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Oceanographic Data from NAFO Subarea 0 and Division 2G Collected during Fisheries Surveys Conducted in 2005 and 2006.

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Abstract

Three oceanographic sections were completed during two surveys conducted in Division 0A, Baffin Bay, during August-September and October-November, 2007. One was at Cape Christian on August 31 and two were at Broughton Island, Sept. 3 and Nov. 4. This is the first time that the Broughton Island Section has been surveyed. Temperature, salinity and fluorescence data were collected at 5-6 stations along each transect. In addition bottom temperature was collected at each fishing station distributed between 100 m and 1500 m bottom depth. Cold arctic polar water (<0 ^{o}C) was clearly apparent between approx. 50 m to 300 m in the sections taken along the Baffin coast and a majority of surveys stations had bottom temperatures less than 2.0 ^{o}C. Surface plots of bottom temperature collected during a shrimp survey conducted in Div. 0B2G in 2005 and 2006 showed that the cold polar water extended south into Div. 0B with warmer Atlantic water (3-4 ^{o}C) found in deeper waters.

Division 0A

Two stratified random surveys were carried out in the Northwest Atlantic Fisheries Organization (NAFO) Division 0A from August 26 to September 5 and from October 27 to November 7, 2007. This was a collaborative effort between Fisheries and Oceans Canada, the Nunavut Wildlife Management Board, Baffin Fisheries Coalition, Government of Nunavut, Nunavut Tungavik Inc., and the Greenland Institute of Natural Resources. The Greenlandic research vessel Paamiut was used to carry out the surveys. The science crew was comprised of six Canadians and one Greenlander. Both surveys covered were conducted within southern Div. 0A (below 73.5^{o}N). The objectives were:

1. Collect the data required to establish age structure, estimate population abundance, biomass, and recruitment of Greenland halibut;
2. Collect the data required to establish age structure, estimate population abundance, biomass, and recruitment of shrimp;
3. Record numbers caught and collect length and weight data on all other commercial species caught, to allow calculation of abundance, biomass, and size structure of these species;
4. Record numbers and collect weight data on all non-commercial species caught, to allow calculation of abundance of these species;
5. Collect additional data and biological samples as desired and as time permits (e.g. lengths for by-catch, maturity information, coral samples, other special requests);
6. Collect temperature data at each fishing station;
7. Collect oceanographic data at pre-determined standard stations.

A Star Oddi DST CTD© sensors (sensitive to within ±0.1°C) mounted on one of the trawl doors provided bottom temperature data for most sets. Salinity measurements were unusable. All sensors used were intercalibrated with a Seabird CTD (Conductivity-Temperature-Depth) system during the standard oceanographic transects. In the few cases where there was no data from the trawl door sensor temperature data from the trawl eye sensor was used.

Temperature increased over the 100 m to 800 m depths covered in the first survey (Fig. 1-2). Cold polar water was found on the shallow shelf areas and bottom temperature ranged from -1.76 °C to 2.74 °C with 43.8% less than 0 °C. During the second survey bottom temperature declined over 400 m to 1500 m depths and ranged from -0.11 °C to 4.0 °C with 85.5% less than or equal to 2.0 °C (Fig. 3-4). Mean near bottom temperatures throughout the 400 m to 1500 m depths varied from 1.5 °C to 0.4 °C in 2006 (Table 1). Temperatures below 750 m had increased slightly compared to previous years (Table 1).

A Seabird 19© CTD system equipped with a fluorometer was deployed at 5-6 stations along three transects in Baffin Bay, two during the September trip and one during the October trip. Readings were taken to the bottom or within the top approx. 700 m of the water column. Information on date, location and depth of each cast is given in Table 2. Data output from Ocean Data View© (Schlitzer 2004) for the oceanographic transects at Broughton Island and Cape Christian are shown in Figures 5-7. Cold arctic polar water (<0 °C) was clearly apparent between approx. 50 m to 300 m in the sections taken along the Baffin coast.

