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Comparison of 1968 and 1969 Temperature Conditions in the Gulf of Maine and Adjacent Waters

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Surface temperatures at Boothbay Harbor, Maine have proved to be a good index to offshore surface and subsurface temperature conditions in the Gulf of Maine and contiguous waters (Colton 1968a, 1968b, and 1969). The monthly mean temperatures at Boothbay Harbor[1/] were higher in 1969 than in 1968 in all months except September and December (Figure 1). Positive anomalies (1969 minus 1968) of 1.0°C or greater occurred in January, February, March, June, and November. The 1969 annual mean temperature was 0.8°C higher than in 1968.

The only temperature data available for offshore comparisons are from B.T. observations taken on the annual fall groundfish surveys (Albatross IV Cruise 68-7, 10 October - 25 November, 1968

1/ These data were made available by Mr. W. R. Welch of the BCF Biological Laboratory, Boothbay Harbor, Maine.

and Albatross IV Cruise 69-11, 8 October - 23 November 1969). Although there was a considerable time period required to cover the area as a whole, most 60-minute quadrangle areas were sampled at roughly the same time (± week) each year. Anomalies were computed as the difference between the 1969 and 1968 mean temperatures within 30-minute quadrangle areas at depths of 1, 50, and 100 m. During a given cruise the number of temperature observations within 30-minute quadrangle areas ranged from one to six, but in most quadrangles there were at least two observations each year.

Surface temperatures (Figure 2) were higher in 1969 over the central Gulf of Maine, along the coast from Grand Manan to Portland, and east of Cape Cod. Temperatures were also higher in the South Channel area, over Georges Shoals and the southeast part of Georges Bank, and along the edge of the Continental Shelf south of Nantucket Shoals. In all other areas the temperatures were lower in 1969 than in 1968. The greatest positive anomalies occurred over the south central Gulf of Maine and the greatest negative anomalies in the mouth of the Northeast Channel and along the southern edge of Georges Bank between Lydonia and Veatch Canyons.

Temperatures at 50 m (Figure 3) were higher in 1969 in the south central Gulf of Maine and off southeastern Nova Scotia (Roseway and LaHave Banks). In all other areas temperatures were lower in 1969 than in 1968. The negative anomalies were greatest south of Browns and Georges Banks and increased with distance from shore. At 100 m (Figure 4) 1969 temperatures were also higher in the south central Gulf of Maine with the highest values occurring over the Wilkinson Basin area. In all other areas the anomalies were negative.

Valid predictions cannot be made on a basis of such limited data for as illustrated in the 1968 and 1969 seasonal temperature curves for Boothbay Harbor, temperature conditions for a specific month are not always indicative of the annual trend. However, Colton (1968b and 1969) has shown that the long-term warming and cooling trends of both surface and subsurface waters in the Gulf of Maine depend in large measure on the relative position and degree of mixing of coastal and oceanic water masses. Cold years occur when Slope Water is displaced or modified by Coastal Water of Labrador origin. The negative subsurface anomalies in the Northeast Channel area and along the edge of the Continental Shelf during October - November 1969 may have been associated with a change in the composition of the subsurface water resulting from an incursion of Labrador Coastal Water. If in fact there was a shift in the relative position and degree of mixing of Slope Water and Labrador Coastal Water, this could be indicative of a check or reversal in the upward trend in coastal and offshore sea water temperatures which commenced in 1968. We shall continue to monitor hydrographic conditions in critical areas along the Continental Slope to determine if the negative temperature anomalies observed during 1969 were due to a major change in the composition of the subsurface water.

References

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1969. Temperature conditions in the Gulf of Maine and adjacent waters during 1968. J. Fish. Res. Bd. Canada 26: 2746-2751.

