

Lecture 09

GEE Mosaicking and Compositing

2024-05-06

Sébastien Valade



UNIVERSIDAD NACIONAL
AUTÓNOMA DE
MÉXICO

1. Introduction

2. Mosaicking

1. Mosaicking images
2. Mosaicking layers

3. Compositing

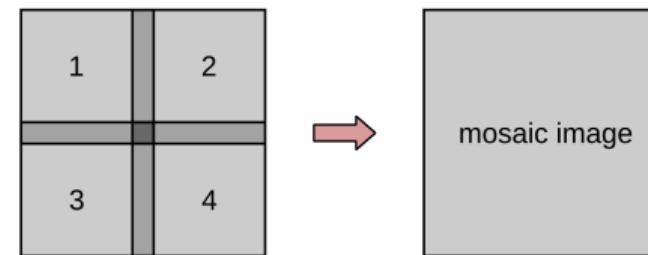
1. Introduction

2. Mosaicking

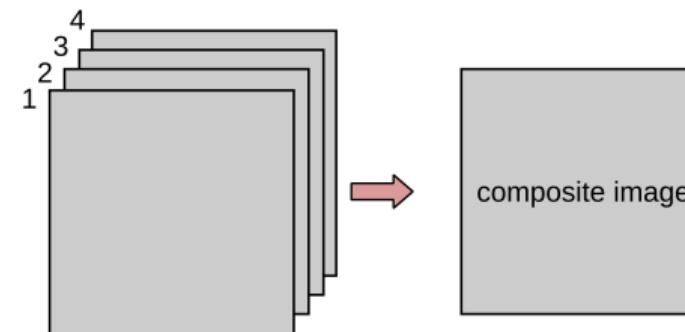
1. Mosaicking images
2. Mosaicking layers

3. Compositing

- **Mosaicking:** process of spatially assembling image datasets to produce a spatially continuous image

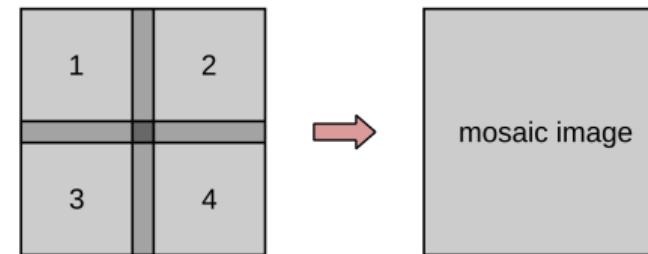


- **Compositing:** process of combining spatially overlapping images into a single image based on an aggregation function

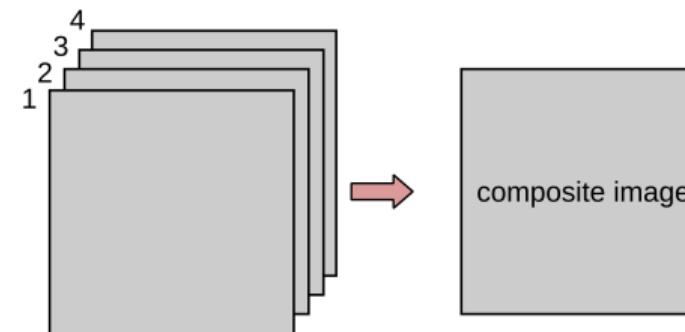


⇒ in GEE, these terms are used interchangeably (both operations are often performed together), see [reference](#)

- **Mosaicking:** process of spatially assembling image datasets to produce a spatially continuous image



- **Compositing:** process of combining spatially overlapping images into a single image based on an aggregation function



⇒ in GEE, these terms are used interchangeably (both operations are often performed together), see [reference](#)