Division 0B and 2G

The Northern Shrimp Research Foundation conducted surveys in Divs 0B and 2G during the summer of 2005 and 2006 from the FPI stern trawler Cape Ballard. A trawl-mounted Seabird 19 CTD system provided profiles of water column temperature, salinity and pressure. These measurements were supplemented with XBT temperature profiles for fishing sets where the CTD failed. Temperature patterns were similar in both years, however the 2006 data indicates that bottom temperatures in some areas decreased compared to those in 2005 (Fig. 8). The average bottom temperature based on all historical data is also shown in Fig. 8. In both years the bottom temperature in Div. 0B looks similar to average conditions, however, farther south in Div. 2G bottom temperatures in 2006 were colder than average. In general, the influence of the cold (<0 °C) arctic current waters is seen along the coast and temperatures warmed to 4.0 °C as depth increased, a similar pattern to that observed in 2001 for Div. 0B (Treble 2002).

References

SCHLITZER, R. 2004. Ocean Data View. http://odv.awi-bremerhaven.de

TREBLE, M.A. 2002. Analysis of data from the 2001 trawl survey in NAFO Subarea 0, NAFO SCR Doc. 02/47.

TREBLE, M.A. 2007. Analysis of data from the 2007 trawl survey in NAFO Division 0A. NAFO SCR Doc. 07/??.

Table 1. Mean temperature and S.E. in () by depth stratum for NAFO Division 0A.

NAFO	Depth Stratum (m)				
Division 0A	401-500	501-750	751-1000	1001-1250	1251-1500
South- 1999	1.6 (0.50)	1.4 (0.16)	1.0 (0.03)	0.6 (0.05)	0.1 (0.04)
2001	0.7 (0.10)	1.5 (0.22)	0.9 (0.07)	0.7 (0.05)	0.2 (0.05)
2004	1.3 (0.21)	1.5 (0.25)	1.0 (0.05)	0.6 (0.05)	0.1 (0.04)
2006	**1.5 (0.34)**	**1.4 (0.12)**	**1.3 (0.09)**	**0.9 (0.08)**	**0.4 (0.25)**

Table 2. Oceanographic stations along three transects in Baffin Bay, sampled during two fisheries surveys conducted in 2007.

Section	**Deg. N**	**Min. N**	**Deg. W**	**Min. W**	**Date**	**Cast Depth (approx. m)**	**Water Depth (approx. m)**
Broughton Island	68	00.00	62	00.00	Sept. 3 + Nov. 4	632 + 656	1594
Broughton Island	67	54.00	62	10.00	Sept. 3 + Nov. 4	650 + 627	1333
Broughton Island	67	50.00	62	20.00	Sept. 3 + Nov. 4	651 + 652	1113
Broughton Island	67	46.07	62	31.37	Sept. 3 + Nov. 4	624 + 603	977
Broughton Island	67	42.73	62	39.38	Sept. 3 + Nov. 4	617 + 651	741
Broughton Island	67	38.10	62	49.00	Sept. 3 + Nov. 4	121 + 141	148
Cape Christian	71	6.50	66	53.4	Aug. 31	725	1548
Cape Christian	71	3.00	67	3.70	Aug. 31	700	1295
Cape Christian	71	0.60	67	13.70	Aug. 31	621	1050
Cape Christian	70	57.10	67	26.20	Aug. 31	565	581
Cape Christian	70	54.10	67	35.60	Aug. 31	345	353
Cape Christian	70	50.89	67	46.29	Aug. 31	170	180

