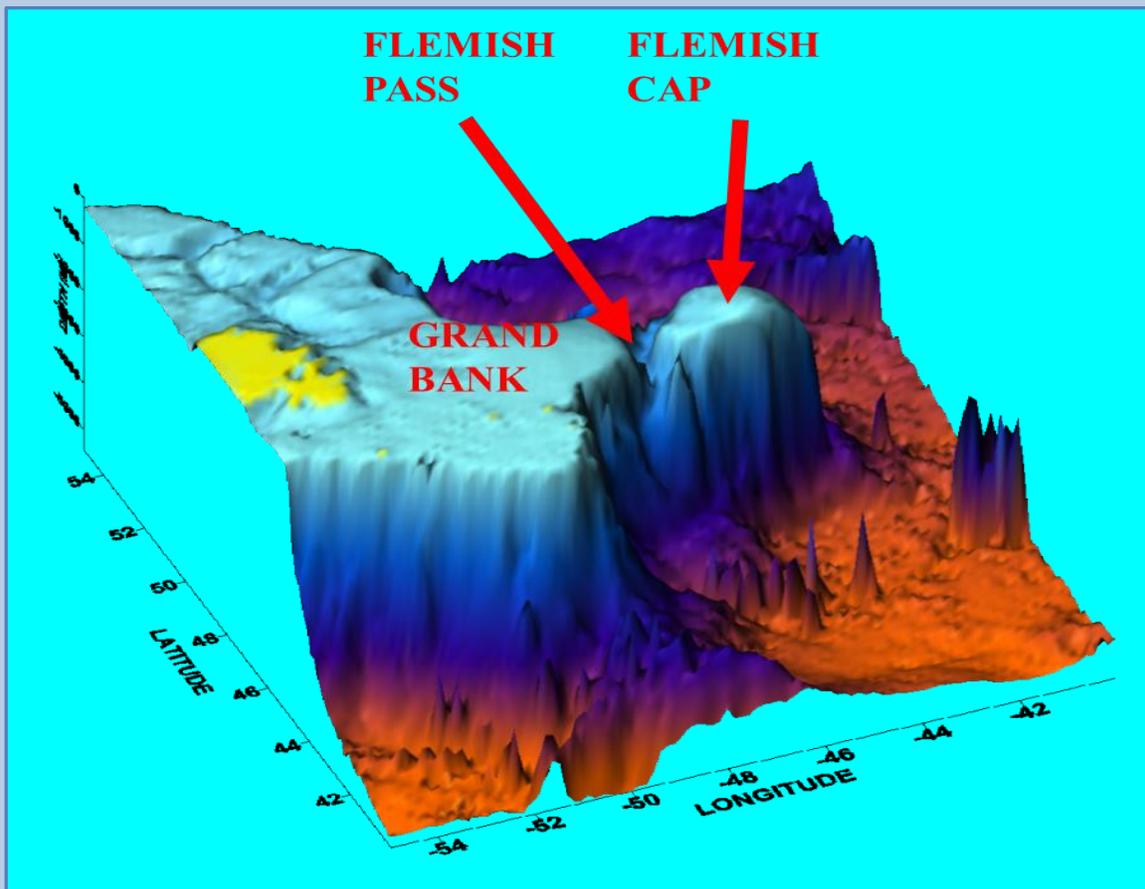


The 2017 Ocean Climate Status Summary for NAFO Sub Division 3M

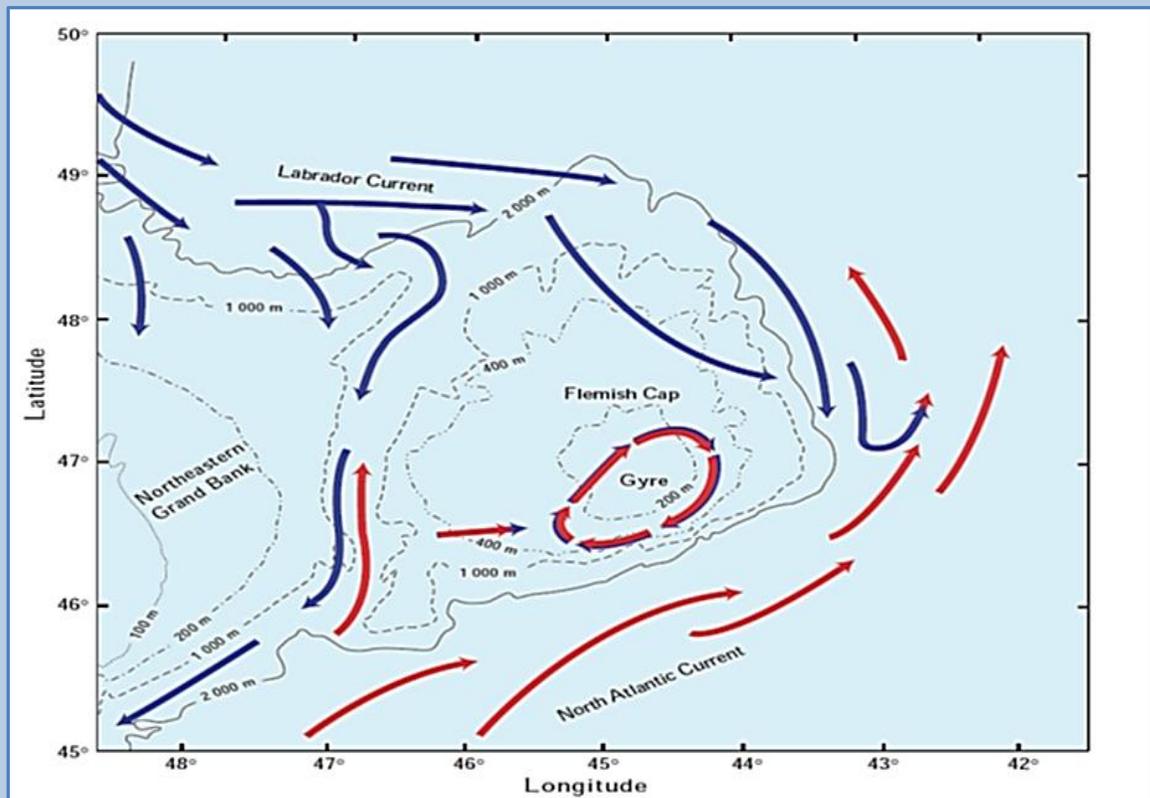
The Flemish Cap

A bathymetric map of the Flemish Cap showing its location in relation to the adjacent Grand Banks of Newfoundland.



