

POLYMODE

NEWS

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B.I.O. MOORED EXPERIMENT AT 50°W by Ross Hendry

The Ocean Circulation Group at the Bedford Institute of Oceanography (B.I.O.) plans to obtain one year of moored current and temperature measurements at a three-point array in the deep ocean near 38°N and 50°W. A triangular array (50 km per side) which would allow spatially coherent measurements of mesoscale eddy motions is proposed, with instruments at 4000 and 4750 m in 5400 m water depth. The array will be deployed in May 1977, recovered and reset in November 1977, and finally recovered later in 1978.

The purpose of the proposed experiment is to measure propagation characteristics of deep eddies in the most energetic deep eddy regime. Measurements made by W.H.O.I. along both 70°W and 55°W have shown that the eddy regime is displaced southward of the northern edge of the surface Gulf Stream. Quantitative estimates of the dominant scales of propagation could provide important feedback to eddy-resolving general circulation models, for example. This experiment should also provide meaningful estimates of deep eddy kinetic energy, $u'-v'$ correlations and mean flows. It is a local experiment rather than a geographical exploration, but could provide eddy information about a relatively unexplored area as well.

TEMPERATURE AND PRESSURE MEASUREMENTS FROM POLYMODE ARRAY II by Carl Wunsch

Array II, consisting of twelve moorings placed in the near- and under-Gulf Stream region for 27 months, is one of the major elements of POLYMODE. The array contains three settings with each setting in place for nine months. Some results from the first setting have been described previously (Schmitz, 1977). The second setting was recovered in October 1976 and data is now available from the first two settings. The mooring distribution in the array is shown in Figure 1. Moorings contain both Woods Hole Oceanographic Institution current meters and M.I.T./Draper Lab T/P recorders. This note is confined to a brief discussion of some of the results of the T/P recorders. Overall responsibility for array II rests with Bill Schmitz (W.H.O.I.).

The northernmost moorings are under the mean path of the Gulf Stream and extend only to 4000 m. The southern cluster is in the region now believed to be a recirculation area for the Gulf Stream. These moorings extend to nominal depths of 500 m. To give some idea of the character of the data, Figure 2 shows the raw (that is, unaveraged) temperature and pressure data from moorings at the northern (4000 m) and southern (3200 m) extremities of the second setting of the

(continued page 3)

NOTES from the Editor

In May 1977, Bill Simmons (POLYMODE Executive Scientist) will take up a new post as Oceanographic Program Scientific Officer for the First GARP Global Experiment at the GARP Activities Office in Geneva, Switzerland (World Meteorological Organization, Case Postale 5, CH-1211 Geneva 20, Switzerland). Bill joined MODE as Executive Officer in the fall of 1973 and worked on coordinating MODE-I scientific reporting (the University of Rhode Island Summer Institute), assembling the early summary reviews of MODE-I, and developing the scientific plan for POLYMODE (U.S. POLYMODE Program and Plan). His duties end with MODE in the drafting of the long-awaited manuscript on the MODE-I summary results.

The bulk of the scientific planning for POLYMODE has been completed and the execution phase is upon us. This is an opportune moment for Bill to embark on a new assignment. Good luck, Bill.

--F. W.

POLYMODE OFFICE NOTES

The deadline for formal submission of proposals to IDOE for the mid-August panel review is 24 June, 1977. Proposals considered at that time would be for funding in October.

 Additional copies of the U. S. POLYMODE Program and Plan are available upon request from the POLYMODE Executive Office, Building 54-1417, M.I.T., Cambridge, MA 02139.

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The POLYMODE* News is produced at the Woods Hole Oceanographic Institution. It is edited by Ferris Webster and Catherine Herrity.

Material of interest for this newsletter may be sent to either of the above at the Woods Hole Oceanographic Institution, Woods Hole, MA, 02543, Telephone (617) 548-1400, Telex 710-346-6601.

*POLYMODE is derived from the names of the U.S.S.R. POLYGON experiments and the Mid-Ocean Dynamics Experiment (MODE).

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TEMPERATURE AND PRESSURE MEASUREMENTS
FROM POLYMODE ARRAY II (continued)

array. A general shortening of the energy dominant period can be seen going north from the southern part of the array out of the circulation region up toward the Gulf Stream system. Pressure may be thought of as varying with the fourth power of the velocity over the mooring. Some difficulty was had with exceedingly large excursions of moorings in the near Gulf Stream region.

Figures 3 and 4 display the low-passed temperature (and pressure) as a function of time on mooring 583, and a feeling for the vertical structure of the motion in the cluster area at about 35°N can be seen. Some vertical coherence over the water column is apparent. There seems to be more energy in scales of about 50 days in contrast to the MODE-I region.

The low-passed temperature and pressure at 800 m from the southern part of the array is displayed in Figures 5 and 6. There is a considerable visual resemblance between the records for those moorings in the cluster. The increase in energy and decrease in time scale from south to north across the array is also obvious. Figures 7 and 8 show the full 18-month filtered temperature and pressure records from three positions within array II. In the 5622-5752 (Figure 8) pair, an arbitrary

0.1°C offset has been made in one of the records to compensate for what appears to be a calibration error (origin unknown). The very large pressure event apparent in record 55711 (Figure 7b) near year day 345 of 1975 apparently corresponds to the presence of a large branch of the Gulf Stream passing through the array as described by Richardson in POLYMODE News No. 8. The event is obvious in all of the moorings in that region.

