Northeast Fisheries Center Reference Document 90-08

Expendable Bathythermograph Observations from the NMFS/Ship of Opportunity Program for 1989

by
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ABSTRACT

This report presents the results of the twentieth year of the NMFS Ship of Opportunity Program. The data are presented as monthly plots of surface temperature and salinity, and vertical sections of water column temperature. Operational procedures and data management are discussed.

INTRODUCTION

In mid-year, 1970, a cooperative expendable bathythermograph (XBT) program was initiated between the National Marine Fisheries Service (NMFS) and the Maritime Administration (MARAD) of the U.S. Department of Commerce. This program, conducted in support of the Marine Resources Monitoring Assessment and Prediction (MARMAP) program of NMFS, involved use of maritime cadets from Kings Point Maritime Academy to gather XBT data on board merchant ships along the East and Gulf Coasts of the United States.

Objectives of this cooperative program were to identify and describe seasonal and year-to-year variations of temperature, salinity, and circulation in major currents of the Gulf of Mexico and the western North Atlantic, using merchant ships as inexpensive platforms for collection of oceanographic data. In the mid-1970s, the objectives of the program were revised to concentrate on water masses, circulation, and planktonic biota of the Middle Atlantic Bight, Gulf of Maine, and eastern Gulf of Mexico, with particular interest in the continental shelf and slope waters of the Middle Atlantic Bight. Coverage in the Gulf of Mexico ended in 1987.

AREAS OF STUDY

Ship routes were selected to obtain regular sampling in the most dynamic or diagnostic areas. Repeated coverage is important for comparative analyses, so ships with the most regular schedules were chosen whenever possible.

Expendable bathythermograph (XBT) and meteorological data were collected in 1989 by the vessels *Oleander* (Figure 1) and *Yankee Clipper*. Continuous plankton records were also collected on the *Oleander* and *Yankee Clipper* cruises but resulting data are not given here.

The *Oleander* transits from Newark, New Jersey to Bermuda on a weekly basis, with approximately monthly collections of data between Ambrose Light and the vicinity of the Gulf Stream's North Wall in either an easterly or westerly direction (Figure 4).

The *Yankee Clipper* transits weekly from Boston, Massachusetts to Halifax, Nova Scotia making monthly data collections from approximately the 20 fm line off Boston to Cape Sable (Figure 19).

OPERATIONAL PROCEDURES

PHYSICAL DATA

On both vessels, XBT and weather data were handled using the Bathy Systems data acquisition system. This system consists of the Bathy Systems model SA810 XBT controller, a Hewlett-Packard desk top computer, and Synergetics Geostationary Operational Environmental Satellite (GOES) data transmitter and antenna, Sippican XBT probes, and software from Bathy Systems. The XBT and meteorological data were sent via GOES

Figure 1. M/V *Oleander,* Bermuda Container Line.

transmitter (Figure 2) to the Command and Data Acquisition system (CDA) ground station at Wallops Island, Virginia and relayed to the National Environmental Satellite, Data, and Information Service (NESDIS) computer in Washington, D.C., for distribution to outside users. Temperature and weather data were transmitted via GOES every three and six hours, respectively. The temperature data transmitted via GOES therefore were considered "real time."

DATA PROCESSING

An Autosal model 8400 salinometer was used for salinity determinations. Temperature/depth data collected aboard ship on computer cassette tapes were processed and quality controlled by personnel at the NMFS Narragansett Laboratory. Figure 3 shows an overview of data processing procedures, from collection to their availability to the scientific community.

RESULTS

NEW YORK BIGHT

Observations made from the M/V *Oleander* (Figure 1) throughout the year are presented as monthly vertical sections (Figures 5 through 18). These portrayals consist of a cruise track, surface parameter plot, and temperature section in two scales. Each transect is identified by a cruise number and date of collection. Table 1 lists all cruises for 1989 along with the data collected, including continuous plankton records (CPR) acquired on the cruises.

GULF OF MAINE

Observations made from the M/V *Yankee Clipper* throughout the year are presented as monthly sections (Figures 20 through 31). These portrayals consist of a cruise track, surface parameter plot, and temperature section in two scales. Each transect is identified by a cruise number and date of collection. Table 2 lists all cruises for 1989 along with the data type collected, including continuous plankton records (CPR) acquired on the cruises.

Data for any transect are available from NODC in a variety of forms. Requests for, or inquiries about, Ship of Opportunity XBT data held by NODC, as well as data products, should be directed to:

National Oceanographic Data Center
(D761)
National Environmental Satellite
Data and Information Service, NOAA
Washington, D.C. 20235

Data can also be requested through:

Science and Research Director
National Oceanic and Atmospheric
Administration
National Marine Fisheries Service
Northeast Fisheries Center
Woods Hole, MA 02543

ACKNOWLEDGEMENTS

Appreciation is extended to the officers and crews of the M/V *Oleander*, Bermuda Container Lines; and the M/V *Yankee Clipper*, Claus Spect, Hamburg, Germany, for their generous cooperation in this program, the success of which depends on them. Appreciation is also extended to Harvey Thurm of the National Weather Service, whose volunteers ride monthly aboard the *Oleander* collecting data.

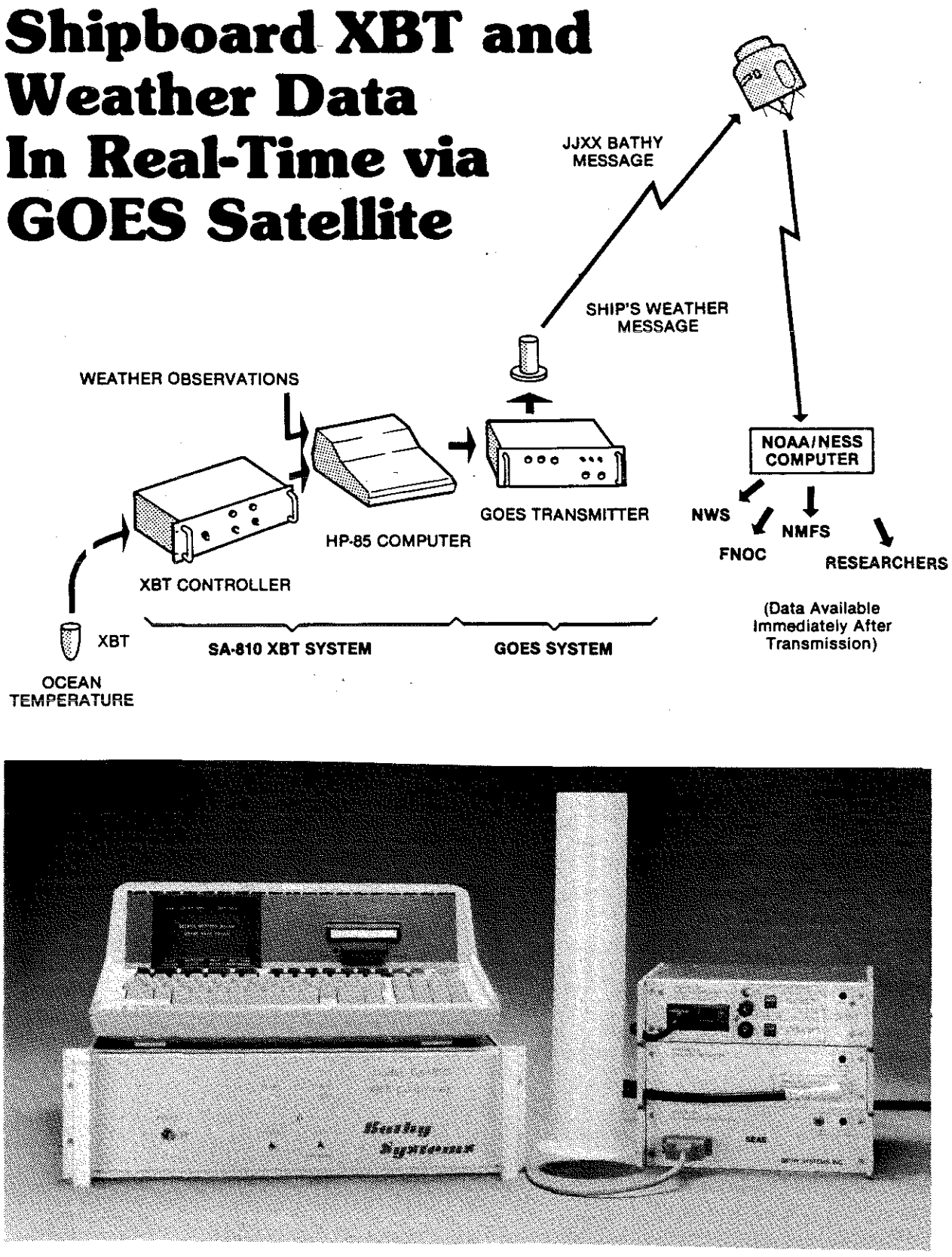

Figure 2. Shipboard XBT and weather data system currently used aboard the Northeast Fisheries Center ships of opportunity.

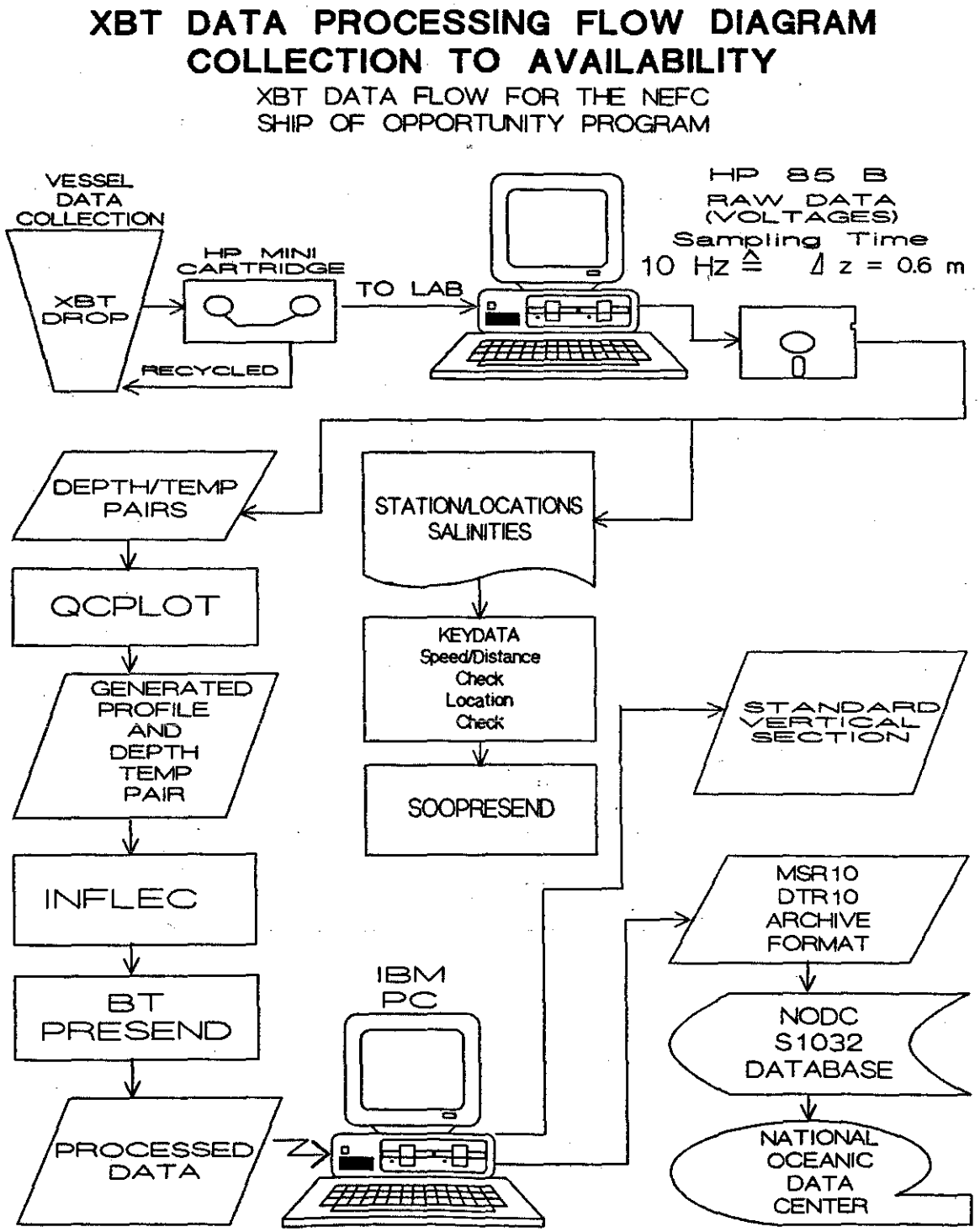

Figure 3. XBT data processing flow diagram.

Table 1. 1989 New York Bight transect data from the vessel *Oleander*

Cruise Number	Dates	XBT	CPR	Surf T	Surf S
89-01	January 7-8	✘	✘	✘	✘
89-02	February 3	✘	✘	✘	✘
89-03	March 3-4	✘	✘	✘	✘
89-04	April 7	✘	✘	✘	✘
89-05	April 13-14	✘		✘	✘
89-06	May 13	✘	✘	✘	✘
89-07	June 9-10	✘	✘	✘	✘
89-08	July 7	✘	✘	✘	✘
89-09	August 4	✘	✘	✘	✘
89-10	September 1	✘	✘	✘	✘
89-11	September 29	✘	✘	✘	✘
89-12	October 11-12	✘	✘	✘	✘
89-13	November 10-11	✘	✘	✘	✘
89-14	December 15	✘	✘	✘	✘

Table 2. 1989 Gulf of Maine transect data from the vessel *Yankee Clipper*

Cruise Number	Dates	XBT	CPR	Surf T	Surf S
89-01	January 4-5	✘	✘	✘	✘
89-02	February 4	✘	✘	✘	✘
89-03	March 6-7	✘	✘	✘	✘
89-04	April 7-8	✘	✘	✘	✘
89-05	May 6	✘	✘	✘	✘
89-06	June 16-17	✘	✘	✘	✘
89-07	July 8	✘	✘	✘	✘
89-08	August 4-5	✘	✘	✘	✘
89-09	September 1-2	✘	✘	✘	✘
89-10	October 6-7	✘	✘	✘	✘
89-11	November 4	✘	✘	✘	✘
89-12	December 9	✘	✘	✘	✘

