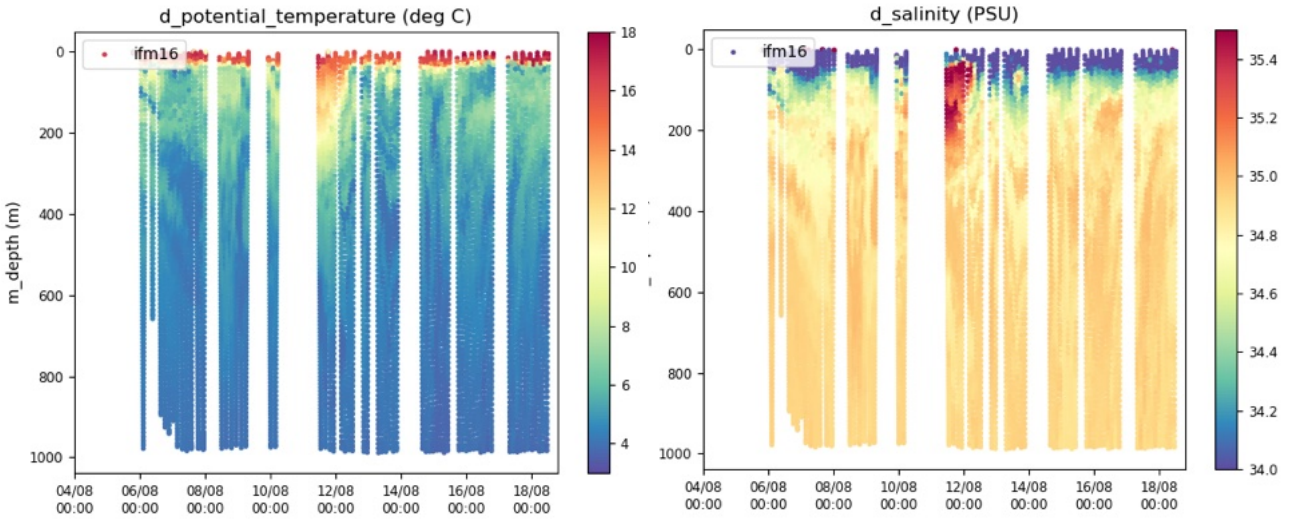
M212

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

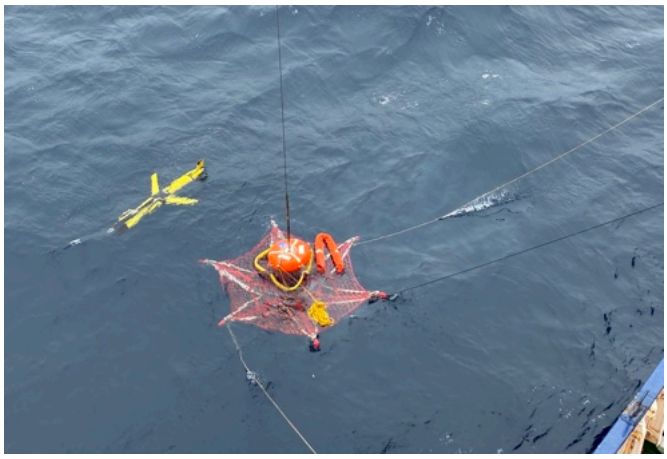
Weekly Report No. 4
(August 18 — August 24, 2025)

The week started on Monday afternoon with the successful recovery of the second Slocum glider. The glider had been deployed for 13 days, during which it carried out continuous profiling in the upper 1000 m of the water column. Equipped with sensors for conductivity, temperature, depth (CTD), oxygen, turbidity, and microstructure, the platform provided a unique dataset combining standard hydrography with information on turbulent kinetic energy dissipation. This type of measurement allows for the direct quantification of mixing intensity. The autonomous operation of the glider enables detailed observations of the complex structures in the frontal zone of the North Atlantic Current, and to study the impact of short-term flow variability on mixing across the front. At 14:15 LT, the ship arrived at the glider recovery position. The glider was transmitting its position continuously, which enabled successful localization despite limited visibility. Recovery was accomplished using the ship's RLS - Rescue Star, and the glider was retrieved undamaged thanks to the coordinated effort of the bridge and deck crew. It is now being serviced and prepared for redeployment next week.



