

→ EARTH OBSERVATION FOR SUSTAINABLE DEVELOPMENT

Climate Resilience

**Webinar Series on how to use Earth
Observation to tackle Climate Change**

*Webinar 06: How-to' Session: Using the EO4SD
CR Platform to access EO data (hands-on)*

2) Introduction to the Jupyter Notebook

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What is the Jupyter Notebook?

- The **Jupyter Notebook** is an incredibly powerful tool for interactively developing and presenting data science projects
 - Programming in the browser
 - Code, Instructions and output are displayed “in-line”
 - Used by scientists and researchers



What is the Jupyter Notebook?

- The Jupyter Notebook enables users to author notebook documents that include:
 - Live code
 - Interactive widgets
 - Plots
 - Narrative text
 - Equations
 - Images
 - Video



*These documents provide a complete and self-contained record of a computation that can be **converted to various formats** and **shared with others** using email, Dropbox, version control systems (like git/GitHub) or nbviewer.jupyter.org.*

Components of the Jupyter Notebook

Notebook web application



- ❖ **The notebook web application** enables users to:
 - **Edit code in the browser**
 - **Run code from the browser**
 - See the results of computations with **rich media representations**
 - Create and use **interactive JavaScript widgets**
 - Author **narrative text** using the **Markdown** markup language
 - Include **mathematical equations** using LaTeX syntax in Markdown

Kernels



- ❖ Through **Jupyter's kernel** and messaging architecture, the Notebook allows code to be run in a range of different programming languages.
 - For each notebook document that a user opens, the web application starts a kernel that runs the code for that notebook.
 - **Python**
 - Julia
 - R
 - Ruby
 - Haskell
 - Scala
 - node.js
 - Go

Notebook documents

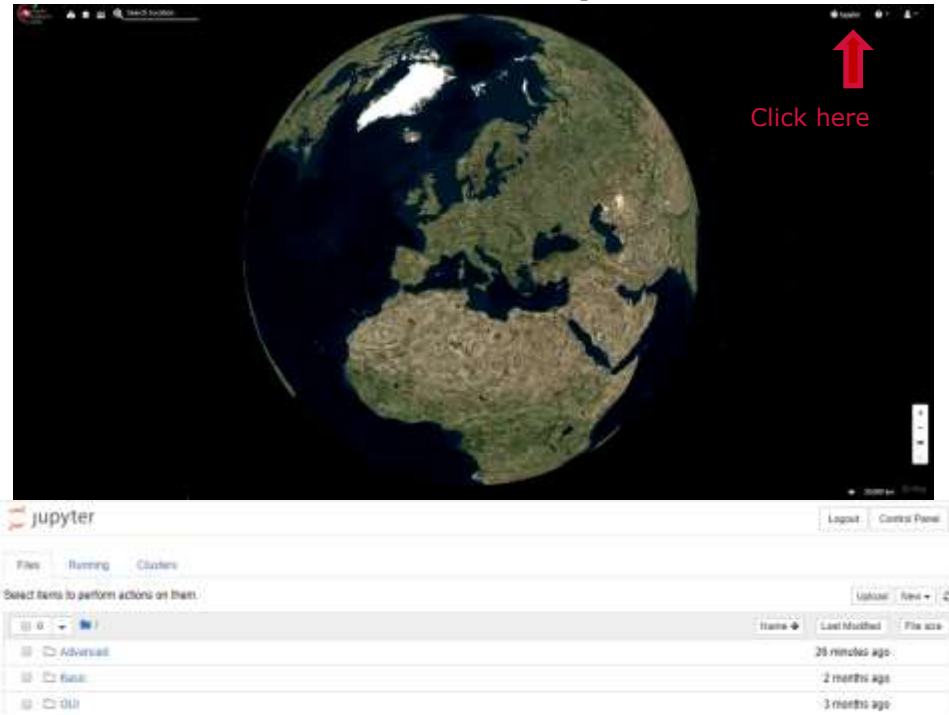


- ❖ **Notebook documents** contain the **inputs and outputs** of an interactive session as well as **narrative text** that accompanies the code but is not meant for execution.
 - **Rich output** generated by running code, including HTML, images, video, and plots, is embedded in the notebook, which makes it a complete and self-contained record of a computation.
 - When you run the notebook web application on your computer, notebook documents are just **files on your local filesystem with a .ipynb extension**. This allows you to use familiar workflows for organizing your notebooks into folders and sharing them with others.

