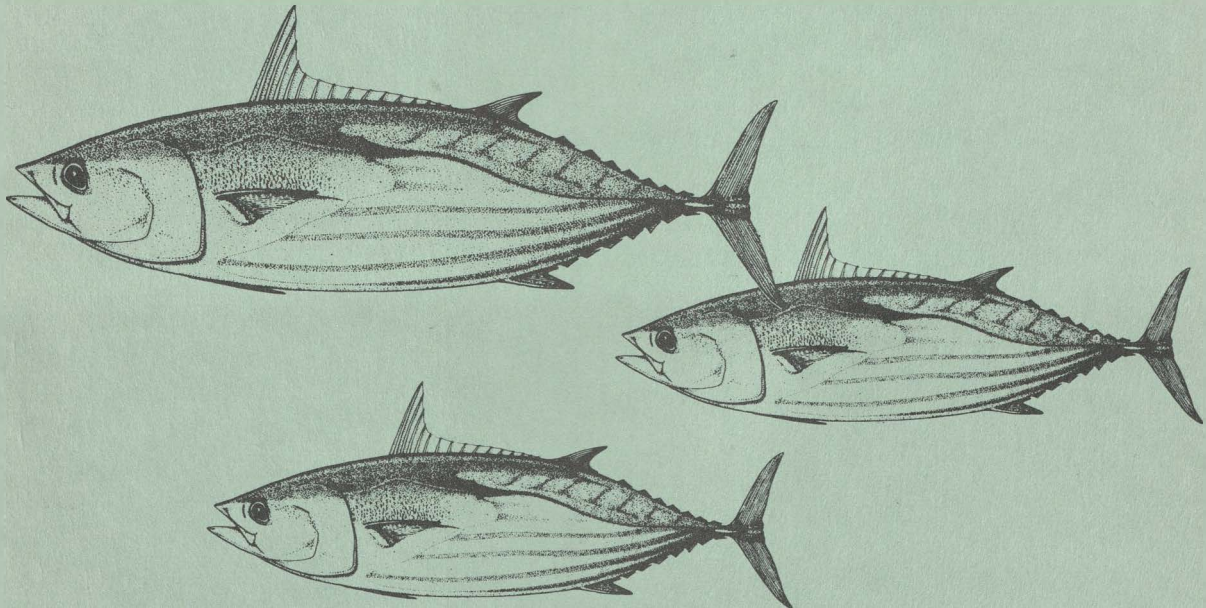


OCTOBER 1976  
No. 10



# FISHING INFORMATION

Southwest Fisheries Center-La Jolla, California



U.S. DEPARTMENT OF COMMERCE  
National Oceanic and Atmospheric Administration  
NATIONAL MARINE FISHERIES SERVICE  
SOUTHWEST FISHERIES CENTER  
8604 LA JOLLA SHORES DRIVE - P. O. BOX 271  
LA JOLLA, CALIFORNIA 92037

# FISHING INFORMATION

OCTOBER 1976 , No. 10



EDITOR: JAMES A. RENNER

- I. Barrett, Acting Director, SOUTHWEST FISHERIES CENTER  
M. Laurs, Acting Deputy Director  
R. Shomura, Director, Honolulu Laboratory  
N. Abramson, Director, Tiburon Laboratory  
G. Seckel, Acting Director, Pacific Environmental Group

# PREFACE

This publication, Fishing Information, appears monthly and contains 1) fishery advisory information, 2) a narrative description of pertinent surface temperature conditions, 3) charts of winds and pressures for the eastern North Pacific, 4) charts of sea surface temperature for the North Pacific and eastern tropical Pacific, and 5) charts of subsurface temperature structure in the eastern North Pacific.

A supplement to Fishing Information appears at 15-day intervals throughout the year. This is a chart of sea surface temperature (contoured at 2°F (1°C) intervals) from Baja California to Vancouver Island out to about 135°W. Special bulletins are published in conjunction with the 15-day sea surface temperature charts which include short-term projections of albacore distribution and locations of productive fishing areas, information on oceanographic and atmospheric conditions, and other information as is appropriate during the albacore fishing season.

The secretary of Commerce has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department.

# CONTENTS

	<u>Page</u>
Acknowledgements	iv
Sea Surface Temperature and Environmental Conditions - October 1976, F. Miller	1
<u>ENVIRONMENTAL CHARTS, PACIFIC OCEAN - October 1976</u>	
Figure 1. Sixteen-year mean (1961-1976) observed sea level values of barometric pressure (millibars), resultant wind direction (degrees true), resultant wind speed (knots) and average wind speed (knots) regardless of direction	4
Figure 2. Observed sea level values of barometric pressure (millibars), resultant wind direction (degrees true), resultant wind speed (knots) and average wind speed (knots) regardless of direction	5
Figure 3. Mean sea surface temperature, eastern North Pacific Ocean. Square shows temperatures at weathership station. Numerals on shore are temperatures at coastal and lightship stations	6
Figure 4. Mean sea surface temperature chart, western North Pacific Ocean	7
Figure 5. Deviation of sea surface temperatures, eastern North Pacific Ocean from 20-year mean (1948-67). Hatched areas are colder in 1976	8
Figure 6. Deviation of sea surface temperatures, western North Pacific Ocean from 20-year mean (1948-67). Hatched areas are colder in 1976	9
Figure 7. Deviation of sea surface temperatures, eastern North Pacific Ocean from those of October 1975. Hatched areas are colder in 1976	10
Figure 8. Mean sea surface temperatures, eastern tropical Pacific Ocean. Numerals on shore are temperatures at coastal stations	11
Figure 9. Deviation of sea surface temperatures, eastern tropical Pacific Ocean from 20-year mean (1948-67). Shaded areas are colder in 1976. Contours are dashed in sparse data areas	12
Figure 10. Surface temperature and salinity and subsurface temperature structure from expendable bathythermograph observations between Seattle and Honolulu, October 4-10, 1976	13
Figure 11. Surface temperature and salinity and subsurface temperature structure from expendable bathythermograph observations between San Francisco and Honolulu, October 13-19, 1976	14
Figure 12. Surface temperature and salinity and subsurface temperature structure from expendable bathythermograph observations between Los Angeles and Honolulu, October 6-11, 1976	15

## ENVIRONMENTAL CHARTS ANALYZED BY:

F. Miller (Figures 8 and 9)  
J. Renner (Figures 1, 2, 3, 4, 5, 6, 7, 10, 11, 12 and  
15 day Supplement)

TECHNICAL EDITOR:  
R. Allen  
CARTOGRAPHY:  
R. Allen, H. Orr

# Acknowledgements

The following organizations and stations contributed data for October 1976 charts:

