

SENTINEL-3 OLCI L2 BIOGEOCHEMISTRY DATA ACCESS PROGRAM WITH PYTHON

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INTRODUCTION

Sentinel-3 is part of Copernicus Program, Europe's ambitious remote sensing program aimed to "providing accurate, timely and easily accessible information to improve the management of the environment, understand and mitigate the effects of climate change and ensure civil security,"¹

Sentinel-3 Ocean and Land Colour Instrument (OLCI) collect and provides data to monitor ocean and land geophysical parameters, for example sea surface Chlorophyll-a concentration.

¹<https://sentiwiki.copernicus.eu/web/copernicus-programme>

SENTINEL-3 OLCI USAGE

Applications	OLCI Geophysical Products						
	Rxxx	PAR	T865	A865	IWV	OTCI	GI-FAPAR RC681 RC865
Mapping and monitoring of Land Use and Cover (LUC)						✓	✓
Athmospheric Monitoring			✓	✓	✓		
Climate Change Monitoring	✓	✓	✓	✓	✓	✓	✓

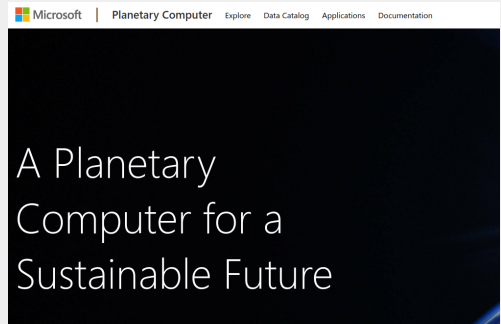
Figure 1: Sentinel-3 OLCI products and application
(<https://sentiwiki.copernicus.eu/web/olci-applications>)

SENTINEL-3 DATA ACCESS

Data access provided by several organizations. Copernicus' WEkEO and Microsoft's Planetary Computer to name two of them.



(a) WEkEO



(b) Planetary Computer

Figure 2: Two example of Sentinel-3 data provider: WEkEO and Planetary Computer

TUTORIAL ON ACCESSING SENTINEL-3 OLCI

TUTORIAL ON ACCESSING SENTINEL-3 OLCI

USING GITHUB CODESPACE

Python and Github/Jupyterhub can be used to access and open satellite datasets.



(a) Python



(b) JupyterHub



(c) Github Codespaces

Figure 3: Python, Jupyter and Github make it easier to use satellite dataset.

i Note

Python is “easy” and reliable. Cloud infrastructure such as Github Codespace and JupyterHub make it even more easier.

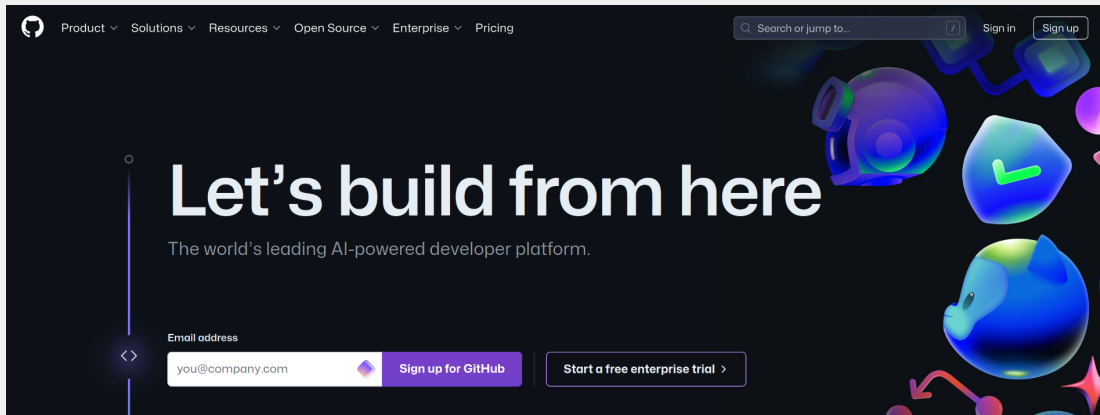
🔥 Caution

This tutorial will guide you using **Github Codespaces**

STEP 1: CREATE GITHUB ACCOUNT

💡 Steps

Easy. Just go to <https://github.com/signup>



STEP 2: MAKE A COPY OF THE CODE REPOSITORY I

Steps

1. Log-in to your Github & go to `https://github.com/eds-ocean/imber-sen3`,
2. Click **Fork**,
3. Continue as example on the next slide.

STEP 2: MAKE A COPY OF THE CODE REPOSITORY II

Create a new fork

A *fork* is a copy of a repository. Forking a repository allows you to freely experiment with changes without affecting the original project.

