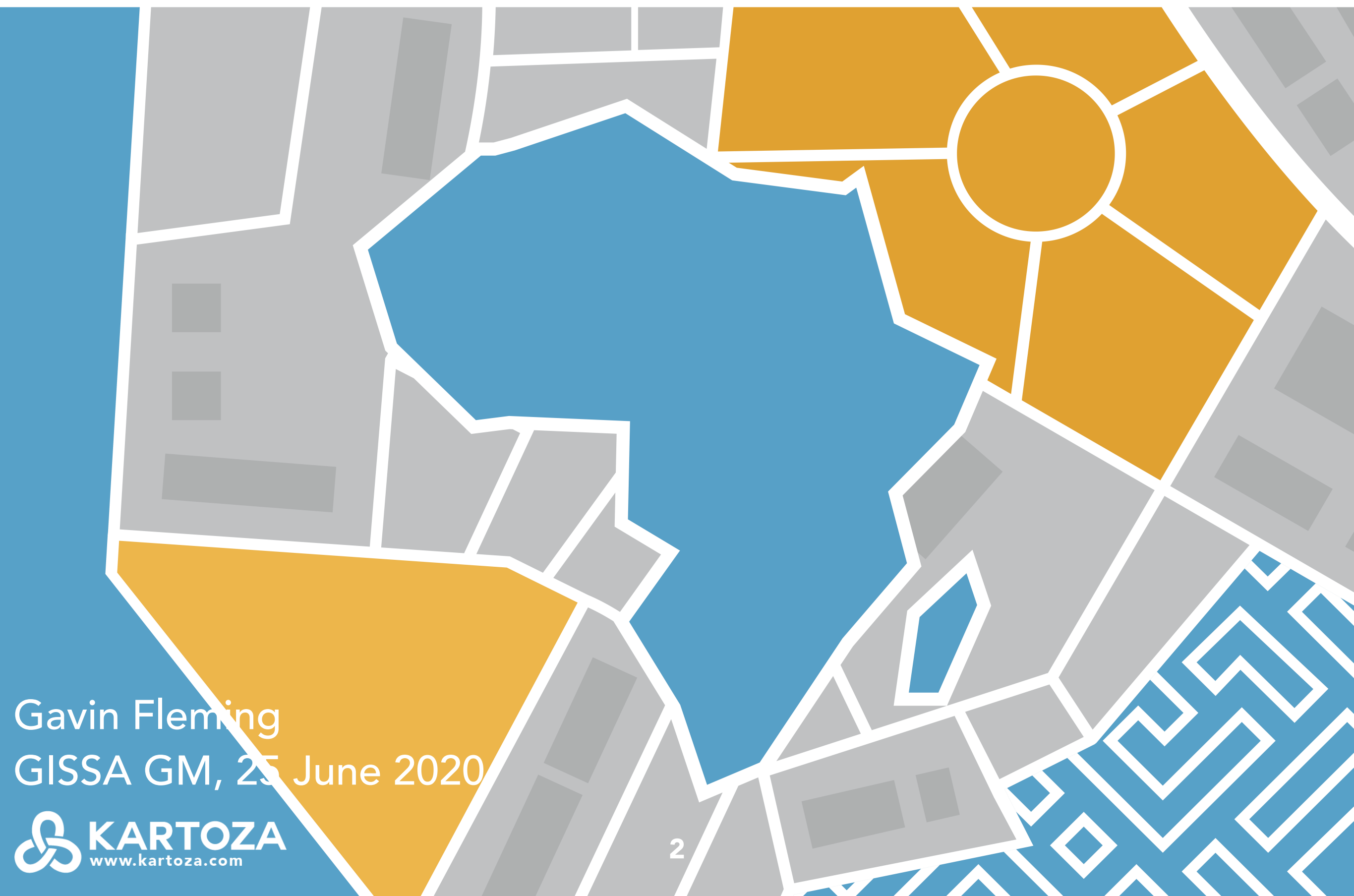




KARTOZA
OPEN SOURCE GEOSPATIAL SOLUTIONS

COGeo, STAC, VT, OGC API



Gavin Fleming
GISSA GM, 25 June 2020

'Technology and Innovation'

Some recent geo tech developments

- COGGeo / COG: Cloud optimised GeoTIFF
- STAC: Spatio-temporal asset catalog
- Vector Tiles
- OGC API

Cloud optimised GeoTIFF

- Efficient imagery data access
- Reduced duplication of data
- Legacy compatibility
- No web map server required!



