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Orientation: Ocean Observation and Global Change
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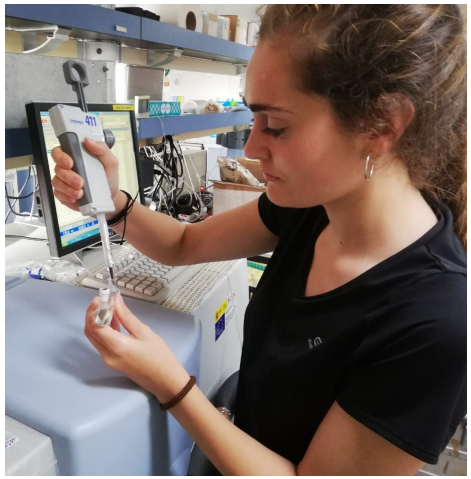
Research Area: 1.9 Impact on biogeochemical cycles



PhD project: **Evolution of natural and anthropogenic carbon transports in the North Atlantic subpolar gyre**

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Summary: Around 31% of carbon dioxide derived from human activities (Canth) has been absorbed by the ocean (DeVries, 2014; Gruber et al., 2019; Sabine et al., 2004). This accumulation helps to mitigate atmospheric carbon dioxide (CO2), but leads to severe impacts such as ocean acidification. In this, the North Atlantic subpolar gyre (SPNA) highlights as the largest Canth inventory per unit area (Khatiwala et al., 2013; Pérez et al., 2010), due to regional deep convection injects Canth into lower layers of the Atlantic Meridional Overturning Circulation (AMOC). The IPCC expects the AMOC to slow down (IPCC_SPM, 2019). If this situation were to happen, a remarkable impact could be noticed in the Canth capture of the main oceanic carbon sink. Both components of CO2, i.e. anthropogenic and natural, present high variability and uncertainties difficult to observe and quantify. In particular, there is no a direct measurement to obtain Canth concentration, but two main methodologies to derive it that relies on data (i.e methods based on tracers as CFCs and back-calculation methods). Therefore, long-term high-quality measurements are crucial to monitor the response of the system to perturbations. The aim of this project is to study the evolution of natural and anthropogenic carbon transports (trend, mean and variability) through A25-OVIDE section (Portugal to Greenland), as well as the upper and lower SPNA frontiers (RAPID and OSNAP lines). For that, we will collect data in the region in two periods (June 2021 and spring-summer of 2023) and will compare them with previous results (from 2002 onwards). Furthermore, we will develop a new approach for estimating Canth, relying on a back calculation method. We expect the results will contribute to better understanding the behavior of the region, and will help models to improve their predictions, among others.