As a final comparison at this early stage of array II, Figure 9 displays the spectra of temperature and pressure in the main thermocline from MODE center (mooring 542), from the POLYMODE east region of array I (latitude 28°, longitude 50°, mooring 546) and from the central cluster of array II (mooring 583). The very large offset in energy levels is obvious and is not accounted for simply by the change in stratification. A large increase in mooring motion is also obvious from the pressure spectrum.

The third setting of array II will be recovered in May-June 1977.

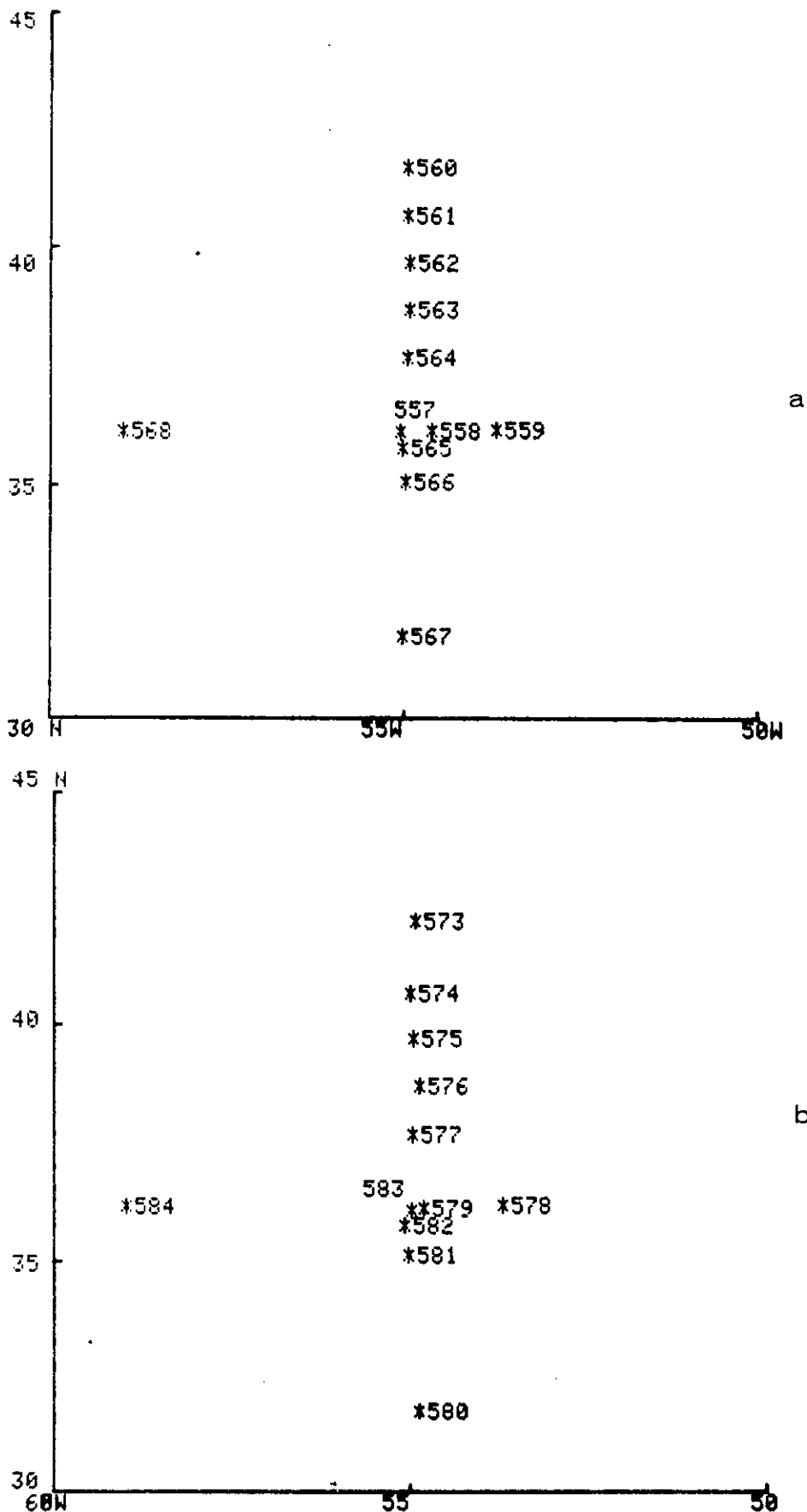
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Schmitz, Jr., W. J. (1977) On the deep general circulation in the western North Atlantic. J. Mar. Res., 35(1), 21-28.