2. Mosaicking

1. Introduction

2. Mosaicking

- 1. Mosaicking images**
- 2. Mosaicking layers**

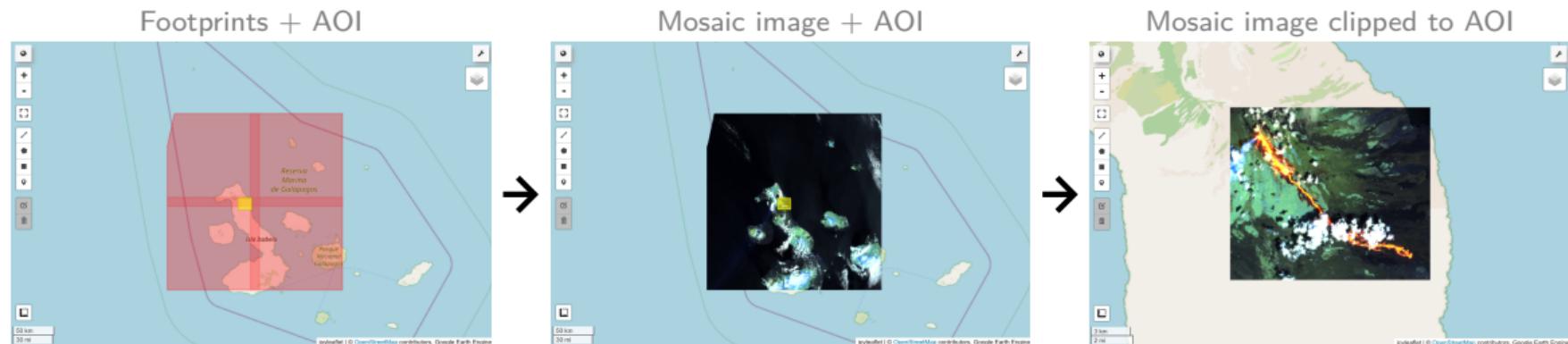
3. Compositing

2.1. Mosaicking images

Mosaicking images: make a single image from multiple images

EX: make a single image from a lava flow whose extent overlaps several Sentinel-2 products

⇒ **mosaicking** will reduce the ImageCollection to a single image



2.1. Mosaicking images

Mosaicking images: make a single image from multiple images

EX: make a single image from a lava flow whose extent overlaps several Sentinel-2 products

⇒ **mosaicking** will reduce the ImageCollection to a single image

```
# Get aoi and ImageCollection
aoi = ee.Geometry.Rectangle([-91.3348, -0.1229, -91.2003, -0.0069])
ic = (ee.ImageCollection('COPERNICUS/S2_HARMONIZED')
      .filterBounds(aoi)
      .filterDate('2022-01-11', '2022-01-12')
      )

# Mosaic and clip
image_mosaic = ic.mosaic()
image_mosaic_clip = image_mosaic.clip(aoi)
ic_footprints = ic.map(lambda img: ee.Feature(img.geometry()))

# Plot
vis_params = {'bands': ['B12', 'B11', 'B8A'], 'min': 0, 'max': 3000} # Swir bands composition

Map = geemap.Map()
Map.addLayerControl()
Map.centerObject(image_mosaic_clip, 12)
Map.addLayer(image_mosaic, vis_params, 'image mosaic')
Map.addLayer(image_mosaic_clip, vis_params, 'image mosaic (clipped)')
Map.addLayer(ic_footprints.draw(color='red'), {'opacity': 0.5}, 'footprints')
Map.addLayer(aoi, {'color': 'yellow', 'opacity': 1}, 'AOI')
Map
```



2.2. Mosaicking layers

Mosaicking layers: make a single image from multiple image layers

EX: make a single image from multiple image layers with different visualization parameters

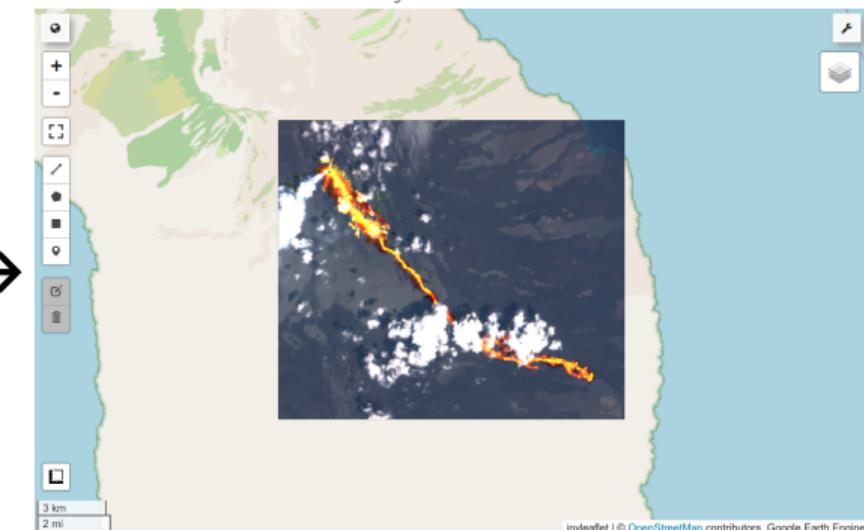
⇒ using masking operations we can visualize the hot lava pixels with SWIR bands composition, and the background pixels with RGB bands composition

NB: The mosaic() method composites overlapping images according to their order in the collection: the last image in the collection is on top.

Hot pixels mask



Layer mosaic



2.2. Mosaicking layers

Mosaicking layers: make a single image from multiple image layers

EX: make a single image from multiple image layers with different visualization parameters

⇒ using masking operations we can visualize the hot lava pixels with SWIR bands composition, and the background pixels with RGB bands composition

NB: The mosaic() method composites overlapping images according to their order in the collection: the last image in the collection is on top.

