Time Series Analisys on Geoespatial Data with Python

Author: João Otavio Nascimento Firigato

email: joaootavionf007@gmail.com

LinkedIn: https://www.linkedin.com/in/jo%C3%A3o-otavio-firigato-4876b3aa/

First instructions:

✅ Access the link to join our private WhatsApp community for students: https://chat.whatsapp.com/EPn27ZgR07lF3e1vnj8FiI

❗ It is important to access the Whatsapp Group to get the Colab Notebooks, as the PDF files are protected from text copying.

Chapter 16 - Harmonic Time Series Clustering

In this example we will cluster harmonic time series obtained from Google Earth Engine. We start by installing and importing the necessary libraries:

In [ ]:
```
!pip install rasterio
!pip install tslearn
```

```
Collecting rasterio
  Downloading rasterio-1.4.3-cp311-cp311-manylinux_2_17_x86_64.manylinux2014_x86_
64.whl.metadata (9.1 kB)
Collecting affine (from rasterio)
  Downloading affine-2.4.0-py3-none-any.whl.metadata (4.0 kB)
Requirement already satisfied: attrs in /usr/local/lib/python3.11/dist-packages
(from rasterio) (25.3.0)
Requirement already satisfied: certifi in /usr/local/lib/python3.11/dist-packages
(from rasterio) (2025.1.31)
Requirement already satisfied: click>=4.0 in /usr/local/lib/python3.11/dist-packa
ges (from rasterio) (8.1.8)
Collecting cligj>=0.5 (from rasterio)
  Downloading cligj-0.7.2-py3-none-any.whl.metadata (5.0 kB)
Requirement already satisfied: numpy>=1.24 in /usr/local/lib/python3.11/dist-pack
ages (from rasterio) (2.0.2)
Collecting click-plugins (from rasterio)
  Downloading click_plugins-1.1.1-py2.py3-none-any.whl.metadata (6.4 kB)
Requirement already satisfied: pyparsing in /usr/local/lib/python3.11/dist-packag
es (from rasterio) (3.2.3)
Downloading rasterio-1.4.3-cp311-cp311-manylinux_2_17_x86_64.manylinux2014_x86_6
4.whl (22.2 MB)
   ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 22.2/22.2 MB 68.4 MB/s eta 0:00:00
Downloading cligj-0.7.2-py3-none-any.whl (7.1 kB)
Downloading affine-2.4.0-py3-none-any.whl (15 kB)
Downloading click_plugins-1.1.1-py2.py3-none-any.whl (7.5 kB)
Installing collected packages: cligj, click-plugins, affine, rasterio
Successfully installed affine-2.4.0 click-plugins-1.1.1 cligj-0.7.2 rasterio-1.4.
3
Collecting tslearn
  Downloading tslearn-0.6.3-py3-none-any.whl.metadata (14 kB)
Requirement already satisfied: numpy in /usr/local/lib/python3.11/dist-packages
(from tslearn) (2.0.2)
Requirement already satisfied: scipy in /usr/local/lib/python3.11/dist-packages
(from tslearn) (1.14.1)
Requirement already satisfied: scikit-learn in /usr/local/lib/python3.11/dist-pac
kages (from tslearn) (1.6.1)
Requirement already satisfied: numba in /usr/local/lib/python3.11/dist-packages
(from tslearn) (0.60.0)
Requirement already satisfied: joblib in /usr/local/lib/python3.11/dist-packages
(from tslearn) (1.4.2)
Requirement already satisfied: llvmlite<0.44,>=0.43.0dev0 in /usr/local/lib/pytho
n3.11/dist-packages (from numba->tslearn) (0.43.0)
Requirement already satisfied: threadpoolctl>=3.1.0 in /usr/local/lib/python3.11/
dist-packages (from scikit-learn->tslearn) (3.6.0)
Downloading tslearn-0.6.3-py3-none-any.whl (374 kB)
   ━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━━ 374.4/374.4 kB 5.3 MB/s eta 0:00:00
Installing collected packages: tslearn
Successfully installed tslearn-0.6.3
```

In [ ]:
```
import ee
ee.Authenticate()
ee.Initialize(project='my-project-1527255156007')
```

In [ ]:
```
import folium
from folium import plugins
from IPython.display import Image
import geopandas as gpd
import json
import math
import pandas as pd
```

```
from tslearn.clustering import TimeSeriesKMeans
from tslearn.utils import to_time_series_dataset
```

Let's select our area and generate 60 random points in that area:

In [ ]:
```
AOI =  ee.Geometry.Polygon(
        [[[-56.37397887990624, -12.737207954893526],
          [-56.37397887990624, -13.300834158918619],
          [-55.37113311574608, -13.300834158918619],
          [-55.37113311574608, -12.737207954893526]]])
points = ee.FeatureCollection.randomPoints(AOI,60)
```

Let's create a monthly image collection from 2017 to 2019:

In [ ]:
```
months = ee.List.sequence(1,12)
years = ee.List.sequence(2017, 2019)
```

In [ ]:
```
MD_NDVI = ee.ImageCollection('MODIS/MOD09GA_006_NDVI').filterDate('2017-1-1','20
```

Let's visualize our analysis area, with the points created:

In [ ]:
```
modis_ndvi = MD_NDVI.median().clip(AOI)
mean_ndvi = MD_NDVI.mean().clip(AOI)
```

In [ ]:
```
vis_params = {'min': 0, 'max': 1, 'b': ['red', 'yellow','green']}
```

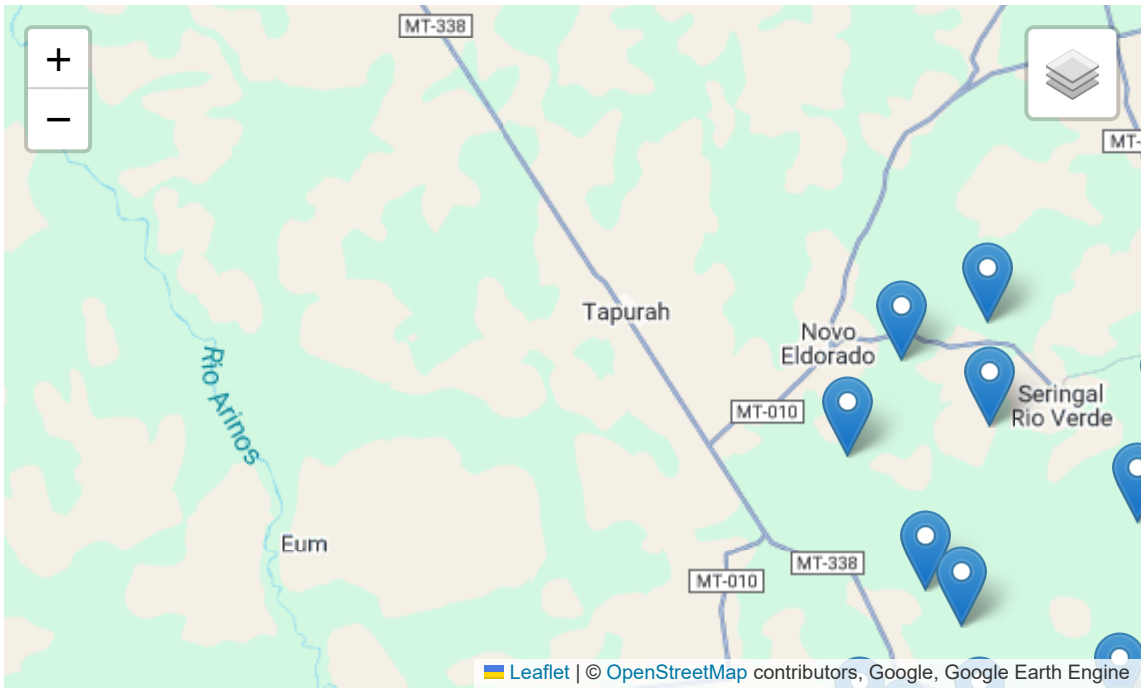
In [ ]:
```
basemaps = {
    'Google Maps': folium.TileLayer(
        tiles = 'https://mt1.google.com/vt/lyrs=m&x={x}&y={y}&z={z}',
        attr = 'Google',
        name = 'Google Maps',
        overlay = True,
        control = True
    ),
    'Google Satellite': folium.TileLayer(
        tiles = 'https://mt1.google.com/vt/lyrs=s&x={x}&y={y}&z={z}',
        attr = 'Google',
        name = 'Google Satellite',
        overlay = True,
        control = True
    ),
    'Google Terrain': folium.TileLayer(
        tiles = 'https://mt1.google.com/vt/lyrs=p&x={x}&y={y}&z={z}',
        attr = 'Google',
        name = 'Google Terrain',
        overlay = True,
        control = True
    ),
    'Google Satellite Hybrid': folium.TileLayer(
        tiles = 'https://mt1.google.com/vt/lyrs=y&x={x}&y={y}&z={z}',
        attr = 'Google',
        name = 'Google Satellite',
        overlay = True,
        control = True
    ),
    'Esri Satellite': folium.TileLayer(
        tiles = 'https://server.arcgisonline.com/ArcGIS/rest/services/World_Imag
```

```
        attr = 'Esri',
        name = 'Esri Satellite',
        overlay = True,
        control = True
    )
}
```