Cloud Optimized GeoTIFF

An imagery format for cloud-native geospatial processing

Normal GeoTIFF

- Internally tiled (not striped)
- Internal overviews
- Compressed

HTTP Get Range requests

- Server: 'Accept-Ranges: bytes'
- Client: request part of object

COG on the command line

- Create

```
gdal_translate in.tif out.tif -co TILED=YES -co COPY_SRC_OVERVIEWS=YES -co COMPRESS=DEFLATE
```

- Use: get a pixel value


```
gdallocationinfo --debug on /vsicurl/http://even.rouault.free.fr/gtiff_test/  
S2A_MSIL1C_20170102T111442_N0204_R137_T30TXT_20170102T111441_TCI_cloudoptimized_5  
12.tif 5000 5000
```


- Use: read part of an array and store in a TIFF file

```
gdal_translate --debug on /vsicurl/http://even.rouault.free.fr/gtiff_test/  
S2A_MSIL1C_20170102T111442_N0204_R137_T30TXT_20170102T111441_TCI_cloudoptimized_5  
12.tif -srcwin 1024 1024 256 256 out.tif
```

COG in web apps

With geotiff.js

← Back 

 **Get the sum pixel value of an area**

Draw Geometry on map

Rectangle

Polygon

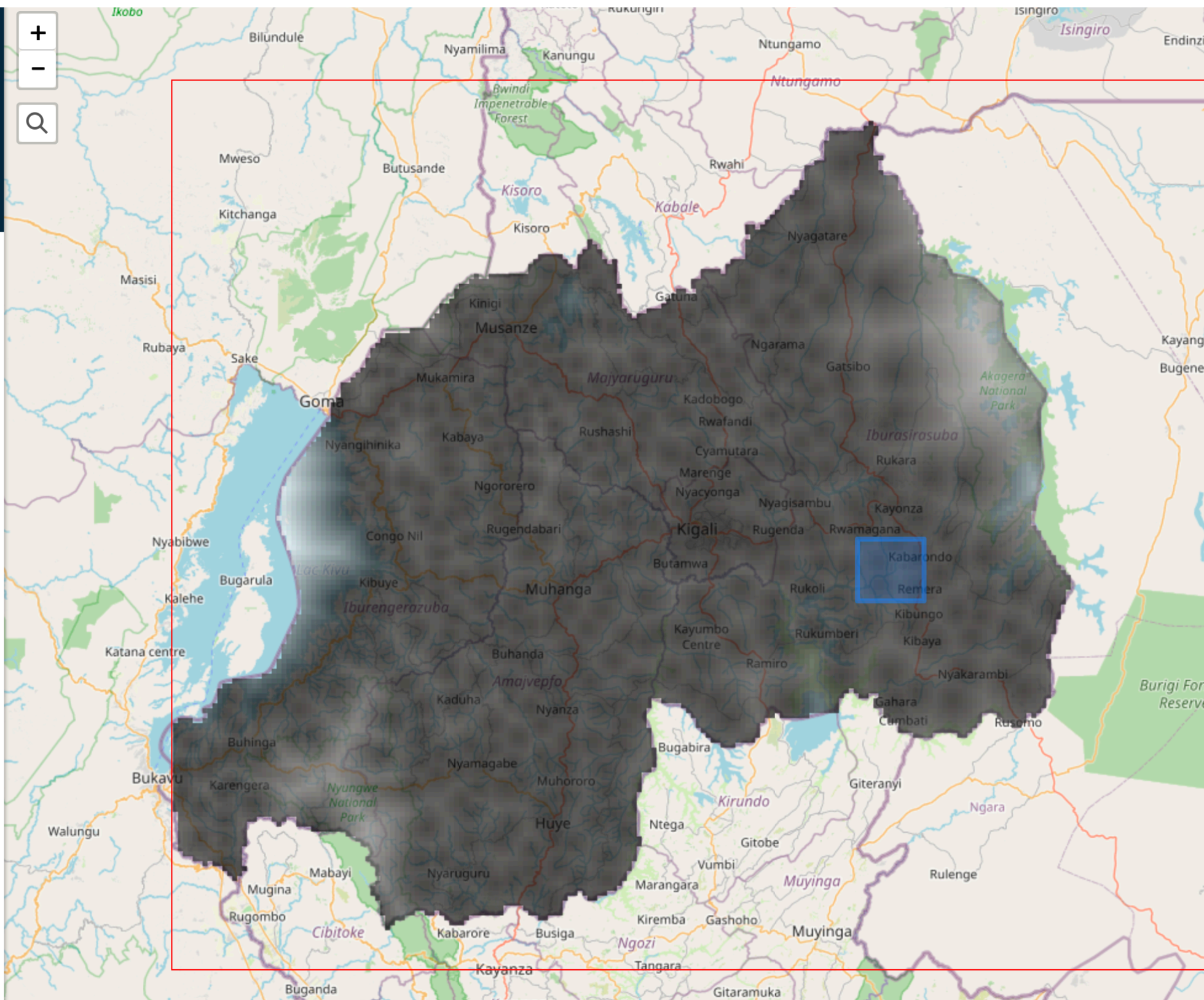
Import Geometry from file

Import GeoJSON

Calculate Sum

Results

1077.63



COG on your desktop

The image shows a GIS application interface. At the top, a window titled "Data Source Manager — Raster" is open. On the left, a sidebar contains icons for "Browser", "Vector", "Raster", "Mesh", and "Delimited Text". The "Raster" option is selected. In the main area of the "Data Source Manager", the "Source Type" is set to "Protocol: HTTP(S), cloud, etc." and the "Protocol" is "HTTP/HTTPS/FTP". The "URI" field contains the URL: <https://oin-hotosm.s3.amazonaws.com/56f9b5a963ebf4bc00074e70/0/56f9c2d42b67227a79b4faec.tif>.