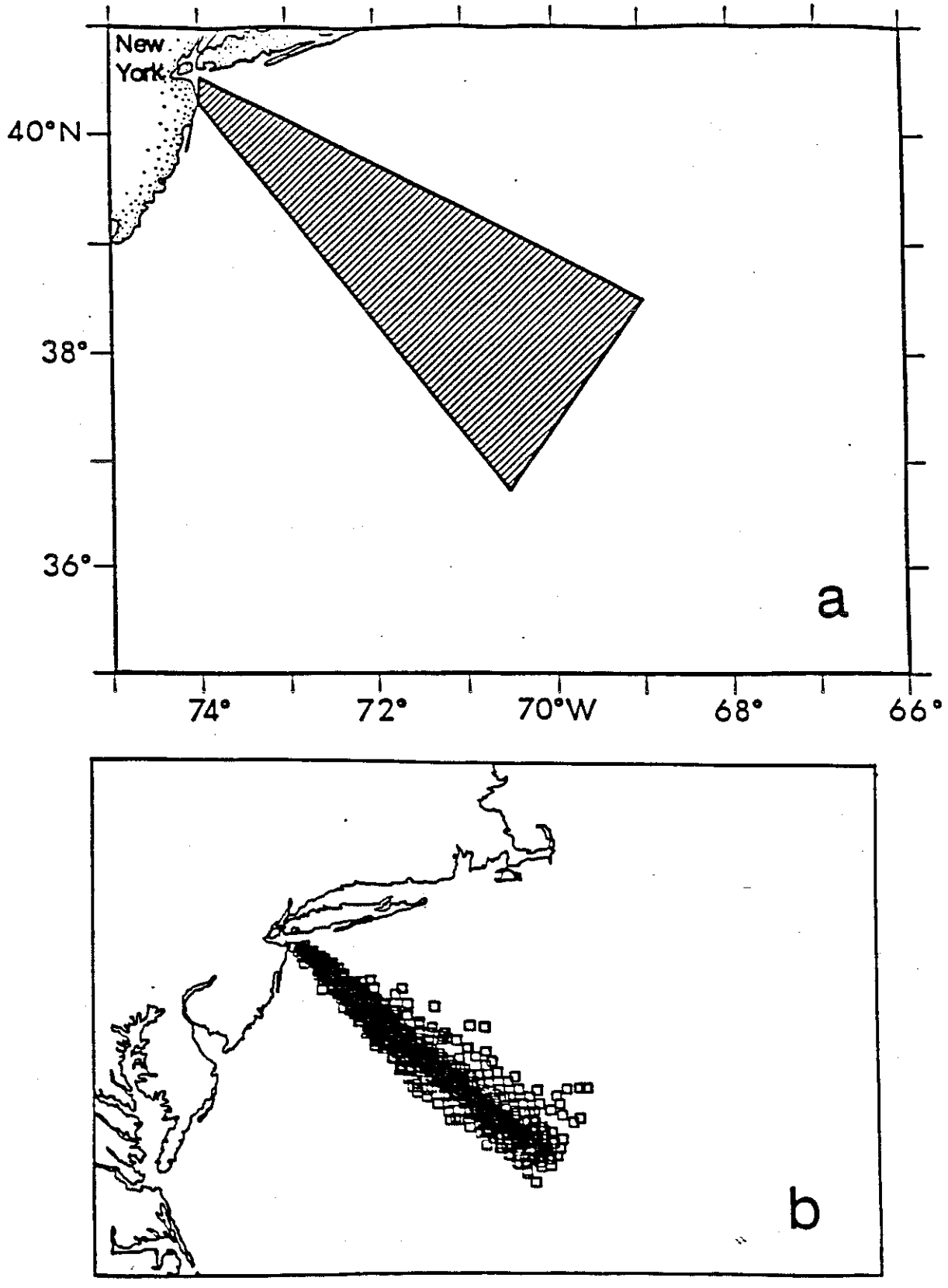

Figure 4. Transect envelope (a) and data density plot (b) from NMFS Ship of Opportunity Program, route MB (New York Bight), 1971 to the present.

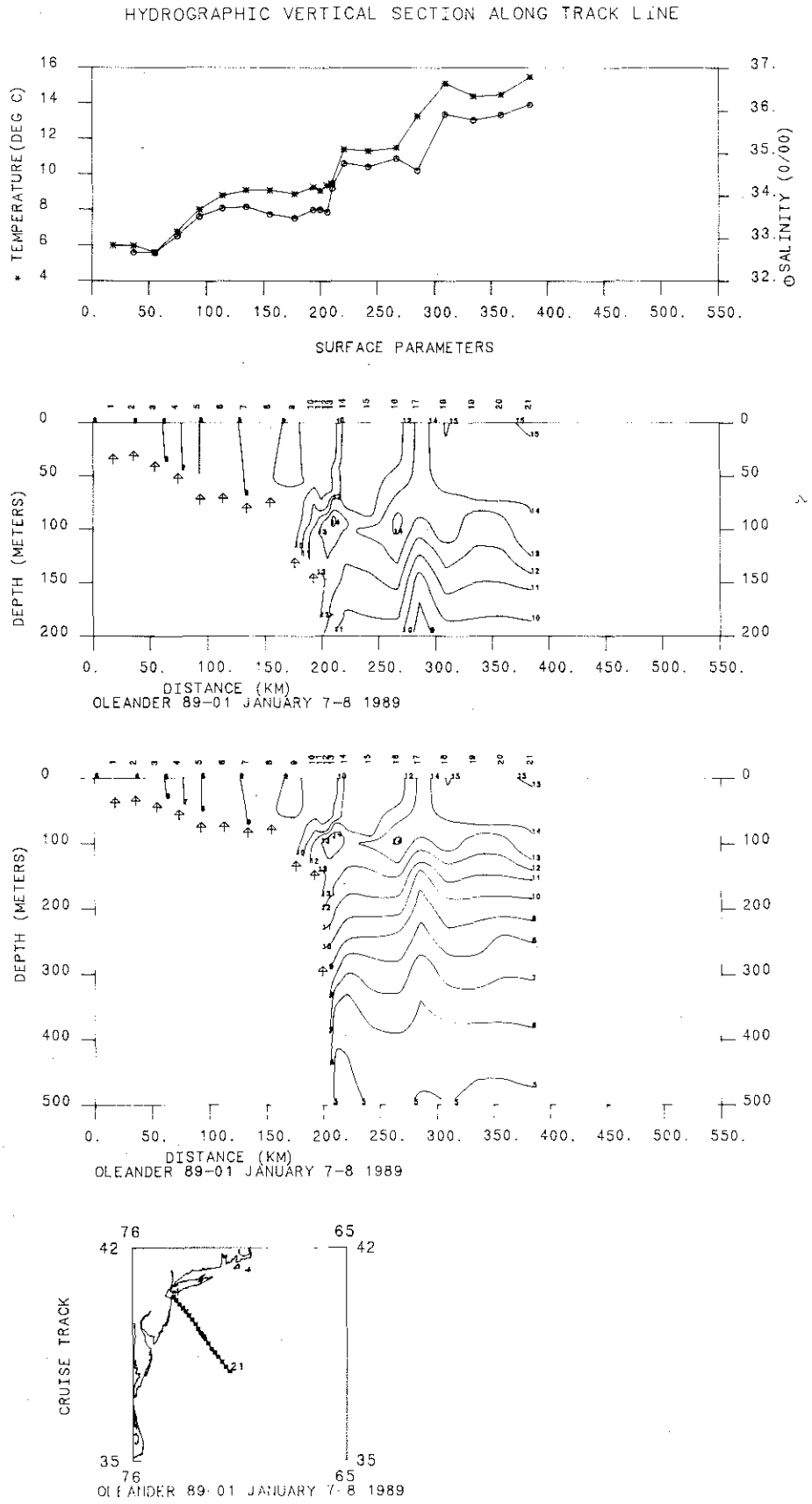

Figure 5. Vertical distribution of temperature, in °C, within the New York Bight, January 7-8, 1989.

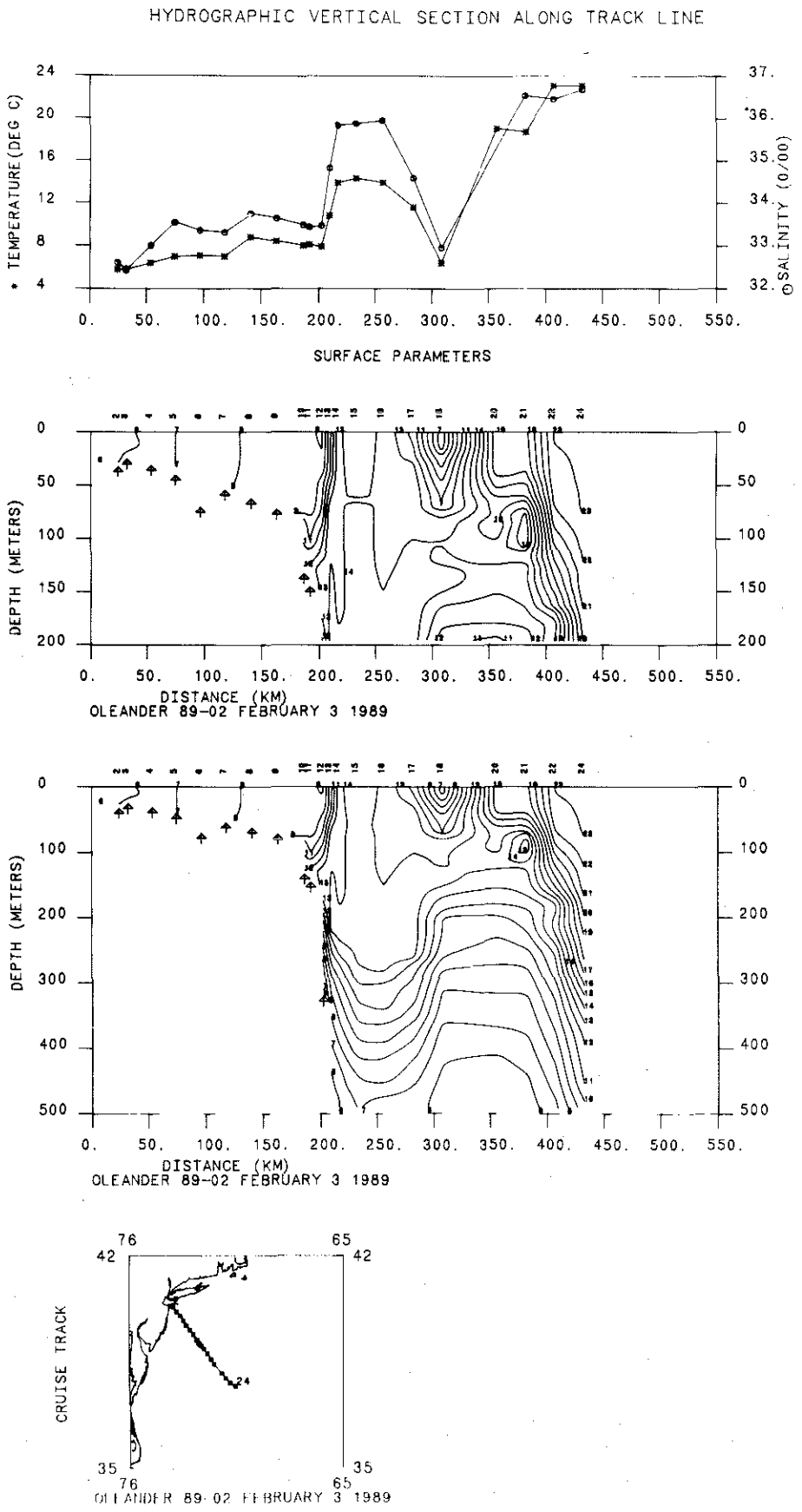

Figure 6. Vertical distribution of temperature, in °C, within the New York Bight, February 3, 1989.

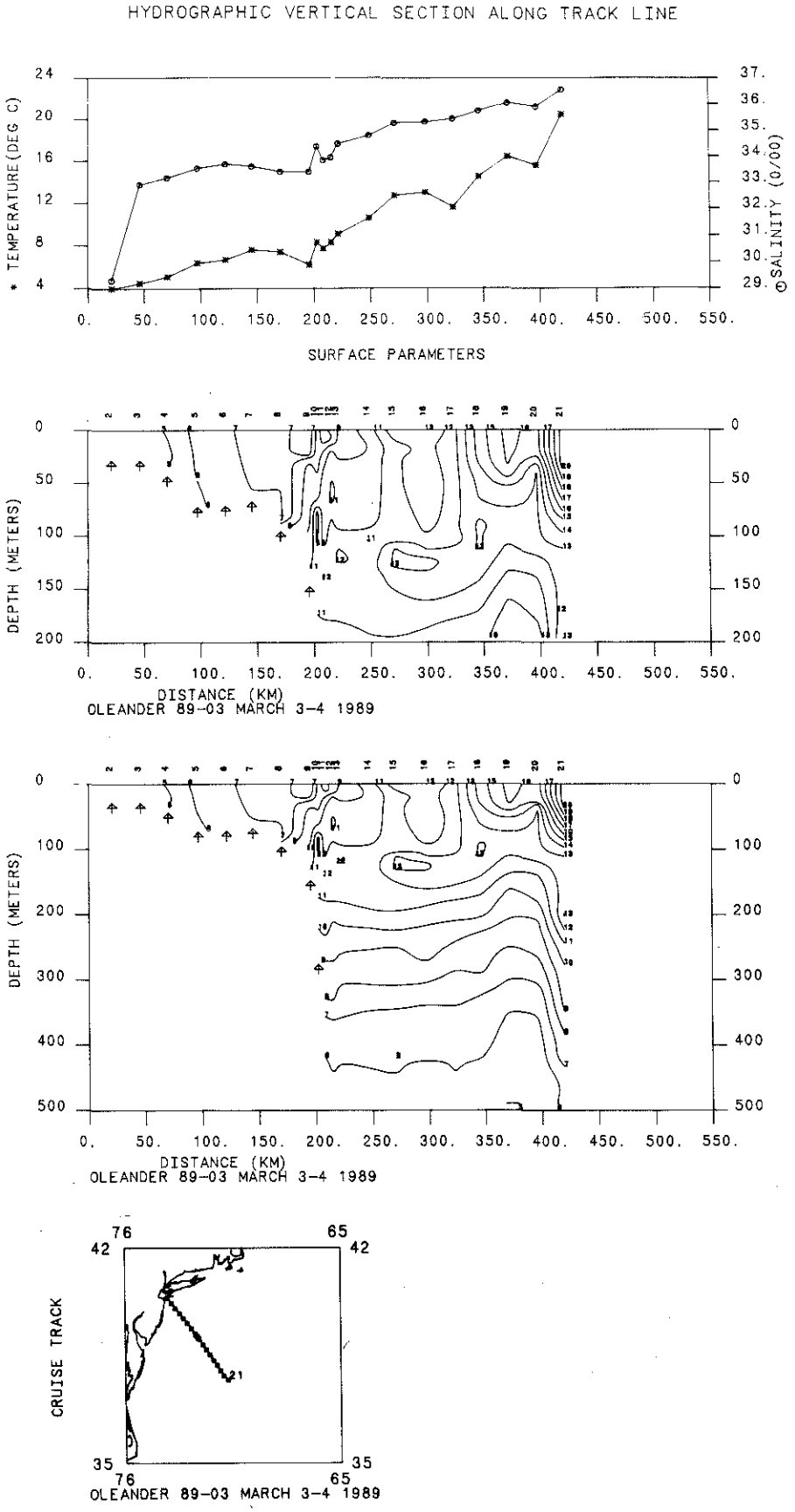

Figure 7. Vertical distribution of temperature, in °C, within the New York Bight, March 3-4, 1989.

