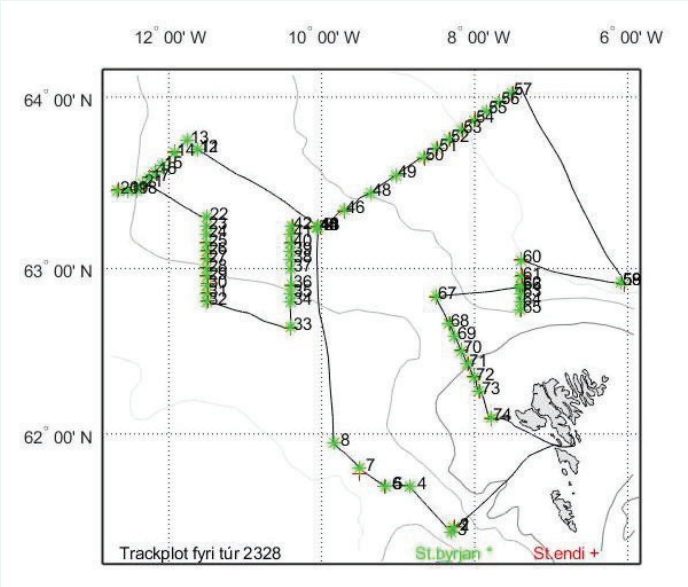
Standard hydrography

Mooring deployments

Jákup Sverri, cruise nr. 2328
Period: 8-13/6 2022
Responsible PI: Karin Margretha H. Larsen

Objective: *The objectives of the cruise were to deploy current moorings and to monitor hydrographic changes in the ocean around the Faroe Islands.*



Summary

The cruise is part of the regular investigations along standard hydrographic sections (temperature, salinity, nutrients and CO_2 along section R). In addition to this, we deployed currents meters (Acoustic Doppler Current Profilers, ADCPs) in the Faroe Bank Channel and on the north Faroe slope, and made some additional hydrographic transects onto the Iceland-Faroe ridge (IFR) (see the Figures and Table 1). We also made five deep profiles using a Video Plankton Recorder (VPR), which takes 20 pictures pr. second, in addition to providing hydrographic data (temperature and salinity).

