ANERIS

# Operational Sensing Life Technologies for Marine Ecosystems

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# Milestone 8. Demonstration of the workflows to the project partners

Lead Beneficiary: LifeWatch ERIC

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# Table of Contents

## Summary

This Milestone (M 8) refers to the demonstration of the workflows to the project partners of ANERIS project, funded by the European Union's Horizon Europe Research and Innovation Action under Grant Agreement No. 101094924.

It outlines the presentation of the development of fully operational workflows designed for the analysis of genomic data, focusing on the first Operational Marine Biology (OMB) product, **Intraspecific Variation**, developed within ANERIS Work Package 2 (WP2), Genomic Technologies. This Milestone is related to Deliverable 2.2. Workflow for the analysis of genomic data.

The milestone document provides a summary of the demonstration, including date, attendees, and the agenda. It also outlines the scientific questions addressed by the OMB product and describes how the workflows, currently integrated into the MyLifeWatch platform (https://my.lifewatch.eu), were presented. Additionally, it highlights some items discussed among the project partners following the demonstration.

## List of Abbreviations

**ANERIS:** operAtional seNsing lifE technologies for maRIne ecosystemS.

**EBVs:** Essential Biodiversity Variables.

**EOVs**: Essential Ocean Variables.

**MSFD**: Marine Strategy Framework Directive.

**OMB:** Operational Marine Biology.

**VRE:** Virtual Research Environment.

**WP**: Work Package.

## 1. Date, attendants and agenda

The demonstration of the operational workflows to project partners took place during the 2nd General Assembly of ANERIS project in Seville on 27 November 2024. Attendants were ANERIS project partners that attended the General Assembly (see attendance list in Annex).

Agenda:

- Scientific question addressed by OMB Product 1, INtraspecific Variation, Pascal Hablutzel, VLIZ
- Demonstration, Joaquín López-Lérida; LW ERIC.
- Discussion, Christos Arvanitidis, LW ERIC

*Figure 1. Partner from ANERIS project that attended the Demonstration of the workflows.*

## 2. Scientific question

The presenter detailed the escalating crisis in marine biodiversity, emphasizing that the loss and alteration of biodiversity often occur unnoticed, caused by the acceleration of climate change and anthropogenic pressures on marine systems. He highlighted the critical need for integrating biodiversity knowledge to effectively evaluate, monitor, and support marine ecosystems.

A significant portion of the presentation focused on the challenges associated with biological observations. The presenter underscored that biological properties, unlike physical or chemical

parameters, are complex to measure and integrate then in any operational monitoring system due to their complex nature. This complexity necessitates a radical enhancement in our methodologies to better understand marine ecosystems under the pressures of long-term global change and multiple environmental and anthropogenic stressors, acting in competition or in concert.

In response to these challenges, the ANERIS project proposes the implementation of a series of Operational Marine Biology products. These products are envisioned as a comprehensive biodiversity information framework designed for systematic and prolonged routine measurements of oceanic and coastal life. The objective is to facilitate rapid interpretation and dissemination of biological data, which is crucial for timely and effective decision-making in marine management and policy formulation.

The new OMB products aim at establishing a foundational baseline of biological information pertinent to Essential Biodiversity Variables and Essential Ocean Variables. This foundation is expected to significantly enhance the capability to deliver crucial data for marine policy descriptors, particularly aligning with the objectives of the Marine Strategy Framework Directive.

Furthermore, the presentation outlined the specific workflow, which was designed to generate results for the first OMB product focusing on **Intraspecific Variation** using metabarcoding data. This part of the discussion detailed the procedural steps involved in the workflow, illustrating how data is collected, analyzed, and utilized within the context of this OMB product.

## 3. Workflow development

The speaker provided a comprehensive demonstration of the integration and execution of the OMB Product 1 workflows during a live session, utilizing the MyLifeWatch.eu platform. This demonstration aimed to showcase the seamless integration of the workflow, highlighting its flexibility and adaptability to various research needs.

To support this presentation, a detailed video was used, illustrating each step of the process, from integration to execution. The video served as a visual guide, offering insights into the functionality of the workflow and the outputs generated.

Some representative images from the video are provided in the following sections. These images capture key moments of the workflow demonstration and highlight the capabilities of the MyLifeWatch.eu platform. They include:

1. The initialization of the workflow, displaying the title screen.
2. The visualization of the workflow editor, showcasing the main component wrapper used for file integration.