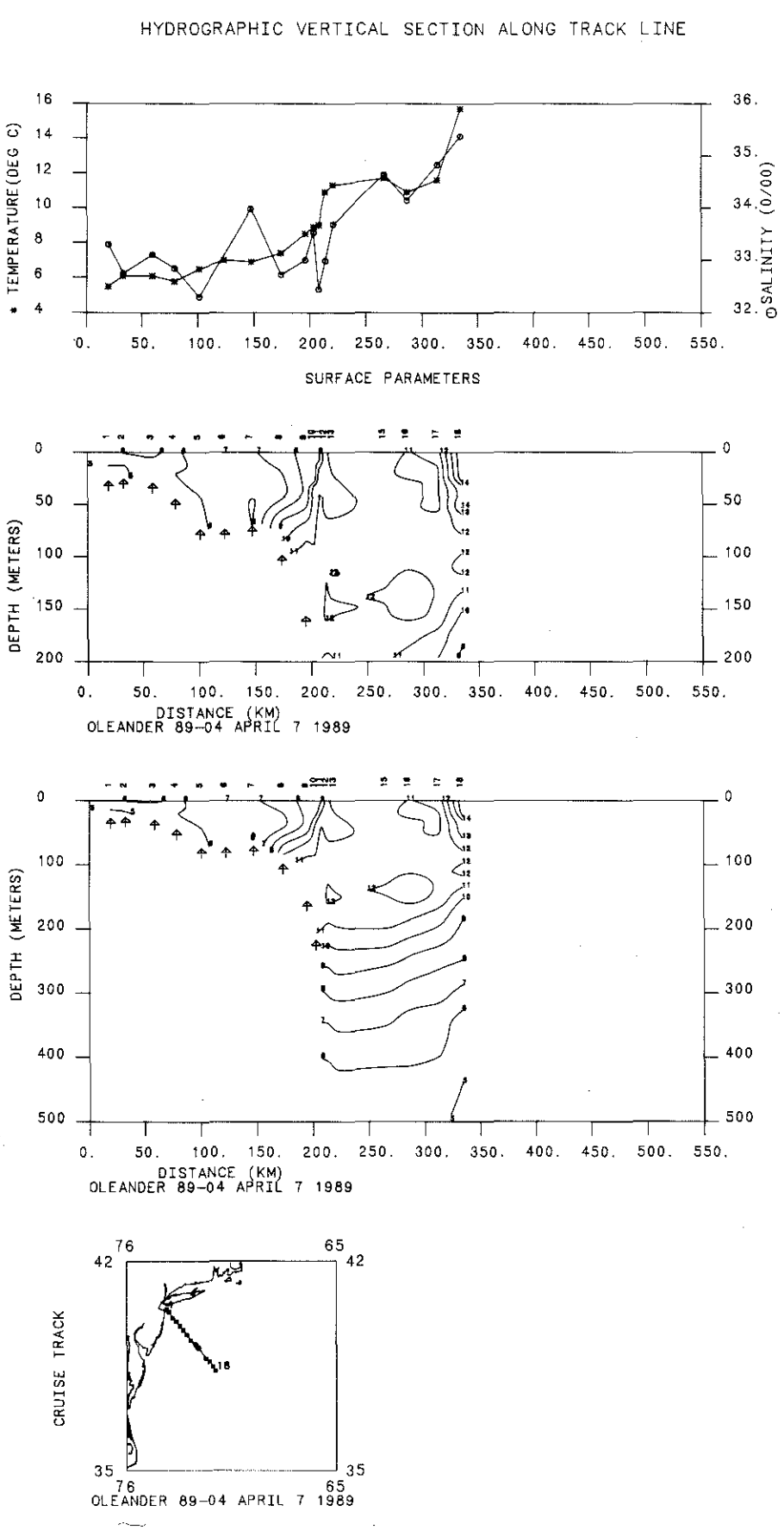

Figure 8. Vertical distribution of temperature, in °C, within the New York Bight, April 7, 1989.

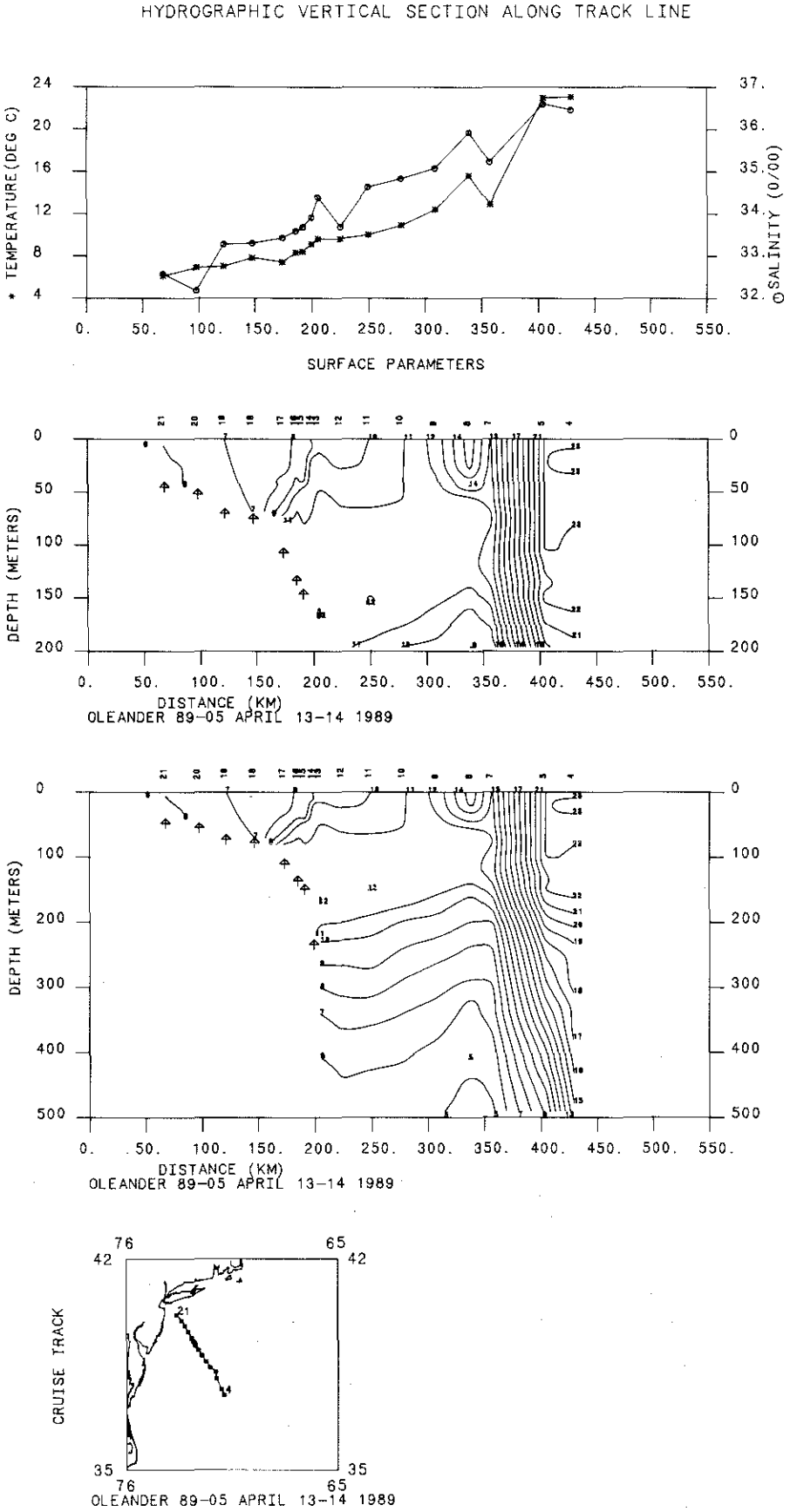

Figure 9. Vertical distribution of temperature, in °C, within the New York Bight, April 13-14, 1989.

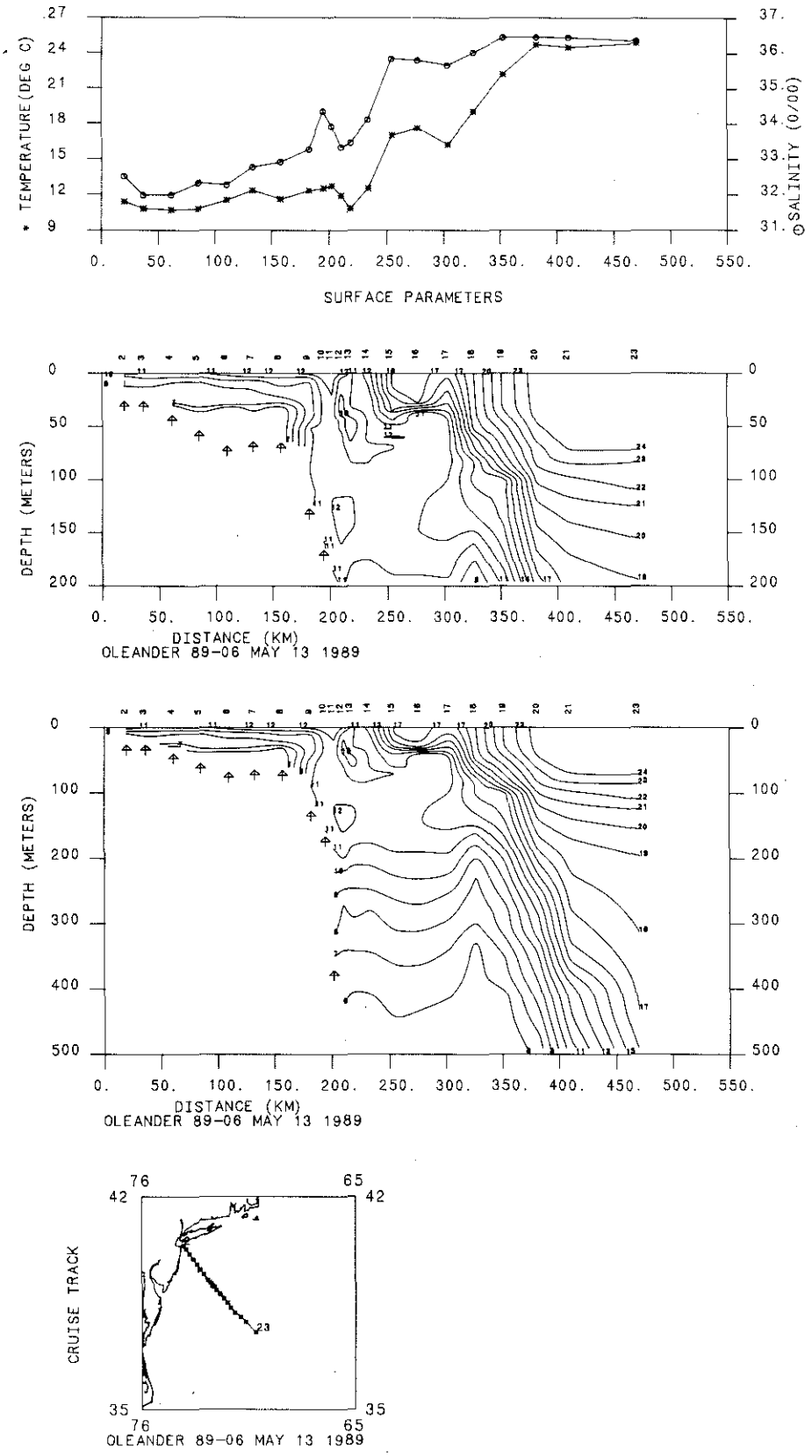

Figure 10. Vertical distribution of temperature, in °C, within the New York Bight, May 13, 1989.

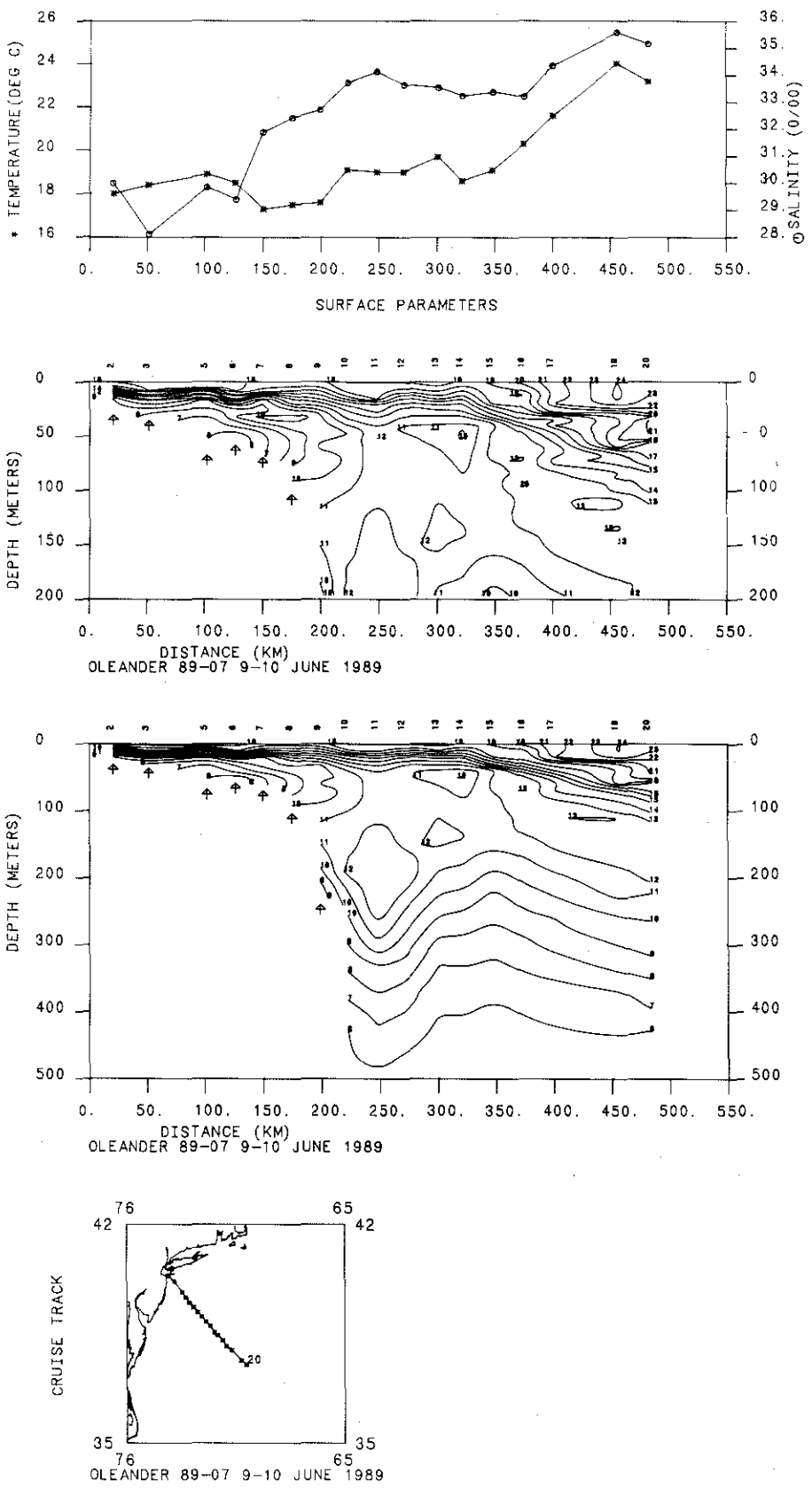

Figure 11. Vertical distribution of temperature, in °C, within the New York Bight, June 9-10, 1989.