- Inter-American Tropical Tuna Commission, La Jolla, California
- Kelco Company, San Diego, California
- National Oceanic and Atmospheric Administration
  - National Environmental Satellite Service, Washington, D.C.
  - National Marine Fisheries Service, La Jolla, California; Honolulu, Hawaii
  - National Ocean Survey, Pacific Marine Center, Seattle, Washington
  - National Weather Service, San Diego, California and Washington, D.C.
- Fisheries Research Board of Canada, Pacific Environmental Institute, West Vancouver, British Columbia by L.F. Giovando from observations by
  - L. Sabourin at Langara Island Light; G. Anderson at Cape St. James Light;
  - L. Collins at Kains Island Lightstation; I.G. McNeil at Amphitrite Point Light
- Scripps Institution of Oceanography, La Jolla, California
- Fishing Vessels, *Carol S., Concho, Diana C., Gina Karen, Jo Linda, Marco Polo, Maria C.J., Marla Marie, Maria Elena, Missouri, Polaris, Rosa Olivia, Santa Elena, Santa Rosa, Venturous,* and *Willa G.*

Expendable bathythermograph and salinity observations are made by the mates and engineers of the *California*, and *Hawaiian Enterprise* of the Matson Navigation Co. The data are processed under supervision of D. R. McLain at the NMFS Pacific Environmental Group, using computer facilities of the Fleet Numerical Weather Central, Monterey. The project is partially supported by the National Science Foundation and the Office of Naval Research.

# Sea Surface Temperature and Environmental Conditions

F. Miller

## Eastern North Pacific

During October sea surface temperatures (SST) normally show seasonal cooling of 2 to 4°F (1.1 to 2.2°C). However, the rate of cooling is usually not uniform over the north Pacific. Depending on whether low or high surface pressure systems dominate a particular region, SST's will cool more or less than seasonal rates. At this time of year heavy cloud cover and high seas and winds normally develop across the Pacific north of 40°N. South of 40°N the eastern and western subtropical high pressure systems usually cause light seas and considerable solar heating at the sea surface.

In October 1976 a very large and intense stationary low pressure system developed off the Aleutian Islands near 50°N, 175°W. Around the periphery of this low, storms developed with unusually high winds and severe weather. The wind mixing of the ocean surface layer was extensive and caused SST's to drop more than 2°F (1.1°C) below normal (Figure 5). From 30°N to 45°N between 145°W and 180° the decrease in SST's from September 1976 was more than 4°F (2.2°C). This was a considerably greater decrease than normal and occurred in a frontal region with high winds between the Aleutian low pressure system and a high pressure ridge extending from British Columbia southwestward into the Pacific.

Along the U.S. west coast and extending southwestward, above normal SST's (Figure 5) were associated with above normal surface pressures and lower than normal winds and cloud cover. In October there was a northward expansion of above normal SST's due to the persistence of a high pressure system along the U.S. west coast (Figures 2 and 5).

In a broad zone extending from British Columbia to Hawaii, weather fronts moving into the eastern Pacific became more intense in October 1976 partly because of the stronger than normal SST gradients, particularly east of 145°W from 30°N to 45°N. A southerly wind trajectory over relatively warm water (Figures 2 and 5) ahead of weather fronts combined with northerly winds over a cold north Pacific will probably cause above normal weather activity north of 30°N between 150°W and 130°W in November.

## Western North Pacific

A deep and persistent low pressure system with extensive cloud cover and high winds developed and became nearly stationary to the east of northern Honshu, Japan. The negative SST anomalies (Figure 6) and very strong north-south SST gradients (Figure 4) from 40°N to 45°N were associated with gale force winds and ocean mixing along the southern edge of the low system. This low was linked with the Aleutian low system through fast moving weather fronts which resulted in an unusually prolonged period of very rough and cold seas over the north Pacific.

South of 35°N the SST's were slightly above normal in association with the western center of the subtropical high pressure area from 25°N to 30°N between 130°E and 170°E.

## Eastern Tropical Pacific

Sea surface temperatures (SST) normally decrease slightly in October north of 5°N along the equator west of 150°W. In the southern hemisphere to 20°S and west of 90°W SST's increase less than 1°F (0.6°C). In the Peru Current east of 90°W and along the equator to 150°W upwelling and surface wind mixing normally cause SST's to reach the annual minimum between September and October. The equatorial ocean front usually has a strong north-south temperature gradient along the equator from Ecuador to the Galápagos Islands, and a slightly weaker gradient westward to 140°W where the front normally becomes weak.

In October 1976, SST's (Figure 8) were above normal over more of the eastern tropical Pacific than in any month since January 1973, which marked the end of the 1972-73 El Niño condition. During October the equatorial region covered by positive SST anomalies greater than 2°F (1.1°C) expanded westward to at least 180° (Figure 9).

In the northern hemisphere north of 10°N SST's were significantly above normal in the fishing grounds west of Baja California and around the Revillagigedo Islands. Also, between 120°W and 140°W from 5°N to 15°N tropical tuna fishing was active in September and October over a wider latitudinal range because of light winds and seas and above normal SST's. The light winds and warm seas aided fishermen in the local banks of Baja California and the Revillagigedo Islands. The negative anomalies (Figure 9) east of 100°W from 5°N to 10°N were associated with rough weather and high surface winds along and south of the intertropical convergence zone.

Between 80°W and 120°W from 5°N to 20°S the pattern of positive SST anomalies remained nearly unchanged from September 1976. However, along the coast of Ecuador and Peru SST's were near normal except in a coastal area from 6°S to about 80°S. In this area SST data from ships indicated that the warm pocket of water usually found off the coast of central Peru continued to move close to the coast at times during the month. South of 15°S along the coast of Peru SST's were 2 to 4°F (1.1 to 2.2°C) below normal (Figure 9) as they were in previous months. Above normal winds and extensive cloud cover associated with weather fronts moving onto the coast of Chile kept surface layers of the ocean well mixed and coastal upwelling active south of 15°S.

Past records of El Niño years show a trend in the SST's to return toward normal in October at coastal stations. However, in other years with above normal SST's over the tropical Pacific during the southern spring, as shown in Figure 9, the SST's usually increase again in December and January. This event marks the peak of an El Niño cycle and has a great affect on the Anchoveta fishing industry.

Since June 1976, the surface pressure gradient between Peru at 16°S and 30°S, 90°W has remained below normal most of the time. The SST's at coastal stations from Talara (5°S) to Callao, Peru (11.5°S) have been above normal since March 1976. By October 1976 coastal SST's were decreasing seasonally toward normal. However, off the coast of South America and along the equator the warm anomalies expanded westward to the 180th meridian and poleward. In addition, the satellite cloud photos have shown a marked reduction in heavy low stratus coverage west of Peru since June. Apparently, more heating was getting through to the surface and caused more cumuliform cloud development off the coast of Peru and Ecuador. At this time it seems unlikely that, if the atmospheric circulation remains abnormal, the SST's in the tropical and subtropical areas of the eastern Pacific will return to normal for several months.

With southern summer approaching, the abnormal air-sea interactions and in situ heating will probably lead to a marked increase in the SST's along the coasts of Ecuador and Peru in December and January 1977, just as occurred in other El Niño years. As a result, tuna fishing may be good off Peru but Anchoveta fishing may not be good until early in 1977.