3. The configuration of input files connected to the ANERIS Intraspecific Variation component within the workflow editor.
4. The commencement of workflow execution, indicating successful processing of the input files.
5. Various results generated post-execution, including unique graphical outputs that emphasize the analytical capabilities of the workflow.
6. Real-life images from a panel discussion held during a conference, where the workflow and its implications were debated among experts and attendees.

These images, coupled with the video demonstration, provide a thorough understanding of the workflow's integration and its utility within the MyLifeWatch.eu platform, reinforcing its role in advancing research initiatives.


*Figure 2. Workflow Initialization Screen.*

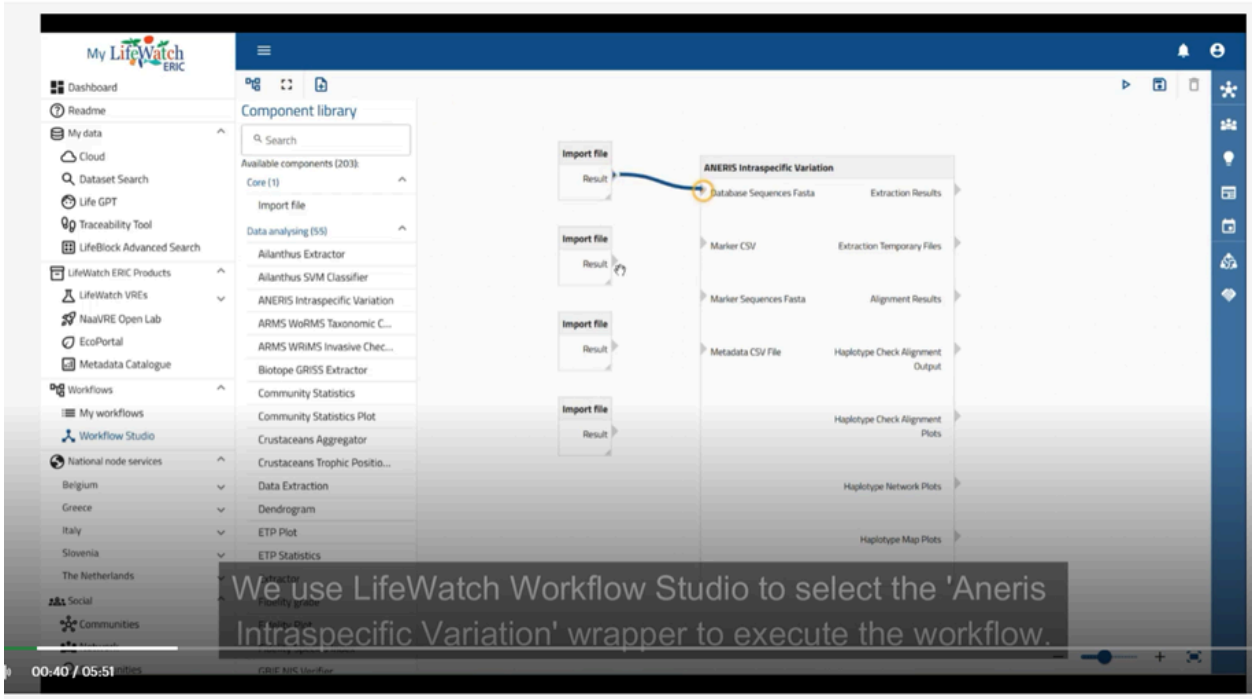


*Figure 3. LifeWatch ERIC Workflow Editor Displaying the Main Component Wrapper.*

