Experimentation and Reproducibility with Jupyter Open Science EO Dashboards

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Observing Global Changes with Satellites

- International Cooperation on EO Dashboard between ESA, NASA and JAXA
- **@LPS22:**
  - **Agora NASA-ESA-JAXA Cooperation on EO Dashboard**
  - **Demo at the Open Earth Forum**

EODashboard.org

Demonstrate joint capabilities of NASA-ESA-JAXA to **observe global environmental changes**, communicate findings through **storytelling** for the general public, promote **Open Science** and

engage the community through collaborative features and technology

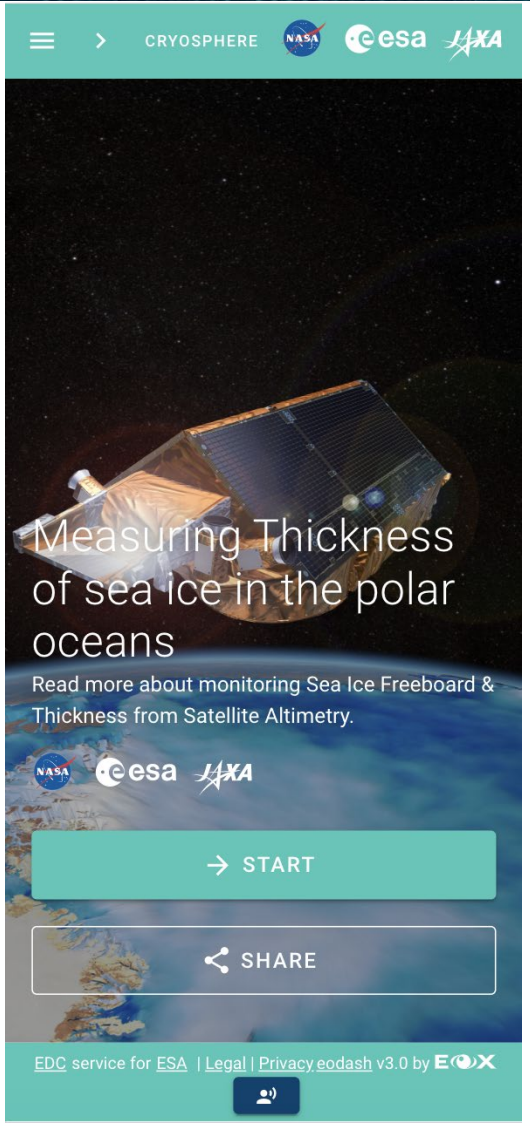
Open Science for Society

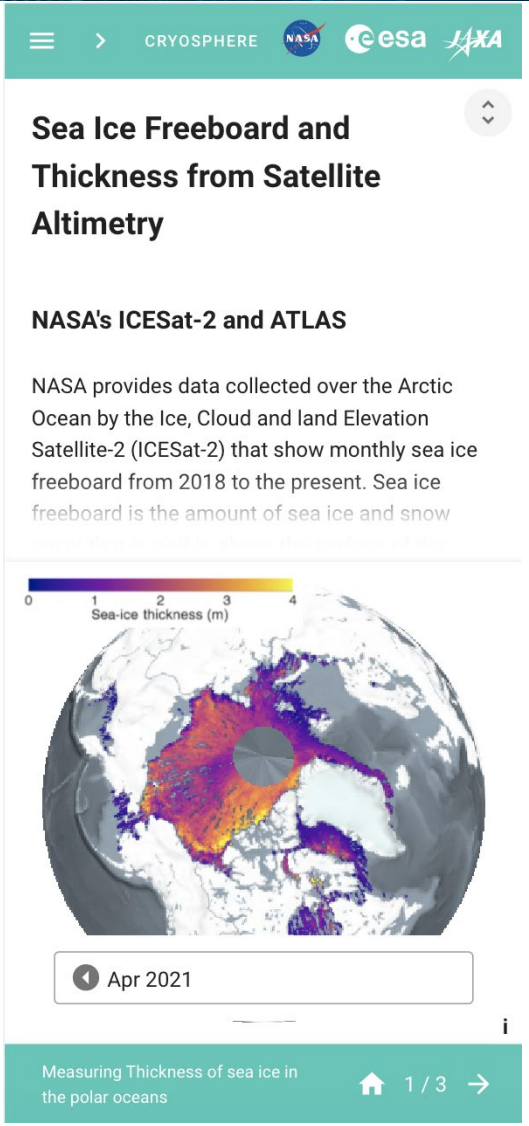
- Open for everyone: decision makers, scientists, EO & data science, students, general public
- Accessible for everyone: storytelling
- Engaging the community: create a challenge, provide a playground
  - **How to use EO data from NASA, ESA, JAXA to reproduce the indicators on EO Dashboard, or produce entirely new indicators?**

- Open Ingredients:
  - **Content**
  - **Data**
  - **Workflows**
  - **Technology**

> 4300 participants
132 countries

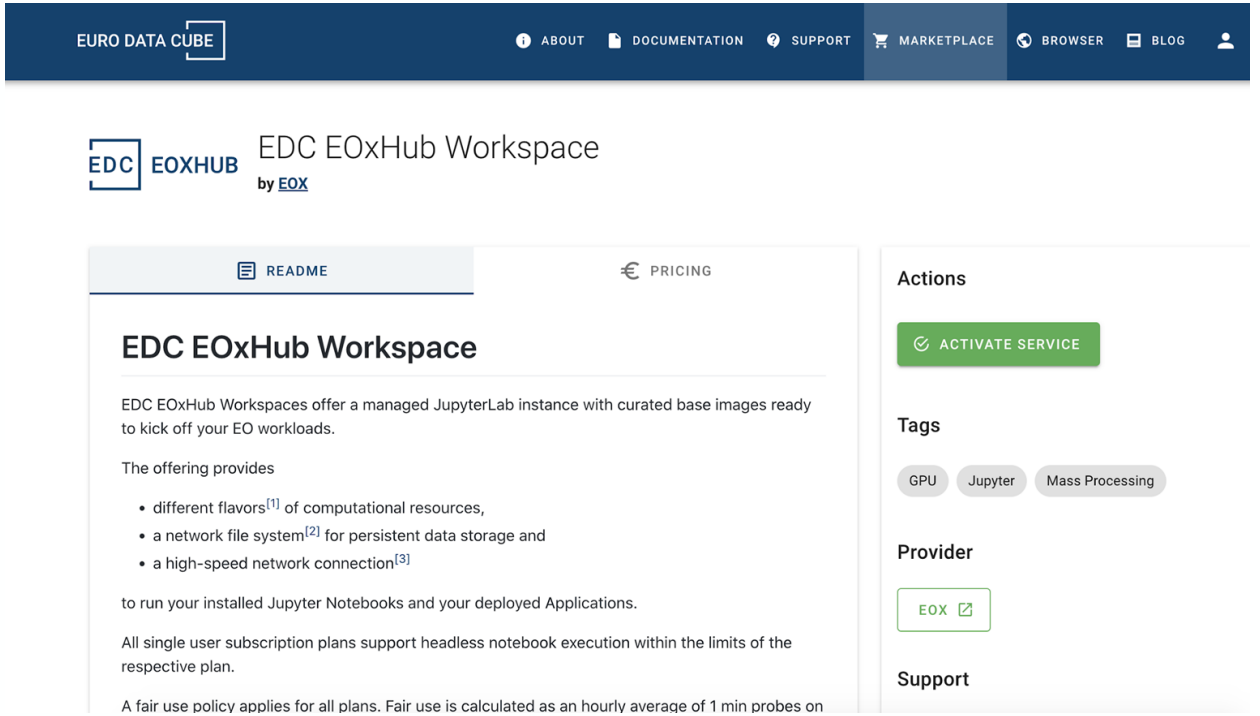
1. Create Meaningful Content





- Guided by Science Teams
- Exploiting curated datasets and products
- Using well described workflows and algorithms
- Implemented and scaled on EO Platforms
- Made accessible through tutorials