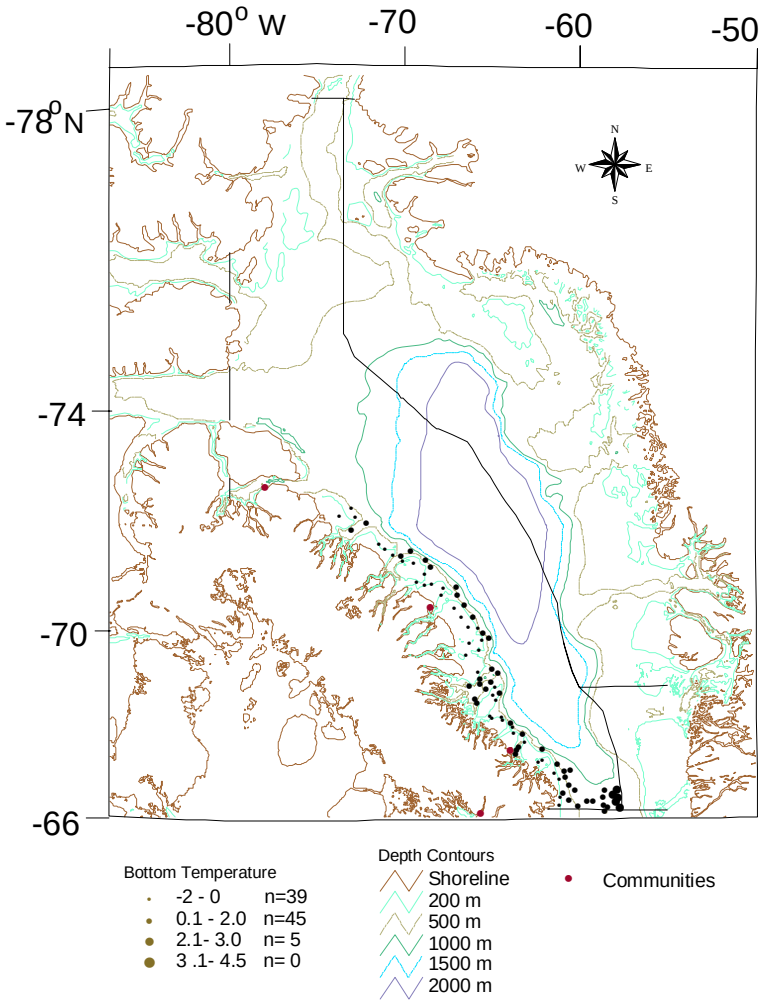

Fig. 1. Distribution of bottom temperatures (°C) on depth contours in Baffin Bay (Div. 0A) between 100 m and 800 m during August-September, 2007.

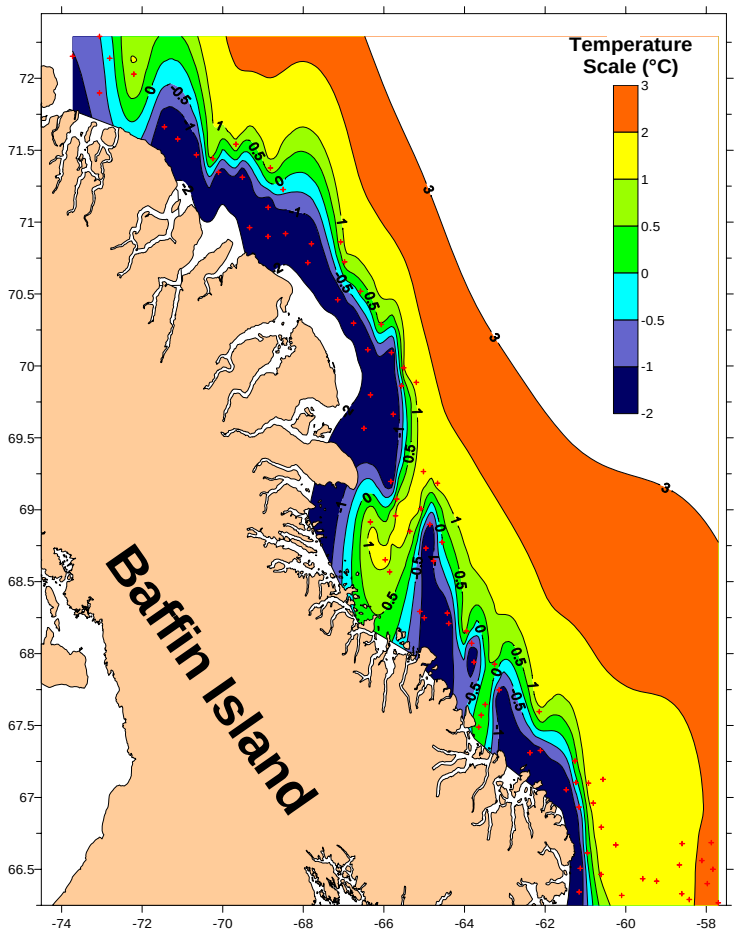

Figure 2. Surface plot of bottom temperatures (°C) in Baffin Bay (Div. 0A) between 100 m and 800 m during August-September, 2007. Crosses mark sample locations.