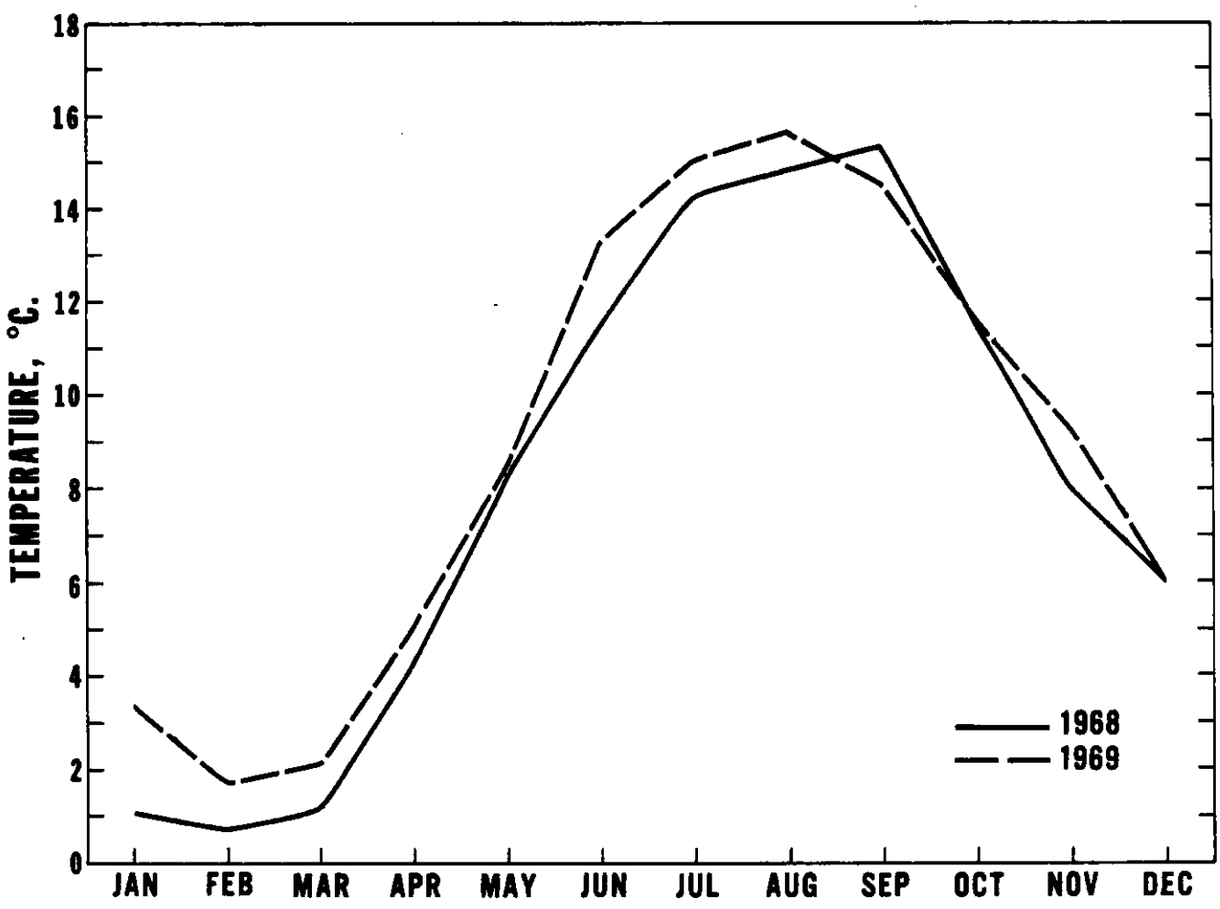

Fig. 1. Seasonal temperature curves, Boothbay Harbor, Maine, 1968 and 1969.