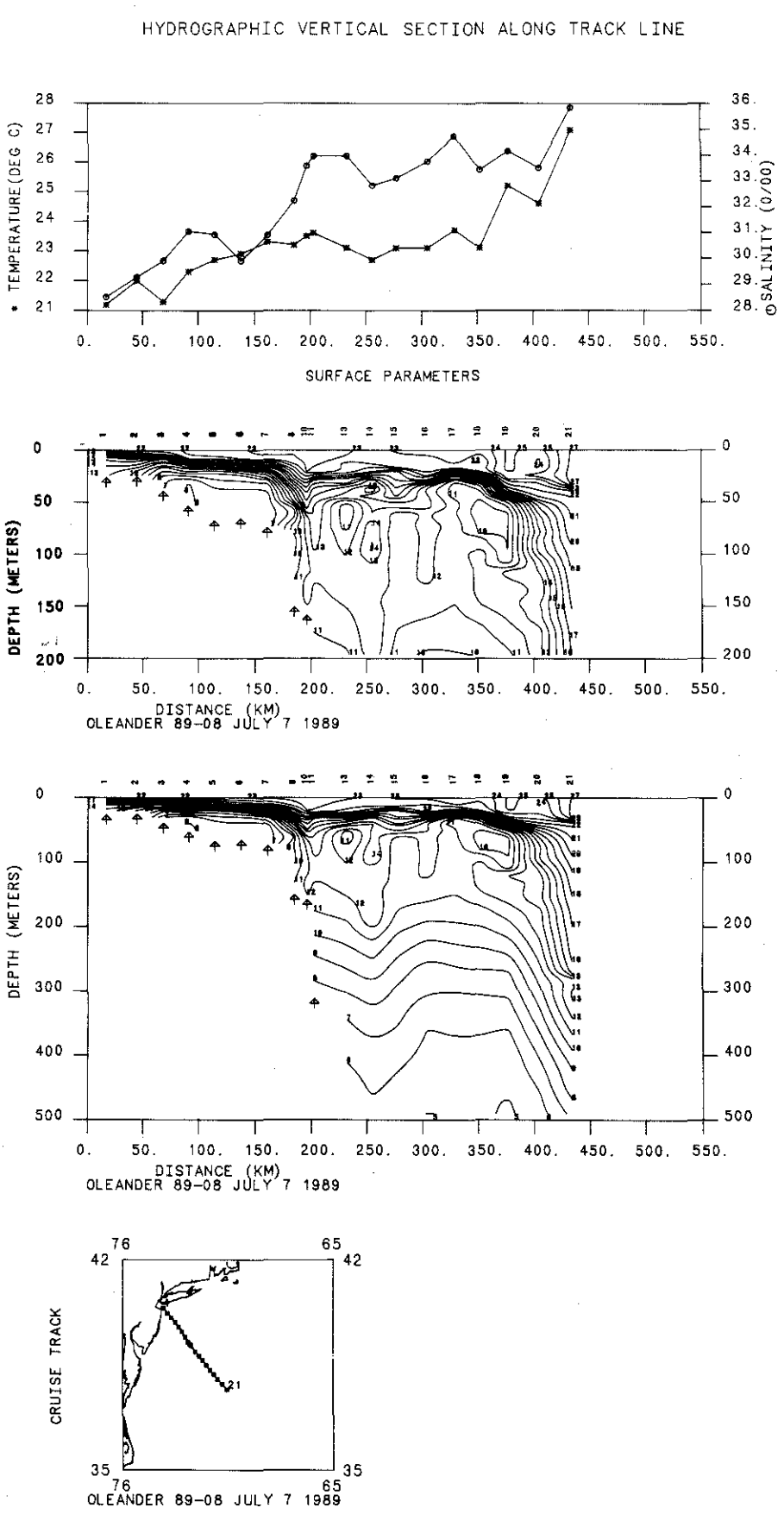

Figure 12. Vertical distribution of temperature, in °C, within the New York Bight, July 7, 1989.

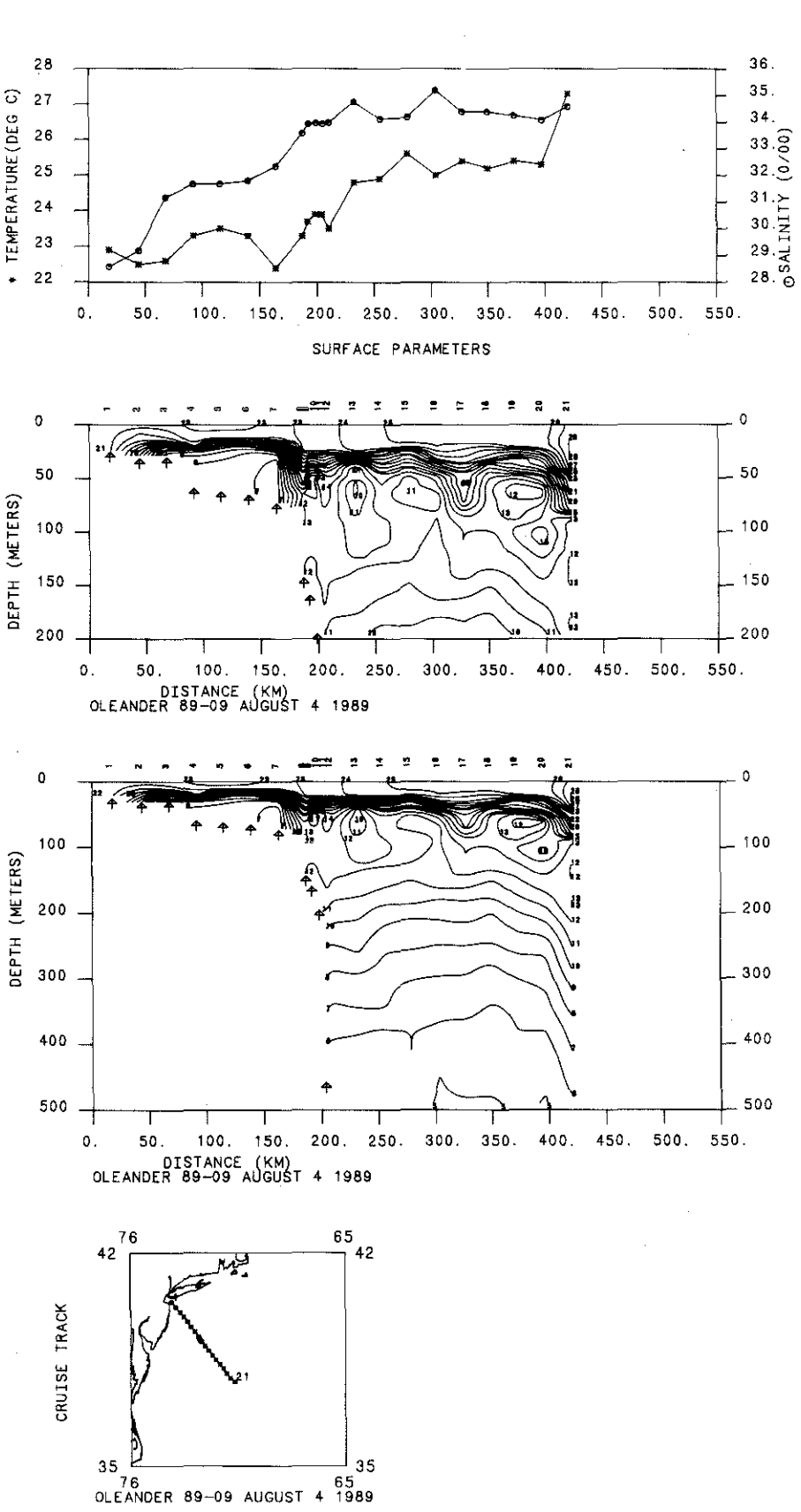

Figure 13. Vertical distribution of temperature, in °C, within the New York Bight, August 4, 1989.

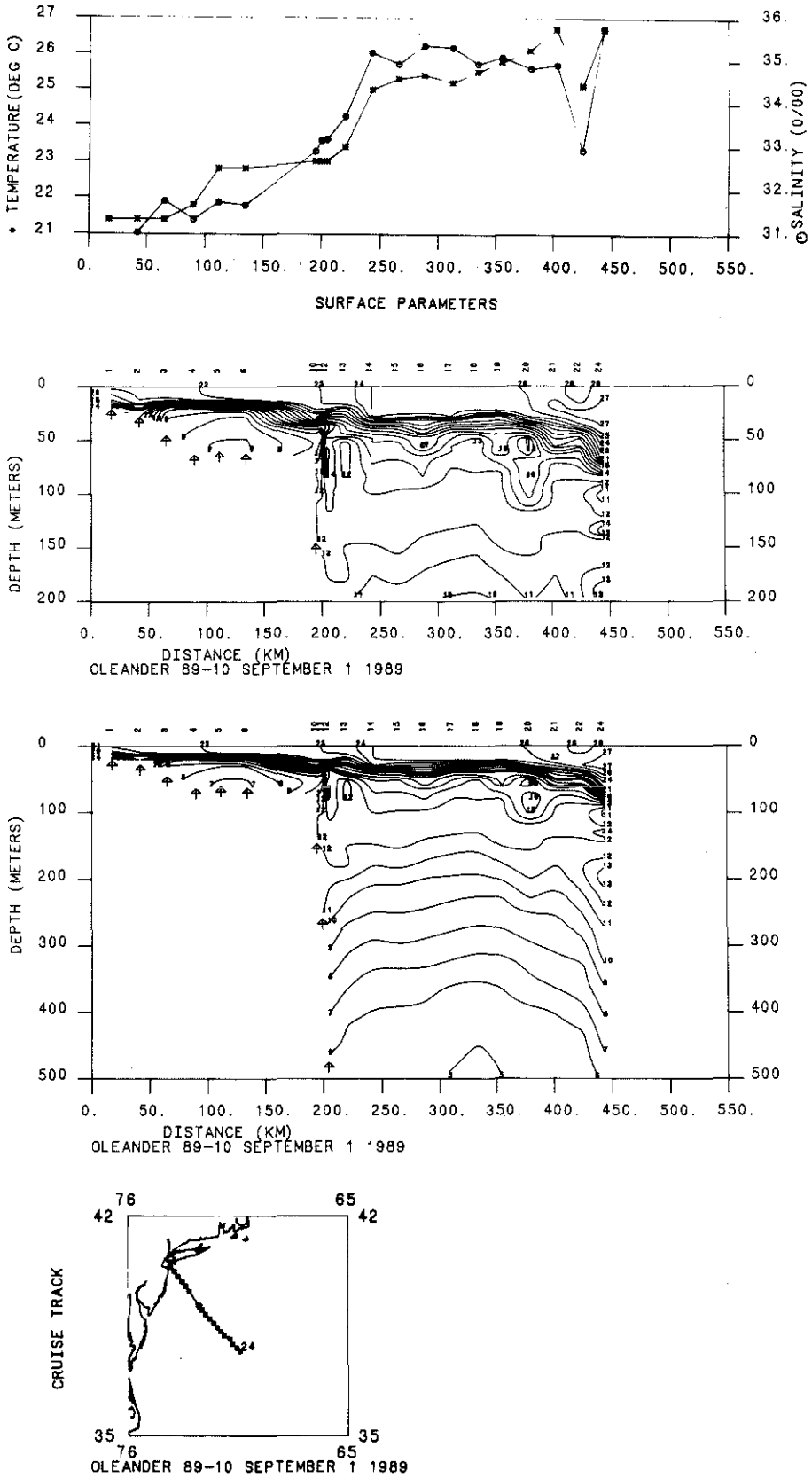

Figure 14. Vertical distribution of temperature, in °C, within the New York Bight, September 1, 1989.

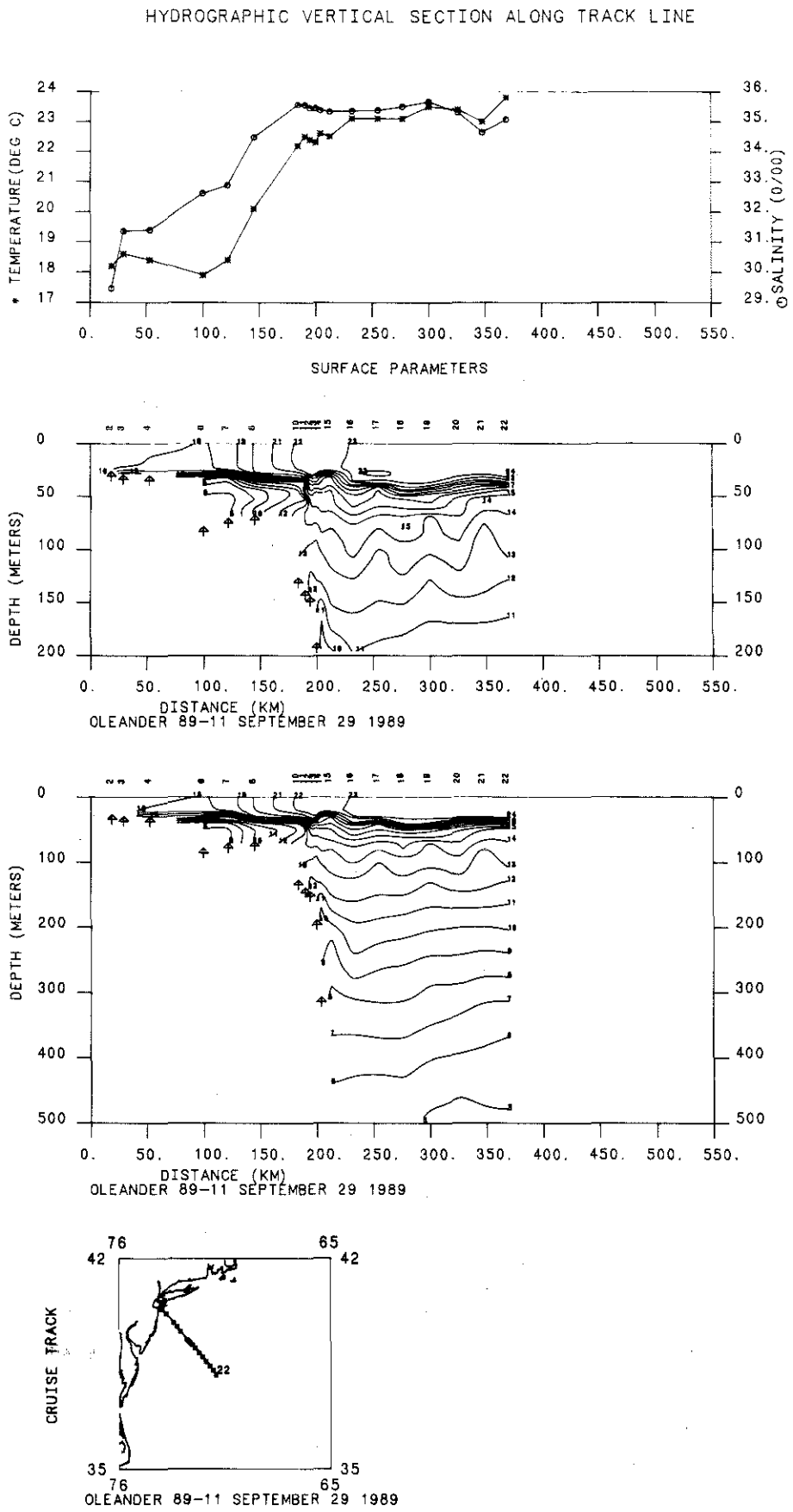

Figure 15. Vertical distribution of temperature, in °C, within the New York Bight, September 29, 1989.

