EUMETSAT

PROGRAMME OF THE EUROPEAN UNION

Copernicus
Europe's eyes on Earth

Explore Analysis Ready Data (ARD) with the data cube for atmospheric composition

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EUMETSAT Short Course series | 16 February 2022

What is '*Analysis Ready Data*' ?

Analysis Ready Data (CEOS ARD) are satellite data that have been processed to a minimum set of requirements and organized into a form that allows immediate analysis with a minimum of additional user effort and interoperability both through time and with other datasets

(Committee on Earth Observation Satellites)

Why do we need ‘Analysis Ready Data’ ?

Most of the time working with satellite data goes toward making data *’ready’* for analysis instead of actual analysis

80% *Data preparation*

20% *Analysis*

Common pre-processing steps to harmonize satellite data for large area and long term analyses:

Geolocation and spatial alignment

To allow comparison of observations of the same location on the Earth’s surface over time

Radiometric calibration

To provide consistent data that reflect surface changes and not changes due to sensor changes

Atmospheric correction

To reduce the variable radiometric influence of the atmosphere

Generation of per pixel quality flags

To allow users to filter unsuitable observations, e.g. clouds

after Dwyer et al. (2018). Analysis Ready Data: Enabling Analysis of the Landsat Archive

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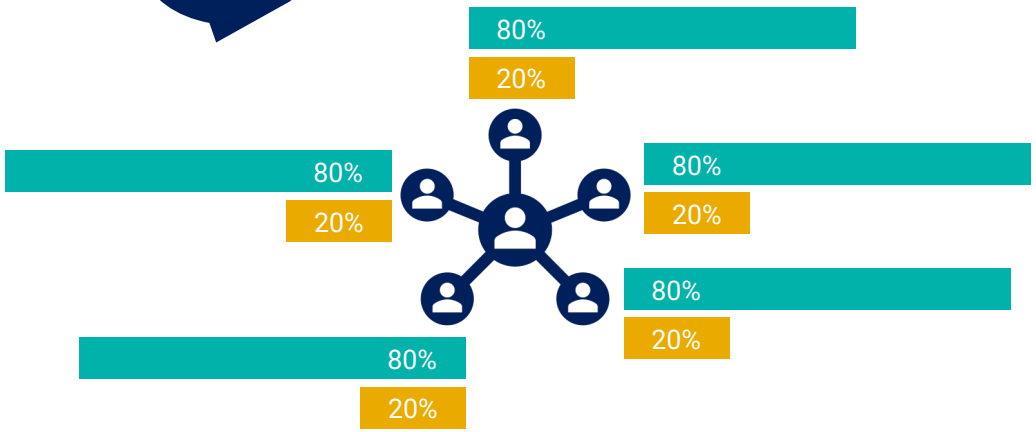
Users of the same data are repeating the same preparatory steps



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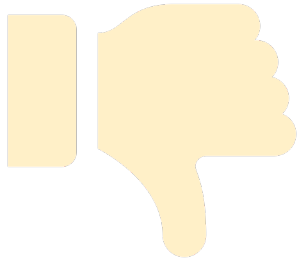
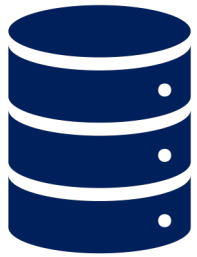
Principle idea of ARD

Shifting the responsibility of data pre-processing from EO data users to data providers, such as EUMETSAT

- Geolocation and spatial alignment
- Radiometric calibration
- Atmospheric correction
- Generation of per pixel quality flags



