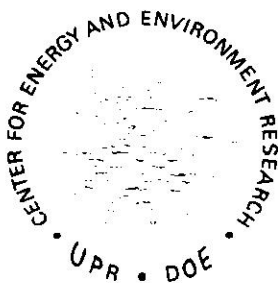


DATA REPORT  
OHER - OTEC CRUISE

MARCH 22-27, 1980



CENTER FOR ENERGY AND ENVIRONMENT RESEARCH  
UNIVERSITY OF PUERTO RICO - U.S. DEPARTMENT OF ENERGY

DATA REPORT  
OHER - OTEC CRUISE  
MARCH 22-27, 1980

## TABLE OF CONTENTS

|                           | PAGE |
|---------------------------|------|
| List of Figures.....      | 1    |
| Introduction.....         | 2    |
| Methods.....              | 2    |
| Bibliography.....         | 4    |
| Hydrographic Data.....    | 5    |
| Zooplankton Data.....     | 50   |
| Appendix                  |      |
| Cruise Plan.....          | 56   |
| List of Participants..... | 61   |
| Weather Code.....         | 62   |

## List of Figures

- Figure 1. Station Plan.
- Figure 2. Small Scale Study.
- Figure 3. Progression of XBT temperature profiles at Benchmark (17°57.3N, 65°51.5W) during March 23 and 24, 1980.
- Figure 4. XBT Graph March 23, 1980: Time 1802, Lat. 17°30.2N, Long. 65°42.9W.
- Figure 5. XBT Graph March 25, 1980: Time 0356, Lat. 18°01.6N, Long. 65°40.4W.
- Figure 6. XBT Graph March 26, 1980: Time 1945, Lat. 17°25.5N, Long. 66°30.0W.
- Figure 7. Salinity (‰) vs Temperature (°C) composite March 23 to 27, 1980.
- Figure 8. Temperature (°C) vs Depth (m) composite March 23 to 27, 1980.
- Figure 9. Salinity (‰) vs Depth (m) composite March 23 to 27, 1980.
- Figure 10. Dissolved oxygen (m<sup>l</sup>/l) vs Depth (m) composite March 23 to 27, 1980.
- Figure 11. Phosphate concentration vs Depth at Benchmark 17°57.3N, 65°51.5W during March 23 & 24, 1980.
- Figure 12. Nitrate/Nitrite concentration vs Depth at Benchmark 17°57.3N, 65°51.5W during March 23 & 24, 1980.
- Figure 13. Silicate concentration vs depth at Benchmark 17°57.3N, 65°51.5W during March 23 & 24, 1980.
- Figure 14. Mean Phosphate concentration vs Depth at Benchmark 17°57.3N, 65°51.5W during March 23 & 24, 1980.
- Figure 15. Mean Nitrate/Nitrite concentration vs Depth at Benchmark 17°57.3N, 65°51.5W during March 23 & 24, 1980.
- Figure 16. Mean Silicate concentration vs Depth at Benchmark 17°57.3N, 65°51.5W during March 23 & 24, 1980.
- Figure 17. Phosphate concentration vs Temperature at Benchmark 17°57.3N, 65°51.5W during March 23 & 24, 1980.
- Figure 18. Nitrate/Nitrite concentration vs Temperature at Benchmark 17°57.3N, 65°51.5W during March 23 & 24, 1980.
- Figure 19. Silicate concentration vs Temperature at Benchmark 17°57.3N, 65°51.5W during March 23 & 24, 1980.
- Figure 20. Phosphate vs Depth in a transect south of Punta Tuna on March 25, 1980.
- Figure 21. Nitrate/Nitrite vs Depth (m) in a transect south of Punta Tuna on March 25, 1980.
- Figure 22. Silicate vs Depth in a transect south of Punta Tuna on March 25, 1980.

## INTRODUCTION

The ability to detect the effects of an OTEC plant on the marine environment is dependent upon the magnitude of its effects relative to the scale and intensity of variability (pattern) within this ecosystem. The scale of pattern examined in this study is approximately  $10 \text{ km}^2$  which has been estimated to be the area whose alteration by the operation of an OTEC plant can be physically measured. The purpose of this cruise was to determine the magnitude of variability to various ecosystem components within and between such areas. Small scale and large scale transects were run to determine the presence of environmental gradients, if any, and the magnitude of between station variability. The cruise was conducted on the R/V CRAWFORD during March 22 through 27, 1980.

Two current meters (InterOcean Model 135) were also moored at depths of 50 and 150 meters at the benchmark buoy during the period of the cruise.

## METHODS

### Hydrographic Data

Hydrocasts were made with 5 liter or 12 liter Niskin bottles usually lowered to depths of 1000 m. Bottles were placed at nominal depths of 0, 10, 25, 50, 75, 100, 150, 200, 250, 300, 400, 500, 650, 800, 1000 m for determinations of temperature, salinity, oxygen, chlorophyll, phaeopigments and nutrients (nitrate-nitrite, phosphate, ammonia, silicate).

Temperature was measured with paired deep sea reversing thermometers. The thermometers were recently calibrated at the Physical Chemical Oceanographic Data Facility (PCODF) at Scripps Institution of Oceanography and measurements were considered accurate to 0.01°C. Unprotected thermometers were placed on bottles sampling at depths of 100 meters or greater.

Salinity was determined with a Hytech induction salinometer. Readings are considered accurate to 0.003‰.

Dissolved oxygen was determined by the Winkler method as revised by Carpenter (1965) and modified by Anderson (1971). Measurements are accurate to 0.02 ml/l. Nutrients were measured with a Technicon Autoanalyzer using methods described by Strickland and Parsons (1968). Chlorophyll was measured with a Turner Model 111 fluorometer using methods described by Strickland and Parsons (1968).

Station depths were obtained through an E.D.O. Depth Recorder permanently installed on the ship or estimated from a chart, NOS Z6659. Sonic depths obtained in Fathoms were converted to meters but were not corrected for speed of sound variations. Chart depths are indicated by (C) and sonic depths by an (S) besides the number. All depths are in meters.

Densities ( $\sigma_t$ ) were calculated from a handbook of Oceanographic Tables (Bialek, 1966).

Station times are given in Greenwich Mean Time (GMT), Plankton Tow Times are in local time. Puerto Rico is 4 hours behind G.M.T.

### Net Tows

Zooplankton tows were made with a 75 cm opening-closing net equipped with 202  $\mu$ m mesh. Volume of water filtered was calculated from a flowmeter suspended off center in the mouth of the net.

### BIBLIOGRAPHY

- Anderson, G.C. 1971. Oxygen analysis. Marine Technicians Handbook, SIO Ref. No. 71-10, Sea Grant Pub. No. 11.
- Bialek, E.L. (compiler), 1966. Handbook of Oceanographic Tables. U.S. Naval Oceanographic Office, Washington, D.C. Special Publication.
- Carpenter, D.H. 1965. The Chesapeake Bay Institute technique for Winkler dissolved oxygen method. Limnol. Oceanogr. 10: 141-143.
- Strickland, J.D.H. and T.R. Parsons. 1968. A practical handbook of seawater analysis. Fish. Res. Board of Canada. Bull. No. 167: 311 pp.

HYDROGRAPHIC DATA



R/V CRAWFORD

OTEC CRUISE 8003

STATION: Benchmark

| Latitude | Longitude | MO/DAY/YR | Messenger Time     | Bottom    | Wind    | Speed               | Weather | Dominant Waves                  | Secchi         |
|----------|-----------|-----------|--------------------|-----------|---------|---------------------|---------|---------------------------------|----------------|
| 17°57.3N | 66°51.5W  | 3/23/80   | 1121 (GMT)         | 1737m (s) | 0 (Dir) | 0 (Kt)              | 1       | 145° 3 ft 6s (Dir) (Ht)(Period) |                |
| Z        | T         | S         | NH <sub>4</sub> -N | N         | Si      | P <sub>04-3-P</sub> | Ch1a    | Phaeo                           | σ <sub>t</sub> |
| 0        | 25.96     | 36.127    | 0.2                | 0.3       | 1.4     | .08                 | 0.05    | 0.01                            | 23.93          |
| 10       | 25.92     | 36.120    | 0.2                | 0.3       | 0.7     | <.08                | 0.05    | 0.02                            | 23.93          |
| 28       | 25.88     | 36.120    | 0.2                | 0.3       | 0.7     | <.08                | 0.05    | 0.01                            | 23.94          |
| 51       | 25.88     | 36.118    | <.2                | 0.3       | 0.7     | <.08                | 0.06    | 0.02                            | 23.94          |
| 76       | 24.82     | 36.890    | <.2                | 0.3       | 0.2     | <.08                | 0.14    | 0.07                            | 24.85          |
| 104      | 23.92     | 37.015    | <.2                | 0.3       | 0.3     | <.08                | 0.22    | 0.18                            | 25.22          |
| 132      | 22.19     | 36.935    | <.2                | 1.0       | <.1     | <.08                | 0.08    | 0.10                            | 25.66          |
| 155      | 21.15     | 36.855    | <.2                | 1.9       | 0.2     | <.08                | 0.05    | 0.07                            | 25.89          |
| 207      | --        | 36.616    | 0.5                | 3.6       | 0.2     | 0.10                | 0.00    | 0.01                            | 26.39          |
| 258      | 18.19     | 36.491    | <.2                | 3.4       | 0.4     | <.08                | 0.00    | 0.00                            | 26.54          |
| 309      | 17.18     | 36.357    | <.2                | 6.2       | 2.7     | 0.23                | 0.00    | 0.00                            | 26.76          |
| 412      | 15.12     | 36.038    | 0.2                | 13.3      | 4.4     | 0.63                | 0.00    | 0.00                            | 26.98          |
| 515      | 12.77     | 35.657    | <.2                | 17.8      | 8.1     | 0.99                | 0.00    | 0.00                            | 27.20          |
| 665      | 8.73      | 35.008    | 0.2                | 25.5      | 14.9    | 1.52                | 0.00    | 0.00                            | 27.38          |
| 819      | 7.02      | 34.887    | <.2                | 26.9      | 13.9    | 1.66                | 0.00    | 0.00                            | 28.55          |
| 1026     | 5.33      | 36.912    | <.2                | 17.1      | 19.6    | 1.26                | 0.00    | 0.00                            |                |

R/V CRAWFORD

OIEC CRUISE 8003

STATION: Benchmark

| Latitude | Longitude | MO/DAY/YR | Messenger Time | Bottom             | Wind | Speed  | Weather              | Dominant Waves                  | Secchi |                |
|----------|-----------|-----------|----------------|--------------------|------|--------|----------------------|---------------------------------|--------|----------------|
| 17°57.3N | 66°51.5W  | 3/23/80   | 2259 (GMT)     | 1244m (s)          |      | 2 (Kt) | 1                    | 190° 1 ft 5s (Dir) (Ht)(Period) |        |                |
| Z        | T         | S         | O <sub>2</sub> | NH <sub>4</sub> -N | N    | Si     | PO <sub>4</sub> -3-P | Chla                            | Phaeo  | σ <sub>t</sub> |
| 0        | 26.44     | 36.140    | 4.71           | 0.2                | 0.6  | 0.6    | 0.11                 | 0.07                            | 0.01   | 23.78          |
| 9        | 27.82     | 36.119    | 4.73           | <.2                | 0.2  | <0.1   | <.08                 | 0.06                            | 0.00   | 23.33          |
| 28       | 25.96     | 36.119    | 4.73           | 0.2                | 0.1  | 0.8    | <.08                 | 0.05                            | 0.01   | 23.92          |
| 51       | 25.91     | 36.115    | 4.71           | 0.2                | 0.1  | 0.5    | <.08                 | 0.11                            | 0.03   | 23.93          |
| 75       | 25.51     | 36.492    | 4.73           | 0.2                | 0.2  | 0.3    | <.08                 | 0.21                            | 0.05   | 24.35          |
| 103      | 25.04     | 37.013    | 4.58           | <.2                | 0.2  | 1.1    | <.08                 | 0.21                            | 0.20   | 24.43          |
| 131      | 24.54     | 36.955    | 4.38           | 0.6                | 1.0  | 0.7    | <.08                 | 0.08                            | 0.09   | 25.58          |
| 154      | 21.61     | 36.889    | 4.32           | 0.2                | 1.3  | 0.3    | <.08                 | 0.06                            | 0.08   | 25.79          |
| 206      | 19.31     | 36.636    | 4.38           | 0.2                | 2.5  | 1.6    | 0.11                 | 0.01                            | 0.01   | 26.22          |
| 257      | 18.32     | 36.505    | 4.56           | 0.2                | 3.5  | 1.6    | 0.15                 | 0.00                            | 0.00   | 26.37          |
| 309      | 17.25     | 36.364    | 4.29           | <.2                | 6.3  | 1.2    | 0.29                 |                                 |        | 26.52          |
| 411      | 15.13     | 36.035    | 3.73           | <.2                | 10.9 | 2.3    | 0.60                 |                                 |        | 26.76          |
| 514      | 13.16     | 35.723    | 3.44           | <.2                | 15.0 | 2.3    | 0.84                 |                                 |        | 26.94          |
| 664      | 9.41      | 35.142    | 2.97           | 0.2                | 21.0 | 15.3   | 1.14                 |                                 |        | 27.19          |
| 818      | 6.79      | 34.882    | 3.22           | <.2                | 29.7 | 20.7   | 1.93                 |                                 |        | 27.39          |
| 1024     | 5.43      | 34.905    | 4.01           | 0.4                | 27.2 | 30.1   | 1.80                 |                                 |        | 27.58          |