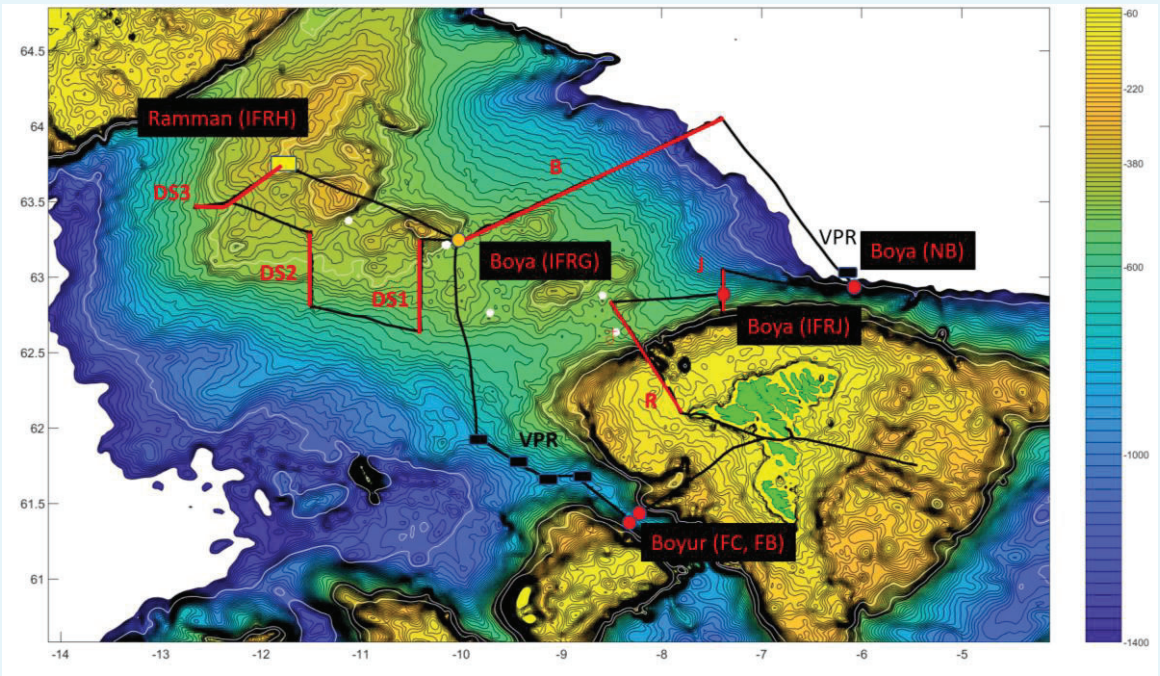


Fig. 1 **The 2328 Cruise track, with detailed bottom topography (values in meters). Names of hydrographic sections (standard and new) are annotated, and the mooring locations of ADCP are shown with red dots (buoys), and a yellow rectangle (a trawl proof frame).**

About the cruise We left Tórshavn harbor on Thursday 8/6 kl. 8, and deployed two ADCPs in the Faroe Bank Channel, and made a CTD cast there. Thereafter, we then made four VPR profiles along an expected branch of the overflow, toward the IFR (Fig. 2). When overflow layer had thinned considerably, we continued to ADCP mooring IFRG. Acoustic contact was, unfortunately, not obtained with this instrument, which therefore remained deployed. A CTD cast was taken at this location (9/6 at 9.30 am), whereafter we headed to the ADCP in a trawl-proof frame located farther west (IFRH). This instrument was recovered, without any challenges. Three detailed hydrographic sections (DS3, DS2 og DS1, Figs. 1,4,5 and 6) were thereafter occupied, in order to assess whether overflow-type water makes it over the crest of the IFR – which it indeed did.

This brought us back to mooring site IFRG. A second CTD was taken, and then we again searched for the ADCP - without any luck. We ended the search by making a third CTD cast. These three CTD casts demonstrate extreme water mass variability, at this location (Fig. 3).

A long hydrographic transect was now taken in a NE direction (named B, in Figs. 1 and 7), in order to guide the preparation of next year's deployments of ten profiling moorings along this same section (will take place in August 2024, a collaboration between Woods Hole Oceanographic Institute (US), the University of Bergen and FAMRI).

As part of long-term monitoring of the transport in the Faroe Current, an ADCP was re-deployed at mooring site NB, where also a VPR profile was made. And in order to test our new hypothesis of a westward deep countercurrent of overflow-type water towards the IFR (under the Faroe Current), we also deployed an ADCP at located IFRJ, farther west on the north Faroe slope (Fig. 1). Prior to this deployment, a short hydrographic section (J, Figs. 1 and 8) was made. The cruise ended with the occupation of standard section R, towards the Faroes (Figs. 1 and 9).

Nutrient concentration and CO_2 were sampled at selected stations on section R. We came back to Tórshavn harbor on Tuesday, 13. June at 12.00.

Samples

Table 1. Measurements and samples during the cruise.

Samples / Data	Overview
Underway Thermosalinograph	Sea surface (6 m) 8/6 until 13/6
CTD stations	60 stations (8 stations along standard section R + one additional stations in the Faroe Bank Channel and 51 extra stations crossing the IFR)
CO_2, Nutrients and algae	Along section R
Salinity samples	At most CTD stations (in stable water)
VPR	4 stations in the Faroe Bank Channel and on at site NB

Equipment

Sea-Bird 911+ CTD, equipment for deployment of ADCP buoys and trawlproof frame, equipment for water samples (bottles, chemicals, etc) and a VPR.

Comments

The water samples will be processed and analyzed during autumn, 2023.