EO data users

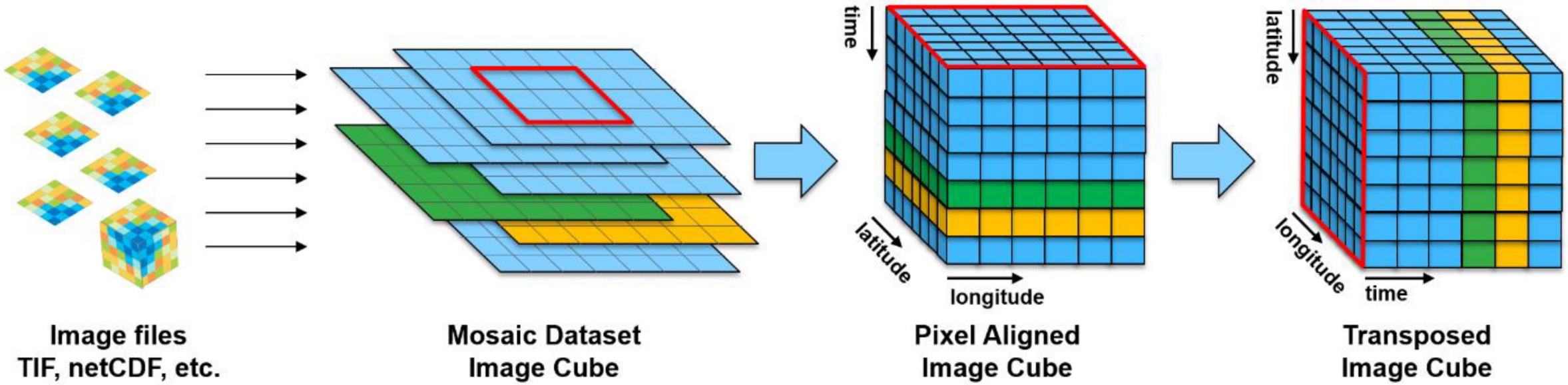


EO data providers

EUMETSAT

How does it look like in practise?

Analysis Ready Data are often disseminated in form of a data cube with either a regional or thematic focus

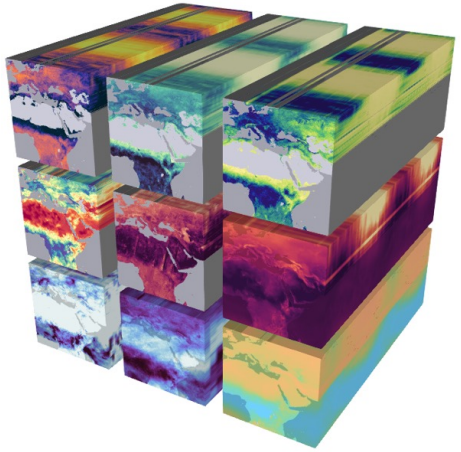


after Kopp et al. (2019): Achieving the Full Vision of Earth Observation Data Cubes

Examples of ARD and data cube initiatives

Earth System Data Cube

Biosphere-atmosphere interactions



Rapid action on Covid-19 and EO

Open Data Cube

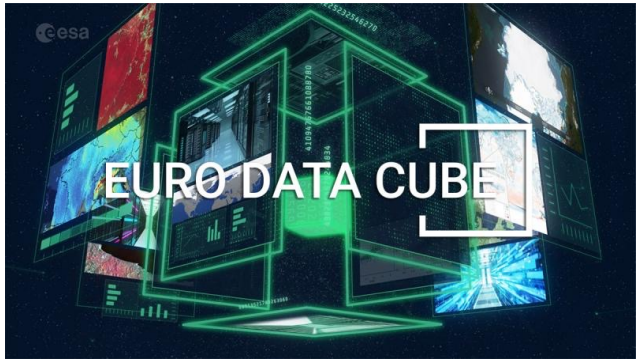
OPEN DATA CUBE

Swiss Data Cube

Digital Earth AUSTRALIA

AFRICA REGIONAL DATA CUBE

Euro Data Cube



Technology and Atmospheric Mission Platform

TOP
atmospheric composition platform

EUMETSAT's Atmospheric Composition Data Cube (ACDC)

copernicus.eumetsat.int

3 Data services | **3 instruments on 4 different satellites** | **6 atmospheric variables**

18 different data products in 3 different data formats (NetCDF, HDF5, ASCII)

