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Sea Surface Temperatures in the Northwestern Atlantic in 1982

by

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Sea surface temperature (SST) data, principally collected from cooling water intakes of merchant ships, are reported in radio weather messages and log books transmitted to the U.S. Fleet Numerical Oceanography Center (FNOC) and the National Climatic Center for processing and archiving. The "real-time" reports of the data base provided by the radio messages are analyzed by FNOC and the Pacific Environmental Group of the National Marine Fisheries Service, which is co-located with FNOC. An elementary step in the analysis is the computation of average monthly temperatures and anomalies (from 1948-67 means) for each 1° x 1° square for which enough data have been reported each month. The average SST's, anomalies and number of observations are then printed in the 1° x 1° squares they characterize to produce a map such as the one shown in figure 1. To facilitate interpretation of the data, anomalies greater than +1°C or less than -1°C are shaded.

Sea surface temperatures in the first quarter of 1982, (Figs. 1, 2, and 3) were anomalously cold in the Middle Atlantic Bight (west of 72°W), continuing a trend which began in this area in the fall of 1981. By April this area of negative anomalies had decreased considerably in extent and intensity.

In the Gulf of Maine (42-44°N, 66-70°W) an area of warmer than usual water appeared in April and May (Figs. 4 and 5). During this period, the coastal weather station at Portland, Maine (43.7°N) observed above-normal air temperatures, with anomalies ranging up to +13°F during the last half

of April and up to +6°F during the first half of May. At the same time, winds frequently were from the SE-SW quadrant, bringing warm air into the region. The pattern of positive SST anomalies reappeared in this area in October-December. Although the December data are rather sparse and it is difficult to define the extent of the positive anomaly pattern, it probably was present then because January 1983 data show it to be well-developed at that time.

Sea surface temperature data collected in the 40-41°N, 68-69°W one-degree square are more abundant than in other areas because of six-hourly SST reports taken from the hull thermistor of a NOAA meteorological buoy moored in about 50 m of water on southwestern Georges Bank since 1978. As a consequence, the total number of observations recorded for that 1° square in a month may exceed 600 and thus represent a more significant recent time series than the data from other squares. During 1982, the data from this square (Table 1) showed the surface water to be cooler than the long-term average in every month, with SST anomalies ranging from -5.1°C in July to -0.1°C in December. The negative anomalies recorded in this square during 1982 were more intense in the summer and early fall months than in 1980 and 1981, but less intense in November and December.

Pooled average SST anomalies for the entire area north of 35 N and west of 60 W (Table 2) were weakly negative for January-April, June-August, and December. All of the anomalies were much smaller than the monthly standard deviations.

The algebraic sum of the twelve monthly area mean anomalies yields a rough index of how anomalous the sea surface temperature was for the year in the area of the northwestern Atlantic. The algebraic sum for 1982 was -1.66°C, which is less negative than in 1978, 1980, and 1981 (-2.82, -1.85, and -3.53°C), but more negative than in 1979 (0.70).

In order to characterize the spatial (SW to NE) and temporal gradients of SST anomalies during the course of 1982, monthly anomalies from fifteen one-degree squares (Fig. 13) were plotted on a space-time grid (Fig. 14). The most striking feature in this portrayal is the broad scale negative anomaly pattern in December 1981 and January 1982, which diminshed in scale and intensity during the rest of the year. This anomaly pattern persisted the longest in quadrangle 6 (40-41°N, 69-70°W).

Table 1. Average monthly sea surface temperature anomalies (°C) for 1980-82 in the one-degree quadrangle defined by 40-41°N, 68-69°W on Southwestern Georges Bank.

	1980		1981		1982	
MONTH	NUMBER OBS	SST ANOM.	NUMBER OBS	SST ANOM.	NUMBER OBS	SST ANOM.
JAN	180	-0.7	231	-3.1	212	-2.5
FEB	163	-2.1	224	-2.4	32	-1.3
MAR	195	-2.1	244	-1.4	314	-1.2
APR	177	-1.0	223	-0.6	623	-1.4
MAY	201	-2.1	236	-1.8	579	-2.1
JUN	134	-3.9	233	-3.3	640	-4.0
JUL	48	-3.6	236	-4.9	637	-5.1
AUG	59	-3.9	235	-4.9	674	-4.5
SEP	111	-0.2	225	-2.2	653	-3.0
OCT	202	-1.4	244	-2.0	681	-2.2
NOV	203	-1.3	245	-1.4	694	-0.2
DEC	246	-1.9	240	-2.0	410	-0.1

Table 2. Monthly mean sea surface temperature anomalies (°C) from the 1948-1967 monthly means for 1982 in the Northwestern Atlantic Ocean (35°-46°N, 60°-76°W).

MONTH	NUMBER OF 1 SQUARES	SST ANOM. (C)	1948-67 STAN DEV.
JAN	118	-0.78	1.26
FEB	95	-0.37	1.23
MAR	105	-0.11	1.49
APR	119	-0.12	1.51
MAY	111	0.10	1.22
JUN	129	-0.20	0.91
JUL	120	-0.12	0.89
AUG	123	-0.44	0.85
SEP	126	0.11	0.89
OCT	124	0.04	0.95
NOV	119	0.25	0.90
DEC	81	-0.02	0.91