Staff from Havstovan

Hjálmar Hátún (PI) and Regin Kristiansen

(additional figures)

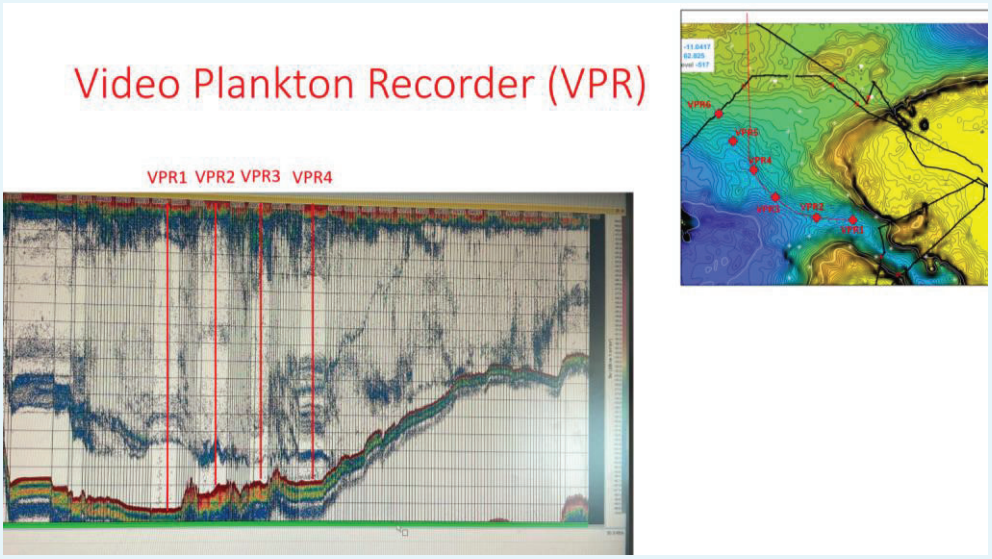


Fig. 2 Section with VPR profiles (red dots and lines), following a possible overflow branch from the Faroe Bank Channel towards the IFR. Backscatter observed with an EK80 echosounder is shown in the background, with the Faroe Bank Channel on the left-hand side, and the crest of the IFR to the right. The white/blank area reveals the near-bottom overflow water.