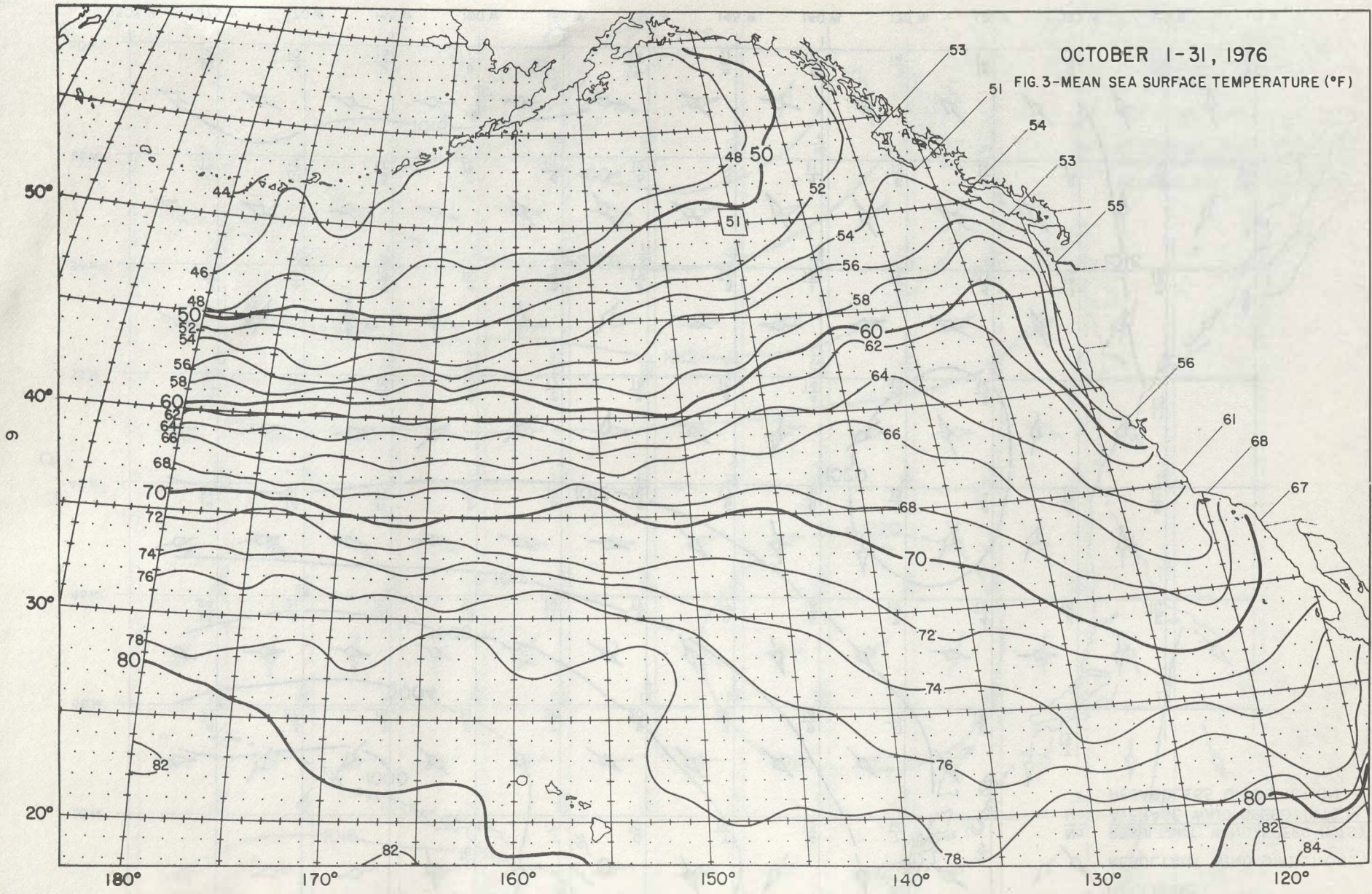






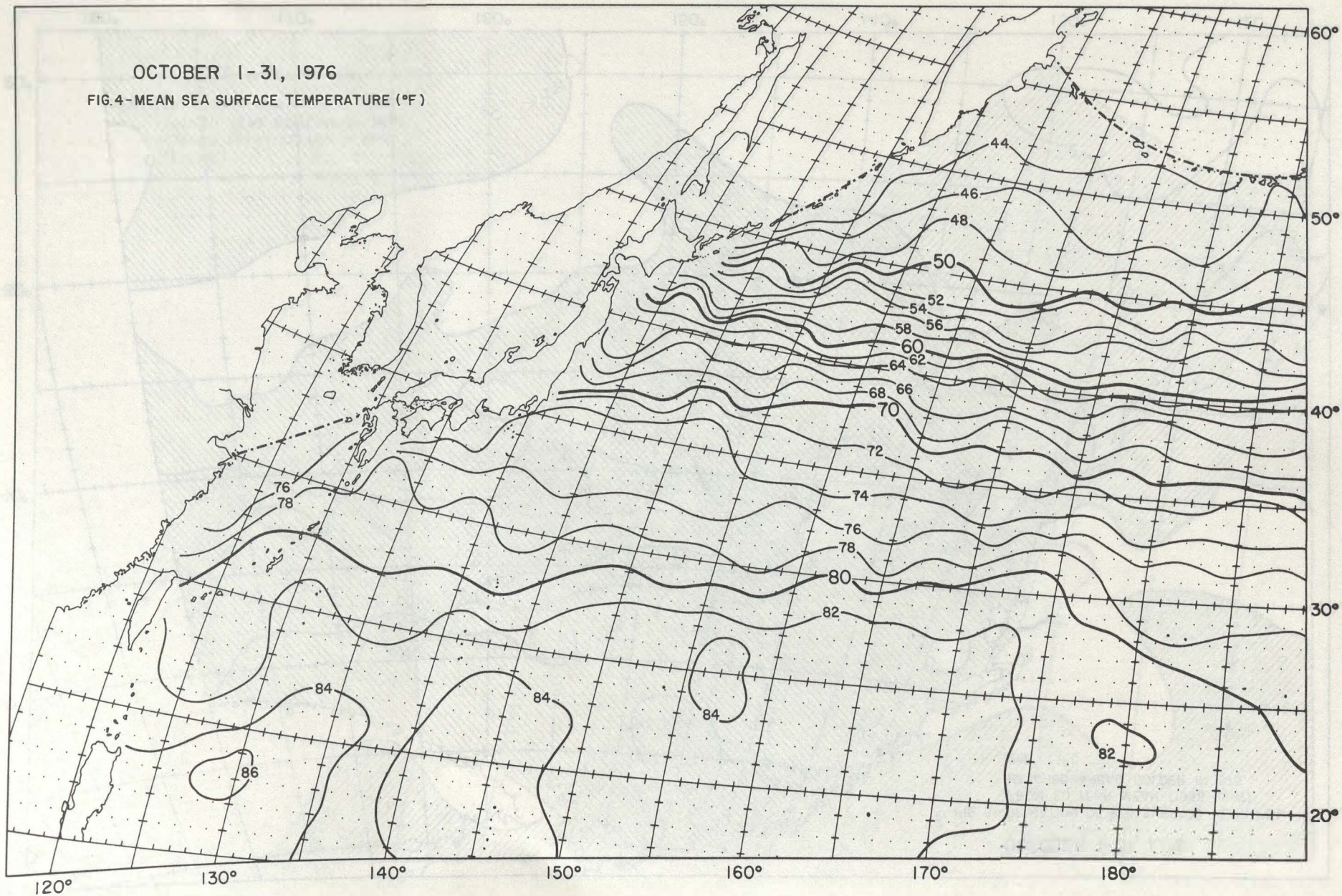
OCTOBER 1-31, 1976

FIG. 3-MEAN SEA SURFACE TEMPERATURE (°F)