In [ ]:
```
def add_ee_layer(self, ee_object, vis_params, name):

    try:
        # display ee.Image()
        if isinstance(ee_object, ee.image.Image):
            map_id_dict = ee.Image(ee_object).getMapId(vis_params)
            folium.raster_layers.TileLayer(
            tiles = map_id_dict['tile_fetcher'].url_format,
            attr = 'Google Earth Engine',
            name = name,
            overlay = True,
            control = True
            ).add_to(self)
        # display ee.ImageCollection()
        elif isinstance(ee_object, ee.imagecollection.ImageCollection):
            ee_object_new = ee_object.mosaic()
            map_id_dict = ee.Image(ee_object_new).getMapId(vis_params)
            folium.raster_layers.TileLayer(
            tiles = map_id_dict['tile_fetcher'].url_format,
            attr = 'Google Earth Engine',
            name = name,
            overlay = True,
            control = True
            ).add_to(self)
        # display ee.Geometry()
        elif isinstance(ee_object, ee.geometry.Geometry):
            folium.GeoJson(
            data = ee_object.getInfo(),
            name = name,
            overlay = True,
            control = True
        ).add_to(self)
        # display ee.FeatureCollection()
        elif isinstance(ee_object, ee.featurecollection.FeatureCollection):
            ee_object_new = ee.Image().paint(ee_object, 0, 2)
            map_id_dict = ee.Image(ee_object_new).getMapId(vis_params)
            folium.raster_layers.TileLayer(
            tiles = map_id_dict['tile_fetcher'].url_format,
            attr = 'Google Earth Engine',
            name = name,
            overlay = True,
            control = True
        ).add_to(self)

    except:
        print("Could not display {}".format(name))

# Add EE drawing method to folium.
folium.Map.add_ee_layer = add_ee_layer
```

In [ ]:
```
my_map = folium.Map(location=[-13.0912068,-55.9881647], zoom_start=10)
```

```
# Add custom basemaps
basemaps['Google Maps'].add_to(my_map)

# Add the elevation model to the map object.
my_map.add_ee_layer(modis_ndvi, vis_params, 'NDVI')
my_map.add_ee_layer(points.geometry(), {}, 'Points')
my_map.add_child(folium.LayerControl())

# Display the map.
display(my_map)
```



We can then generate our monthly collection of images:

In [ ]:
```
def monthly(collection):
  img_coll = ee.ImageCollection([])
  for y in years.getInfo():
    for m in months.getInfo():
      filtered = collection.filter(ee.Filter.calendarRange(y, y, 'year')).filter
      filtered = filtered.median()
      img_coll = img_coll.merge(filtered.set('year', y).set('month', m).set('sys
  return img_coll
```

In [ ]:
```
Monthly_MD = monthly(MD_NDVI)
```

Now we generate our NDVI harmonic series:

In [ ]:
```
dependent = 'NDVI'
harmonics = 3
harmonicFrequencies = list(range(1, harmonics+1))
```

In [ ]:
```
harmonicFrequencies
```

Out[ ]:
```
[1, 2, 3]
```

In [ ]:
```
def getNames (base, lst_freq) :
  name_lst = []
  for i in lst_freq:
```

```
    name_lst.append(ee.String(base + str(i)))
  return name_lst
```

In [ ]:
```
cosNames = getNames('cos_', harmonicFrequencies);
sinNames = getNames('sin_', harmonicFrequencies);
independents = ee.List(['constant', 't']).cat(cosNames).cat(sinNames);
```

In [ ]:
```
def addConstant (image) :
  return image.addBands(ee.Image(1));
```

In [ ]:
```
def addTime (image) :
  date = ee.Date(image.get('system:time_start'));
  years = date.difference(ee.Date('1970-01-01'), 'year');
  timeRadians = ee.Image(years.multiply(2 * math.pi));
  return image.addBands(timeRadians.rename('t').float());
```

In [ ]:
```
def addHarmonics (image) :
  frequencies = ee.Image.constant(harmonicFrequencies)
  time = ee.Image(image).select('t')
  cosines = time.multiply(frequencies).cos().rename(cosNames)
  sines = time.multiply(frequencies).sin().rename(sinNames)
  return image.addBands(cosines).addBands(sines)
```

In [ ]:
```
harmonicMODIS2 = Monthly_MD.map(addConstant).map(addTime).map(addHarmonics);
```

In [ ]:
```
harmonicTrend = harmonicMODIS2.select(independents.add(dependent)).reduce(ee.Red
```

In [ ]:
```
harmonicTrendCoefficients = harmonicTrend.select('coefficients').arrayProject([0
```

In [ ]:
```
fittedHarmonic = harmonicMODIS2.map(lambda image : image.addBands(image.select(i
```

In [ ]:
```
print(fittedHarmonic.getInfo())
print(harmonicTrendCoefficients.getInfo())
```

{'type': 'ImageCollection', 'bands': [], 'features': [{'type': 'Image', 'bands': [{'id': 'NDVI', 'data_type': {'type': 'PixelType', 'precision': 'float', 'min': -1, 'max': 1}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'constant', 'data_type': {'type': 'PixelType', 'precision': 'int', 'min': 1, 'max': 1}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 't', 'data_type': {'type': 'PixelType', 'precision': 'float'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_1', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_2', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_3', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_1', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_2', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_3', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'fitted', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}], 'properties': {'system:time_start': 1451606400000, 'month': 1, 'year': 2016, 'system:index': '1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_2_0'}}, {'type': 'Image', 'bands': [{'id': 'NDVI', 'data_type': {'type': 'PixelType', 'precision': 'float', 'min': -1, 'max': 1}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'constant', 'data_type': {'type': 'PixelType', 'precision': 'int', 'min': 1, 'max': 1}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 't', 'data_type': {'type': 'PixelType', 'precision': 'float'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_1', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_2', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_3', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_1', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_2', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_3', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'fitted', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}], 'properties': {'system:time_start': 1454284800000, 'month': 2, 'year': 2016, 'system:index': '1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_2_0'}}, {'type': 'Image', 'bands': [{'id': 'NDVI', 'data_type': {'type': 'PixelType', 'precision': 'float', 'min': -1, 'max': 1}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'constant', 'data_type': {'type': 'PixelType', 'precision': 'int', 'min': 1, 'max': 1}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 't', 'data_type': {'type': 'PixelType', 'precision': 'float'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_1', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_2', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_3', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_1', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_2', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_3', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'fitted', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}], 'properties': {'system:time_start': 1456790400000, 'month': 3, 'year': 2016, 'system:index': '1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_2_0'}}, {'type': 'Image', 'ba

nds': [{'id': 'NDVI', 'data_type': {'type': 'PixelType', 'precision': 'float', 'min': -1, 'max': 1}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'constant', 'data_type': {'type': 'PixelType', 'precision': 'int', 'min': 1, 'max': 1}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 't', 'data_type': {'type': 'PixelType', 'precision': 'float'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_1', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_2', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_3', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_1', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_2', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_3', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'fitted', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}], 'properties': {'system:time_start': 1459468800000, 'month': 4, 'year': 2016, 'system:index': '1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_2_0'}}, {'type': 'Image', 'bands': [{'id': 'NDVI', 'data_type': {'type': 'PixelType', 'precision': 'float', 'min': -1, 'max': 1}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'constant', 'data_type': {'type': 'PixelType', 'precision': 'int', 'min': 1, 'max': 1}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 't', 'data_type': {'type': 'PixelType', 'precision': 'float'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_1', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_2', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_3', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_1', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_2', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_3', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'fitted', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}], 'properties': {'system:time_start': 1462060800000, 'month': 5, 'year': 2016, 'system:index': '1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_2_0'}}, {'type': 'Image', 'bands': [{'id': 'NDVI', 'data_type': {'type': 'PixelType', 'precision': 'float', 'min': -1, 'max': 1}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'constant', 'data_type': {'type': 'PixelType', 'precision': 'int', 'min': 1, 'max': 1}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 't', 'data_type': {'type': 'PixelType', 'precision': 'float'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_1', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_2', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_3', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_1', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_2', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_3', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'fitted', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}], 'properties': {'system:time_start': 1464739200000, 'month': 6, 'year': 2016, 'system:index': '1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_2_0'}}, {'type': 'Image', 'bands': [{'id': 'NDVI', 'data_type': {'type': 'PixelType', 'precision': 'float', 'min': -1, 'max':

1}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'constant', 'data_type': {'type': 'PixelType', 'precision': 'int', 'min': 1, 'max': 1}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 't', 'data_type': {'type': 'PixelType', 'precision': 'float'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_1', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_2', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_3', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_1', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_2', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_3', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'fitted', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}], 'properties': {'system:time_start': 1467331200000, 'month': 7, 'year': 2016, 'system:index': '1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_2_0'}}, {'type': 'Image', 'bands': [{'id': 'NDVI', 'data_type': {'type': 'PixelType', 'precision': 'float', 'min': -1, 'max': 1}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'constant', 'data_type': {'type': 'PixelType', 'precision': 'int', 'min': 1, 'max': 1}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 't', 'data_type': {'type': 'PixelType', 'precision': 'float'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_1', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_2', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_3', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_1', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_2', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_3', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'fitted', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}], 'properties': {'system:time_start': 1470009600000, 'month': 8, 'year': 2016, 'system:index': '1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_2_0'}}, {'type': 'Image', 'bands': [{'id': 'NDVI', 'data_type': {'type': 'PixelType', 'precision': 'float', 'min': -1, 'max': 1}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'constant', 'data_type': {'type': 'PixelType', 'precision': 'int', 'min': 1, 'max': 1}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 't', 'data_type': {'type': 'PixelType', 'precision': 'float'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_1', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_2', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_3', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_1', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_2', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_3', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'fitted', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}], 'properties': {'system:time_start': 1472688000000, 'month': 9, 'year': 2016, 'system:index': '1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_2_0'}}, {'type': 'Image', 'bands': [{'id': 'NDVI', 'data_type': {'type': 'PixelType', 'precision': 'float', 'min': -1, 'max': 1}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'constant', 'data_type': {'type': 'PixelTyp

e', 'precision': 'int', 'min': 1, 'max': 1}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 't', 'data_type': {'type': 'PixelType', 'precision': 'float'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_1', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_2', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_3', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_1', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_2', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_3', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'fitted', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}], 'properties': {'system:time_start': 1475280000000, 'month': 10, 'year': 2016, 'system:index': '1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_2_0'}}, {'type': 'Image', 'bands': [{'id': 'NDVI', 'data_type': {'type': 'PixelType', 'precision': 'float', 'min': -1, 'max': 1}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'constant', 'data_type': {'type': 'PixelType', 'precision': 'int', 'min': 1, 'max': 1}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 't', 'data_type': {'type': 'PixelType', 'precision': 'float'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_1', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_2', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_3', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_1', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_2', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_3', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'fitted', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}], 'properties': {'system:time_start': 1477958400000, 'month': 11, 'year': 2016, 'system:index': '1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_2_0'}}, {'type': 'Image', 'bands': [{'id': 'NDVI', 'data_type': {'type': 'PixelType', 'precision': 'float', 'min': -1, 'max': 1}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'constant', 'data_type': {'type': 'PixelType', 'precision': 'int', 'min': 1, 'max': 1}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 't', 'data_type': {'type': 'PixelType', 'precision': 'float'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_1', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_2', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_3', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_1', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_2', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_3', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'fitted', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}], 'properties': {'system:time_start': 1480550400000, 'month': 12, 'year': 2016, 'system:index': '1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_2_0'}}, {'type': 'Image', 'bands': [{'id': 'NDVI', 'data_type': {'type': 'PixelType', 'precision': 'float', 'min': -1, 'max': 1}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'constant', 'data_type': {'type': 'PixelType', 'precision': 'int', 'min': 1, 'max': 1}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 't', 'data_type':