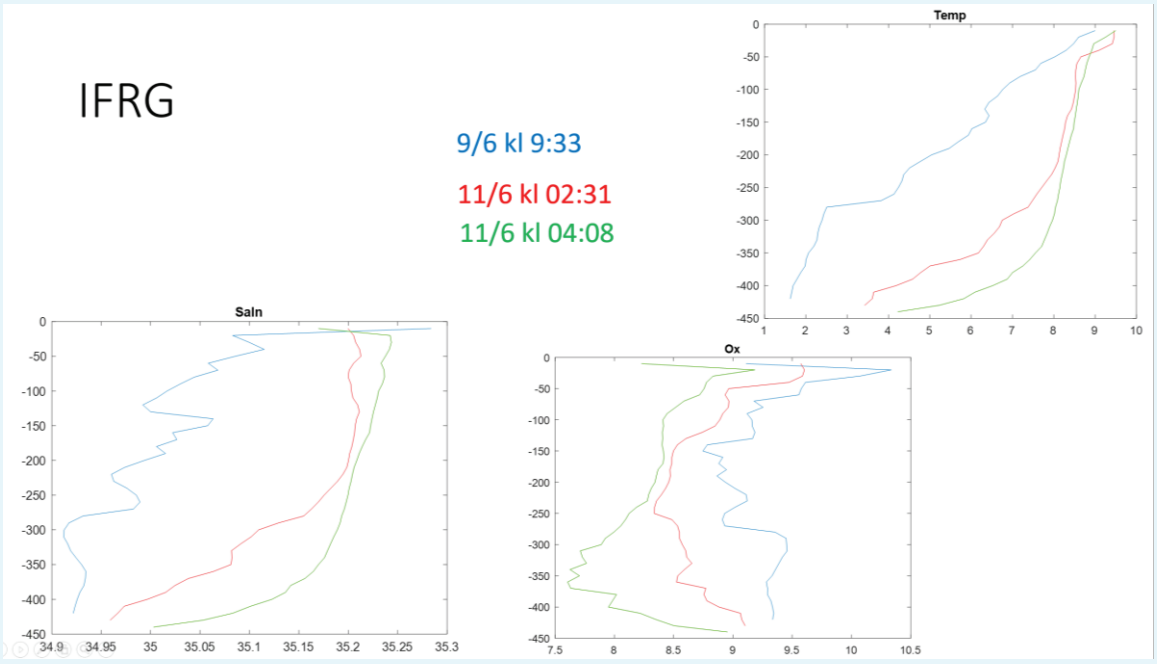


Fig. 3 Three CTD profiles at ADCP mooring IFRG, at the crest of the IFR (see Fig. 1), which demonstrate extreme large hydrographic changes throughout the water column.

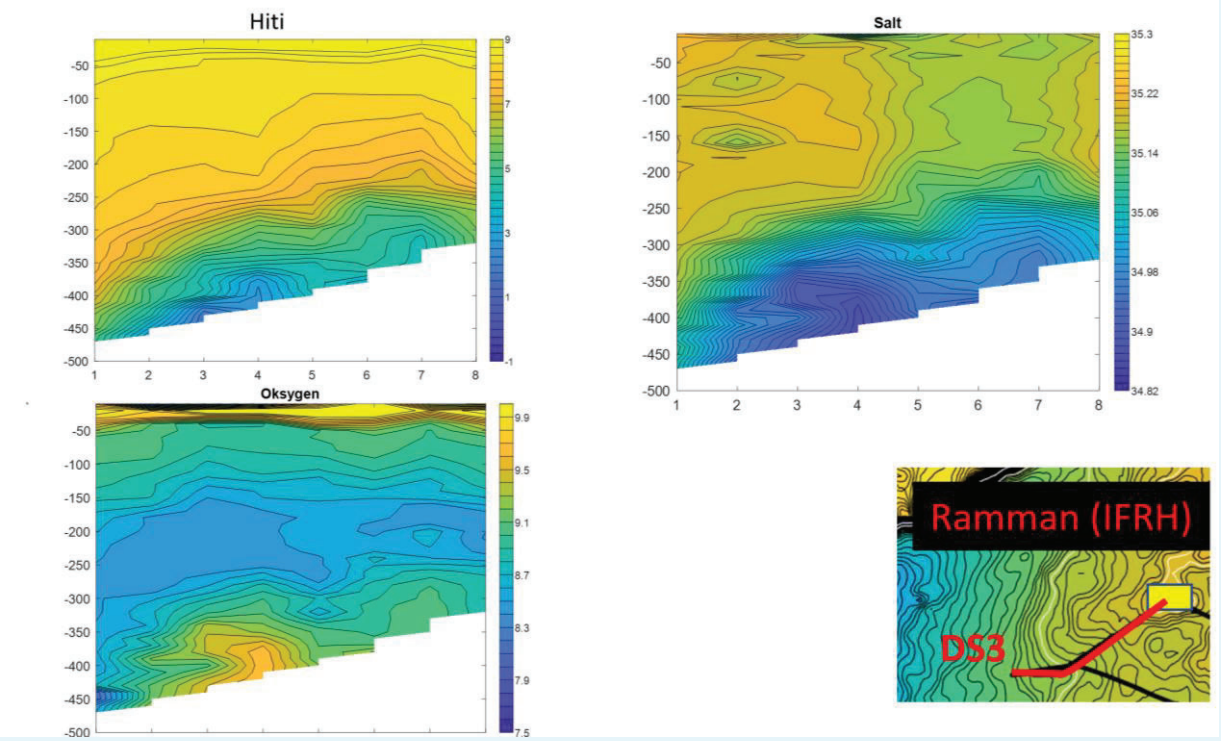


Fig. 4 Section DS3, which demonstrates strong mixing between an overflow plume and the overlying warmer and saltier Atlantic water.