Oceanographic surveys of the Flemish Cap during 2017 show moderating temperatures compared to the record cold conditions observed in 2015.

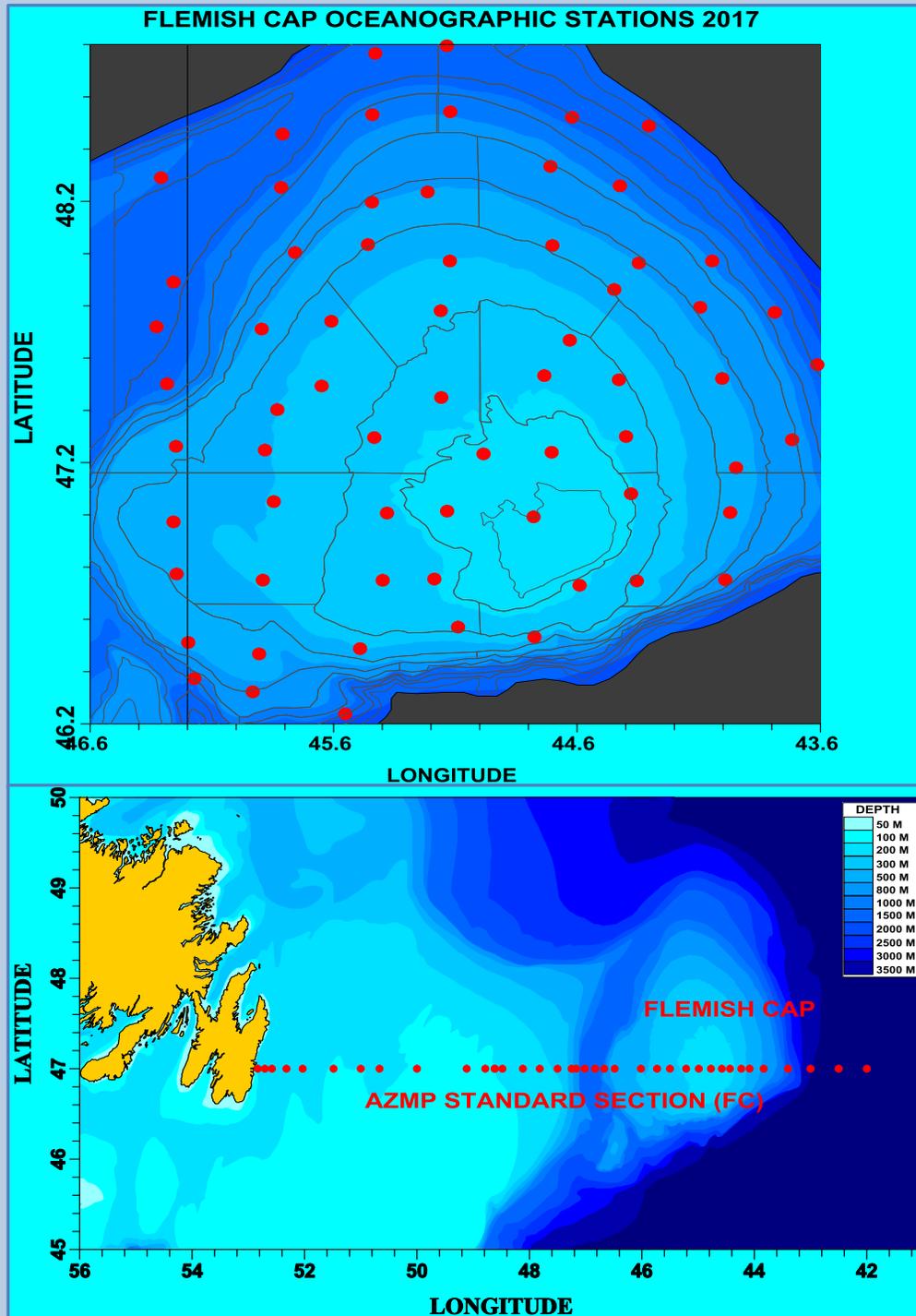
The water mass characteristic of the Flemish Cap area are derived from a mixture of Labrador Current Water from the north mixing with warmer and saltier North Atlantic Current Water from the south.