2. Provide Access to Data & Compute

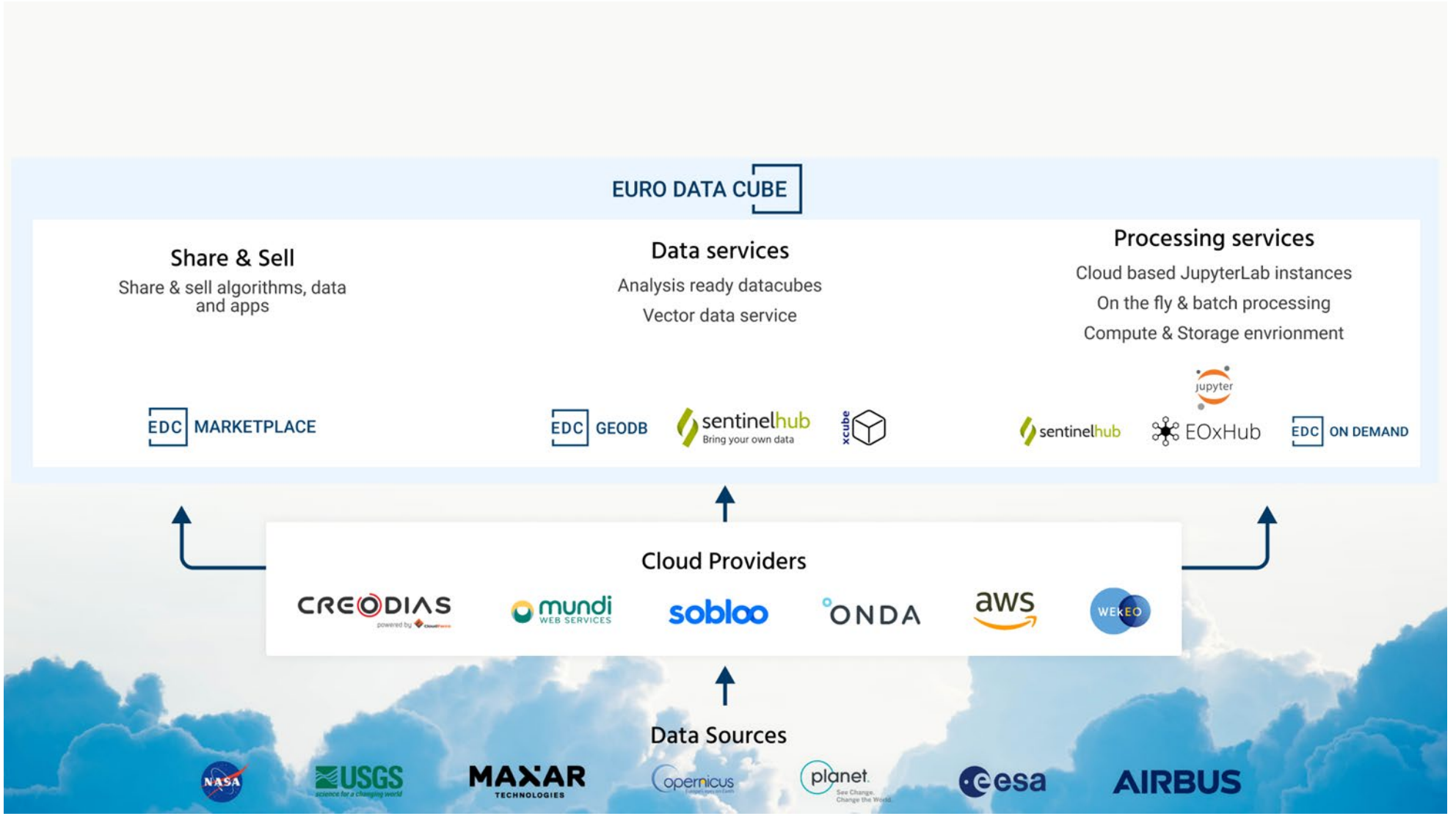


- Provide preconfigured hosted **workspaces**
- + a collection of **Jupyter Notebooks**
- To **reproduce** sample scientific workflows entirely or partially:
  - Accessing data located in distributed systems
  - Analysing data
  - Generate indicators
- And expand with own data (**BYOD**)
- Provide guidance t**o scale up and integrate** into the dashboard **(BYOA)**

