

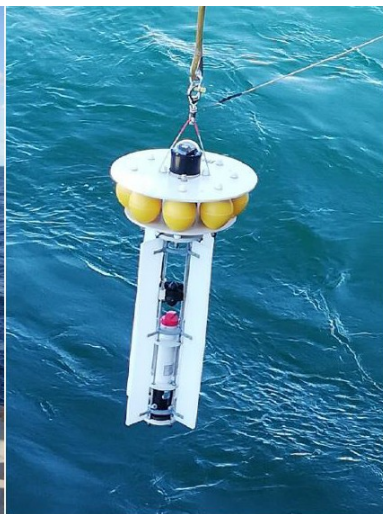
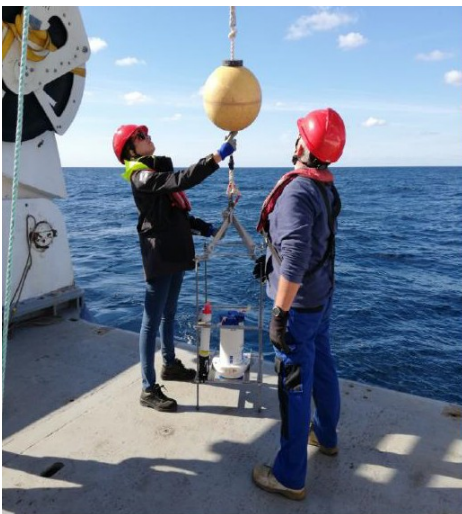


3-years Post-Doctoral position in Oceanography

Coupling vertical velocities and biogeochemistry to estimate carbon export in the Southwest Pacific ocean

Starting date: Between December 2023 and February 2024

The ocean is complex and highly heterogeneous, with fine scale structures (fronts, eddies, 1–100 km in space, day–weeks in time). Such structures influence the vertical transfer of nutrients, the biological production and eventually the ability of the ocean to capture atmospheric CO₂. Horizontal components of 3D-oceanic currents are generally well known but their vertical ones (vertical velocities, VV) are still largely uncharacterized, being often short-lived and one to two orders of magnitude smaller than horizontal velocities. Consequently, **direct in situ measurement of VV is currently one of the biggest challenges in physical oceanography** and is of utmost importance for a better representation of the oceanic CO₂ capture, especially in the context of increasing global warming. Our team has recently developed innovative technologies to directly measure VV in situ. In the framework of **HOPE-VV (HHow Physical processes affect ocean CO₂ capture: focus on Vertical Velocities**, AMIDEX Blanc project, 2023-27, PI Anne Petrenko), we will use these new methods to add a physical component to the ERC HOPE project (2022-2028, PI: Sophie Bonnet) that will study biogeochemical processes involved in carbon export. Hence HOPE-VV will provide the ideal context to evaluate the relative contribution of physical and biogeochemical processes influencing the transfer of carbon to the deep ocean, potentially shattering our understanding of CO₂ sequestration mechanisms by the ocean.



Left to right: Deployment of our recently-developed technologies: FreeFall-ADCP, VVP (Vertical Velocity Profiler), and VVP in the water close to the RV Antédon II.

- The candidate will study the temporal variability of VV thanks to the time series analysis of data acquired at 5 physical mooring lines (including a 5-beam ADCP) deployed around an automated biogeochemical profiling smart buoy for 2 annual cycles at the study site, close to Noumea, New Caledonia, SouthWest Pacific ocean,
- She/he will also investigate the spatial variability of VV across physical structures (e.g., eddies' core and edges, fronts) measured with the deployments of our FF-ADCP and VVP during seasonal oceanic expeditions performed around the fixed mooring site.
- She/he will also contribute to compare biogeochemical data (for example, but not only, from an underwater video profiler, UVP-6) to the VV derived from the ADCP data to deduce the part of the carbon sinking flux (particles will be translated to carbon) attributed to VV, and the part attributed to gravitational settling.

These data will be exploited in synergy with our colleagues working in the HOPE-VV project and IRD colleagues based at IRD Nouméa (as S. Cravatte), additional international colleagues involved in the ERC

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HOPE, as well as theoretician colleagues from the SEALAB project (AMIDEX project, PI P. Le Gal, IRPHE, Marseille). Regular meetings with these consortium researchers will permit comparisons of physical and biogeochemical data as well as experimental data with more theoretical data. The candidate may also participate to a sea cruise in 2024/25.

LOCATION AND PRACTICAL ASPECTS

The successful applicant will be hosted by the laboratory MIO* within the team OPLC and will work in close collaboration with A. Petrenko, S. Barrillon, S. Bonnet and other MIO colleagues. The gross salary will be 2600-3350 €/month (depending on experience), equivalent to a net salary of roughly 2100-2700 €/month.

* MIO = Mediterranean Institute of Oceanography, CNRS, Aix Marseille Université, Campus Technologique et Scientifique de Luminy, 163 avenue de Luminy - Bâtiment Méditerranée, 13288 MARSEILLE, France

QUALIFICATION

The post-doctoral candidate will need to master several techniques as data analysis and statistics, ADCP measurements and analysis, image processing and/or IA. Previous cruise participation is welcome. A solid background in physical oceanography and theoretical/numerical tools is a prerequisite. Language: matlab or python. Curiosity, autonomy and willingness to develop new skills are also necessary.

APPLICATION

Interested candidates should send their CV including copy of PhD and committee final report, list of publications and motivation letter to A. Petrenko and S. Barrillon (anne.petrenko@mio.osupytheas.fr, stephanie.barrillon@mio.osupytheas.fr). Applications will close as soon as a suitable candidate is found and validated by the AMIDEX selection process.

WEB sites:

www.erc-hope.eu (will be operational in October 2023) - <https://people.mio.osupytheas.fr/~petrenko/>

REFERENCES (selected ones from the proposing team)

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