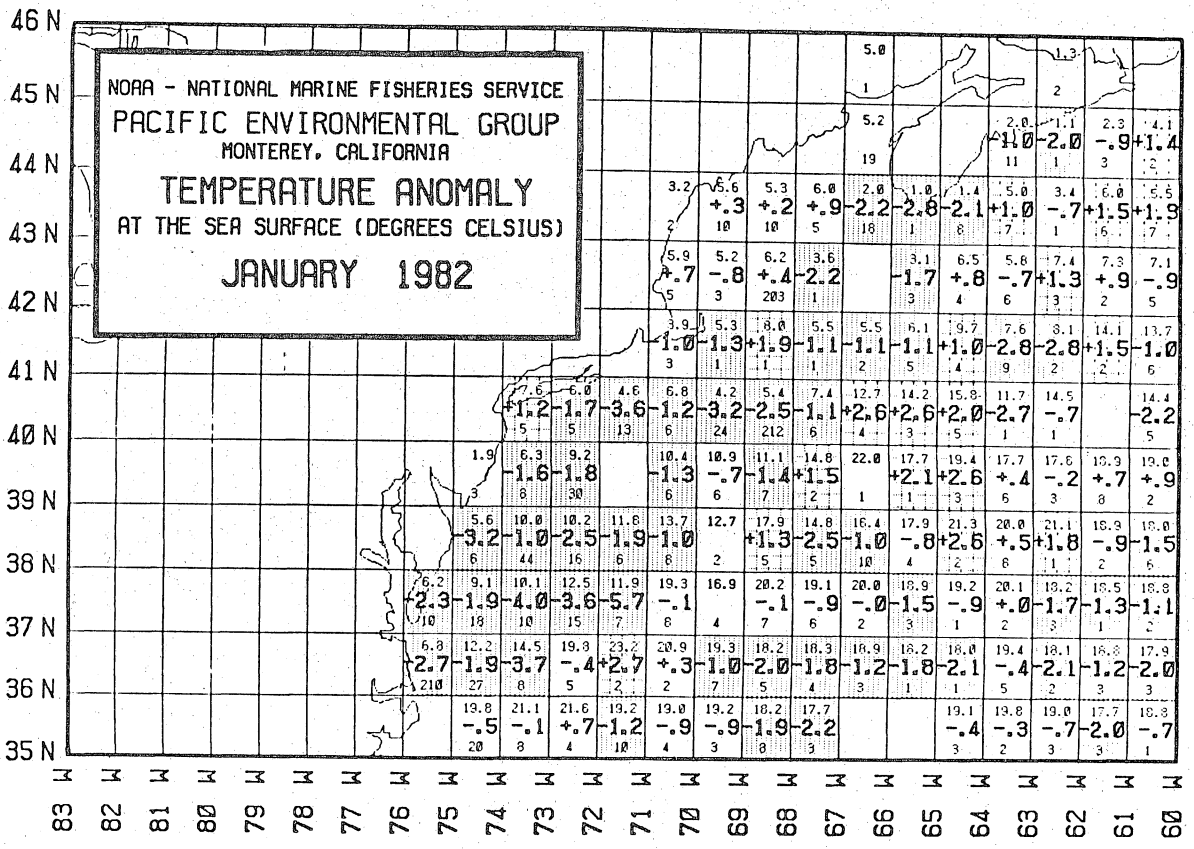

Figure 1. Average sea surface temperature anomalies (°C) for January 1982. Also shown in each 1° square are average sea surface temperatures (upper number) and the number of observations (lower number).

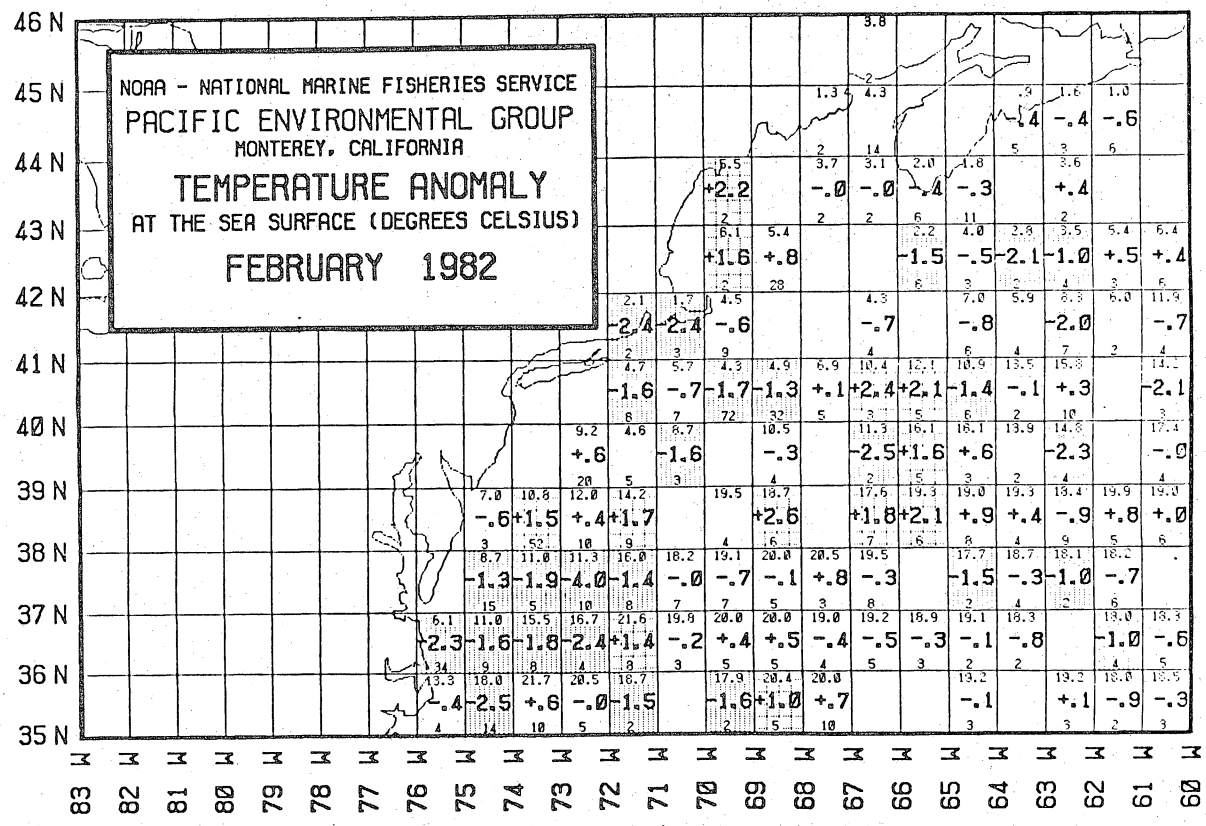

Figure 2. Average sea surface temperature anomalies (°C) for February 1982. Also shown in each 1° square are average sea surface temperatures (upper number) and the number of observations (lower number).