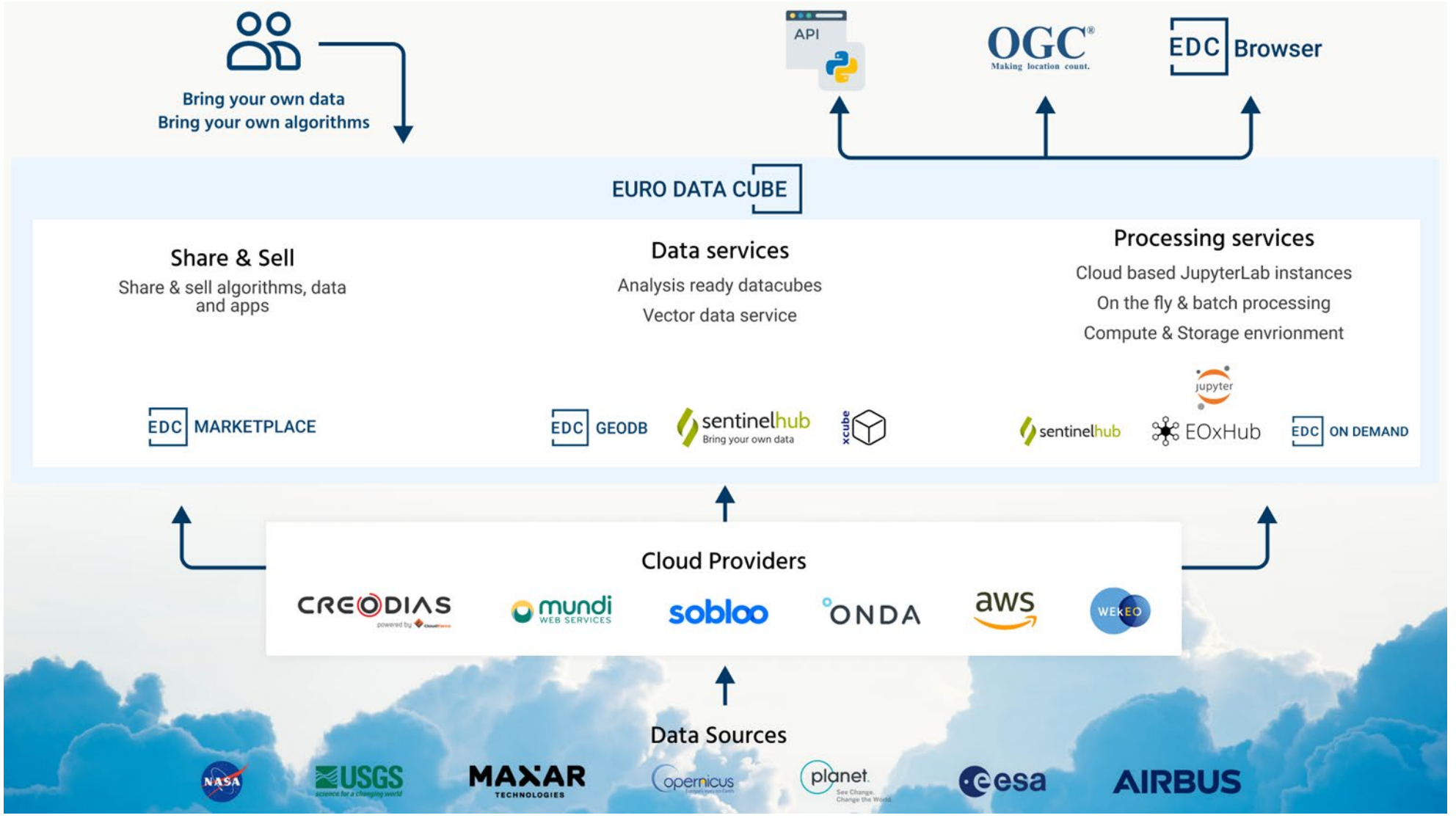
Euro Data Cube

Euro Data Cube

Euro Data Cube



Euro Data Cube



Available Open Data

https://collections.eurodatacube.com & https://browser.eurodatacube.com

Euro Data Cube Public Collections

EURO DATA CUBE

About

This registry exists to help people discover and share collections that are available via Euro Data Cube

See all usage examples for collections listed in this registry tagged with **dashboard hackathon**.

Search collections (currently 10 matching datasets)

Search collections

You are currently viewing a subset of data tagged with **dashboard hackathon**.

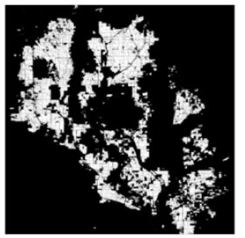
Add to this registry

If you want to add a collection or example of how to use a collection to this registry, please follow the instructions on the Euro Data Cube Public Collections GitHub repository.

Unless specifically stated in the applicable collection's documentation, collections available through the Euro Data Cube Public Collections are not provided and maintained by Euro Data Cube. Collections are provided and maintained by a variety of third parties under a variety of licenses. Please check collection licenses and related documentation to determine if a collection may be used for your application.

ALOS-2 PALSAR-2 ScanSAR Reference Rice Paddy Field Map

dashboard hackathon | JAXA | open data | raster | rice paddy | SAR | sentinel hub

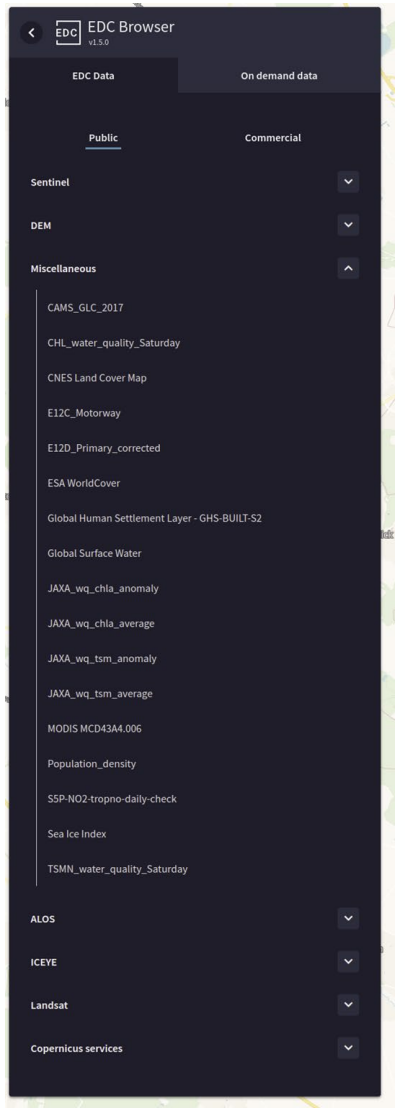


This collection contains reference rice paddy field maps derived from ALOS-2 ScanSAR geometrically corrected (orthorectified) data in selected AOIs between 2019 and 2020 for NASA/ESA/JAXA EODashboard Hackathon.
The reference map is described in the digital code as 255: rice paddy field, 0: others.

Details →

ALOS-2 PALSAR-2 ScanSAR for Agriculture

dashboard hackathon | JAXA | open data | raster | SAR | sentinel hub



Recap - EDC Platform

Leverage the power of existing EO specific

- **API services** like Sentinel Hub, GeoDB

  and

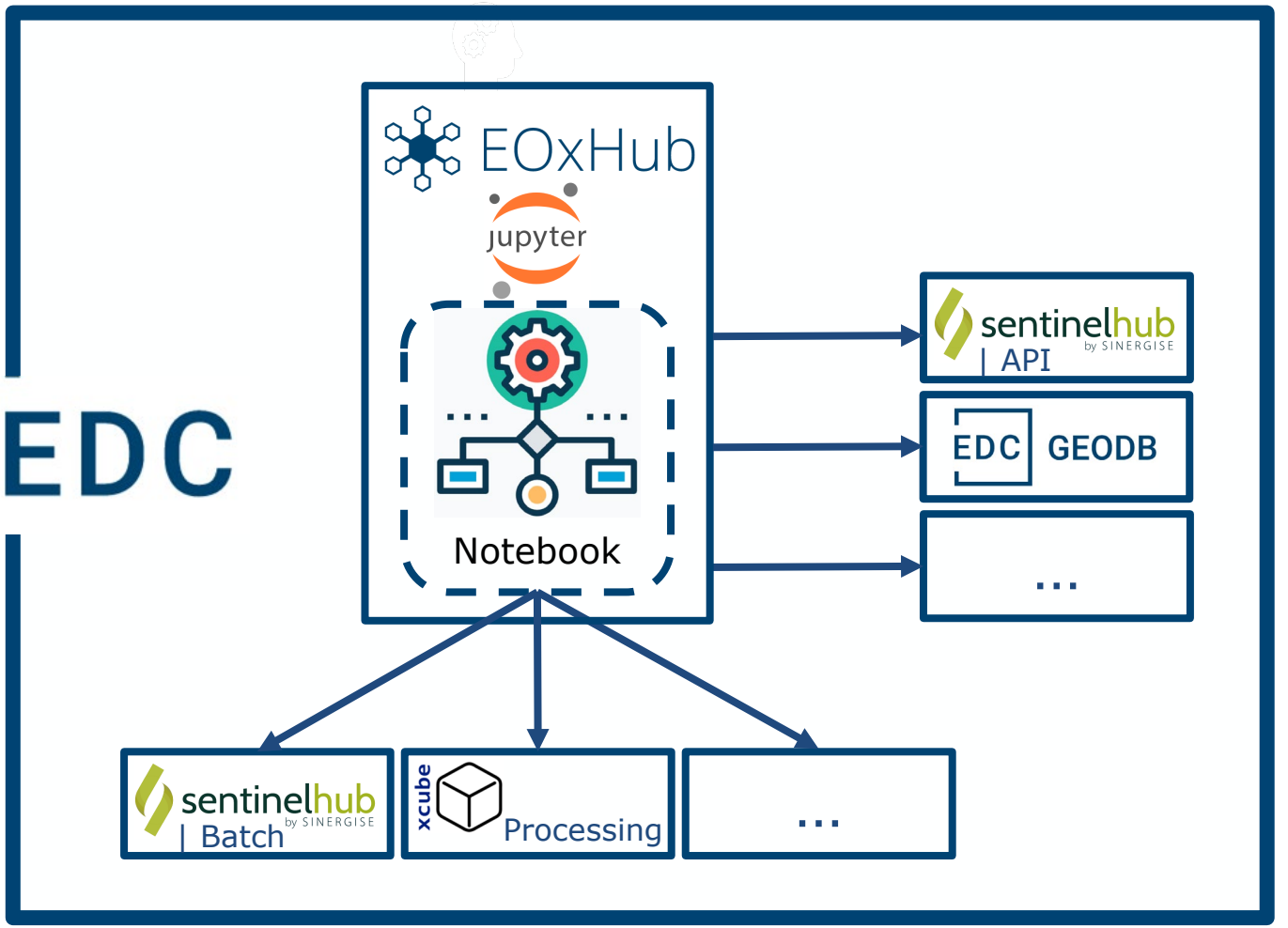
- **Large-scale processing environments** like Sentinel Hub Batch, xcube-gen Processing

for your EO enabled workflows.