JOAO OTAVIO NASCIMENTO FIRIGATO, joaootavionf007@gmail.com

{'type': 'PixelType', 'precision': 'float'}, 'crs': 'EPSG:4326', 'crs_transform':
[1, 0, 0, 0, 1, 0]}, {'id': 'cos_1', 'data_type': {'type': 'PixelType', 'precisio
n': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id':
'cos_2', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:
4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_3', 'data_type': {'typ
e': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1,
0, 0, 0, 1, 0]}, {'id': 'sin_1', 'data_type': {'type': 'PixelType', 'precision':
'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_
2', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:432
6', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_3', 'data_type': {'type':
'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0,
0, 0, 1, 0]}, {'id': 'fitted', 'data_type': {'type': 'PixelType', 'precision': 'd
ouble'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}], 'properties':
{'system:time_start': 1483228800000, 'month': 1, 'year': 2017, 'system:index': '1
_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_2_0'}}, {'ty
pe': 'Image', 'bands': [{'id': 'NDVI', 'data_type': {'type': 'PixelType', 'precis
ion': 'float', 'min': -1, 'max': 1}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0,
0, 0, 1, 0]}, {'id': 'constant', 'data_type': {'type': 'PixelType', 'precision':
'int', 'min': 1, 'max': 1}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1,
0]}, {'id': 't', 'data_type': {'type': 'PixelType', 'precision': 'float'}, 'crs':
'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_1', 'data_type':
{'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transfor
m': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_2', 'data_type': {'type': 'PixelType', 'prec
ision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'i
d': 'cos_3', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'E
PSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_1', 'data_type': {'t
ype': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform':
[1, 0, 0, 0, 1, 0]}, {'id': 'sin_2', 'data_type': {'type': 'PixelType', 'precisio
n': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id':
'sin_3', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:
4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'fitted', 'data_type': {'typ
e': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1,
0, 0, 0, 1, 0]}], 'properties': {'system:time_start': 1485907200000, 'month': 2,
'year': 2017, 'system:index': '1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_
1_1_1_1_1_1_1_1_1_2_0'}}, {'type': 'Image', 'bands': [{'id': 'NDVI', 'data_type':
{'type': 'PixelType', 'precision': 'float', 'min': -1, 'max': 1}, 'crs': 'EPSG:43
26', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'constant', 'data_type': {'typ
e': 'PixelType', 'precision': 'int', 'min': 1, 'max': 1}, 'crs': 'EPSG:4326', 'cr
s_transform': [1, 0, 0, 0, 1, 0]}, {'id': 't', 'data_type': {'type': 'PixelType',
'precision': 'float'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]},
{'id': 'cos_1', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs':
'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_2', 'data_type':
{'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transfor
m': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_3', 'data_type': {'type': 'PixelType', 'prec
ision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'i
d': 'sin_1', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'E
PSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_2', 'data_type': {'t
ype': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform':
[1, 0, 0, 0, 1, 0]}, {'id': 'sin_3', 'data_type': {'type': 'PixelType', 'precisio
n': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id':
'fitted', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPS
G:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}], 'properties': {'system:time_star
t': 1488326400000, 'month': 3, 'year': 2017, 'system:index': '1_1_1_1_1_1_1_1_1_1
_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_2_0'}}, {'type': 'Image', 'bands':
[{'id': 'NDVI', 'data_type': {'type': 'PixelType', 'precision': 'float', 'min': -
1, 'max': 1}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'c
onstant', 'data_type': {'type': 'PixelType', 'precision': 'int', 'min': 1, 'max':
1}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 't', 'data_t
ype': {'type': 'PixelType', 'precision': 'float'}, 'crs': 'EPSG:4326', 'crs_trans
form': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_1', 'data_type': {'type': 'PixelType', 'p

recision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]},
{'id': 'cos_2', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs':
'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_3', 'data_type':
{'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transfor
m': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_1', 'data_type': {'type': 'PixelType', 'prec
ision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'i
d': 'sin_2', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'E
PSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_3', 'data_type': {'t
ype': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform':
[1, 0, 0, 0, 1, 0]}, {'id': 'fitted', 'data_type': {'type': 'PixelType', 'precisi
on': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}], 'prope
rties': {'system:time_start': 1491004800000, 'month': 4, 'year': 2017, 'system:in
dex': '1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_2_0'}},
{'type': 'Image', 'bands': [{'id': 'NDVI', 'data_type': {'type': 'PixelType', 'pr
ecision': 'float', 'min': -1, 'max': 1}, 'crs': 'EPSG:4326', 'crs_transform': [1,
0, 0, 0, 1, 0]}, {'id': 'constant', 'data_type': {'type': 'PixelType', 'precisio
n': 'int', 'min': 1, 'max': 1}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0,
1, 0]}, {'id': 't', 'data_type': {'type': 'PixelType', 'precision': 'float'}, 'cr
s': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_1', 'data_typ
e': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transf
orm': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_2', 'data_type': {'type': 'PixelType', 'pr
ecision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]},
{'id': 'cos_3', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs':
'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_1', 'data_type':
{'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transfor
m': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_2', 'data_type': {'type': 'PixelType', 'prec
ision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'i
d': 'sin_3', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'E
PSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'fitted', 'data_type':
{'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transfor
m': [1, 0, 0, 0, 1, 0]}], 'properties': {'system:time_start': 1493596800000, 'mon
th': 5, 'year': 2017, 'system:index': '1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_
1_1_1_1_1_1_1_1_1_1_2_0'}}, {'type': 'Image', 'bands': [{'id': 'NDVI', 'data_typ
e': {'type': 'PixelType', 'precision': 'float', 'min': -1, 'max': 1}, 'crs': 'EPS
G:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'constant', 'data_type':
{'type': 'PixelType', 'precision': 'int', 'min': 1, 'max': 1}, 'crs': 'EPSG:432
6', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 't', 'data_type': {'type': 'Pixe
lType', 'precision': 'float'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0,
1, 0]}, {'id': 'cos_1', 'data_type': {'type': 'PixelType', 'precision': 'doubl
e'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_2', 'd
ata_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs
_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_3', 'data_type': {'type': 'PixelTyp
e', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1,
0]}, {'id': 'sin_1', 'data_type': {'type': 'PixelType', 'precision': 'double'},
'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_2', 'data_t
ype': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_tran
sform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_3', 'data_type': {'type': 'PixelType',
'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]},
{'id': 'fitted', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'cr
s': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}], 'properties': {'system:ti
me_start': 1496275200000, 'month': 6, 'year': 2017, 'system:index': '1_1_1_1_1_1_
1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_2_0'}}, {'type': 'Image', 'band
s': [{'id': 'NDVI', 'data_type': {'type': 'PixelType', 'precision': 'float', 'mi
n': -1, 'max': 1}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'i
d': 'constant', 'data_type': {'type': 'PixelType', 'precision': 'int', 'min': 1,
'max': 1}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 't',
'data_type': {'type': 'PixelType', 'precision': 'float'}, 'crs': 'EPSG:4326', 'cr
s_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_1', 'data_type': {'type': 'PixelTy
pe', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1,
0]}, {'id': 'cos_2', 'data_type': {'type': 'PixelType', 'precision': 'double'},

