Blue-Cloud

Piloting innovative services for Marine Research & the Blue Economy

A machine learning approach to derive plankton biomass and diversity products from the Global Ocean

IMDIS | 12 April 2021

Blue-Cloud has received funding from the European Union's Horizon Programme call BG-07-2019-2020, topic: [A] 2019 - Blue Cloud services, grant Agreement number 862409.

Oceanographic and marine data management in the European landscape is progressing considerably during the last three decades. As such, providing discovery and access to multidisciplinary data sets is becoming more important.

Copernicus Europe's eyes on Earth · WEKEO · D4SCIENCE INFRASTRUCTURE · EUDAT Collaborative Data Infrastructure


EcoTaxa 2.5
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Copernicus Marine Service
ENA
European Nucleotide Archive
SeaDataNet
EMODnet
ICOS
Integrated Carbon Observation System
Large amounts of multidisciplinary marine data are available in an interoperable or harmonized way in leading European marine data. As new technologies become available, there is a challenge to adopt them to expand these data management services. In this context, the operators of these European marine data infrastructures have joined forces to explore and demonstrate the power of a Blue Cloud.
EurOBIS
European Ocean Biogeographic Information System
Euro Argo
EURO BIOIMAGING
Copernicus
WEKEO
D4SCIENCE INFRASTRUCTURE
EUDAT Collaborative Data Infrastructure

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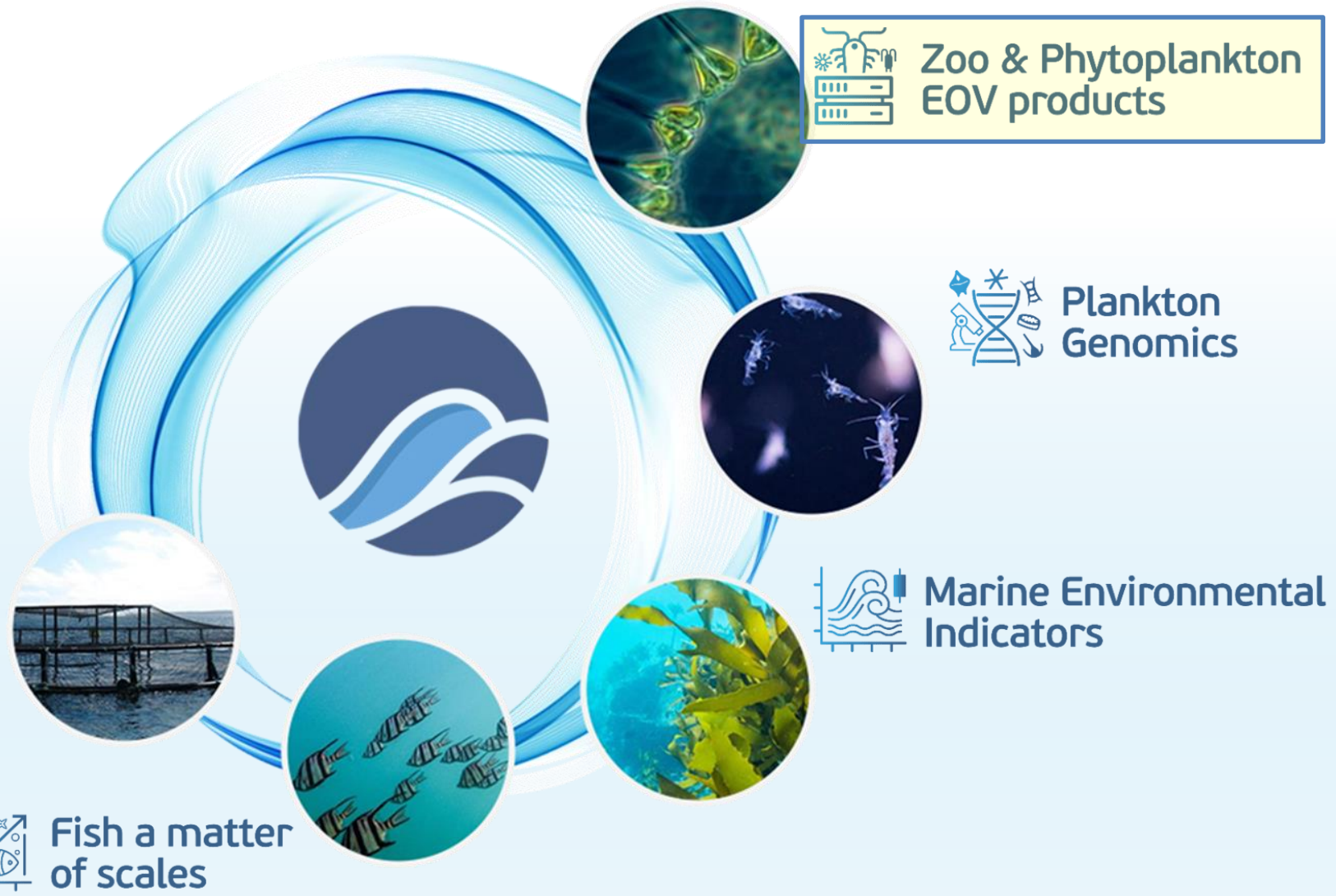
Piloting innovative services for Marine Research & the Blue Economy