Required fields are marked with an asterisk ().*

Owner *



ed10302007

Repository name *

imber-sen3

✔ imber-sen3 is available.

By default, forks are named the same as their upstream repository. You can customize the name to distinguish it further.

Description (optional)

Sentinel-3 OLCI Biogeochemistry Data Acquisition Program

☒ Copy the `main` branch only

Contribute back to eds-ocean/imber-sen3 by adding your own branch. [Learn more.](#)

① You are creating a fork in your personal account.

Create fork

STEP 3: CREATE GITHUB CODESPACE I

💡 Steps

1. On the forked repository, click **Code**, then select tab **Codespaces**,
2. Click the three dots (...) and select **Manage Codespaces**,
3. Click down arrow beside **Create codespace on main** and then select **Configure and create codespace**,
4. Click **Configure and create codespace** and fill parameter like in the example.

(see next slides)

STEP 3: CREATE GITHUB CODESPACE II

The screenshot shows the GitHub interface for a repository named 'imber-sen3', which is public and forked from 'eds-ocean/imber-sen3'. The repository has 1 branch and 0 tags. The 'main' branch is selected, and it is noted that this branch is up to date with the upstream repository. The repository contains several files and folders, including '.resources', 'Code', 'Settings', '.gitignore', 'LICENSE', and 'README.md'. The 'Codespaces' tab is active, displaying a message that no codespaces are currently set up for this repository. A dropdown menu is open, showing options to 'New with options...', 'Configure dev container', 'Set up prebuilds', 'Manage codespaces', 'Share a deep link', and 'What are codespaces?'. The 'Create codespace on main' button is highlighted. The bottom of the screen shows the repository path '02007/imber-sen3/codespaces'.

STEP 3: CREATE GITHUB CODESPACE III

The screenshot shows the GitHub Codespaces interface. At the top, the heading "Your codespaces" is followed by a "Go to docs" button and a green "Create codespace on main" button with a dropdown arrow. Below this, a blue notification bar states: "Codespace usage for this repository is paid for by ed10302007." To the right of the notification is a dropdown menu with two options: "Create codespace on main" (which is checked and shows "2-core • 8GB RAM • 32GB") and "Configure and create codespace" (with the subtext "Show advanced options before launching codespace"). The main content area is titled "Getting started with GitHub Codespaces" and contains three cards: "Learn core concepts" (with a link to "Start here"), "Configure and manage" (with links to "secret management" and "port forwarding"), and "Develop locally" (with links to "Visual Studio Code" and "JetBrains").

Your codespaces

Go to docs Create codespace on main

Codespace usage for this repository is paid for by ed10302007.

Getting started with GitHub Codespaces

Learn core concepts
New to Codespaces? [Start here](#). Learn the core concepts and how to get started.

Configure and manage
Learn more about features like [secret management](#) and [port forwarding](#).


Develop locally
Access codespaces from within [Visual Studio Code](#) or [JetBrains](#).

✓ Create codespace on main
2-core • 8GB RAM • 32GB

Configure and create codespace
Show advanced options before launching codespace

STEP 3: CREATE GITHUB CODESPACE IV

Create codespace for
ed10302007/imber-sen3

Branch This branch will be checked out on creation	 main ▾
Region Your codespace will run in the selected region	Europe West ▾
Machine type Resources for your codespace	4-core ▾
<div>Create codespace</div>	

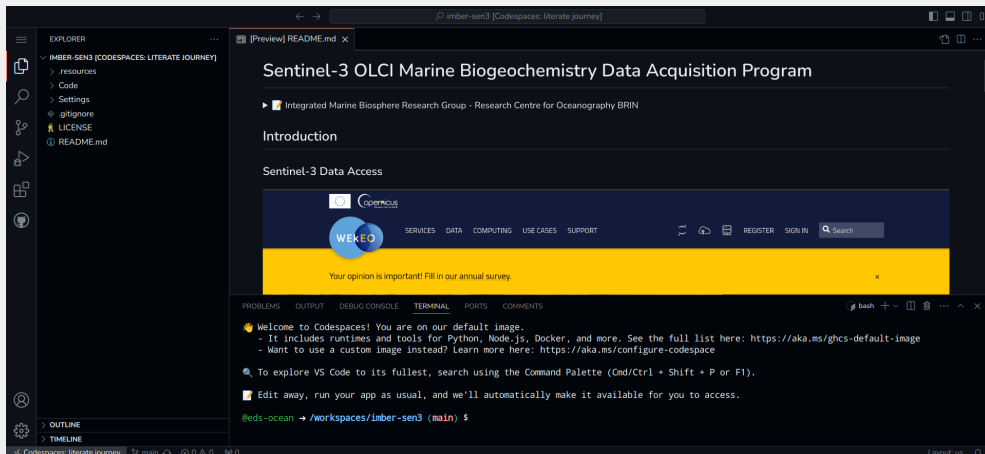
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RUNNING THE CODE