'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_3', 'data_t
ype': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_tran
sform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_1', 'data_type': {'type': 'PixelType',
'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]},
{'id': 'sin_2', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs':
'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_3', 'data_type':
{'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transfor
m': [1, 0, 0, 0, 1, 0]}, {'id': 'fitted', 'data_type': {'type': 'PixelType', 'pre
cision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}], 'p
roperties': {'system:time_start': 1498867200000, 'month': 7, 'year': 2017, 'syste
m:index': '1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_2_0'}}, {'ty
pe': 'Image', 'bands': [{'id': 'NDVI', 'data_type': {'type': 'PixelType', 'precis
ion': 'float', 'min': -1, 'max': 1}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0,
0, 0, 1, 0]}, {'id': 'constant', 'data_type': {'type': 'PixelType', 'precision':
'int', 'min': 1, 'max': 1}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1,
0]}, {'id': 't', 'data_type': {'type': 'PixelType', 'precision': 'float'}, 'crs':
'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_1', 'data_type':
{'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transfor
m': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_2', 'data_type': {'type': 'PixelType', 'prec
ision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'i
d': 'cos_3', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'E
PSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_1', 'data_type': {'t
ype': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform':
[1, 0, 0, 0, 1, 0]}, {'id': 'sin_2', 'data_type': {'type': 'PixelType', 'precisio
n': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id':
'sin_3', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:
4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'fitted', 'data_type': {'typ
e': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1,
0, 0, 0, 1, 0]}], 'properties': {'system:time_start': 1501545600000, 'month': 8,
'year': 2017, 'system:index': '1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_
1_1_1_2_0'}}, {'type': 'Image', 'bands': [{'id': 'NDVI', 'data_type': {'type': 'P
ixelType', 'precision': 'float', 'min': -1, 'max': 1}, 'crs': 'EPSG:4326', 'crs_t
ransform': [1, 0, 0, 0, 1, 0]}, {'id': 'constant', 'data_type': {'type': 'PixelTy
pe', 'precision': 'int', 'min': 1, 'max': 1}, 'crs': 'EPSG:4326', 'crs_transfor
m': [1, 0, 0, 0, 1, 0]}, {'id': 't', 'data_type': {'type': 'PixelType', 'precisio
n': 'float'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'c
os_1', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:43
26', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_2', 'data_type': {'type':
'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0,
0, 0, 1, 0]}, {'id': 'cos_3', 'data_type': {'type': 'PixelType', 'precision': 'do
uble'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_1',
'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'c
rs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_2', 'data_type': {'type': 'PixelT
ype', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0,
1, 0]}, {'id': 'sin_3', 'data_type': {'type': 'PixelType', 'precision': 'doubl
e'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'fitted',
'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'c
rs_transform': [1, 0, 0, 0, 1, 0]}], 'properties': {'system:time_start': 15042240
00000, 'month': 9, 'year': 2017, 'system:index': '1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1
_1_1_1_1_1_1_1_1_1_1_1_2_0'}}, {'type': 'Image', 'bands': [{'id': 'NDVI', 'data_t
ype': {'type': 'PixelType', 'precision': 'float', 'min': -1, 'max': 1}, 'crs': 'E
PSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'constant', 'data_type':
{'type': 'PixelType', 'precision': 'int', 'min': 1, 'max': 1}, 'crs': 'EPSG:432
6', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 't', 'data_type': {'type': 'Pixe
lType', 'precision': 'float'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0,
1, 0]}, {'id': 'cos_1', 'data_type': {'type': 'PixelType', 'precision': 'doubl
e'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_2', 'd
ata_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs
_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_3', 'data_type': {'type': 'PixelTyp
e', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1,

0]}, {'id': 'sin_1', 'data_type': {'type': 'PixelType', 'precision': 'double'},
'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_2', 'data_t
ype': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_tran
sform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_3', 'data_type': {'type': 'PixelType',
'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]},
{'id': 'fitted', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'cr
s': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}], 'properties': {'system:ti
me_start': 1506816000000, 'month': 10, 'year': 2017, 'system:index': '1_1_1_1_1_1
_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_2_0'}}, {'type': 'Image', 'bands': [{'i
d': 'NDVI', 'data_type': {'type': 'PixelType', 'precision': 'float', 'min': -1,
'max': 1}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'cons
tant', 'data_type': {'type': 'PixelType', 'precision': 'int', 'min': 1, 'max':
1}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 't', 'data_t
ype': {'type': 'PixelType', 'precision': 'float'}, 'crs': 'EPSG:4326', 'crs_trans
form': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_1', 'data_type': {'type': 'PixelType', 'p
recision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]},
{'id': 'cos_2', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs':
'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_3', 'data_type':
{'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transfor
m': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_1', 'data_type': {'type': 'PixelType', 'prec
ision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'i
d': 'sin_2', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'E
PSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_3', 'data_type': {'t
ype': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform':
[1, 0, 0, 0, 1, 0]}, {'id': 'fitted', 'data_type': {'type': 'PixelType', 'precisi
on': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}], 'prope
rties': {'system:time_start': 1509494400000, 'month': 11, 'year': 2017, 'system:i
ndex': '1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_2_0'}}, {'type': 'Imag
e', 'bands': [{'id': 'NDVI', 'data_type': {'type': 'PixelType', 'precision': 'flo
at', 'min': -1, 'max': 1}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1,
0]}, {'id': 'constant', 'data_type': {'type': 'PixelType', 'precision': 'int', 'm
in': 1, 'max': 1}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'i
d': 't', 'data_type': {'type': 'PixelType', 'precision': 'float'}, 'crs': 'EPSG:4
326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_1', 'data_type': {'type':
'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0,
0, 0, 1, 0]}, {'id': 'cos_2', 'data_type': {'type': 'PixelType', 'precision': 'do
uble'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_3',
'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'c
rs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_1', 'data_type': {'type': 'PixelT
ype', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0,
1, 0]}, {'id': 'sin_2', 'data_type': {'type': 'PixelType', 'precision': 'doubl
e'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_3', 'd
ata_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs
_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'fitted', 'data_type': {'type': 'PixelTy
pe', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1,
0]}], 'properties': {'system:time_start': 1512086400000, 'month': 12, 'year': 201
7, 'system:index': '1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_2_0'}}, {'typ
e': 'Image', 'bands': [{'id': 'NDVI', 'data_type': {'type': 'PixelType', 'precisi
on': 'float', 'min': -1, 'max': 1}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0,
0, 0, 1, 0]}, {'id': 'constant', 'data_type': {'type': 'PixelType', 'precision':
'int', 'min': 1, 'max': 1}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1,
0]}, {'id': 't', 'data_type': {'type': 'PixelType', 'precision': 'float'}, 'crs':
'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_1', 'data_type':
{'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transfor
m': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_2', 'data_type': {'type': 'PixelType', 'prec
ision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'i
d': 'cos_3', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'E
PSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_1', 'data_type': {'t
ype': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform':
[1, 0, 0, 0, 1, 0]}, {'id': 'sin_2', 'data_type': {'type': 'PixelType', 'precisio

n': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id':
'sin_3', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:
4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'fitted', 'data_type': {'typ
e': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1,
0, 0, 0, 1, 0]}], 'properties': {'system:time_start': 1514764800000, 'month': 1,
'year': 2018, 'system:index': '1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_2_
0'}}, {'type': 'Image', 'bands': [{'id': 'NDVI', 'data_type': {'type': 'PixelTyp
e', 'precision': 'float', 'min': -1, 'max': 1}, 'crs': 'EPSG:4326', 'crs_transfor
m': [1, 0, 0, 0, 1, 0]}, {'id': 'constant', 'data_type': {'type': 'PixelType', 'p
recision': 'int', 'min': 1, 'max': 1}, 'crs': 'EPSG:4326', 'crs_transform': [1,
0, 0, 0, 1, 0]}, {'id': 't', 'data_type': {'type': 'PixelType', 'precision': 'flo
at'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_1',
'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'c
rs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_2', 'data_type': {'type': 'PixelT
ype', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0,
1, 0]}, {'id': 'cos_3', 'data_type': {'type': 'PixelType', 'precision': 'doubl
e'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_1', 'd
ata_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs
_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_2', 'data_type': {'type': 'PixelTyp
e', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1,
0]}, {'id': 'sin_3', 'data_type': {'type': 'PixelType', 'precision': 'double'},
'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'fitted', 'data_
type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_tra
nsform': [1, 0, 0, 0, 1, 0]}], 'properties': {'system:time_start': 1517443200000,
'month': 2, 'year': 2018, 'system:index': '1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_
1_1_1_2_0'}}, {'type': 'Image', 'bands': [{'id': 'NDVI', 'data_type': {'type': 'P
ixelType', 'precision': 'float', 'min': -1, 'max': 1}, 'crs': 'EPSG:4326', 'crs_t
ransform': [1, 0, 0, 0, 1, 0]}, {'id': 'constant', 'data_type': {'type': 'PixelTy
pe', 'precision': 'int', 'min': 1, 'max': 1}, 'crs': 'EPSG:4326', 'crs_transfor
m': [1, 0, 0, 0, 1, 0]}, {'id': 't', 'data_type': {'type': 'PixelType', 'precisio
n': 'float'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'c
os_1', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:43
26', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_2', 'data_type': {'type':
'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0,
0, 0, 1, 0]}, {'id': 'cos_3', 'data_type': {'type': 'PixelType', 'precision': 'do
uble'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_1',
'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'c
rs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_2', 'data_type': {'type': 'PixelT
ype', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0,
1, 0]}, {'id': 'sin_3', 'data_type': {'type': 'PixelType', 'precision': 'doubl
e'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'fitted',
'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'c
rs_transform': [1, 0, 0, 0, 1, 0]}], 'properties': {'system:time_start': 15198624
00000, 'month': 3, 'year': 2018, 'system:index': '1_1_1_1_1_1_1_1_1_1_1_1_1_1_1_1
_1_1_1_1_1_2_0'}}, {'type': 'Image', 'bands': [{'id': 'NDVI', 'data_type': {'typ
e': 'PixelType', 'precision': 'float', 'min': -1, 'max': 1}, 'crs': 'EPSG:4326',
'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'constant', 'data_type': {'type': 'P
ixelType', 'precision': 'int', 'min': 1, 'max': 1}, 'crs': 'EPSG:4326', 'crs_tran
sform': [1, 0, 0, 0, 1, 0]}, {'id': 't', 'data_type': {'type': 'PixelType', 'prec
ision': 'float'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'i
d': 'cos_1', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'E
PSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_2', 'data_type': {'t
ype': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform':
[1, 0, 0, 0, 1, 0]}, {'id': 'cos_3', 'data_type': {'type': 'PixelType', 'precisio
n': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id':
'sin_1', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:
4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_2', 'data_type': {'typ
e': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1,
0, 0, 0, 1, 0]}, {'id': 'sin_3', 'data_type': {'type': 'PixelType', 'precision':
'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'fitt