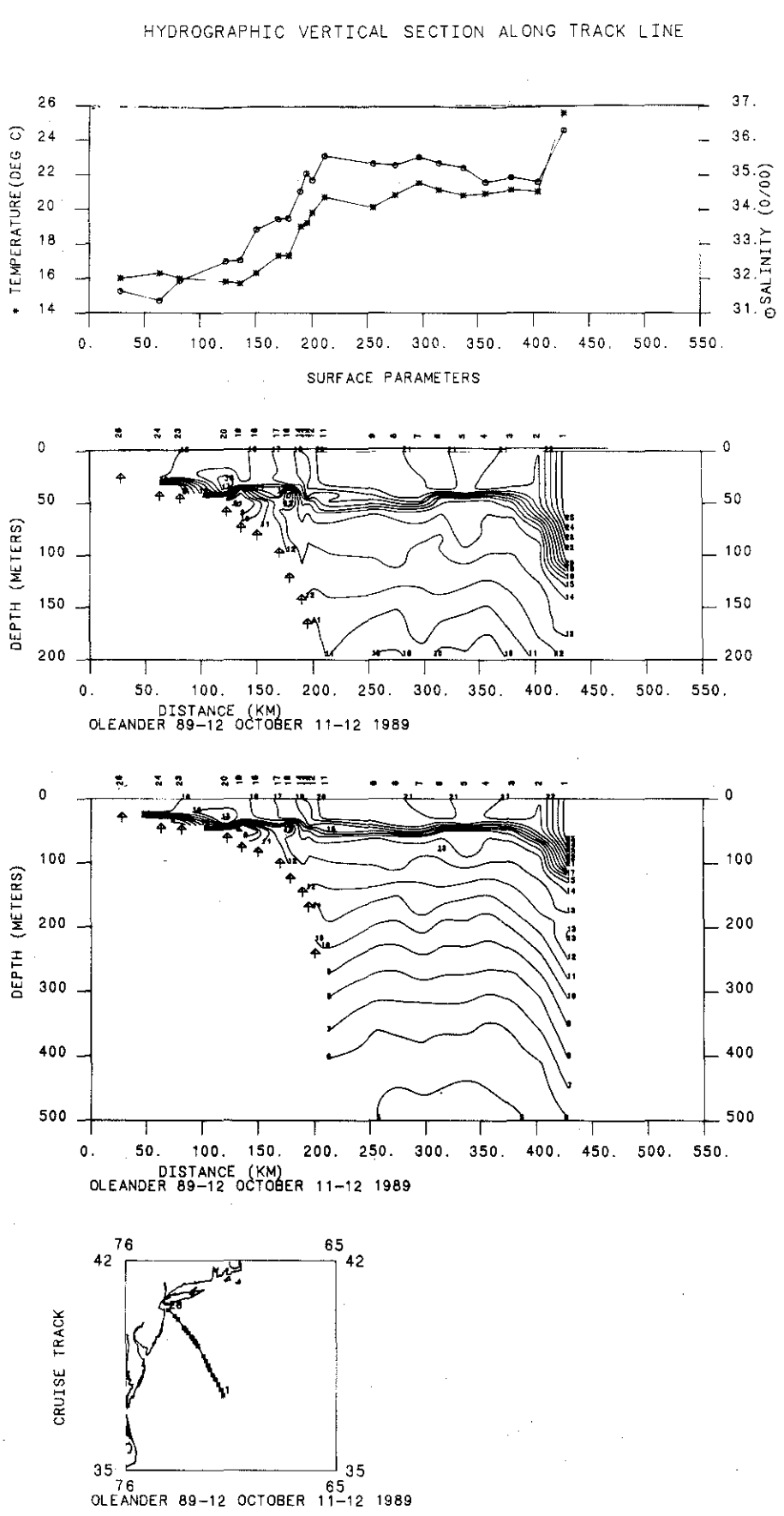

Figure 16. Vertical distribution of temperature, in °C, within the New York Bight, October 11-12, 1989.

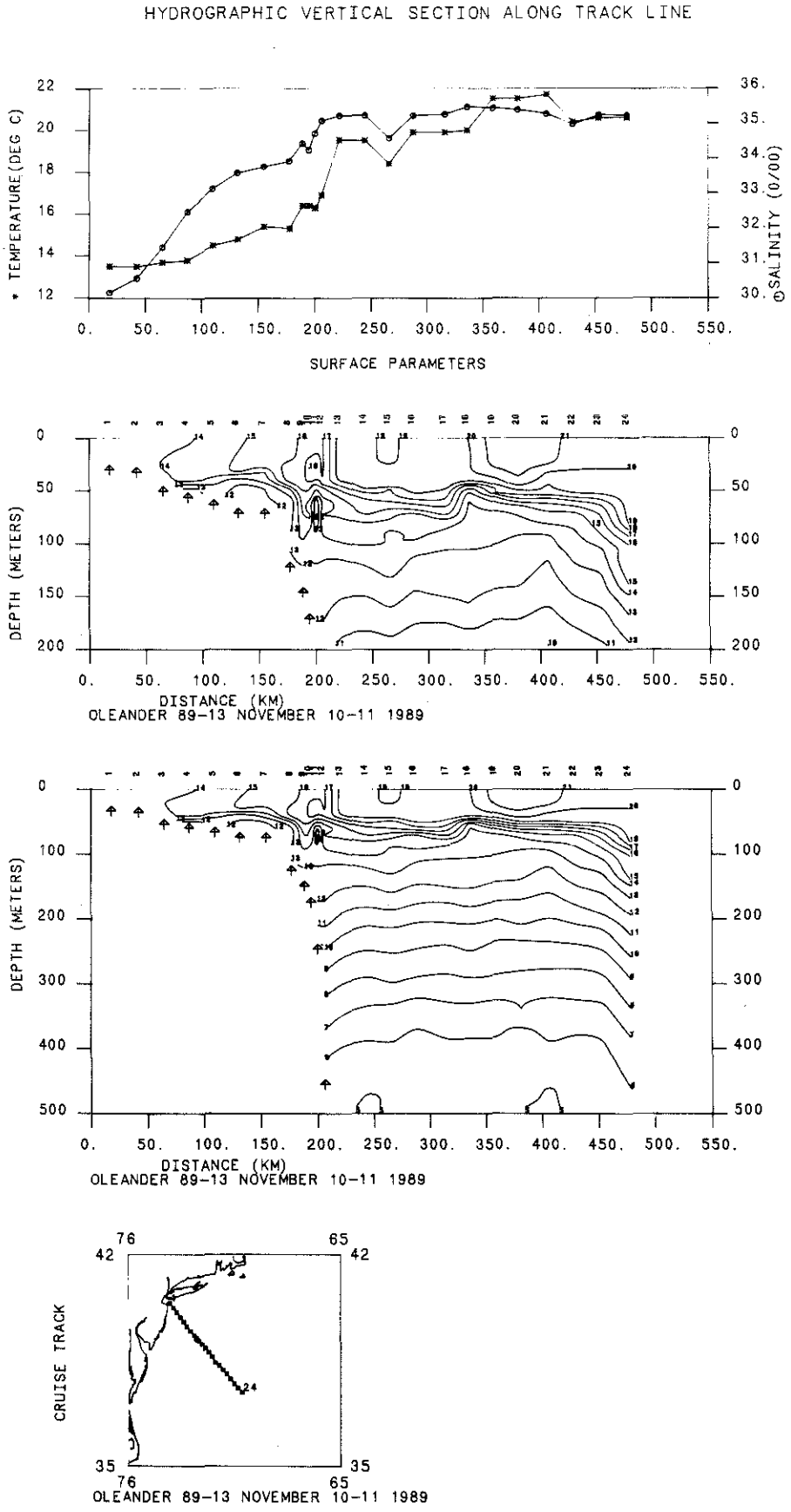

Figure 17. Vertical distribution of temperature, in °C, within the New York Bight, November 10-11, 1989.

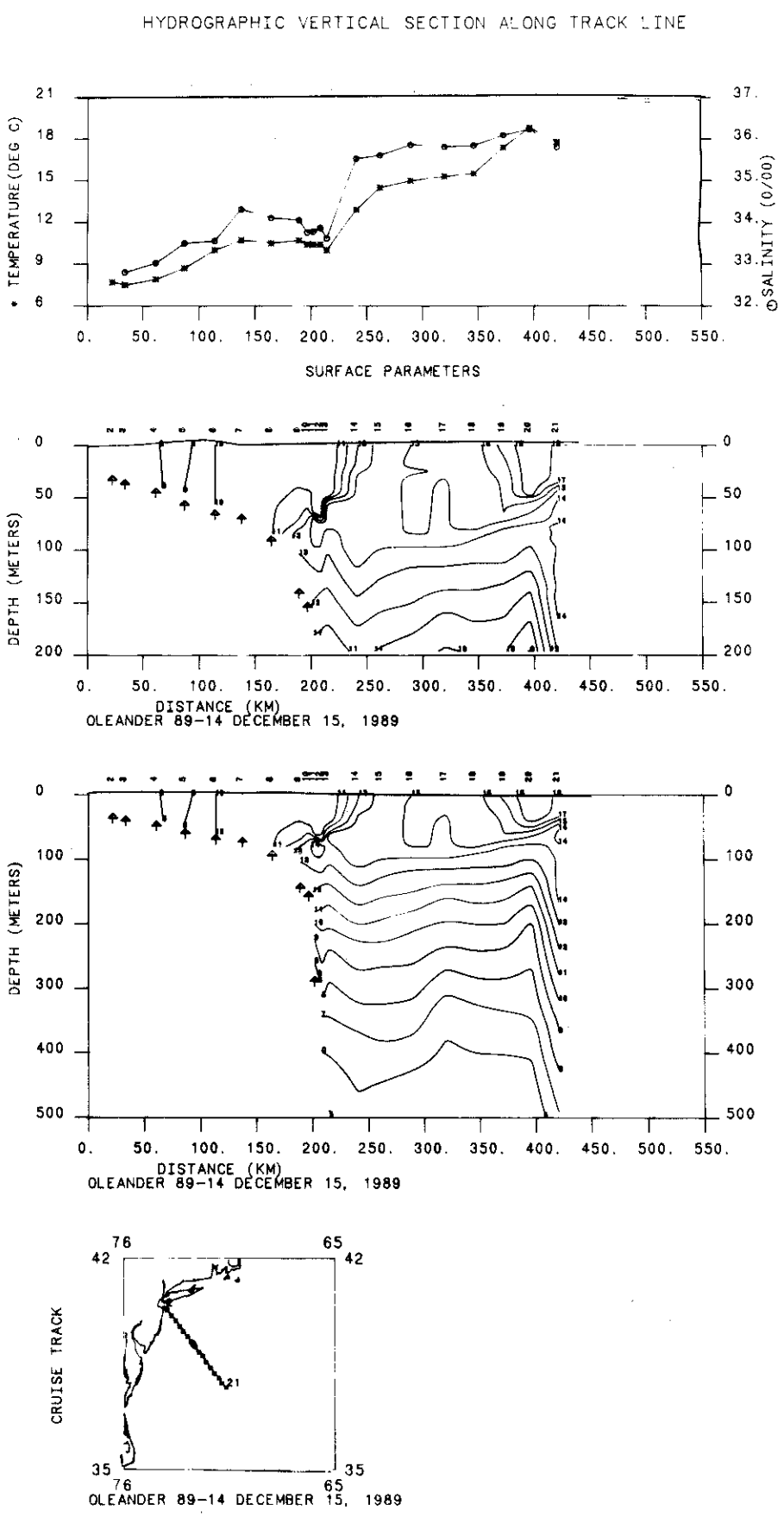

Figure 18. Vertical distribution of temperature, in °C, within the New York Bight, December 15, 1989.

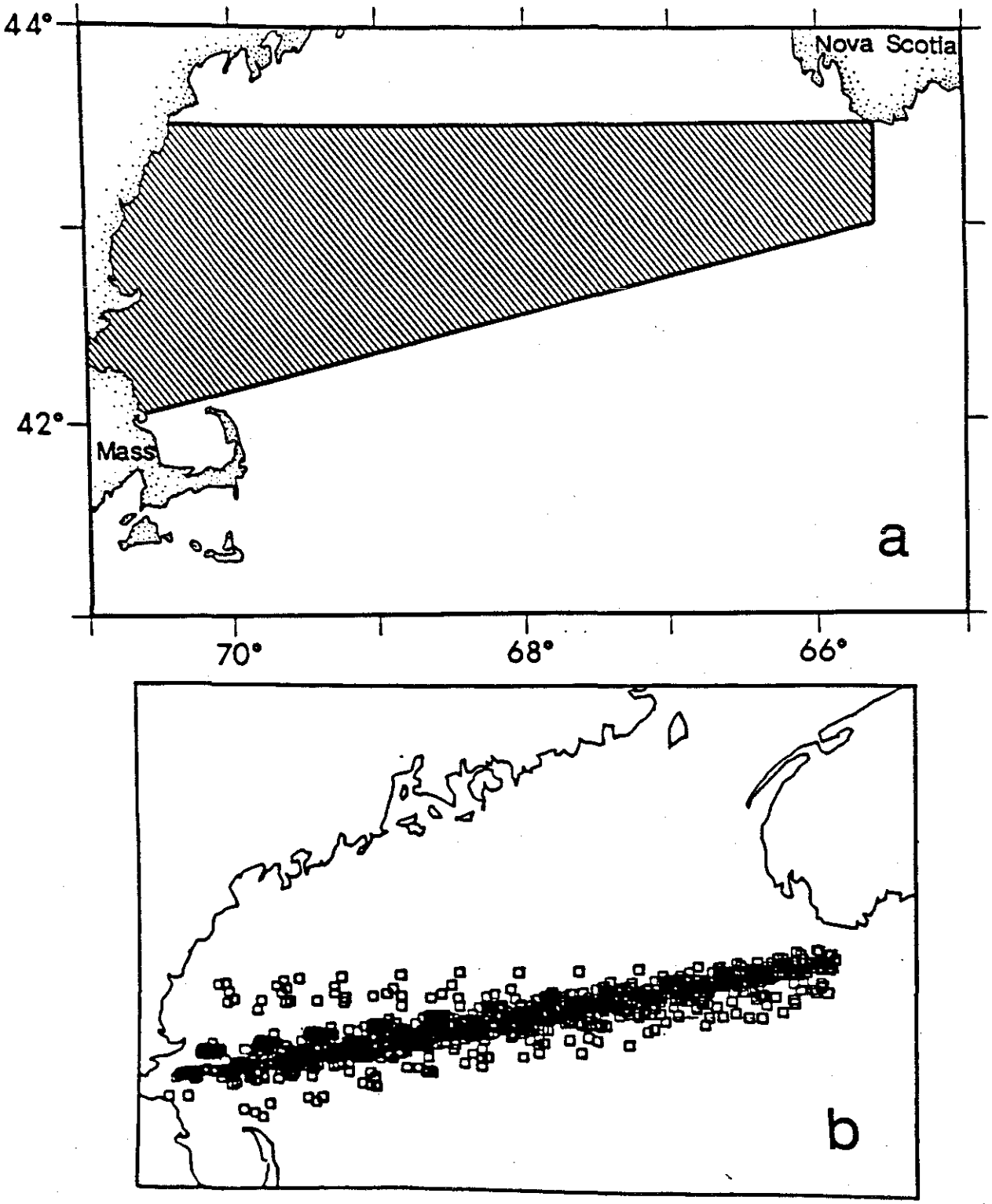

Figure 19. Transect envelope (a) and data density plot (b) from the NMFS Ship of Opportunity Program, route MC, Gulf of Maine, 1961 to present.