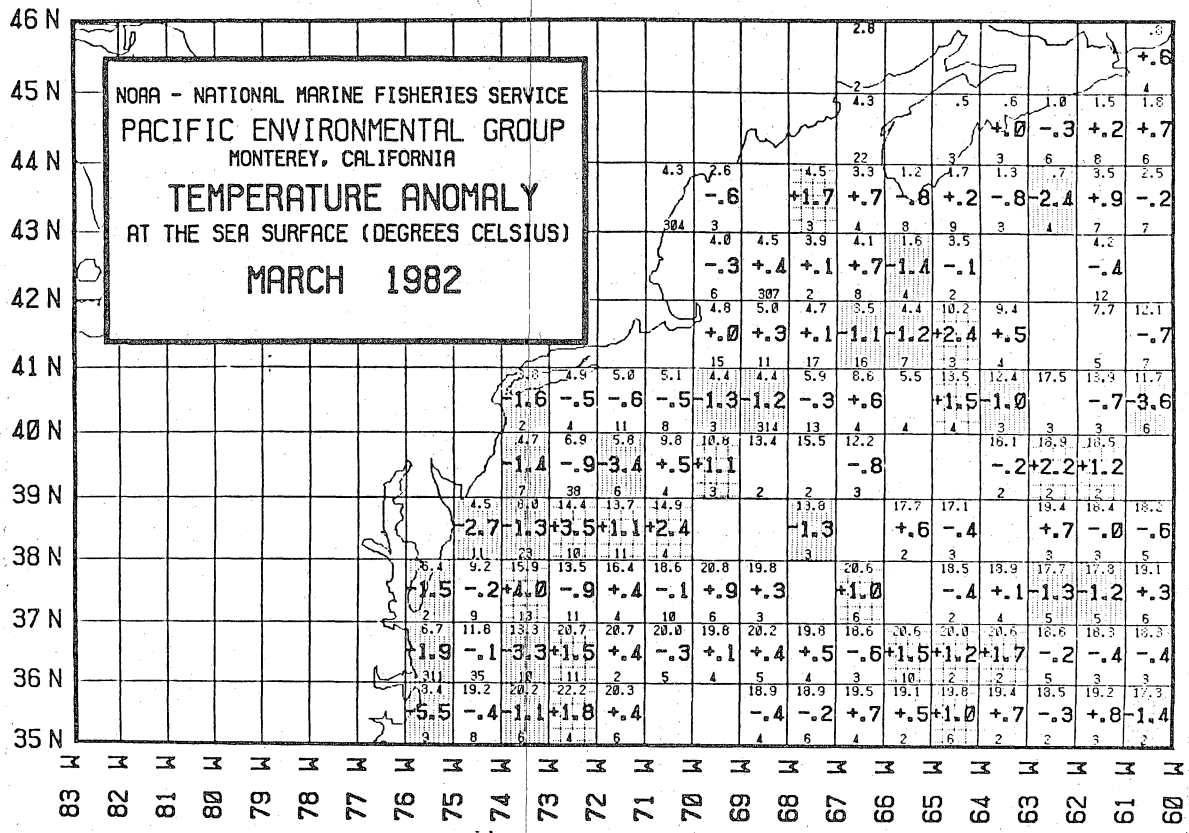

Figure 3. Average sea surface temperature anomalies (°C) for March 1982. Also shown in each 1° square are average sea surface temperatures (upper number) and the number of observations (lower number).

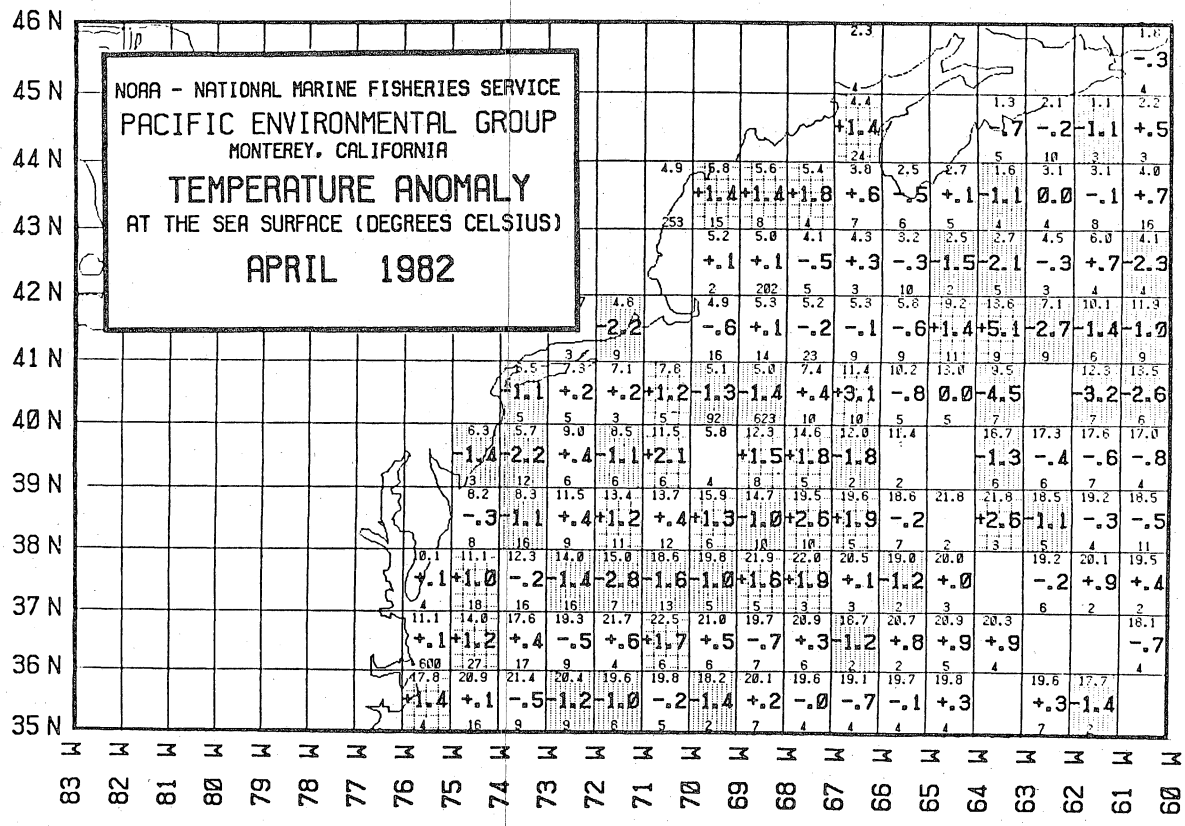

Figure 4. Average sea surface temperature anomalies (°C) for April 1982. Also shown in each 1° square are average sea surface temperatures (upper number) and the number of observations (lower number).