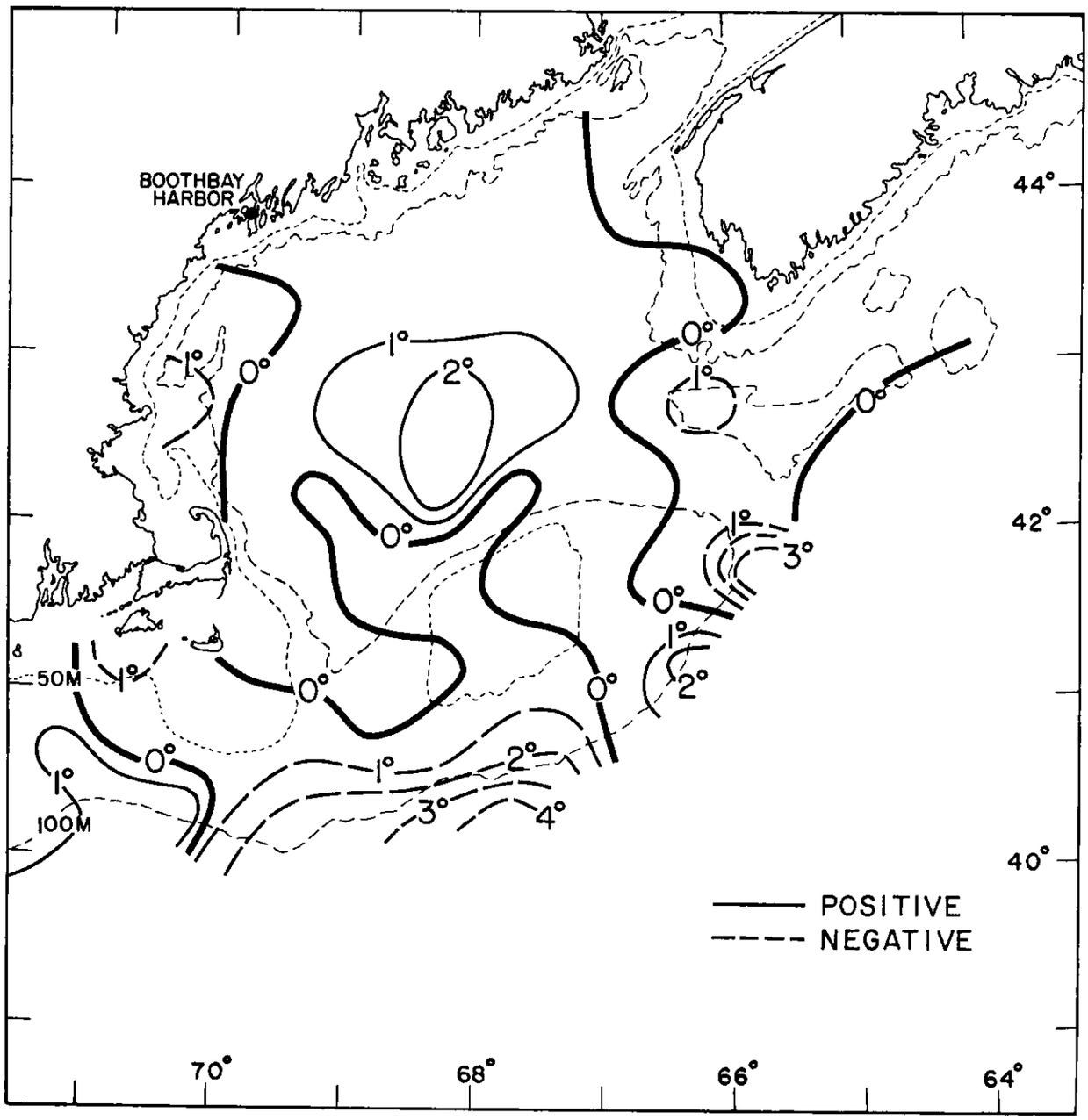

Fig. 2. Temperature anomalies at the surface during October - November 1969 relative to October - November 1968.