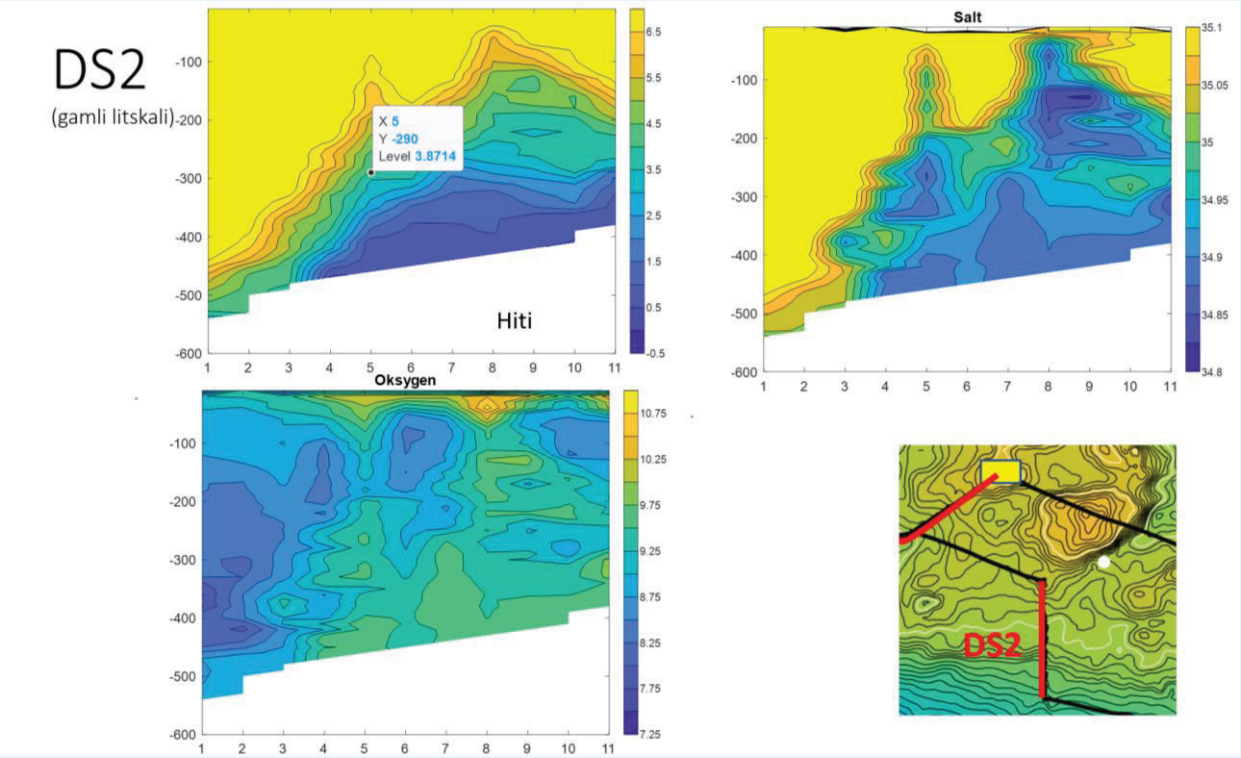


Fig 5. An extraordinarily large volume of overflow-type water, on the southern side if the IFR.