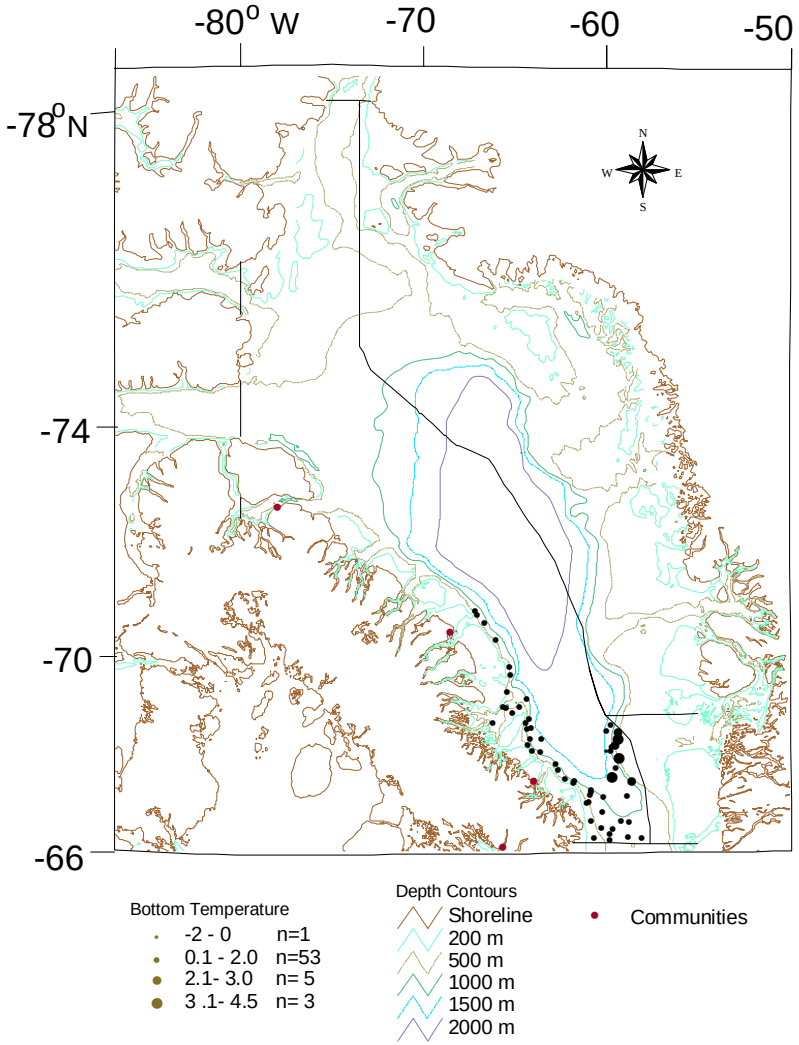

Figure 3. Distribution of bottom temperatures (°C) on bathymetric contours in Baffin Bay (Div. 0A) between 400 m and 1500 m during October-November, 2007.

