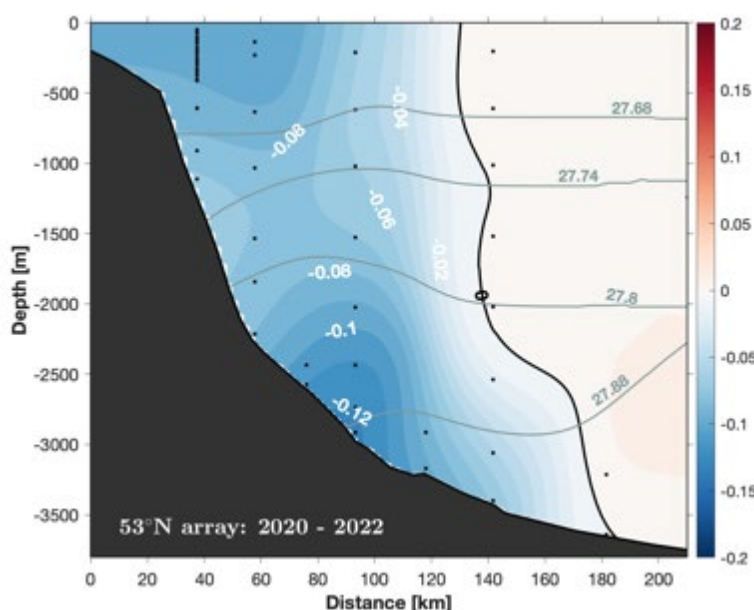


## 5<sup>th</sup> Weekly Report (05.09. – 11.09.2022)

The Meteor M184 cruise is nearing its end and the scientific work had to be terminated on Saturday morning, with entry into the Exclusive Economic Zone (EEZ) of the United Kingdom. Already now the voyage M184 can be considered a great success, which was especially due to the excellent support of the ship's master of the Meteor and the entire crew. A big thank you at this point to the boatswain Michael Zeigert and the deck crew who contributed decisively to the remarkably smooth measurement and maintenance operation. During the cruise, data were collected with the goal of conducting research on two main topics, the role of the ocean in the climate system and the dynamical classification of fronts.



*Anne-Sophie Fortin and Jörg Fröhle launching the last uCTD on RV Meteor M184 (Photo: P. Henning)*



*Mean velocity structure of the western boundary current system from the 53°N Observatory for the period 2020 to 2022. Blue colors indicate southward (out of Labrador Sea) and red colors northward (into the Labrador Sea) currents. The intensity of color is an indicator for current strength. The different cores of the current are associated with water masses (indicated by lines of constant density). Graphics is courtesy of F. Dilmahamad, GEOMAR)*

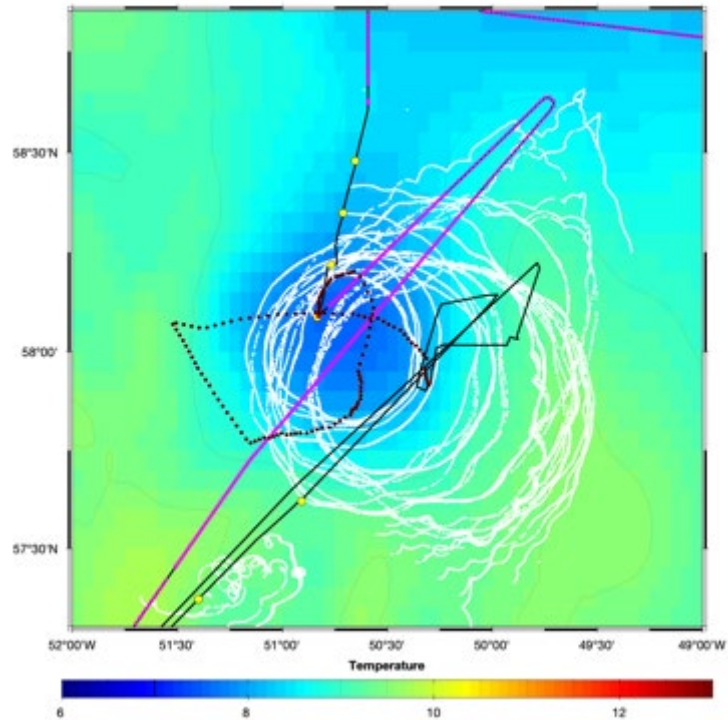
The diverse measurements we conducted during M184 each contribute in their own way to both themes. The measurements with moored sensors have recorded time series that allow short-term and long-term changes in the Labrador Sea boundary current system to be studied (from less than hours to decades; since 1997). The same is true for shipboard measurements, although here the measurement spectrum is much larger and parameters and methods are much more complex.

