1. Project Information

Proposal reference number[1]	
Experiment Acronym (ID)[2]	IMAPOCEAN
Title of the project[3]	Integrated Multilevel Active Passive Ocean Current Education Advancement Network
Host Research Infrastructure[4]	SmartBay
Starting date - End date[5]	2/12/2023 - 5/12/2023
Name of Principal Investigator[6] **Home Laboratory** **Address** **E-mail address** **Telephone**	Ariadne Dimoula 42 Mill St. Orono Maine 04473 University of Massachusetts Dartmouth 285 Old Westport RD Dartmouth, MA 02747 ariadne@p3rd.earth +1 207.307.9393

2. Project objectives[7] (250 words max.)

- Quantify the transport of intermediate and deep waters.
- Monitor ocean surface flow through active drifting ocean drones.
- Engage the public in ocean current research through building and deploying Drifters.
- Guide and lead students to reach their own conclusions about our impact on the Earth.
- Activate and connect schools and communities across the Globe, creating a web of oceanographic data and increasing global connectedness and climate awareness.

Our scientific and technical objectives are to execute a multilevel study of the water column using both active and passive monitoring tools. These tools are Sea Horse Tilt Current Meter, and student-built oceanographic drones called “Drifters” which use GPS to monitor surface ocean current flow. These Drifters can be built in any classroom with relatively little experience. They record meaningful sea surface data through telemetrically reporting drifter movement every few minutes using GPS. This tool has the added benefit of engaging students’ and their communities in ocean research through building, launching, and monitoring their Drifter. Drifters rescue and re-launch collaborations allow for additional people and communities to be engaged in a single project. This research project is designed in such a way that it can be carried out in multiple locations in order to

[1] Reference number assigned to the proposal by the TA-Office.
[2] User-project identifier used in the proposal.
[3] Title of the approved proposal. The length cannot exceed 255 characters
[4] Name of the installation/infrastructure accessed with this project. If more than one installations/infrastructures are used by the same project, please list them in the box.
[5] Specify starting and end date of the project (including eventual preparatory phase before the access).
[6] Fill in with the full contact of the Principal Investigator (user group leader).
[7] Write the short-term, medium and long-term objectives of the project. Use no more than 250 words.

understand changes in surface to bottom current patterns as well as the interconnectedness of ocean systems. By continuing this research in Ireland we are creating a robust dataset contributing knowledge of current movement throughout the water column, including understanding any changes occurring because of climate change.

3. Main achievements and difficulties encountered (250 words max.)[8]

The presence and widespread outbreak of Covid-19 has slowed down school interactions but now that the world is starting to heal and reopen, it is more possible to connect. However, for areas still at risk, this is where the benefit of remote education comes in, as well as social distancing.

Coordinating with schools and this research funding timeline can be challenging as both can occur on different programs, where schools can require flexibility and extra support in the preplanning of the research conduction. A major outcome of this program is a curriculum centered on oceanographic research and the roll of oceanographers for Irish Transitional Year Students

However, exposing early school students to pursue careers in the physical ocean and natural science through demonstrating impact through their first-hand gathered research is an important achievement. It demonstrates a creativity that takes people or ideas to the next level and raises the awareness of today's natural systems. We hope to set an example for students of how it is possible to collect data on ocean systems, and use climate data to inform decisions. For those of us coordinating IMAPOCEAN, this project demonstrates a larger driving passion for the Earth and ocean circulation system, combined with a passion for educating and transforming the brains and hearts of student and their communities to see the ocean as a global network.

In August 2023 the smart bay subsea observatory developed a fault and needs to be recovered. This means there will be no ocean current/ tidal data available at the time of this project as the observatory will likely not be redeployed for a couple of months. Discussion with the JERICO team decided to proceed with launching our research tools even though there may not be comparison data. Our subsea surface data will become more reliable the more data we are able to collect over time, so starting now in effort to build valuable data.