R/V CRAWFORD

OCE CRUISE 8003

STATION: Benchmark

| Latitude | Longitude | MO/DAY/YR      | Messenger Time     | Bottom     | Wind | Speed | Weather              | Dominant Waves                | Secchi         |
|----------|-----------|----------------|--------------------|------------|------|-------|----------------------|-------------------------------|----------------|
| Z        | T         | S              | NH <sub>4</sub> -N | >1000m (c) | Si   | (Kt)  | PO <sub>4</sub> -3-P | 180° (Dir) 3 ft (Ht) (Period) | σ <sub>t</sub> |
|          |           | O <sub>2</sub> |                    | N          |      |       |                      | Chla                          | Phaeo          |
| 17°57.3N | 66°51.5W  | 3/24/80        | 0609 (GMT)         | >1000m     |      | 2     |                      |                               |                |
| 1        | 26.08     | 36.129         | <.2                | 0.1        | 0.8  |       | <.08                 | 0.09                          | 0.00           |
| 10       | 26.06     | 36.131         | <.2                | 0.1        | 0.8  |       | <.08                 | 0.00                          | 0.00           |
| 29       | 25.89     | 36.107         | <.2                | 0.1        | 0.8  |       | <.08                 | 0.06                          | 0.01           |
| 51       | 25.87     | 36.102         | <.2                | 0.1        | 0.8  |       | <.08                 | 0.09                          | 0.00           |
| 75       | 25.86     | 36.105         | <.2                | 0.1        | 0.8  |       | <.08                 | 0.07                          | 0.01           |
| 102      | 24.72     | 36.938         | <.2                | 0.1        | 0.3  |       | <.08                 | 0.20                          | 0.14           |
| 130      | 23.32     | 37.023         | 0.2                | 0.3        | 0.2  |       | <.08                 | 0.20                          | 0.30           |
| 153      | 22.29     | 36.950         | 0.2                | 0.5        | 0.3  |       | <.08                 | 0.11                          | 0.19           |
| 204      | 19.42     | 36.659         | <.2                | 2.6        | 0.2  |       | 0.14                 | 0.02                          | 0.01           |
| 255      | 18.32     | 36.511         | 0.2                | 3.9        | 0.8  |       | 0.14                 | 0.01                          | 0.01           |
| 305      | 17.28     | 36.374         | 0.2                | 7.0        | 1.6  |       | 0.31                 |                               |                |
| 407      | 14.94     | 36.006         | 0.2                | 13.7       | 4.3  |       | 0.67                 |                               |                |
| 510      | 12.69     | 35.646         | 0.3                | 19.3       | 7.3  |       | 1.09                 |                               |                |
| 658      | 9.13      | 35.069         | 0.3                | 28.5       | 14.1 |       | 1.73                 |                               |                |
| 810      | 7.11      | 34.903         | 0.2                | 30.6       | 18.6 |       | 1.95                 |                               |                |
| 1016     | 5.36      | 34.910         | 0.3                | 27.5       | 20.9 |       | 1.77                 |                               |                |

R/V CRAWFORD

OIEC CRUISE 8003

STATION: S-1

| Latitude | Longitude | MO/DAY/YR | Messenger Time | Bottom             | Wind        | Speed     | Weather              | Dominant Waves                       | Secchi |                |
|----------|-----------|-----------|----------------|--------------------|-------------|-----------|----------------------|--------------------------------------|--------|----------------|
| 17°52.7N | 65°53.9W  | 3/24/80   | 1003 (GMT)     | 1920m              | 0°<br>(Dir) | 4<br>(Kt) | 1                    | 0°<br>(Dir) 1 ft 6s<br>(Ht) (Period) |        |                |
| Z        | T         | S         | O <sub>2</sub> | NH <sub>4</sub> -N | N           | Si        | PO <sub>4</sub> -3-P | Ch1a                                 | Phaeo  | σ <sub>t</sub> |
| 0        | 26.02     | 36.120    | 4.72           | <.2                | 0.2         | 0.4       | <.08                 | 0.06                                 | 0.01   | 23.90          |
| 10       | 26.00     | 36.120    | 4.72           | <.2                | 0.2         | 0.6       | <.08                 | 0.06                                 | 0.00   | 23.91          |
| 28       | 25.91     | 36.115    | 4.74           | <.2                | 0.2         | 1.7       | <.08                 | 0.07                                 | 0.00   | 23.61          |
| 51       | 25.86     | 36.131    | 4.74           | <.2                | 0.1         | 0.9       | <.08                 | 0.09                                 | -0.00  | 23.96          |
| 75       | 25.69     | 36.393    | 4.77           | <.2                | 0.1         | 0.9       | <.08                 | 0.11                                 | 0.01   | 24.20          |
| 102      | 24.50     | 36.971    | 4.70           | <.2                | 0.1         | 0.1       | <.08                 | 0.21                                 | 0.13   | 25.02          |
| 130      | 23.20     | 36.993    | 4.49           | <.2                | 0.3         | <.1       | <.08                 | 0.20                                 | 0.20   | 25.41          |
| 153      | 21.87     | 36.936    | 4.28           | <.2                | 1.0         | 0.1       | <.08                 | 0.07                                 | 0.12   | 25.75          |
| 204      | 19.59     | 36.669    | 4.37           | <.2                | 1.9         | 0.1       | <.08                 | 0.01                                 | 0.01   | 26.17          |
| 255      | 18.28     | 36.513    | 4.55           | <.2                | 3.5         | 0.6       | 0.16                 | 0.01                                 | 0.01   | 26.39          |
| 305      | 17.53     | 36.417    | 4.40           | <.2                | 4.9         | 1.2       | 0.25                 | 0.00                                 | 0.01   | 26.50          |
| 406      | 15.26     | 36.061    | 3.78           | <.2                | 11.4        | 3.3       | 0.68                 |                                      |        | 26.76          |
| 506      | 12.95     | 35.692    | 3.44           | <.2                | 13.1        | 6.8       | 0.81                 |                                      |        | 26.97          |
| 652      | 9.58      | 35.148    | 2.91           | <.2                | 22.2        | 12.4      | 1.44                 |                                      |        | 27.17          |
| 804      | 7.10      | 34.898    | 3.11           | <.2                | 24.6        | 15.9      | 1.67                 |                                      |        | 27.35          |
| 1009     | 5.41      | 34.911    | 4.03           | <.2                | 21.3        | 20.8      | 1.49                 |                                      |        | 27.58          |

R/V CRAWFORD

OTEC CRUISE 8003

STATION: Benchmark

| Latitude | Longitude | MO/DAY/YR | Messenger Time | Bottom             | Wind      | Speed   | Weather              | Dominant Waves                  | Secchi |                |
|----------|-----------|-----------|----------------|--------------------|-----------|---------|----------------------|---------------------------------|--------|----------------|
| 17°57.3N | 65°51.5W  | 3/24/80   | 1749 (GMT)     | 1554m (s)          | 60° (Dir) | 12 (kt) | 1                    | 60° 1 ft 5s (Dir) (Ht) (Period) |        |                |
| Z        | T         | S         | O <sub>2</sub> | NH <sub>4</sub> -N | N         | Si      | PO <sub>4</sub> -3-P | Ch1a                            | Phaeo  | σ <sub>t</sub> |
| 0        | 26.31     | 36.137    | 4.71           | <.2                | 0.3       | 0.4     | <.08                 | 0.06                            | 0.01   | 23.82          |
| 8        | 26.18     | 36.132    | 4.72           | <.2                | 0.1       | 0.8     | <.08                 | 0.06                            | 0.01   | 23.86          |
| 25       | 25.97     | 36.118    | 4.73           | 0.2                | 0.2       | 0.7     | <.08                 | 0.06                            | 0.01   | 23.92          |
| 51       | 25.94     | 36.124    | 4.72           | <.2                | 0.2       | 0.4     | <.08                 | 0.11                            | 0.02   | 23.93          |
| 76       | 25.88     | 36.130    | 4.70           | <.2                | 0.2       | 0.8     | <.08                 | 0.18                            | 0.04   | 23.95          |
| 101      | 24.52     | 36.959    | 4.72           | <.2                | 0.2       | 0.3     | <.08                 | 0.17                            | 0.10   | 24.99          |
| 127      | 23.38     | 37.025    | 4.52           | <.2                | 0.3       | <.1     | <.08                 | 0.16                            | 0.18   | 25.39          |
| 148      | 21.97     | 36.923    | 4.34           | <.2                | 1.1       | 0.4     | <.08                 | 0.10                            | 0.11   | 25.71          |
| 199      | 19.64     | 36.641    | 4.37           | <.2                | 1.0       | 0.4     | <.08                 | 0.10                            | 0.01   | 26.13          |
| 253      | 18.51     | 36.533    | 4.56           | 0.2                | 3.8       | 0.6     | 0.20                 | 0.01                            | 0.01   | 26.33          |
| 296      | 17.82     | 36.457    | 4.47           | <.2                | 4.2       | 0.8     | 0.23                 | 0.16                            | 0.18   | 26.46          |
| 396      | 15.35     | 36.075    | 3.80           | <.2                | 11.6      | 3.2     | 0.73                 | 0.10                            | 0.11   | 26.74          |
| 493      | 13.10     | 35.710    | 3.41           | <.2                | 13.5      | 5.7     | 0.64                 | 0.10                            | 0.11   | 26.94          |
| 646      | 9.68      | 35.184    | 2.96           | <.2                | 22.1      | 9.6     | 1.58                 | 0.10                            | 0.11   | 27.18          |
| 795      | 7.30      | 34.923    | 3.10           | <.2                | 24.1      | 17.6    | 1.66                 | 0.10                            | 0.11   | 27.34          |
| 1008     | 5.34      | 34.913    | 4.06           | <.2                | 21.9      | 13.0    | 1.89                 | 0.10                            | 0.11   | 27.60          |

R/V CRAWFORD

OIEC CRUISE 8003

STATION: S-3

| Latitude | Longitude | MO/DAY/YR | Messenger Time     | Bottom    | Wind       | Speed                | Weather | Dominant Waves       | Secchi         |
|----------|-----------|-----------|--------------------|-----------|------------|----------------------|---------|----------------------|----------------|
| 17°55.9N | 65°46.4W  | 3/25/80   | 0319 (GMT)         | 2012m (s) | 100° (Dir) | 18 (Kt)              | 2       | 100° 6 ft (Dir) (Ht) |                |
| Z        | T         | S         | NH <sub>4</sub> -N | N         | Si         | P0 <sub>4</sub> -3-P | Ch1a    | Phaeo                | σ <sub>t</sub> |
| 1        | 26.08     | 36.156    | 4.71               | 0.3       | 0.7        | 0.08                 | 0.03    | 0.01                 | 23.91          |
| 8        | 26.08     | 36.158    | 4.73               | 0.2       | 0.7        | <.08                 | 0.04    | 0.01                 | 23.91          |
| 28       | 26.07     | 36.157    | 4.74               | 0.2       | 0.7        | <.08                 | 0.04    | 0.01                 | 23.92          |
| 50       | 25.86     | 36.144    | 4.75               | 0.2       | 0.7        | <.08                 | 0.06    | 0.01                 | 23.97          |
| 75       | 25.71     | 36.291    | 4.78               | 0.2       | 0.7        | <.08                 | 0.10    | 0.04                 | 24.12          |
| 98       | 24.55     | 36.974    | 4.68               | 0.2       | 0.1        | 0.09                 | 0.15    | 0.10                 | 25.00          |
| 124      | 23.42     | 37.038    | 4.48               | 0.5       | <.1        | 0.08                 | 0.17    | 0.25                 | 25.39          |
| 143      | 22.02     | 36.940    | 4.33               | 1.2       | <.1        | 0.08                 | 0.09    | 0.16                 | 25.71          |
| 191      | 19.81     | 36.697    | 4.35               | 2.3       | 0.3        | 0.08                 | 0.02    | 0.02                 | 26.13          |
| 240      | 18.64     | 36.554    | 4.61               | 3.0       | 0.4        | 0.10                 | 0.00    | 0.01                 | 26.32          |
| 292      | 17.74     | 36.445    | 4.54               | 6.8       | 0.9        | 0.16                 |         |                      | 26.47          |
| 387      | 15.98     | 36.178    | 4.02               | 10.1      | 2.6        | 0.55                 |         |                      | 26.68          |
| 482      | 13.30     | 35.755    | 3.56               | 16.3      | 6.7        | 0.97                 |         |                      | 26.94          |
| 632      | 9.61      | 35.175    | 2.99               | 25.3      | 12.7       | 1.60                 |         |                      | 27.18          |
| 782      | 7.13      | 34.894    | 3.10               | 29.1      | 18.3       | 1.96                 |         |                      | 27.35          |
| 1019     | 5.37      | 34.915    | 4.06               | 25.1      | 20.5       | 1.78                 |         |                      | 27.59          |