The general circulation consists of the offshore branch of the Labrador Current flowing through the Flemish Pass on the Grand Bank side and a jet that flows eastward north of the Cap and then southward east of the Cap.

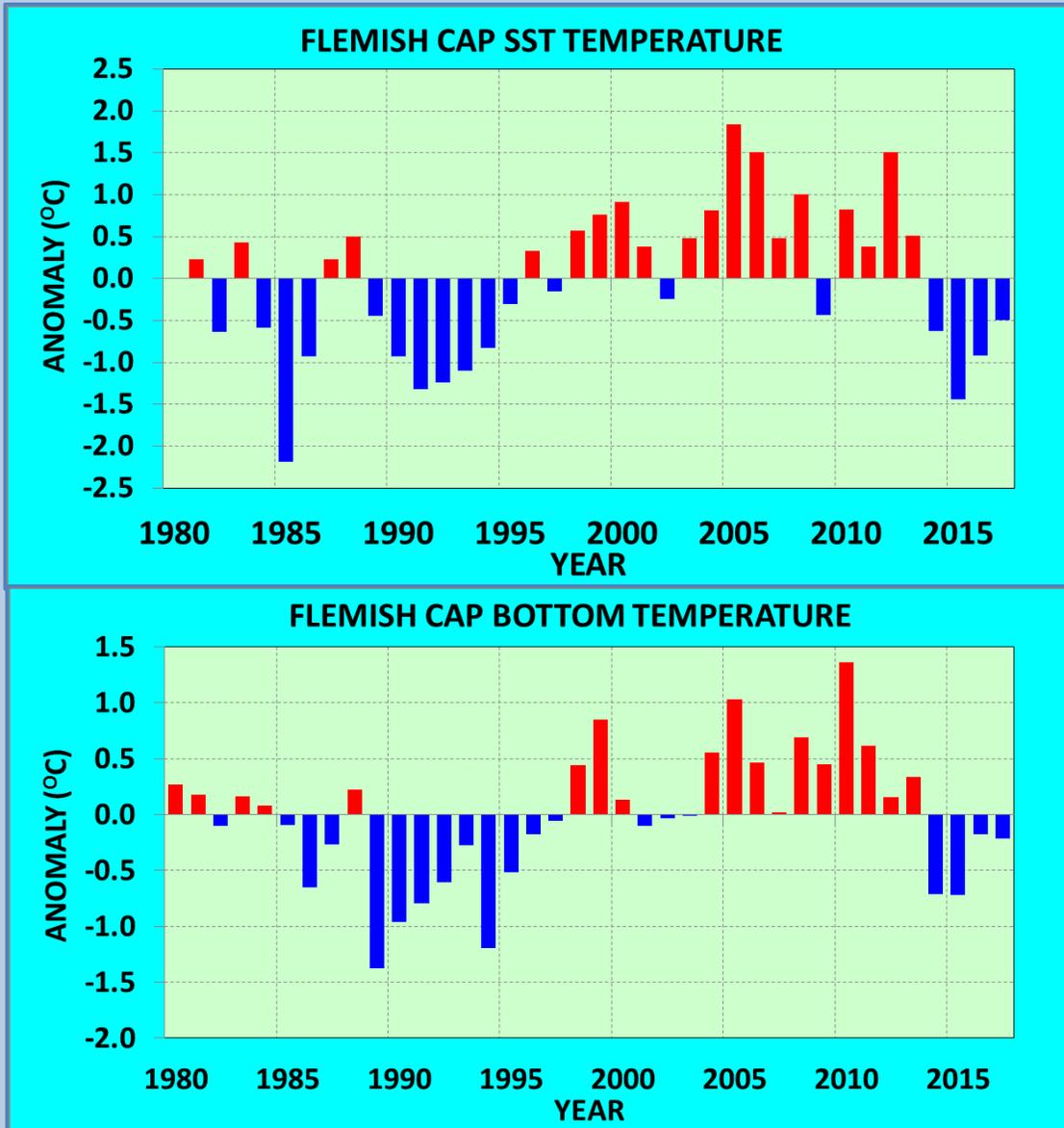
To the south, the North Atlantic Current flows to the northeast influencing waters around the southern areas of the Cap. In the absence of strong wind forcing the circulation over the central Flemish Cap is dominated by a topographically induced clockwise gyre.

