Hands-On with ESA EarthCODE – Using Open EO Research Data

Tartu, Tuesday 16 June 2026

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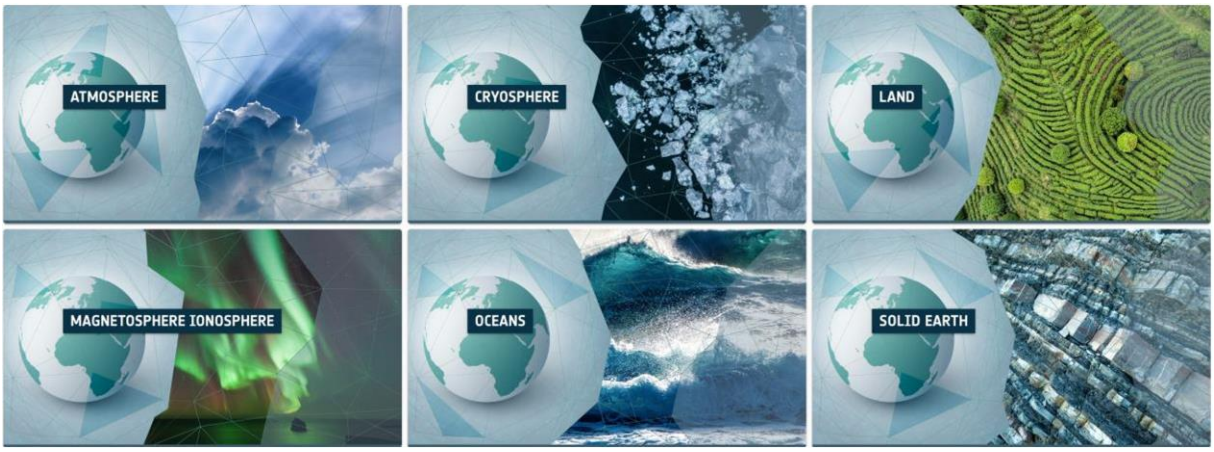
Topic(s) and focus

EarthCODE (https://earthcode.esa.int) is a strategic ESA Earth Observation initiative to support the adoption of Open Science practice in Earth System Sciences, implementing the vision included in ESA's EO Science Strategy, Earth Science in Action for Tomorrow's World (2024). The initiative helps scientists publish, discover, explore, reuse, modify, and build upon EO research outputs, enabling reproducible workflows on cloud-based EO environments and improving the utilisation of EO science mission data products for Earth Action.

EarthCODE provides access to openly available, FAIR ESA EO research including data and workflows across the major scientific themes: polar sciences, land, ocean, atmosphere, solid Earth, and magnetosphere/ionosphere.



This hands-on workshop introduces participants to EarthCODE - guiding them through publishing, searching, finding, and accessing ESA-funded research data. The workshop equips participants with the practical knowledge to leverage EarthCODE capabilities for their own research and applications.

Objective(s)

During this half-day workshop, we will introduce EarthCODE's capabilities, with a focus on tools newly available in 2026—such as accessing and using openly available ESA EO research data via EarthCODE's *osc-library*. Participants will be guided through searching for relevant datasets, accessing analysis-ready data from scientific studies, and working with common open-source EO tools both locally and within EarthCODE workspace on specific platform environments.

- ∉ EarthCODE data and how it can be used in your research and applications

- ∉ Using the osc library to search for and access ESA EO research data
- ∉ Working with common EO tools locally and on EarthCODE platforms
- ∉ Publishing research outputs using EarthCODE platforms and services

The hands-on technical content will introduce the modern open-source Python EO ecosystem, including Zarr for cloud-optimised, chunked storage; Xarray for labelled, multidimensional EO data handling; and Dask for scalable computation and parallel processing – on Jupyter Notebooks. Participants will load selected datasets into Xarray, inspect and interpret variables, and apply practical operations commonly required in GIScience workflows. Finally, the dataset can be further investigated with the embedded visualisation tools available within EarthCODE workspace. Participants will also learn how to publish their newly developed methods into EarthCODE, contributing to enlarge the knowledge base.

The core objective will be to enable participants to reuse openly available ESA EO research data products via the Open Science Catalog (https://opensciencedata.esa.int). For example, we will refer to the Antarctica analysis-ready data (ARD) cubes made available through EarthCODE, where complex EO data have been FAIRified and packaged to support direct reuse for modelling and visualisation (https://discourse-earthcode.eox.at/t/antartica-insyncdata-cubes/107; https://esa-earthcode.github.io/polar-science-cluster-dashboard/).

At the end of the workshop, we will take time for discussion and feedback on how to make EarthCODE better for the community.

Planned outcome(s)

By the end of this half-day workshop, participants will be able to reuse openly available ESA EO research data products from EarthCODE published on the Open Science Catalog using the osc-library developed within EarthCODE initiative. They will be also able to use and explore EarthCODE workspace to develop their own projects.

Participants will also learn and gain hands-on skills to load Zarr-backed EO data into Xarray; apply Dask for lazy/scalable computation; and perform core GIScience operations on analysis-ready data.

Workshop format

Half-day hands-on tutorial in Jupyter Notebooks, with short introductions between practical exercises.

Target audience

This workshop is aimed at beginner-to-intermediate participants who are new to EarthCODE but want to work hands-on with openly available ESA EO research data. It is suitable for GIS science researchers and practitioners who already use EO data (or want to start) and want a practical, reproducible workflow for accessing and analysing EarthCODE data in Python.

Participants should bring a laptop and be comfortable working in a Jupyter Notebook environment. The workshop assumes prior knowledge of the Python programming language and basic familiarity with EO data concepts. No local installation is required, as all resources will be accessed online using notebook environments provided through EarthCODEsupported platforms.