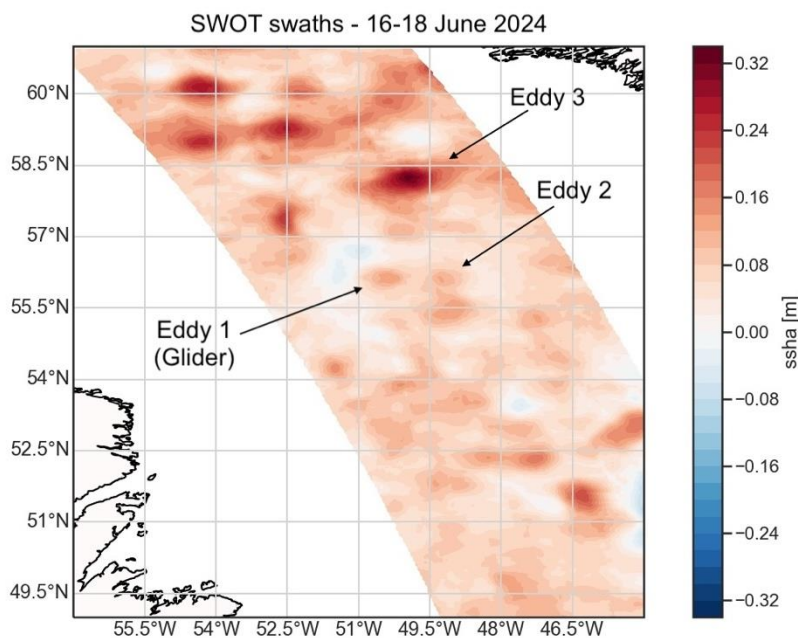




The workplan on the fourth week at sea on the FS Maria S. Merian Expedition MSM 129/2 was primarily guided by the analysis of near real-time SWOT satellite data, which provides high-resolution sea surface state data, as well as the ADCP which provides current velocity information within the upper 1000 meters. After completing mooring operations on the west coast of Greenland, we identified a mesoscale eddy (Eddy 3 in the 1st Figure) from the SWOT satellite, and performed an ADCP transect through it, allowing to estimate the location of the eddy centre. A CTD cast was performed to characterize the eddy in terms of temperature, salinity, oxygen, fluorescence, water velocity and images of particles and micro-organisms. From this data, we identified the eddy as an “Irminger Ring”, a type of eddy formed on the west



coast of Greenland. The core of the eddy hosts a specific water mass that is warmer and more saline than its surroundings, originating from the Irminger Current, hence the name “Irminger Rings.” These eddies are crucial as they play a significant role in the heat and freshwater transport within the Labrador Sea, and hence can influence the deep convective patch.

Sea surface height anomaly from SWOT swaths flying over the Labrador Sea on 16, 17 and 18 June 2024, allowing for the identification of anticyclonic eddies, from which adaptive sampling strategy is devised. Graphics: Neele Sander

We then steamed toward the K1 mooring station, passing through another eddy and performing underway uCTD

profiles every 30 minutes. This provided a concurrent velocity structure data via the ADCP, along with temperature, salinity, and fluorescence data in the upper 400 meters. Upon reaching K1, the final mooring operation commenced. Thanks to the dedication



Deployment of telemetry buoy as part of K1
Photo: Stefanie Brechtelsbauer

and teamwork of the crew, technical and scientific team, the complex K1 mooring was deployed within three hours. This was followed by the deployment of a “Trap mooring” for Memorial University in Canada, designed to collect downward settling particle flux. Afterward, the usual post-deployment calibration casts were performed, and we continued with our ‘adaptive-sampling strategy’ to capture the ocean submesoscale.

An extensive sampling strategy was then devised within the eddy where the glider was deployed (Eddy 1 in the 1st Figure) on June 18th 2024. After a few hours of steaming, we started with a repetitive CTD casts which lasted for 12 hours at the eddy centre. This was done so that part of the time cycle (~ 15 hours) of a specific wave, namely near-inertial waves, was captured. This wave-type originates from the wind-work on the sea surface, and upon reaching an anticyclonic eddy, propagate along its periphery in deeper depths and can hence create zone of high velocity shear. After the CTD, we then started using the Moving Vessel Profiler (MVP), which is an automatic continuous underway sampler providing temperature, salinity and fluorescence data at high-resolution in the upper 120 meters. Sections across the eddy were planned, as well as sections under the SWOT swath. This will later allow comparison studies of what is observed from the SWOT satellite, and the upper water column structure, as a validation for the SWOT satellite as well as for investigating small-scale features and their dynamical imprint on the upper water column structure.

On Saturday June 29th, 11 days after its deployment, we recovered the glider which was released into the anticyclonic eddy (Eddy 1 in the 1st Figure). It sampled continuously throughout its mission, providing 5 realizations of the eddy periphery during its “in-and-out of the eddy” track. The glider also surveyed, during the last two days of its mission, another anticyclonic eddy slightly eastward (Eddy 2 in the 1st Figure), hence providing an insight of two eddies, although one with more transects than the other.



FS Maria S Merian – MSM129/2
07.06.2024 – 06.07.2024
St. John's (Canada) – Reykjavik (Iceland)

4th Weekly Report (24.06. – 30.06.2024)



We have now reached waters south of Greenland, and will start with a series of CTD stations, which will continue over the next 3 days, on the southern and eastern Greenland coast, before starting our way back to Reykjavik, Iceland. We hope for smooth weather in between our last stations and also for our way to Iceland.

You can track the progress of our cruise on the GEOMAR Beluga web portal at <https://beluga.geomar.de/msm129>, as well as reading and listening to the blog of the cruise at <http://www.oceanblogs.org/msm129/>

On behalf of all participants of FS Maria S Merian, best regards,

Fehmi Dilmahamod (Co-chiefscientist MSM129/2)

GEOMAR Helmholtz Centre for Ocean Research Kiel