R/V CRAWFORDOTEC CRUISE 8003

STATION: V-1

| Latitude | Longitude | MO/DAY/YR | Messenger Time | Bottom             | Wind         | Speed                | Weather | Dominant Waves                        | Secchi         |
|----------|-----------|-----------|----------------|--------------------|--------------|----------------------|---------|---------------------------------------|----------------|
| 18°04.4N | 65°32.6W  | 3/25/80   | 0921 (GMT)     | 29 m<br>(s)        | 75°<br>(Dir) | 5<br>(Kt)            | 1       | 60°<br>(Dir) 1 ft 5s<br>(Ht) (Period) |                |
| Z        | T         | S         | O <sub>2</sub> | NH <sub>4</sub> -N | Si           | PO <sub>4</sub> -3-P | Ch1a    | Phaeo                                 | σ <sub>t</sub> |
| 0        | 26.12     | 36.152    | 4.71           | <.2                | 1.4          | 0.09                 | 0.12    | 0.02                                  | 23.89          |
| 15       | 26.10     | 36.152    | 4.71           | 0.2                | 1.4          | 0.08                 | 0.13    | 0.03                                  | 23.90          |

R/V CRAWFORD

OIEC CRUISE 8003

STATION: V-3

| Latitude | Longitude | MO/DAY/YR | Messenger Time | Bottom             | Wind      | Speed  | Weather              | Dominant Waves                  | Secchi |                |
|----------|-----------|-----------|----------------|--------------------|-----------|--------|----------------------|---------------------------------|--------|----------------|
| 18°01.8N | 65°32.7W  | 3/25/80   | 1141 (GMT)     | 1317m (s)          | 70° (Dir) | 8 (Kt) | 1                    | 95° 2 ft 6s (Dir) (Ht) (Period) |        |                |
| Z        | T         | S         | O <sub>2</sub> | NH <sub>4</sub> -N | N         | Si     | PO <sub>4</sub> -3-P | Ch1a                            | Phaeo  | σ <sub>t</sub> |
| 0        | 26.99     | 36.079    | 4.72           | 0.2                | 0.2       | 1.3    | <.08                 | 0.03                            | 0.01   | 23.57          |
| 8        | 26.98     | 36.076    | 4.72           | <.2                | 0.2       | <.1    | <.08                 | 0.04                            | 0.01   | 23.57          |
| 24       | 26.01     | 36.078    | 4.73           | 0.3                | 0.2       | 1.3    | <.08                 | 0.04                            | 0.01   | 23.87          |
| 48       | 25.93     | 36.135    | 4.72           | 1.2                | 0.2       | 0.6    | <.08                 | 0.10                            | 0.02   | 23.94          |
| 73       | 25.91     | 36.139    | 4.74           | 0.4                | 0.2       | 1.2    | <.08                 | 0.10                            | 0.02   | 23.95          |
| 97       | 25.03     | 36.839    | 4.75           | 0.3                | 0.2       | 0.6    | <.08                 | 0.06                            | 0.04   | 24.75          |
| 121      | 24.05     | 37.001    | 4.59           | 0.6                | 0.3       | 0.4    | <.08                 | 0.18                            | 0.14   | 25.17          |
| 141      | 22.86     | 36.996    | 4.41           | 0.5                | 0.6       | 0.4    | <.08                 | 0.10                            | 0.16   | 25.52          |
| 190      | 19.49     | 36.661    | 4.34           | 0.2                | 1.9       | <.1    | <.08                 | 0.01                            | 0.01   | 26.19          |
| 240      | 18.42     | 36.532    | 4.41           | 1.0                | 4.2       | 0.8    | 0.19                 | 0.01                            | 0.01   | 26.37          |
| 279      | 17.93     | 36.470    | 4.41           | 0.4                | 3.9       | 1.5    | 0.20                 | 0.00                            | 0.01   | 26.44          |
| 373      | 16.35     | 36.228    | 4.09           | 0.4                | 9.1       | 2.1    | 0.51                 |                                 |        | 26.64          |
| 465      |           | 35.860    | 3.66           | 0.4                | 14.6      | 4.1    | 0.84                 |                                 |        |                |
| 615      | 9.86      | 35.221    | 3.03           | 0.4                | 24.3      | 11.3   | 1.57                 |                                 |        | 27.17          |
| 761      | 7.29      | 34.918    | 3.12           | 0.5                | 28.3      | 21.9   | 1.97                 |                                 |        | 27.35          |
| 975      | 5.62      | 34.889    | 3.86           | 0.2                | 21.2      | 11.3   | 1.48                 |                                 |        | 27.54          |



R/V CRAWFORD

OTEC CRUISE 8003

STATION: V-5

| Latitude | Longitude | MO/DAY/YR | Messenger Time     | Bottom    | Wind     | Speed                | Weather | Dominant Waves                 | Secchi         |
|----------|-----------|-----------|--------------------|-----------|----------|----------------------|---------|--------------------------------|----------------|
| 17°48.5N | 65°32.6W  | 3/25/80   | 1718 (GMT)         | 3109m (s) | 55 (Dir) | 5 (Kt)               | 1       | 75° 2 ft 5s (Dir) (Ht)(Period) |                |
| Z        | T         | S         | NH <sub>4</sub> -N | N         | Si       | PO <sub>4</sub> -3-P | Chla    | Phaeo                          | σ <sub>t</sub> |
| 0        | 26.43     | 36.085    | <.2                | 0.1       | 1.0      | <.08                 | 0.05    | 0.01                           | 23.74          |
| 8        | 26.14     | 36.081    | <.2                | 0.1       | 1.0      | <.08                 | 0.04    | 0.01                           | 23.83          |
| 27       | 25.85     | 36.113    | 0.2                | 0.1       | 0.7      | <.08                 | 0.04    | 0.01                           | 23.95          |
| 49       | 25.84     | 36.154    | <.2                | 0.1       | <.1      | <.08                 | 0.06    | 0.01                           | 23.99          |
| 72       | 25.54     | 36.486    | <.2                | 0.1       | 1.4      | <.08                 | 0.06    | 0.01                           | 24.33          |
| 99       | 24.53     | 37.017    | 0.4                | 0.2       | <.1      | <.08                 | 0.15    | 0.13                           | 25.04          |
| 126      | 23.05     | 37.046    | 0.2                | 1.0       | 0.3      | <.08                 | 0.14    | 0.25                           | 25.49          |
| 148      | 21.53     | 36.894    | 0.4                | 1.2       | 18.9     | <.08                 | 0.06    | 0.10                           | 25.81          |
| 198      | 19.92     | 36.712    | 0.2                | 2.3       | 0.4      | .08                  | 0.02    | 0.02                           | 26.11          |
| 248      | 18.49     | 36.540    | 0.2                | 3.0       | 1.0      | 0.17                 | 0.00    | 0.01                           | 26.36          |
| 296      | 17.85     | 36.462    | 0.2                | 4.6       | 1.0      | 0.19                 |         |                                | 26.45          |
| 392      | 15.83     | 36.150    | <.2                | 9.8       | 3.4      | 0.50                 |         |                                | 26.69          |
| 488      | 13.23     | 35.732    | <.2                | 14.5      | 4.8      | 0.77                 |         |                                | 26.94          |
| 630      | 9.42      |           |                    |           |          |                      |         |                                |                |
| 779      | 7.28      | 34.916    | 0.2                | 25.9      | 18.4     | 1.61                 |         |                                | 27.34          |
| 982      | 5.70      | 34.896    | 0.4                | 22.1      | 20.6     | 1.44                 |         |                                | 27.54          |

R/V CRAWFORD

OTEC CRUISE 8003

STATION: V-6

| Latitude | Longitude | MO/DAY/YR | Messenger Time | Bottom             | Wind     | Speed  | Weather              | Dominant Waves      | Secchi |                |
|----------|-----------|-----------|----------------|--------------------|----------|--------|----------------------|---------------------|--------|----------------|
| 17°32.5N | 65°32.8W  | 3/25/80   | 2013 (GMT)     | 1554m (s)          | 90 (Dir) | 7 (Kt) | 1                    | 90° 2 ft (Dir) (Ht) |        |                |
| Z        | T         | S         | O <sub>2</sub> | NH <sub>4</sub> -N | N        | Si     | PO <sub>4</sub> -3-P | Ch1a                | Phaeo  | σ <sub>t</sub> |
| 0        | 26.50     | 36.095    | 4.72           |                    |          |        |                      | 0.04                | 0.01   | 23.73          |
| 8        | 26.08     | 36.106    | 4.74           |                    |          |        |                      | 0.05                | 0.04   | 23.86          |
| 26       | 25.99     | 36.157    | 4.76           |                    |          |        |                      | 0.04                | 0.01   | 23.94          |
| 53       | 25.81     | 36.180    | 4.78           |                    |          |        |                      | 0.03                | 0.01   | 24.00          |
| 79       | 25.56     | 36.771    | 4.85           |                    |          |        |                      | 0.08                | 0.01   | 24.54          |
| 106      | 24.61     | 37.016    | 4.56           |                    |          |        |                      | 0.16                | 0.16   | 25.00          |
| 132      | 23.31     | 37.091    | 4.18           |                    |          |        |                      | 0.13                | 0.18   | 25.46          |
| 155      | 22.33     | 36.987    | 4.26           |                    |          |        |                      | 0.07                | 0.09   | 25.66          |
| 207      | 19.57     | 36.685    | 4.20           |                    |          |        |                      | 0.01                | 0.01   | 26.18          |
| 263      | 17.87     | 36.463    | 4.38           |                    |          |        |                      | 0.01                | 0.00   | 26.45          |
| 307      | 16.62     | 36.275    | 4.05           |                    |          |        |                      | 0.01                | 0.00   | 26.61          |
| 411      | 14.18     | 35.891    | 3.75           |                    |          |        |                      | 0.01                | 0.00   | 26.86          |
| 512      | 10.95     | 35.313    | 2.93           |                    |          |        |                      | 0.01                | 0.00   | 27.05          |
| 671      | 8.30      | 34.983    | 2.90           |                    |          |        |                      | 0.01                | 0.00   | 27.25          |
| 824      | 6.32      | 34.778    | 3.11           |                    |          |        |                      | 0.01                | 0.00   | 27.37          |
| 1041     | 5.19      | 34.990    | 4.15           |                    |          |        |                      | 0.01                | 0.00   | 27.67          |

R/V CRAWFORD

OTEC CRUISE 8003

STATION: Pt-6

| Latitude | Longitude | MO/DAY/YR | Messenger Time | Bottom             | Wind     | Speed                | Weather | Dominant Waves      | Secchi         |
|----------|-----------|-----------|----------------|--------------------|----------|----------------------|---------|---------------------|----------------|
| 17°28.0N | 65°53.0W  | 3/26/80   | 0018 (GMT)     | 2067m (s)          | 90 (Dir) | 7 (kt)               | 1       | 90° 2 ft (Dir) (Ht) |                |
| Z        | T         | S         | O <sub>2</sub> | NH <sub>4</sub> -N | Si       | PO <sub>4</sub> -3-P | Ch1a    | Phaeo               | σ <sub>t</sub> |
| 2        | 26.25     | 36.087    | 4.71           | <.2                | 1.5      | 0.09                 | 0.03    | 0.00                | 23.80          |
| 11       | 26.23     | 36.084    | 4.72           | <.2                | 1.6      | <.08                 | 0.03    | 0.00                | 23.81          |
| 30       | 26.04     | 36.077    | 4.74           | <.2                | 1.7      | <.08                 | 0.03    | 0.00                | 23.86          |
| 58       | 25.88     | 36.144    | 4.75           | <.2                | 1.5      | <.08                 | 0.04    | 0.00                | 23.96          |
| 86       | 25.58     | 36.501    | 4.81           | <.2                | 1.3      | <.08                 | 0.09    | 0.03                | 24.32          |
| 114      | 24.70     | 37.004    | 4.65           | <.2                | 0.9      | <.08                 | 0.15    | 0.09                | 24.98          |
| 142      | 22.82     | 37.034    | 4.32           | <.2                | 0.9      | .08                  | 0.12    | 0.18                | 25.56          |
| 165      | 21.56     | 36.912    | 4.14           | 0.2                | 1.0      | .09                  | 0.05    | 0.06                | 25.82          |
| 222      | 19.32     | 36.653    | 4.18           | <.2                | 1.3      | 0.11                 | 0.01    | 0.01                | 26.24          |
| 282      | 17.58     | 36.418    | 4.20           | <.2                | 1.7      | 0.32                 | 0.00    | 0.00                | 26.49          |
| 329      | 16.59     | 36.266    | 3.99           | <.2                | 3.4      | 0.45                 |         |                     | 26.61          |
| 441      | 13.79     | 35.828    | 3.63           | <.2                | 6.5      | 0.87                 |         |                     | 26.90          |
| 549      | 11.26     | 35.411    | 3.12           | <.2                | 10.3     | 1.31                 |         |                     | 27.07          |
| 717      | 7.50      | 34.865    | 2.90           | <.2                | 20.0     | 2.03                 |         |                     | 22.27          |
| 876      | 6.29      | 34.876    | 3.46           | 0.2                | 22.3     | 1.97                 |         |                     | 27.45          |
| 1096     | 4.92      | 34.943    | 4.41           | 0.2                | 23.8     | 1.71                 |         |                     | 27.67          |