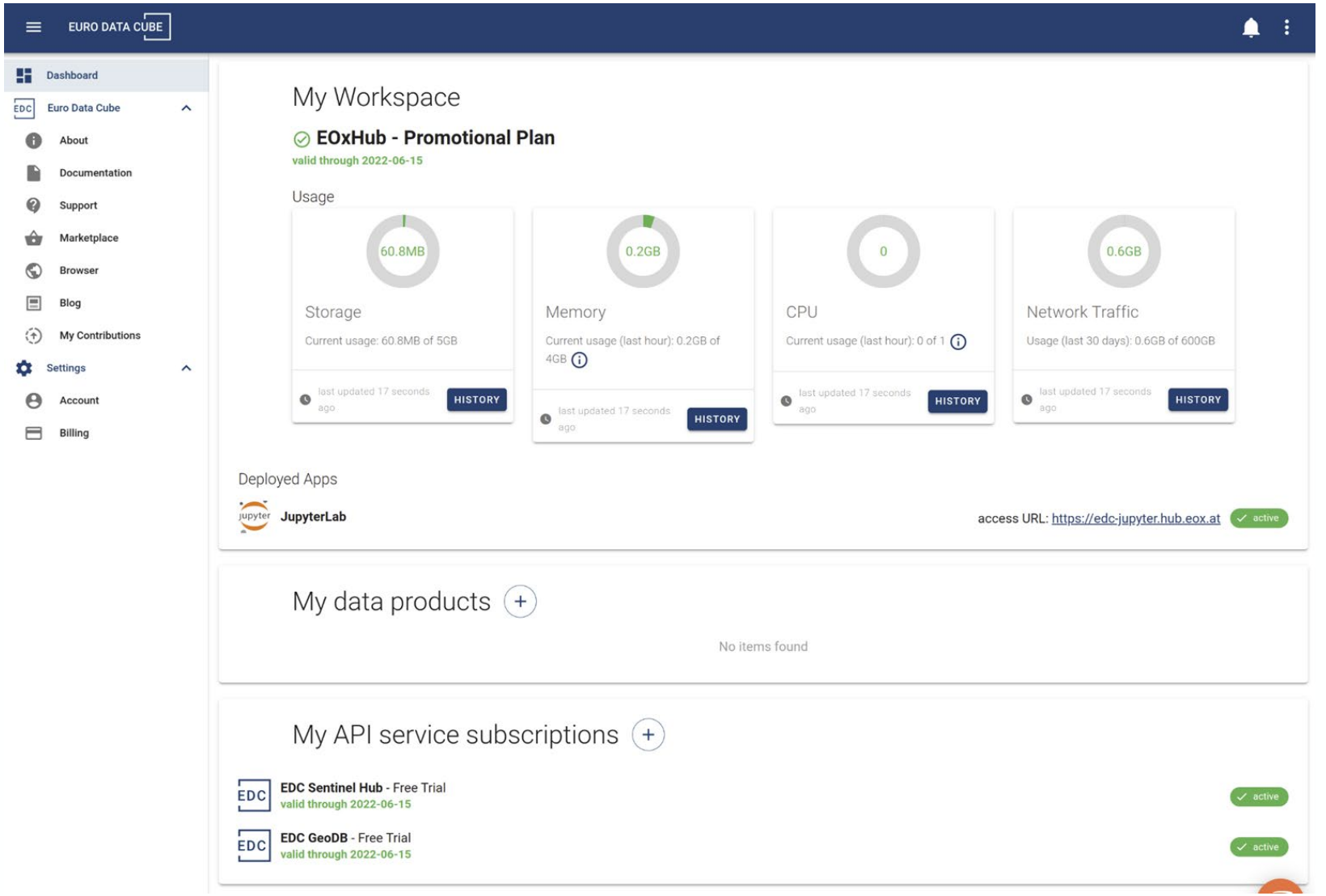
Use the EOxHub Workspace offering with its

- Cloud based execution runtime

for **interactive** exploitation using JupyterLab as well as **headless** invocation via its WPS 2.0 based API.