CONTRIBUTORS

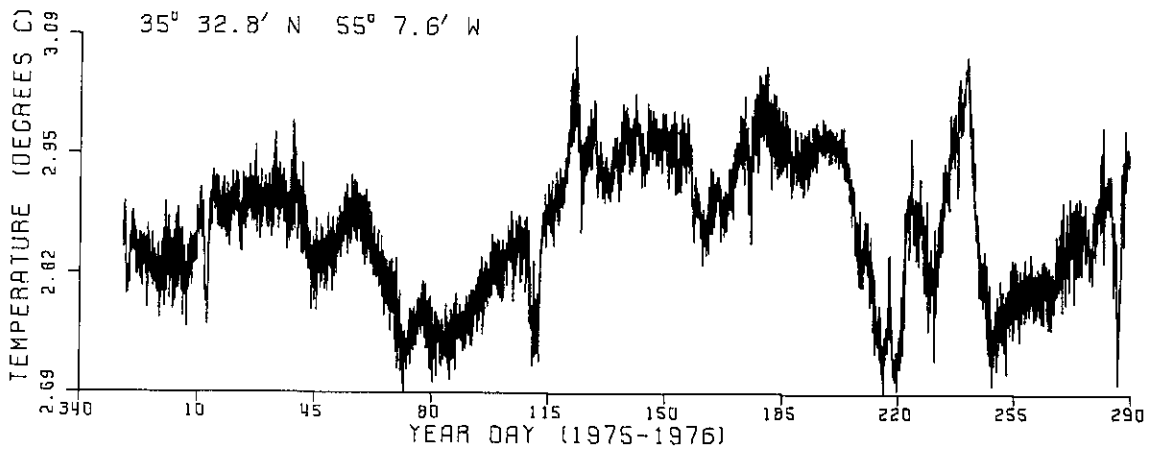
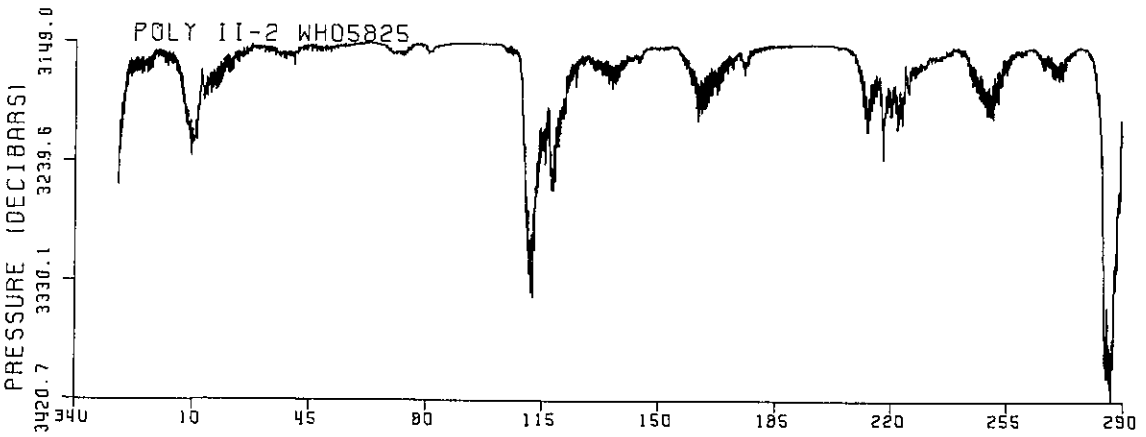
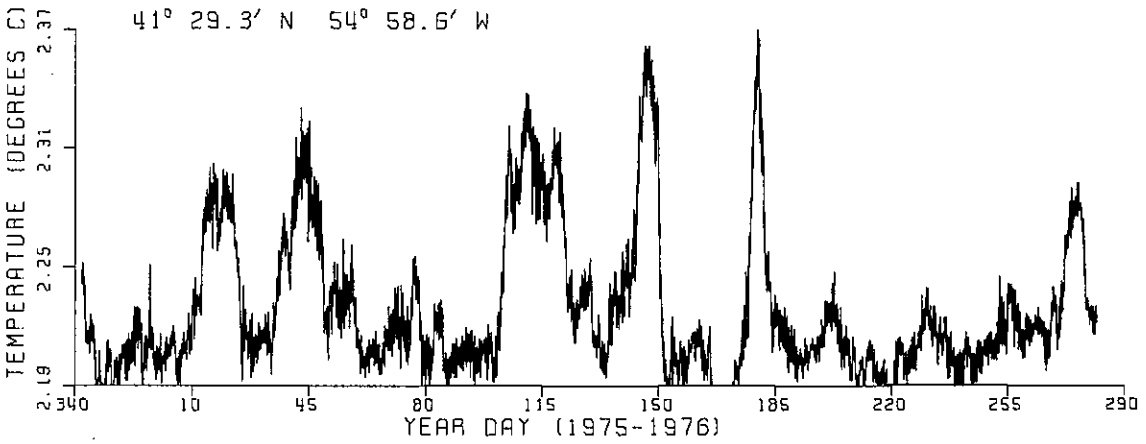
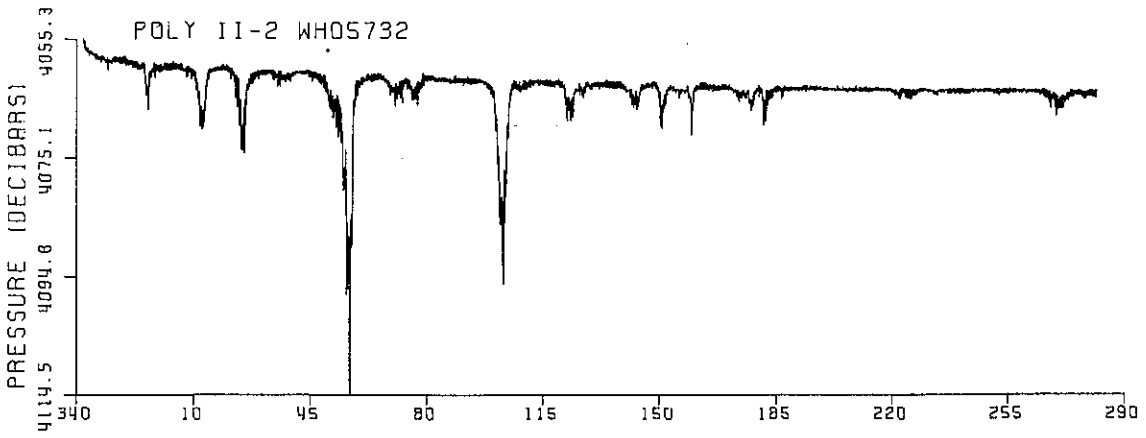
Dr. Ross Hendry
Bedford Institute of Oceanography
P.O. Box 1006
Dartmouth, Nova Scotia
B2Y 4A2 CANADA
(902) 426-3846

Dr. Carl Wunsch
Room No. 54-1324
Massachusetts Institute of Technology
Cambridge MA 02139
(617) 253-5937



Positions and mooring designations of POLYMODE array II: a) first setting, b) second setting.