Maps showing the locations of CTD profiles obtained from the summer EU multi-species assessment survey during 2017 on the Flemish Cap and the NL seasonal AZMP surveys (bottom Panel).

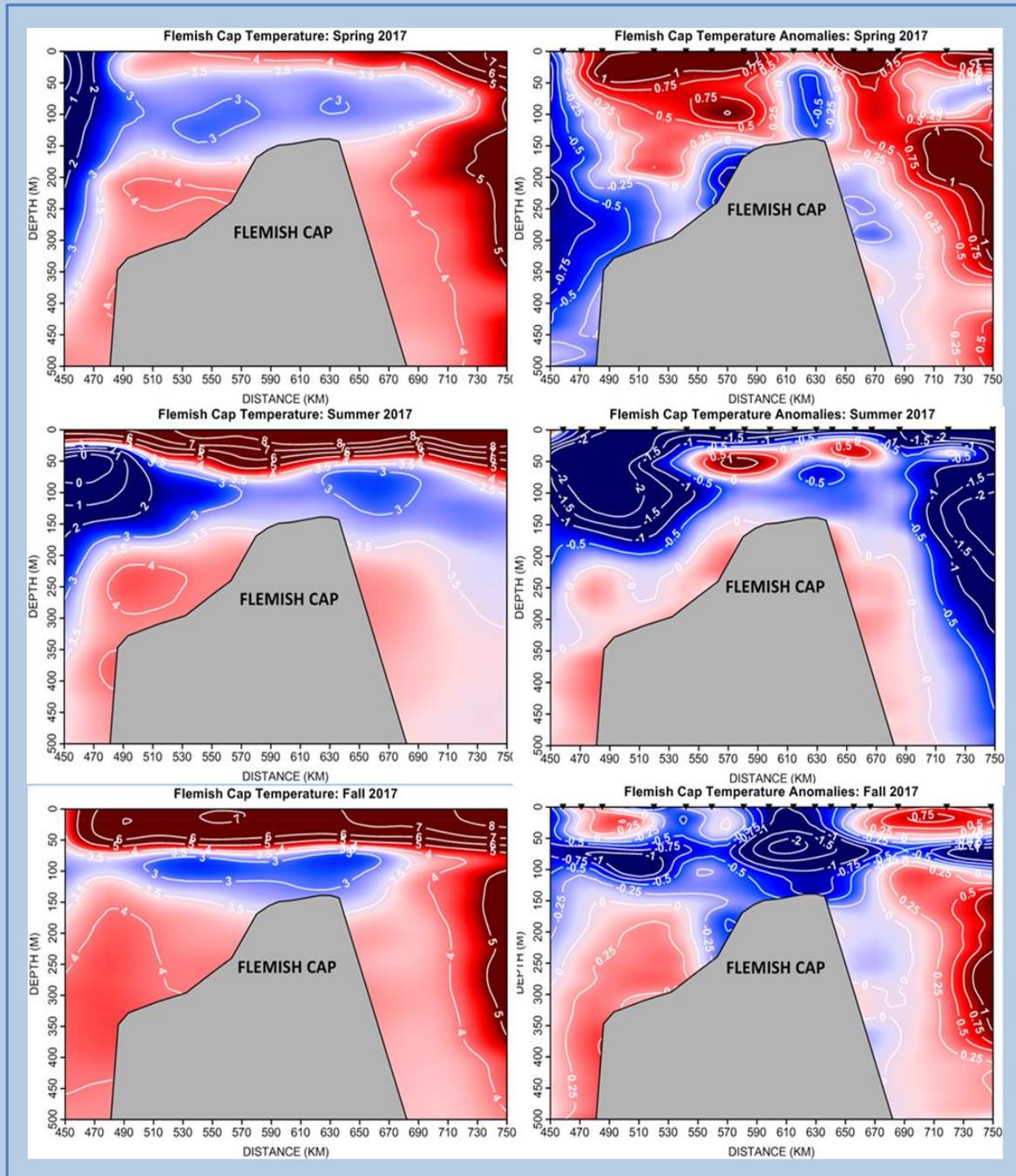


SEA-SURFACE AND BOTTOM TEMPERATURE TRENDS

Long-Term trends in surface and bottom temperatures