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ICES Report on Ocean Climate 2021

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4.1 West Greenland

B. Cisewski and J. Mortensen

The NOAA LME project identifies the ecosystem of the Canadian eastern Arctic–western Greenland as a single LME. Here, only conditions in the western Greenland portion of the region are examined. The hydrographic conditions presented are monitored at two oceanographic sections across the continental slope of West Greenland in the southwestern part of the ecoregion at a position that is influenced by the West Greenland Current (WGC; Figure 4.3). The WGC carries water north along the west coast of Greenland and consists of two components: a cold, fresh, inshore component which is a mixture of Polar Water and melt water, and a warmer, saltier, offshore component which is called Irminger Sea Water. Being part of the cyclonic Subpolar Gyre, the WGC is subject to hydrographic variations on time-scales associated with variability in the gyre.

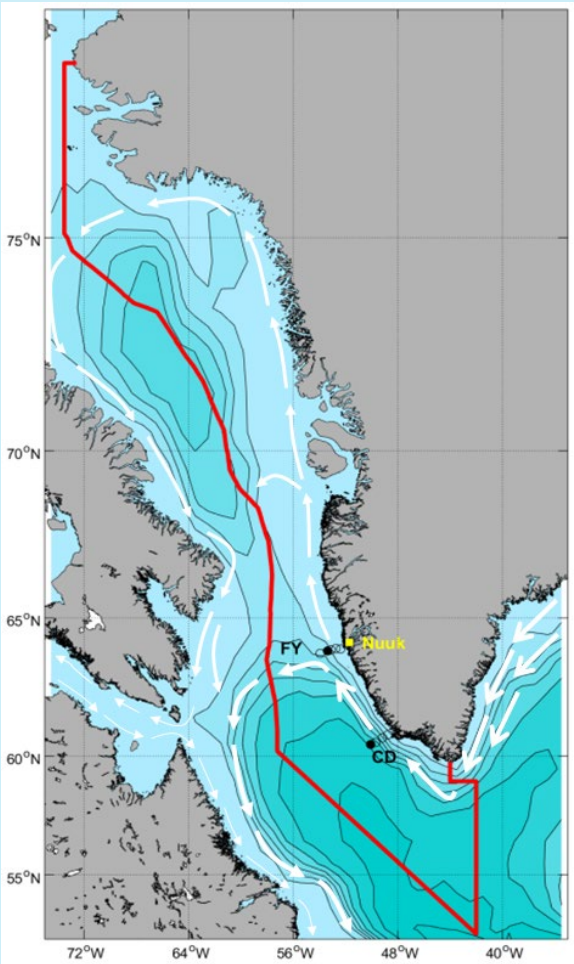

Figure 4.3. Circulation schematic for the Labrador Sea and Davis Strait. The location of Nuuk is marked in yellow. White arrows show the path of the surface circulation. The thick arrows are the West Greenland Current (WGC). The red lines show the extent of NAFO Area 1a, western Greenland. Circles labelled 'FY' are the stations of the Fyllas Bank hydrographic section; station 4 is marked as a black circle. Circles labelled 'CD' are the stations of the Cape Desolation hydrographic section; station 3 is marked as a black circle.

The West Greenland shelf and adjacent seas are delineated in the north by the NOAA LME boundaries and in the south by ICES marine ecoregion boundaries. The data presented here are from two hydrographic sections located across the southwest Greenland continental shelf, which are sampled twice annually (in June/July by the Greenland Institute of Natural Resources, Greenland, and in autumn by the Thünen Institute of Sea Fisheries, Germany). The time-series shown are from the continental slope influenced by the WGC. In autumn 2021, the Cape Desolation and Fyllas Bank sections had to be cancelled due to ship engine failures and severe weather conditions. In winter 2020/2021, the NAO index was negative. The annual mean air temperature at Nuuk Weather Station in West Greenland was 0.2°C in 2021, 1.2°C above the long-term mean (1991–2020: T_{mean} = –1.0°C; Cappelen and Drost Jensen, 2021; Figure 4.4). The mean water properties between 0 and 50 m depth at Fyllas Bank Station 4 (Figure 4.5) are used to monitor variability of the fresh surface water component of the WGC in June/July. In 2021, the temperature of this water mass was 1.59°C, 0.1°C below its long-term mean (1981–2010: T_{mean} = 1.69°C; Figure 4.6). Salinity increased in 2021, being 0.31 above its long-term mean (1981–2010 S_{mean} = 33.27; Mortensen, 2022; Figure 4.6).

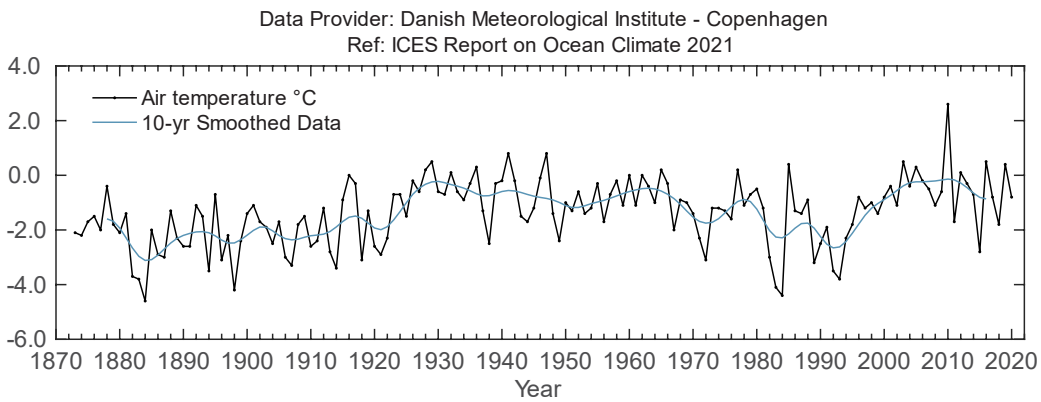

Figure 4.4. West Greenland. Annual mean air temperature at Nuuk station (64.16°N 51.75°W). Data source: Cappelen (2021).