5 demonstrators to showcase the **Blue Cloud** Services and its potential in promoting the Blue economy



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Zoo & Phytoplankton EOV products

Objective

Machine learning approach to derive zoo and phytoplankton biomass and diversity products

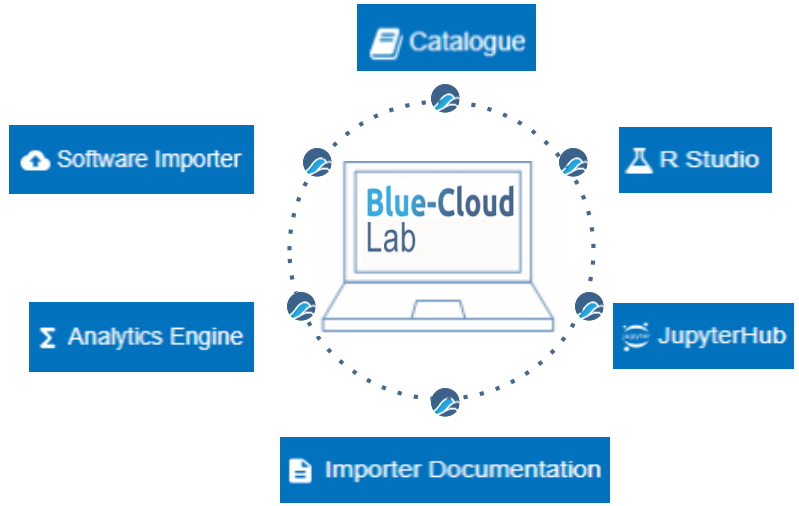
Methodology

Data compilation & processing

Ground truth modelling using NRT data

Big data & Machine learning