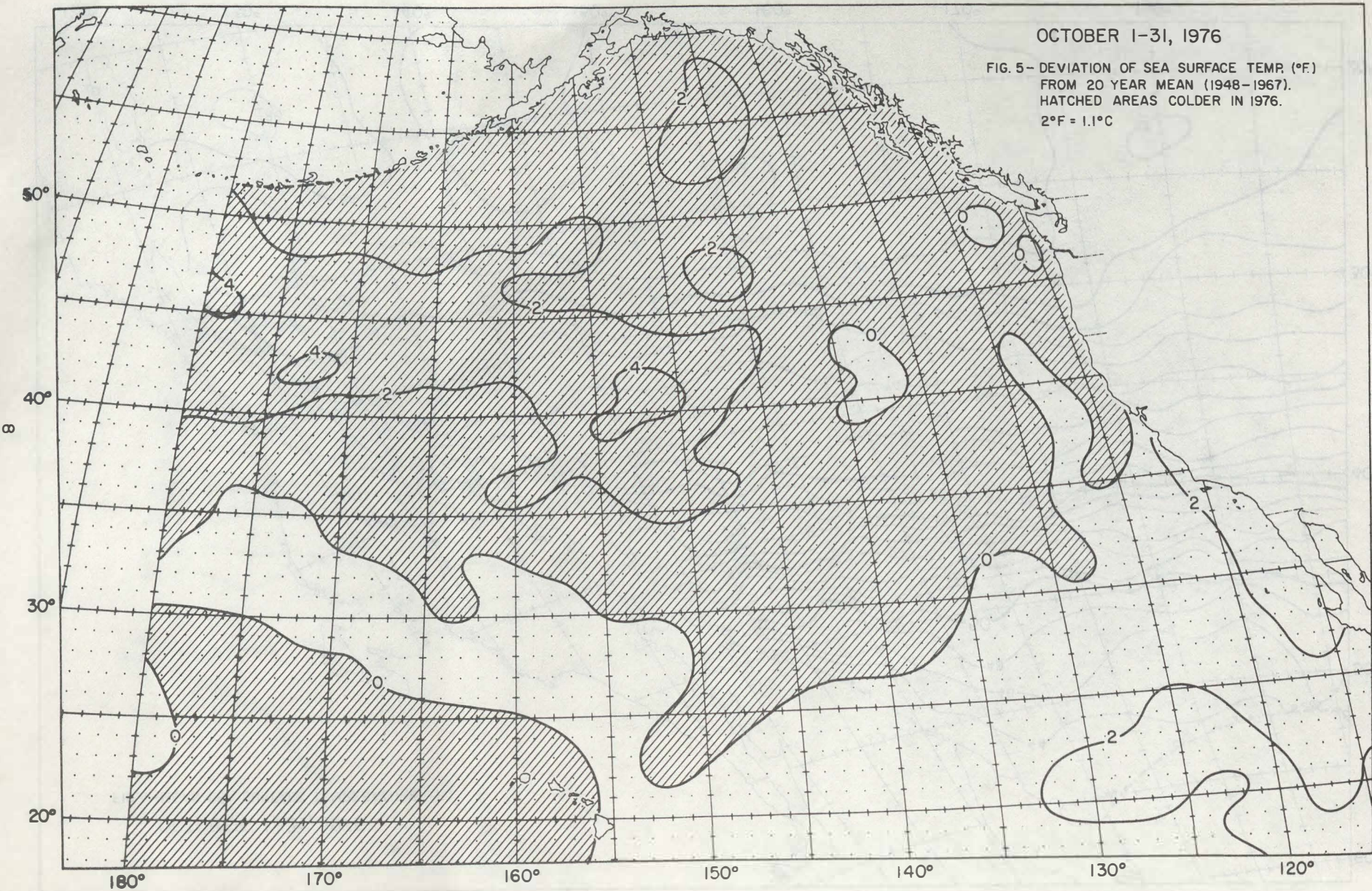
OCTOBER 1-31, 1976

FIG.4-MEAN SEA SURFACE TEMPERATURE (°F)