The Jupyter Notebook within the EO4SD platform

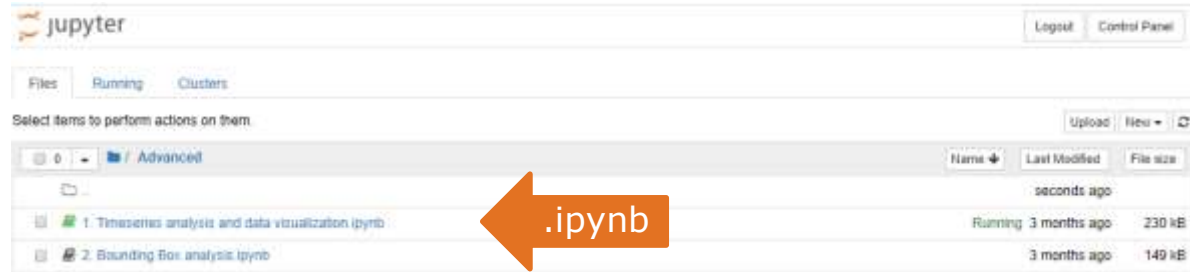
- When you first start the notebook server, your browser will open to the notebook dashboard
- The dashboard serves as a home page for the notebook
- Its main purpose is to display the notebooks and files in the current directory

- For example, here is a screenshot of the dashboard page for the examples directory in the Jupyter repository



The Jupyter Notebook within the EO4SD platform

- The **top of the notebook list** displays clickable breadcrumbs of the current directory.
- By clicking on these breadcrumbs or on sub-directories in the notebook list, you can navigate through your file system
- The notebook list shows green "Running" text and a green notebook icon next to running notebooks. Notebooks remain running until you explicitly shut them down

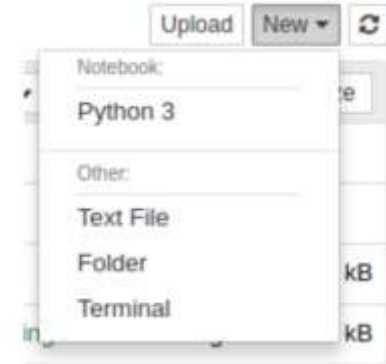


The screenshot shows the Jupyter interface with a notebook list. The first notebook is titled "1. Timeseries analysis and data visualization (.ipynb)" and has a green "Running" status. An orange arrow points to the ".ipynb" extension in the filename.

Name	Last Modified	File size
0		
Advanced		
1. Timeseries analysis and data visualization (.ipynb)	Running 3 months ago	230 kB
2. Bounding Box analysis (.ipynb)	3 months ago	149 kB

The Jupyter Notebook within the EO4SD platform

- To create a **new notebook**, click on the **"New"** button at the top of the list and select a kernel from the dropdown
- To **shutdown, delete, duplicate**, or **rename a notebook** check the checkbox next to it and an array of controls will appear at the top of the notebook list. You can also use the same operations on directories and files when applicable.