Tool

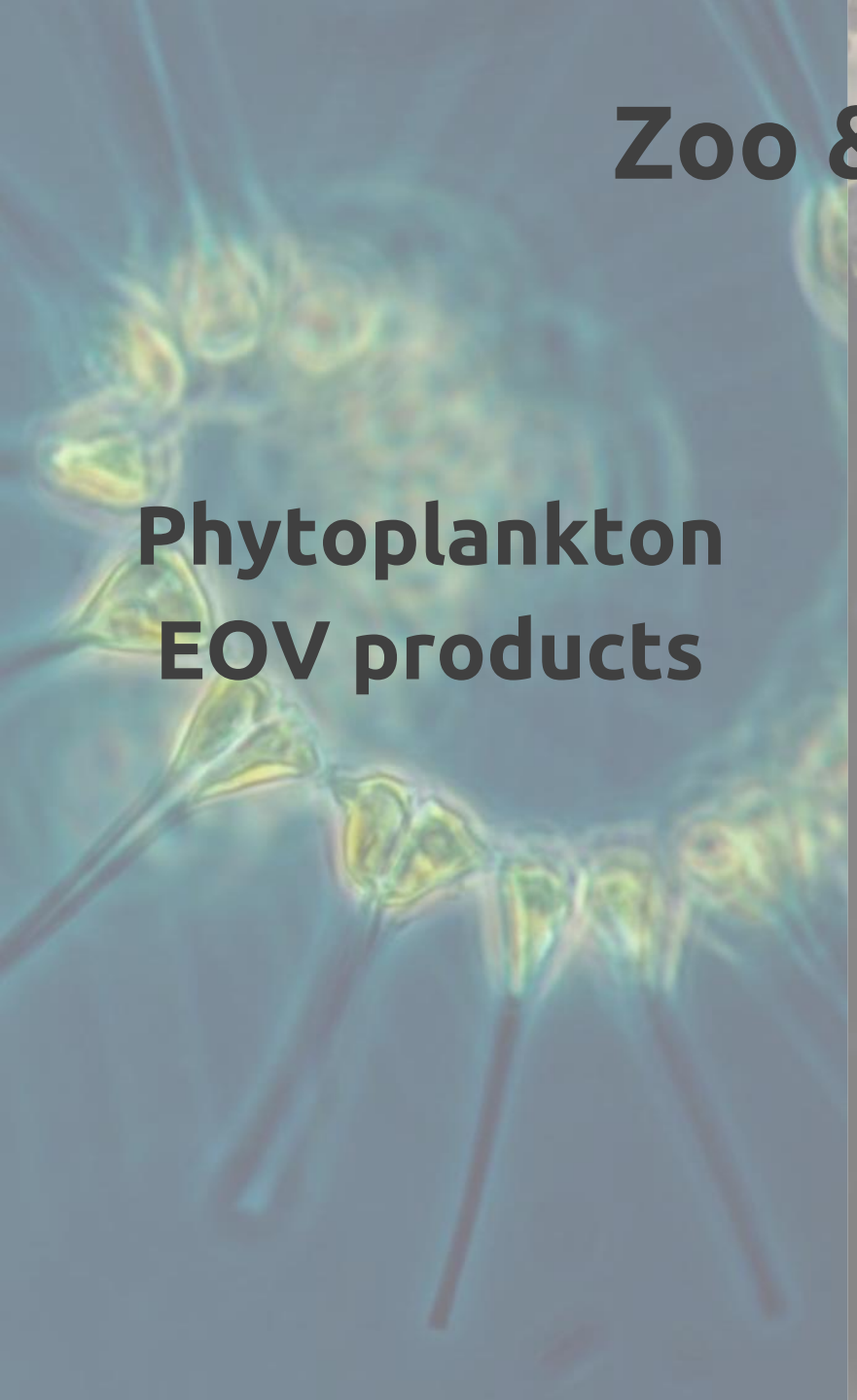


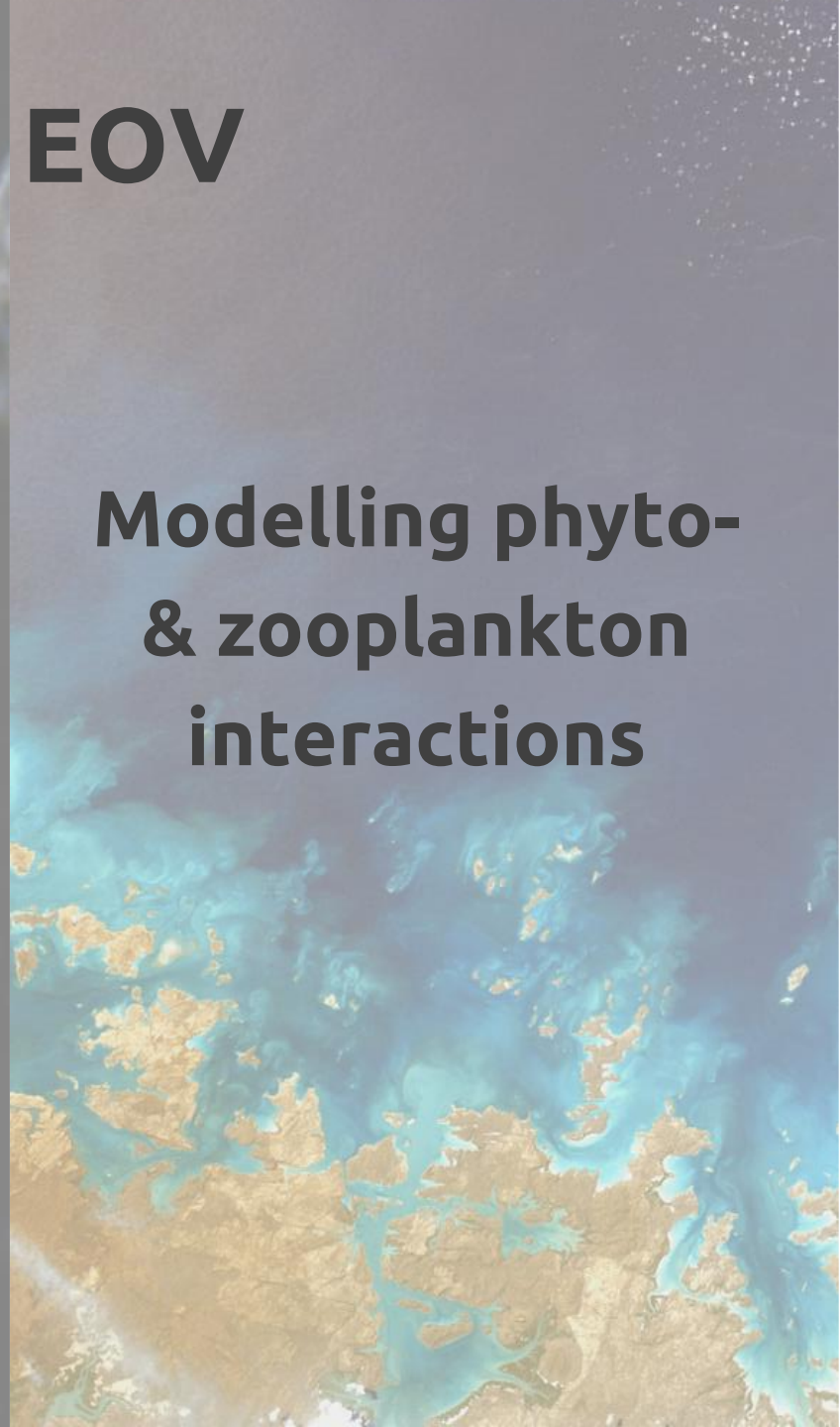
Zoo & Phytoplankton EOV demonstrator

Phytoplankton EOV products

Zooplankton EOV products

Modelling phyto- & zooplankton interactions





Phytoplankton EOV products

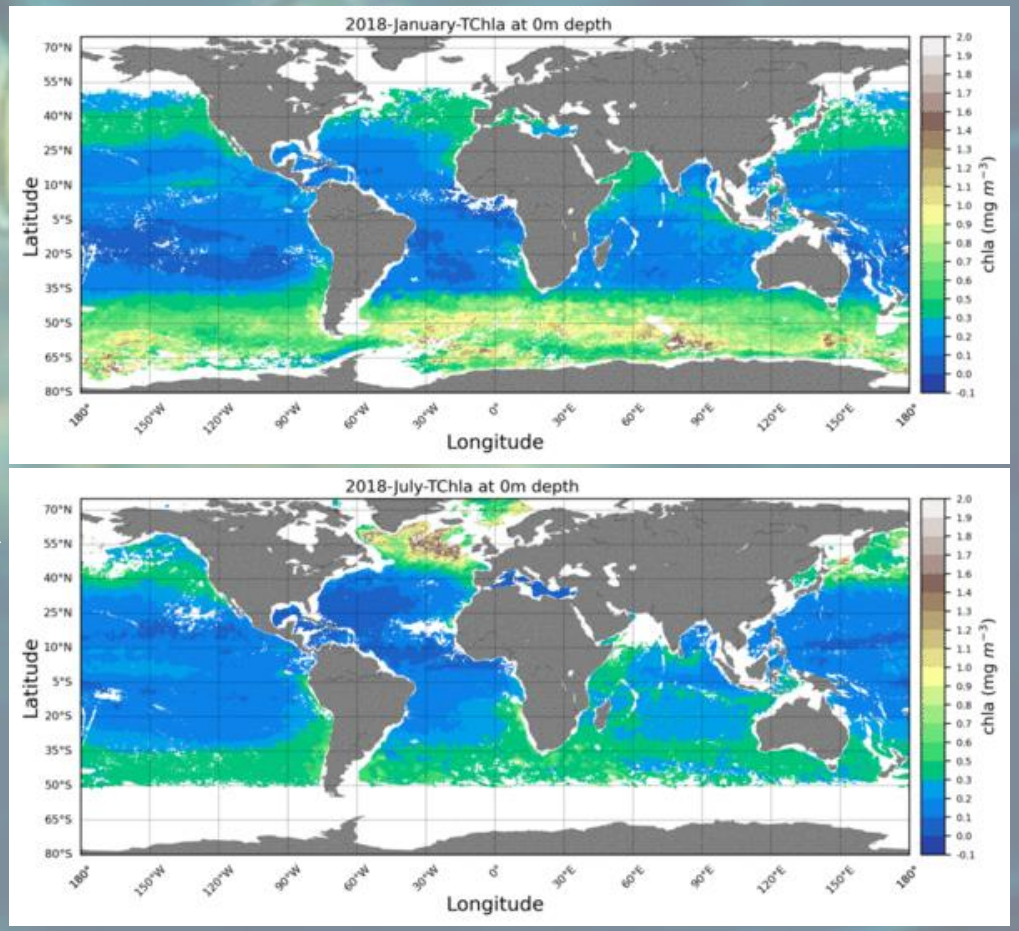
Deriving global ocean 3D Chlorophyll-a concentrations using machine learning techniques

INPUT DATA

- BGC-Argo floats (Chla)