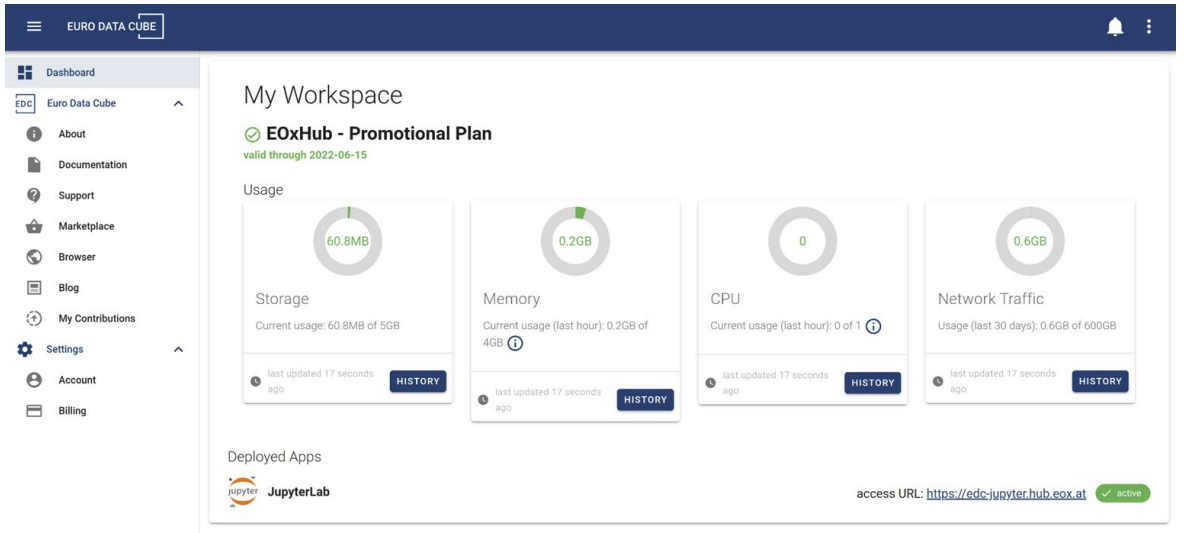


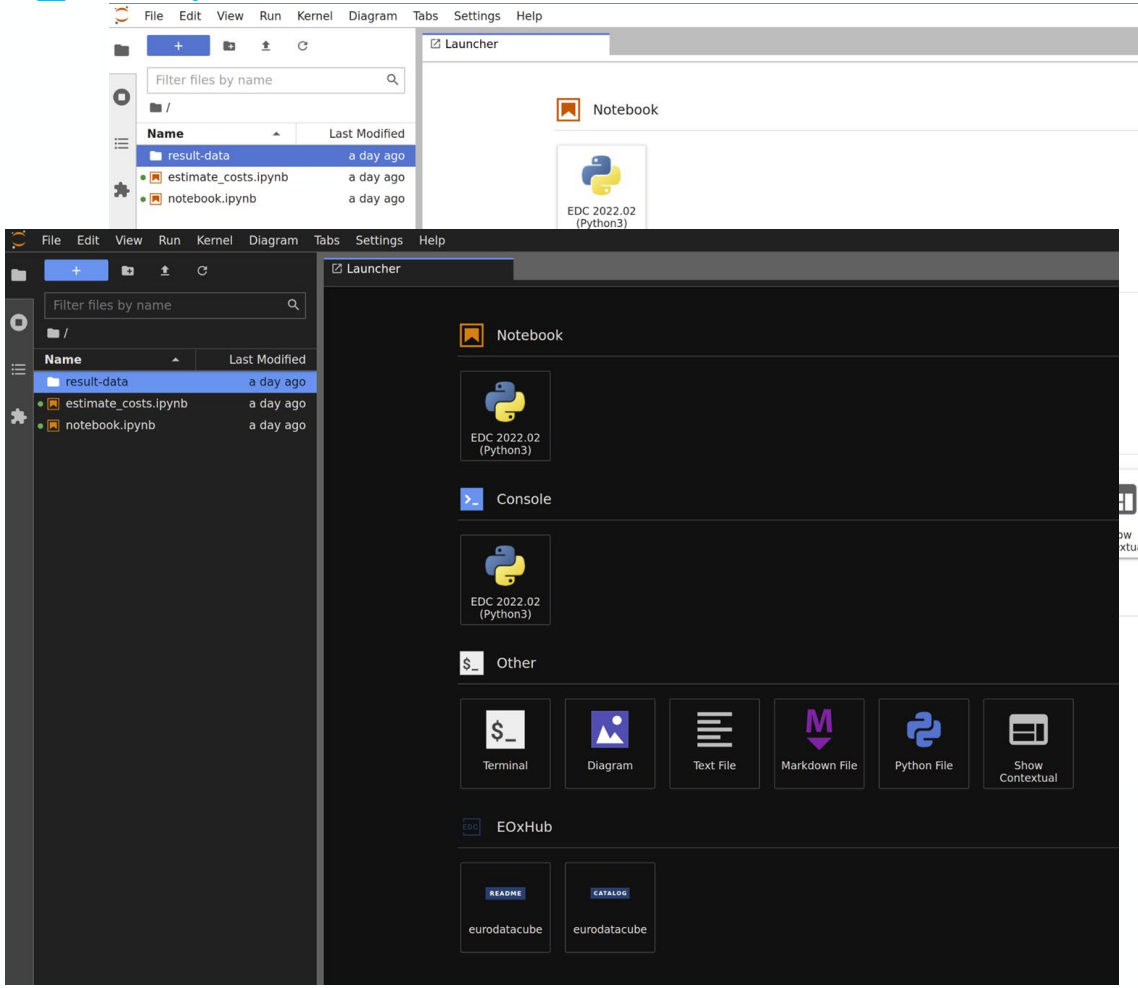
EDC Dashboard



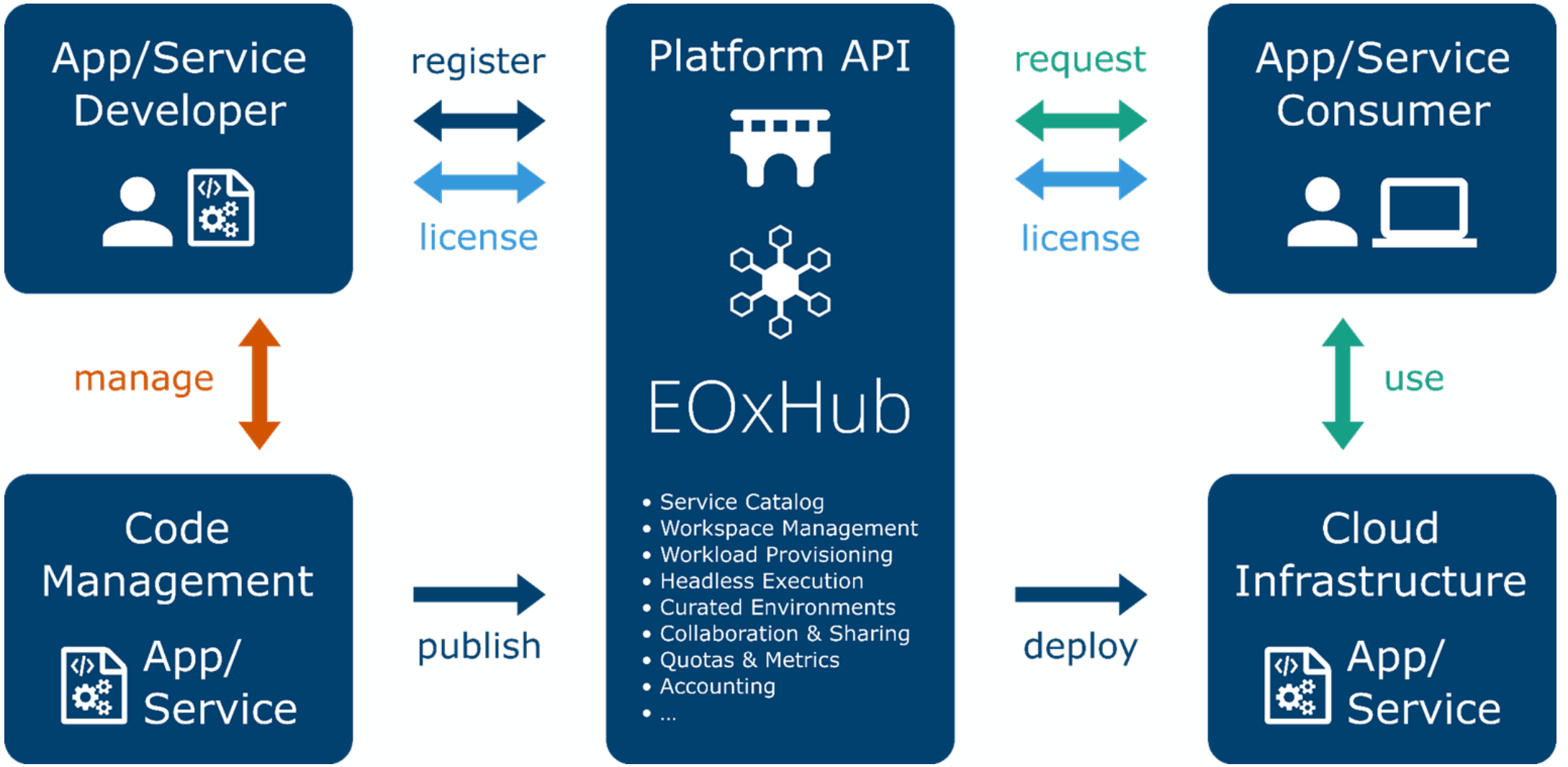
EDC EOxHub Workspace

- https://eurodatacube.com/marketplace/infra/edc_eoxhub_workspace
- Managed JupyterLab
- Curated base images
- Different flavours of computational resources
- Run Jupyter Notebooks
- User deployed Applications e.g. EO Browser