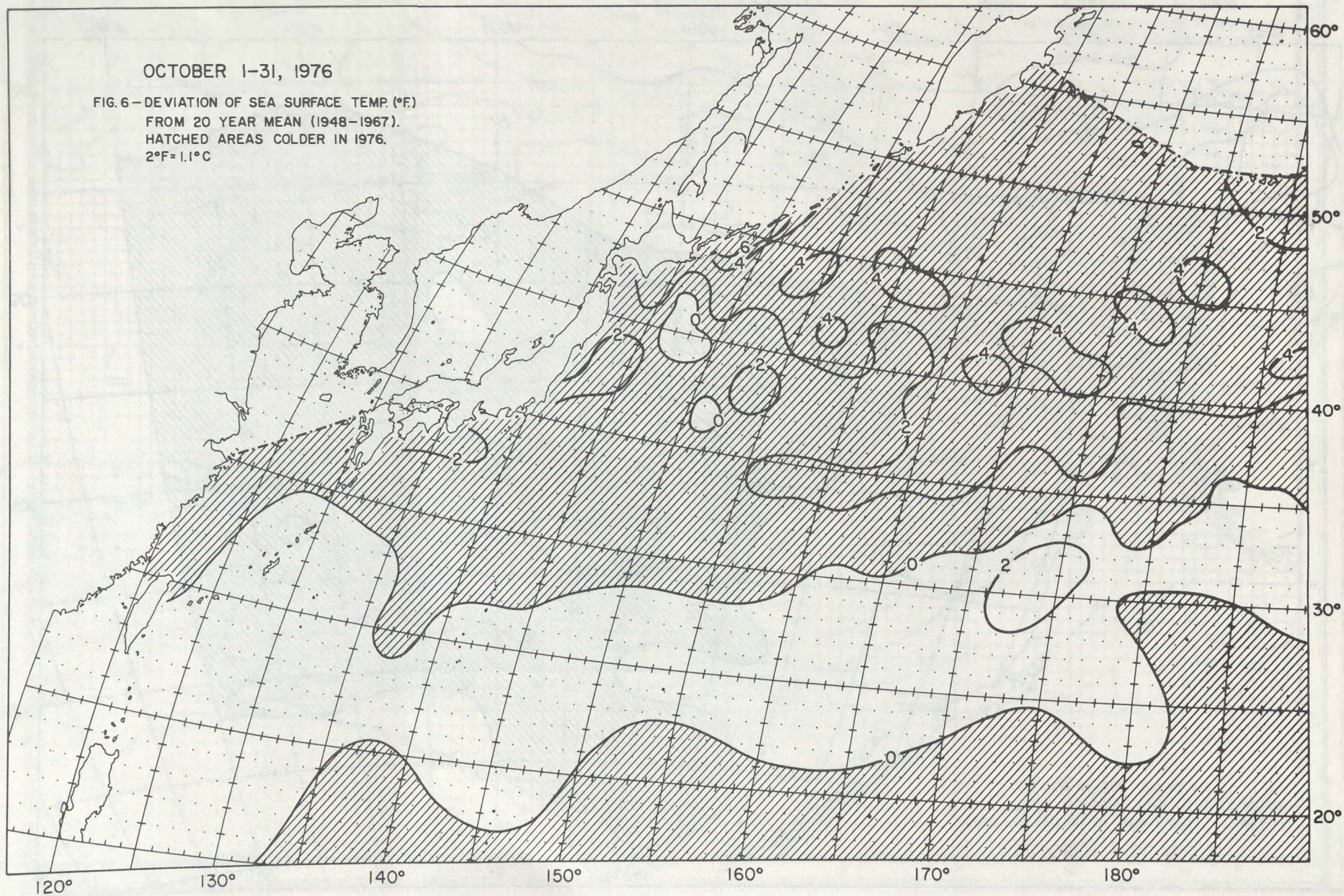
OCTOBER 1-31, 1976

FIG. 5-- DEVIATION OF SEA SURFACE TEMP. (°F.)  
FROM 20 YEAR MEAN (1948-1967).  
HATCHED AREAS COLDER IN 1976.  
2°F = 1.1°C