	Instrument	Variable	Temporal resolution	Spatial resolution
TEMIS	• GOME-2 • GOME-2 • TROPOMI	• Absorbing Aerosol Index (AAI) • Formaldehyde (HCHO) • Nitrogen Dioxide (NO2)	• Daily | 23 Jan 2007 – present • Monthly | Jan 2007 – Jul 2016 • Monthly | Feb 2018 – present	• 1 deg x 1 deg
EUMETSAT AC SAF ATMOSPHERIC COMPOSITION MONITORING	• GOME-2	• Nitrogen Dioxide (NO2)	• Monthly | Feb 2007 – Aug 2017	• 0.25 deg x 0.25 deg
AERIS IASI	• IASI	• Carbon Monoxide (CO) • Formic acid (HCOOH) • Ammonia (NH3)	• Monthly | Oct 2007 – Jan 2022 • Monthly | Oct 2007 – Jan 2022 • Monthly | Oct 2007 – Jun 2020	• 1 deg x 1 deg

EUMETSAT's Atmospheric Composition Data Cube (ACDC)

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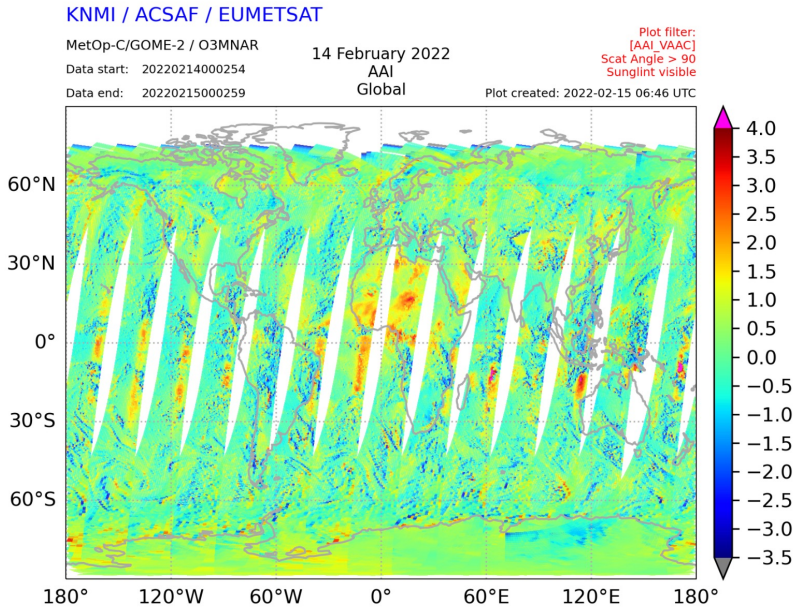
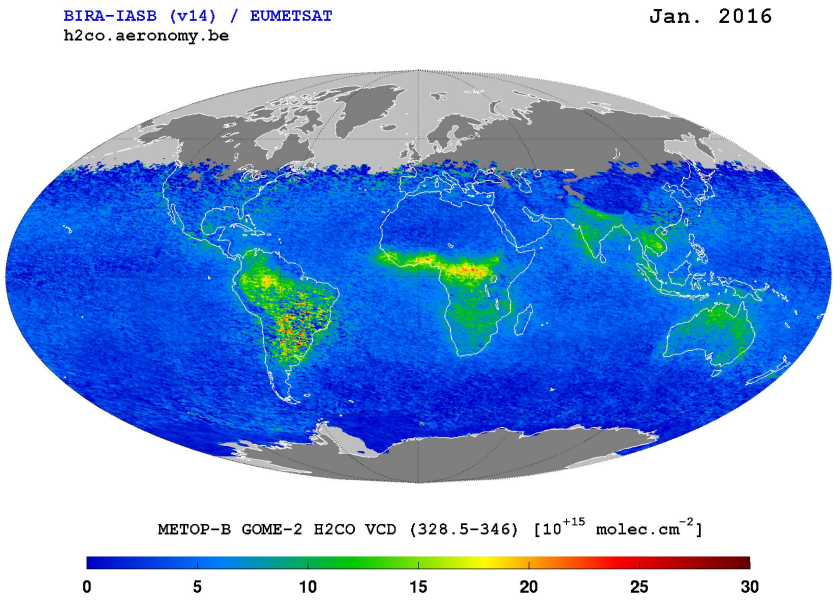
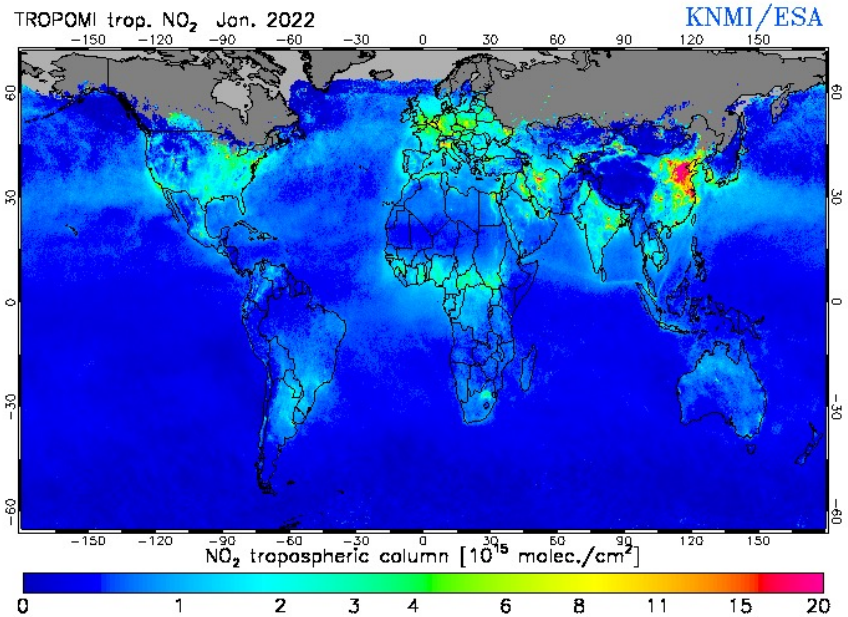
GOME-2 AAI