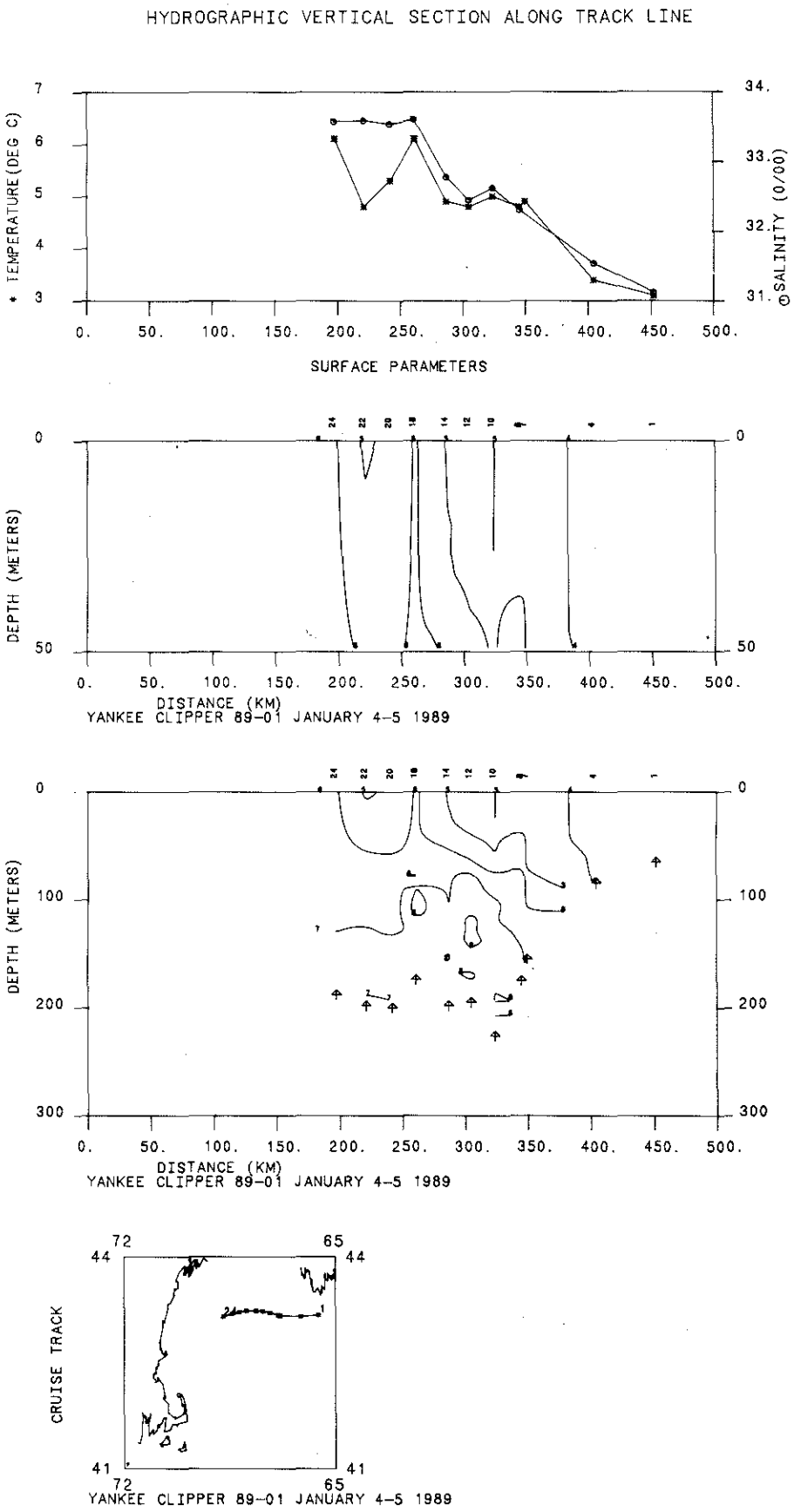

Figure 20. Vertical distribution of temperature, in °C, within the Gulf of Maine, January 4-5, 1989.

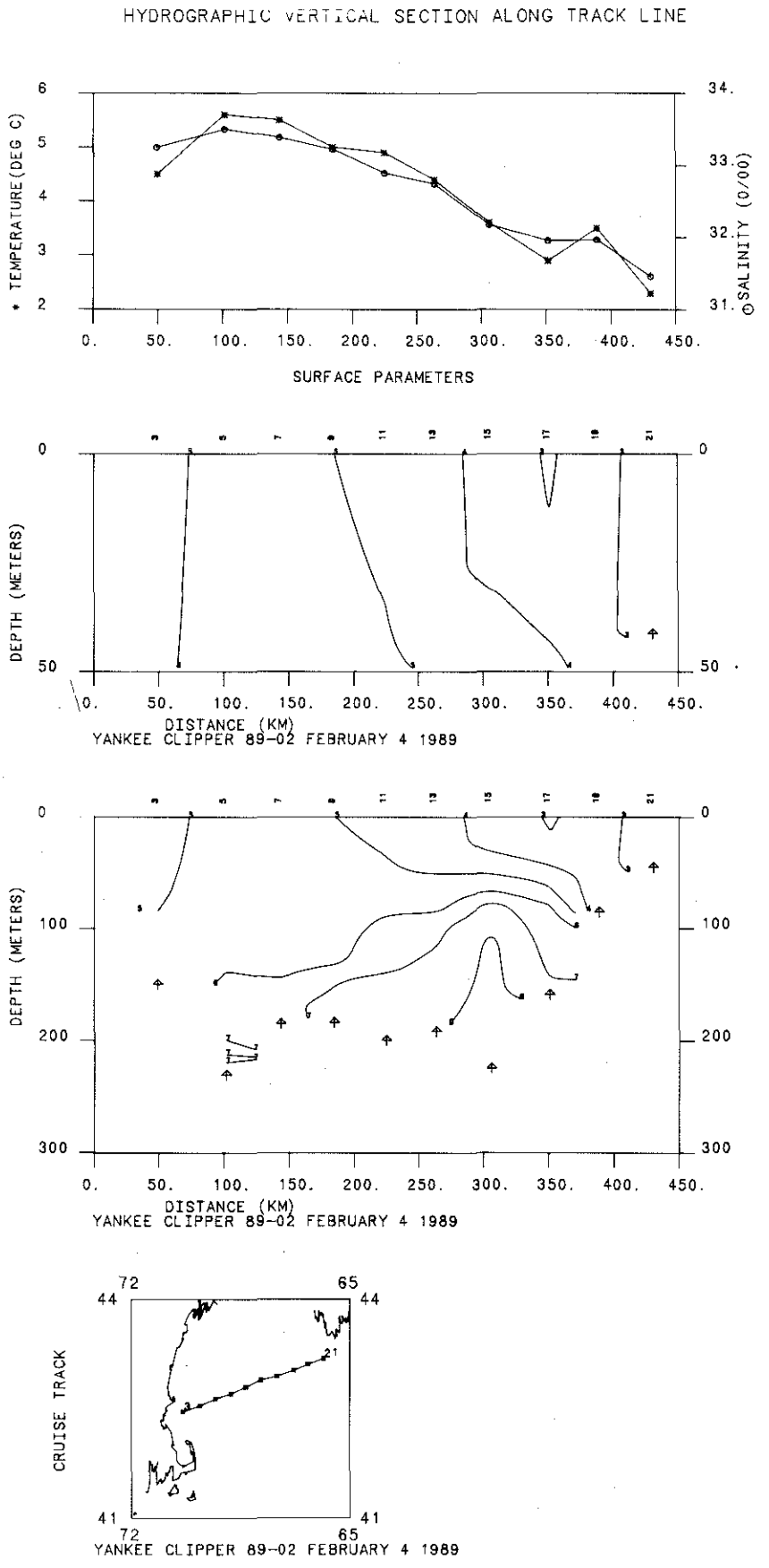

Figure 21. Vertical distribution of temperature, in °C, within the Gulf of Maine, February 4, 1989.

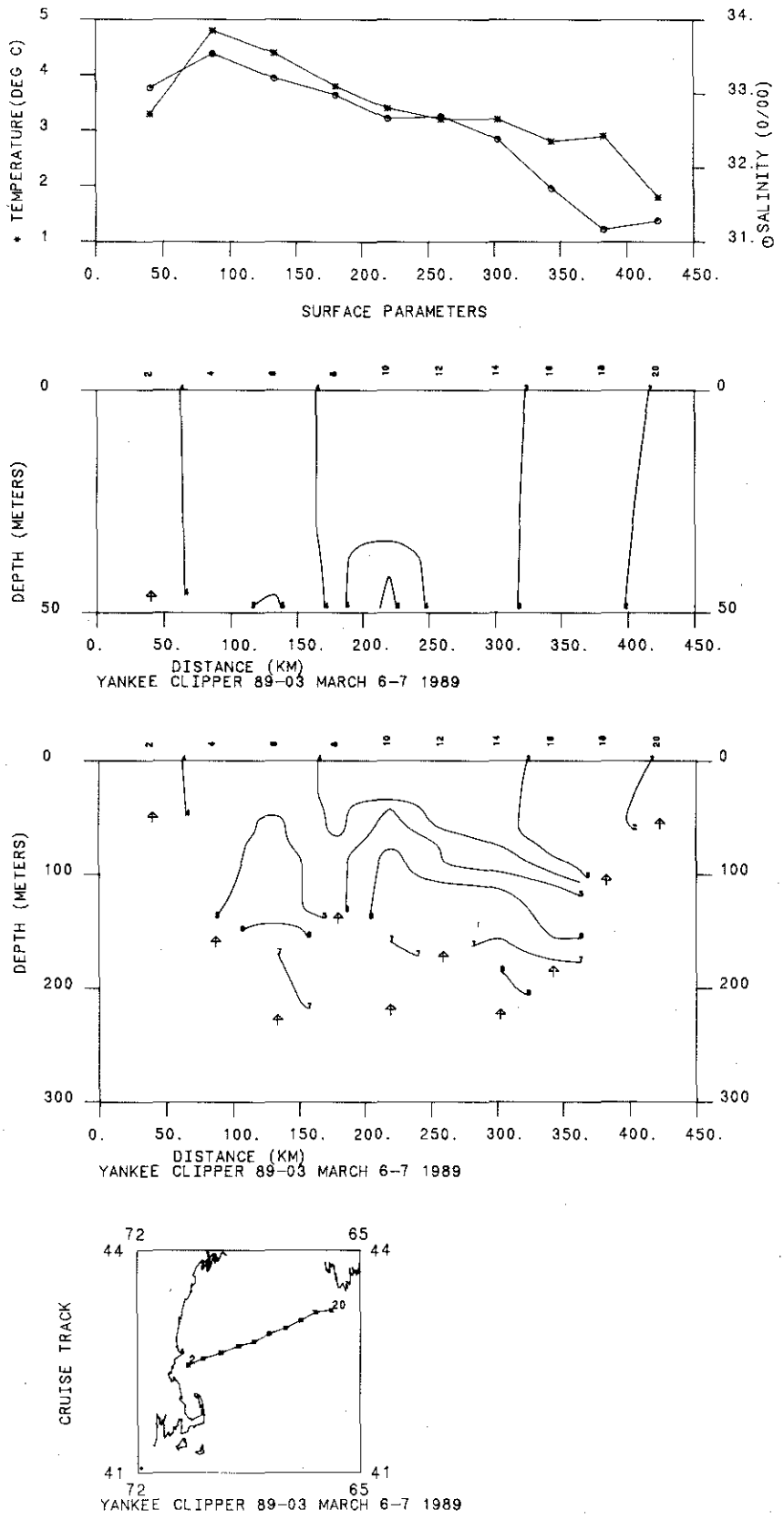

Figure 22. Vertical distribution of temperature, in °C, within the Gulf of Maine, March 6-7, 1989.

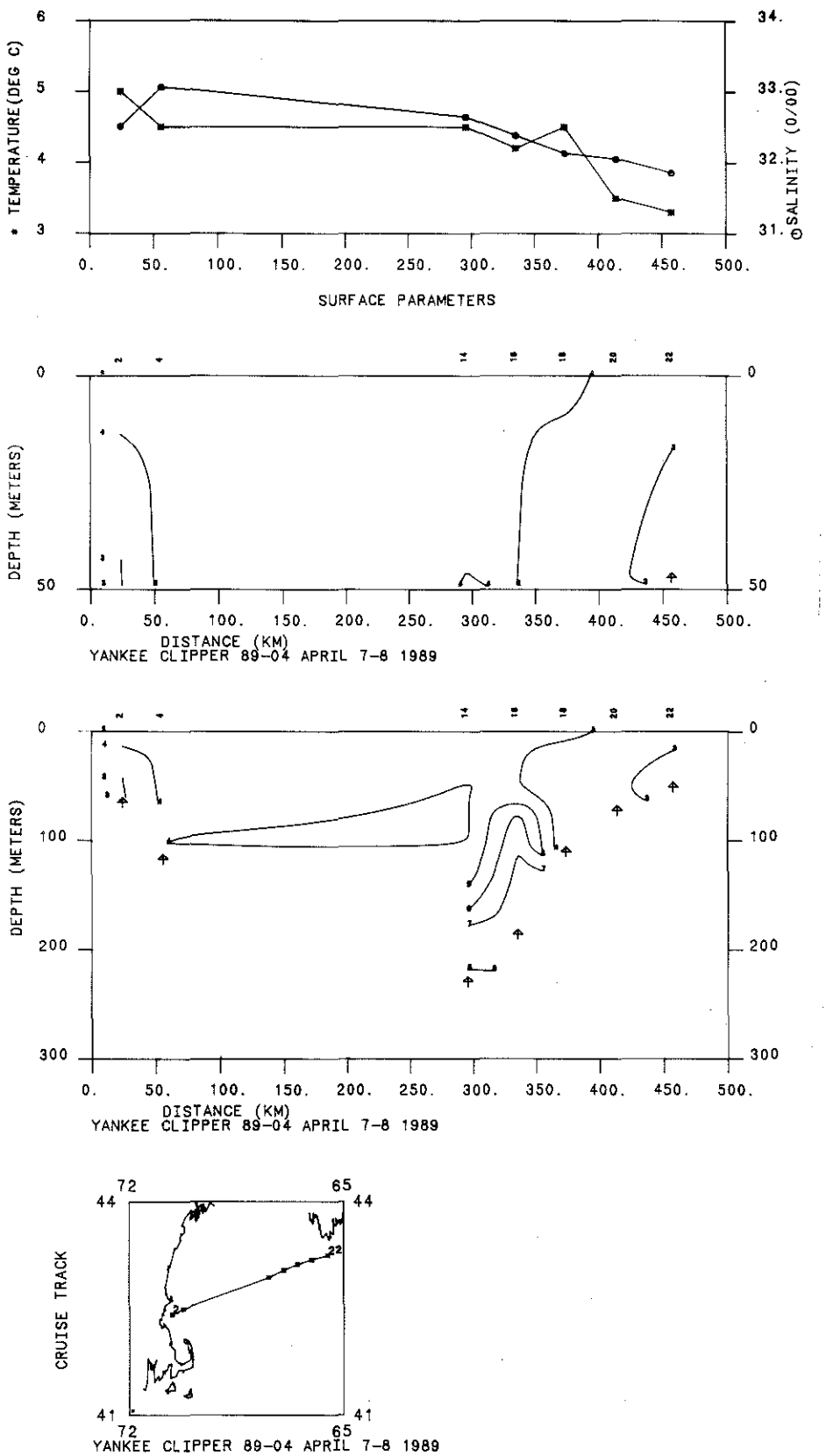

Figure 23. Vertical distribution of temperature, in °C, within the Gulf of Maine, April 7-8, 1989.