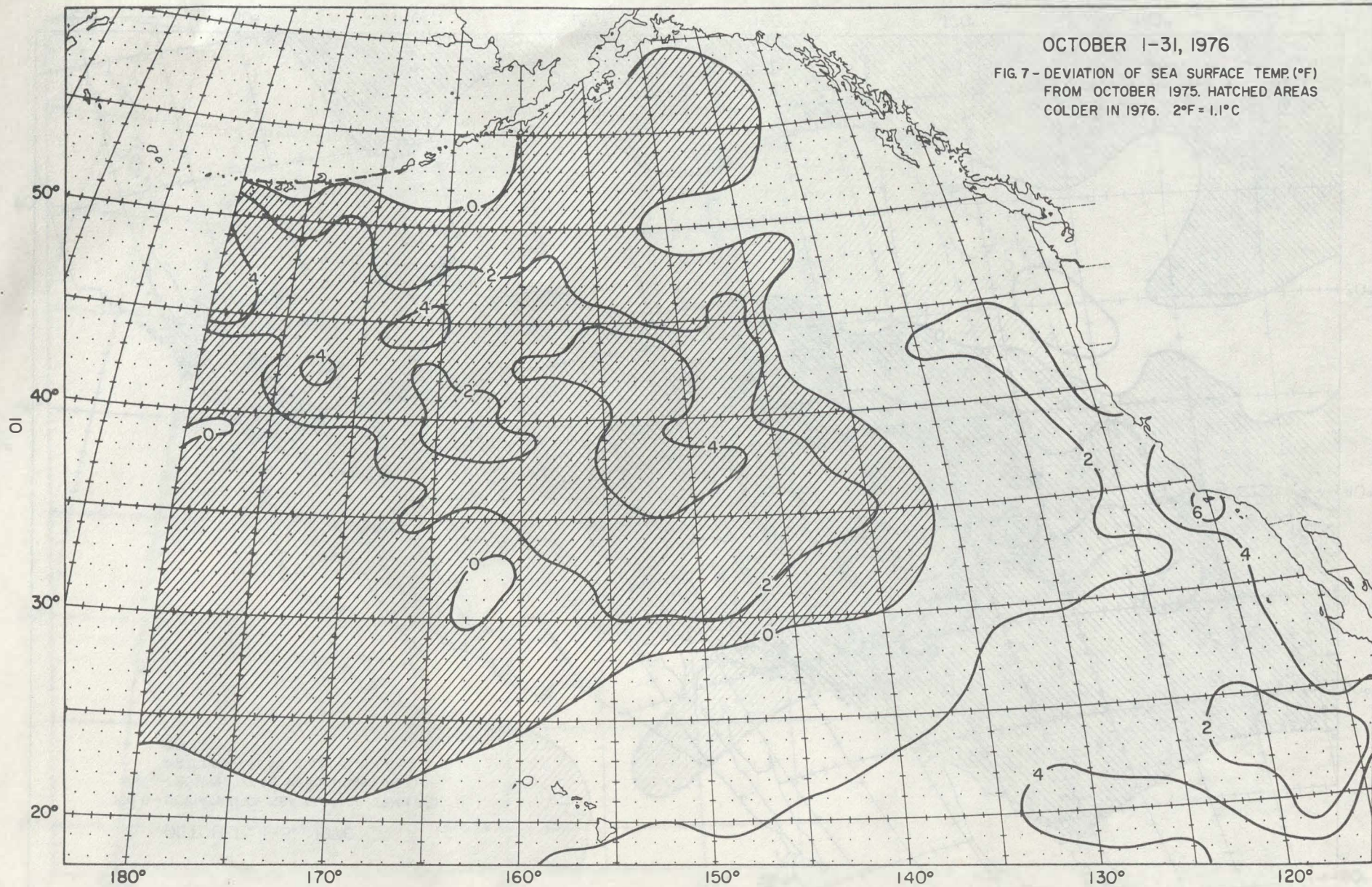
OCTOBER 1-31, 1976

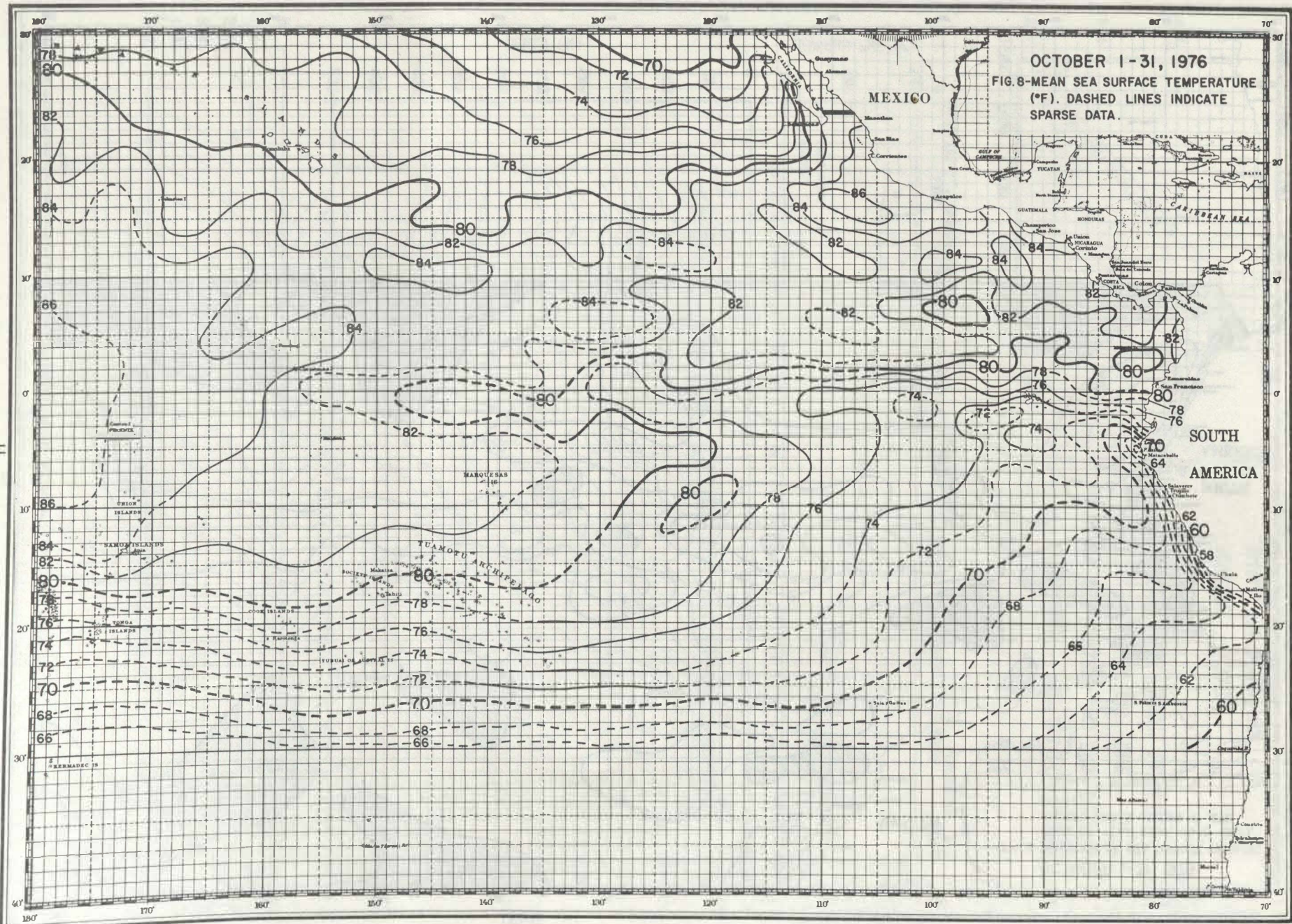
FIG. 6 - DEVIATION OF SEA SURFACE TEMP (°F)  
FROM 20 YEAR MEAN (1948-1967).  
HATCHED AREAS COLDER IN 1976.  
2°F = 1.1°C



OCTOBER 1-31, 1976

FIG. 7 - DEVIATION OF SEA SURFACE TEMP. (°F)  
FROM OCTOBER 1975. HATCHED AREAS  
COLDER IN 1976. 2°F = 1.1°C





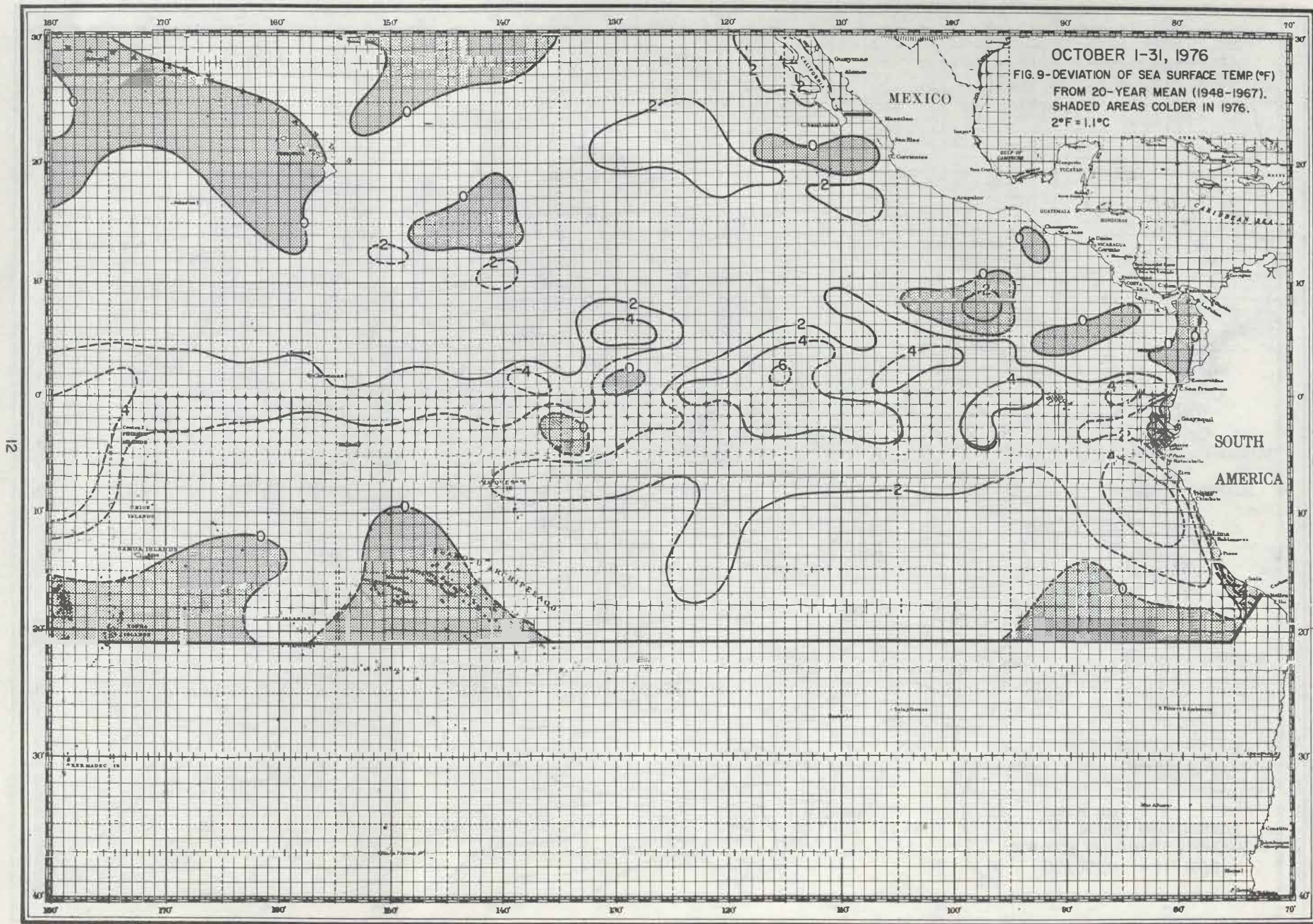
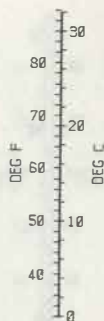
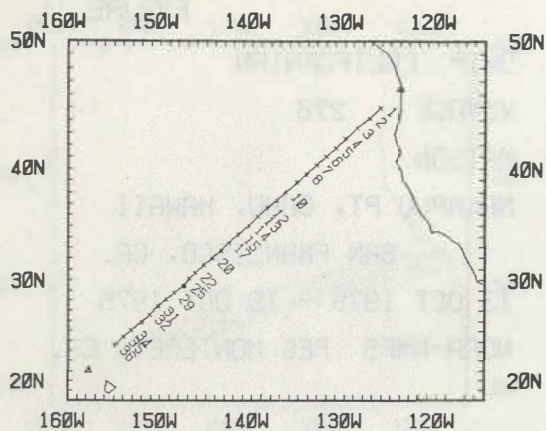