Below the "Data Source Manager" window, a "Layers" panel is visible. It lists several layers: "Lutra demo", "56f9c2d42b67227a79b4faec.tif" (checked), "SkySat_Freeport_s03_20170831T1627402" (unchecked), "RWA_MNH_ANC.tif" (checked), "0.337794" (unchecked), "0.404943" (unchecked), and "OpenStreetMap" (checked).

The main map area displays a geographical map of a region in East Africa, showing various towns and geographical features. A large, semi-transparent, grid-like overlay is visible on the right side of the map, representing a COG (Cloud Optimized GeoTIFF) dataset. The overlay consists of a grid of small, light-colored squares, with some areas appearing darker, possibly indicating different data values or processing stages.

Spatio-temporal asset catalog

'an open specification to increase the interoperability of searching for satellite imagery'

- Item: a GeoJSON feature
- Catalog: a JSON file
- Collection: A collection of STAC Items
- STAC API

Searching for a satellite image now

EarthExplorer (2 Minutes and 52 Seconds)

The screenshot shows the EarthExplorer website interface in a Firefox browser. The browser's address bar displays the URL <https://earthexplorer.usgs.gov>. The page features the USGS logo and the text "science for a changing world". The main content area is titled "EarthExplorer - Home" and includes a navigation menu with options like "Home", "Save Criteria", "Load Favorite", and "Manage Criteria".