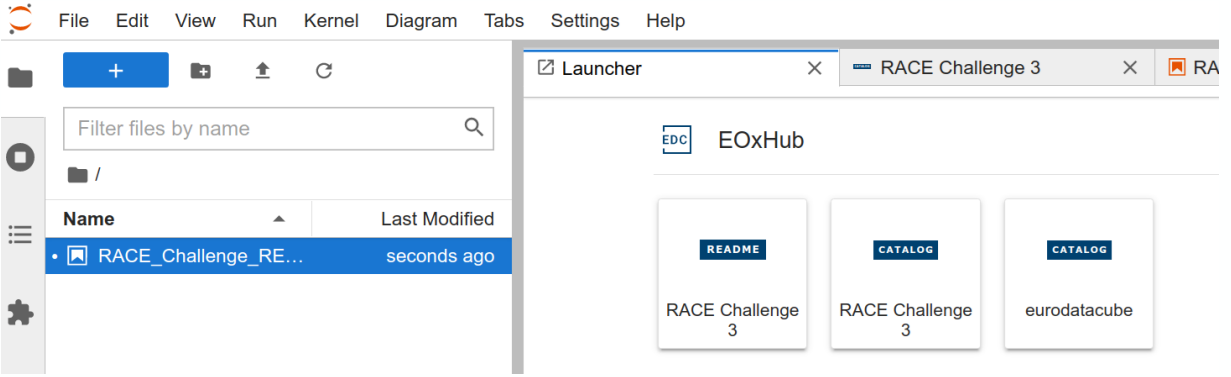
EDC EOxHub Workspace

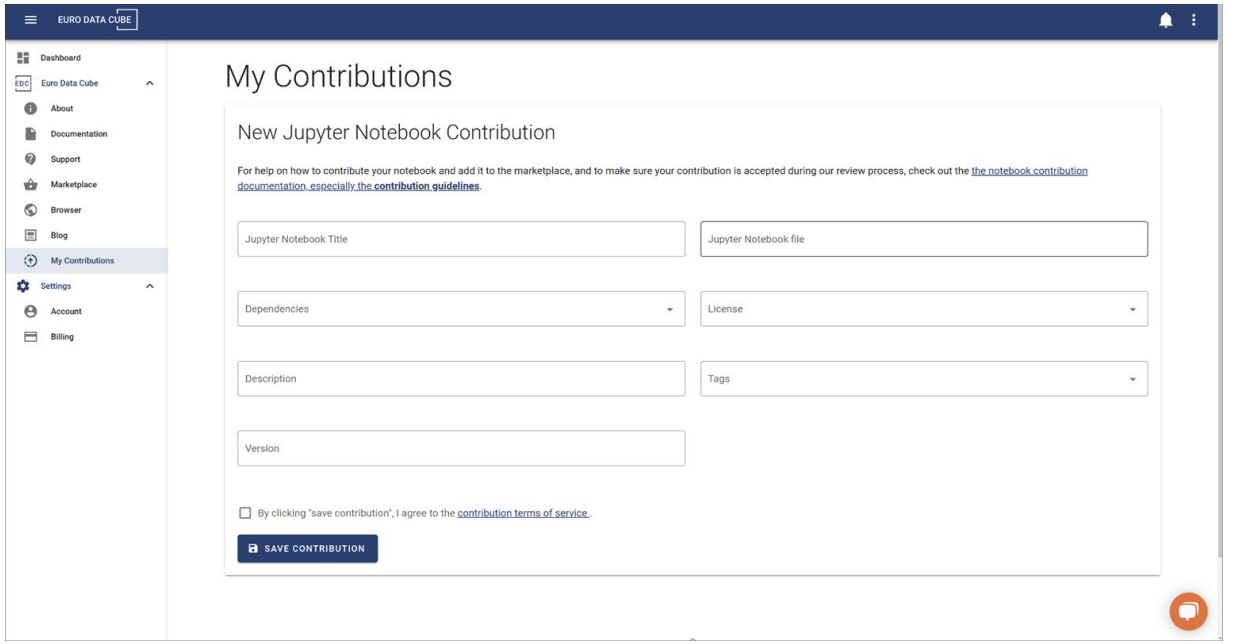


Collaborative Indicator Development

- Enabling ad-hoc teams
- Curated list of sample notebooks
- Dedicated tutorial notebooks for hackathons
- Community contributed notebooks
- Automatic testing with base images and updates
- EDC EOxHub Workspace for Indicator
  - Experimentation
  - Upscaling