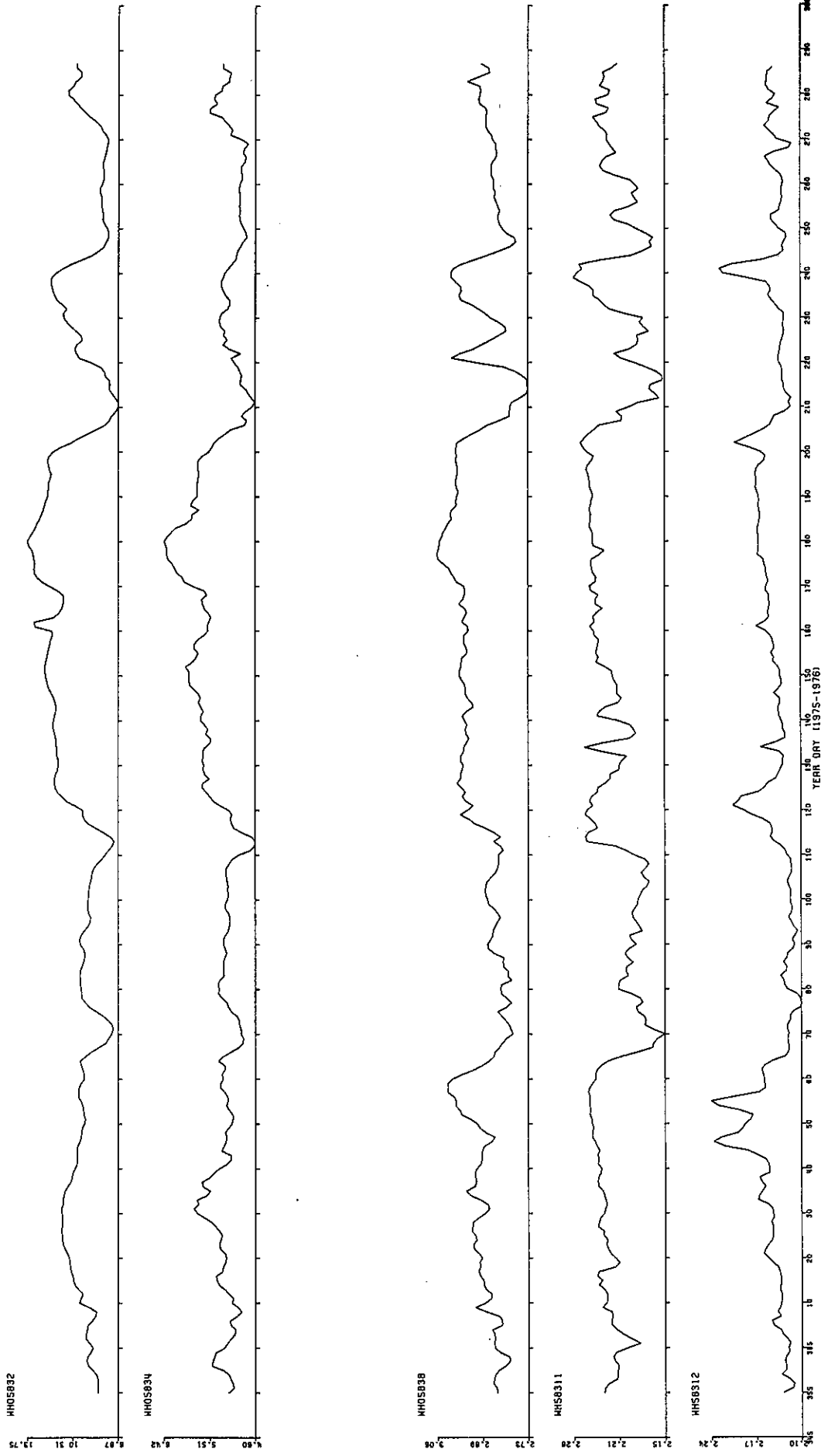
Figure 1 (Wunsch)



Raw pressure and temperature records, second setting, from: a) 4000 m (nominal) instrument at northern end of array II; and b) 3000 m at southern end of array II.

