Accessing and Processing Brazilian EO Data Cubes with Open Data Cube

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Brazil Data Cube Project

Started in 2019. Developed by INPE.

(Goal 1) Analysis-Ready Data (ARD) of medium-resolution satellite images (10 to 60 meters) for all Brazilian territory: CBERS-4, Landsat 8 and Sentinel 2

(Goal 2) Multidimensional data cubes from these ARD image collections

(Goal 3) Big data technologies, image time series analysis and machine learning methods

(Goal 4) Land use and cover information for all Brazilian territory.

Source: [Giuliani et al, 2017]

Collections of Earth observation satellite imagens – ARD

Data cubes – four-dimensional array.

Source: [Kopp et al, 2019]
Brazil Data Cube Project

http://brazildatacube.dpi.inpe.br/portal/explore

BDC – Large
Each tile: 6 x 4 degrees

CBERS 4/WFI – 64 meters
Each file (band/tile): 170 MB
Each tile: ~ 1 GB

BDC – Medium
Each tile: 3 x 2 degrees

Landsat 8/OLI – 30 meters
Each file (band/tile): 200 MB
Each tile: ~ 2 GB

BDC – Small
Each tile: 1.5 x 1 degree

Sentinel 2/MSI – 10 meters
Each file (band/tile): 400 MB
Each tile: ~ 5.4 GB
EO data cubes and satellite image time series analysis

Data cubes available at:
http://brazildatacube.dpi.inpe.br/portal/explore

Land use and cover change maps:
https://doi.pangaea.de/10.1594/PANGAEA.899706

SITS (Satellite Image Time Series) R package:
https://github.com/e-sensing
http://brazildatacube.dpi.inpe.br/portal/explore

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ODC + BDC

Indexing tool: stac2odc

BDC-STAC

SpatioTemporal Asset Catalog

Collection → Product

Item → Dataset

jupyter Notebooks

OGC Web Services

ODC Explorer
KMeans Clustering - CB4_64_16D_STK_v1

This document presents an example of spectral clustering in the CBERS4 collection (CB4_64_16D_STK_v1) of the BDC. This simple example aims to present how to clustering the data from the BDC stored inside the ODC.

```python
In [1]: import datacube
   ...: import numpy as np
   ...: import matplotlib.pyplot as plt
   ...: dc = datacube.Datacube(app='datacube')

In [2]: PRODUCT_NAME = 'CB4_64_16D_STK_v1'

Load CB4_64_16D_STK_v1 product

Initially, an entire scene will be loaded, in a range of specific dates

In [3]: cb4_64_16D_ftile = dc.load(PRODUCT_NAME, measurements = ['red', 'green', 'blue', 'nir'],
   ...:                             time = ('2019-12-19', '2019-12-31'), resolution = (64, -64))
   ...: cb4_64_16D_ftile
```
Open Data Cube Explorer

CBERS 4 data cubes for the Cerrado biome in Brazil
Brazil Data Cube OGC Web Services

This URL is an end-point and is not intended for direct viewing. For more information:

OPEN DATA CUBE
Open Web Services (datacube-ows) Repository

OGC Services

ODC + BDC
ODC + BDC

Data Cube OGC Web Services
  • http://brazildatacube.dpi.inpe.br/odc/ows/

Data Cube Explorer
  • http://brazildatacube.dpi.inpe.br/odc/explorer/

Data Cube STAC (0.9)
  • http://brazildatacube.dpi.inpe.br/odc/explorer/stac

Jupyterhub
  • http://brazildatacube.dpi.inpe.br/bdc-hub/hub/login
Satellite Image
Time Series Analysis
CB4_64_16D_STK_v1.ingest.yaml

source_type: CB4_64_16D_STK_v1
output_type: CB4_64_16D_STK_v1_ingested
description: CBERS-4 ingested data

location: '/data/ingested/'
file_path_template: 'CB4_64_16D_STK_v1_ingested_{product_id}.nc'

netcdf:
  format: NetCDF

global_attributes:
  title: CBERS-4 ingested
  summary: CBERS-4 data product
  source: CBERS-4 version 1
  institution: INPE
  instrument: AWFI
Viewing the ROI

In [7]: from examples.utils.data_cube_utilities.dc_display_map import display_map
display_map(latitude, longitude)
CB4_64_16D_STK_1: CBERS 4 version 1

cyclic_16_day

CB4_64_16D_STK_1

LC_30_16D_STK_1

whole collection

Last processed 22 hours ago
1,674 datasets

4,725.775km² (approx.)
No configured regions
Entirely EPSG:10001

eo metadata:

format GeoTiff
instrument AWFI
label
platform CBERS4
product_type cyclic_16_day

Product information