ed', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:432
6', 'crs_transform': [1, 0, 0, 0, 1, 0]}], 'properties': {'system:time_start': 15
22540800000, 'month': 4, 'year': 2018, 'system:index': '1_1_1_1_1_1_1_1_1_1_1_1
_1_1_1_1_1_1_1_2_0'}}, {'type': 'Image', 'bands': [{'id': 'NDVI', 'data_type':
{'type': 'PixelType', 'precision': 'float', 'min': -1, 'max': 1}, 'crs': 'EPSG:43
26', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'constant', 'data_type': {'typ
e': 'PixelType', 'precision': 'int', 'min': 1, 'max': 1}, 'crs': 'EPSG:4326', 'cr
s_transform': [1, 0, 0, 0, 1, 0]}, {'id': 't', 'data_type': {'type': 'PixelType',
'precision': 'float'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]},
{'id': 'cos_1', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs':
'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_2', 'data_type':
{'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transfor
m': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_3', 'data_type': {'type': 'PixelType', 'prec
ision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'i
d': 'sin_1', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'E
PSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_2', 'data_type': {'t
ype': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform':
[1, 0, 0, 0, 1, 0]}, {'id': 'sin_3', 'data_type': {'type': 'PixelType', 'precisio
n': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id':
'fitted', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPS
G:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}], 'properties': {'system:time_star
t': 1525132800000, 'month': 5, 'year': 2018, 'system:index': '1_1_1_1_1_1_1_1_1_1
_1_1_1_1_1_1_1_1_2_0'}}, {'type': 'Image', 'bands': [{'id': 'NDVI', 'data_typ
e': {'type': 'PixelType', 'precision': 'float', 'min': -1, 'max': 1}, 'crs': 'EPS
G:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'constant', 'data_type':
{'type': 'PixelType', 'precision': 'int', 'min': 1, 'max': 1}, 'crs': 'EPSG:432
6', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 't', 'data_type': {'type': 'Pixe
lType', 'precision': 'float'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0,
1, 0]}, {'id': 'cos_1', 'data_type': {'type': 'PixelType', 'precision': 'doubl
e'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_2', 'd
ata_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs
_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_3', 'data_type': {'type': 'PixelTyp
e', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1,
0]}, {'id': 'sin_1', 'data_type': {'type': 'PixelType', 'precision': 'double'},
'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_2', 'data_t
ype': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_tran
sform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_3', 'data_type': {'type': 'PixelType',
'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]},
{'id': 'fitted', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'cr
s': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}], 'properties': {'system:ti
me_start': 1527811200000, 'month': 6, 'year': 2018, 'system:index': '1_1_1_1_1_1_
1_1_1_1_1_1_1_1_1_1_1_1_2_0'}}, {'type': 'Image', 'bands': [{'id': 'NDVI', 'data_
type': {'type': 'PixelType', 'precision': 'float', 'min': -1, 'max': 1}, 'crs':
'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'constant', 'data_typ
e': {'type': 'PixelType', 'precision': 'int', 'min': 1, 'max': 1}, 'crs': 'EPSG:4
326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 't', 'data_type': {'type': 'Pi
xelType', 'precision': 'float'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0,
0, 1, 0]}, {'id': 'cos_1', 'data_type': {'type': 'PixelType', 'precision': 'doubl
e'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_2', 'd
ata_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs
_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_3', 'data_type': {'type': 'PixelTyp
e', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1,
0]}, {'id': 'sin_1', 'data_type': {'type': 'PixelType', 'precision': 'double'},
'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_2', 'data_t
ype': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_tran
sform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_3', 'data_type': {'type': 'PixelType',
'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]},
{'id': 'fitted', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'cr
s': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}], 'properties': {'system:ti
me_start': 1530403200000, 'month': 7, 'year': 2018, 'system:index': '1_1_1_1_1_1_

1_1_1_1_1_1_1_1_1_1_2_0'}}, {'type': 'Image', 'bands': [{'id': 'NDVI', 'data_ty
pe': {'type': 'PixelType', 'precision': 'float', 'min': -1, 'max': 1}, 'crs': 'EP
SG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'constant', 'data_type':
{'type': 'PixelType', 'precision': 'int', 'min': 1, 'max': 1}, 'crs': 'EPSG:432
6', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 't', 'data_type': {'type': 'Pixe
lType', 'precision': 'float'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0,
1, 0]}, {'id': 'cos_1', 'data_type': {'type': 'PixelType', 'precision': 'doubl
e'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_2', 'd
ata_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs
_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_3', 'data_type': {'type': 'PixelTyp
e', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1,
0]}, {'id': 'sin_1', 'data_type': {'type': 'PixelType', 'precision': 'double'},
'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_2', 'data_t
ype': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_tran
sform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_3', 'data_type': {'type': 'PixelType',
'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]},
{'id': 'fitted', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'cr
s': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}], 'properties': {'system:ti
me_start': 1533081600000, 'month': 8, 'year': 2018, 'system:index': '1_1_1_1_1_1_
1_1_1_1_1_1_1_1_1_1_2_0'}}, {'type': 'Image', 'bands': [{'id': 'NDVI', 'data_typ
e': {'type': 'PixelType', 'precision': 'float', 'min': -1, 'max': 1}, 'crs': 'EPS
G:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'constant', 'data_type':
{'type': 'PixelType', 'precision': 'int', 'min': 1, 'max': 1}, 'crs': 'EPSG:432
6', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 't', 'data_type': {'type': 'Pixe
lType', 'precision': 'float'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0,
1, 0]}, {'id': 'cos_1', 'data_type': {'type': 'PixelType', 'precision': 'doubl
e'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_2', 'd
ata_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs
_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_3', 'data_type': {'type': 'PixelTyp
e', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1,
0]}, {'id': 'sin_1', 'data_type': {'type': 'PixelType', 'precision': 'double'},
'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_2', 'data_t
ype': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_tran
sform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_3', 'data_type': {'type': 'PixelType',
'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]},
{'id': 'fitted', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'cr
s': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}], 'properties': {'system:ti
me_start': 1535760000000, 'month': 9, 'year': 2018, 'system:index': '1_1_1_1_1_1_
1_1_1_1_1_1_1_1_1_1_2_0'}}, {'type': 'Image', 'bands': [{'id': 'NDVI', 'data_type':
{'type': 'PixelType', 'precision': 'float', 'min': -1, 'max': 1}, 'crs': 'EPSG:43
26', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'constant', 'data_type': {'typ
e': 'PixelType', 'precision': 'int', 'min': 1, 'max': 1}, 'crs': 'EPSG:4326', 'cr
s_transform': [1, 0, 0, 0, 1, 0]}, {'id': 't', 'data_type': {'type': 'PixelType',
'precision': 'float'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]},
{'id': 'cos_1', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs':
'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_2', 'data_type':
{'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transfor
m': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_3', 'data_type': {'type': 'PixelType', 'prec
ision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'i
d': 'sin_1', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'E
PSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_2', 'data_type': {'t
ype': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform':
[1, 0, 0, 0, 1, 0]}, {'id': 'sin_3', 'data_type': {'type': 'PixelType', 'precisio
n': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id':
'fitted', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPS
G:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}], 'properties': {'system:time_star
t': 1538352000000, 'month': 10, 'year': 2018, 'system:index': '1_1_1_1_1_1_1_1_1_
1_1_1_1_1_2_0'}}, {'type': 'Image', 'bands': [{'id': 'NDVI', 'data_type': {'typ
e': 'PixelType', 'precision': 'float', 'min': -1, 'max': 1}, 'crs': 'EPSG:4326',
'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'constant', 'data_type': {'type': 'P

ixelType', 'precision': 'int', 'min': 1, 'max': 1}, 'crs': 'EPSG:4326', 'crs_tran
sform': [1, 0, 0, 0, 1, 0]}, {'id': 't', 'data_type': {'type': 'PixelType', 'prec
ision': 'float'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'i
d': 'cos_1', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'E
PSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_2', 'data_type': {'t
ype': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform':
[1, 0, 0, 0, 1, 0]}, {'id': 'cos_3', 'data_type': {'type': 'PixelType', 'precisio
n': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id':
'sin_1', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:
4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_2', 'data_type': {'typ
e': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1,
0, 0, 0, 1, 0]}, {'id': 'sin_3', 'data_type': {'type': 'PixelType', 'precision':
'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'fitt
ed', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:432
6', 'crs_transform': [1, 0, 0, 0, 1, 0]}], 'properties': {'system:time_start': 15
41030400000, 'month': 11, 'year': 2018, 'system:index': '1_1_1_1_1_1_1_1_1_1_1_
1_2_0'}}, {'type': 'Image', 'bands': [{'id': 'NDVI', 'data_type': {'type': 'Pixel
Type', 'precision': 'float', 'min': -1, 'max': 1}, 'crs': 'EPSG:4326', 'crs_trans
form': [1, 0, 0, 0, 1, 0]}, {'id': 'constant', 'data_type': {'type': 'PixelType',
'precision': 'int', 'min': 1, 'max': 1}, 'crs': 'EPSG:4326', 'crs_transform': [1,
0, 0, 0, 1, 0]}, {'id': 't', 'data_type': {'type': 'PixelType', 'precision': 'flo
at'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_1',
'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'c
rs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_2', 'data_type': {'type': 'PixelT
ype', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0,
1, 0]}, {'id': 'cos_3', 'data_type': {'type': 'PixelType', 'precision': 'doubl
e'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_1', 'd
ata_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs
_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_2', 'data_type': {'type': 'PixelTyp
e', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1,
0]}, {'id': 'sin_3', 'data_type': {'type': 'PixelType', 'precision': 'double'},
'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'fitted', 'data_
type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_tra
nsform': [1, 0, 0, 0, 1, 0]}], 'properties': {'system:time_start': 1543622400000,
'month': 12, 'year': 2018, 'system:index': '1_1_1_1_1_1_1_1_1_1_1_1_2_0'}}, {'typ
e': 'Image', 'bands': [{'id': 'NDVI', 'data_type': {'type': 'PixelType', 'precisi
on': 'float', 'min': -1, 'max': 1}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0,
0, 0, 1, 0]}, {'id': 'constant', 'data_type': {'type': 'PixelType', 'precision':
'int', 'min': 1, 'max': 1}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1,
0]}, {'id': 't', 'data_type': {'type': 'PixelType', 'precision': 'float'}, 'crs':
'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_1', 'data_type':
{'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transfor
m': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_2', 'data_type': {'type': 'PixelType', 'prec
ision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'i
d': 'cos_3', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'E
PSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_1', 'data_type': {'t
ype': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform':
[1, 0, 0, 0, 1, 0]}, {'id': 'sin_2', 'data_type': {'type': 'PixelType', 'precisio
n': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id':
'sin_3', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:
4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'fitted', 'data_type': {'typ
e': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1,
0, 0, 0, 1, 0]}], 'properties': {'system:time_start': 1546300800000, 'month': 1,
'year': 2019, 'system:index': '1_1_1_1_1_1_1_1_1_1_1_2_0'}}, {'type': 'Image', 'b
ands': [{'id': 'NDVI', 'data_type': {'type': 'PixelType', 'precision': 'float',
'min': -1, 'max': 1}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]},
{'id': 'constant', 'data_type': {'type': 'PixelType', 'precision': 'int', 'min':
1, 'max': 1}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id':
't', 'data_type': {'type': 'PixelType', 'precision': 'float'}, 'crs': 'EPSG:432
6', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_1', 'data_type': {'type':