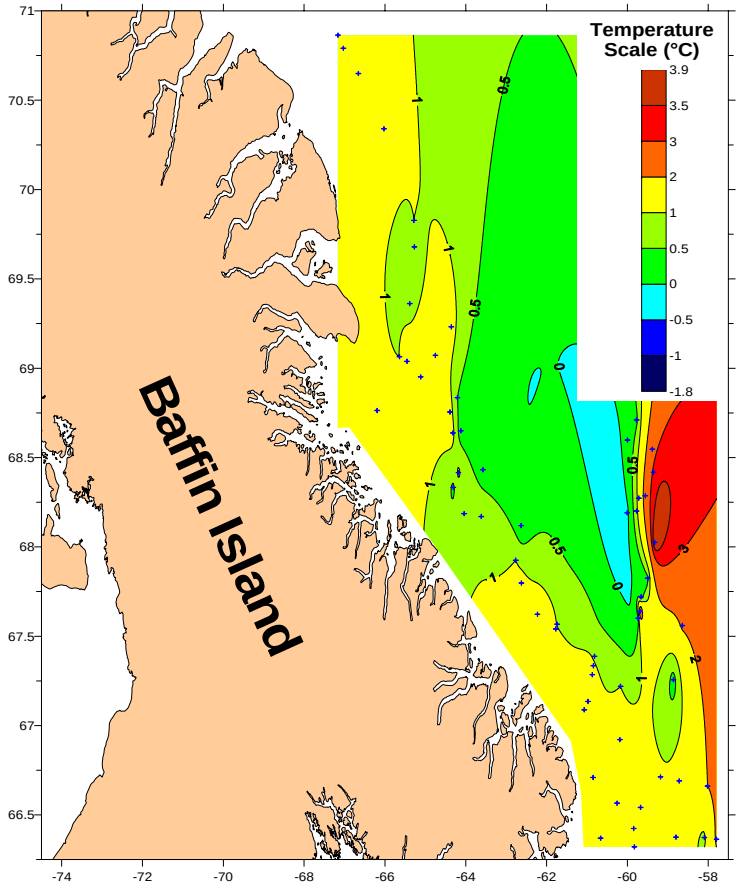

Figure 4. Surface plot of bottom temperatures (°C) in Baffin Bay (Div. 0A) between 400 m and 1500 m during October-November, 2007. Crosses mark sample locations.