R/V CRAWFORD

OTEC CRUISE 8003

STATION: Pt-5

| Latitude | Longitude | MO/DAY/YR | Messenger Time | Bottom             | Wind      | Speed  | Weather              | Dominant Waves                   | Secchi |                |
|----------|-----------|-----------|----------------|--------------------|-----------|--------|----------------------|----------------------------------|--------|----------------|
| 17°44.2N | 65°53.0W  | 3/26/80   | 0322 (GMT)     | 732m (s)           | 110 (Dir) | 3 (Kt) |                      | 100° 4 ft 4s (Dir) (Ht) (Period) |        |                |
| Z        | T         | S         | O <sub>2</sub> | NH <sub>4</sub> -N | N         | Si     | PO <sub>4</sub> -3-P | Ch1a                             | Phaeo  | σ <sub>t</sub> |
| 0        | 26.18     | 36.109    | 4.71           | <.2                | 0.3       | 1.5    | <.08                 | 0.03                             | 0.00   | 23.84          |
| 9        | 26.16     | 36.109    | 4.72           | <.2                | 0.3       | 1.5    | <.08                 | 0.04                             | 0.00   | 23.85          |
| 28       | 26.04     | 36.131    | 4.74           | <.2                | 0.3       | 1.5    | <.08                 | 0.04                             | 0.00   | 23.90          |
| 56       | 25.95     | 36.138    | 4.74           | <.2                | 0.3       | 1.3    | <.08                 | 0.04                             | 0.01   | 23.94          |
| 84       | 25.59     | 36.510    | 4.81           | <.2                | 0.3       | 0.9    | <.08                 | 0.09                             | 0.00   | 24.33          |
| 112      | 24.84     | 37.020    | 4.61           | 0.2                | 0.3       | 0.7    | <.08                 | 0.15                             | 0.10   | 24.95          |
| 139      | 22.79     | 37.020    |                | <.2                | 1.3       | 0.5    | <.08                 | 0.13                             | 0.17   | 25.56          |
| 163      | 21.51     | 36.886    | 4.33           | 0.2                | 1.4       | 0.9    | <.08                 | 0.09                             | 0.07   | 25.82          |
| 219      | 19.06     | 36.601    | 4.55           | <.2                | 2.8       | 1.0    | 0.17                 | 0.01                             | 0.01   | 26.26          |
| 278      | 18.01     | 36.481    | 4.55           | <.2                | 4.8       | 1.0    | 0.35                 | 0.01                             | 0.00   | 26.42          |
| 325      | 17.08     | 36.352    | 4.21           | 0.2                | 6.0       | 3.4    | 0.76                 | 0.01                             | 0.00   | 26.56          |
| 437      | 14.00     | 35.860    | 3.68           | 0.2                | 12.8      | 6.5    | 1.21                 | 0.01                             | 0.00   | 26.88          |
| 544      | 11.25     | 35.417    | 3.14           | <.2                | 21.4      | 6.7    | 1.35                 | 0.01                             | 0.00   | 27.08          |
| 650      | 8.85      | 35.044    | 2.90           | <.2                | 22.5      | 13.5   | 1.23                 | 0.01                             | 0.00   | 27.21          |

R/V CRAUFORD

OTEC CRUISE 8003

STATION: Pt-3

| Latitude | Longitude | MO/DAY/YR | Messenger Time | Bottom             | Wind      | Speed  | Weather              | Dominant Waves                  | Secchi |                |
|----------|-----------|-----------|----------------|--------------------|-----------|--------|----------------------|---------------------------------|--------|----------------|
| 17°56.0N | 65°53.0W  | 3/26/80   | 0713 (GMT)     | 1920m (s)          | 110 (Dir) | 2 (Kt) | 1                    | 120° 4 ft 3s (Dir) (Ht)(Period) |        |                |
| Z        | T         | S         | O <sub>2</sub> | NH <sub>4</sub> -N | N         | Si     | PO <sub>4</sub> -3-P | Ch1a                            | Phaeo  | σ <sub>t</sub> |
| 1        | 26.12     | 36.104    | 4.71           | <.2                | 0.1       | 1.1    | <.08                 | 0.04                            | 0.00   | 23.86          |
| 10       | 26.15     | 36.107    | 4.71           | <.2                | 0.2       | 1.2    | <.08                 | 0.03                            | 0.01   | 23.85          |
| 29       | 26.14     | 36.109    | 4.72           | <.2                | 0.1       | 1.2    | <.08                 | 0.05                            | 0.00   | 23.85          |
| 57       | 26.05     | 36.135    | 4.72           | <.2                | 0.1       | 1.0    | <.08                 | 0.05                            | 0.01   | 23.90          |
| 85       | 25.71     | 36.291    | 4.73           | <.2                | 0.1       | 0.8    | <.08                 | 0.12                            | 0.03   | 24.12          |
| 112      | 24.75     | 36.993    | 4.68           | <.2                | 0.1       | 0.4    | <.08                 | 0.35                            | 0.15   | 25.11          |
| 140      | 22.96     | 36.992    | 4.47           | <.2                | 0.6       | 0.1    | <.08                 | 0.16                            | 0.19   | 25.49          |
| 164      | 21.89     | 36.926    | 4.31           | <.2                | 1.2       | 0.2    | 0.10                 | 0.09                            | 0.11   | 25.74          |
| 220      | 19.01     | 36.593    | 4.52           | <.2                | 2.7       | 0.2    | 0.11                 | 0.04                            | 0.00   | 26.26          |
| 279      | 17.95     | 36.470    | 4.59           | <.2                | 4.6       | 2.0    | 0.22                 | 0.00                            | 0.00   | 26.44          |
| 326      | 17.22     | 36.359    | 4.30           | <.2                | 7.1       | 0.4    | 0.38                 | 0.00                            | 0.00   | 26.53          |
| 438      | 14.41     | 35.921    | 3.70           | <.2                | 14.5      | 5.5    | 0.85                 | 0.00                            | 0.00   | 26.84          |
| 546      | 11.68     | 35.480    | 3.15           | <.2                | 21.9      | 10.6   | 1.30                 | 0.00                            | 0.00   | 27.05          |
| 713      | 8.27      | 34.991    | 3.03           | <.2                | 29.3      | 19.2   | 1.95                 | 0.00                            | 0.00   | 27.25          |
| 872      | 6.34      | 34.866    |                | <.2                | 30.0      | 24.0   | 1.97                 | 0.00                            | 0.00   | 27.43          |
| 1092     | 4.87      | 34.935    | 4.43           | <.2                | 25.5      | 25.5   | 1.71                 | 0.00                            | 0.00   | 27.67          |

R/V CRAWFORD

OIEC CRUISE 8003

STATION: Pt-1

| Latitude | Longitude | MO/DAY/YR | Messenger Time     | Bottom  | Wind      | Speed                | Weather | Dominant Waves                  | Secchi |                |
|----------|-----------|-----------|--------------------|---------|-----------|----------------------|---------|---------------------------------|--------|----------------|
| 17°58.2N | 65°53.0W  | 3/26/80   | 0850 (GMT)         | 46m (s) | 100 (Dir) | 5 (Kt)               |         | 110° 4 ft 4s (Dir) (Ht)(Period) |        |                |
| Z        | T         | S         | NH <sub>4</sub> -N | N       | Si        | PO <sub>4</sub> -3-P |         | Chla                            | Phaeo  | σ <sub>t</sub> |
| 0        | 26.28     | 36.176    | <.2                | 0.3     | 1.2       | <.08                 |         | 0.14                            | 0.02   | 23.86          |
| 23       | 26.38     | 36.177    | 0.3                | 0.3     | 1.2       | <.08                 |         | 0.21                            | 0.03   | 23.83          |

R/V CRAWFORDOIEC CRUISE 8003STATION: J-1

| Latitude | Longitude | MO/DAY/YR | Messenger Time     | Bottom  | Wind      | Speed  | Weather             | Dominant Waves                  | Secchi |            |
|----------|-----------|-----------|--------------------|---------|-----------|--------|---------------------|---------------------------------|--------|------------|
| 17°54.8N | 66°16.0W  | 3/26/80   | 1207 (GMT)         | 17m (s) | 30° (Dir) | 4 (Kt) | 1                   | 130° 2 ft 6s (Dir) (Ht)(Period) |        |            |
| Z        | T         | S         |                    |         |           |        |                     | Ch1a                            | Phaeo  | $\sigma_t$ |
| 1        | 26.36     | 36.163    |                    | N       | Si        |        | P0 <sub>4</sub> -3P | 0.22                            | 0.00   | 23.83      |
| 8        | 26.34     | 36.164    | NH <sub>4</sub> -N | 0.3     | <.1       |        | <.08                | 0.24                            | 0.00   | 23.83      |
|          |           |           | O <sub>2</sub>     | 0.3     | <.1       |        | <.08                |                                 |        |            |
|          |           |           | 4.73               |         |           |        |                     |                                 |        |            |
|          |           |           | 4.72               |         |           |        |                     |                                 |        |            |

R/V CRAWFORD

OPEC CRUISE 8003

STATION: J-3

| Latitude | Longitude | MO/DAY/YR | Messenger Time | Bottom             | Wind      | Speed  | Weather              | Dominant Waves                 | Secchi |                |
|----------|-----------|-----------|----------------|--------------------|-----------|--------|----------------------|--------------------------------|--------|----------------|
| 17°48.7N | 66°16.0W  | 3/26/80   | 1452 (GMT)     | 1079m (s)          | 90° (Dir) | 5 (Kt) | 1                    | 90° 2 ft 6s (Dir) (Ht)(Period) |        |                |
| Z        | T         | S         | O <sub>2</sub> | NH <sub>4</sub> -N | N         | Si     | PO <sub>4</sub> -3-P | Ch1a                           | Phaeo  | σ <sub>t</sub> |
| 0        | 26.26     | 36.044    | 4.71           | <.2                | 0.2       | 1.2    | <.08                 | 0.04                           | 0.01   | 23.77          |
| 8        | 26.19     | 36.045    | 4.71           | <.2                | 0.2       | .7     | <.08                 | 0.05                           | 0.01   | 23.79          |
| 26       | 26.10     | 36.041    | 4.72           | <.2                | 0.2       | 1.0    | <.08                 | 0.12                           | 0.02   | 23.82          |
| 48       | 26.03     | 36.057    | 4.71           | 0.5                | 0.2       | 0.9    | <.08                 | 0.11                           | 0.02   | 23.85          |
| 70       | 25.78     | 36.238    | 4.75           | 0.3                | 0.2       | 1.1    | <.08                 | 0.11                           | 0.02   | 24.06          |
| 96       | 25.40     | 36.664    | 4.78           | 0.9                | 0.2       | 1.2    | <.08                 | 0.11                           | 0.02   | 24.51          |
| 122      | 23.85     | 37.008    | 4.58           | 0.3                | 0.2       | 0.8    | <.08                 | 0.25                           | 0.14   | 25.24          |
| 144      | 22.66     | 36.973    | 4.40           | <.2                | 0.9       | 1.3    | <.08                 | 0.12                           | 0.14   | 25.56          |
| 192      | 19.66     | 36.684    | 4.30           | <.2                | 2.2       | 0.9    | <.08                 | 0.01                           | 0.01   | 26.16          |
| 239      | 18.37     | 36.519    | 4.43           | <.2                | 3.6       | 1.3    | .12                  | 0.01                           | 0.00   | 26.37          |
| 288      | 17.60     | 36.425    | 4.40           | 0.2                | 5.2       | 1.9    | .19                  | 0.01                           | 0.00   | 26.49          |
| 384      | 15.80     | 36.142    | 3.93           | <.2                | 9.5       | 3.1    | .43                  | 0.01                           | 0.00   | 26.70          |
| 485      | 13.57     | 35.781    | 3.50           | <.2                | 13.7      | 5.9    | .70                  | 0.01                           | 0.00   | 26.90          |
| 628      | 10.22     | 35.263    | 3.04           | 0.2                | 21.0      | 11.6   | 1.23                 | 0.01                           | 0.00   | 27.14          |
| 780      | 7.69      | 34.951    | 3.06           | <.2                | 23.7      | 18.0   | 1.54                 | 0.01                           | 0.00   | 27.31          |