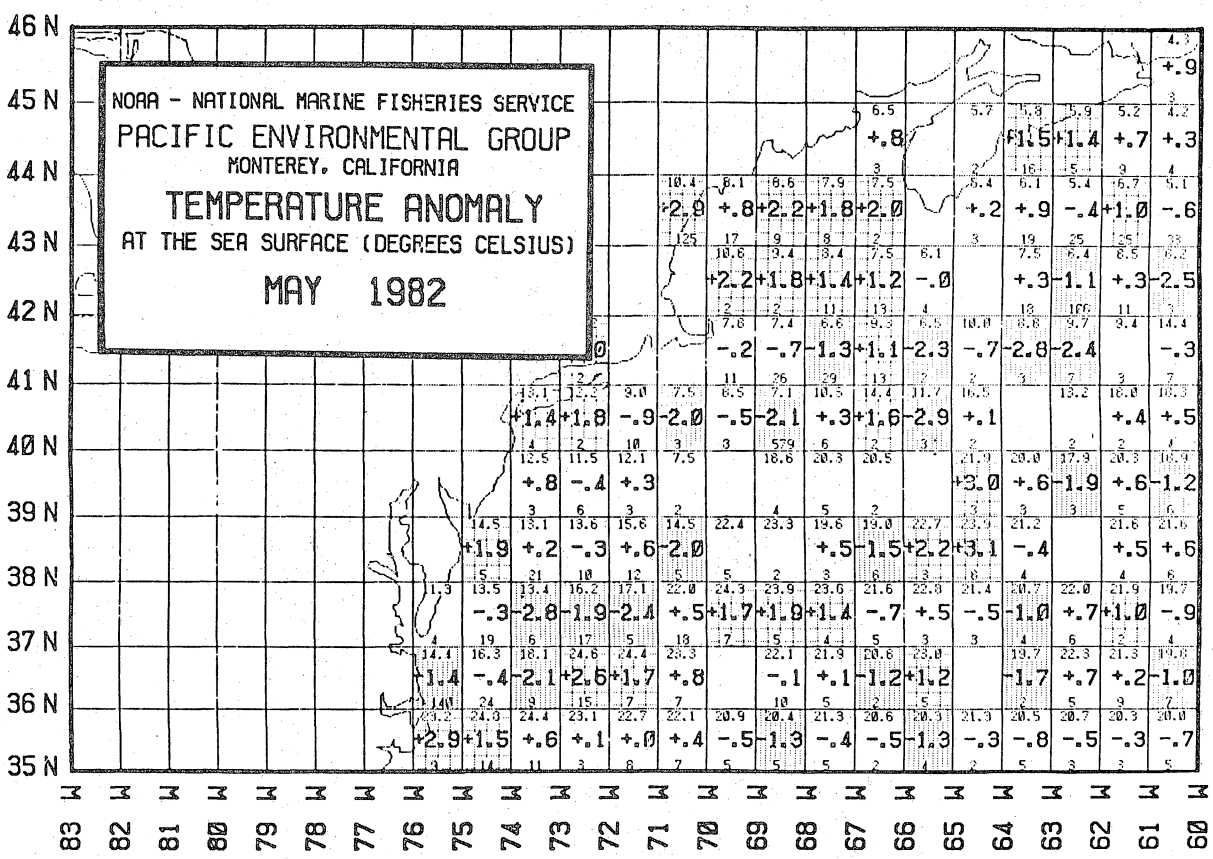

Figure 5. Average sea surface temperature anomalies (°C) for May 1982. Also shown in each 1° square are average sea surface temperatures (upper number) and the number of observations (lower number).

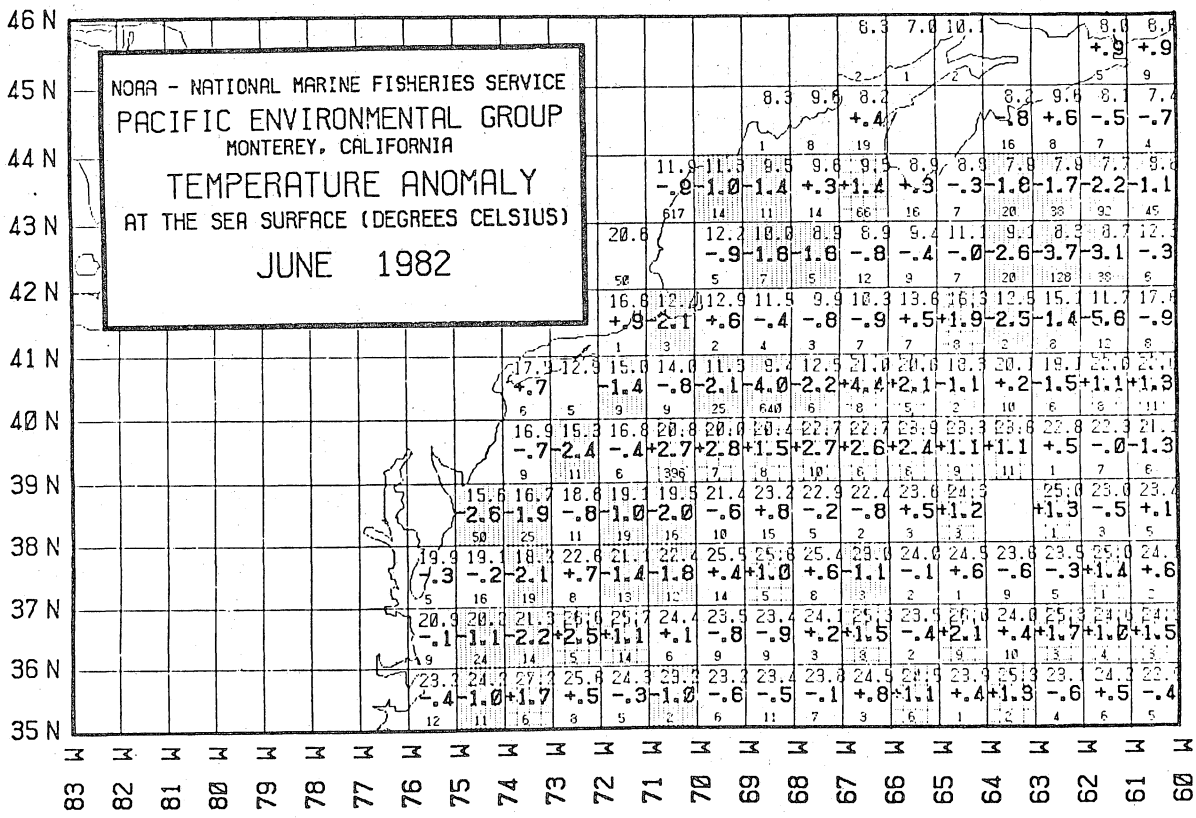

Figure 6. Average sea surface temperature anomalies (°C) for June 1982. Also shown in each 1° square are average sea surface temperatures (upper number) and the number of observations (lower number).