on the Flemish Cap showing the most recent Cold anomaly and the moderation in conditions during 2017.

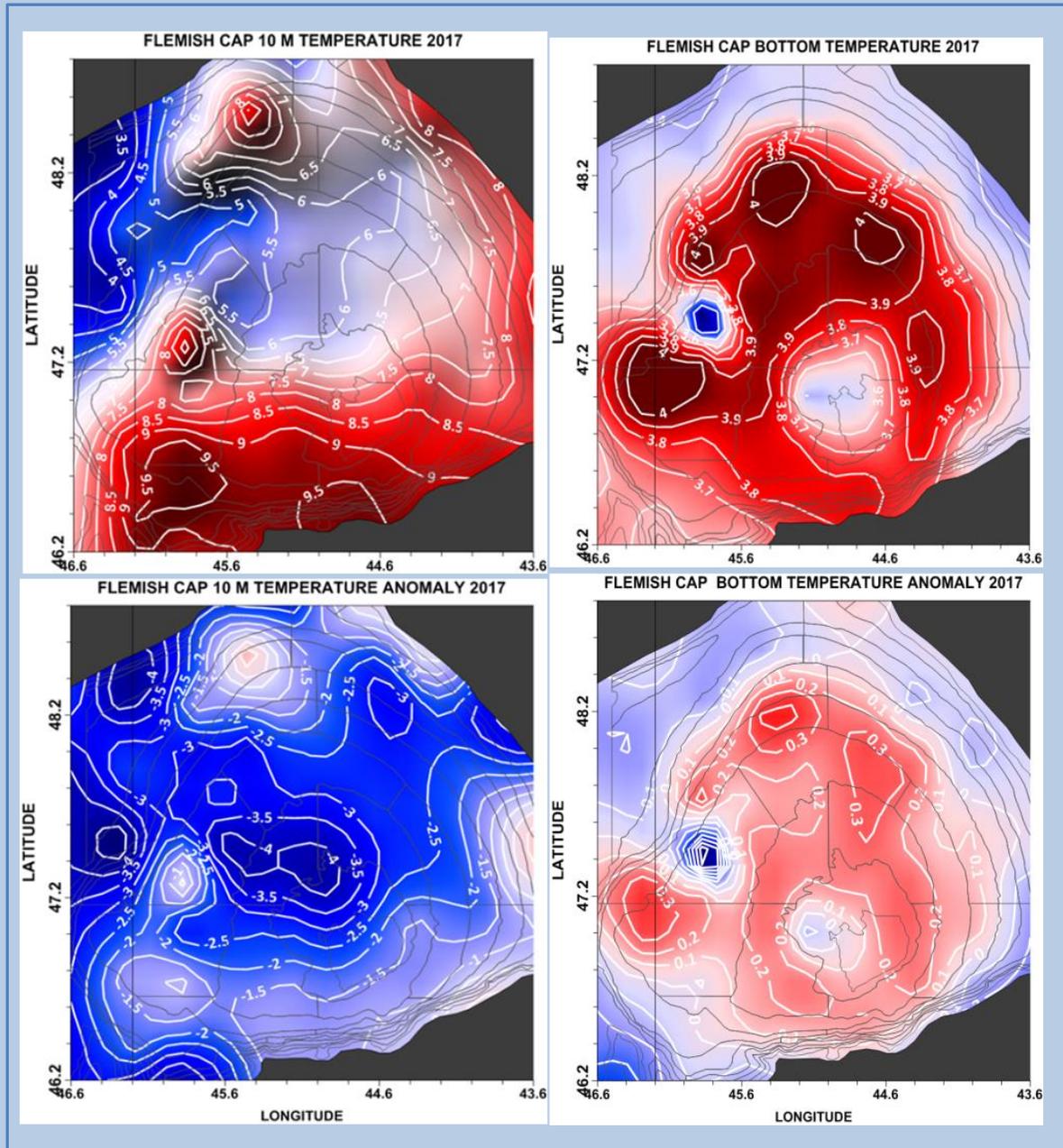


Seasonal temperature and temperature anomaly cross sections along 47°N during 2017 showing the complex and highly variable nature of the thermal habitat in the region.