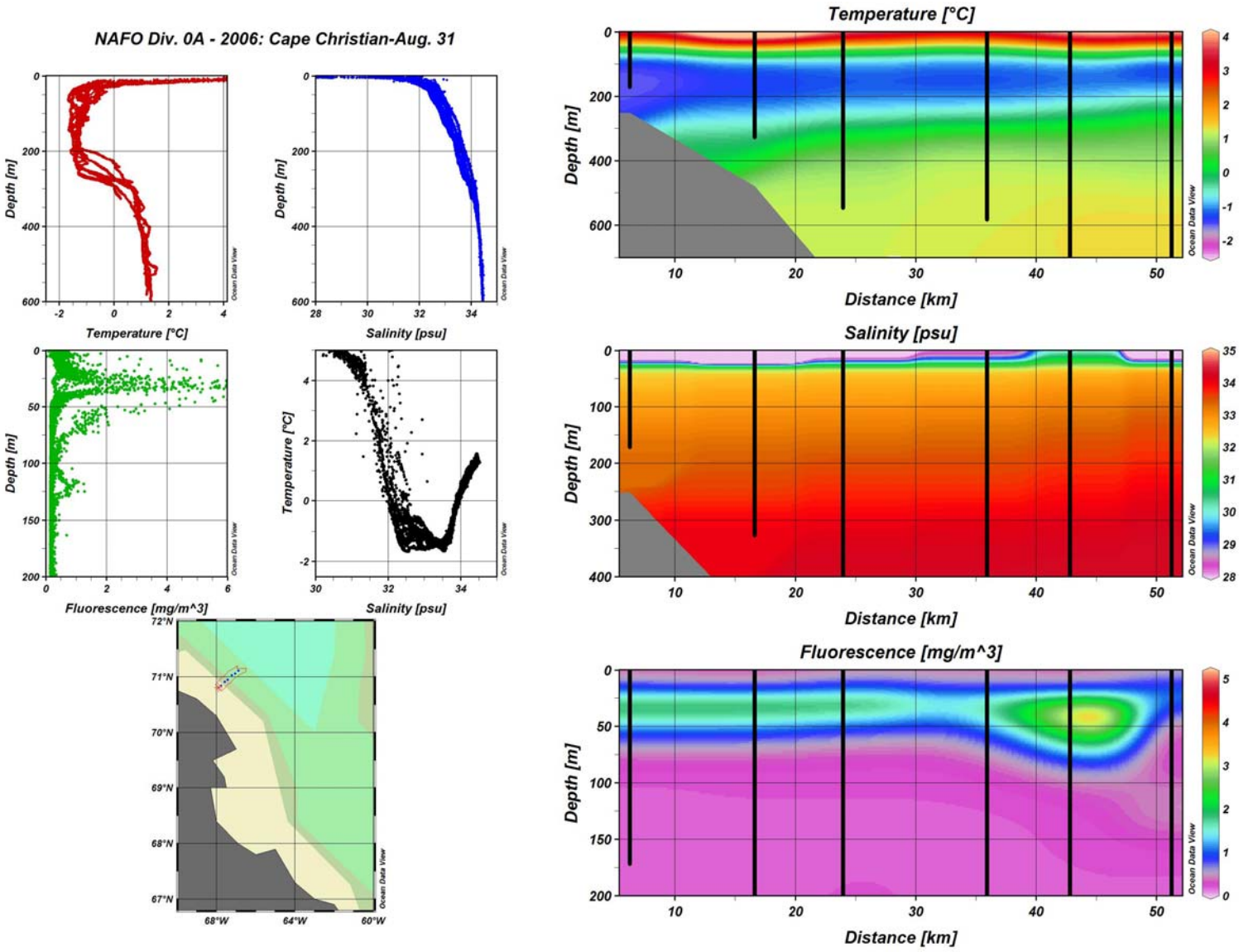

Figure 5. Oceanographic data, temperature, salinity and fluorescence for Cape Christian transect sampled August 32, 2007.

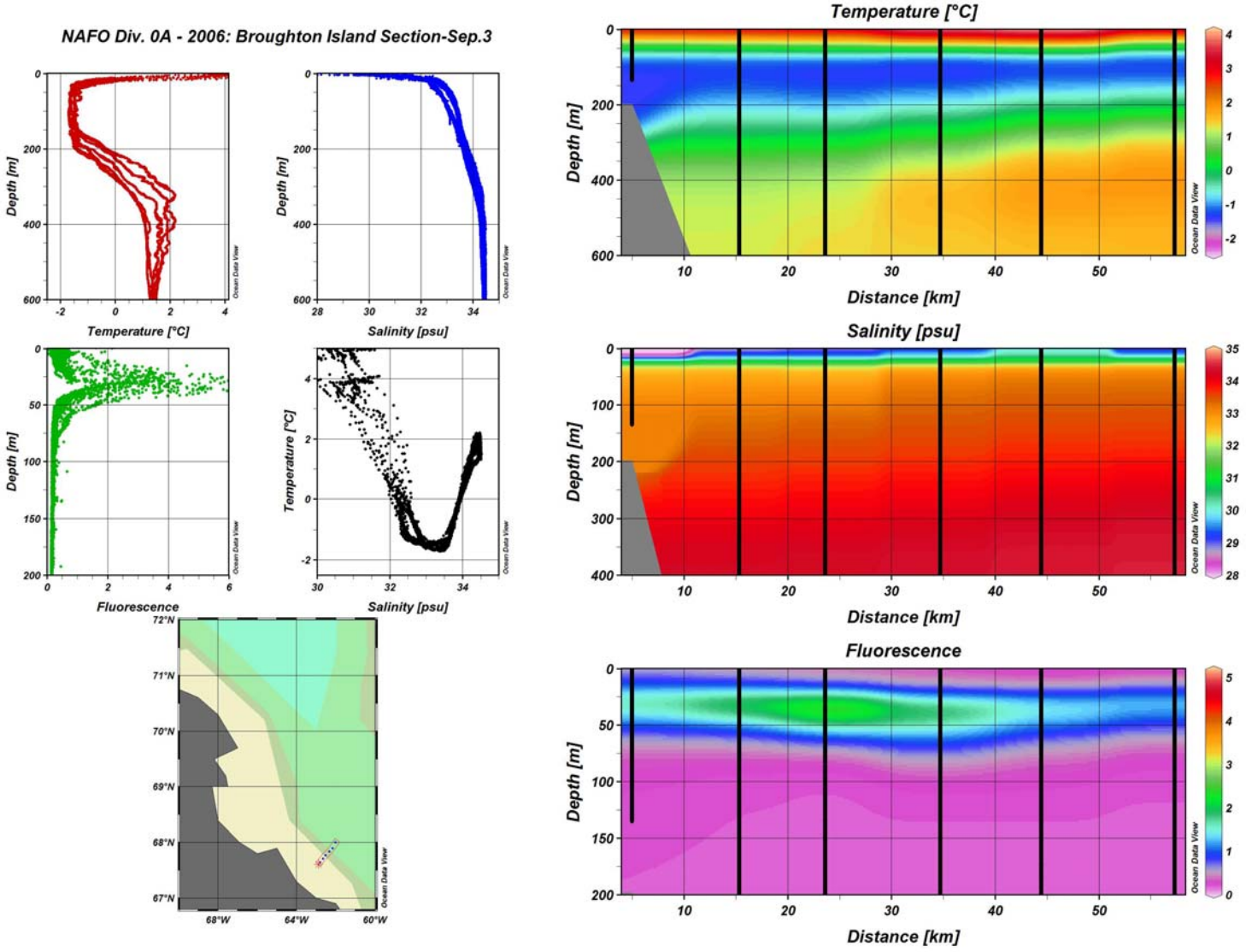

Figure 6. Oceanographic data, temperature, salinity and fluorescence for the Broughton Island transect, sampled September 3, 2007.