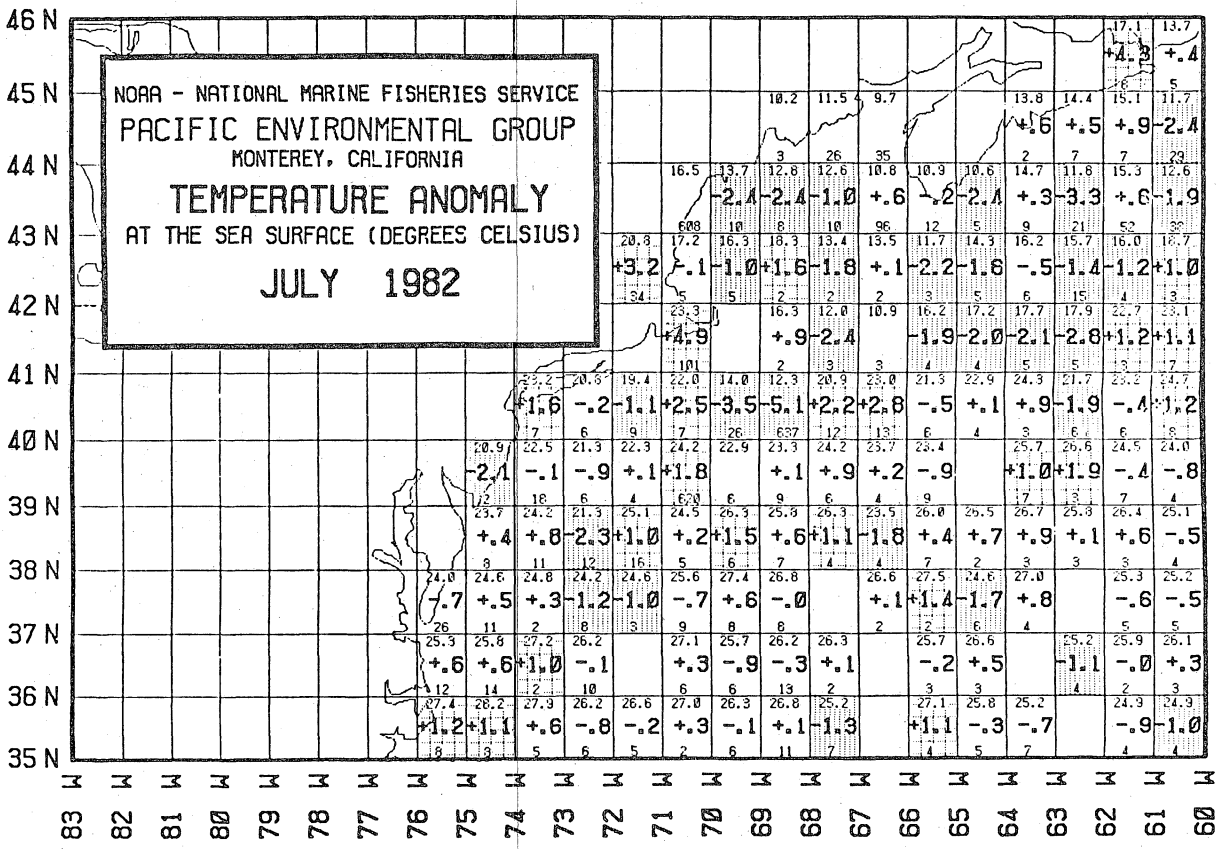

Figure 7. Average sea surface temperature anomalies (°C) for July 1982. Also shown in each 1° square are average sea surface temperatures (upper number) and the number of observations (lower number).

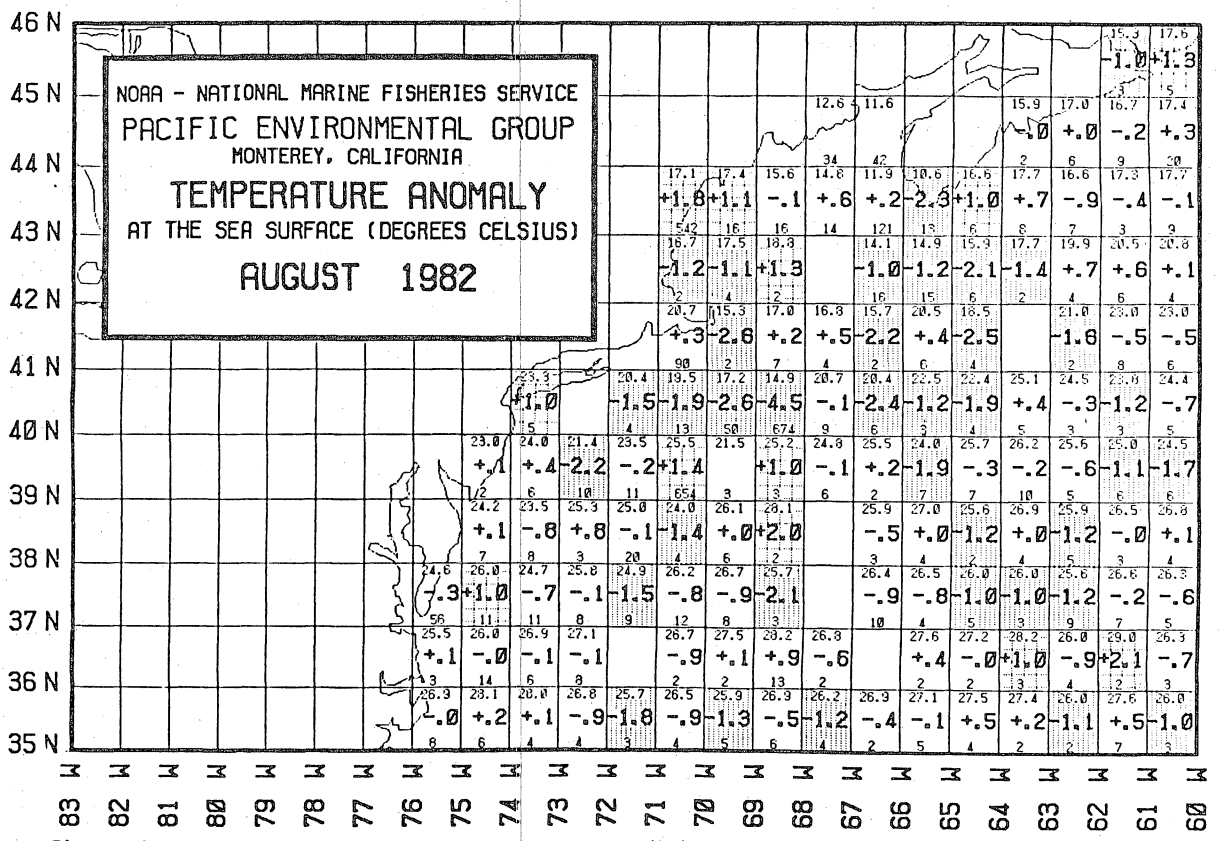

Figure 8. Average sea surface temperature anomalies (°C) for August 1982. Also shown in each 1° square are average sea surface temperatures (upper number) and the number of observations (lower number).