Data collected by DFO's AZMP spring, summer and fall surveys for 2017.

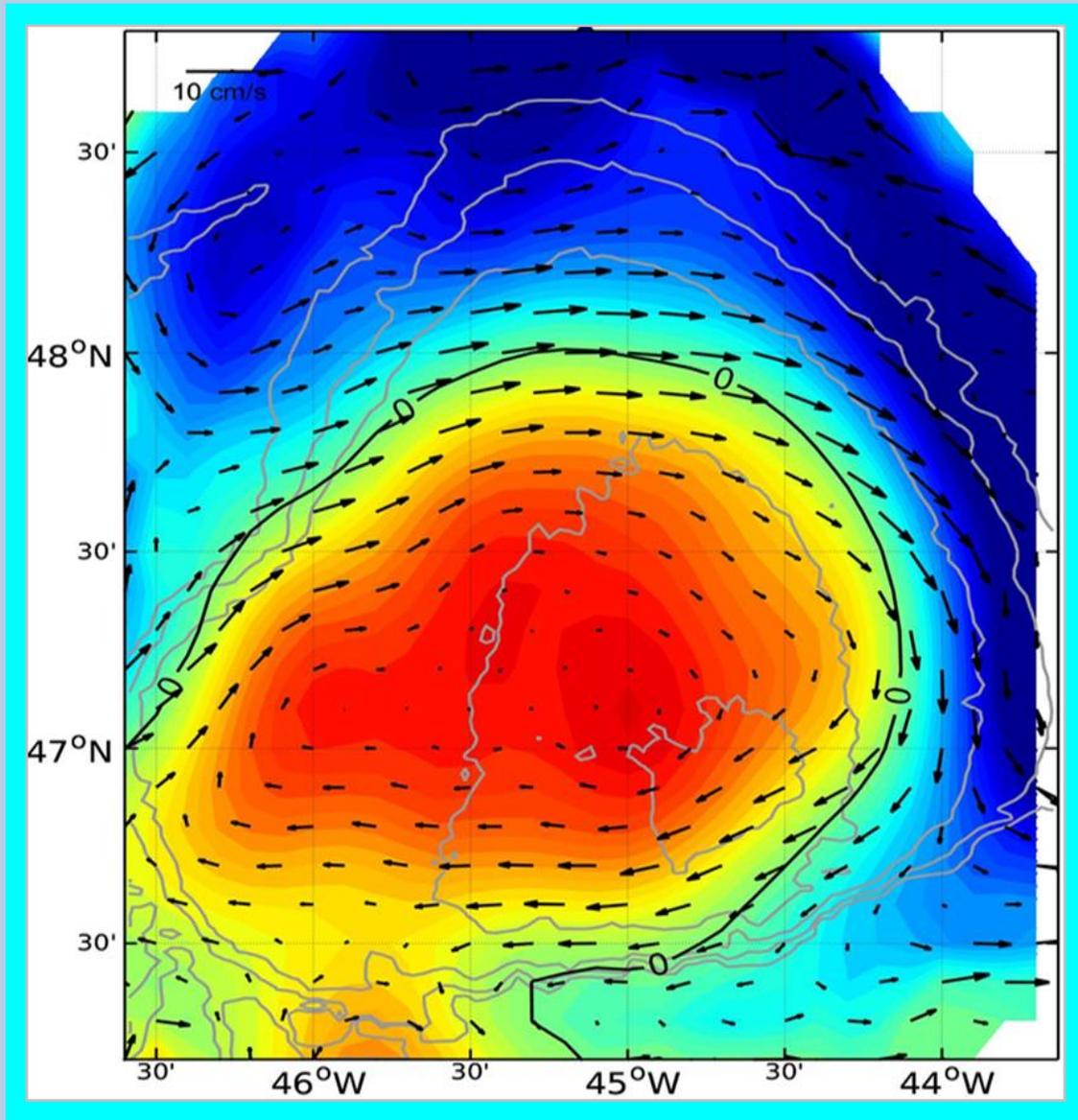
Summer temperature and temperature anomaly maps over the Flemish Cap during the 2017 EU survey showing highly variable conditions and the significant upper water column (10-m) temperature anomaly.