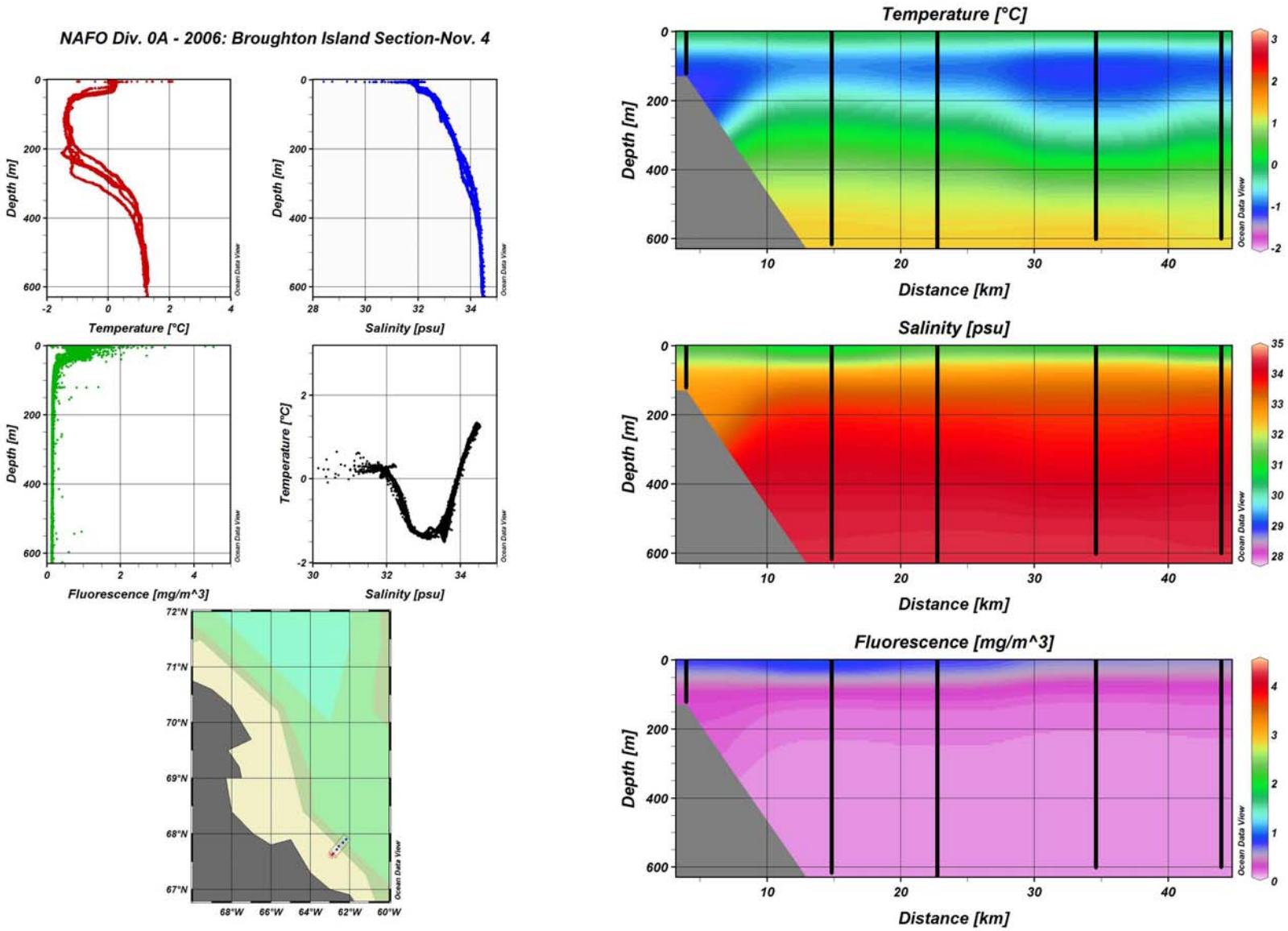

Figure 7. Oceanographic data, temperature, salinity and fluorescence for Broughton Island transect sampled November 4, 2007.