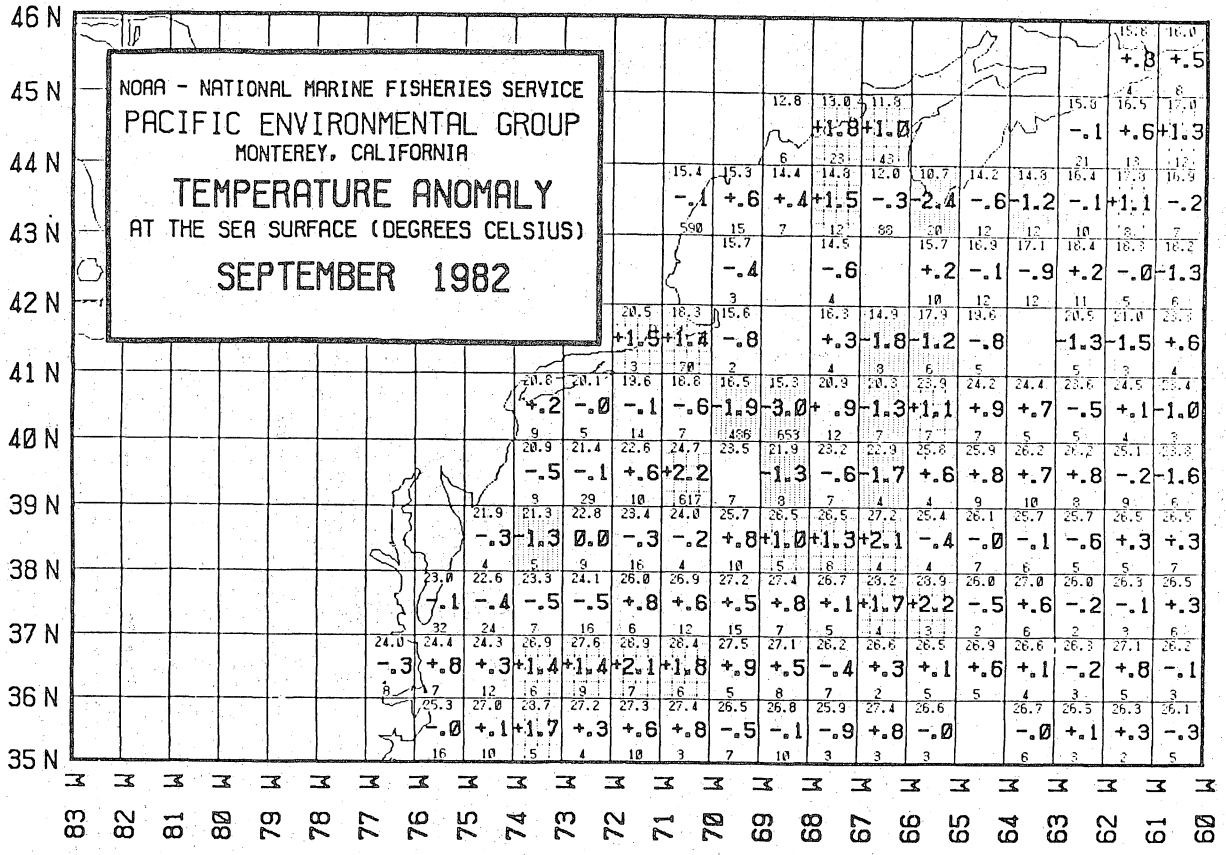

Figure 9. Average sea surface temperature anomalies (°C) for September 1982. Also shown in each 1° square are average sea surface temperatures (upper number) and the number of observations (lower number).

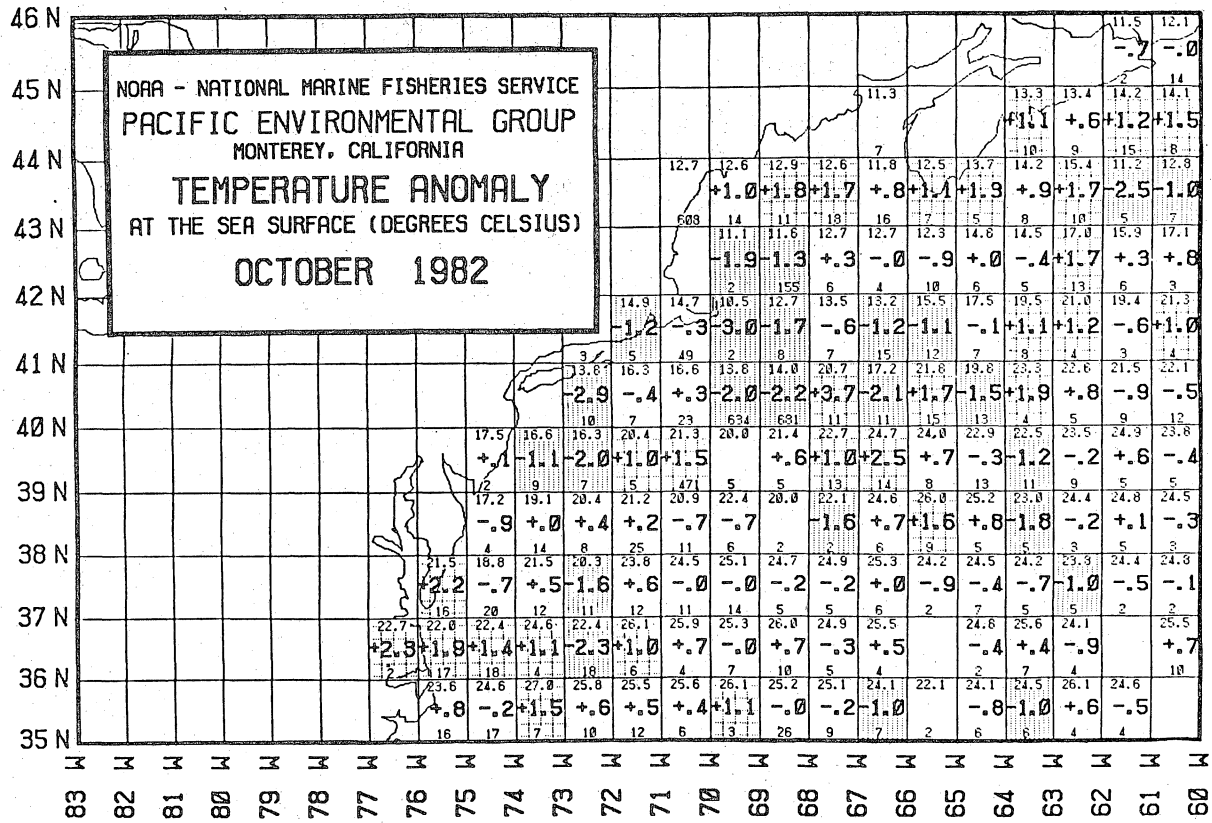

Figure 10. Average sea surface temperature anomalies (°C) for October 1982. Also shown in each 1° square are average sea surface temperatures (upper number) and the number of observations (lower number).