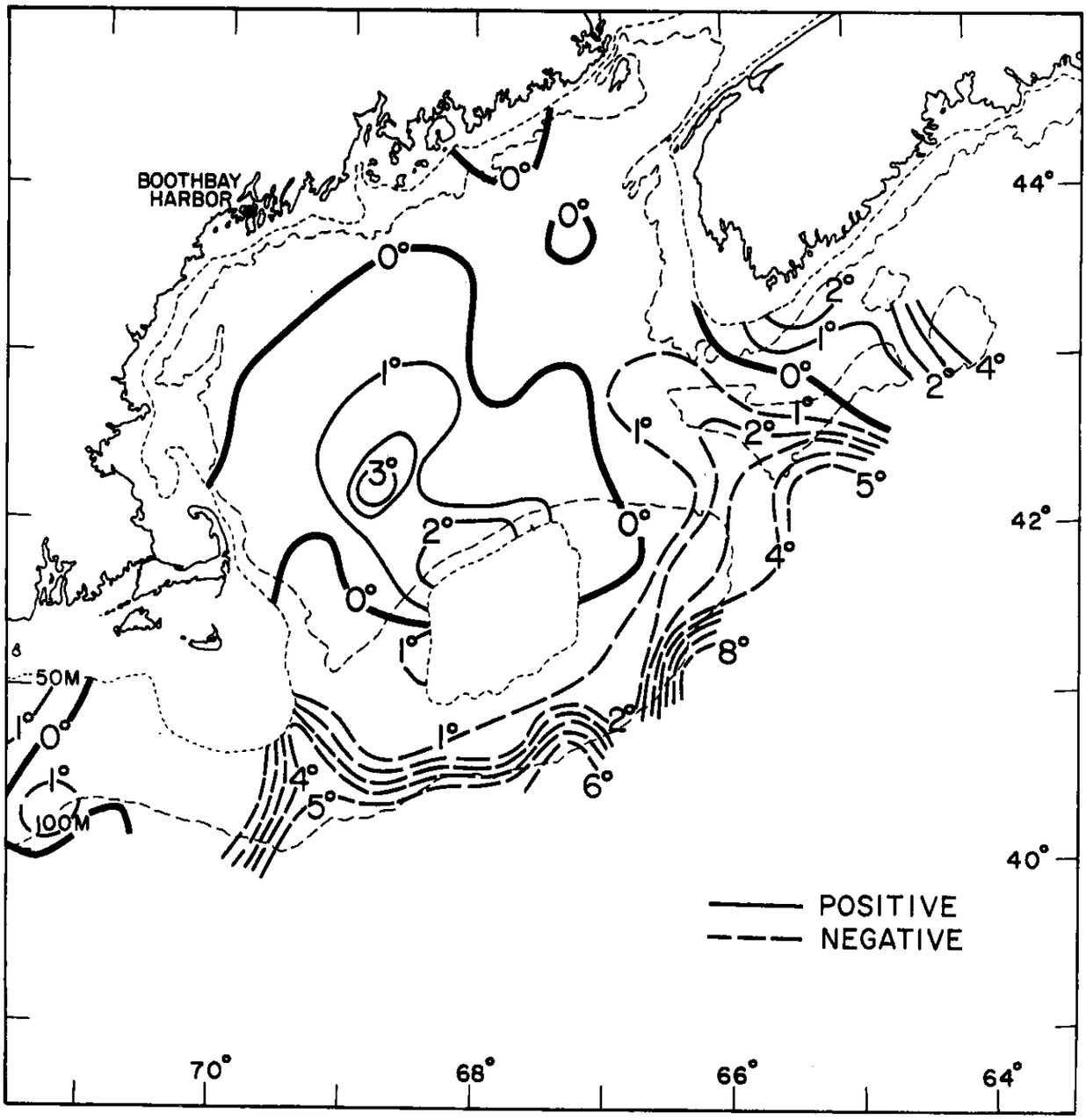

Fig. 3. Temperature anomalies at 50 m during October - November 1969 relative to October-November 1968.