Data collected by the EU stratified random multispecies survey of the Flemish Cap area during June-July of 2017.

The average upper-layer geostrophic circulation based on the EU summer survey showing a coherent anticyclonic (clockwise) circulation around the Flemish Cap.

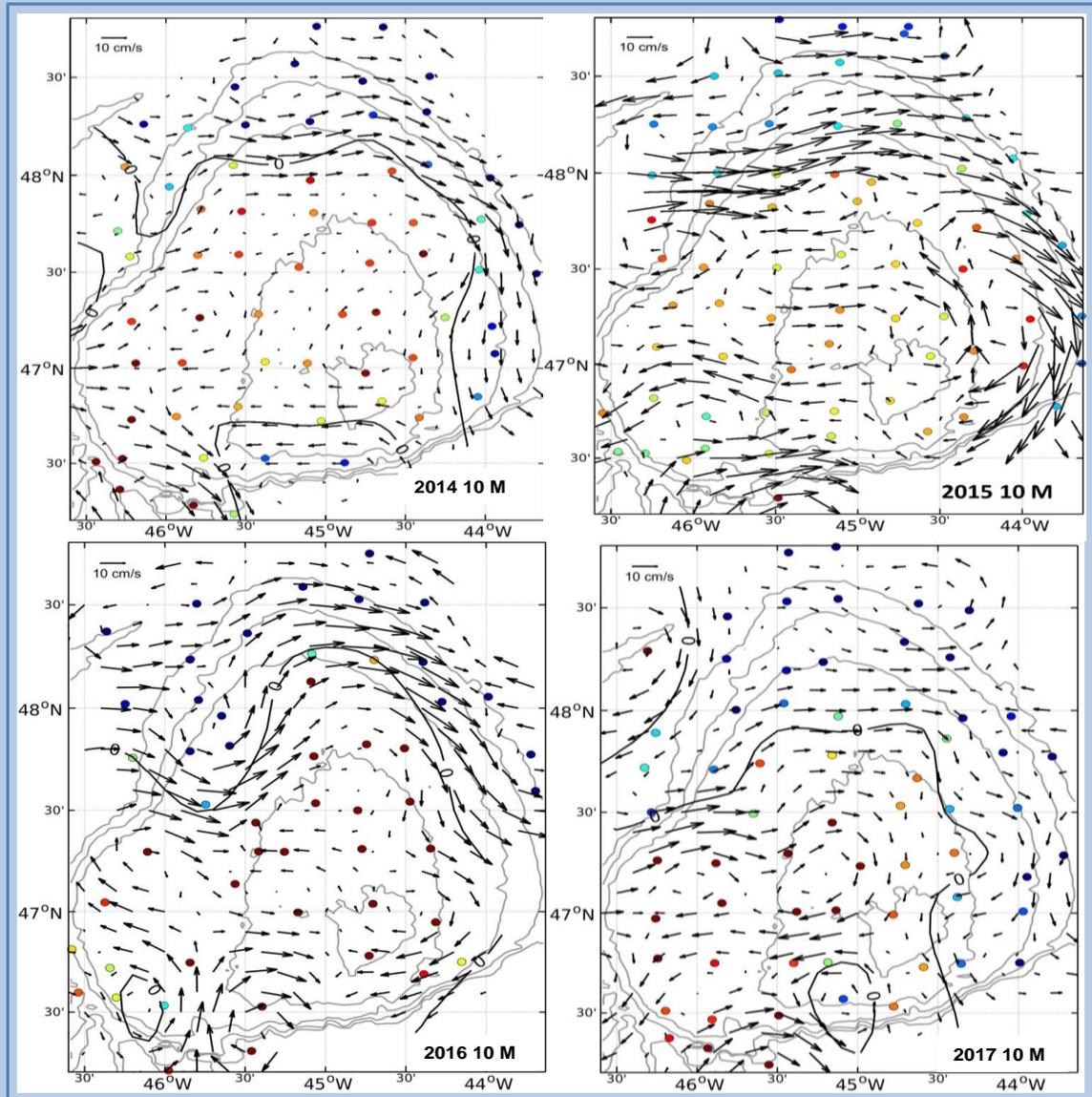
The weakest currents are near the centre and in the south where the influence of the Labrador Current is weak.



Geostrophic currents were calculated from all CTD data collected by the EU assessments surveys during the June-July period from 1988 to 2017. The color contours represent the dynamic height field.