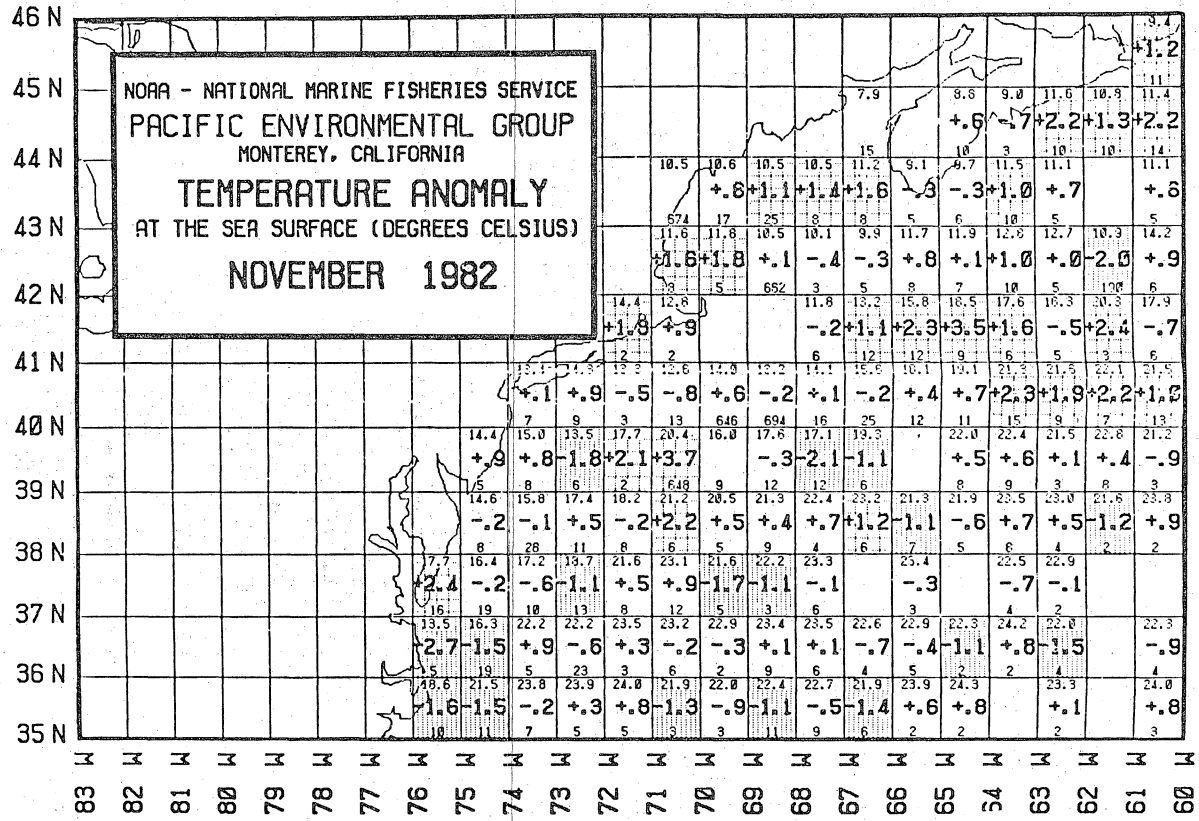

Figure 11. Average sea surface temperature anomalies (°C) for November 1982. Also shown in each 1° square are average sea surface temperatures (upper number) and the number of observations (lower number).

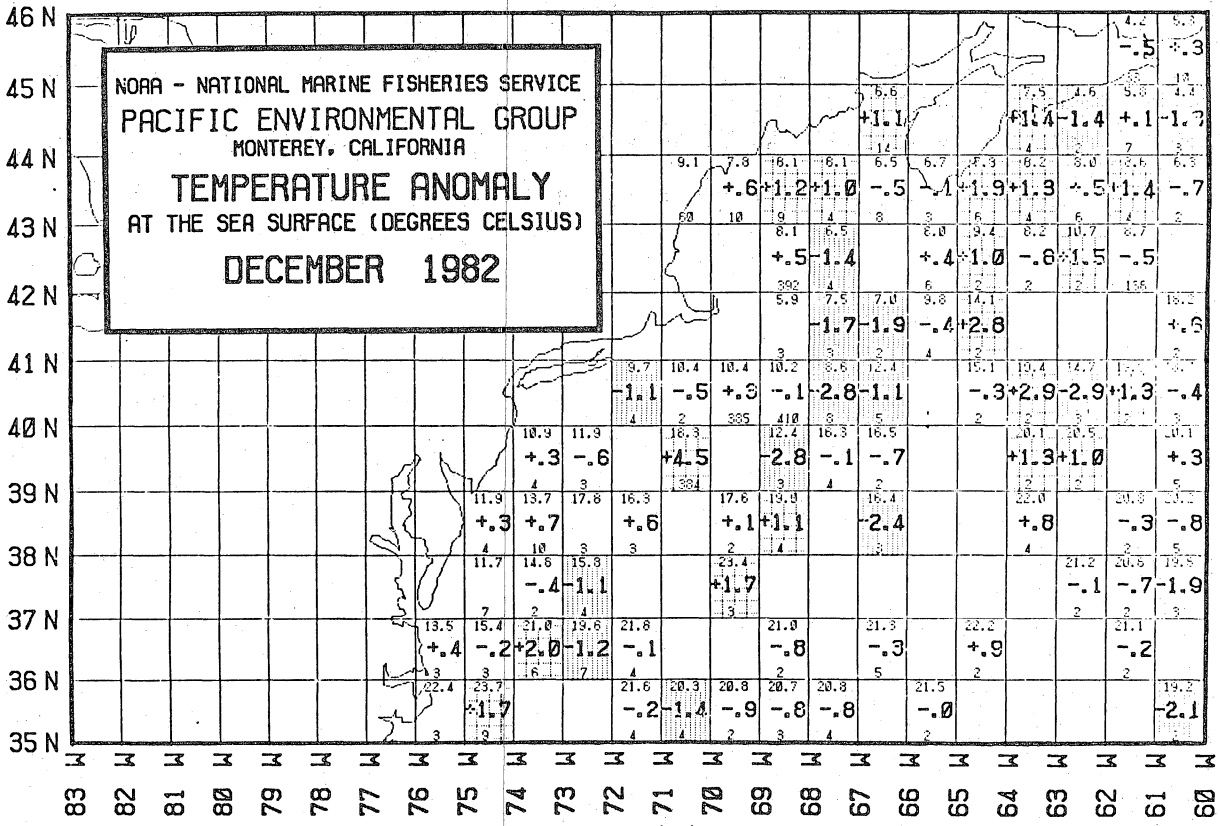

Figure 12. Average sea surface temperature anomalies (°C) for December 1982. Also shown in each 1° square are average sea surface temperatures (upper number) and the number of observations (lower number).