'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_2', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_3', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_1', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_2', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_3', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'fitted', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}], 'properties': {'system:time_start': 1548979200000, 'month': 2, 'year': 2019, 'system:index': '1_1_1_1_1_1_1_1_1_2_0'}}, {'type': 'Image', 'bands': [{'id': 'NDVI', 'data_type': {'type': 'PixelType', 'precision': 'float', 'min': -1, 'max': 1}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'constant', 'data_type': {'type': 'PixelType', 'precision': 'int', 'min': 1, 'max': 1}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 't', 'data_type': {'type': 'PixelType', 'precision': 'float'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_1', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_2', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_3', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_1', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_2', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_3', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'fitted', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}], 'properties': {'system:time_start': 1551398400000, 'month': 3, 'year': 2019, 'system:index': '1_1_1_1_1_1_1_1_1_2_0'}}, {'type': 'Image', 'bands': [{'id': 'NDVI', 'data_type': {'type': 'PixelType', 'precision': 'float', 'min': -1, 'max': 1}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'constant', 'data_type': {'type': 'PixelType', 'precision': 'int', 'min': 1, 'max': 1}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 't', 'data_type': {'type': 'PixelType', 'precision': 'float'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_1', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_2', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_3', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_1', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_2', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_3', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'fitted', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}], 'properties': {'system:time_start': 1554076800000, 'month': 4, 'year': 2019, 'system:index': '1_1_1_1_1_1_1_1_2_0'}}, {'type': 'Image', 'bands': [{'id': 'NDVI', 'data_type': {'type': 'PixelType', 'precision': 'float', 'min': -1, 'max': 1}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'constant', 'data_type': {'type': 'PixelType', 'precision': 'int', 'min': 1, 'max': 1}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 't', 'data_type': {'type': 'PixelType', 'precision': 'float'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_1', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_2', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_3', 'data_type': {'type': 'PixelType', 'precision': 'do

uble'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_1',
'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'c
rs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_2', 'data_type': {'type': 'PixelT
ype', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0,
1, 0]}, {'id': 'sin_3', 'data_type': {'type': 'PixelType', 'precision': 'doubl
e'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'fitted',
'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'c
rs_transform': [1, 0, 0, 0, 1, 0]}], 'properties': {'system:time_start': 15566688
00000, 'month': 5, 'year': 2019, 'system:index': '1_1_1_1_1_1_1_2_0'}}, {'type':
'Image', 'bands': [{'id': 'NDVI', 'data_type': {'type': 'PixelType', 'precision':
'float', 'min': -1, 'max': 1}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0,
1, 0]}, {'id': 'constant', 'data_type': {'type': 'PixelType', 'precision': 'int',
'min': 1, 'max': 1}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]},
{'id': 't', 'data_type': {'type': 'PixelType', 'precision': 'float'}, 'crs': 'EPS
G:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_1', 'data_type': {'typ
e': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1,
0, 0, 0, 1, 0]}, {'id': 'cos_2', 'data_type': {'type': 'PixelType', 'precision':
'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_
3', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:432
6', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_1', 'data_type': {'type':
'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0,
0, 0, 1, 0]}, {'id': 'sin_2', 'data_type': {'type': 'PixelType', 'precision': 'do
uble'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_3',
'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'c
rs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'fitted', 'data_type': {'type': 'Pixel
Type', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0,
1, 0]}], 'properties': {'system:time_start': 1559347200000, 'month': 6, 'year': 2
019, 'system:index': '1_1_1_1_1_1_2_0'}}, {'type': 'Image', 'bands': [{'id': 'NDV
I', 'data_type': {'type': 'PixelType', 'precision': 'float', 'min': -1, 'max':
1}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'constant',
'data_type': {'type': 'PixelType', 'precision': 'int', 'min': 1, 'max': 1}, 'cr
s': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 't', 'data_type':
{'type': 'PixelType', 'precision': 'float'}, 'crs': 'EPSG:4326', 'crs_transform':
[1, 0, 0, 0, 1, 0]}, {'id': 'cos_1', 'data_type': {'type': 'PixelType', 'precisio
n': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id':
'cos_2', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:
4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_3', 'data_type': {'typ
e': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1,
0, 0, 0, 1, 0]}, {'id': 'sin_1', 'data_type': {'type': 'PixelType', 'precision':
'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_
2', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:432
6', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_3', 'data_type': {'type':
'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0,
0, 0, 1, 0]}, {'id': 'fitted', 'data_type': {'type': 'PixelType', 'precision': 'd
ouble'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}], 'properties':
{'system:time_start': 1561939200000, 'month': 7, 'year': 2019, 'system:index': '1
_1_1_1_1_2_0'}}, {'type': 'Image', 'bands': [{'id': 'NDVI', 'data_type': {'type':
'PixelType', 'precision': 'float', 'min': -1, 'max': 1}, 'crs': 'EPSG:4326', 'crs
_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'constant', 'data_type': {'type': 'Pixel
Type', 'precision': 'int', 'min': 1, 'max': 1}, 'crs': 'EPSG:4326', 'crs_transfor
m': [1, 0, 0, 0, 1, 0]}, {'id': 't', 'data_type': {'type': 'PixelType', 'precisio
n': 'float'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'c
os_1', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:43
26', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_2', 'data_type': {'type':
'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0,
0, 0, 1, 0]}, {'id': 'cos_3', 'data_type': {'type': 'PixelType', 'precision': 'do
uble'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_1',
'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'c
rs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_2', 'data_type': {'type': 'PixelT
ype', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0,

1, 0]}, {'id': 'sin_3', 'data_type': {'type': 'PixelType', 'precision': 'doubl
e'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'fitted',
'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'c
rs_transform': [1, 0, 0, 0, 1, 0]}], 'properties': {'system:time_start': 15646176
00000, 'month': 8, 'year': 2019, 'system:index': '1_1_1_1_2_0'}}, {'type': 'Imag
e', 'bands': [{'id': 'NDVI', 'data_type': {'type': 'PixelType', 'precision': 'flo
at', 'min': -1, 'max': 1}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1,
0]}, {'id': 'constant', 'data_type': {'type': 'PixelType', 'precision': 'int', 'm
in': 1, 'max': 1}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'i
d': 't', 'data_type': {'type': 'PixelType', 'precision': 'float'}, 'crs': 'EPSG:4
326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_1', 'data_type': {'type':
'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0,
0, 0, 1, 0]}, {'id': 'cos_2', 'data_type': {'type': 'PixelType', 'precision': 'do
uble'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_3',
'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'c
rs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_1', 'data_type': {'type': 'PixelT
ype', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0,
1, 0]}, {'id': 'sin_2', 'data_type': {'type': 'PixelType', 'precision': 'doubl
e'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_3', 'd
ata_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs
_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'fitted', 'data_type': {'type': 'PixelTy
pe', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1,
0]}], 'properties': {'system:time_start': 1567296000000, 'month': 9, 'year': 201
9, 'system:index': '1_1_1_2_0'}}, {'type': 'Image', 'bands': [{'id': 'NDVI', 'dat
a_type': {'type': 'PixelType', 'precision': 'float', 'min': -1, 'max': 1}, 'crs':
'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'constant', 'data_typ
e': {'type': 'PixelType', 'precision': 'int', 'min': 1, 'max': 1}, 'crs': 'EPSG:4
326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 't', 'data_type': {'type': 'Pi
xelType', 'precision': 'float'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0,
0, 1, 0]}, {'id': 'cos_1', 'data_type': {'type': 'PixelType', 'precision': 'doubl
e'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_2', 'd
ata_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs
_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_3', 'data_type': {'type': 'PixelTyp
e', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1,
0]}, {'id': 'sin_1', 'data_type': {'type': 'PixelType', 'precision': 'double'},
'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_2', 'data_t
ype': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_tran
sform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_3', 'data_type': {'type': 'PixelType',
'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]},
{'id': 'fitted', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'cr
s': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}], 'properties': {'system:ti
me_start': 1569888000000, 'month': 10, 'year': 2019, 'system:index': '1_1_2_0'}},
{'type': 'Image', 'bands': [{'id': 'NDVI', 'data_type': {'type': 'PixelType', 'pr
ecision': 'float', 'min': -1, 'max': 1}, 'crs': 'EPSG:4326', 'crs_transform': [1,
0, 0, 0, 1, 0]}, {'id': 'constant', 'data_type': {'type': 'PixelType', 'precisio
n': 'int', 'min': 1, 'max': 1}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0,
1, 0]}, {'id': 't', 'data_type': {'type': 'PixelType', 'precision': 'float'}, 'cr
s': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_1', 'data_typ
e': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transf
orm': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_2', 'data_type': {'type': 'PixelType', 'pr
ecision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]},
{'id': 'cos_3', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs':
'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_1', 'data_type':
{'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transfor
m': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_2', 'data_type': {'type': 'PixelType', 'prec
ision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'i
d': 'sin_3', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'E
PSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'fitted', 'data_type':
{'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transfor
m': [1, 0, 0, 0, 1, 0]}], 'properties': {'system:time_start': 1572566400000, 'mon