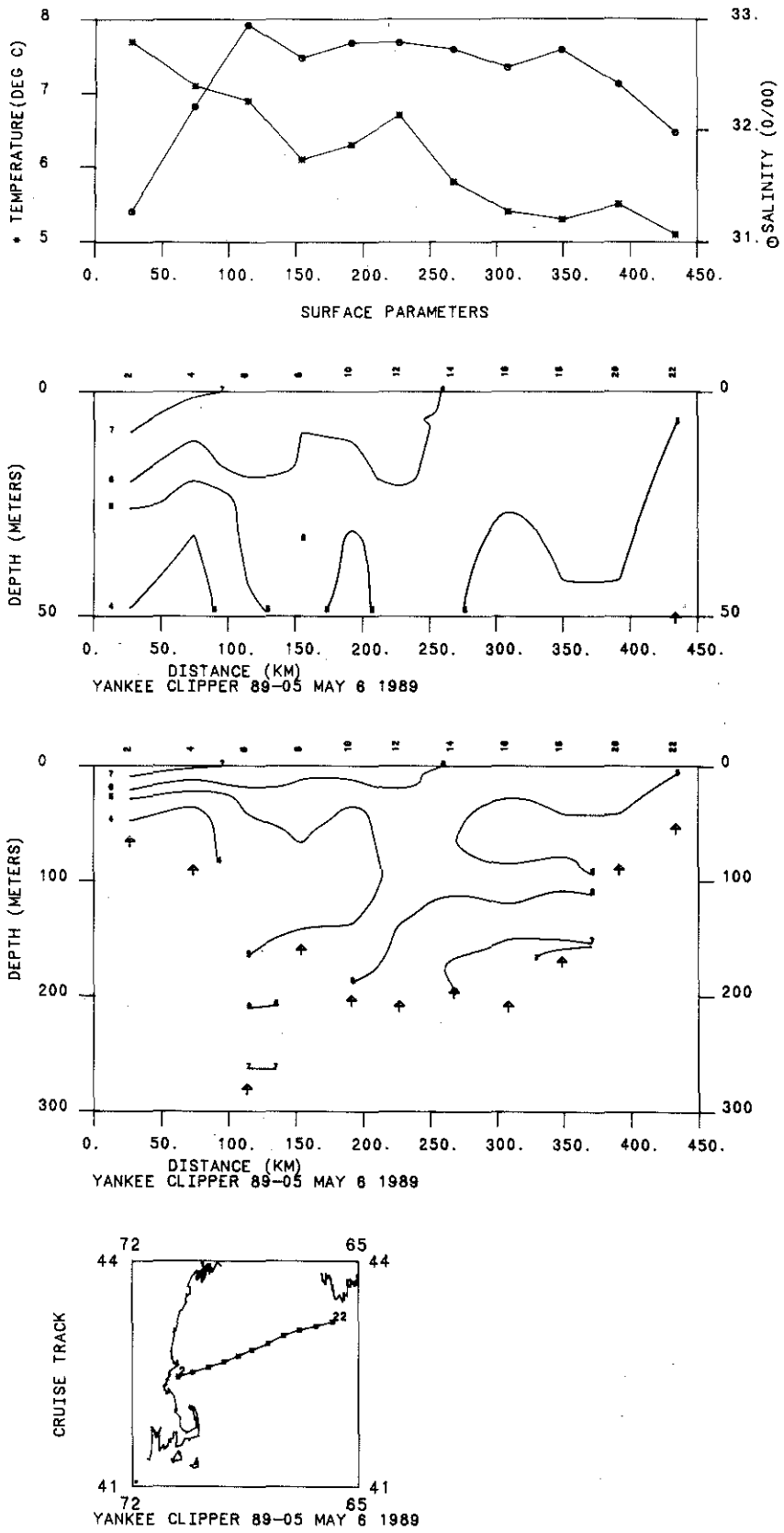

Figure 24. Vertical distribution of temperature, in°C, within the Gulf of Maine, May 6, 1989.

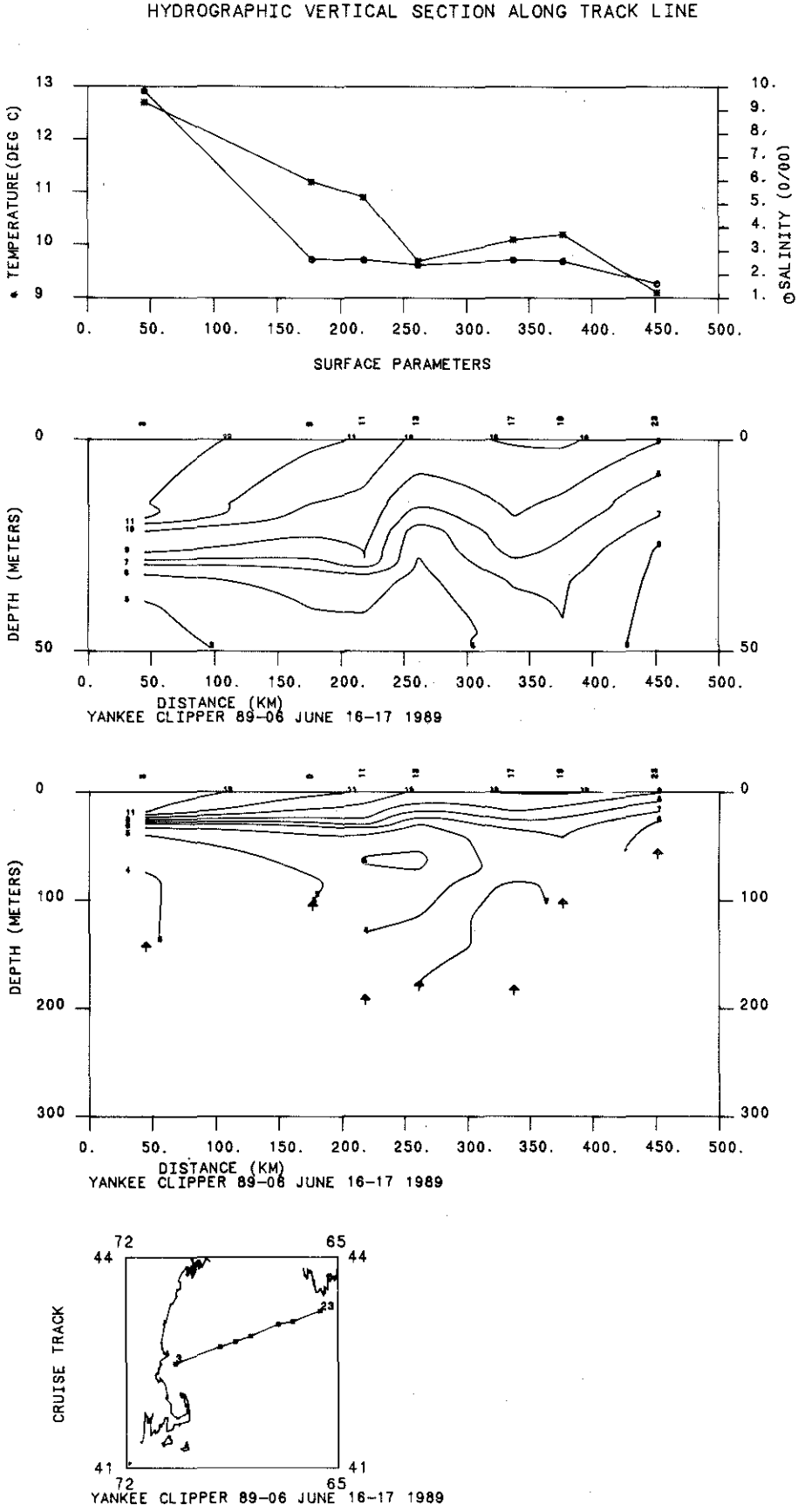

Figure 25. Vertical distribution of temperature, in °C, within the Gulf of Maine, June 16-17, 1989.

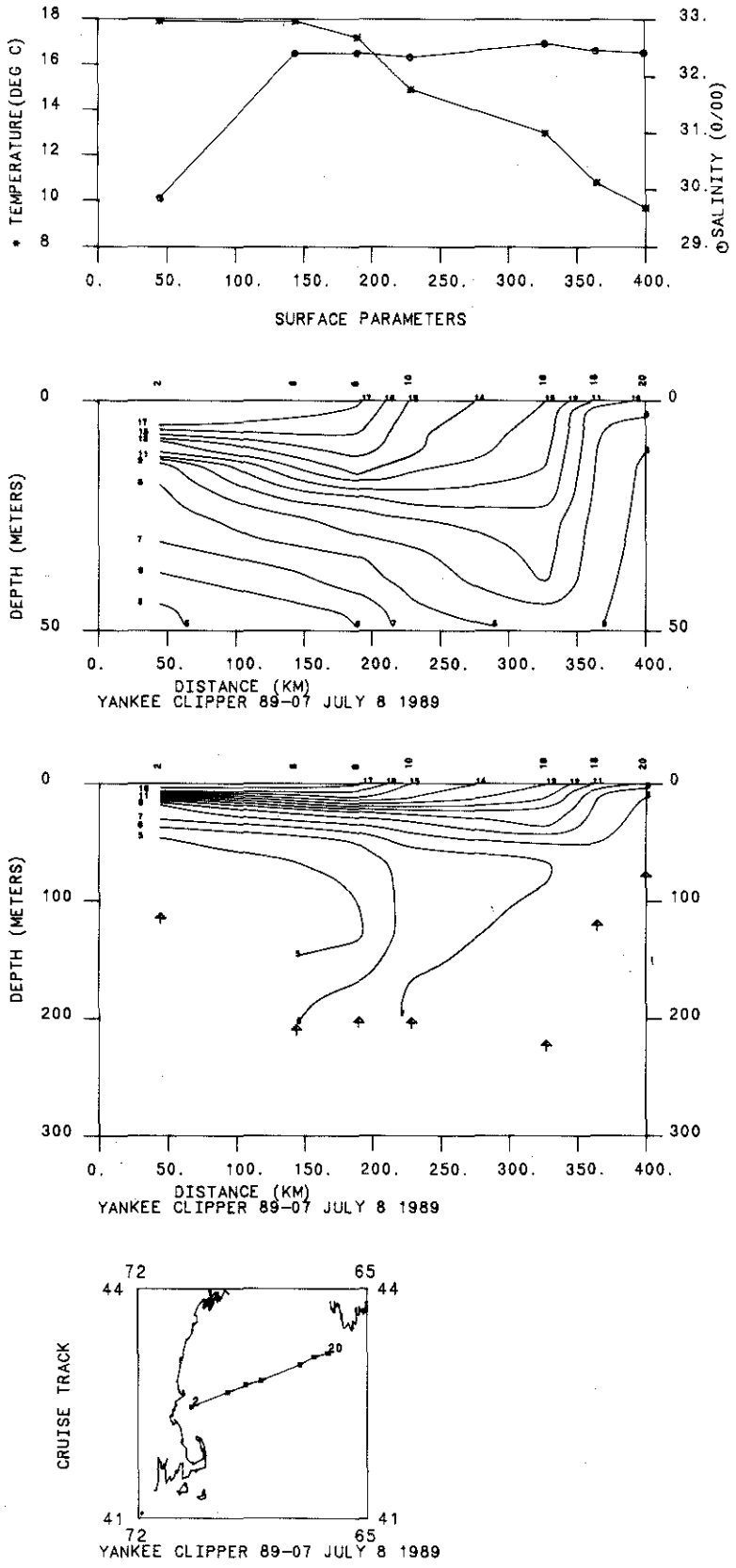

Figure 26. Vertical distribution of temperature, in °C, within the Gulf of Maine, July 8, 1989.

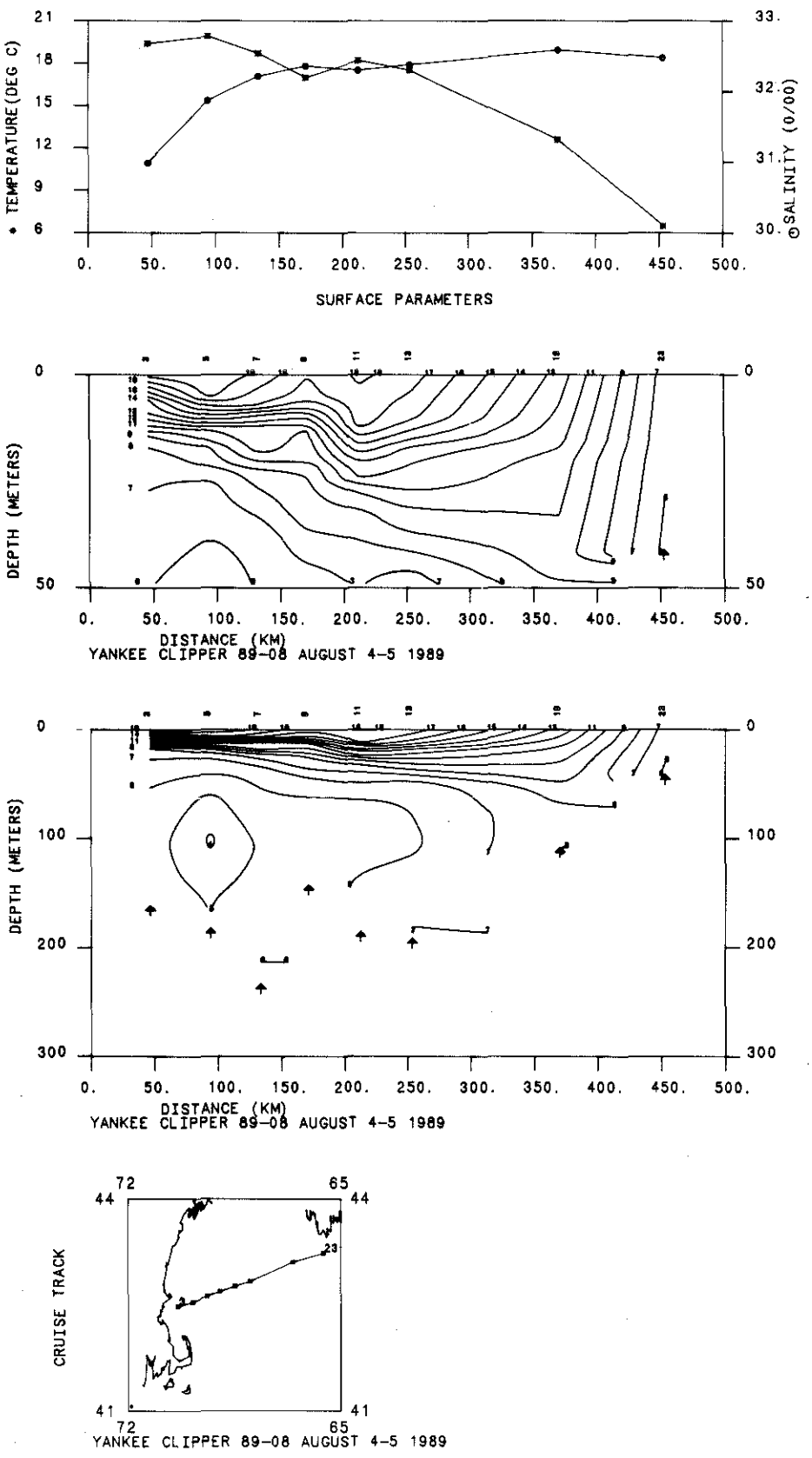

Figure 27. Vertical distribution of temperature, in °C, within the Gulf of Maine, August 4-5, 1989.