GOME-2 HCHO



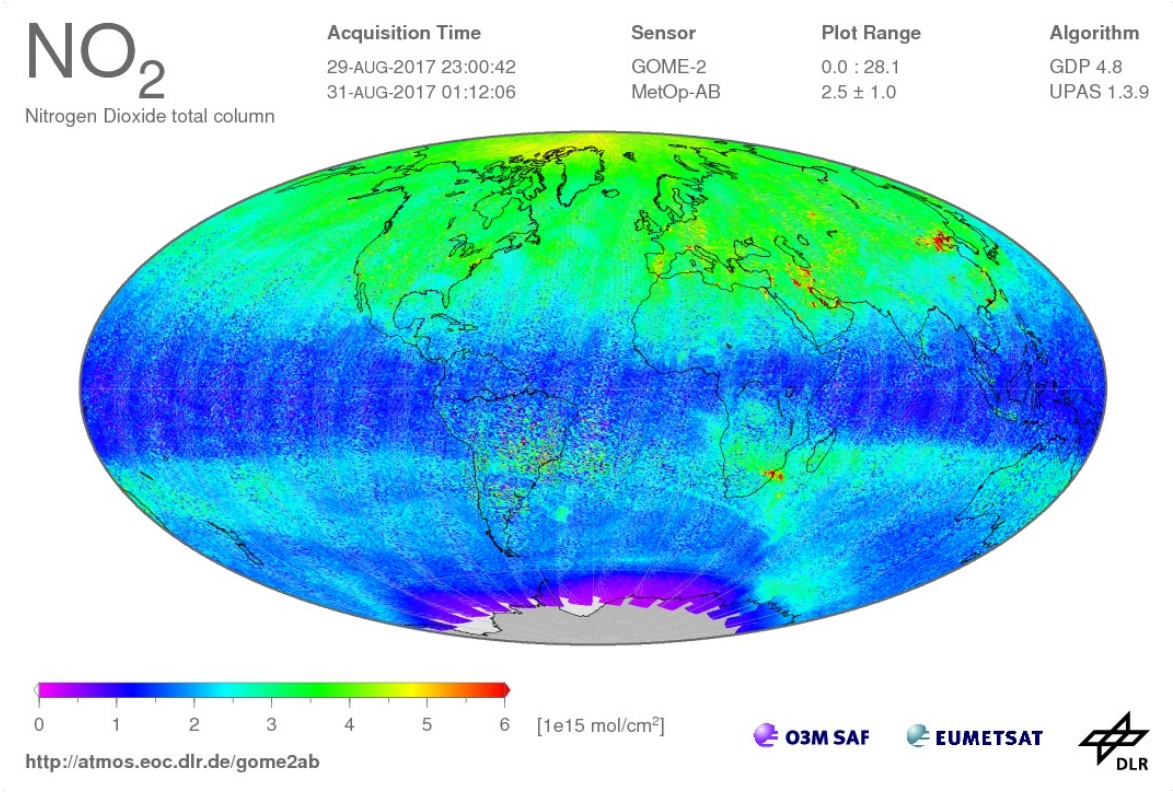
TROPOMI NO_2



EUMETSAT's Atmospheric Composition Data Cube (ACDC)