CCGS Hudson's fast rescue craft with both DFO and CCG staff securing a line to the AZMP's Viking Buoy for its recovery. Credit: Diana Cardoso (DFO).

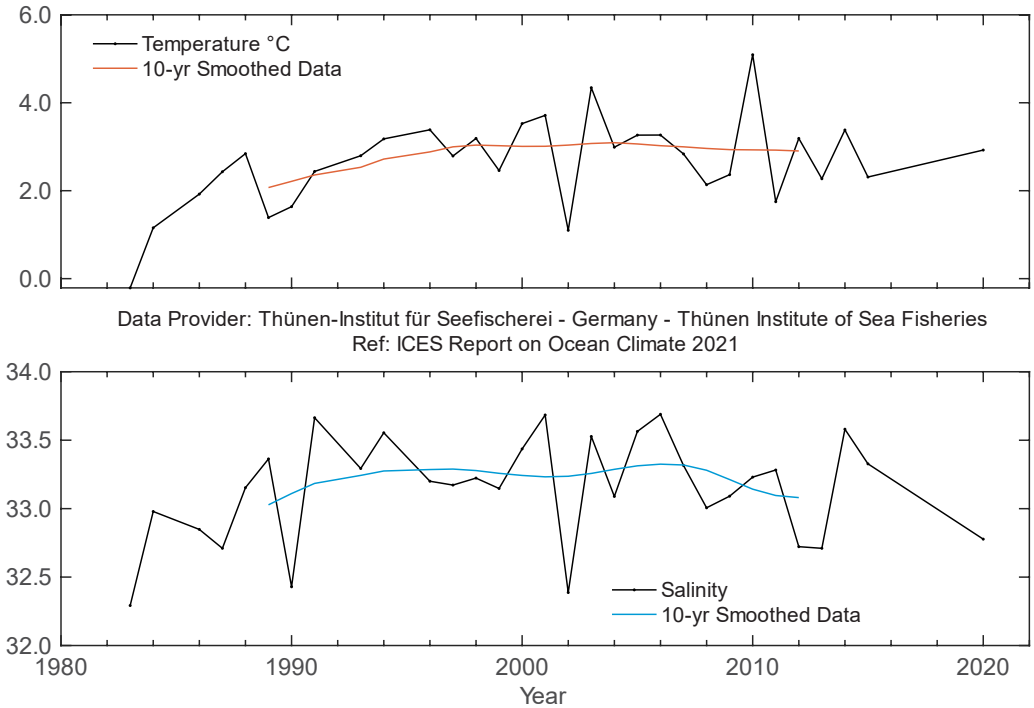

Figure 4.5. West Greenland. Mean temperature (upper panel) and salinity (lower panel) in the 0–50 m water layer at Fyllas Bank Station 4 (63.88°N 53.37°W). Data until 2020.

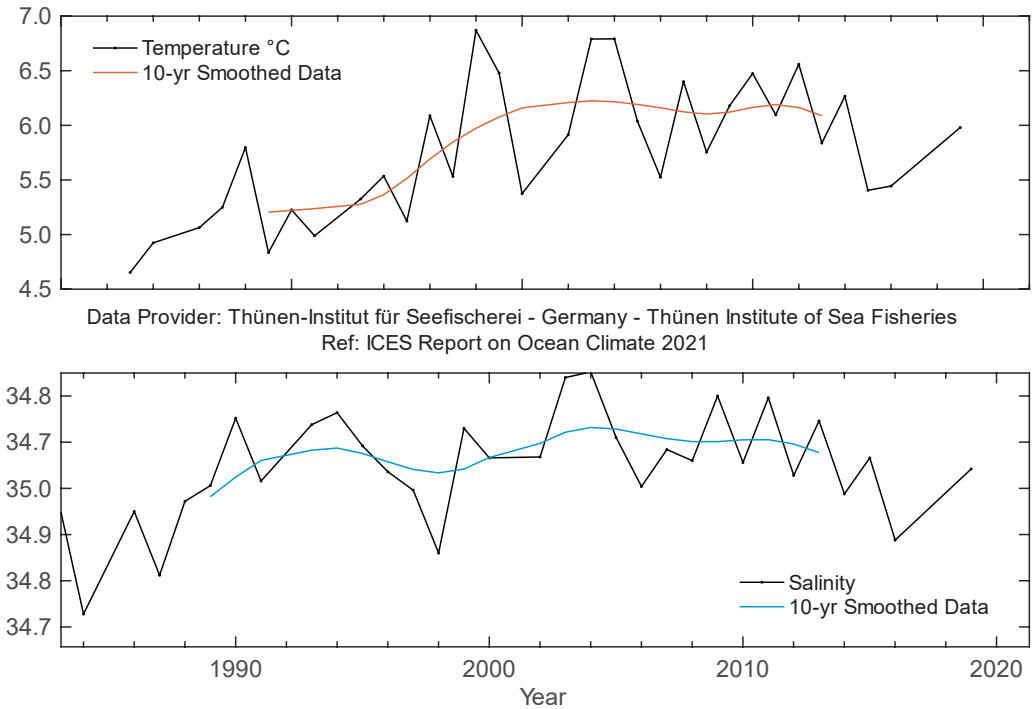

Figure 4.6. West Greenland. Temperature (upper panel) and salinity (lower panel) in the 75–200 m water layer at Cape Desolation Station 3 (60.47°N 50°W). Data until 2019.