- Satellite-derived reflectance's
- Satellite-derived Photosynthetically Available Radiation (PAR)
- Sea Level Anomaly
- T/S profiles

NN model

Sauzède, et al. 2016



Zooplankton EOV products

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Deriving gridded data products for zooplankton distribution using variational analysis & neural networks

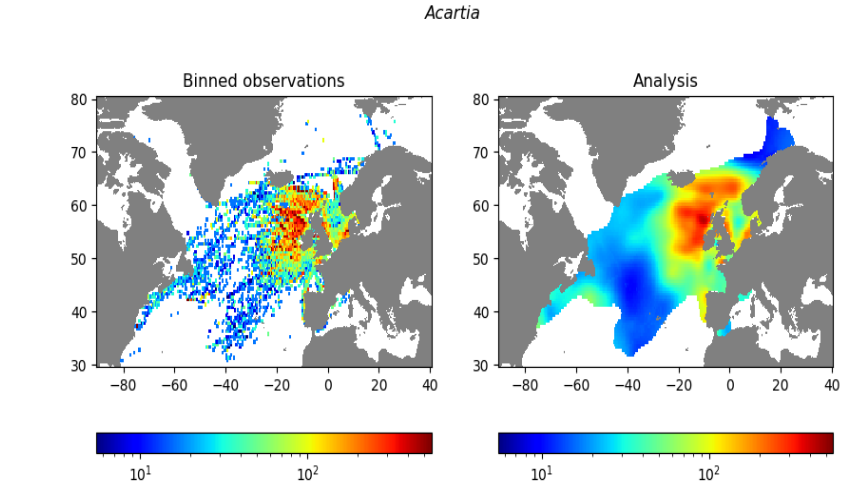
INPUT DATA

- Zooplankton abundances
- T/S climatologlies
- Nutrients (World Ocean Atlas)
- Distance from coast
- Bathymetry

NN model

jupyter julia

DIVAnd + Neural network



https://github.com/gher-ulg/DIVAnd.jl

LIÈGE université GHER

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Modelling phyto- and zooplankton interactions

Understand the drivers that limit phytoplankton abundance and spatio-temporal changes based on the Nutrient, Phytoplankton, Zooplankton and Detritus (NPZD) model