th': 11, 'year': 2019, 'system:index': '1_2_0'}}, {'type': 'Image', 'bands': [{'i
d': 'NDVI', 'data_type': {'type': 'PixelType', 'precision': 'float', 'min': -1,
'max': 1}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'cons
tant', 'data_type': {'type': 'PixelType', 'precision': 'int', 'min': 1, 'max':
1}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 't', 'data_t
ype': {'type': 'PixelType', 'precision': 'float'}, 'crs': 'EPSG:4326', 'crs_trans
form': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_1', 'data_type': {'type': 'PixelType', 'p
recision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]},
{'id': 'cos_2', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs':
'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_3', 'data_type':
{'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transfor
m': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_1', 'data_type': {'type': 'PixelType', 'prec
ision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'i
d': 'sin_2', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'E
PSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_3', 'data_type': {'t
ype': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform':
[1, 0, 0, 0, 1, 0]}, {'id': 'fitted', 'data_type': {'type': 'PixelType', 'precisi
on': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}], 'prope
rties': {'system:time_start': 1575158400000, 'month': 12, 'year': 2019, 'system:i
ndex': '2_0'}}]}
{'type': 'Image', 'bands': [{'id': 'constant', 'data_type': {'type': 'PixelType',
'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]},
{'id': 't', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EP
SG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'cos_1', 'data_type': {'ty
pe': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform':
[1, 0, 0, 0, 1, 0]}, {'id': 'cos_2', 'data_type': {'type': 'PixelType', 'precisio
n': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id':
'cos_3', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:
4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_1', 'data_type': {'typ
e': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1,
0, 0, 0, 1, 0]}, {'id': 'sin_2', 'data_type': {'type': 'PixelType', 'precision':
'double'}, 'crs': 'EPSG:4326', 'crs_transform': [1, 0, 0, 0, 1, 0]}, {'id': 'sin_
3', 'data_type': {'type': 'PixelType', 'precision': 'double'}, 'crs': 'EPSG:432
6', 'crs_transform': [1, 0, 0, 0, 1, 0]}]}

In [ ]:
```
def fitted_harmonic_to_df(fitted_harmonic_coll, fc):

  fitted_values_list = []
  dates_list = []

  for i in range(fitted_harmonic_coll.size().getInfo()):
    image = ee.Image(fitted_harmonic_coll.toList(fitted_harmonic_coll.size()).ge
    fitted_value = image.reduceRegion(
        reducer=ee.Reducer.first(),
        geometry=fc,  # Assuming 'fc' is your region of interest
        scale=30,
        maxPixels=1e13
    ).get('fitted').getInfo()
    date = image.date().format('YYYY-MM-dd').getInfo()

    fitted_values_list.append(fitted_value)
    dates_list.append(date)


  df = pd.DataFrame({'fitted': fitted_values_list}, index=pd.to_datetime(dates_l
  return df
```

For each point, we extract the NDVI harmonic series and add it to our DataFrame:

In [ ]:
```
df_points = pd.DataFrame([])
for n in range(1,points.size().getInfo() + 1):
  print(n)
  feat = ee.Geometry.Point(points.getInfo()["features"][n-1]['geometry']['coordi
  fitted_df = fitted_harmonic_to_df(fittedHarmonic,feat)
  df_points = pd.concat([df_points, fitted_df], axis=1)
```

```
1
2
3
WARNING:googleapiclient.http:Sleeping 1.01 seconds before retry 1 of 5 for reques
t: POST https://earthengine.googleapis.com/v1/projects/my-project-1527255156007/v
alue:compute?prettyPrint=false&alt=json, after 503
WARNING:googleapiclient.http:Sleeping 1.85 seconds before retry 1 of 5 for reques
t: POST https://earthengine.googleapis.com/v1/projects/my-project-1527255156007/v
alue:compute?prettyPrint=false&alt=json, after 503
WARNING:googleapiclient.http:Sleeping 1.31 seconds before retry 1 of 5 for reques
t: POST https://earthengine.googleapis.com/v1/projects/my-project-1527255156007/v
alue:compute?prettyPrint=false&alt=json, after 503
4
WARNING:googleapiclient.http:Sleeping 1.42 seconds before retry 1 of 5 for reques
t: POST https://earthengine.googleapis.com/v1/projects/my-project-1527255156007/v
alue:compute?prettyPrint=false&alt=json, after 503
5
WARNING:googleapiclient.http:Sleeping 1.45 seconds before retry 1 of 5 for reques
t: POST https://earthengine.googleapis.com/v1/projects/my-project-1527255156007/v
alue:compute?prettyPrint=false&alt=json, after 503
WARNING:googleapiclient.http:Sleeping 1.30 seconds before retry 1 of 5 for reques
t: POST https://earthengine.googleapis.com/v1/projects/my-project-1527255156007/v
alue:compute?prettyPrint=false&alt=json, after 503
6
WARNING:googleapiclient.http:Sleeping 1.77 seconds before retry 1 of 5 for reques
t: POST https://earthengine.googleapis.com/v1/projects/my-project-1527255156007/v
alue:compute?prettyPrint=false&alt=json, after 503
```

```
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
WARNING:googleapiclient.http:Sleeping 0.55 seconds before retry 1 of 5 for reques
t: POST https://earthengine.googleapis.com/v1/projects/my-project-1527255156007/v
alue:compute?prettyPrint=false&alt=json, after 502
50
51
52
53
54
55
56
57
58
```

```
---------------------------------------------------------------------------
KeyboardInterrupt                         Traceback (most recent call last)
<ipython-input-27-dc42ac37afaa> in <cell line: 0>()
      3   print(n)
      4   feat = ee.Geometry.Point(points.getInfo()["features"][n-1]['geometry']
['coordinates'])
----> 5   fitted_df = fitted_harmonic_to_df(fittedHarmonic,feat)
      6   df_points = pd.concat([df_points, fitted_df], axis=1)

<ipython-input-26-70adabb2bf3f> in fitted_harmonic_to_df(fitted_harmonic_coll, f
c)
     11         scale=30,
     12         maxPixels=1e13
---> 13     ).get('fitted').getInfo()
     14     date = image.date().format('YYYY-MM-dd').getInfo()
     15

/usr/local/lib/python3.11/dist-packages/ee/computedobject.py in getInfo(self)
    105       The object can evaluate to anything.
    106     """
--> 107     return data.computeValue(self)
    108
    109   def encode(self, encoder: Optional[Callable[..., Any]]) -> Dict[str, An
y]:

/usr/local/lib/python3.11/dist-packages/ee/data.py in computeValue(obj)
   1126   _maybe_populate_workload_tag(body)
   1127
-> 1128   return _execute_cloud_call(
   1129       _get_cloud_projects()
   1130       .value()

/usr/local/lib/python3.11/dist-packages/ee/data.py in _execute_cloud_call(call, n
um_retries)
    406   num_retries = _max_retries if num_retries is None else num_retries
    407   try:
--> 408     return call.execute(num_retries=num_retries)
    409   except googleapiclient.errors.HttpError as e:
    410     raise _translate_cloud_exception(e)  # pylint: disable=raise-missing-
from

/usr/local/lib/python3.11/dist-packages/googleapiclient/_helpers.py in positional
_wrapper(*args, **kwargs)
    128                 elif positional_parameters_enforcement == POSITIONAL_WARN
ING:
    129                     logger.warning(message)
--> 130             return wrapped(*args, **kwargs)
    131
    132         return positional_wrapper

/usr/local/lib/python3.11/dist-packages/googleapiclient/http.py in execute(self,
http, num_retries)
    921
    922         # Handle retries for server-side errors.
--> 923         resp, content = _retry_request(
    924             http,
    925             num_retries,

/usr/local/lib/python3.11/dist-packages/googleapiclient/http.py in _retry_request
(http, num_retries, req_type, sleep, rand, uri, method, *args, **kwargs)
```

```
    189         try:
    190             exception = None
--> 191             resp, content = http.request(uri, method, *args, **kwargs)
    192         # Retry on SSL errors and socket timeout errors.
    193         except _ssl_SSLError as ssl_error:

/usr/local/lib/python3.11/dist-packages/google_auth_httplib2.py in request(self,
uri, method, body, headers, redirections, connection_type, **kwargs)
    216
    217         # Make the request.
--> 218         response, content = self.http.request(
    219             uri,
    220             method,

/usr/local/lib/python3.11/dist-packages/ee/_cloud_api_utils.py in request(***fail
ed resolving arguments***)
     68       # requests errors should be converted to kinds that googleapiclient
     69       # consider transient.
---> 70       response = self._session.request(
     71           method, uri, data=body, headers=headers, timeout=self._timeout
     72       )

/usr/local/lib/python3.11/dist-packages/requests/sessions.py in request(self, met
hod, url, params, data, headers, cookies, files, auth, timeout, allow_redirects,
proxies, hooks, stream, verify, cert, json)
    587         }
    588         send_kwargs.update(settings)
--> 589         resp = self.send(prep, **send_kwargs)
    590
    591         return resp

/usr/local/lib/python3.11/dist-packages/requests/sessions.py in send(self, reques
t, **kwargs)
    701
    702         # Send the request
--> 703         r = adapter.send(request, **kwargs)
    704
    705         # Total elapsed time of the request (approximately)

/usr/local/lib/python3.11/dist-packages/requests/adapters.py in send(self, reques
t, stream, timeout, verify, cert, proxies)
    665
    666         try:
--> 667             resp = conn.urlopen(
    668                 method=request.method,
    669                 url=url,

/usr/local/lib/python3.11/dist-packages/urllib3/connectionpool.py in urlopen(sel
f, method, url, body, headers, retries, redirect, assert_same_host, timeout, pool
_timeout, release_conn, chunked, body_pos, preload_content, decode_content, **res
ponse_kw)
    785
    786             # Make the request on the HTTPConnection object
--> 787             response = self._make_request(
    788                 conn,
    789                 method,

/usr/local/lib/python3.11/dist-packages/urllib3/connectionpool.py in _make_reques
t(self, conn, method, url, body, headers, retries, timeout, chunked, response_con
n, preload_content, decode_content, enforce_content_length)
```

```
    532         # Receive the response from the server
    533         try:
--> 534             response = conn.getresponse()
    535         except (BaseSSLError, OSError) as e:
    536             self._raise_timeout(err=e, url=url, timeout_value=read_timeou
t)

/usr/local/lib/python3.11/dist-packages/urllib3/connection.py in getresponse(sel
f)
    514
    515         # Get the response from http.client.HTTPConnection
--> 516         httplib_response = super().getresponse()
    517
    518         try:

/usr/lib/python3.11/http/client.py in getresponse(self)
   1393         try:
   1394             try:
-> 1395                 response.begin()
   1396             except ConnectionError:
   1397                 self.close()

/usr/lib/python3.11/http/client.py in begin(self)
    323         # read until we get a non-100 response
    324         while True:
--> 325             version, status, reason = self._read_status()
    326             if status != CONTINUE:
    327                 break

/usr/lib/python3.11/http/client.py in _read_status(self)
    284
    285     def _read_status(self):
--> 286         line = str(self.fp.readline(_MAXLINE + 1), "iso-8859-1")
    287         if len(line) > _MAXLINE:
    288             raise LineTooLong("status line")

/usr/lib/python3.11/socket.py in readinto(self, b)
    716         while True:
    717             try:
--> 718                 return self._sock.recv_into(b)
    719             except timeout:
    720                 self._timeout_occurred = True

/usr/lib/python3.11/ssl.py in recv_into(self, buffer, nbytes, flags)
   1312                   "non-zero flags not allowed in calls to recv_into() on
%s" %
   1313                   self.__class__)
-> 1314             return self.read(nbytes, buffer)
   1315         else:
   1316             return super().recv_into(buffer, nbytes, flags)

/usr/lib/python3.11/ssl.py in read(self, len, buffer)
   1164         try:
   1165             if buffer is not None:
-> 1166                 return self._sslobj.read(len, buffer)
   1167             else:
   1168                 return self._sslobj.read(len)

KeyboardInterrupt:
```

