



The expedition MSM142 started on Friday, March 27, 2026, when the research vessel *MARIA S. MERIAN* set sail from Nuuk (Greenland). The start of the expedition was delayed by 1.5 days due to the late arrival of containers. We are expected to arrive in St. John's (Canada) on April 30 for bunkering and a partial science crew change, before continuing to Reykjavik (Iceland), where the cruise will end on May 11, 2026. The scientific and technical team on board consists of 20 people: 14 from GEOMAR Helmholtz Centre for Ocean Research Kiel, 4 from the University of Hamburg, and 2 from the National Oceanography Centre (UK).

This first part of the cruise (until St. John's, Canada) consists of two scientific components: (1) a process study analysing the submesoscale ocean dynamics and its impacts on the Labrador Sea Spring Blooms; and (2) observing the variability of the boundary current at 53°N Observatory and the deep convection at K1, both sites being long-term observatories.



Figure 1 | View from the research vessel of Greenland. Picture taken by Fehmi Dilmahamod.

Submesoscale processes are critical to phytoplankton productivity because they operate on the same temporal scales as phytoplankton growth (hours to days). These processes generate localized hotspots of mixing and restratification while driving intense vertical velocities. These velocities inject surface, phytoplankton-rich waters into the subsurface; consequently, they modulate the physical, chemical, and biological exchange processes that govern marine ecosystems. We are analysing near-real time satellite data to identify a submesoscale feature, either an eddy or front, where we will deploy a swarm of gliders and high-resolution ship-based observational platforms. This integrated approach will allow us to observe the fine-scale physics of the feature and determine how these dynamics drive biogeochemical tracer redistribution.

Another focus is on the variability of the western boundary current at the exit of the Labrador Sea, as well as the deep convection region in the central Labrador Sea. These two critical

aspects of ocean dynamics in the subpolar North Atlantic are monitored through long-term observatories that have been operational since the mid-1990s. They allow us to study the vertical and temporal variability of deep convection and how this variability is reflected in the boundary current at the exit of the Labrador Sea. A further key aspect is the transport variability of the boundary current, which forms part of the lower limb of the Atlantic Meridional Overturning Circulation (AMOC). The data collected during this cruise will provide a detailed snapshot of the Labrador Sea's vertical structure in April 2026, enabling comparison with surveys conducted at similar, though not identical, times of year to identify potential climate-related changes. This component of the work programme involves the recovery and redeployment of 10 moorings, as well as multiple CTD stations.

Since departing from Nuuk, we briefly stopped in sheltered fjord waters along the Greenland coast to test the glider deployment procedure. We have since been steaming southward through two anticyclonic eddies, most likely Irminger Rings, which form along the west coast of Greenland and transport warm, saline waters toward the central Labrador Sea. However, due to the severe weather stations, the chief scientist and the bridge agreed to suspend operations within the eddy. On Saturday, March 28, we experienced winds of up to 10 Bft and wave heights of around 6 m.

Weather conditions are expected to improve over the next three days. We therefore plan to carry out two CTD stations during the night of March 29–30, followed by two mooring recoveries and one redeployment on Monday, March 30, along the southwestern coast of Greenland.

Despite the challenging conditions, the crew on board remain highly motivated. We would like to thank the ship's crew for their tremendous support in setting up the instruments, which helped avoid additional delays to our departure from Nuuk.

On behalf of all participants of RV MARIA S. MERIAN, best regards.

Fehmi Dilmahamod

Chief-scientist MSM142.