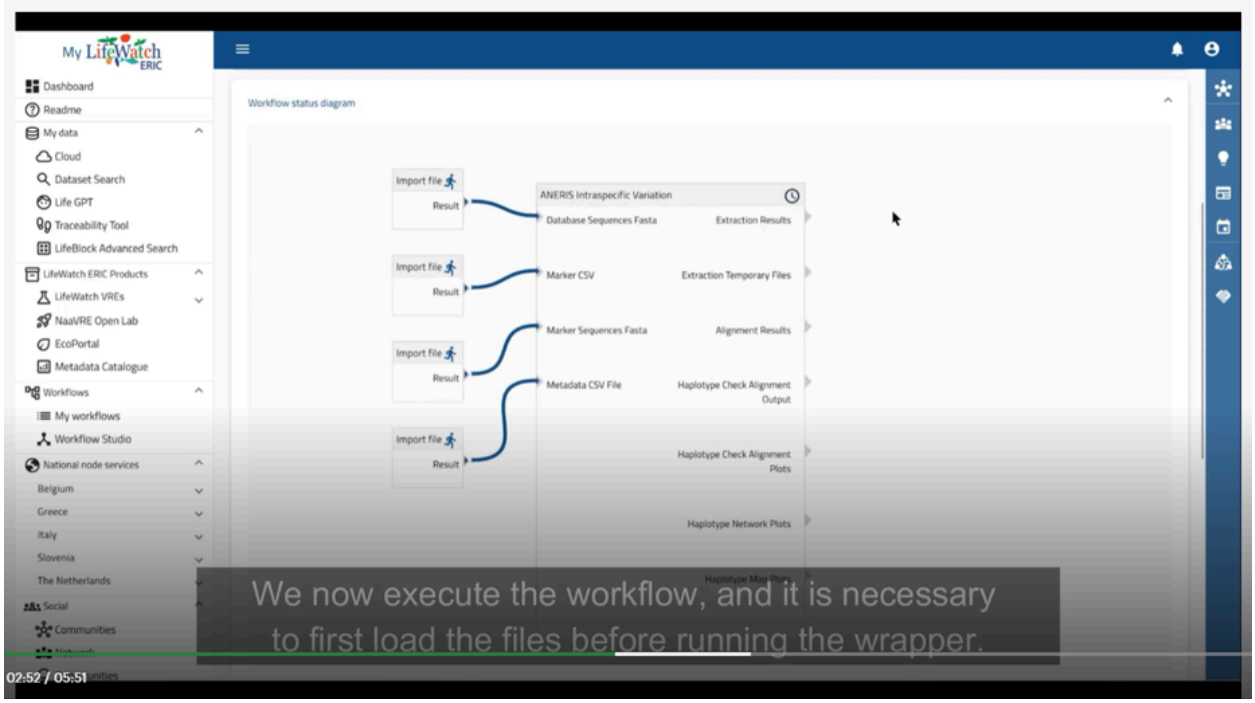


*Figure4. Workflow Editor Showing the ANERIS Intraspecific Variation Component with Connected Input Files*