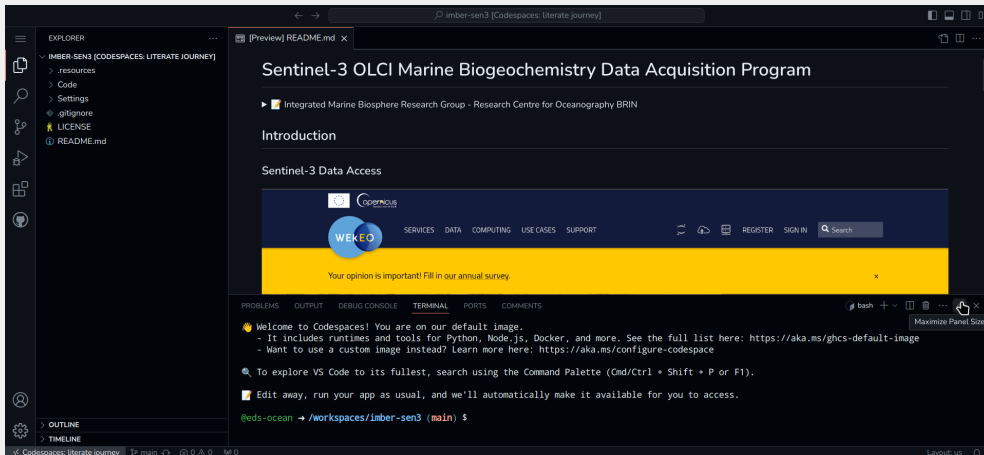
Github Codespace is an environment to run code from various programming language. By default, it opened in VS-Code web and screen will open the Readme file in a Jupyter Notebook page. It also provide Terminal to work on Linux command line environment.

We will just use the Terminal, except if you want to prefer you might want to use the Notebook to run the code instead.