In January 2024 the tilt meters did not make it to Ireland because of mailing failures. The tilt meters arrived late to project PI Ariadne in Maine, they arrived over a week late in the US mail, while she was already in Ireland. Then when Ariadne mailed the tilt meters to Ireland they were stuck in customs and were never delivered to the Marine Institute. We are unsure of why they were not mailed to the Marine Institute.

[8] Describe briefly the main achievements obtained and possible impacts, as well as possible difficulties encountered during the execution of the project. Use no more than 250 words.

4. Dissemination of the results[9]

Transnational Access activity in JERICO -S3 of this IMAPOCEAN SmartBay includes meetings and workshops both in preparation for the experiment and in disseminating the data with the scientists and students.

To display the data collected by the tilt current meters while at the same time coordinating workforce development by orientating the students to where the data is stored, the Smart Bay web developer team will work to display the Tilt Meter data once collected on their web portal. To make sure only the highest quality of data is displayed throughout the JERICO network and on the Smart Bay site, the tilt meter data will need to be verified by comparing to previous current records or the Smart Bay instruments if repaired in time. The data package will be sent via email to team which worked to prepare and launch the Tilt Meters

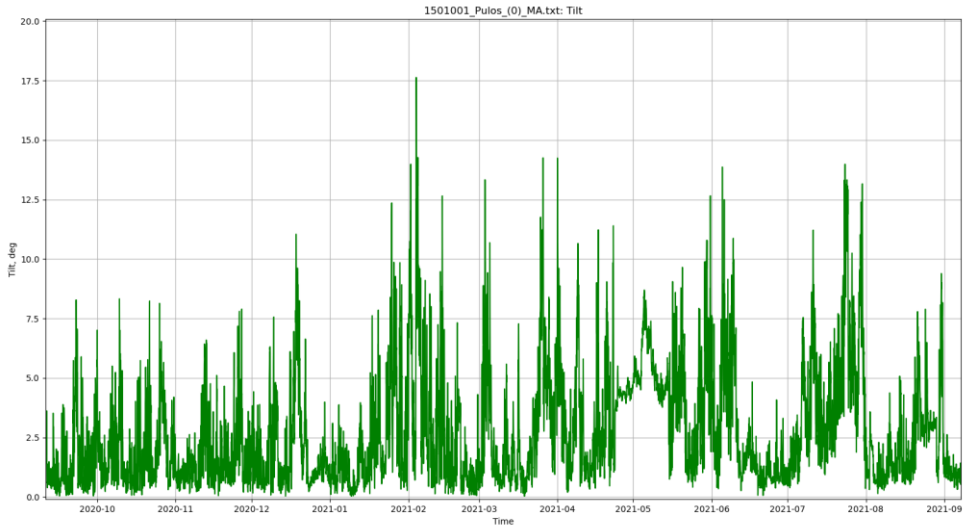
The students will follow their student drifters on this website https://studentdrifters.org/tracks/
As the data set of both tools grows, additional scientific reporting opportunities can be identified.

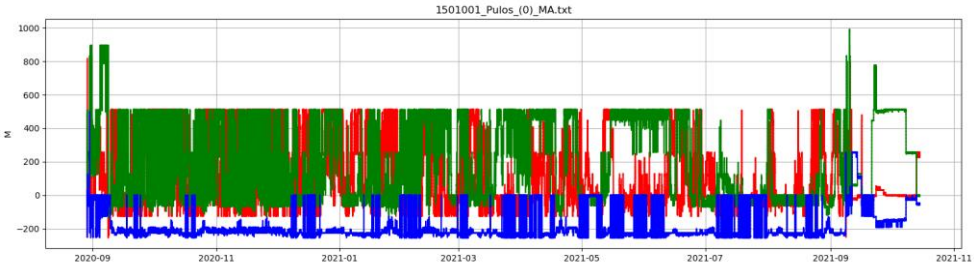
5. Technical and Scientific preliminary Outcomes (2 pages max.)[10]