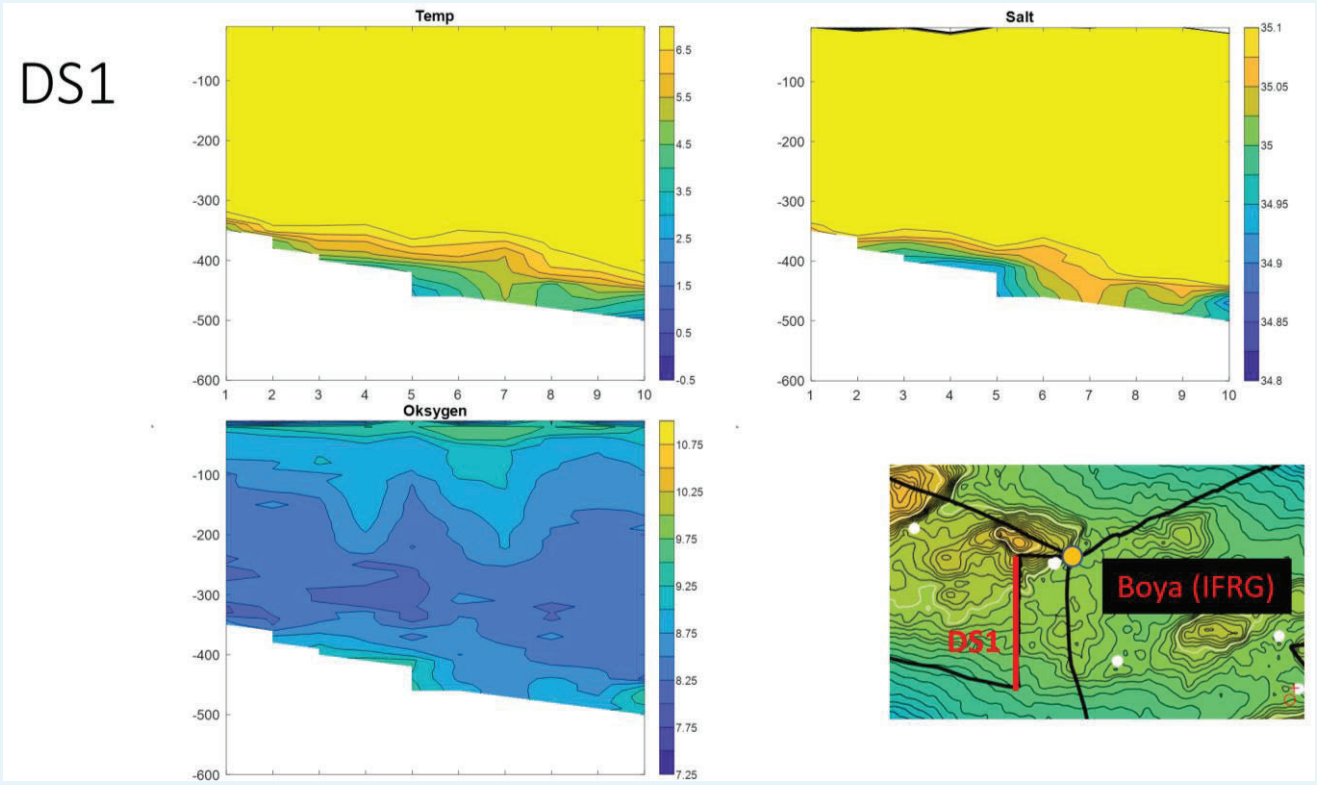


Fig. 6 Almost no overflow-type water at section DS1, although it was occupied just few hours after the neighboring section DS2 was occupied (see Fig. 5).