INPUT DATA

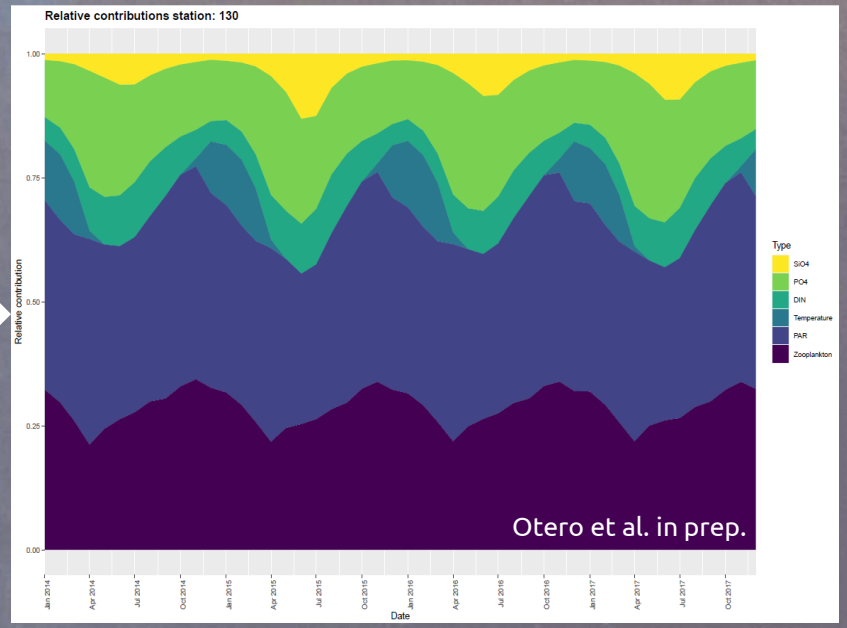
- Zooplankton abundances
- Phytoplankton abundances
- Nutrient, temperature and light data

LifeWatch BELGIUM

EMODnet BIOLOGY
Dive into data on Europe's marine life

NPZD model

Everaert, et al. 2015



VLIZ

How to use the Demonstrator?