R/V CRAWFORD

OPEC CRUISE 8003

STATION: J-5

| Latitude | Longitude | MO/DAY/YR | Messenger Time | Bottom             | Wind      | Speed  | Weather              | Dominant Waves      | Secchi |                |
|----------|-----------|-----------|----------------|--------------------|-----------|--------|----------------------|---------------------|--------|----------------|
| 17°39.7N | 66°16.0W  | 3/26/80   | 1758 (GMT)     | 2323m (s)          | 90° (Dir) | 8 (Kt) | 1                    | 90° 2 ft (Dir) (Ht) |        |                |
| Z        | T         | S         | O <sub>2</sub> | MH <sub>4</sub> -N | N         | Si     | PO <sub>4</sub> -3-P | Ch1a                | Phaeo  | σ <sub>t</sub> |
| 0        | 26.61     | 36.085    | 4.70           | <.2                | 0.1       | 1.0    | <.08                 | 0.04                | 0.00   | 23.69          |
| 8        | 26.34     | 36.083    | 4.71           | <.2                | 0.1       | 1.0    | <.08                 | 0.04                | 0.01   | 23.77          |
| 30       | 26.26     | 36.080    | 4.72           | 0.2                | 0.1       | 0.3    | <.08                 | 0.04                | 0.01   | 23.80          |
| 55       | 26.08     | 36.041    | 4.73           | <.2                | 0.1       | 1.0    | <.08                 | 0.06                | 0.01   | 23.82          |
| 56       | 25.54     | 36.493    | 4.82           | <.2                | 0.1       | 0.8    | <.08                 | 0.11                | 0.02   | 24.34          |
| 110      | 24.41     | 36.992    | 4.66           | <.2                | 0.1       | 0.2    | <.08                 | 0.21                | 0.15   | 25.06          |
| 140      | 23.37     | 37.040    | 4.45           | 0.2                | 0.2       | <.1    | <.08                 | 0.18                | 0.18   | 25.40          |
| 162      | 21.64     | 36.903    | 4.30           | <.2                | 1.1       | 0.3    | <.08                 | 0.08                | 0.10   | 27.79          |
| 216      | 19.42     | 36.672    | 4.14           | <.2                | 3.7       | 0.1    | 0.19                 | 0.00                | 0.01   | 26.22          |
| 271      | 18.01     | 36.481    | 4.60           | <.2                | 3.4       | 1.2    | 0.17                 | 0.00                | 0.01   | 26.42          |
| 330      | 16.50     | 36.260    | 4.10           | <.2                | 8.6       | 2.2    | 0.47                 | 0.00                | 0.01   | 26.62          |
| 423      | 14.24     | 35.899    | 3.62           | 0.4                | 11.6      | 2.9    | 0.62                 | 0.00                | 0.01   | 26.86          |
| 533      | 11.67     | 35.487    | 3.21           | <.2                | 15.8      | 7.8    | 1.08                 | 0.00                | 0.01   | 27.06          |
| 692      | 8.57      | 35.039    | 2.96           | <.2                | 20.7      | 13.0   | 1.41                 | 0.00                | 0.01   | 27.25          |
| 848      | 6.48      | 34.864    | 3.27           | <.2                | 26.7      | 14.8   | 1.77                 | 0.00                | 0.01   | 27.42          |
| 1090     | 5.02      | 34.935    | 4.33           | 0.2                | 24.2      | 22.7   | 1.64                 | 0.00                | 0.01   | 27.66          |

R/V CRAWFORD

OCEC CRUISE 8003

STATION: J-6

| Latitude | Longitude | MO/DAY/YR | Messenger Time | Bottom             | Wind      | Speed  | Weather              | Dominant Waves                 | Secchi |                |
|----------|-----------|-----------|----------------|--------------------|-----------|--------|----------------------|--------------------------------|--------|----------------|
| 17°24.5N | 66°16.0W  | 3/26/80   | 2109 (GMT)     | 4023m (s)          | 90° (Dir) | 6 (Kt) | 1                    | 90° 2 ft 5s (Dir) (Ht)(Period) |        |                |
| Z        | T         | S         | O <sub>2</sub> | NH <sub>4</sub> -N | N         | Si     | PO <sub>4</sub> -3-P | Ch1a                           | Phaeo  | σ <sub>t</sub> |
| 0        | 26.62     | 36.086    | 4.70           | <.2                | 0.1       | 0.4    | <.08                 | 0.04                           | 0.00   | 23.69          |
| 8        | 26.42     | 36.079    | 4.71           | <.2                | 0.1       | 1.0    | <.08                 | 0.04                           | 0.01   | 23.75          |
| 31       | 26.22     | 36.073    | 4.74           | <.2                | 0.1       | 0.6    | <.08                 | 0.05                           | 0.01   | 23.80          |
| 55       | 26.18     | 36.067    | 4.73           | <.2                | 0.1       | 0.6    | <.08                 | 0.06                           | 0.01   | 23.81          |
| 85       | 25.49     | 36.348    | 4.82           | <.2                | 0.1       | 0.8    | <.08                 | 0.12                           | 0.03   | 24.24          |
| 109      | 25.08     | 36.840    | 4.75           | <.2                | 0.1       | 0.3    | <.08                 | 0.20                           | 0.08   | 24.73          |
| 140      | 23.66     | 37.055    | 4.37           | <.2                | 0.5       | <.1    | <.08                 | 0.21                           | 0.19   | 25.32          |
| 161      | 22.42     | 36.995    | 4.20           | <.2                | 1.0       | 0.7    | <.08                 | 0.09                           | 0.08   | 25.64          |
| 213      | 19.55     | 36.689    | 4.03           | <.2                | 4.4       | 1.0    | <.08                 | 0.01                           | 0.01   | 26.20          |
| 267      | 17.93     | 36.470    | 4.16           | <.2                | 4.5       | 0.9    | 0.19                 | 0.00                           | 0.01   | 26.44          |
| 322      | 16.47     | 36.245    | 3.84           | <.2                | 9.7       | 2.9    | 0.23                 |                                |        | 26.63          |
| 420      | 13.77     | 35.826    | 3.59           | <.2                | 14.1      | 18.9   | 0.50                 |                                |        | 26.90          |
| 514      | 11.75     | 35.506    | 3.24           | <.2                | 16.8      | 7.8    | 0.67                 |                                |        | 27.05          |
| 667      | 8.46      | 35.002    | 2.88           | <.2                | 22.5      | 15.1   | 0.86                 |                                |        | 27.23          |
| 816      | 6.57      | 34.866    | 3.25           | <.2                | 21.7      | 20.6   | 0.87                 |                                |        | 27.40          |
| 1052     | 5.03      | 34.934    | 4.31           | <.2                | 15.1      | 15.7   | 1.17                 |                                |        | 27.64          |

R/V CRAWFORD

OCEAN CRUISE 8003

STATION: G-6

| Latitude | Longitude | MO/DAY/YR | Messenger Time | Bottom             | Wind       | Speed  | Weather              | Dominant Waves                  | Secchi |                |
|----------|-----------|-----------|----------------|--------------------|------------|--------|----------------------|---------------------------------|--------|----------------|
| 17°26.5N | 66°45.0W  | 3/27/80   | 0225 (GMT)     | 3877m (s)          | 110° (Dir) | 3 (kt) | 1                    | 110° 5 ft 5s (Dir) (Ht)(Period) |        |                |
| Z        | T         | S         | O <sub>2</sub> | NH <sub>4</sub> -N | N          | Si     | PO <sub>4</sub> -3-P | Chla                            | Phaeo  | σ <sub>t</sub> |
| 0        | 26.36     | 36.116    | 4.70           | <.2                | 0.1        | 0.9    | <.08                 | 0.04                            | 0.01   | 23.80          |
| 8        | 26.34     | 36.117    | 4.71           | <.2                | 0.1        | 1.5    | 0.12                 | 0.04                            | 0.01   | 23.80          |
| 30       | 26.16     | 36.103    | 4.73           | <.2                | 0.1        | 1.5    | <.08                 | 0.04                            | 0.00   | 23.85          |
| 56       | 25.86     | 36.071    | 4.76           | <.2                | 0.1        | 1.5    | <.08                 | 0.05                            | 0.01   | 23.92          |
| 88       | 25.84     | 36.835    | 4.68           | <.2                | 0.1        | 0.8    | <.08                 | 0.11                            | 0.07   | 24.50          |
| 114      | 24.31     | 37.068    | 4.50           | <.2                | 0.2        | 0.7    | <.08                 | 0.29                            | 0.20   | 25.14          |
| 144      | 22.40     | 36.998    | 4.24           | <.2                | 1.2        | 0.8    | <.08                 | 0.09                            | 0.15   | 26.64          |
| 167      | 20.91     | 36.857    | 4.13           | <.2                | 2.4        | 0.8    | 0.11                 | 0.04                            | 0.02   | 25.96          |
| 224      | 18.63     | 36.570    | 4.19           | <.2                | 3.8        | 1.5    | 0.14                 | 0.01                            | 0.01   | 26.34          |
| 281      | 17.89     | 36.466    | 4.42           | <.2                | 5.6        | 1.8    | 0.28                 | 0.00                            | 0.00   | 26.45          |
| 364      | 16.93     | 36.325    | 4.19           | <.2                | 8.2        | 2.8    | 0.40                 | 0.00                            | 0.00   | 26.58          |
| 445      | 14.12     | 35.880    | 3.69           | <.2                | 16.7       | 6.3    | 0.82                 | 0.00                            | 0.00   | 26.86          |
| 548      | 11.14     | 35.377    | 3.05           | <.2                | 23.7       | 9.1    | 1.44                 | 0.00                            | 0.00   | 27.07          |
| 711      | 7.91      | 34.968    | 3.00           | 0.2                | 20.6       | 18.7   | 1.28                 | 0.00                            | 0.00   | 27.29          |
| 871      | 6.40      | 34.870    | 3.38           | 0.2                | 30.3       | 22.5   | 2.00                 | 0.00                            | 0.00   | 27.43          |
| 1117     | 4.83      | 34.936    | 4.40           | 0.2                | 26.2       | 23.9   | 1.71                 | 0.00                            | 0.00   | 27.67          |

R/V CRAWFORD

OTEC CRUISE 8003

STATION: G-5

| Latitude | Longitude | MO/DAY/YR | Messenger Time | Bottom             | Wind       | Speed  | Weather              | Dominant Waves                   | Secchi |                |
|----------|-----------|-----------|----------------|--------------------|------------|--------|----------------------|----------------------------------|--------|----------------|
| 17°41.6N | 66°45.0W  | 3/27/80   | 0559 (GMT)     | 1828m (s)          | 100° (Dir) | 2 (Kt) | 1                    | 110° 3 ft 3s (Dir) (Ht) (Period) |        |                |
| Z        | T         | S         | O <sub>2</sub> | NH <sub>4</sub> -N | N          | Si     | PO <sub>4</sub> -3-P | Ch1a                             | Phaeo  | σ <sub>t</sub> |
| 0        | 26.36     | 36.092    | 4.70           | 0.2                | 0.2        | 1.4    | 0.09                 | 0.05                             | 0.00   | 23.78          |
| 9        | 26.37     | 36.093    | 4.71           | 0.2                | 0.2        | 1.4    | 0.09                 | 0.04                             | 0.01   | 23.77          |
| 27       | 26.29     | 36.084    | 4.72           | 0.2                | 0.2        | 1.4    | <.08                 | 0.04                             | 0.01   | 23.79          |
| 54       | 26.00     | 36.068    | 4.73           | 0.2                | 0.2        | 1.2    | <.08                 | 0.05                             | 0.01   | 23.88          |
| 80       | 25.88     | 36.142    | 4.75           | 0.2                | 0.2        | 0.7    | <.08                 | 0.07                             | 0.03   | 23.96          |
| 107      | 24.78     | 36.920    | 4.74           | <.2                | 0.2        | 0.6    | 0.10                 | 0.21                             | 0.11   | 24.88          |
| 134      | 22.88     | 36.956    | 4.47           | <.2                | 0.5        | 0.7    | 0.10                 | 0.17                             | 0.17   | 25.48          |
| 157      | 21.67     | 36.928    | 4.26           | 0.2                | 1.5        | 0.7    | 0.14                 | 0.08                             | 0.08   | 25.80          |
| 210      | 18.92     | 36.589    | 4.45           | 0.3                | 3.2        | 1.2    | 0.17                 | 0.01                             | 0.00   | 26.02          |
| 268      | 18.22     | 36.501    | 4.58           | 0.5                | 4.1        | 1.4    | 0.20                 | 0.00                             | 0.01   | 26.39          |
| 313      | 17.57     | 36.423    | 4.35           | 0.2                | 12.3       | 4.1    | 0.64                 | 0.00                             | 0.01   | 26.49          |
| 422      | 15.22     | 36.054    | 3.83           | 0.2                | 11.0       | 4.0    | 0.62                 | 0.00                             | 0.00   | 26.76          |
| 527      | 12.92     | 35.674    | 3.39           | 0.2                | 14.0       | 8.1    | 0.75                 | 0.00                             | 0.00   | 26.96          |
| 690      | 8.95      | 35.090    | 3.00           | 0.2                | 12.5       | 17.0   | 1.15                 | 0.00                             | 0.00   | 27.22          |
| 846      | 6.37      | 34.830    | 3.27           | 0.2                | 30.1       | 14.8   | 2.03                 | 0.00                             | 0.00   | 27.40          |
| 1062     | 5.06      | 34.935    | 4.31           | 0.2                | 20.8       | 25.2   | 1.40                 | 0.00                             | 0.00   | 27.60          |