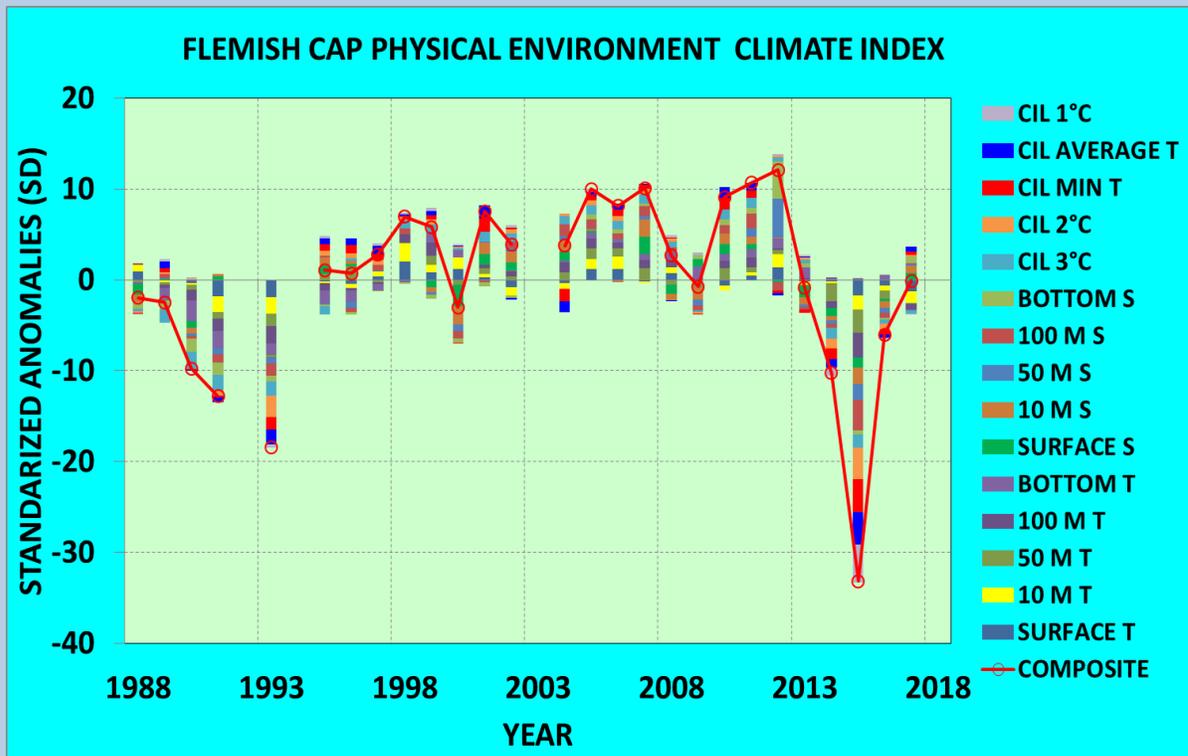
The upper-layer geostrophic circulation showing a general anticyclonic (clockwise) flow. Currents were generally weak in 2014 and 2017 compared to 2015 and 2016.

The very dynamic circulation pattern dominated by the Labrador Current during 2015 corresponded to the extremely cold-fresh conditions.



Geostrophic currents based on CTD data collected by the EU assessments surveys during the June-July period for 2014-2017. The color dots are the CTD locations with the color representing either high (red) or low (blue) dynamic height values.

A composite Climate Index of the water mass properties over the Flemish Cap based on 15 indices of temperature, salinity and CIL properties from the EU survey. The record cold-fresh anomaly that peaked in 2015 has moderated in 2017.



Highlights for 2017

- **Annual sea surface temperatures (SST) around the Flemish Cap increased over the previous two years but remained at -0.5°C below normal in 2017.**
- **Average bottom temperatures based on the EU summer survey around the Flemish Cap were about normal (-0.1 SD) in 2017.**
- **The spatial extent of the CIL ($<3^{\circ}\text{C}$) based on the EU summer survey covered over 80% of the Flemish Cap area in 2017 with average thickness of about 66 m or about 15 m thicker than normal.**
- **During the summer of 2017, both the CIL minimum and average observed core temperature over the Flemish Cap was slightly above normal, a significant increase over the record cold values observed in 2015.**

- ***Oceanographic observations of the Flemish Cap area during the past several years captured a significant event highlighted by an unprecedented cold-fresh water mass over the Flemish Cap that peaked in 2015.***
- ***In 2017, conditions returned to near-normal values over most of the water column except in the near-surface layer where temperature values remained below normal.***

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Reference:

E. Colbourne, A. Perez-Rodriguez, A. Cabrero3 and G. Gonzalez-Nuevo. 2018. Ocean Climate Variability on the Flemish Cap in NAFO Subdivision 3M during 2017. NAFO SCR. Doc. 2018/010. Serial No. N6794.



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