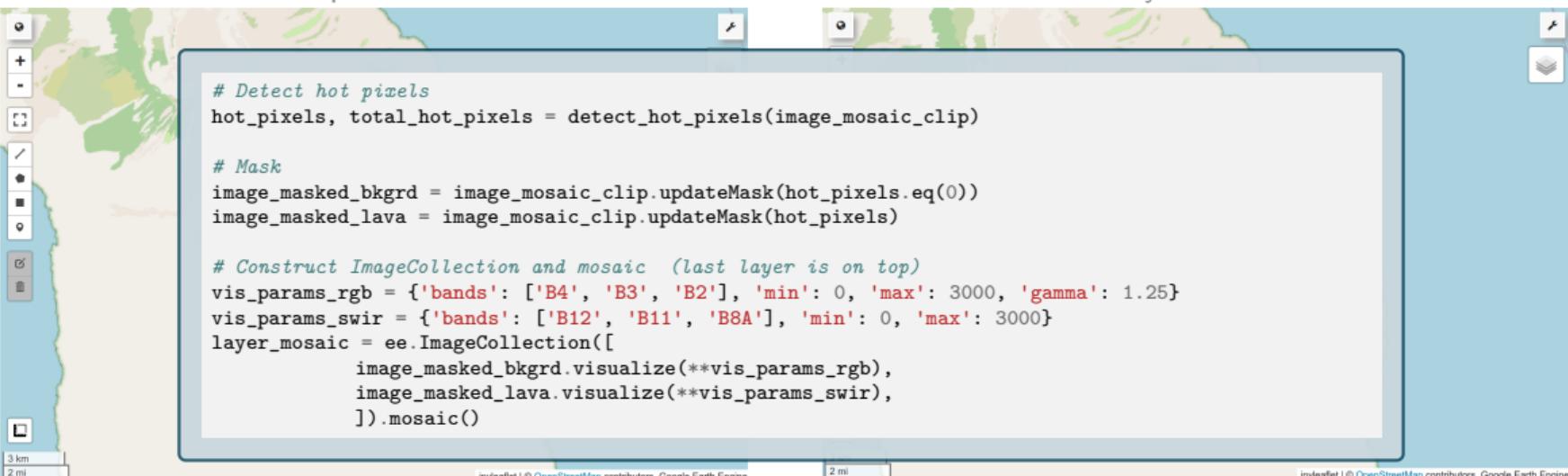
Hot pixels mask

Layer mosaic

```
# Detect hot pixels
hot_pixels, total_hot_pixels = detect_hot_pixels(image_mosaic_clip)

# Mask
image_masked_bkgrd = image_mosaic_clip.updateMask(hot_pixels.eq(0))
image_masked_lava = image_mosaic_clip.updateMask(hot_pixels)

# Construct ImageCollection and mosaic (last layer is on top)
vis_params_rgb = {'bands': ['B4', 'B3', 'B2'], 'min': 0, 'max': 3000, 'gamma': 1.25}
vis_params_swir = {'bands': ['B12', 'B11', 'B8A'], 'min': 0, 'max': 3000}
layer_mosaic = ee.ImageCollection([
    image_masked_bkgrd.visualize(**vis_params_rgb),
    image_masked_lava.visualize(**vis_params_swir),
]).mosaic()
```



1. Introduction

2. Mosaicking

1. Mosaicking images
2. Mosaicking layers

3. Compositing

Compositing example

EX: make a cloud-free (almost) image of Mexico

- ⇒ **compositing** using the median function will reduce the ImageCollection by taking the median value of each pixel over time
- ⇒ in regions where clouds are transient, the median value will tend to be cloud-free

Median composite image



Median composite image clipped

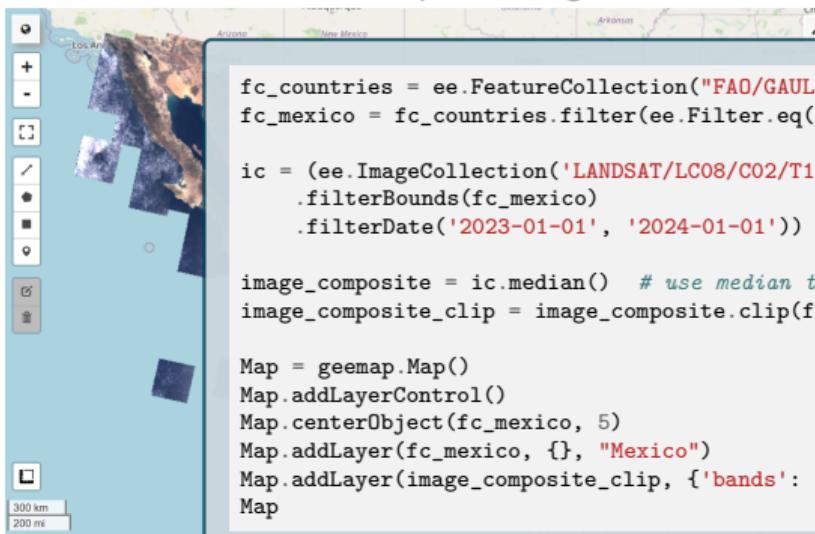


Compositing example

EX: make a cloud-free (almost) image of Mexico

- ⇒ **compositing** using the median function will reduce the ImageCollection by taking the median value of each pixel over time
- ⇒ in regions where clouds are transient, the median value will tend to be cloud-free

Median composite image



Median composite image clipped