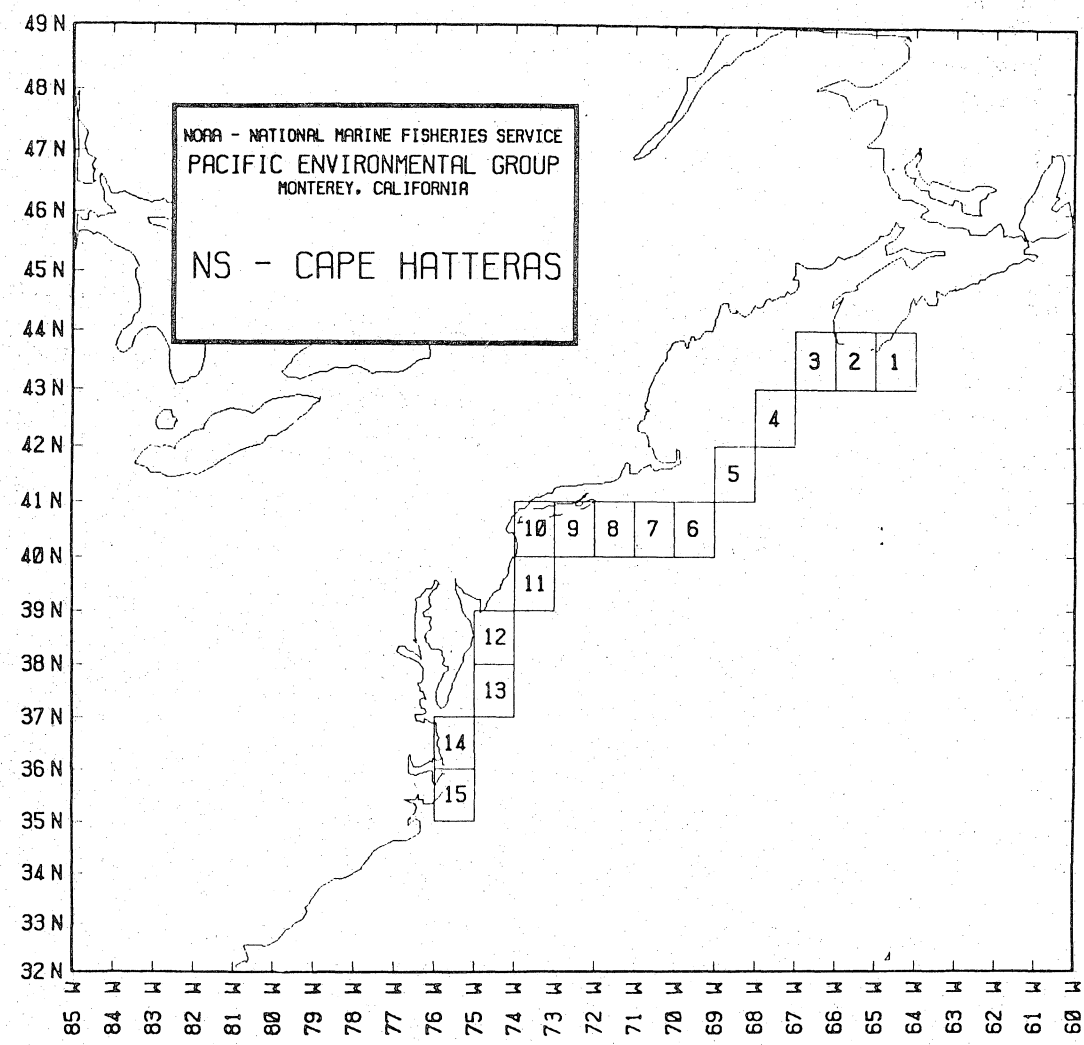

Figure 13. Location of one-degree squares of interest utilized in figure 14.

1982

	D	J	F	M	A	M	J	J	A	S	O	N	D
1 43 N 64 W	-.4 5	-2.1 6	-.3 11	0.2 9	0.1 5	0.2 3	-.3 7	-2.4 3	1.0 5	-.6 12	1.3 5	-.3 6	1.3 6
2 43 N 65 W	-.4 6	-2.0 1	-.4 6	-.0 8	-.5 6		0.3 16	-.2 12	-2.3 19	-2.4 20	1.1 7	-.3 5	-.1 3
3 43 N 66 W	-.1 12	-2.2 18	-.0 2	0.7 4	0.6 7	2.0 2	1.4 66	0.6 96	0.2 121	-.3 88	0.0 16	1.6 8	-.5 8
4 42 N 67 W	-2.9 1	-2.2 1	1.9 1	0.1 2	-.5 5	1.4 11	-1.6 5	-1.0 2	-.6 1	-.6 4	0.3 6	-.4 3	-1.4 4
5 41 N 68 W	-1.0 1	1.9 1		0.3 11	0.1 14	-.7 26	-.4 4	0.9 2	0.2 7	0.9 1	-1.7 0		
6 40 N 69 W	-.4 10	-3.2 24	-1.7 72	-1.3 3	-1.3 92	-.5 8	-2.1 25	-3.5 26	-2.6 50	-1.9 488	-2.0 634	0.6 646	0.3 385
7 40 N 70 W	-2.1 31	-1.2 6	-.7 7	-.5 8	1.2 5	-2.0 3	-.8 9	2.5 7	-1.9 13	-.6 7	0.3 23	-.8 13	-.5 2
8 40 N 71 W	-1.4 7	-3.6 13	-1.6 8	-.6 11	0.2 3	-.9 10	-1.4 9	-1.1 9	-1.5 4	-.1 14	-.4 7	-.5 3	-1.1 4
9 40 N 72 W	-2.9 2	-1.7 9		-.5 4	0.2 5	1.0 2		-.2 6	0.0 1	-.1 5	-2.9 10	0.9 9	
10 40 N 73 W		1.2 5	0.6 1	-1.6 2	-1.1 5	1.4 4	0.7 6	1.6 7	1.0 5	0.2 9	2.4 1	0.1 7	0.6 1
11 39 N 73 W	-1.0 8	-1.6 8	0.6 1	-1.4 7	-2.2 12	0.0 3	-.7 9	-.1 18	0.4 6	-.5 3	-1.1 9	0.0 8	0.3 4
12 38 N 74 W	-1.7 9	-3.2 6	-.6 3	-2.7 11	-.3 0	1.9 5	-2.7 50	0.4 8	0.1 7	-.3 4	-.9 4	-.2 8	0.3 4
13 37 N 74 W	-2.0 23	-1.9 18	-1.3 15	-.2 9	1.0 18	-.3 19	-.2 16	0.5 11	1.0 11	-.4 24	-.7 20	-.2 19	-.9 7
14 36 N 75 W	-3.8 218	-2.7 218	-2.3 34	-1.9 311	0.1 600	-1.4 140	-.1 9	0.6 12	0.1 3	0.0 7	1.9 17	-2.7 5	0.4 3
15 35 N 75 W	3.1 0		-.4 4	-5.5 9	1.4 4	2.9 9	-.4 12	1.2 8	-.0 8	-.0 16	0.0 16	-1.6 10	

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Figure 14. Space-time plot of sea surface temperature anomalies (°C) for 1982. Also shown are the numbers of observations utilized (lower left corner of squares). Location of one-degree squares (1-15) shown in figure 13.