R/V CRAWFORDOCE CRUISE 8003STATION: G-3

| Latitude | Longitude | MO/DAY/YR | Messenger Time | Bottom             | Wind      | Speed  | Weather              | Dominant Waves                  | Secchi |                |
|----------|-----------|-----------|----------------|--------------------|-----------|--------|----------------------|---------------------------------|--------|----------------|
| 17°53.4N | 66°45.0W  | 3/27/80   | 0946 (GMT)     | 558m (s)           | 30° (Dir) | 4 (Kt) | 1                    | 130° 2 ft 6s (Dir) (Ht)(Period) |        |                |
| Z        | T         | S         | O <sub>2</sub> | NH <sub>4</sub> -N | N         | Si     | PO <sub>4</sub> -3-P | Ch1a                            | Phaeo  | σ <sub>t</sub> |
| 1        | 26.40     | 36.008    | 4.70           | <.2                | 0.1       | 1.4    | 0.08                 | 0.09                            | 0.01   | 23.69          |
| 10       | 26.39     | 36.008    | 4.69           | <.2                | 0.1       | 0.8    | <.08                 | 0.10                            | 0.01   | 23.70          |
| 29       | 26.40     | 36.036    | 4.70           | <.2                | 0.1       | 0.6    | <.08                 | 0.10                            | 0.00   | 23.72          |
| 52       | 26.16     | 36.084    | 4.66           | <.2                | 0.2       | 0.2    | <.08                 | 0.11                            | 0.02   | 23.83          |
| 75       | 25.77     | 36.294    | 4.75           | <.2                | 0.3       | 0.9    | <.08                 | 0.21                            | 0.06   | 24.12          |
| 103      | 25.13     | 36.880    | 4.73           | <.2                | 0.3       | 0.8    | <.08                 | 0.19                            | 0.12   | 24.75          |
| 131      | 23.57     | 37.031    | 4.52           | <.2                | 0.4       | 0.4    | <.08                 | 0.18                            | 0.18   | 25.34          |
| 134      | 21.87     | 36.927    | 4.31           | <.2                | 1.1       | 0.2    | 0.14                 | 0.08                            | 0.12   | 25.75          |
| 206      | 19.54     | 36.676    | 4.26           | <.2                | 3.3       | 0.1    | 0.14                 | 0.01                            | 0.01   | 26.19          |
| 256      | 18.33     | 36.513    | 4.54           | <.2                | 3.1       | 0.8    | 0.14                 | 0.00                            | 0.01   | 26.38          |
| 307      | 17.63     | 36.426    | 4.48           | <.2                | 4.6       | 1.3    | 0.21                 |                                 |        | 26.48          |
| 410      | 15.28     | 36.060    | 3.77           | <.2                | 13.2      | 3.4    | 0.72                 |                                 |        | 26.75          |
| 512      | 12.60     | 35.622    | 3.30           | 0.2                | 12.0      | 6.6    | 0.81                 |                                 |        | 26.98          |

R/V CRAWFORDOTEC CRUISE 8003STATION: G-1

| Latitude | Longitude | MO/DAY/YR | Messenger Time | Bottom             | Wind      | Speed  | Weather              | Dominant Waves                 | Secchi |                |
|----------|-----------|-----------|----------------|--------------------|-----------|--------|----------------------|--------------------------------|--------|----------------|
| 17°56.0N | 66°45.0W  | 3/27/80   | 1135 (GMT)     | 549m (s)           | 30° (Dir) | 3 (Kt) | 1                    | 150° 2 ft 6s (Dir)(Ht)(Period) |        |                |
| Z        | T         | S         | O <sub>2</sub> | NH <sub>4</sub> -N | N         | Si     | PO <sub>4</sub> -3-P | Ch1a                           | Phaeo  | σ <sub>t</sub> |
| 0        | 26.38     | 35.996    | 4.70           | <.2                | 0.1       | 0.8    | <.08                 | 0.08                           | 0.01   | 23.69          |
| 23       | 26.32     | 36.068    | 4.70           | 0.4                | 0.1       | 0.6    | <.08                 | 0.08                           | 0.00   | 23.77          |
| 51       | 25.98     | 36.062    | 4.72           | <.2                | 0.1       | 0.6    | <.08                 | 0.07                           | 0.01   | 23.87          |
| 103      | 24.29     | 36.926    | 4.60           | 0.2                | 0.5       | 0.6    | <.08                 | 0.16                           | 0.11   | 25.05          |

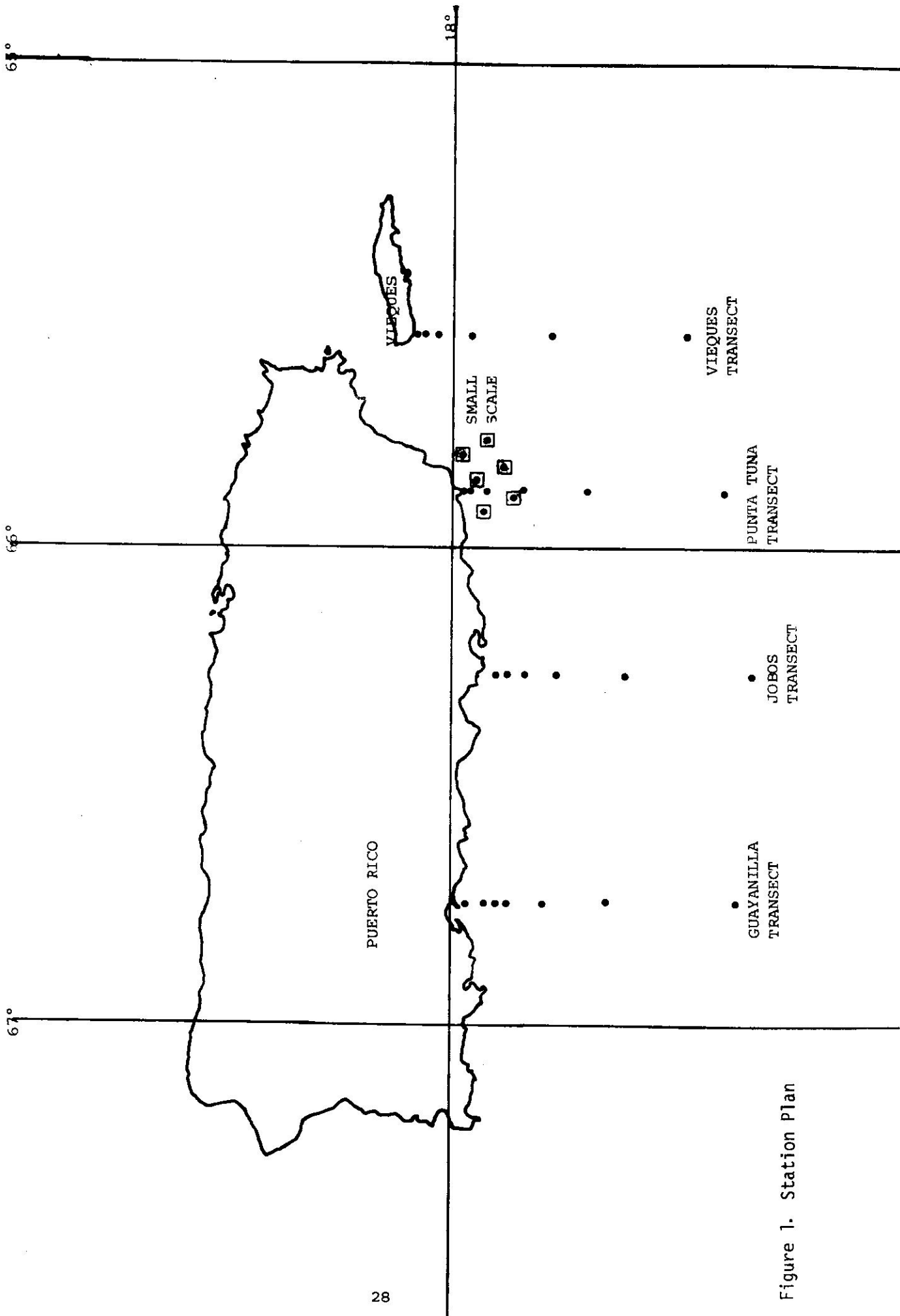
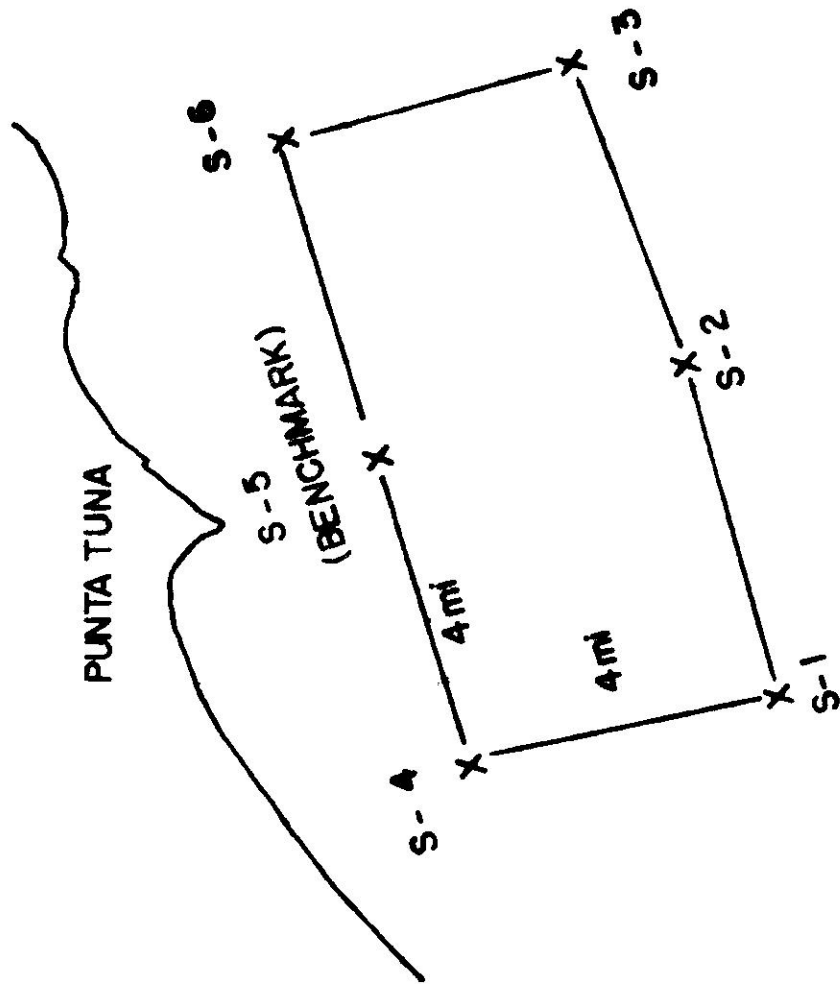
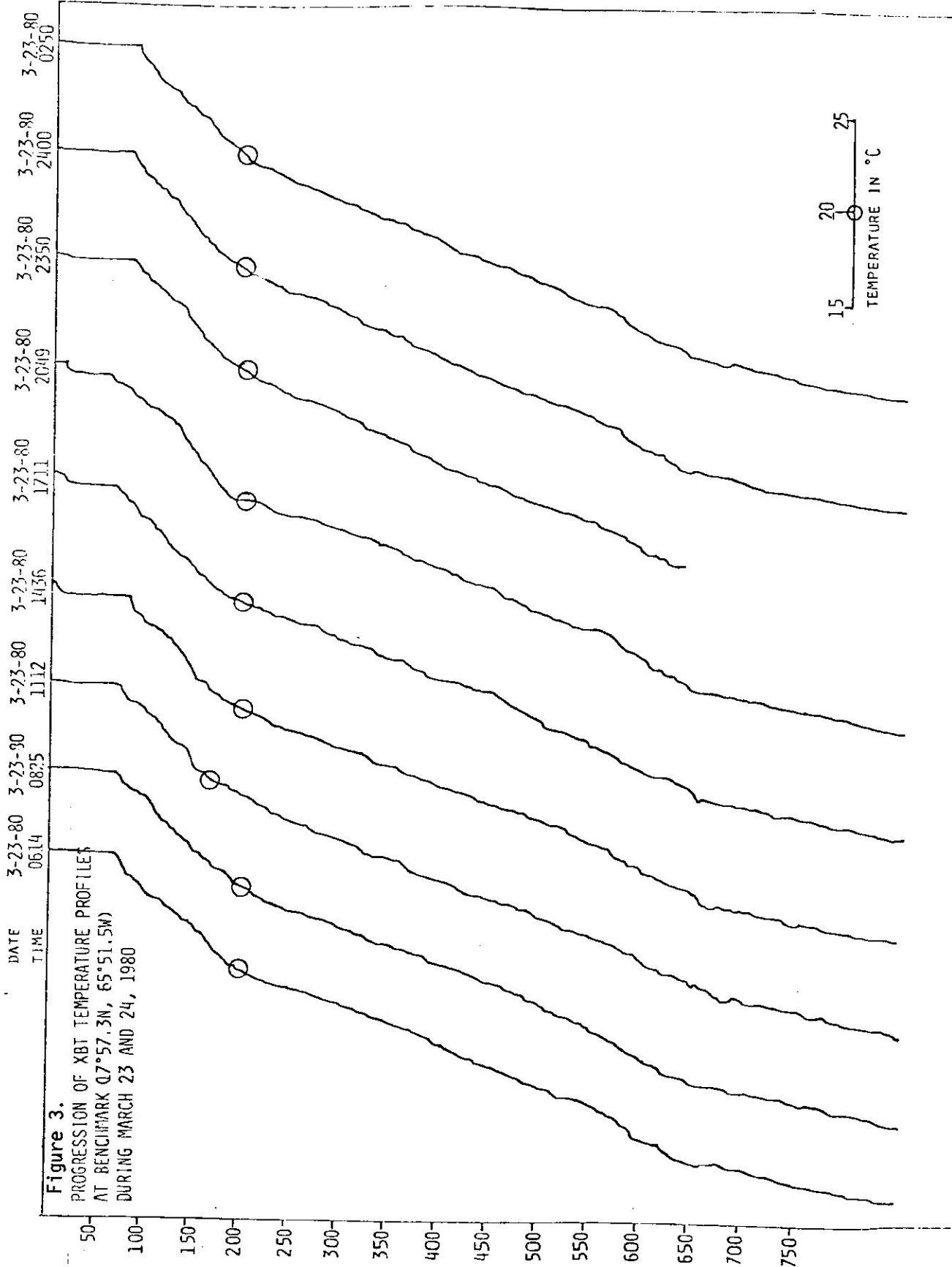