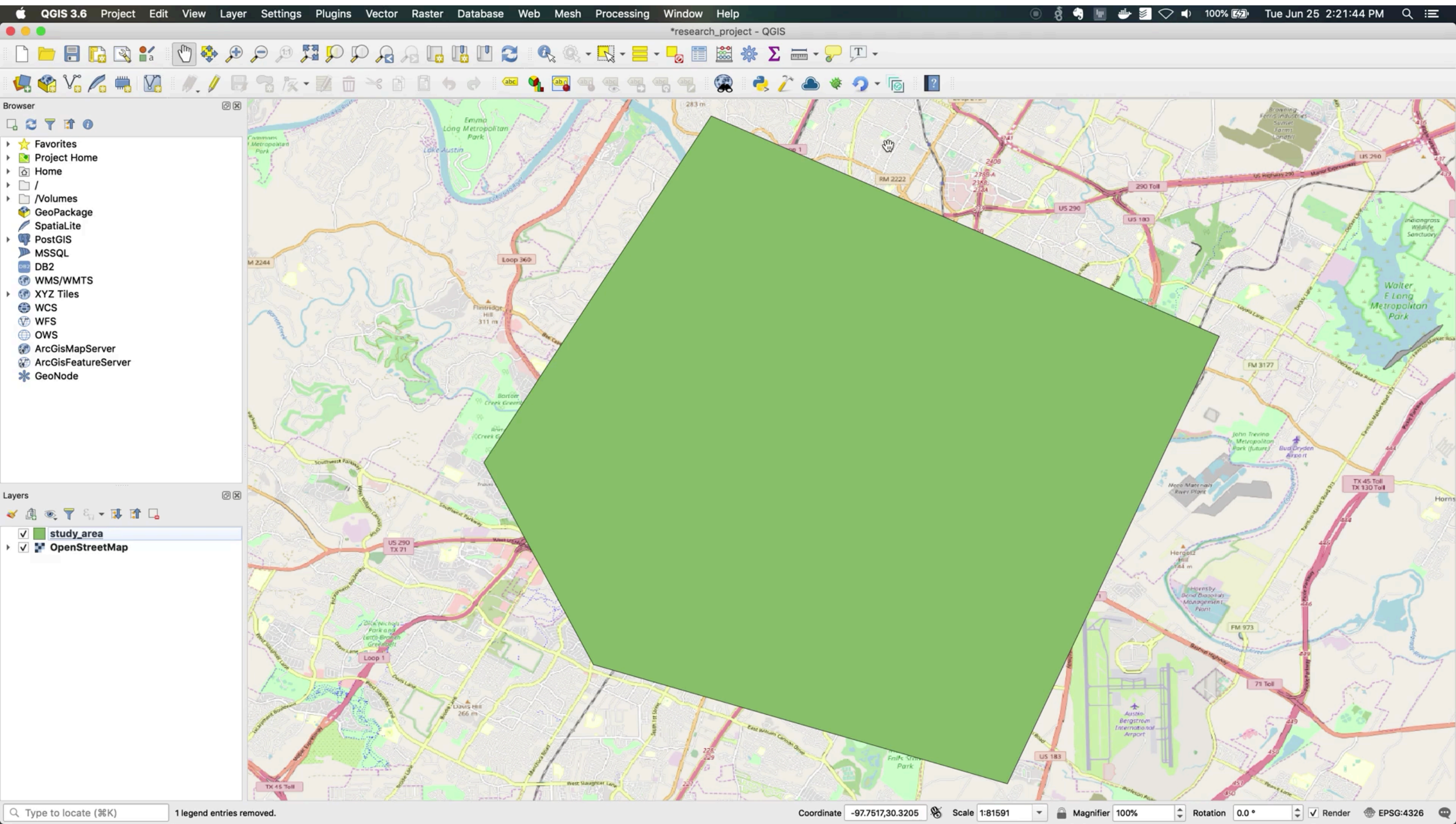
The search interface is divided into several sections:

- Search Criteria Summary (Show)**: A yellow header bar with a "Clear Criteria" link on the right.
- Map/Satellite View**: A large satellite map of the Pacific Ocean. The map is currently in "Satellite" mode, with "Map" also available. A coordinate box shows $(27^{\circ} 54' 57'' \text{ S}, 122^{\circ} 42' 01'' \text{ W})$. There are "Options" and "Overlays" buttons next to the coordinates. A "Google" logo is visible in the bottom left corner of the map area.
- Search Criteria Form**:
 - 1. Enter Search Criteria**: A section with instructions: "To narrow your search area: type in an address or place name, enter coordinates or click the map to define your search area (for advanced map tools, view the [help documentation](#)), and/or choose a date range."
 - Address/Place**: Includes a text input field, "Show", and "Clear" buttons.
 - Coordinates**: Includes tabs for "Predefined Area", "Shapefile", and "KML". Below these are radio buttons for "Degree/Minute/Second" and "Decimal". A message states "No coordinates selected." with "Use Map", "Add Coordinate", and "Clear Coordinates" buttons.
 - Date Range**: Includes a "Result Options" tab. The search range is set from "01/01/2019" to "06/25/2019". A "Search months" dropdown is set to "(all)".
 - Navigation buttons: "Data Sets »", "Additional Criteria »", and "Results »".

The bottom of the page contains a disclaimer: "The up-to-date Google map is not for purchase or for download; it is to be used as a guide for reference and search purposes only." The browser's status bar shows the time as "Tue Jun 25 2:15:36 PM" and the page expiration as "Page Expires In 1:59:25".