Since measurements with the CTD on research vessels were already started in the mid 1970s, comparisons over many decades can be made which are of fundamental importance for climate research. At the same time, by using different instruments from the ship, local measurements are made in very high resolution in space and time. The "Moving Vessel Profiler", the

underway CTD, the radar, the thermosalinograph or even the acoustic current profiler under the ship are important measurement systems that we used for the studies of the fronts. Our task as observational oceanographers is to combine the advantages of all these platforms in a systems-approach to holistically then study and understand processes in the ocean. In addition to modern measurement systems, the timely publication of data through national and international data portals play a crucial role. Access to data has gained enormous momentum in recent years. With the "National Research Data Infrastructure (NFDI)", Germany has taken on a pioneering role that is highly praised internationally.

Through NFDI, the numerous ongoing national data initiatives can be brought together into a "system" - this also includes the initiatives in the earth sciences such as the DataHub of the Earth and Environment Centers of the HGF ([datahub.erde-und-umwelt.de](http://datahub.erde-und-umwelt.de)) and one part of it oceanography data, for example, in the “Marine Data Portal” ([marine-data.de](http://marine-data.de)).

The RV Meteor M184 cruise also showed us once again the unique place research vessels have in scientific data collection. They serve as a floating laboratory at sea that we want to understand and monitor. The ship allows for the safe transport and storage of samples that can only be analyzed in the home laboratory. It is a hub for communication with autonomous/semi-autonomous devices that need to be controlled by or in conjunction with the ship, but also a hub of communication with the outside world to make our research more precise and therefore more successful. Research vessels are a floating work platform, equipped with workshops, cranes, navigation equipment and with experts who can operate these facilities. They are places of communication and knowledge transfer between researchers and technicians at sea, from students to professors and engineers, and also with experts and the interested public on land.



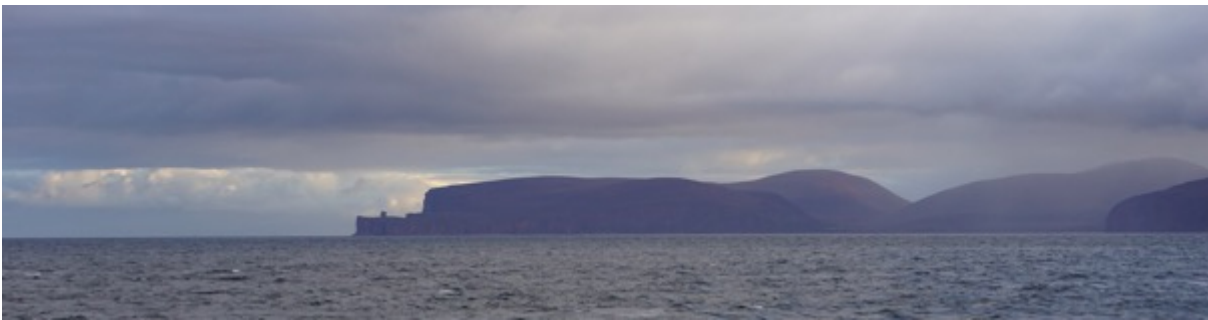
Overview of measurements systems used to survey the frontal structures and dynamics of an ocean eddy during RV Meteor M184. The sea surface temperature map from satellite (contour) was used to estimate a first location of the eddy. A survey with the ADCP (black lines) was used to estimate a centre and CTDs were done (yellow dots). Two underwater glider were launched (black dots) and various Moving vessel profiler surveys done (magenta points). The surface drifter from Hereon were launched from the ship and show nicely the rotation, potential up/downwelling areas and also the propagation (eastward) of the eddy.

Pushed forward by favorable winds, we sail in a fuel-efficiently matter towards Hamburg. It is planned that we will arrive on Thursday, September 15, with the high tide in the morning. Then the loading work will be done, the scientists will leave the ship and on the ship side everything will be prepared for the docking of the RV Meteor on Friday. This will allow the routine shipyard operations to begin. We will say goodbye with a laughing and a crying eye - laughing because we can see families, friends and acquaintances again, crying because the time on board was very enriching and harmonious and will always remain in our best memories.

The many interesting blog entries and pictures of this voyage can best be accessed via the Beluga web portal of GEOMAR <https://beluga.geomar.de/m184>.

With greetings from on board - Johannes Karstensen for the cruise participants of the RV Meteor M184

(GEOMAR Helmholtz Centre for Ocean Research Kiel)



*Finally, after close to 5 weeks at sea we can see land! The Orkneys, north of Scotland. And on this photograph the island of Hoy and, on its northwestern tip, barely visible is the 137m height sea stack „Old Man of Hoy“ that has been, as „Lange Anna“ off Helgoland, formed by wave erosion.*