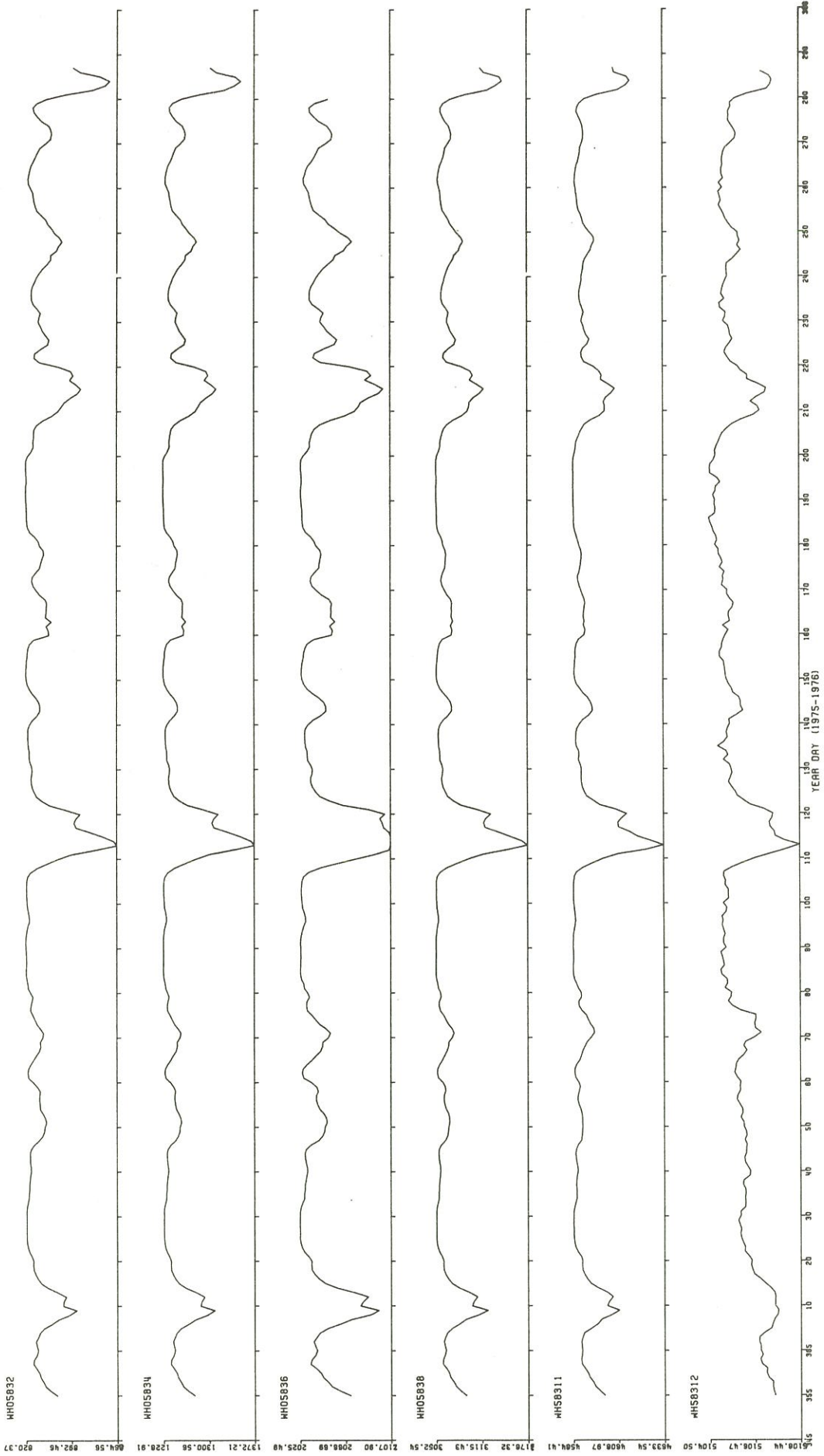
Figure 2 (Wunsch)

TEMPERATURE (DEG C.)



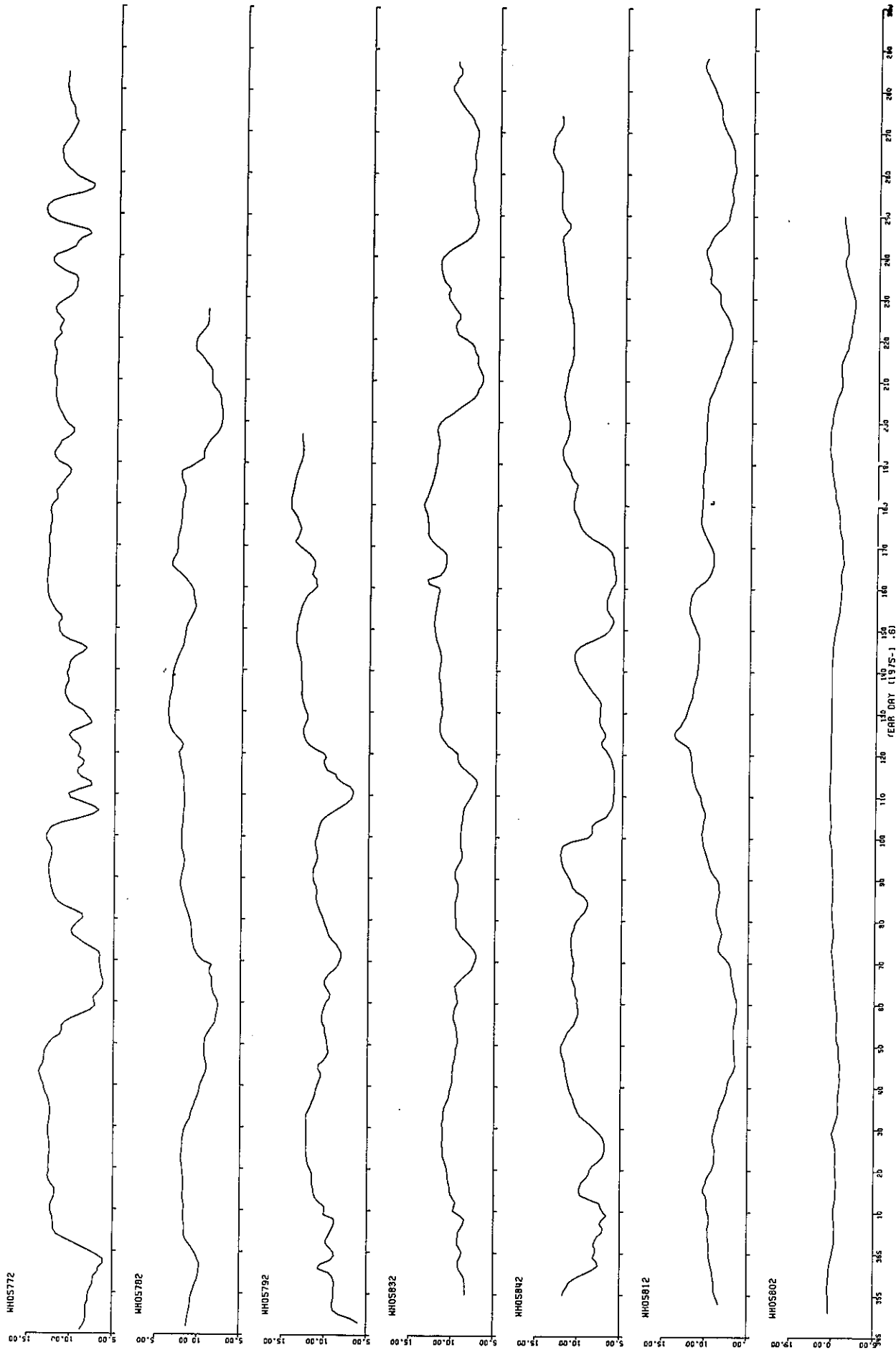
Filtered temperature record from mooring 583.
Figure 3 (Wunsch)