STAC in Action

QGIS STAC Browser (37 Seconds)



Vector Tiles

Fast
Small
Efficient
Render in client

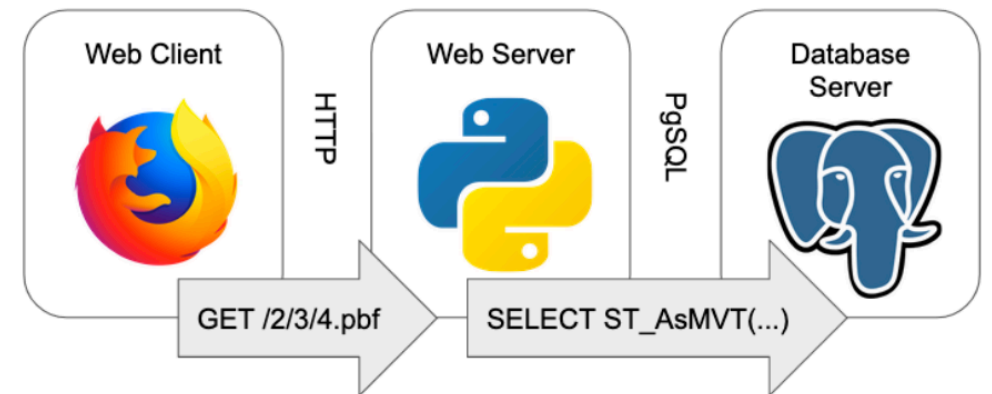
`http://server/{z}/{x}/{y}.format`

Raster tiles

Serve

Render as vector tiles (e.g .mvt)
Instead of rasters

e.g.



Vector Tile tools

- Servers: Tegola, Martin, GeoServer
- Clients: QGIS 3.14, MapBoxGL.js, OpenLayers, Leaflet
- Creation: QGIS 3.14, PostGIS (ST_AsMVT())
- Desktop styling: QGIS 3.14, GeoCat Bridge QGIS plugin, Fresco

mapbox / awesome-vector-tiles Watch 164 Star

<> Code Issues 2 Pull requests Projects Security Insights

Branch: master Go to file Add file Clone

f7o committed 1b4f28f 2 days ago 159 commits 2 branches 0 tags

LICENSE	Initial commit	5 years ago
README.md	Add QGIS native support (QGIS >= 3.14)	5 days ago

README.md

awesome-vector-tiles

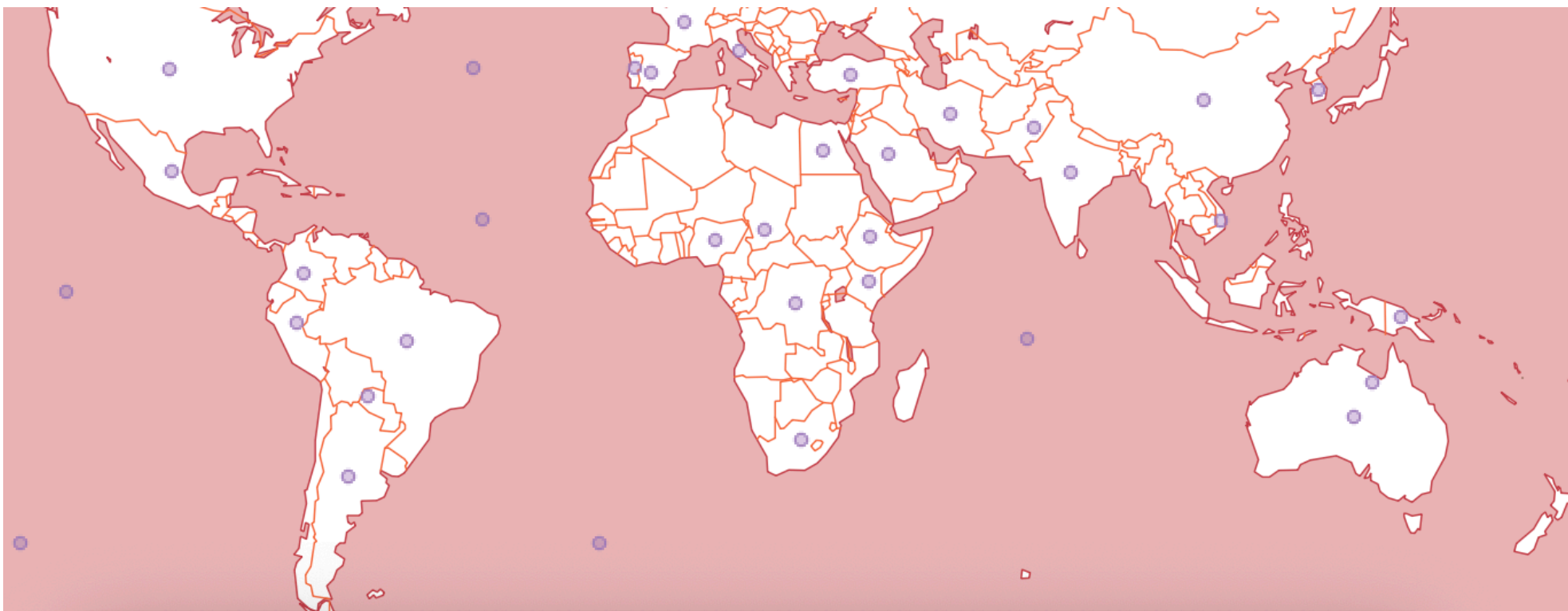
The [Mapbox Vector Tile spec](#) is an efficient encoding for map data into vector tiles that can be rendered dynamically.

