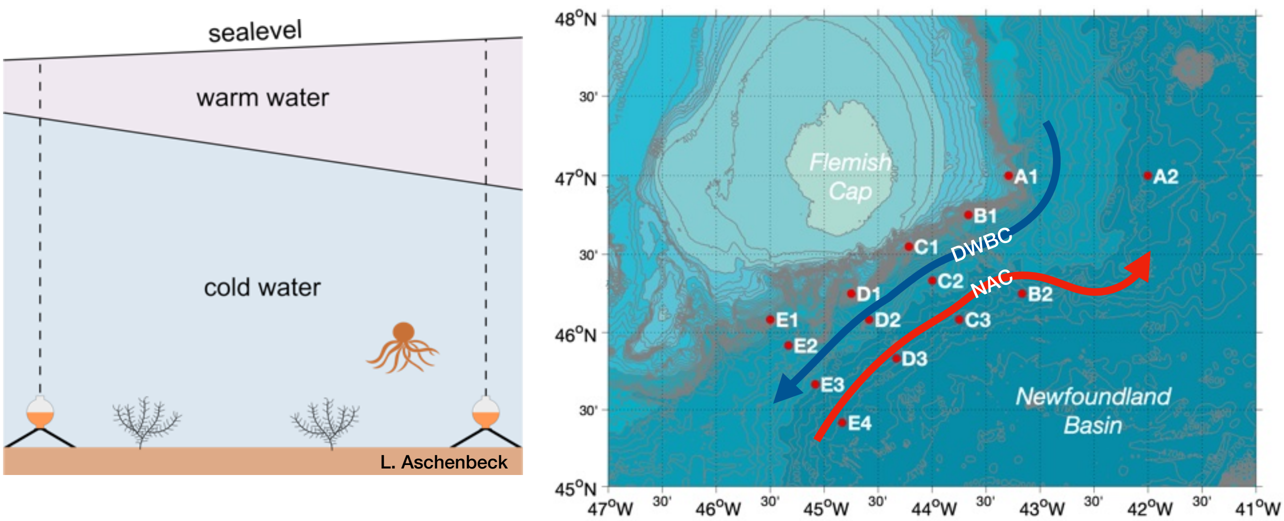
M212

Ponta Delgada — St. John’s
July 30 — September 2, 2025

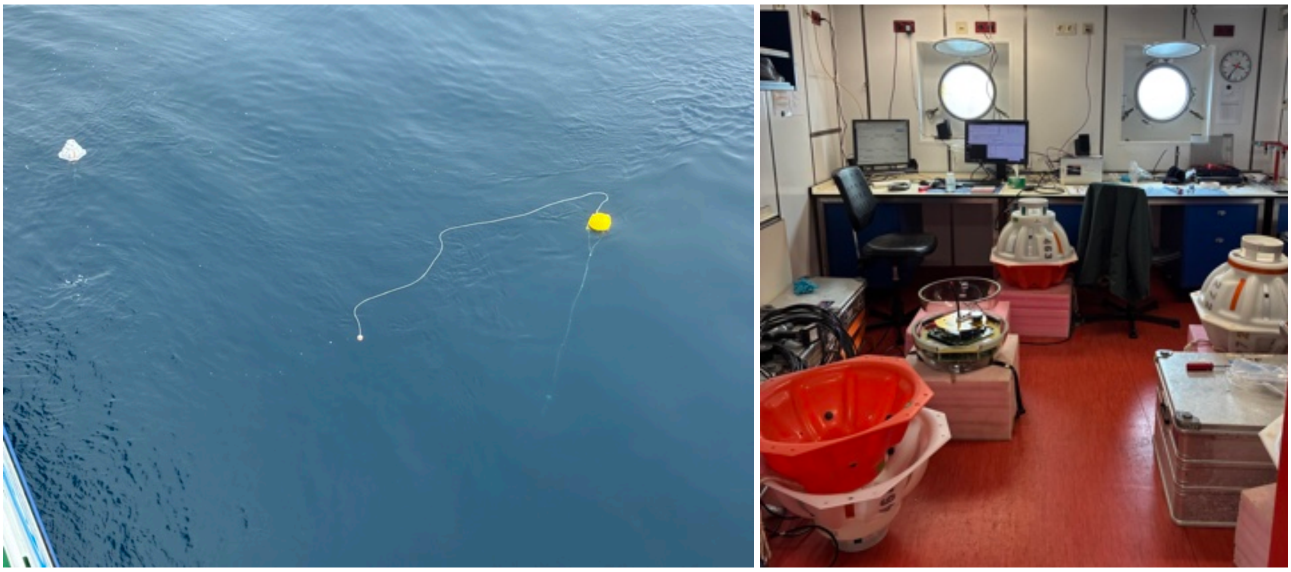
Weekly Report No. 3
(August 11 — August 17, 2025)

The past week began with a CTD tow-yo station, during which the CTD remains in the water for a period of 10 to 12 hours while being alternately lowered and raised over a specific depth range—in our case between 900 meters and the seafloor (yo-yo). The ship moves forward at a slow speed, typically 0.5 knots. The advantage of this method is significantly greater horizontal data coverage while saving time. The tow-yo station started at 6 in the morning and ended at 5 in the afternoon. During this period, 14 CTD profiles were collected, covering an interesting section of the continental slope at the southeastern corner of the Flemish Cap.

After that, we began recovering the PIES array, which had been deployed during the Maria S. Merian cruise MSM121 in September/October 2023. The array consisted of 14 inverted echo sounders distributed along five lines (A–E) east and south of Flemish Cap at water depths ranging from 2000 to 4500 meters. Compared to moorings, PIES are very compact instruments that sit on the seafloor and measure both pressure and the travel time of an acoustic signal to the sea surface and back. Since sound speed in water depends strongly on temperature, the measured travel time provides information on the stratification of the water column. Bottom pressure, in turn, gives insight into current strength and tides.



Left: Schematic illustration of how an inverted echo sounder works. A thicker layers of warm water result in a shorter travel time of the acoustic signal (right), while a thicker layer of cold water results in a longer travel time (left). The slopes of the sea surface and the interface between warm and cold water determine the transport strength of the current. Right: Array of 14 inverted echo sounders southeast of Flemish Cap, at the front between the Deep Western Boundary Current (DWBC) and the North Atlantic Current (NAC), the northern extension of the Gulf Stream system.



Left: Inverted echo sounder (white) with current meter, mounted below the yellow float alongside METEOR. Right: Inverted echo sounder in the lab for data download.

In this region, stratification can change significantly depending on the position of the North Atlantic Current. Whenever warm (saline) water is located above the instruments, the measured travel time decreases substantially. Conversely, when the North Atlantic Current shifts southward and the colder (fresher) boundary current dominates the stratification, the travel time increases again. Combined with the bottom pressure measurements from the PIES, this allows for estimating the transport strength of the currents. Some of the PIES were also equipped with current meters that provide direct measurements of near-bottom velocity.

METEOR in the fog (Enriko Siht).

Recovering the PIES and conducting the CTD stations along the individual transect lines occupied the rest of the week, until late Sunday evening when we set course eastward to recover the glider that has been active for nearly two weeks.

More information about our research activities and life on board will be shared in the upcoming blog posts (https://epoc-eu.org/our-work/expeditions/m212/).

Best wishes from the scientific party of M212.

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