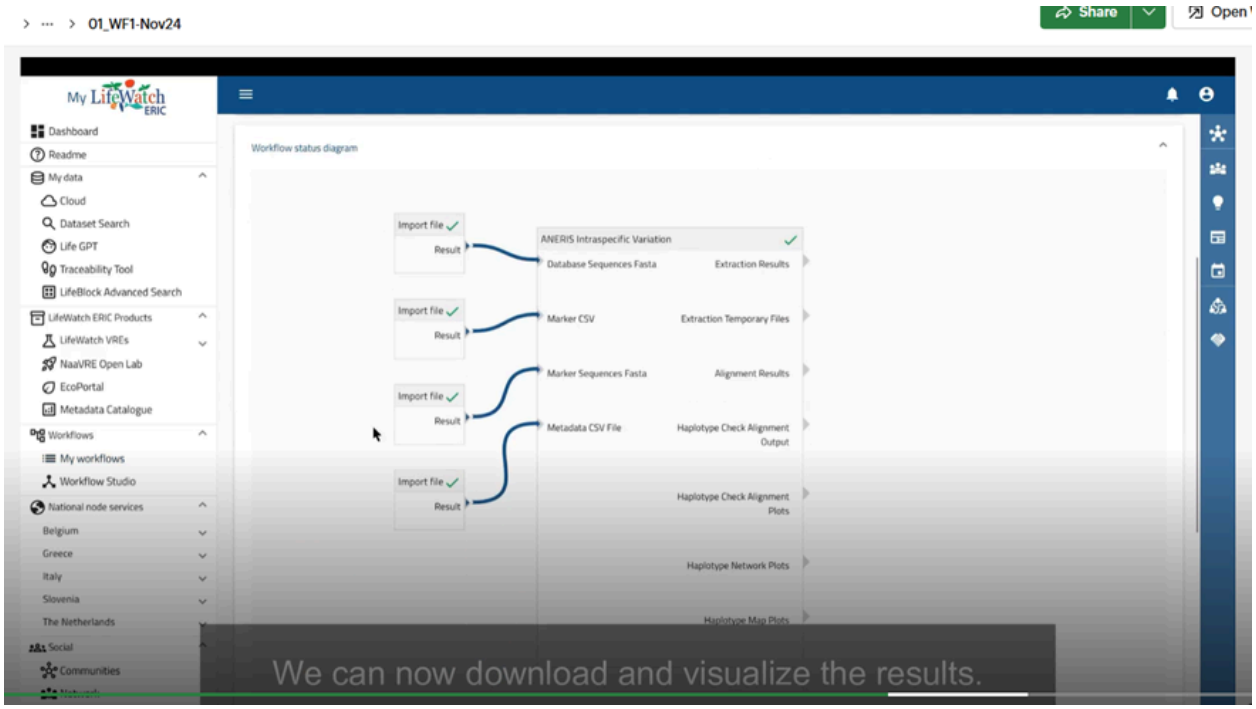


*Figure 5. Workflow Execution in Progress with Input Files Successfully Processed*