The Jupyter Notebook within the EO4SD platform

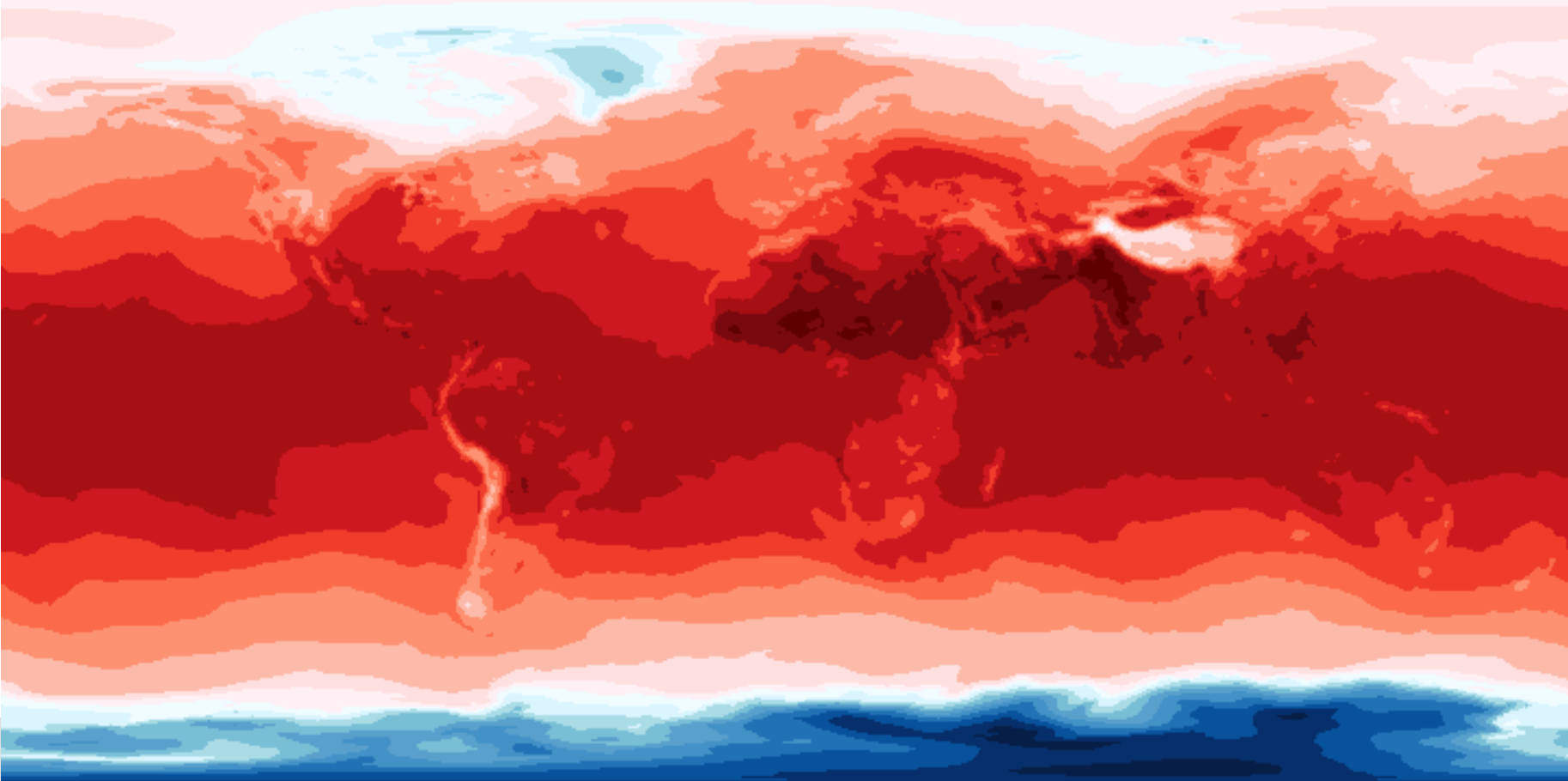
- To see all of your running notebooks along with their directories, click on the "**Running**" tab:



The screenshot shows the Jupyter web interface. At the top left is the 'jupyter' logo. To the right are 'Quit' and 'Logout' buttons. Below the logo are three tabs: 'Files', 'Running' (which is selected), and 'Clusters'. Under the 'Running' tab, there is a section titled 'Currently running Jupyter processes.' with a refresh icon. This section contains two expandable panels: 'Terminals' and 'Notebooks'. The 'Terminals' panel shows 'There are no terminals running.' The 'Notebooks' panel shows two running notebooks:

Notebook Name	Kernel	Status	Time
Basic/Notebook Basics.ipynb	Python 3	Shutdown	seconds ago
Basic/1. What is Jupyter? + Notebook Basics.ipynb	Python 3	Shutdown	seconds ago

Introduction to the Jupyter Notebook



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