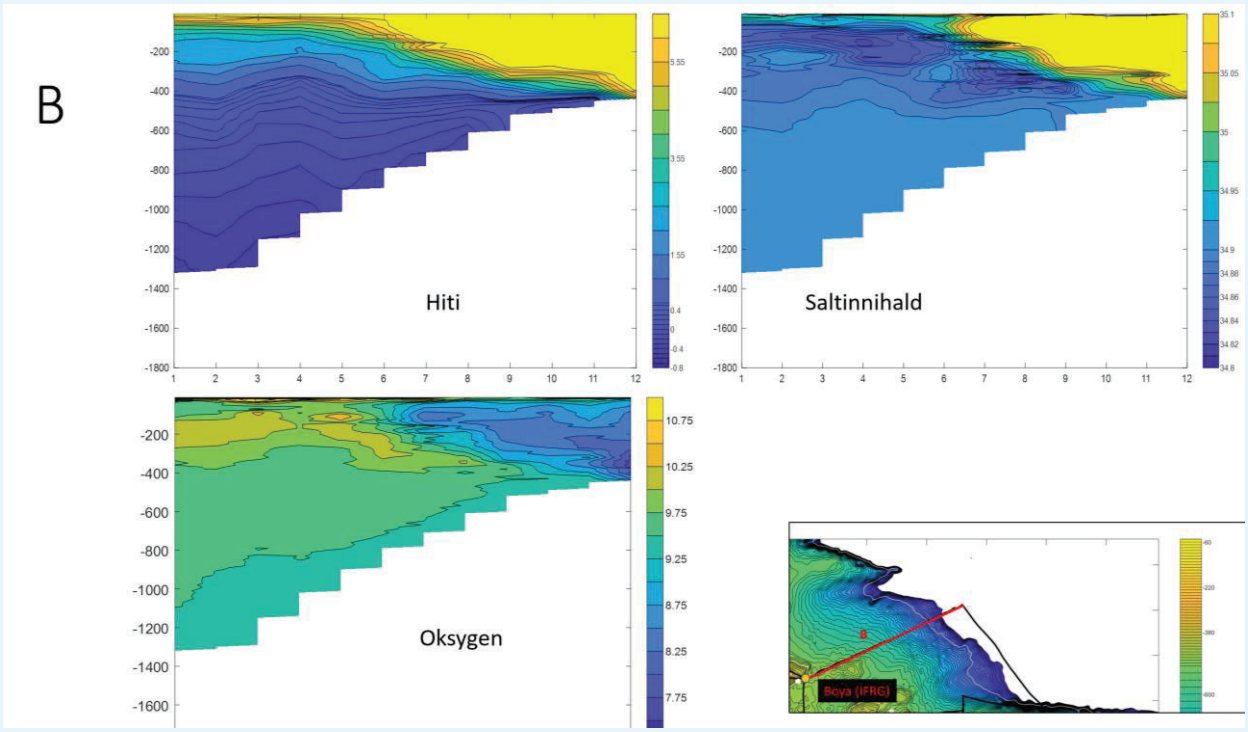


Fig. 7 Section B.