PRESSURE (DECIBARS)



Filtered pressure record from mooring 583.
Figure 4 (Wunsch)

TEMPERATURE (DEG C.)

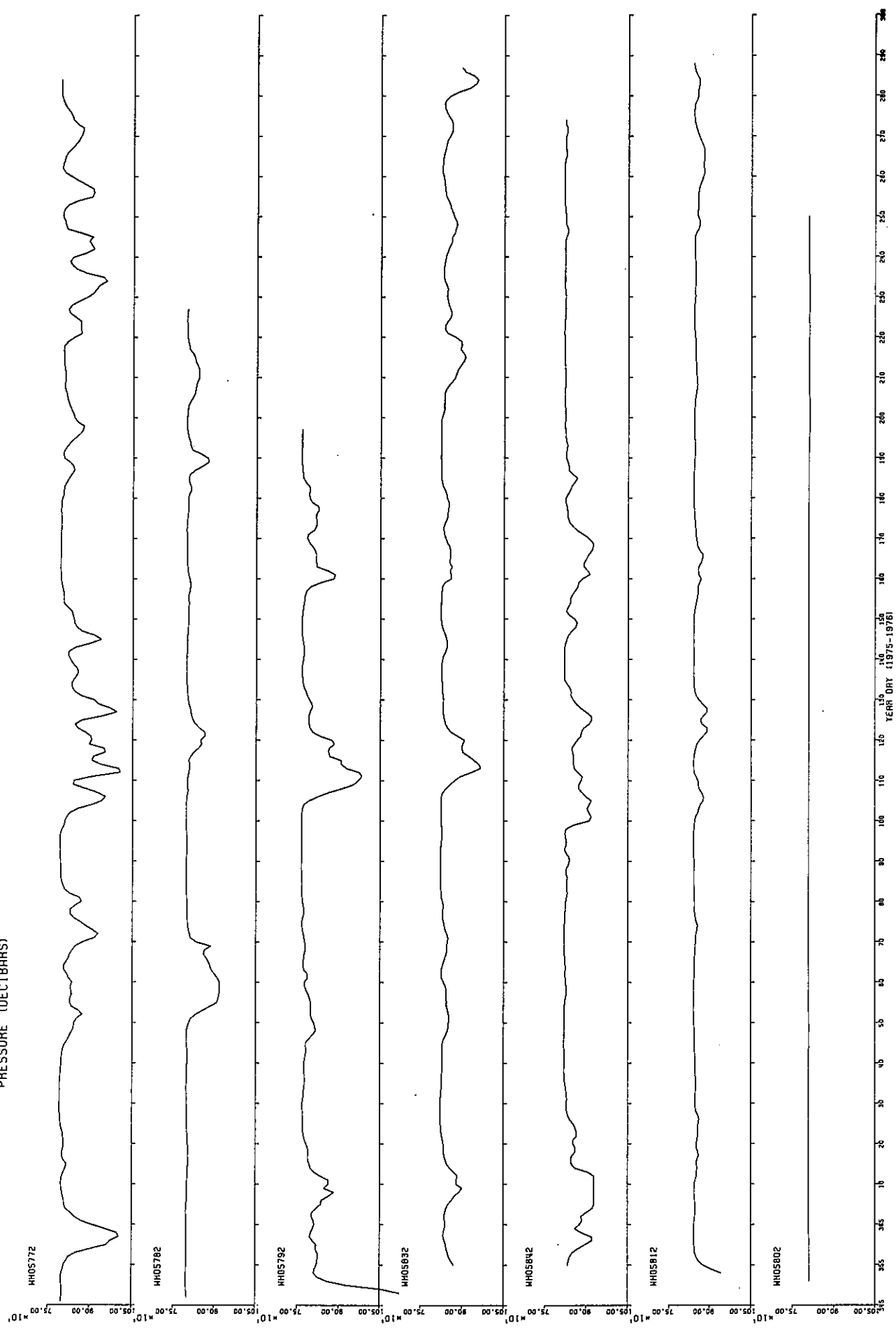


Filtered temperature record from 800 m (nominal) in southern regions of array II, second setting.