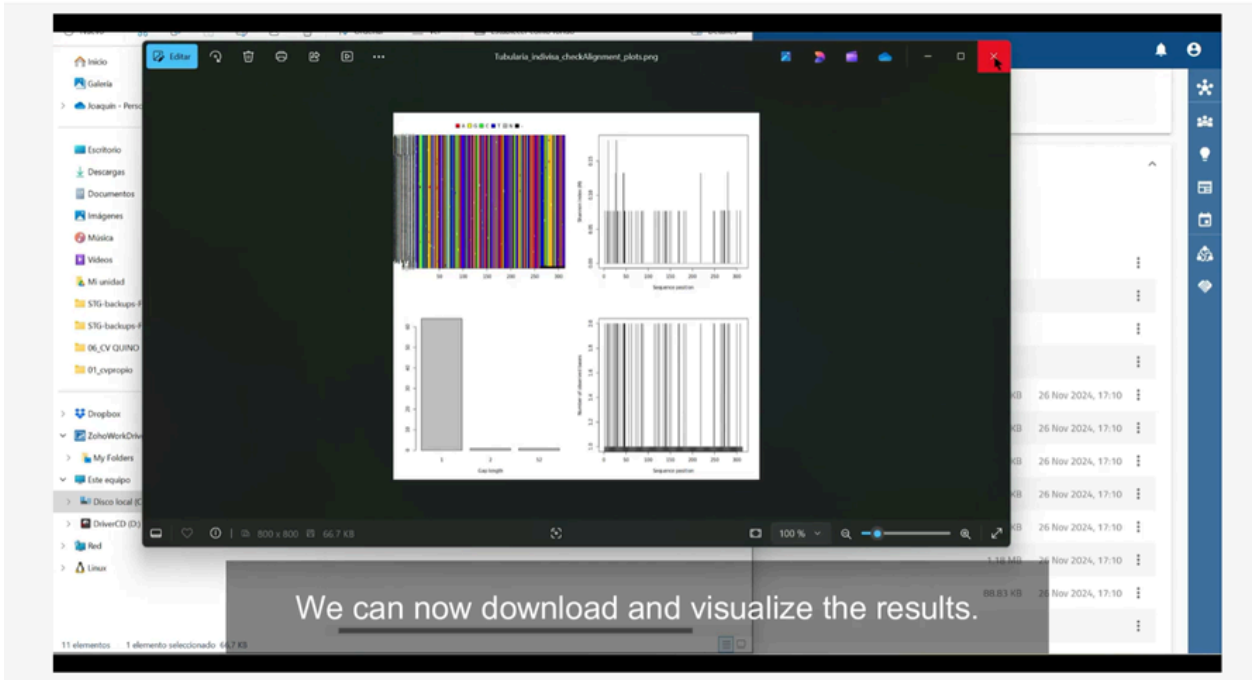


*Figure 6. Example Output Generated from the Workflow Execution*

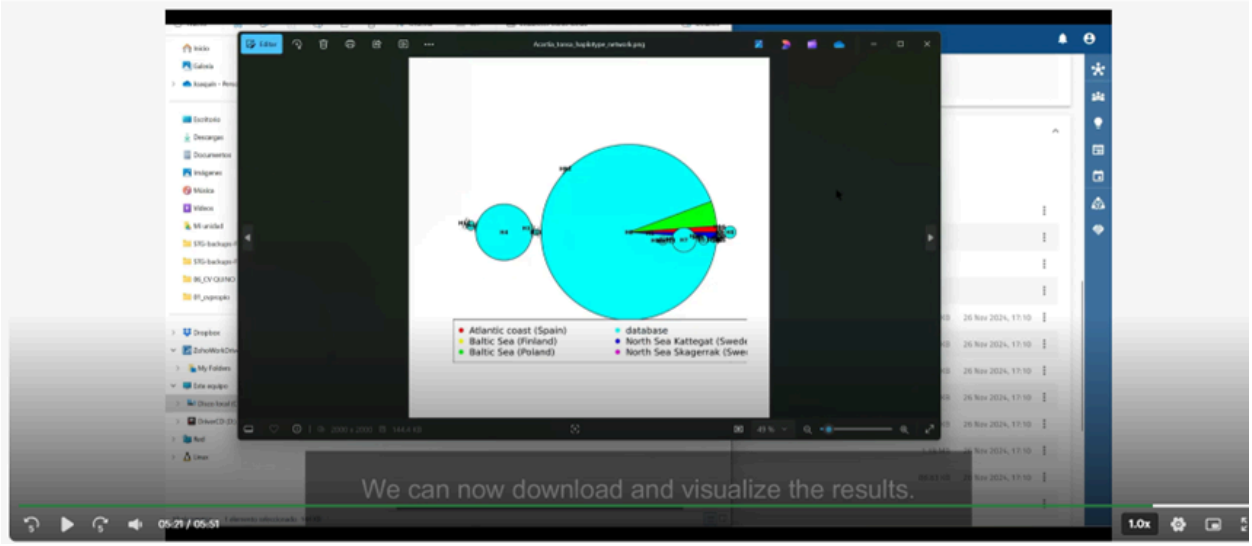


*Figure 7. Unique Graphical Output Resulting from the Workflow Execution*

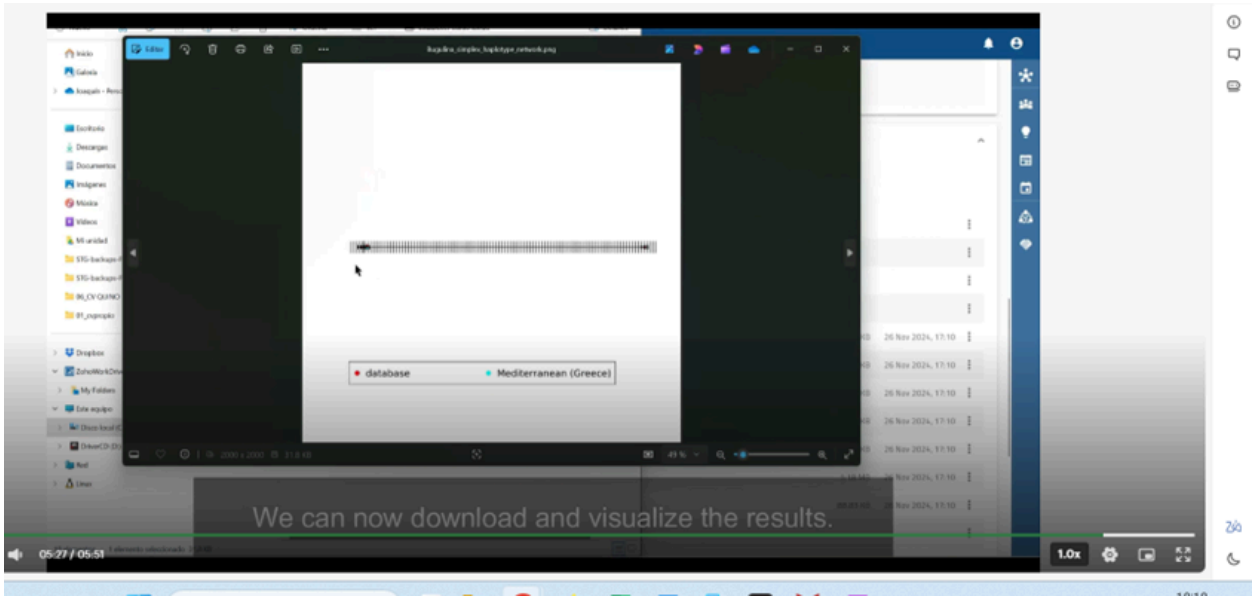


*Figure 8. Additional Graphical Output from the Workflow Execution.*

## 4. Discussion

The floor was open for comments and suggestions. During this time, critical issues such as the sustainability of the workflows beyond the project's lifetime or additional computational capacity needs were discussed.