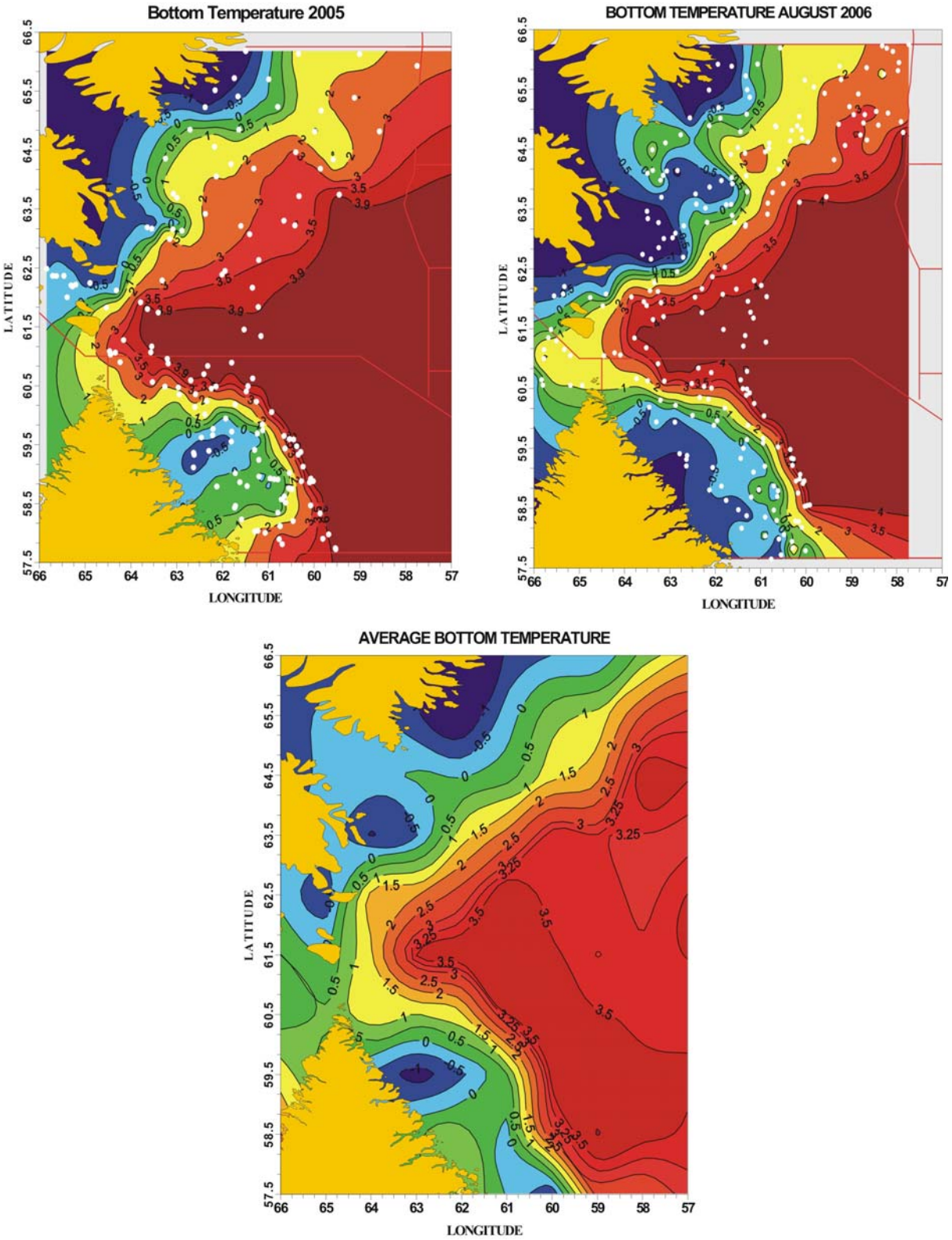

Figure 8. Bottom Temperature values from the Northern Shrimp Research Foundation survey conducted in Div. 0B in 2005 and 2006 and the average bottom temperature for all historical data.