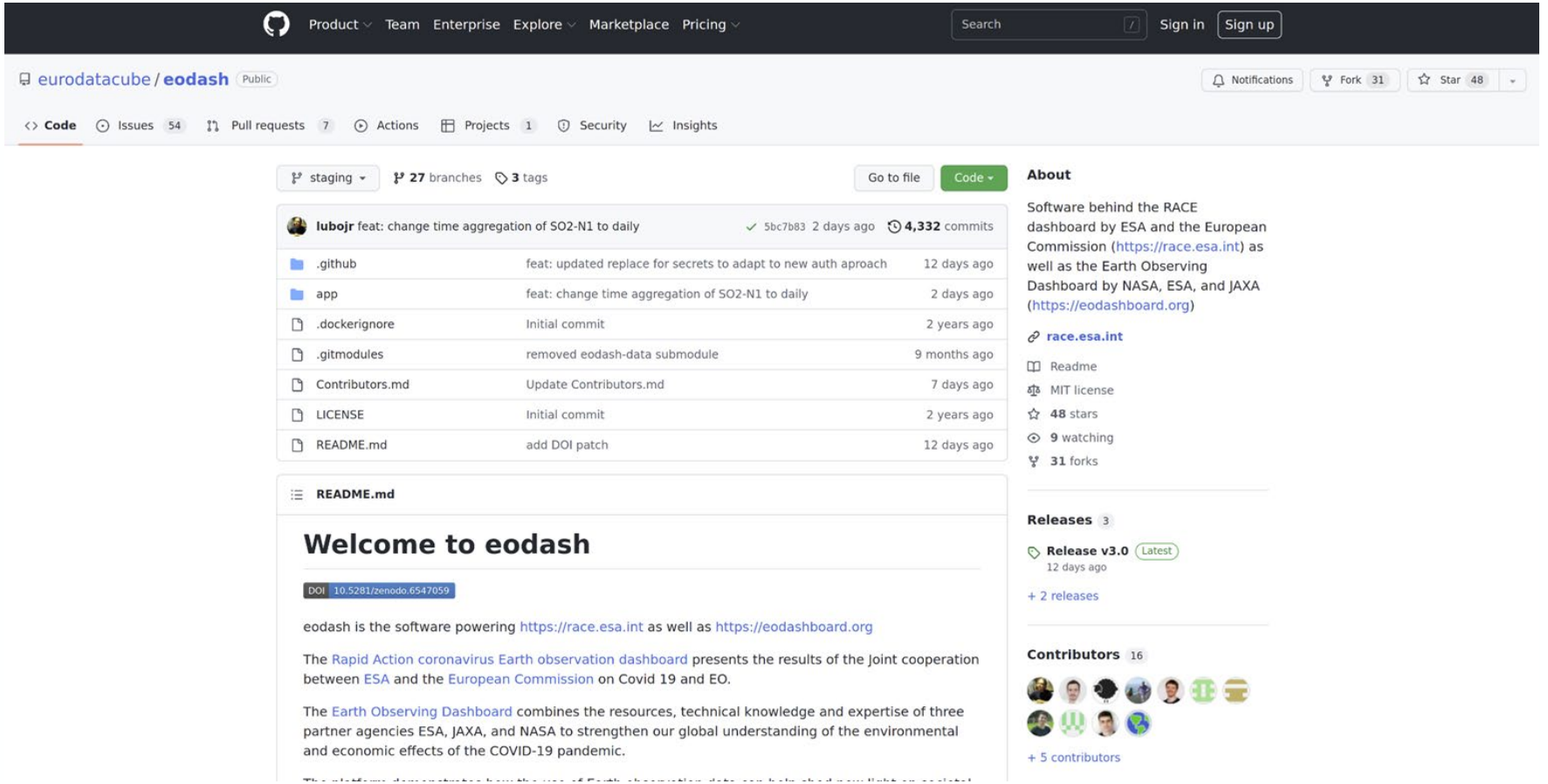
Submit your notebook





Integrate upscaled indicators

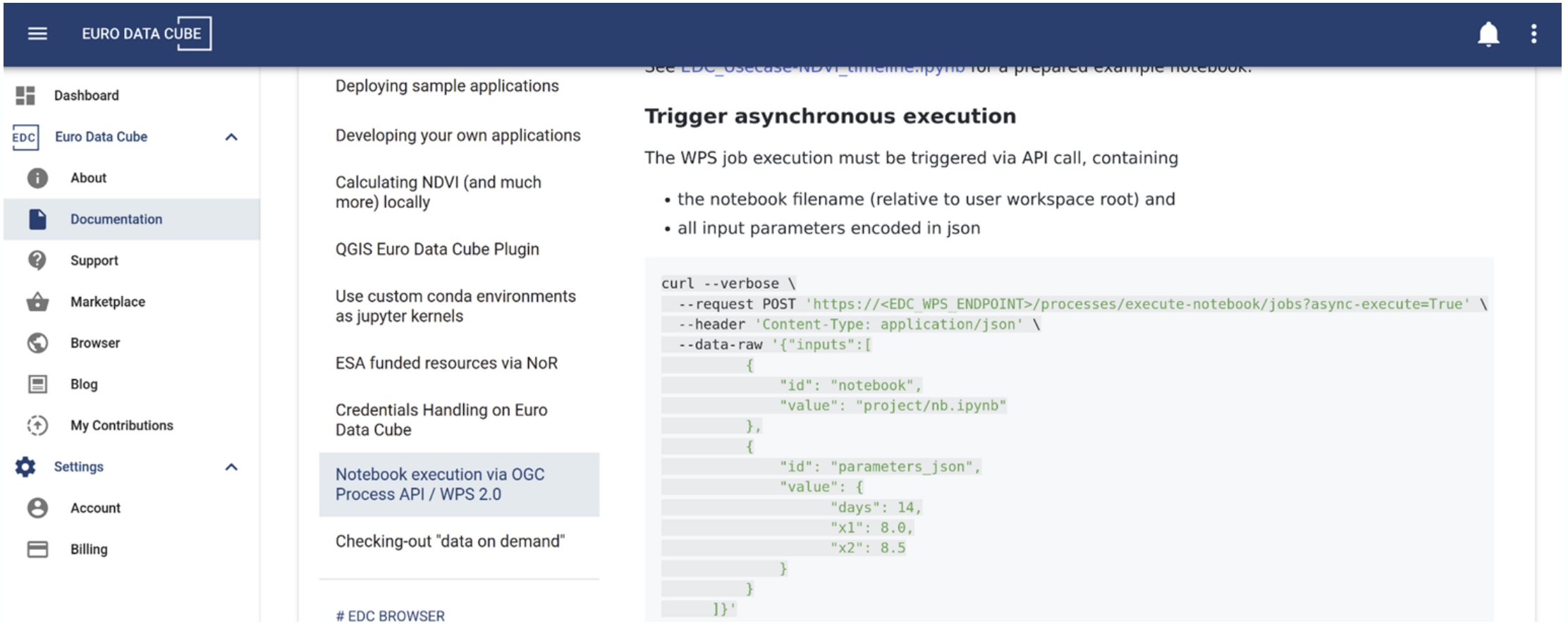
Open Source software project https://github.com/eurodatacube/eodash



Headless Execution

Continuously update data of integrated indicators

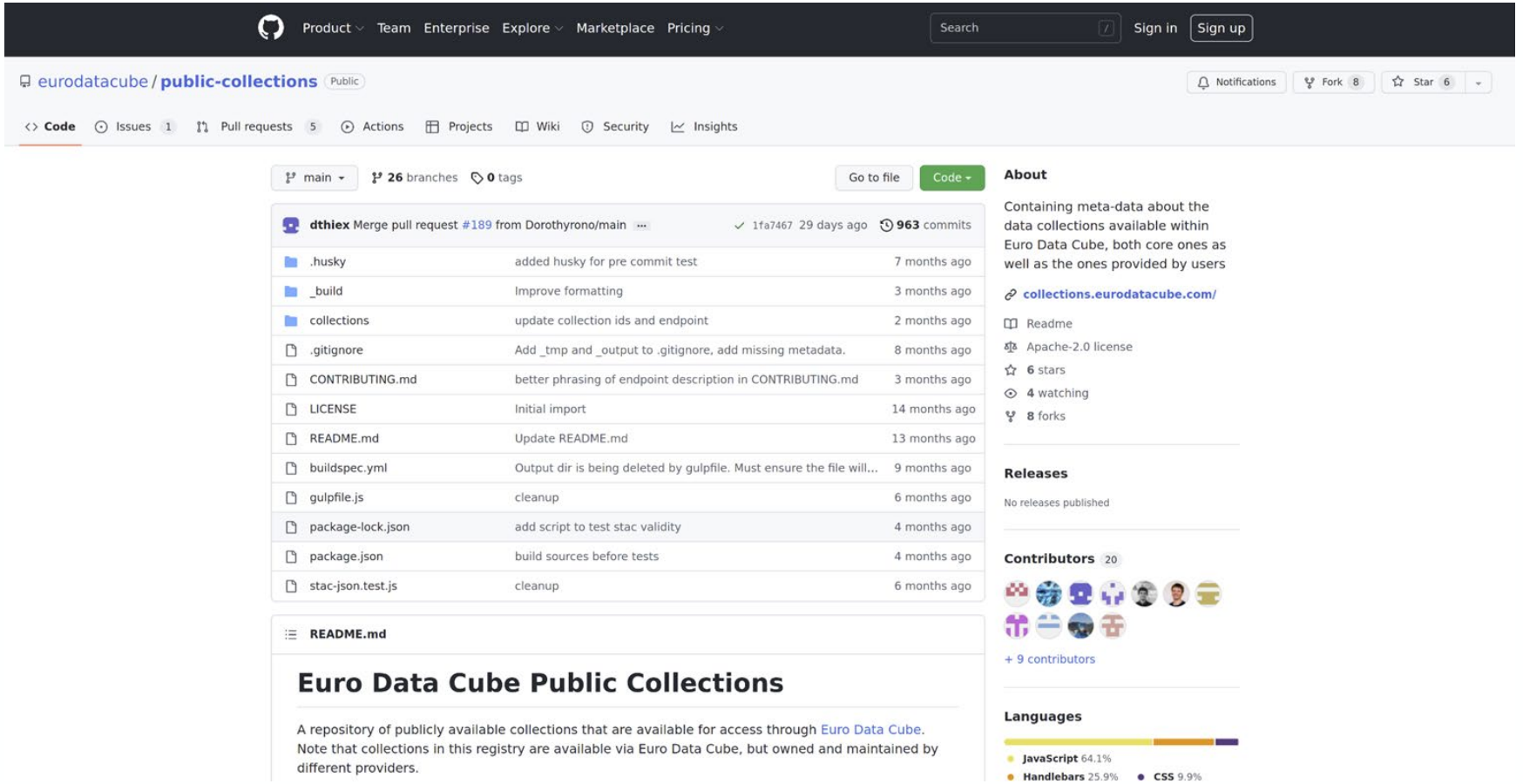
https://eurodatacube.com/documentation/headless-notebook-execution