Figure 1. Station Plan

Figure 2. SMALL SCALE STUDY







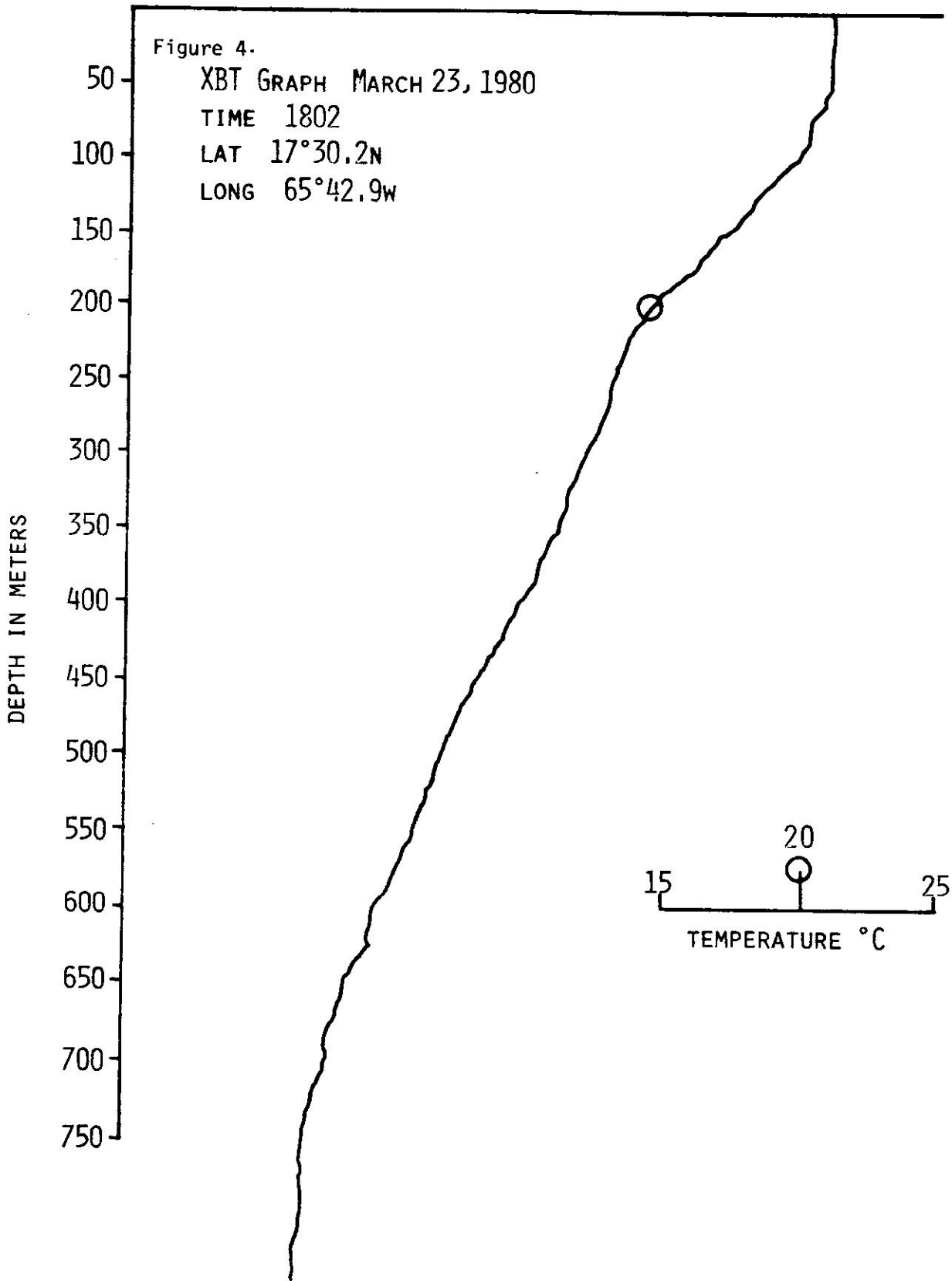


Figure 5.

XBT GRAPH MARCH 25, 1980

TIME 0356

LAT 18°01.6N

LONG 65°40.4W

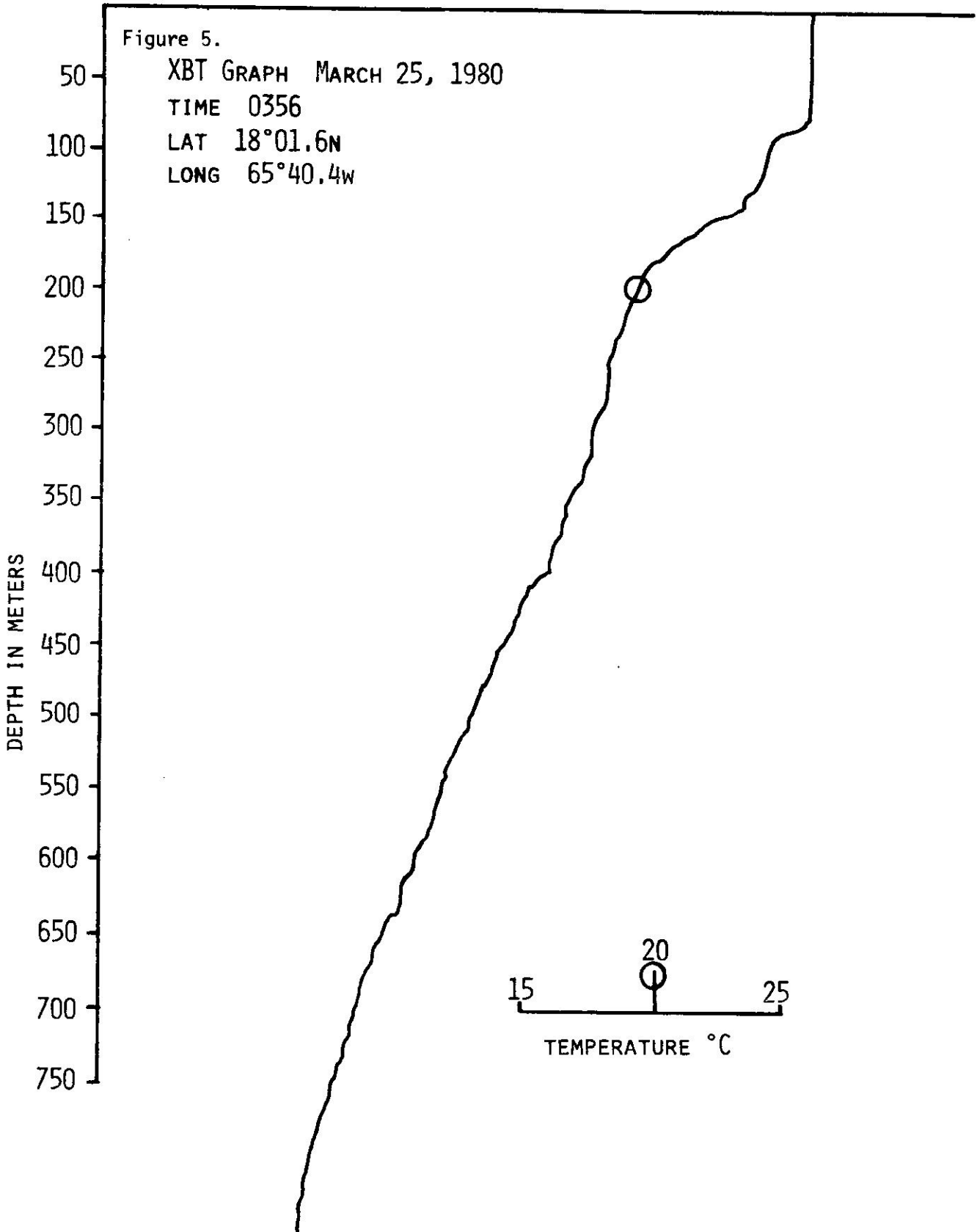
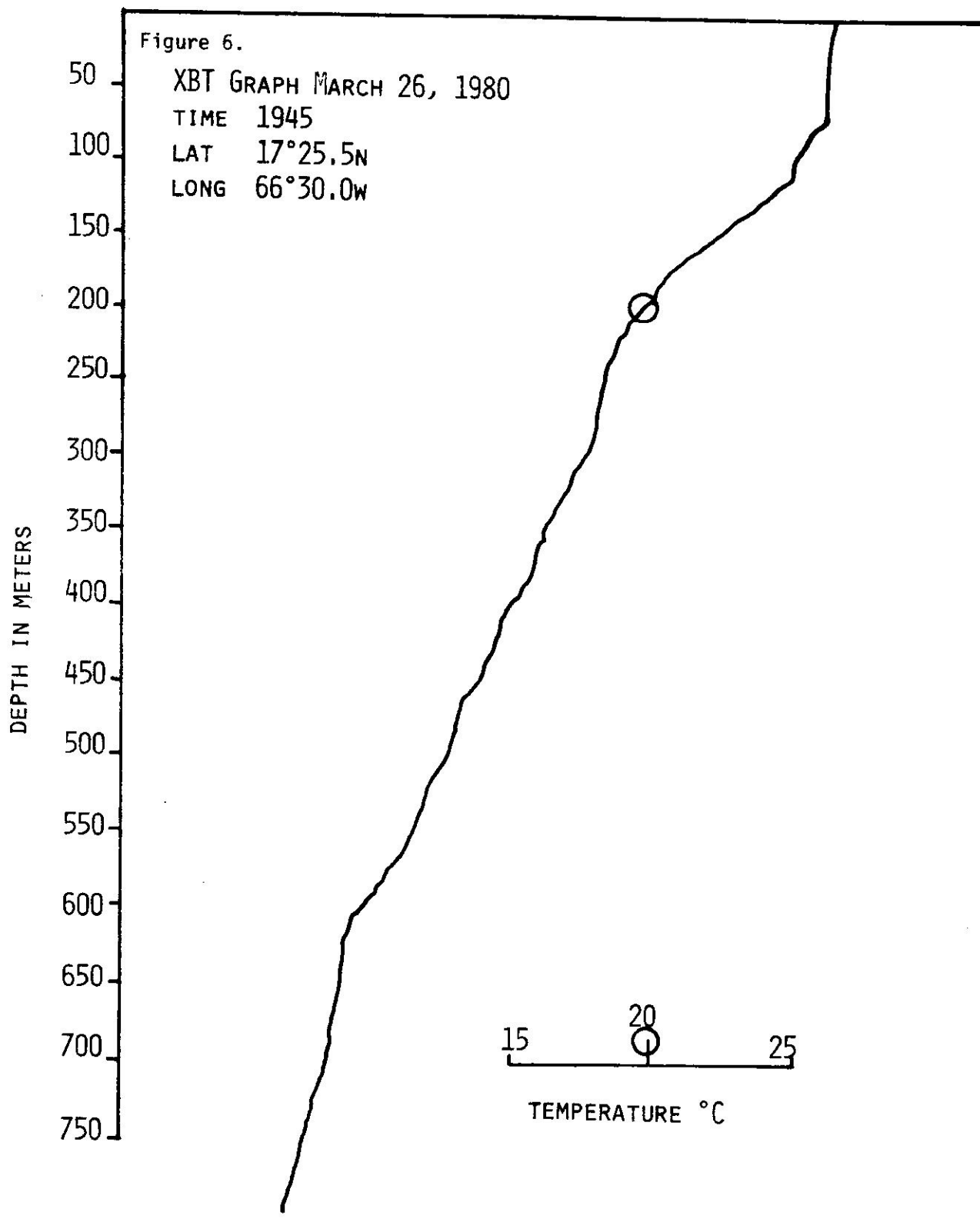


Figure 6.