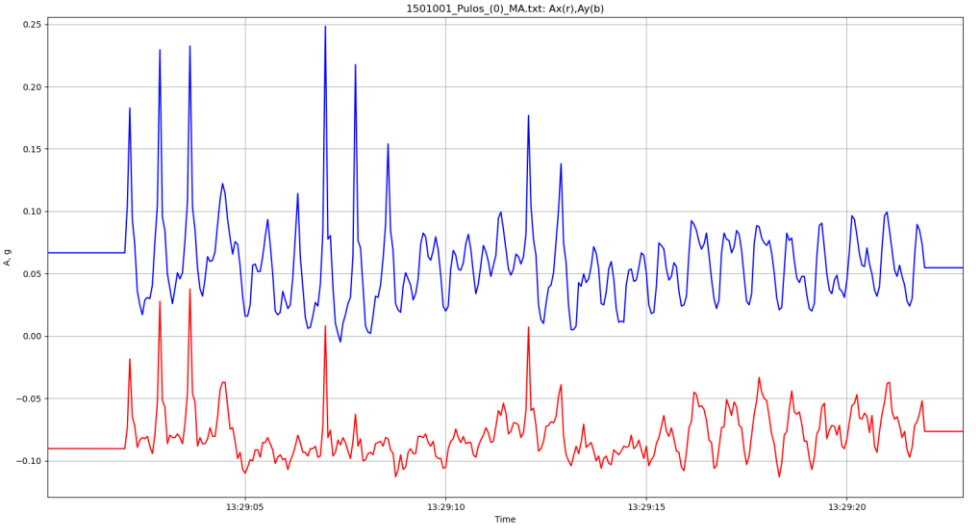
Ariadne worked with Nóirín from Galway Atlantiquria to create a lesson plan for IMAPOCEAN targeting transition year students. Ariadne networked with her connections in education to translate the lesson plan to Irish and Greek. Ariadne worked with Conall and his team on creating the drifter. Conall and his team created a highly fortified drifter as they plan to release from the bow of a large ship and we look to see how this handles.

[9] Describe any plan you have to disseminate and publish the results resulting from work carried out under the Transnational Access activity in JERICO -S3: scientific articles, books - or part of them -, patents, as well as reports and communication to scientific conferences, meetings and workshops. Highlight peer-reviewed publications. **Note that any publications resulting from work carried out under the JERICO -S3 TA activity must acknowledge the support of the European Commission – H2020 Framework Programme, JERICO -S3 under grant agreement No. 871153.**

[10] Describe in detail results and main findings of your experiment at the present stage.







This data was collected during the 2021 season off of Pylos Greece, Demonstrating the seahorse current tilt meter.

1. Basically, only one current meter (out of 4) was recovered.

2. When reprogramming the logger, Manolis specified very sparse sampling rate once an hour for 20sec - should be about every 5 min or so.

3. Magnetometer on the current meter has failed - the readings are weird (Figure M.png). Maybe it was next to a magnet at some point during the transit or storage.

4. Accelerometer and Temperature channels worked well. I am able to derive the tilt of the instrument. See attached plot (Tilt.png).

Axy_zoom1.png shows detailed behavior during a burst (20s long) sampling.

This data is from an early stage of the research, the first deployment. This data allows us to analyze the performance of the instrument. Basically, the range of tilt angles shows that the instrument can work in relatively high current regimes. It will be helpful to compare the tilts with some other current measurements from the same mooring and plot a correlation diagram.

Also, we can plot Tilt vs Wind when we get meteo data from that area.

The sampling rate during bursts was adequate to get estimates of velocity, but the burst samplings need to be set to something faster than once an hour in order to collect more data and resolve higher frequencies.

Paramount Planet Product, Orono Maine, [5/12/2023]

Location and date

Signature of principal investigator