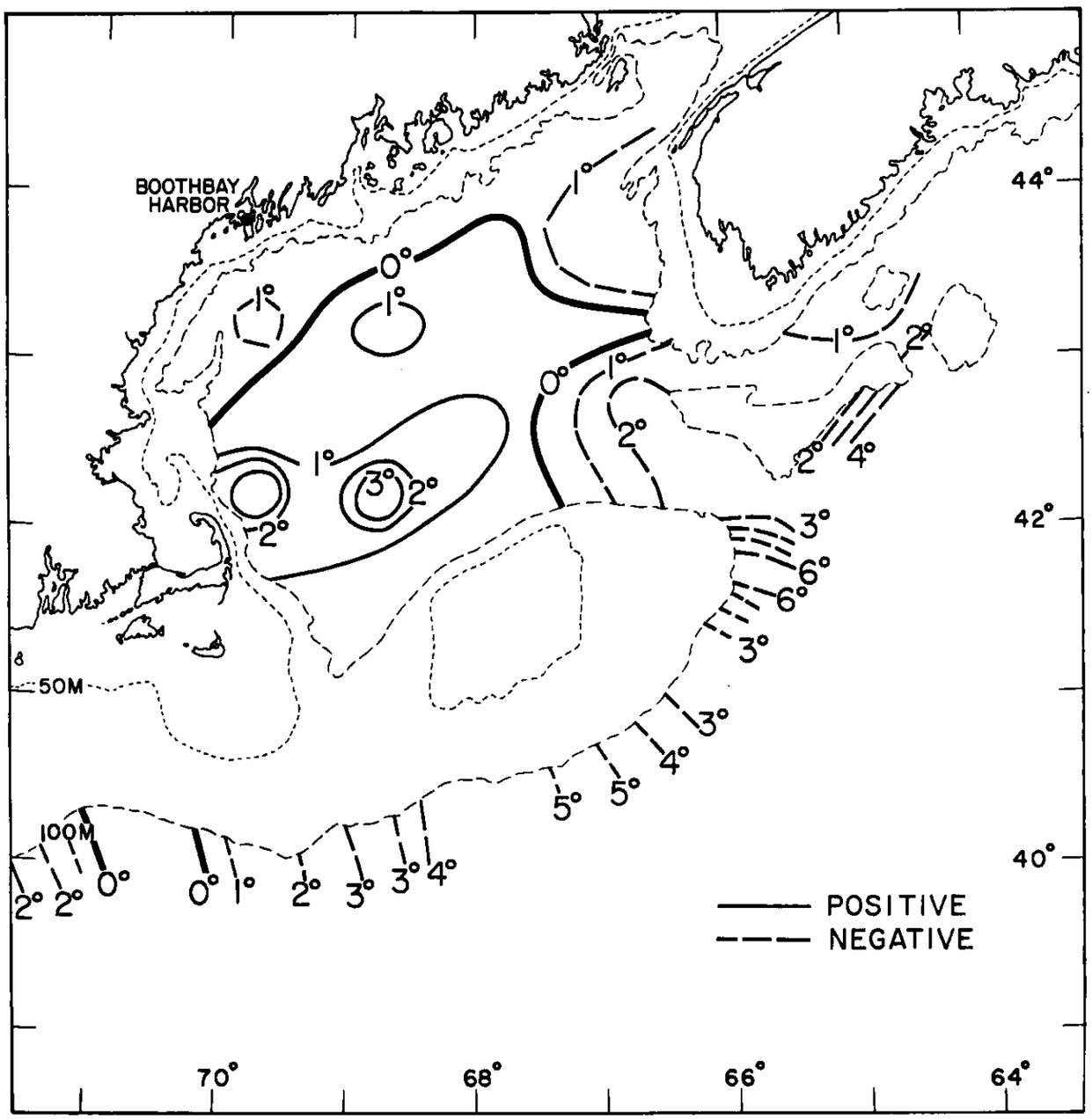

Fig. 4. Temperature anomalies at 100 m during October - November 1969 relative to October - November 1968.