EUMETSAT
AC SAF
ATMOSPHERIC COMPOSITION MONITORING

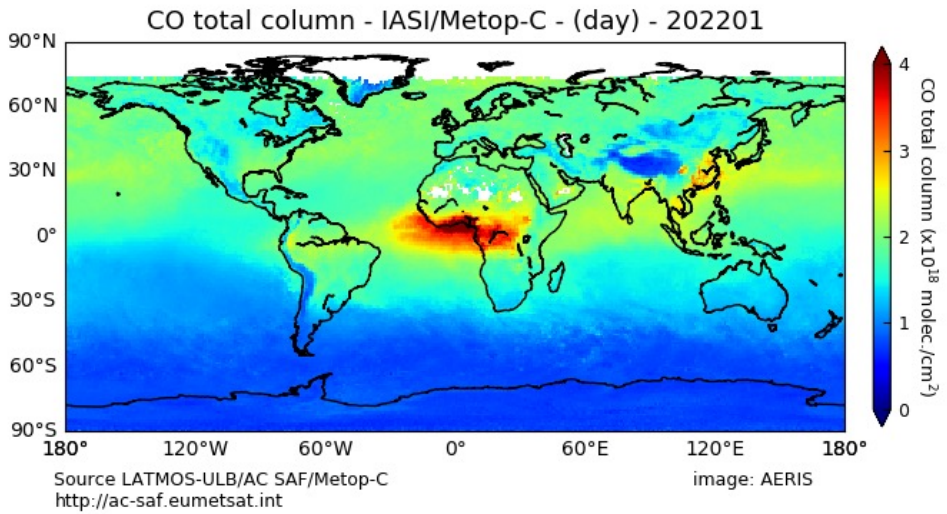
GOME-2 NO_2



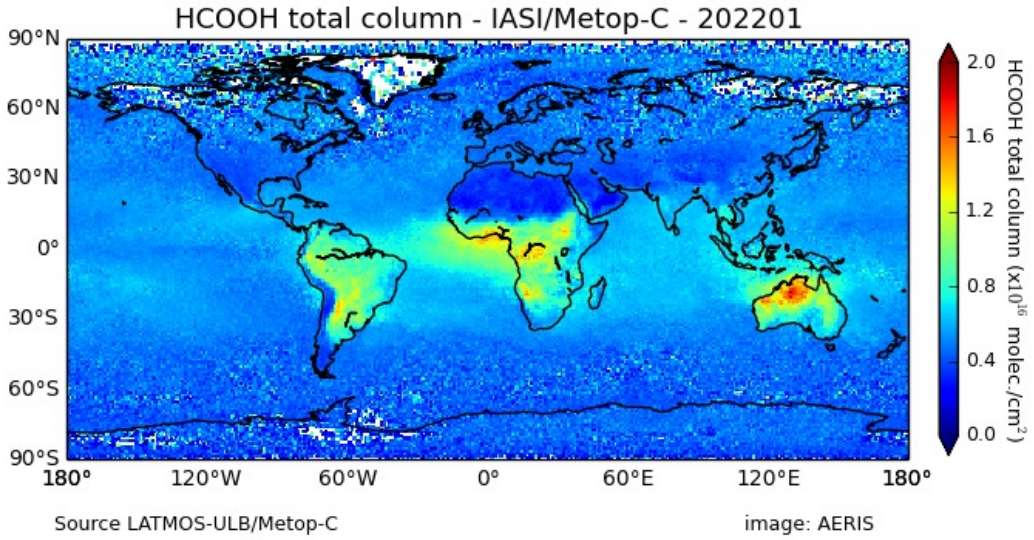
EUMETSAT's Atmospheric Composition Data Cube (ACDC)

AERIS iASI

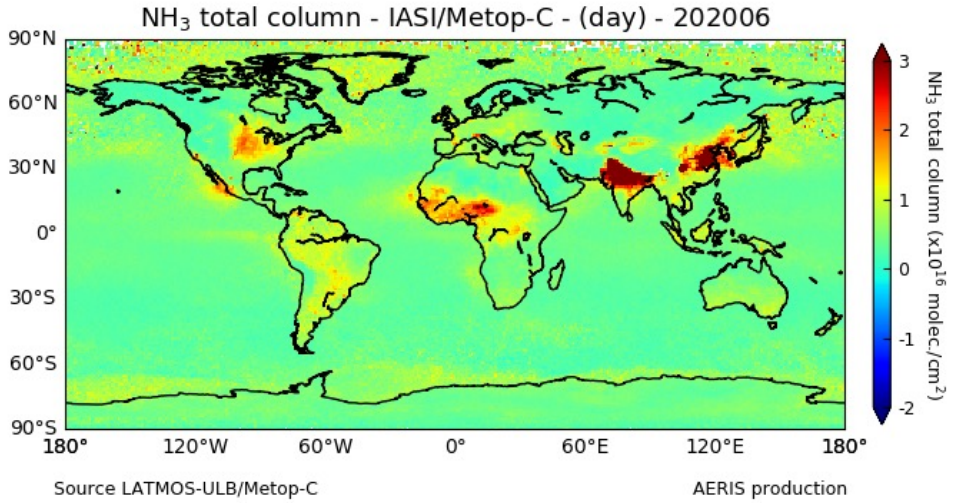
IASI CO



IASI HCOOH



IASI NH_3



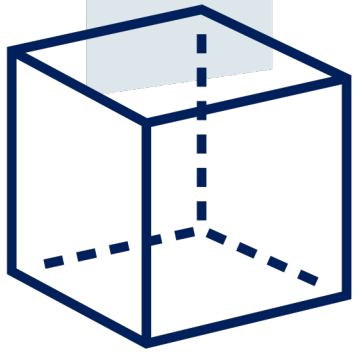
EUMETSAT's Atmospheric Composition Data Cube (ACDC)

TEMIS

EUMETSAT AC SAF ATMOSPHERIC COMPOSITION MONITORING

AERIS

IASI



`https://anaconda.org/Eumetsat/epct`

EUMETSAT Data Tailor API

EUMETSAT Atmospheric Composition Data Cube plugin

Multi-variable | Multi-product | Multi-platform | Multi-sensor

- *Define time coverage*
- *Select Region of Interest*
- *Select variables of interest*
- *…*

python™

Explore the Atmospheric Composition Data Cube (ACDC) yourself

Training platform: **https://epct.ltpy.adamplatform.eu**

Register: **https://login.ltpy.adamplatform.eu/**