Figure 5 (Wunsch)



PRESSURE (DECIBARS)

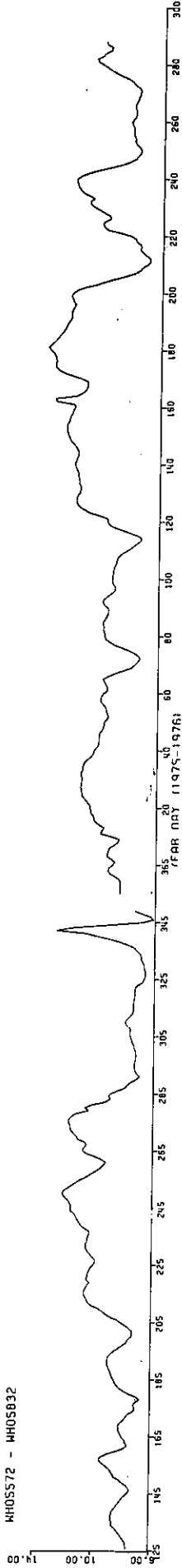


Filtered pressure record from 800 m (nominal) in southern regions of array II, second setting.

Figure 6 (Wunsch)

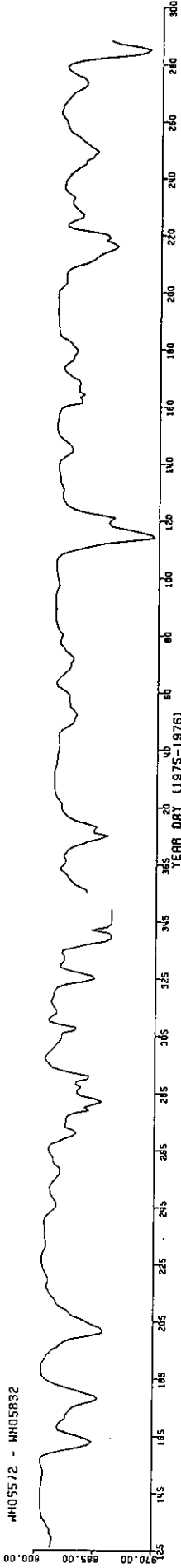
TEMPERATURE (DEG C.)

MH05572 - MH05832



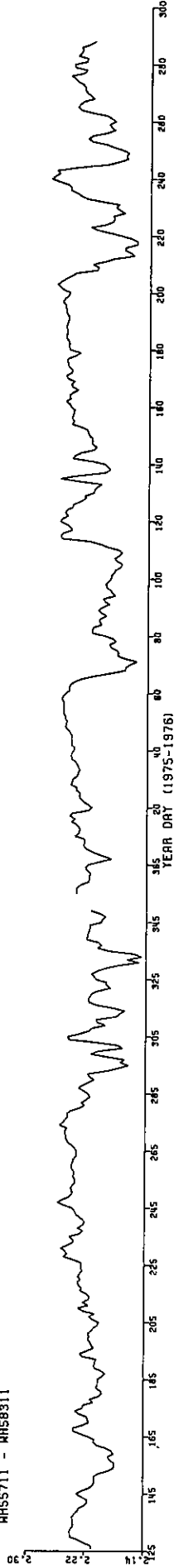
PRESSURE (DECIBARS)

MH05572 - MH05832



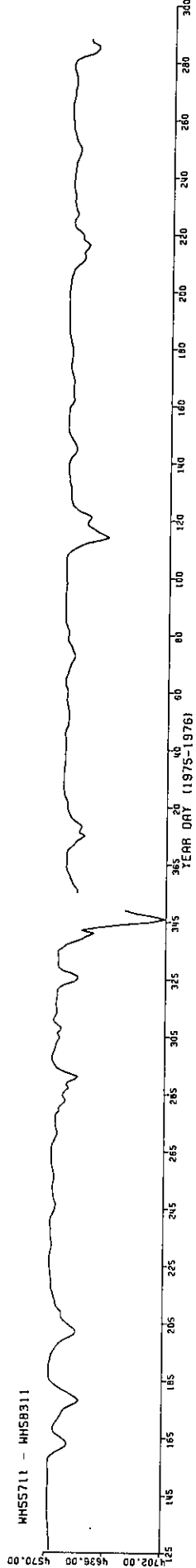
TEMPERATURE (DEG C.)

MH55711 - MH58311



PRESSURE (DECIBARS)