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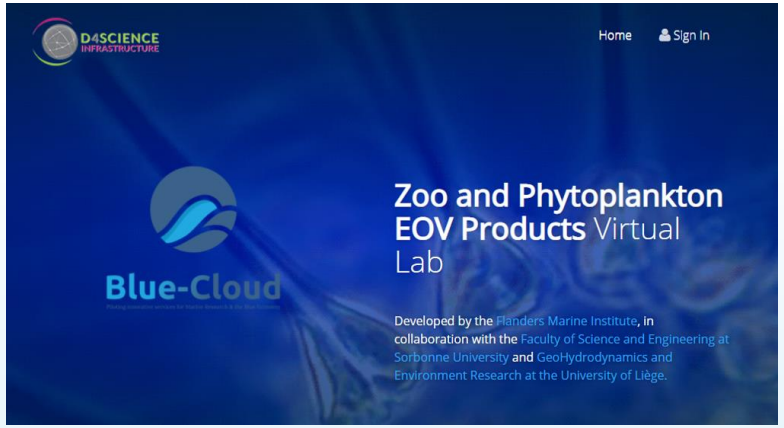
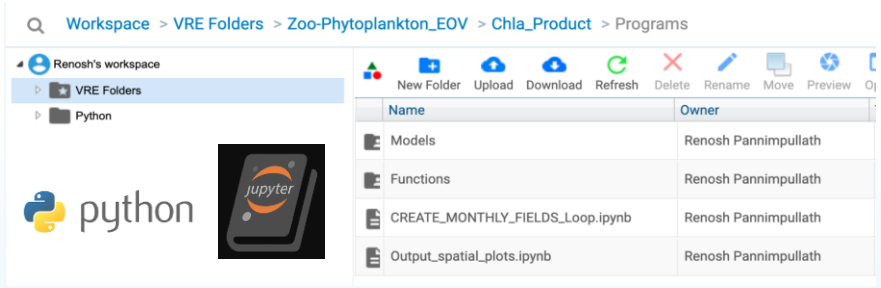
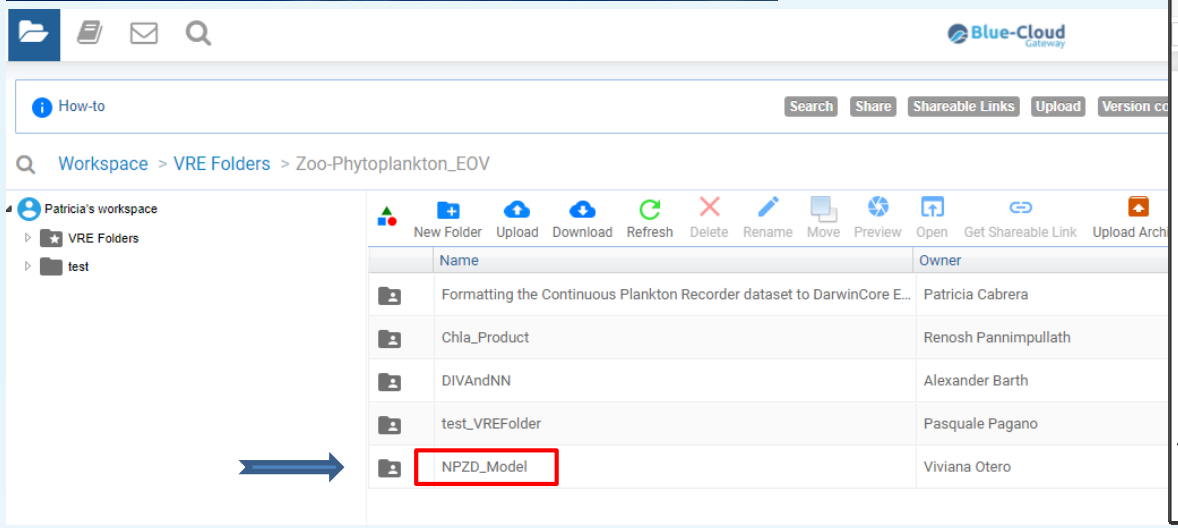
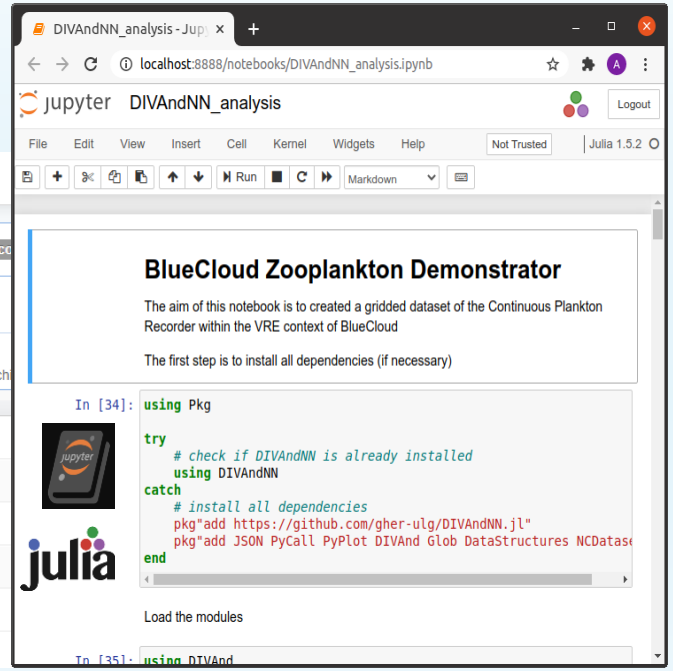
https://blue-cloud.d4science.org/web/zoo-phytoplankton_eov









Conclusions

- Plankton EOV products are available for users to explore the data, methodologies and technologies available in the Blue-Cloud VRE.
- The demonstrator will be updated in a next version to be released by 2022.
- The integration of different **EOV variables**, allows to see data-driven trend & to understand interactions in a **mechanistic way**.
- **Collaborative VRE** have a large potential to boost scientific productivity.

Thank you

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To learn more about the demonstrator visit:
https://www.blue-cloud.org/demonstrators/zoo-and-phytoplankton-eov-products

*Pictures source: https://www.blue-cloud.org/