Contribute Indicator to Open Data

Register Bring Your Own Data

Publish at https://github.com/eurodatacube/public-collections

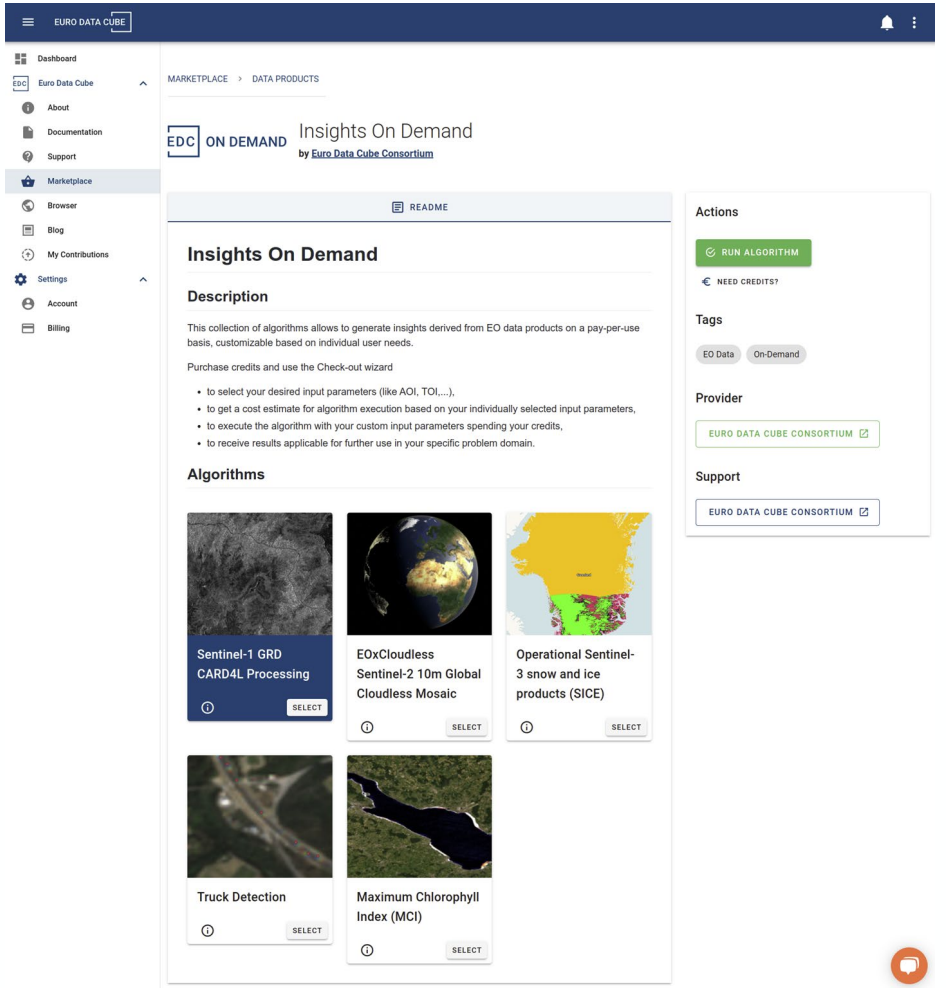


Share Indicator Algorithm

Bring Your Own Algorithm https://eurodatacube.com/documentation/offer_algorithms_for_on_demand_data_generation

Available as Insights On Demand on EDC marketplace
https://eurodatacube.com/marketplace/data-products/on-demand

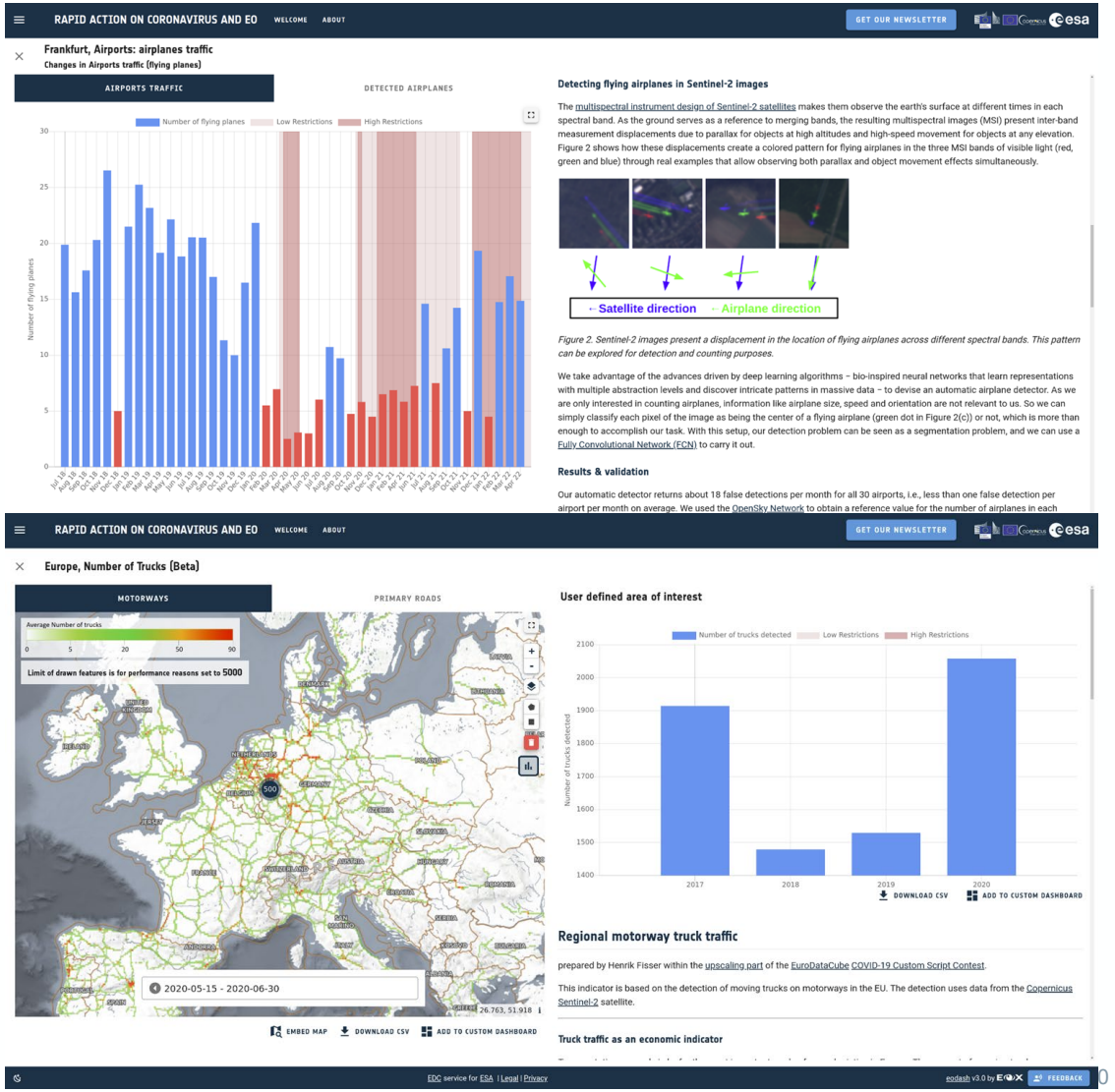
Support reproducible science



Summary

- Support Open and Reproducible Science approach
- Powered by Jupyter Notebooks
- Indicator experimentation, upscaling, and integration in dashboard
  - EO Dashboard Hackathon
  - RACE Challenges
- Enabling ad-hoc teams and community engagement
- On top of readily available indicator data and EO data

- Providing EODASH as an Open Science and educational resource
  - https://eodashboard.org
  - https://race.esa.int



Thank you!