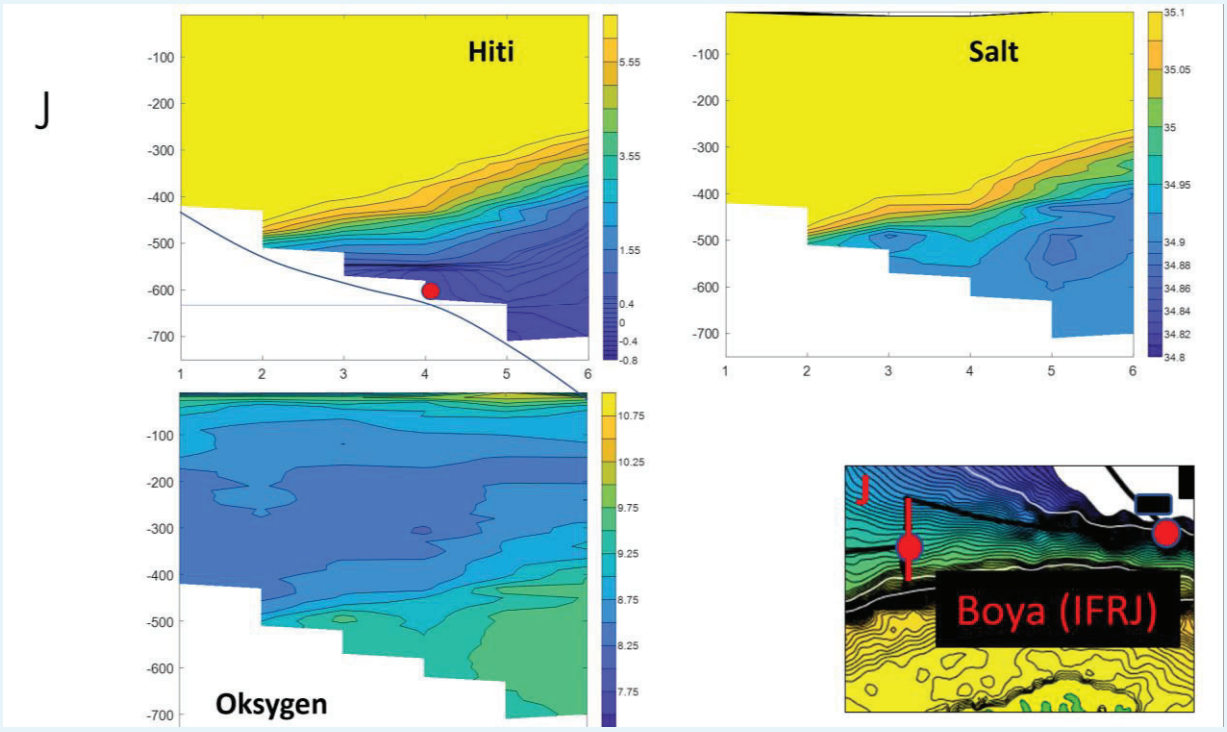


Fig. 8 Section J, and the approximate position of ADCP buoy IFRJ (red dot).

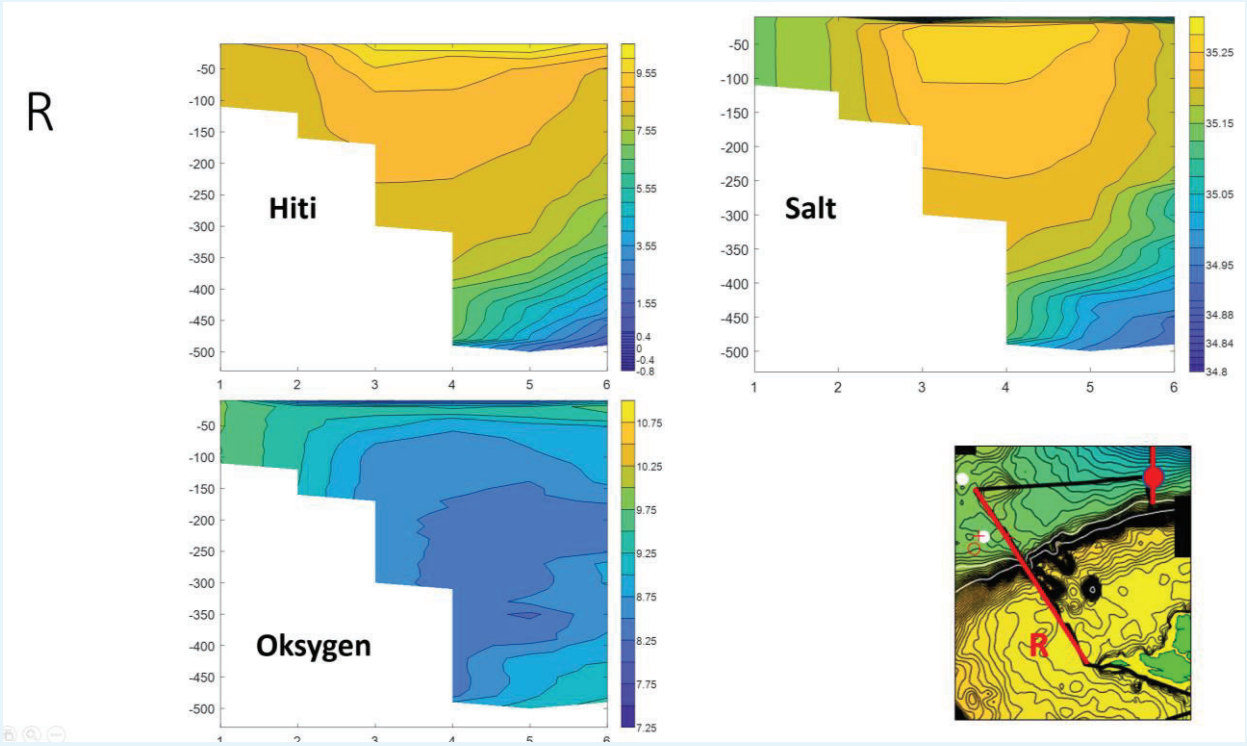


Fig. 9 Standard section R. A pronounced Atlantic current core, resting on the Faroe slope, is evident, and this flow carried much saltier water than last year (June, 2022).