FIGURE 10



SHIP CALIFORNIAN  
 VOYAGE 276  
 MATSON  
 MAKAPUU PT, OAHU, HAWAII  
 - PORTLAND, ORE.  
 04 OCT 1976 - 10 OCT 1976  
 NOAA-NMFS PEG MONTEREY, CA.

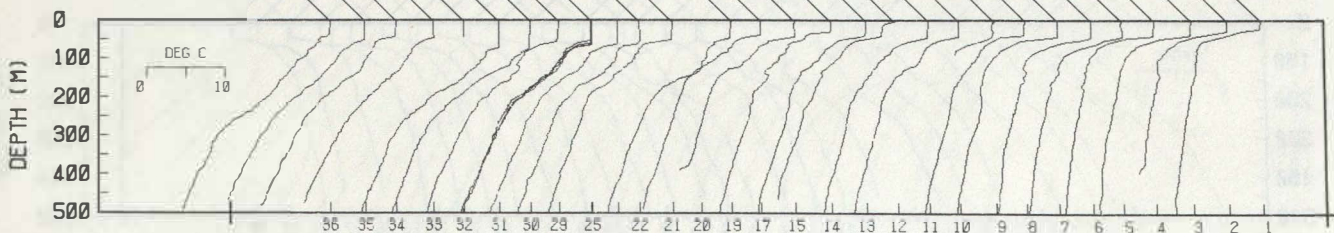
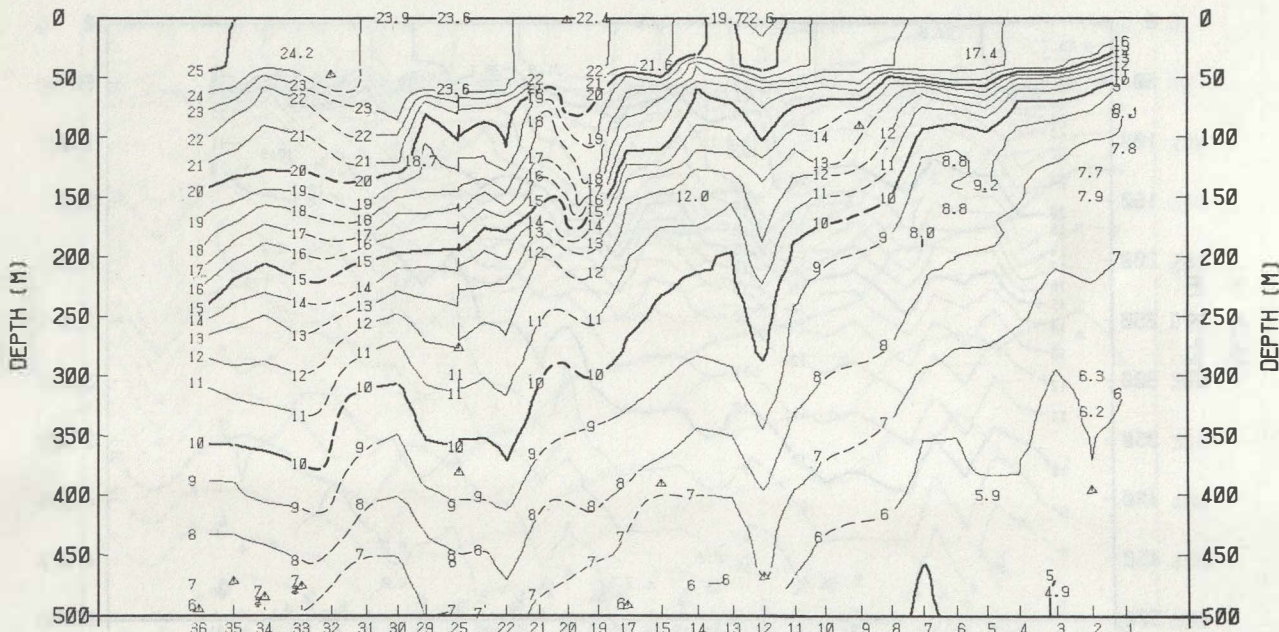
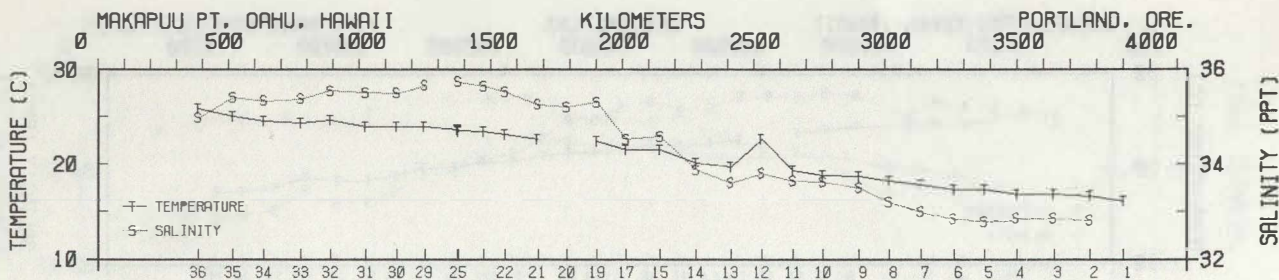
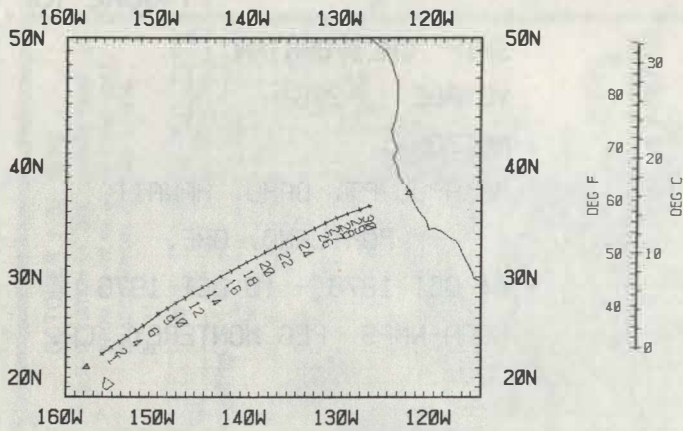


FIGURE 11



SHIP CALIFORNIAN  
 VOYAGE 276  
 MATSON  
 MAKAPUU PT, OAHU, HAWAII  
 - SAN FRANCISCO, CA.  
 13 OCT 1976 - 19 OCT 1976  
 NOAA-NMFS PEG MONTEREY, CA.