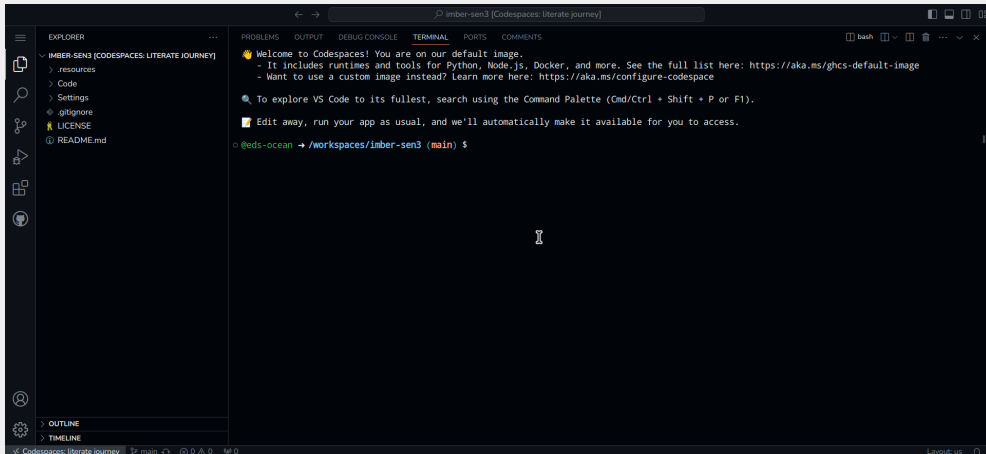
Default codespace screen



Click on the arrow to maximize terminal



Maximized terminal screen



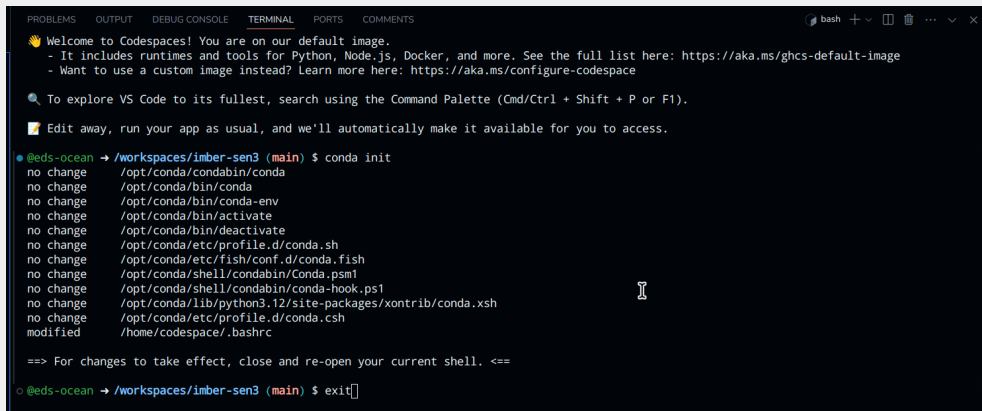
INSTALL CONDA ENVIRONMENT I

Steps

1. Initiate conda,
2. Restart terminal,
3. Install conda environment from yml file.

INSTALL CONDA ENVIRONMENT II

Type `conda init` to initiate Conda. Wait until finished and then type `exit` to close the Terminal



```
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS COMMENTS
Welcome to Codespaces! You are on our default image.
- It includes runtimes and tools for Python, Node.js, Docker, and more. See the full list here: https://aka.ms/ghcs-default-image
- Want to use a custom image instead? Learn more here: https://aka.ms/configure-codespace

To explore VS Code to its fullest, search using the Command Palette (Cmd/Ctrl + Shift + P or F1).

Edit away, run your app as usual, and we'll automatically make it available for you to access.

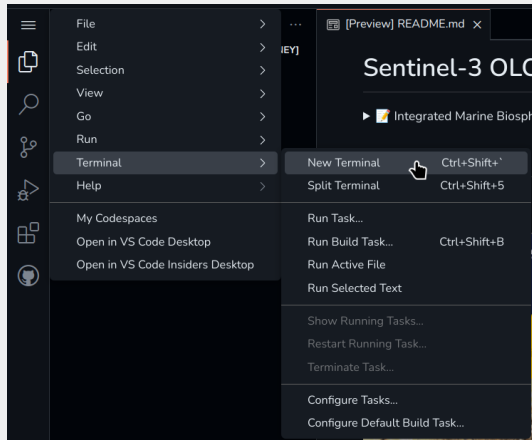
@eds-ocean → /workspaces/imber-sen3 (main) $ conda init
no change /opt/conda/condabin/conda
no change /opt/conda/bin/conda
no change /opt/conda/bin/conda-env
no change /opt/conda/bin/activate
no change /opt/conda/bin/deactivate
no change /opt/conda/etc/profile.d/conda.sh
no change /opt/conda/etc/fish/conf.d/conda.fish
no change /opt/conda/shell/condabin/Conda.psm1
no change /opt/conda/shell/condabin/conda-hook.ps1
no change /opt/conda/lib/python3.12/site-packages/xontrib/conda.xsh
no change /opt/conda/etc/profile.d/conda.csh
modified /home/codespace/.bashrc

==> For changes to take effect, close and re-open your current shell. <==

@eds-ocean → /workspaces/imber-sen3 (main) $ exit
```

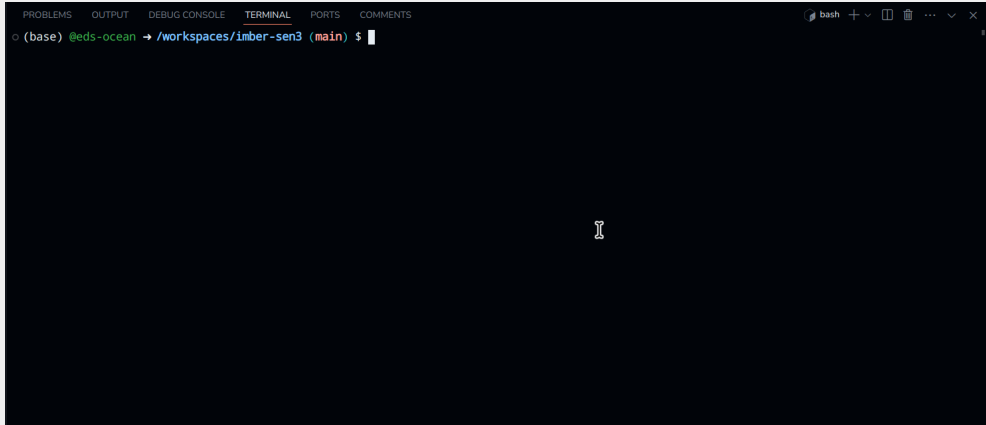
INSTALL CONDA ENVIRONMENT III

Open new terminal by clicking three-lines > Terminal > New Terminal



INSTALL CONDA ENVIRONMENT IV

Newly opened terminal. Note that it now has (base) on the left side.



```
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS COMMENTS
o (base) @eds-ocean -> /workspaces/imber-sen3 (main) $
```


INSTALL CONDA ENVIRONMENT V

Now type code below,

```
conda env create -f Settings/sen3_pc.yml
```

Wait for it until finished, then type,

```
conda activate sen3_pc
```