e.g., Download all “red” and “nir” bands from these Landsat and Sentinel Items

```
$ sat-search search --intersects maine.geojson --found
```

```
1674 items found
```

```
$ clear
```

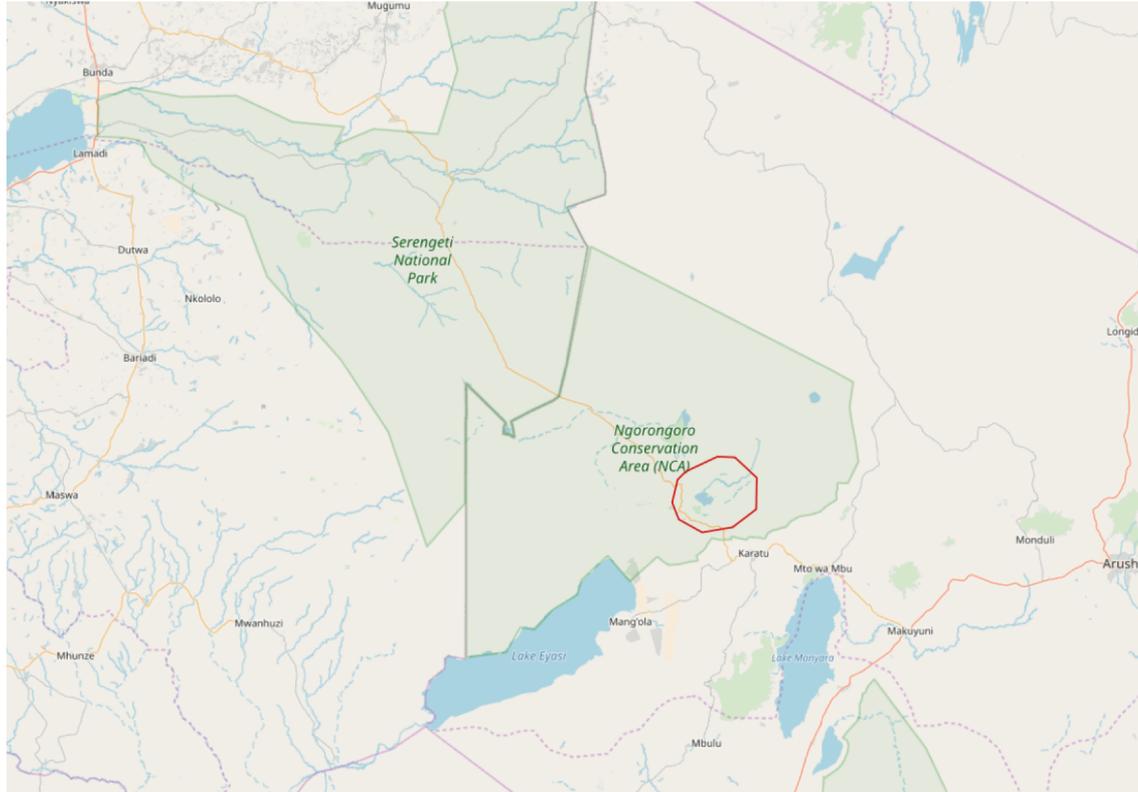
```
}
```

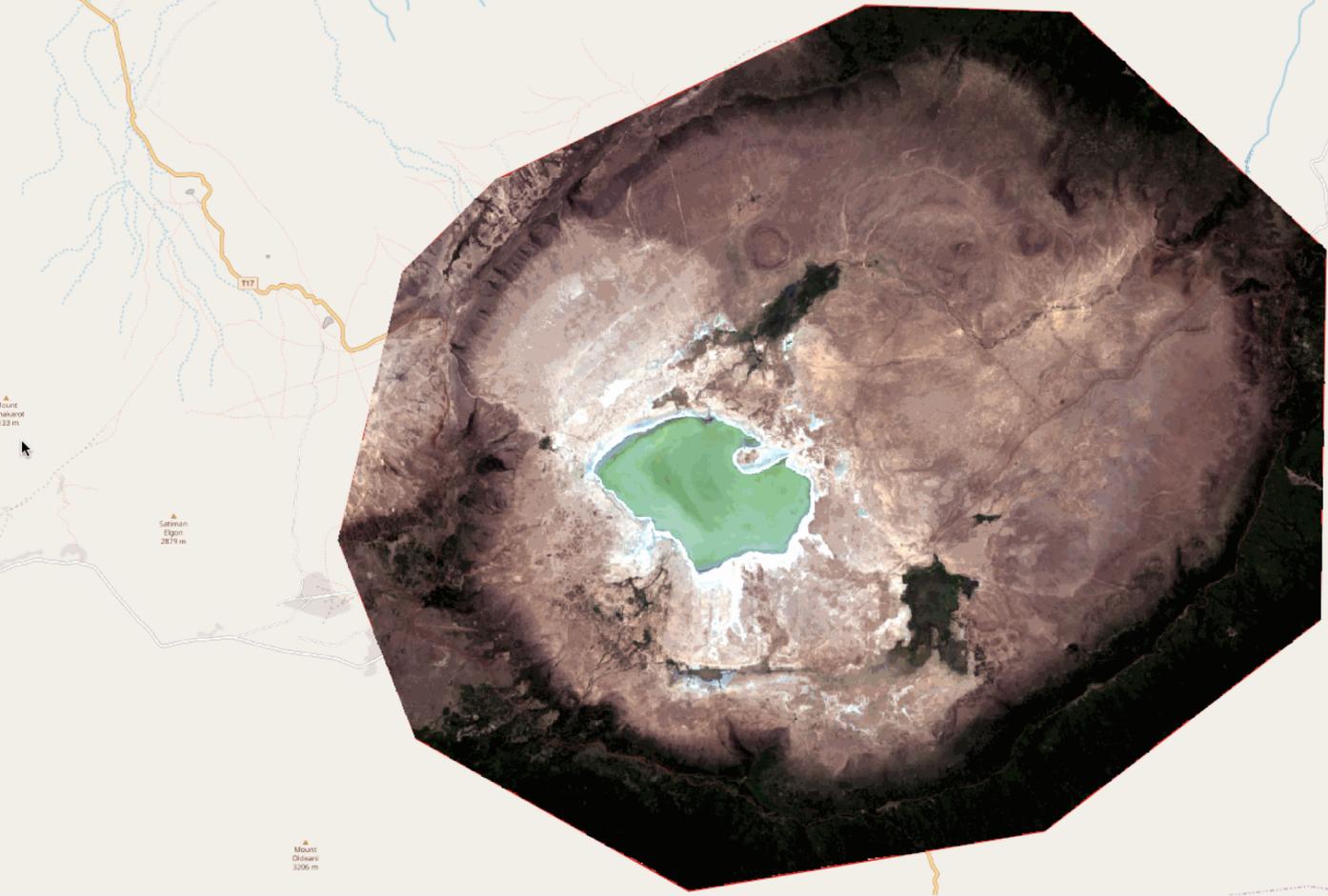
sat-fetch

<https://github.com/sat-utils/sat-fetch>

- Works just like sat-search, plus...
- Option to fetch imagery for just AOIs, rather than the entire asset
- Requires GDAL, or use publicly available Docker image

Ngorongoro crater: landsat-8 and sentinel-2





```
$ time sat-fetch load landsat-scenes.geojson \  
  --download red green blue \  
real 0m59.674s
```