With the DataFrame ready, let's apply TimeSeriesKMeans:

In [ ]:
```
print(df_points)
```

In [ ]:
```
X = df_points.values
```

In [ ]:
```
formatted_X = to_time_series_dataset(X)
formatted_X.shape
```

Out[ ]:
```
(100, 48, 1)
```

In [ ]:
```
km = TimeSeriesKMeans(n_clusters=2, metric="dtw")
labels = km.fit_predict(formatted_X)
```

In [ ]:
```
km = TimeSeriesKMeans(n_clusters=3, metric="softdtw")
labels = km.fit_predict(formatted_X)
```

In [ ]:
```
labels
```

Out[ ]:
```
array([0, 0, 0, 0, 1, 1, 0, 1, 0, 0, 0, 0, 0, 1, 0, 0, 1, 0, 0, 0, 1, 0,
       0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 1, 0, 0, 1, 0, 0, 0, 0, 0, 1, 1, 0,
       1, 0, 0, 0, 0, 0, 0, 0, 0, 0, 1, 0, 0, 0, 0, 0, 0, 0, 0, 0, 1, 0,
       1, 0, 1, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0,
       0, 0, 0, 1, 0, 0, 0, 0, 0, 1, 1, 0])
```

In [ ]:
```
labels_bis
```

Out[ ]:
```
array([1, 1, 1, 0, 2, 2, 1, 2, 1, 1, 1, 1, 1, 2, 0, 0, 2, 1, 1, 0, 0, 1,
       1, 1, 0, 1, 1, 1, 1, 1, 0, 1, 2, 1, 0, 2, 0, 0, 1, 1, 1, 2, 2, 1,
       0, 0, 1, 1, 1, 1, 1, 1, 1, 0, 0, 1, 0, 1, 1, 1, 1, 1, 1, 1, 2, 1,
       2, 0, 0, 0, 1, 1, 1, 1, 0, 1, 0, 1, 1, 0, 0, 1, 1, 1, 1, 0, 1, 1,
       0, 0, 1, 2, 0, 1, 1, 1, 1, 2, 2, 0])
```

In [ ]:
```
newdata = gpd.GeoDataFrame.from_features(points.getInfo()["features"])
newdata['Class'] = labels_bis
```

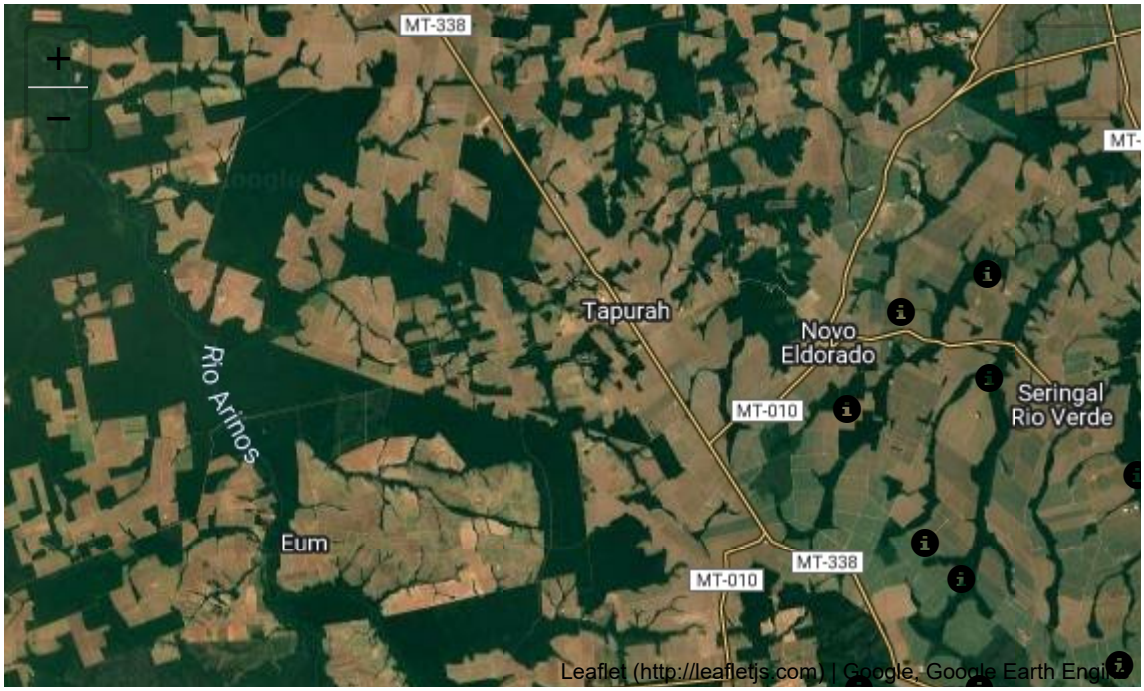
In [ ]:
```
newdata['Class'].values
```

Out[ ]:
```
array([1, 1, 1, 0, 2, 2, 1, 2, 1, 1, 1, 1, 1, 2, 0, 0, 2, 1, 1, 0, 0, 1,
       1, 1, 0, 1, 1, 1, 1, 1, 0, 1, 2, 1, 0, 2, 0, 0, 1, 1, 1, 2, 2, 1,
       0, 0, 1, 1, 1, 1, 1, 1, 1, 0, 0, 1, 0, 1, 1, 1, 1, 1, 1, 1, 2, 1,
       2, 0, 0, 0, 1, 1, 1, 1, 0, 1, 0, 1, 1, 0, 0, 1, 1, 1, 1, 0, 1, 1,
       0, 0, 1, 2, 0, 1, 1, 1, 1, 2, 2, 0])
```

With the generated classes we present using Folium:

In [ ]:
```
resultmap = folium.Map(location=[-13.0912068,-55.9881647], zoom_start=10)
basemaps['Google Satellite Hybrid'].add_to(resultmap)

latitudes = list(newdata.geometry.y.values)
longitudes = list(newdata.geometry.x.values)
labels = list(newdata['Class'].values)
for lat, lng, label in zip(latitudes, longitudes, labels):
  if label == 0:
    folium.Marker(
      location = [lat, lng],
      popup = str(label),
```

```
      icon = folium.Icon(color='red')
     ).add_to(resultmap)
  elif label == 1:
    folium.Marker(
      location = [lat, lng],
      popup = str(label),
      icon = folium.Icon(color='blue')
     ).add_to(resultmap)
  else:
    folium.Marker(
      location = [lat, lng],
      popup = str(label),
      icon = folium.Icon(color='green')
     ).add_to(resultmap)


vis_params = {'min': 0, 'max': 1}# Add the elevation model to the map object.
resultmap.add_ee_layer(rgb, {}, 'phase (hue), amplitude (sat), ndvi (value)')
resultmap.add_child(folium.LayerControl())

# Display the map.
display(resultmap)
```



Thank you! See you in the next Chapter!