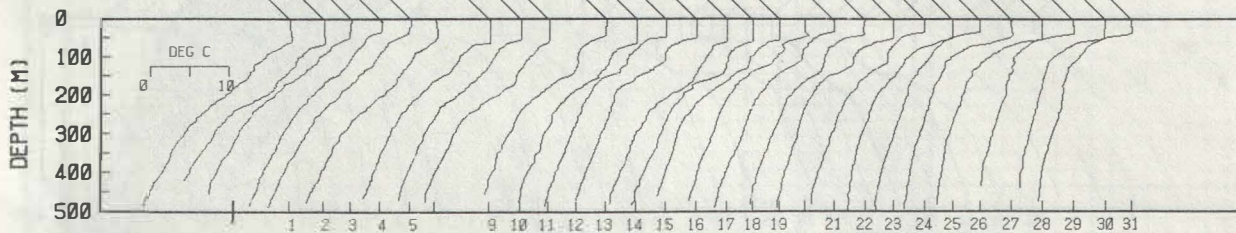
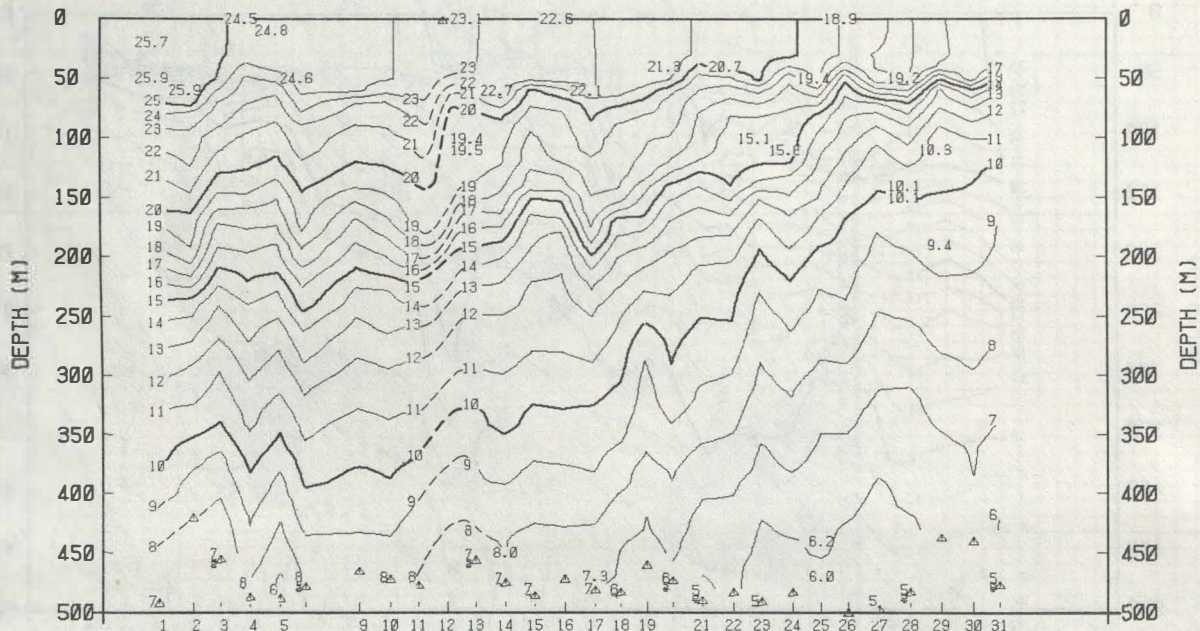
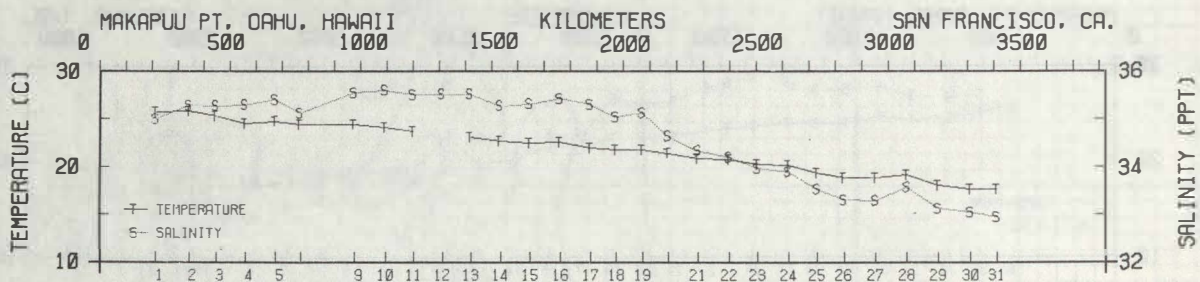
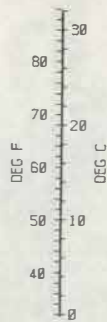
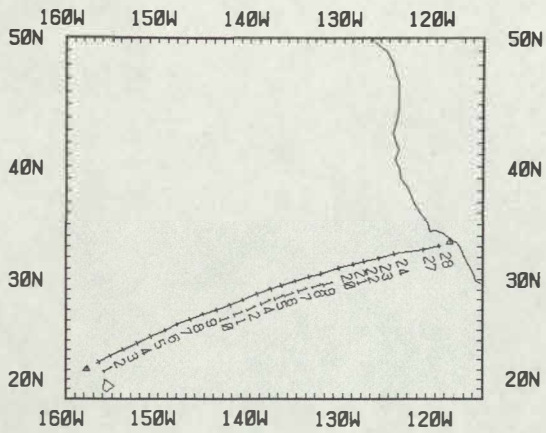


FIGURE 12



SHIP HAWAIIAN ENTERPRISE  
 VOYAGE 151  
 MATSON  
 MAKAPUU PT, OAHU, HAWAII  
 - LOS ANGELES, CA.  
 06 OCT 1976 - 11 OCT 1976  
 NOAA-NMFS PEG MONTEREY, CA.