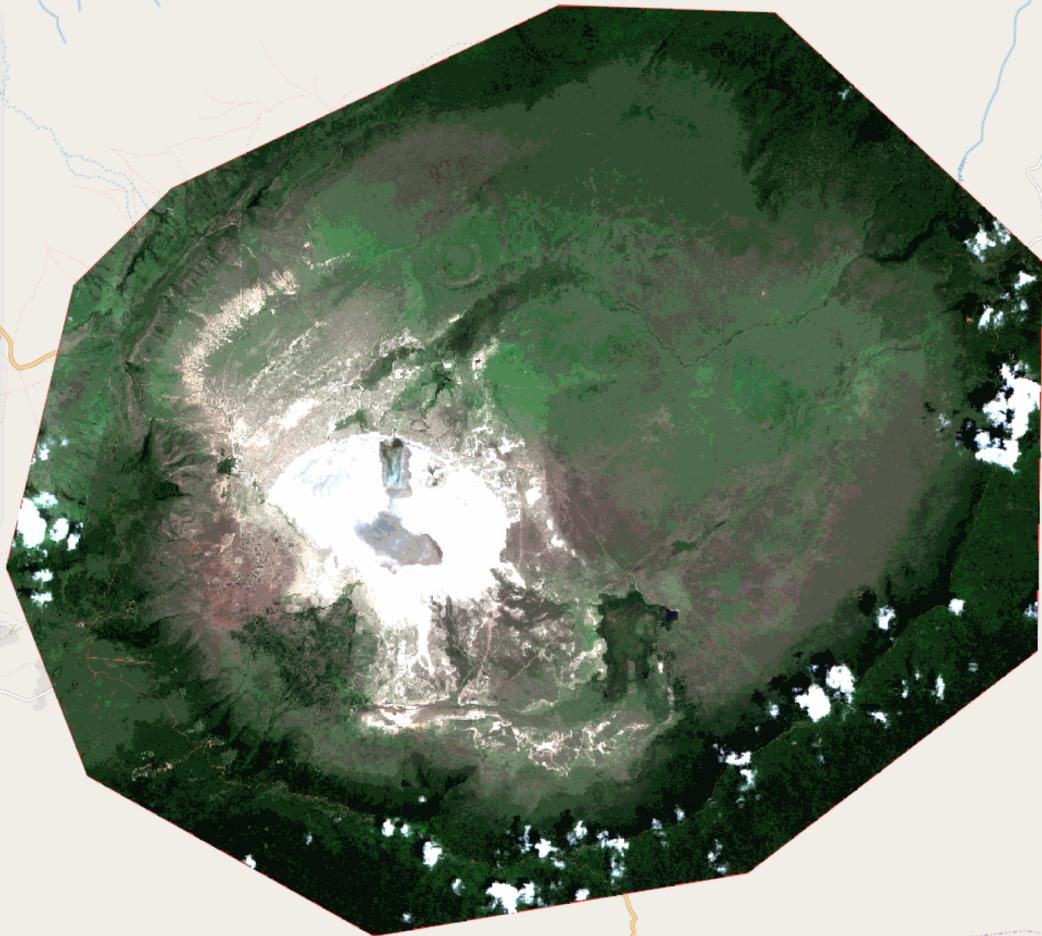
Layers

landsat

sentinel

- 2018-01-24_sentinel-2-l1c
- 2018-01-29_sentinel-2-l1c
- 2018-02-06_sentinel-2-l1c
- 2018-02-13_sentinel-2-l1c
- 2018-02-16_sentinel-2-l1c
- 2018-03-23_sentinel-2-l1c
- 2018-05-12_sentinel-2-l1c
- 2018-06-11_sentinel-2-l1c
- 2018-06-23_sentinel-2-l1c
- 2018-07-01_sentinel-2-l1c

- ngorongoro
- sentinel-scenes
- landsat-scenes
- OpenStreetMap



```
$ time sat-fetch load sentinel-scenes.geojson \  
--download red green blue  
real 8m6.525s
```

How can you be part of this?

If you're an end user:

- Use the tools – provide feedback!
- Use STAC metadata – provide feedback!

If you're an expert in a data type:

- Provide input on the extensions
- If we don't have an extension for it, help write it

If you're a data provider:

- Surface STAC metadata, reach out to someone hosting a catalog and index your data
- Make STAC relevant parameters available in your native metadata
- Consider cloud optimized representations of your data

Join STAC Sprint #5 + OGC API — Features hackathon November 5–7



Chris Holmes [Follow](#)

Sep 9 · 4 min read

tl;dr: *[Signup](#) for the Joint STAC + OGC API Sprint, taking place November 5–7 at the IQT CosmiQ Works office in Arlington, VA. Virtual participants and new community members welcome!*

The longer version

The past couple of years has seen some major steps forward on geospatial interoperability. The trend in OGC towards open collaboration, JSON + REST focus, and OpenAPI specs that started with WFS 3 is sweeping

<https://bit.ly/312QjEG>

Thank you

<https://github.com/radiantearth/stac-spec>

WGISS-48, Hanoi Vietnam

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