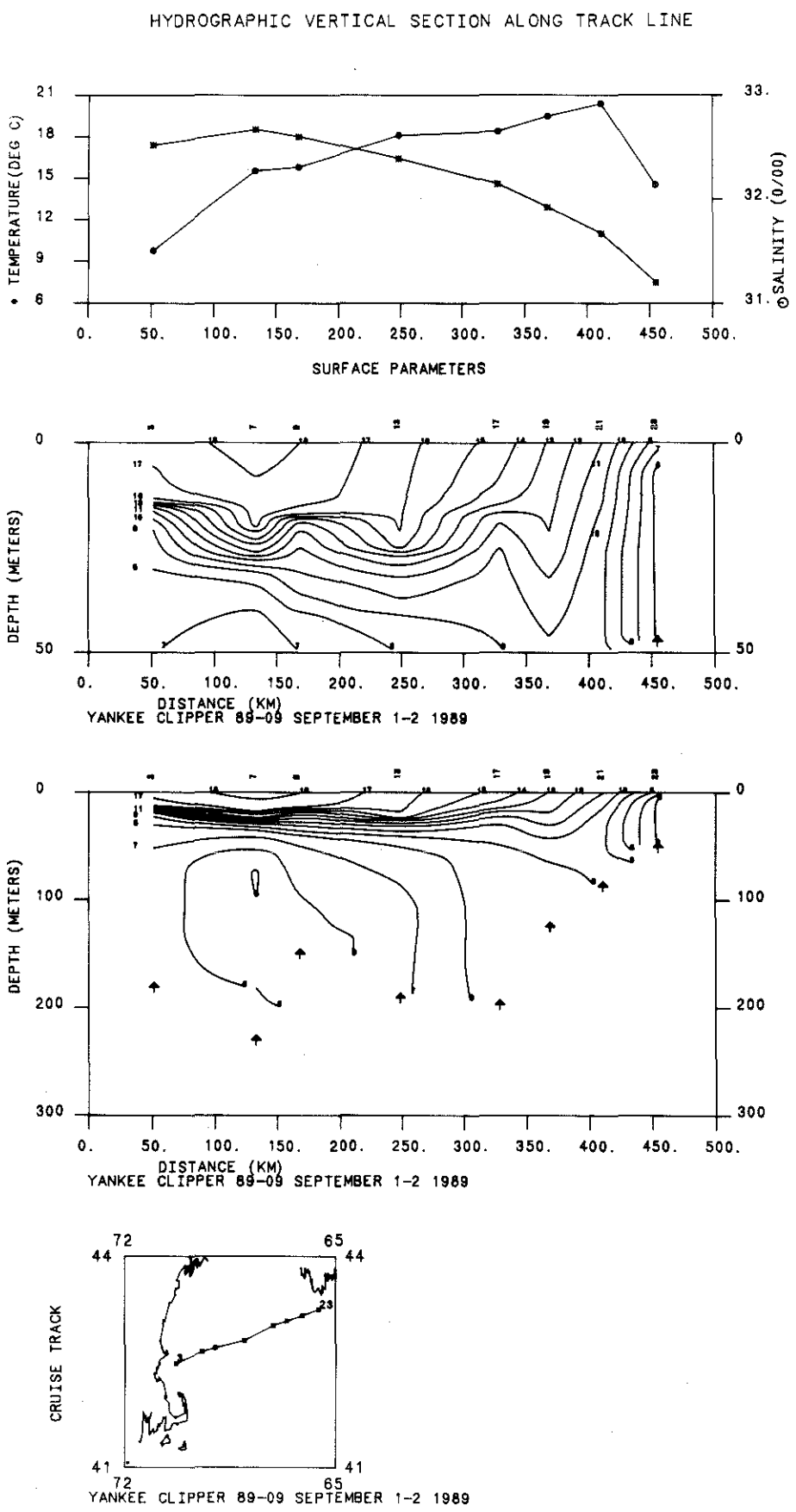

Figure 28. Vertical distribution of temperature, in °C, within the Gulf of Maine, September 1-2, 1989.

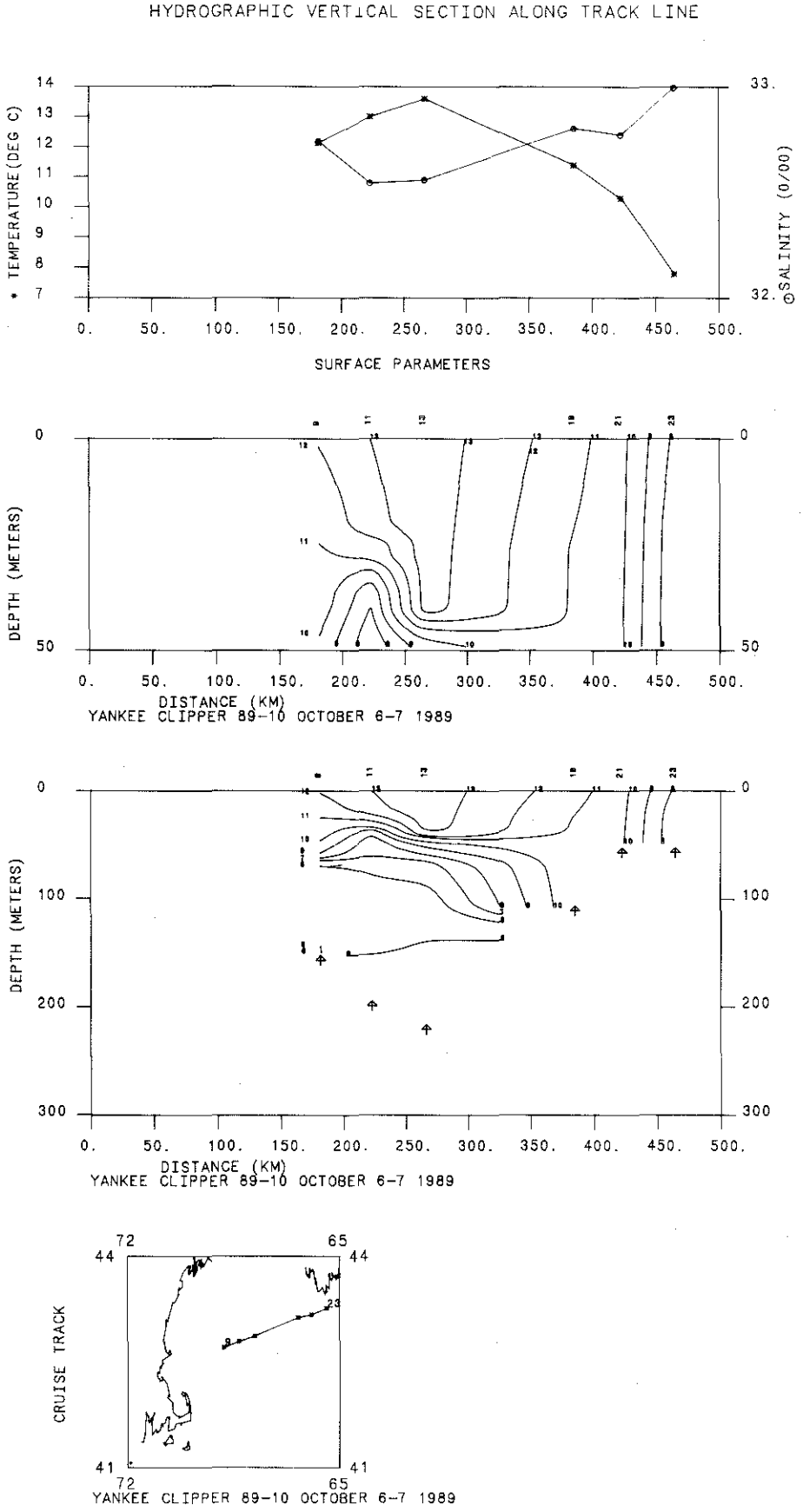

Figure 29. Vertical distribution of temperature, in °C, within the Gulf of Maine, October 6-7, 1989.

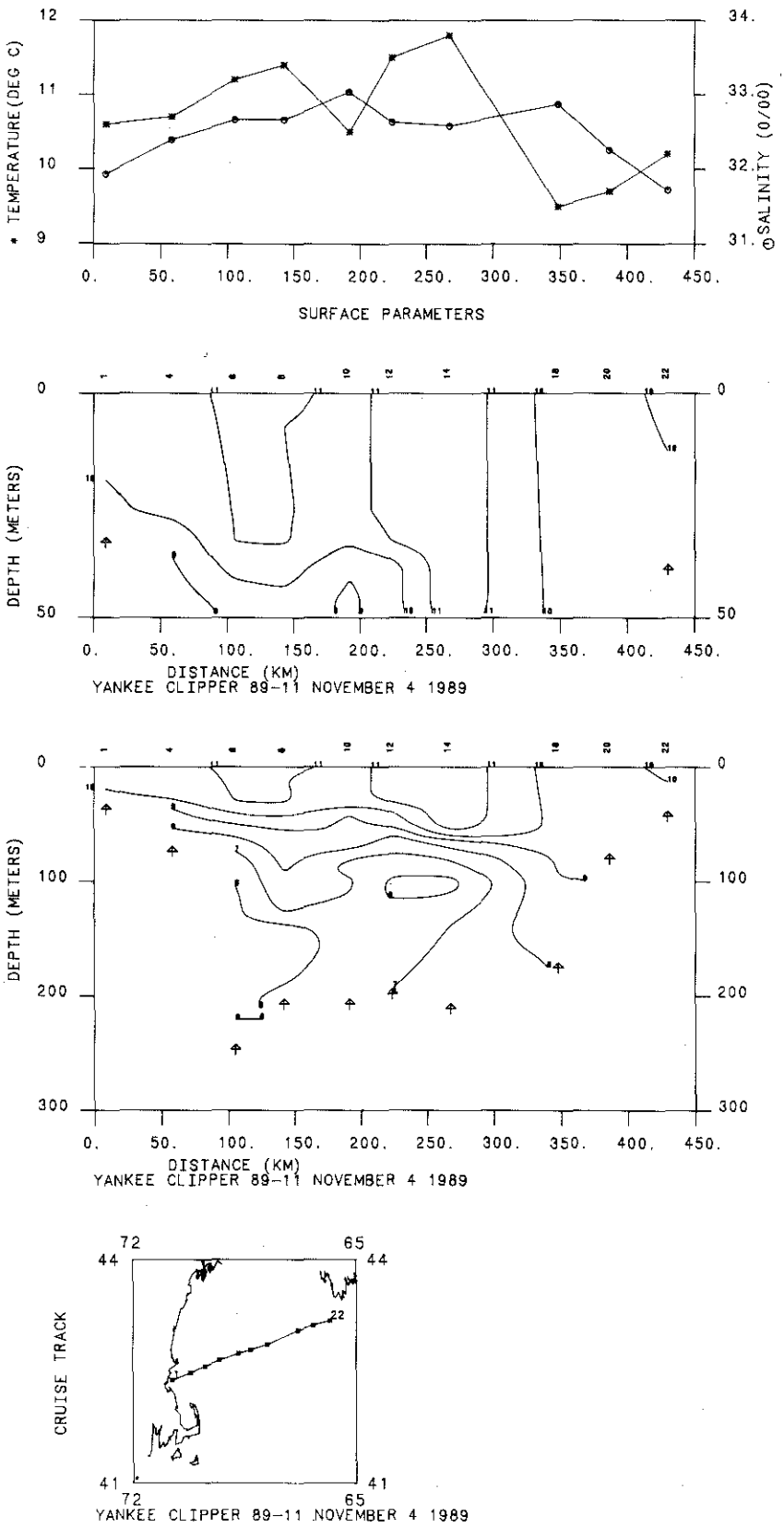

Figure 30. Vertical distribution of temperature, in °C, within the Gulf of Maine, November 4, 1989.

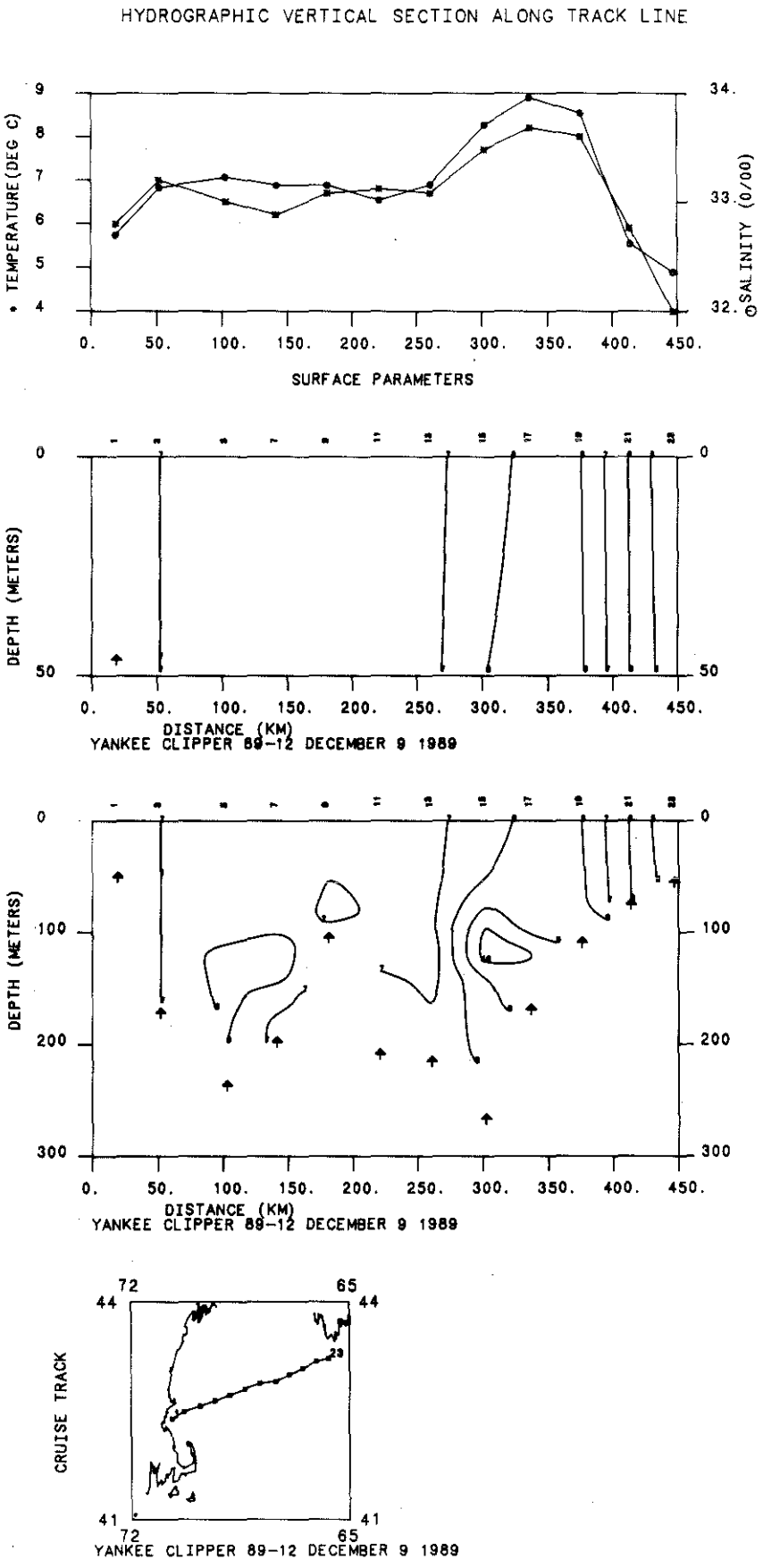

Figure 30. Vertical distribution of temperature, in °C, within the Gulf of Maine, December 9, 1989.