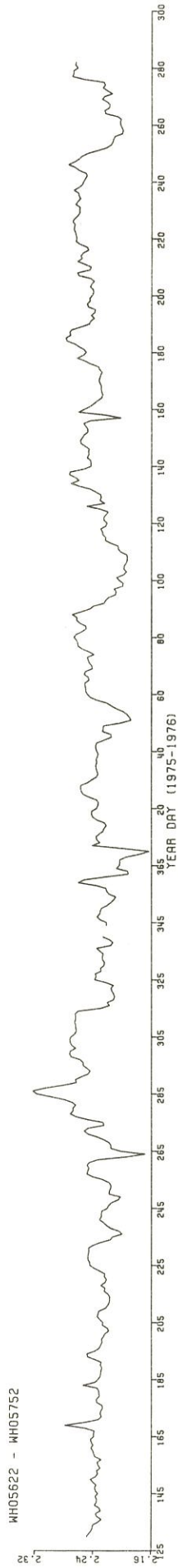
MH55711 - MH58311



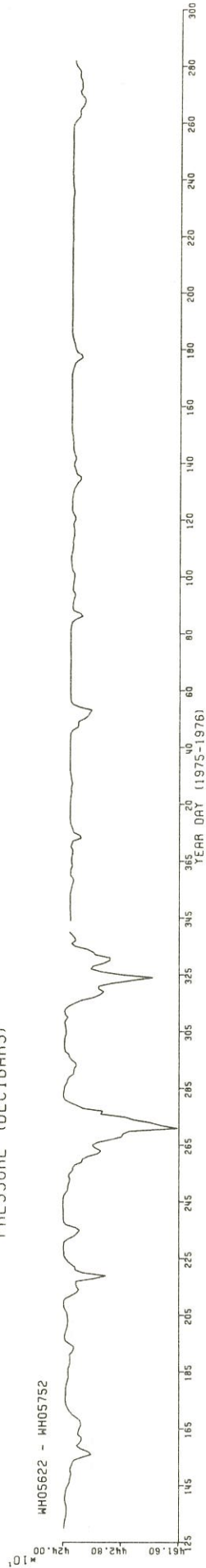
Eighteen months of temperature and pressure on moorings 557-583 at 800 m (a) and 4500 m (b).

Figure 7 (Wunsch)

TEMPERATURE (DEG C.)



PRESSURE (DECIBARS)



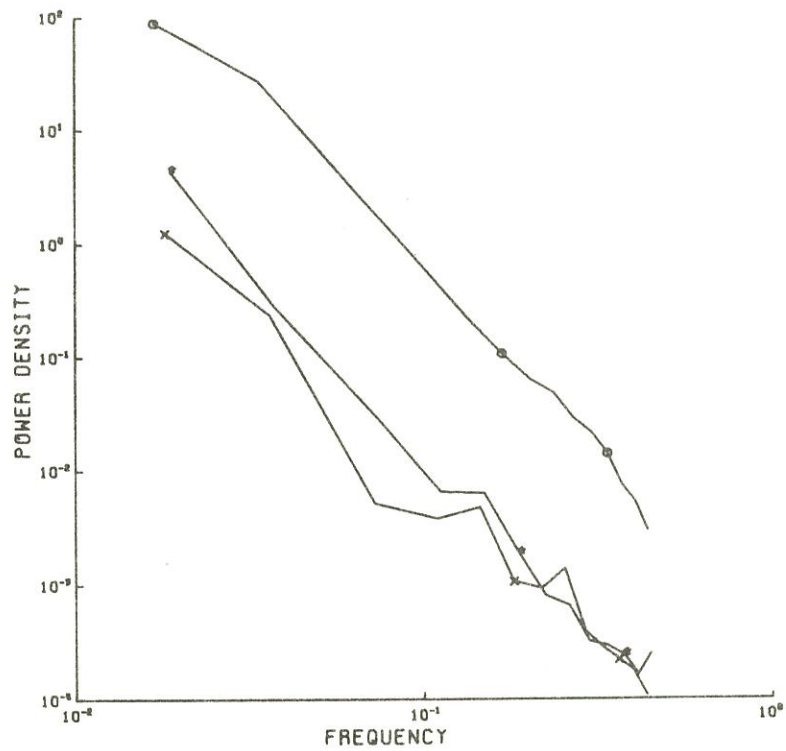
Eighteen months of temperature and pressure on moorings 562-575 at 4200 m.

Figure 8 (Wunsch)

○ WH05832 T

× WH05462 T

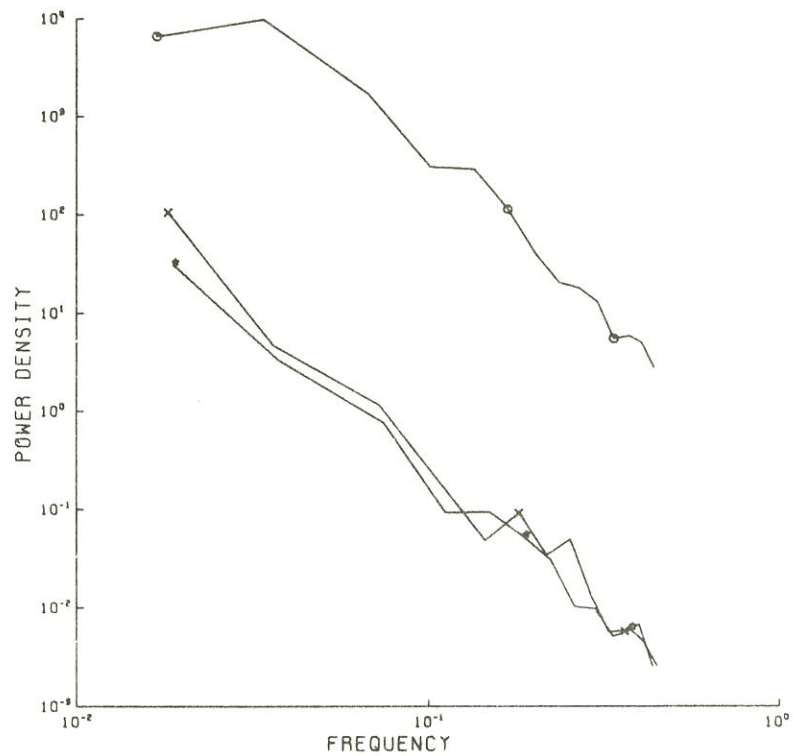
★ WH05422 T



○ WH05832 P

× WH05462 P

★ WH05422 P



Comparative spectra of temperature (a) and pressure (b) from records of comparable duration in thermocline from MODE center (542), POLYMODE array I center 546 at 28°N, 55°W, and array II center (583).

Figure 9 (Wunsch)