Temperature (left) and salinity (right) data transmitted during the mission of the Slocum glider IfM16 from 5 to 18 August. Gaps indicate incomplete data transmission. The dataset downloaded after the glider's recovery is complete. The data show pronounced spatial variability, with the highest temperature and salinity on 11 August being associated with the North Atlantic Current.

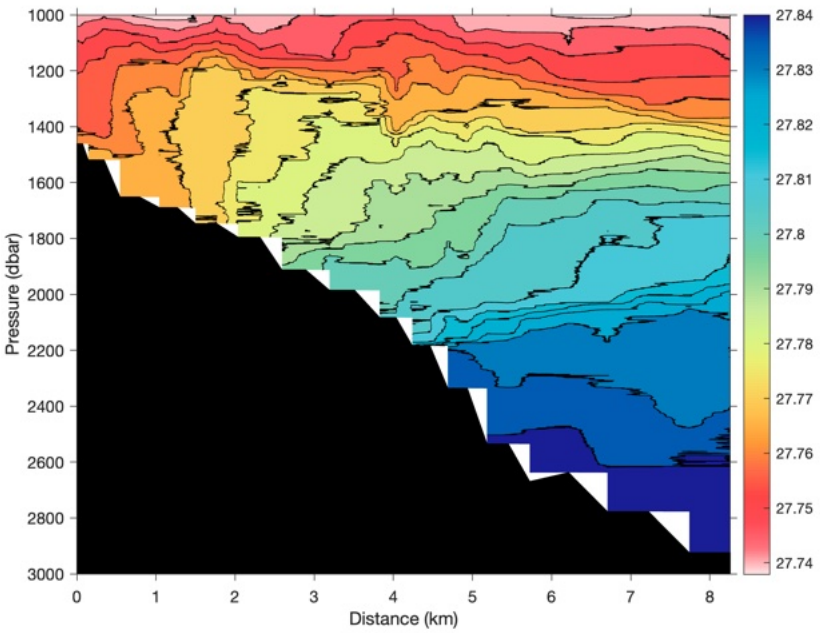
Following the glider recovery, we continued our work at the continental slope south of Flemish Cap, where three CTD tow-yo stations were conducted. This involves continuously moving the CTD rosette package up and down through the water column while the ship maintains a slow speed. During these stations, the CTD was cycled between approximately 1000 m depth and the seafloor, providing high-resolution horizontal coverage that is particularly useful for detecting indi-



Recovery of the Slocum glider IfM16 on Monday, August 18, using the ship's RLS - Rescue Star, build for recovering persons from the water but similarly useful for equipment.

cations of instabilities and mixing. Areas with steep slopes, where the strong currents bottom currents interact with topography, make them hotspots for turbulence and diapycnal exchange. First results confirm this: one of the tow-yos revealed particularly strong horizontal density gradients between 1200 and 2000 m depth, indicating the presence of an energetic bottom current prone to instability. The density data also showed numerous vertical instabilities, clear evidence of active turbulence occurring in the region.

On Thursday, we had to stop our work due to the approach of ex-Hurricane Erin. For safety reasons, the METEOR sought shelter in Trinity Bay, Newfoundland, where the ship remained while the system passed through the research area. Wind and waves in a storm like this not only make scientific work impossible but also put the safety of the ship, its crew, and the researchers at risk. On Sunday morning we left Trinity Bay for the transit to the Grand Banks, the research area for the upcoming week.



Observed density along the 8 km Towyo section conducted on 19 August. Red indicates lower density (lighter water) and blue indicates higher density (heavier water).

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

Best wishes from the scientific party of M212.

Christian Mertens
(University of Bremen)