About
awesome implementations of the Mapbox Vector Tile specification
[www.mapbox.com/developers/vect...](#)
Readme
CC0-1.0 License

Contributors 59

+ 48 contributors

Loading in QGIS



Vector Tiles Connection

Connection Details

Name

URL

Min. Zoom Level

Max. Zoom Level

- ▶ SpatialLite
- ▶ PostGIS
- ▶ MSSQL
- ▶ DB2
- ▶ ArcGIS Map Service
- ▶ ArcGIS Feature Service
- ▶ GeoNode
- ▼ Mergin
 - ▶ My projects
 - ▶ Shared with me
 - ▶ Explore
- ▶ WMS/WMTS
- ▼ Vector Tiles
 - ▶ Lutra demo
 - ▼ XYZ Tiles
 - ▶ Namibia topo
 - ▶ NGI aerial
 - ▶ NGI toposheets on OSM
 - ▶ OpenStreetMap
 - ▶ Zanzibar orthos
 - ▶ WCS
 - ▶ WFS / OGC API - Features
 - ▶ OWS



Information

Symbology

Labels

Label	Layer	Min. Zoom	Max. Zoom
✓ land...	landcover		
✓ park...	park	9	
✓ park...	park	0	
✓ land...	landuse	6	
✓ land...	landuse		
✓ wat...	waterway		
✓ bou...	boundary	9	24
✓ bou...	boundary	4	
✓ water	water	0	24
✓ wat...	water	0	
✓ aero...	aeroway	12	
✓ aero...	aeroway	13	
✓ tunn...	transportation	15	24
✓ tunn...	transportation	13	24
✓ tunn...	transportation	11	24
✓ tunn...	transportation	8	24
✓ tunn...	transportation	5	24
✓ tunn...	transportation	5	24
✓ tunn...	transportation	15	24
✓ tunn...	transportation	15	24

Help Style Apply

Load Style...

Save Style...

Save as Default

Restore Default

Add...

Rename Current...

✓ default

Styling in QGIS

OGC API

- REST API evolution from 'classic' WMS, WFS, WCS, WPS, etc.
- OGC API Features (aka WFS 3)
- OGC API Styles
- Etc.

OGC API implementations

- Clients: GDAL, JavaScript, QGIS
- Servers: GeoServer, QGIS Server

Credits

- <https://www.cogeo.org/>
- <https://info.crunchydata.com/blog/dynamic-vector-tiles-from-postgis>
- <https://docs.mapbox.com/vector-tiles/reference/>
- <https://www.maptiler.com/news/2019/02/what-are-vector-tiles-and-why-you-should-care/>
- <https://changelog.qgis.org/en/qgis/version/3.14/>
- <https://geoexamples.com/other/2019/02/08/cog-tutorial.html>
- <https://geotiffjs.github.io/>
- <https://medium.com/radiant-earth-insights/announcing-the-spatiotemporal-asset-catalog-stac-specification-1db58820b9cf>
- <https://github.com/radiantearth/stac-spec>
- <https://stacspec.org/>
- <https://kb.gg/blog/2019/06/26/qgis-stac-browser.html>
- <https://ogcapi.ogc.org/>
- <http://blog.qgis.org/2019/11/26/qgis-server-is-ready-for-the-new-ogc-api-for-features-protocol/>