*Figure 9. Panel Discussion on the Workflow Execution at the Conference"*

*Figure 10. Attendees Participating in the Workflow Discussion at the Conference*

## 5. Conclusions and Next steps

This demonstration shows how MyLifeWatch.eu could advance the integration, utilization, and sustainability of Operational Marine Biology (OMB) products. The workflow's implementation highlights the platform's potential to streamline complex research processes and improve data accessibility for marine biodiversity studies.

The upcoming phases in the integration process within MyLifeWatch.eu are set to focus on the following:

1. **Development of Additional Workflows**: Two new workflows for Operational Marine Biology (OMB) products will be developed under Work Package 2 (WP2). These workflows aim to expand the analytical capabilities of the platform, addressing emerging research challenges in marine biology.

2. **Creation of a Dedicated Virtual Research Environment (VRE)**: A specialized VRE for the ANERIS project will be established on the MyLifeWatch.eu platform. This VRE will provide researchers with a tailored environment equipped with advanced tools for data analysis and visualization.
3. **Enhancement of Platform Features**: The integration will prioritize improving user experience by incorporating feedback from the research community and implementing technological advancements.
4. **Promotion of Collaborative Research**: The expanded functionality of MyLifeWatch.eu will foster collaboration among scientists, enabling data sharing and joint studies to address global marine biodiversity concerns.

These developments are designed to enhance the functionality and accessibility of research tools, ensuring that technological advancements align with the evolving needs of marine biodiversity studies. The integration of these workflows and the establishment of a dedicated VRE mark significant strides towards a more connected and efficient research ecosystem.

## Acknowledgements

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## Annex

List of participants who attended the workflow demonstration during the In person meeting held in Sevilla on November 27th, 2024.

| Name | Surname | Partner |
|---|---|---|
| Susanne | Vainio | BIOIMAGING |
| Ayoub | El Ghadraoui | BIOIMAGING |
| Mar | Humet Caballero | BIOPOLIS |
| Rocio Aime | Nieto Vilela | BIOPOLIS |
| Cátia | Monteiro | BIOPOLIS |

| Name | Surname | Partner |
|---|---|---|
| Perrine | Paul-Gilloteaux | CNRS |
| Caroline | Thiriet | CNRS |
| Cordelières | Fabrice | CNRS |
| Xavi | Salvador | CSIC |
| Jaume | Piera | CSIC |
| Berta | Companys Oliva | CSIC |
| Douwe | Dreef | CYBO |
| George | Dubelaar | CYBO |
| Harrie | Kools | CYBO |
| Sebastian | Luna-Valero | EGI |
| Smitesh | Jain | EGI |
| Alice | Soccodato | EMBRC-ERIC |
| Tosca | Sala | EMBRC-ERIC |
| Simo | Cusi | EMSO-ERIC |
| Sara | Pero | EMSO-ERIC |
| Manel | Salvador | FECDAS |
| Sara | Riera | FECDAS |
| Panagiotis | Kasapidis | HCMR |
| Joaquin | Lopez Lerida | Lifewatch |
| Cristina | Huertas Olivares | Lifewatch |
| Lucas | De Moncuit | Lifewatch |
| Christos | Arvanitidis | Lifewatch |
| Ana | Bajandas | Lifewatch |
| Cristina | Palomares | Marsbased |
| Juan Salvador | Pérez García | Marsbased |

| Name | Surname | Partner |
|---|---|---|
| Coco | González Pi | Medcities |
| Ander | De Lecea | MI |
| Paul | Gaughan | MI |
| Adrià | Antich | NORCE |
| Alex | Alcocer | Oslomet |
| Maria | Mincheva | PENSOFT |
| Nikola | Ganchev | PENSOFT |
| Ruben | Diez-Lazaro | QUANTA |
| Sara | Montalban | QUANTA |
| Héloïse | Vilaseca | Sfc |
| Madeleine | Walker | SU |
| Jean-Olivier | Irisson | Su |
| Derya | Akkaynak | UH |
| Matias | Carandell Widmer | UPC |
| Marc | Nogueras Cervera | UPC |
| Hanneloor | Heynderickx | VLIZ |
| Rune | Lagaisse | VLIZ |
| Pascal | Hablutzel | VLIZ |