XBT GRAPH MARCH 26, 1980  
TIME 1945  
LAT 17°25.5N  
LONG 66°30.0W



SALINITY %.

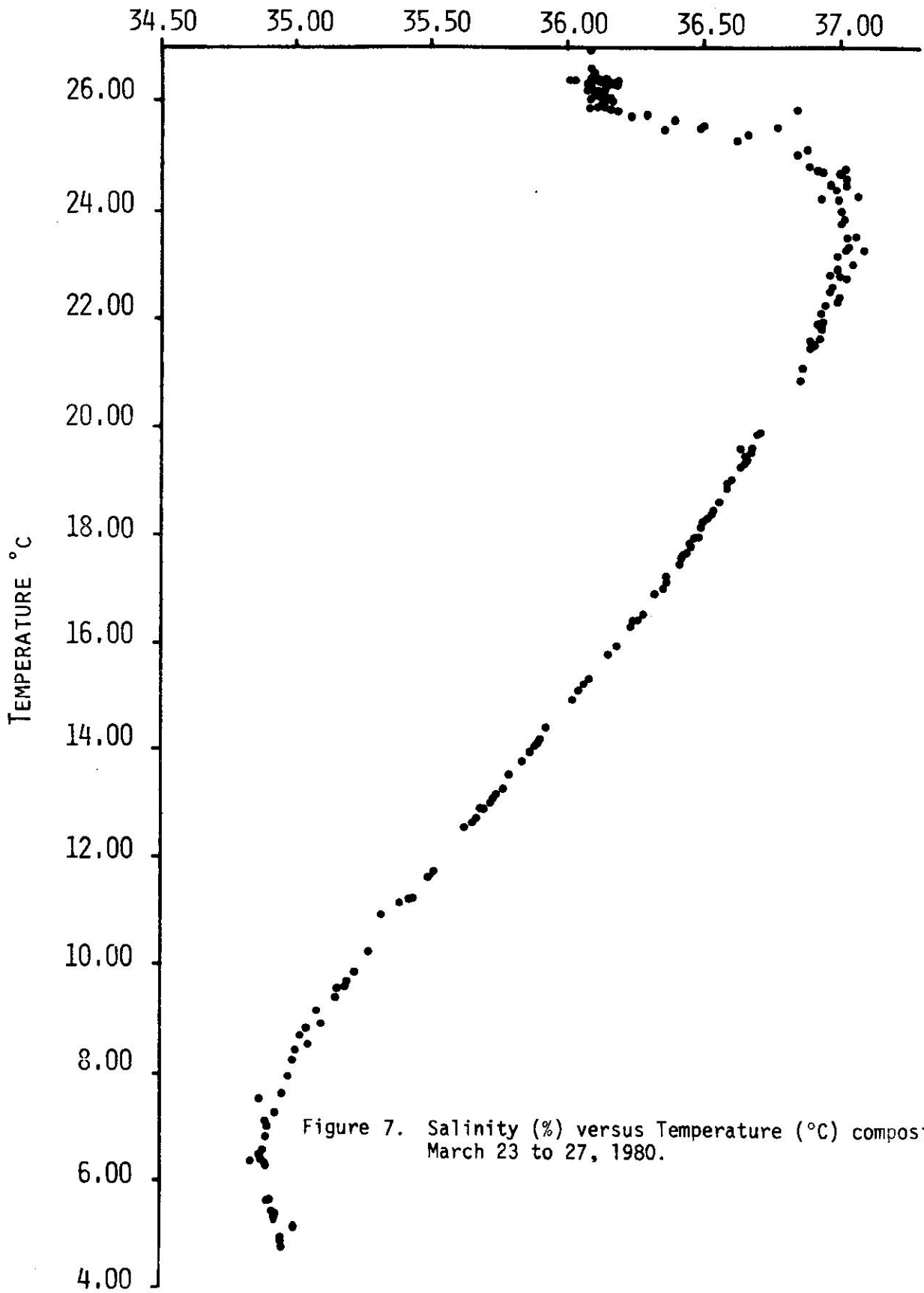


Figure 7. Salinity (%) versus Temperature (°C) composite March 23 to 27, 1980.

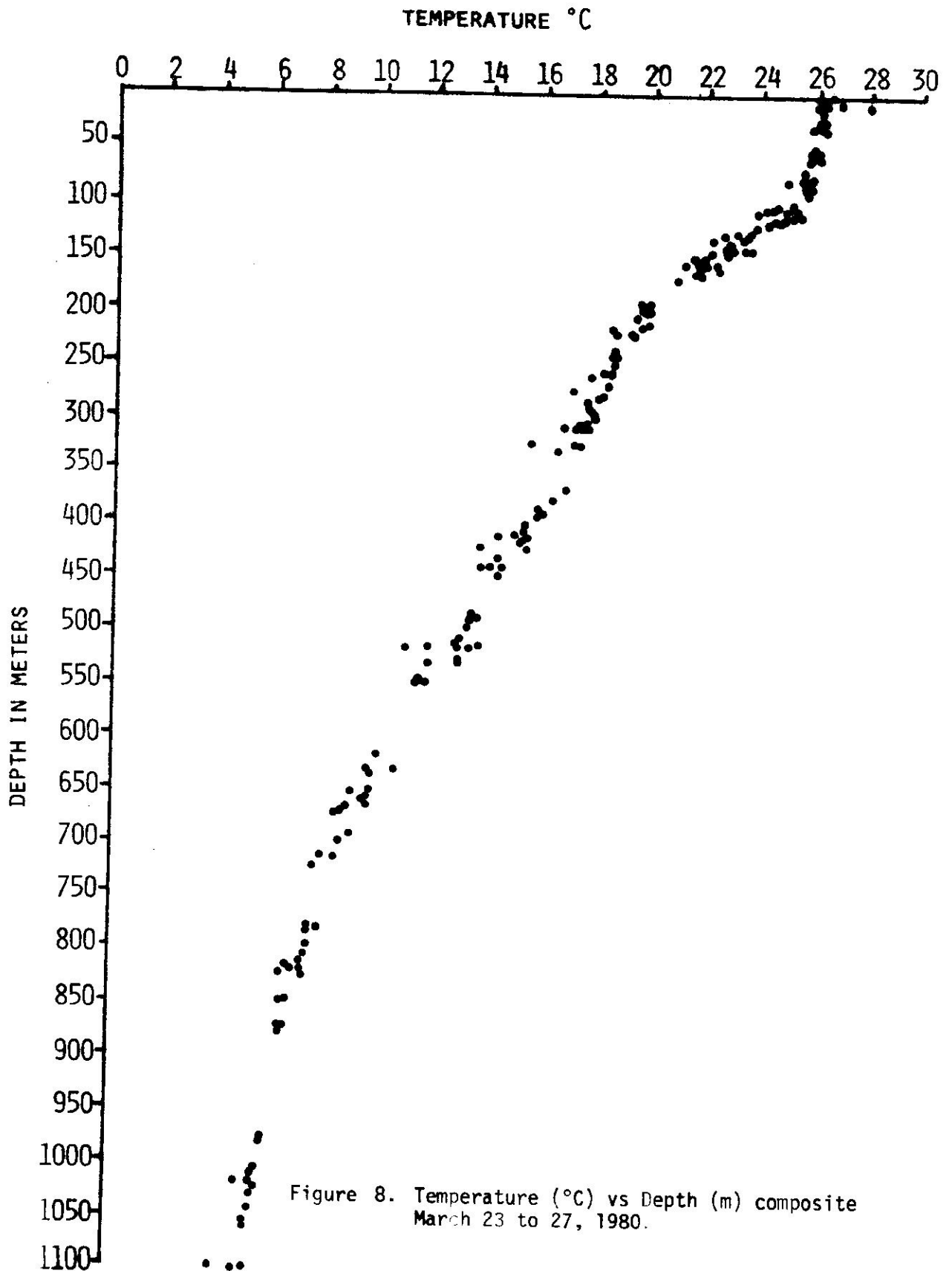


Figure 8. Temperature (°C) vs Depth (m) composite March 23 to 27, 1980.

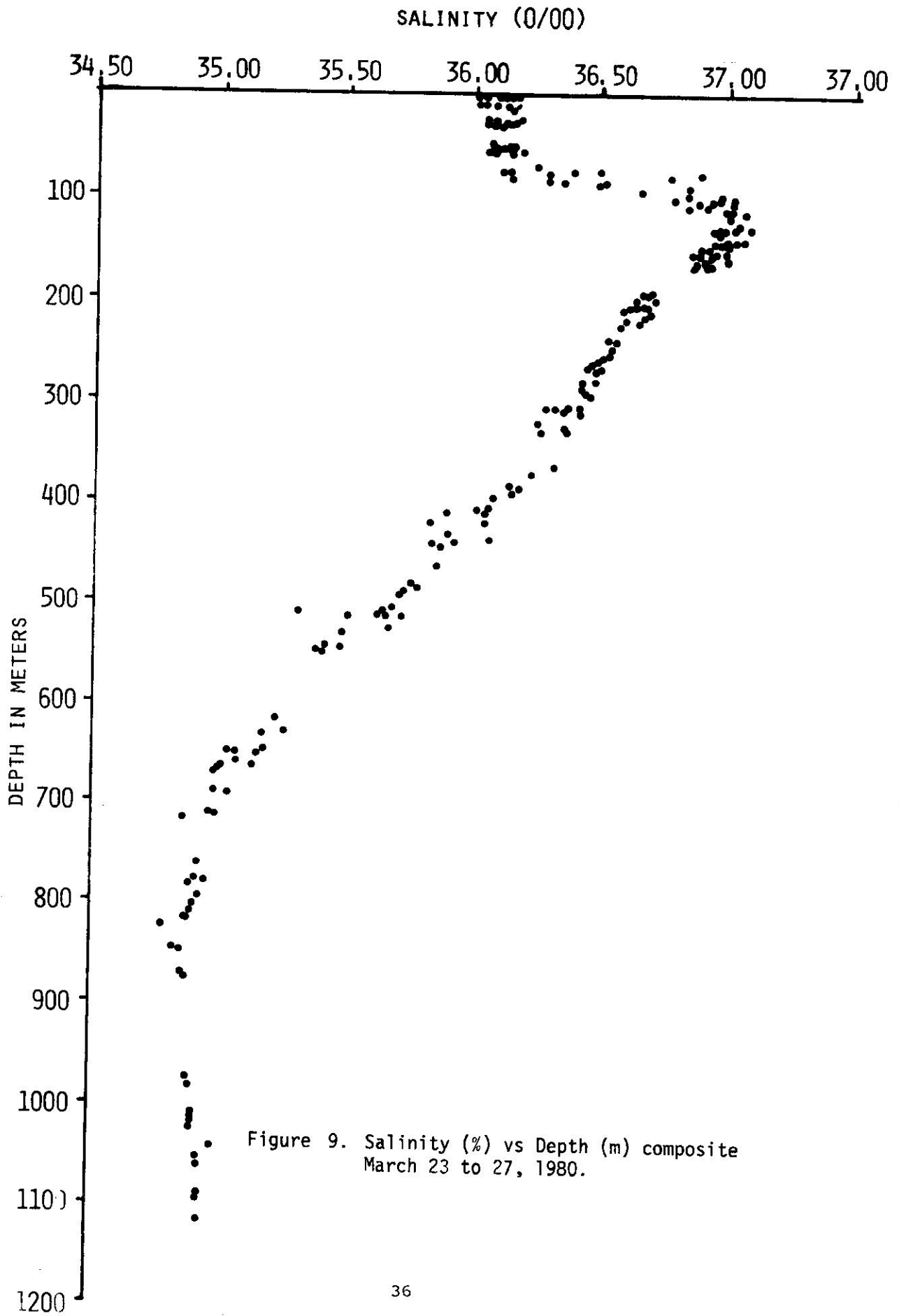


Figure 9. Salinity (%) vs Depth (m) composite March 23 to 27, 1980.

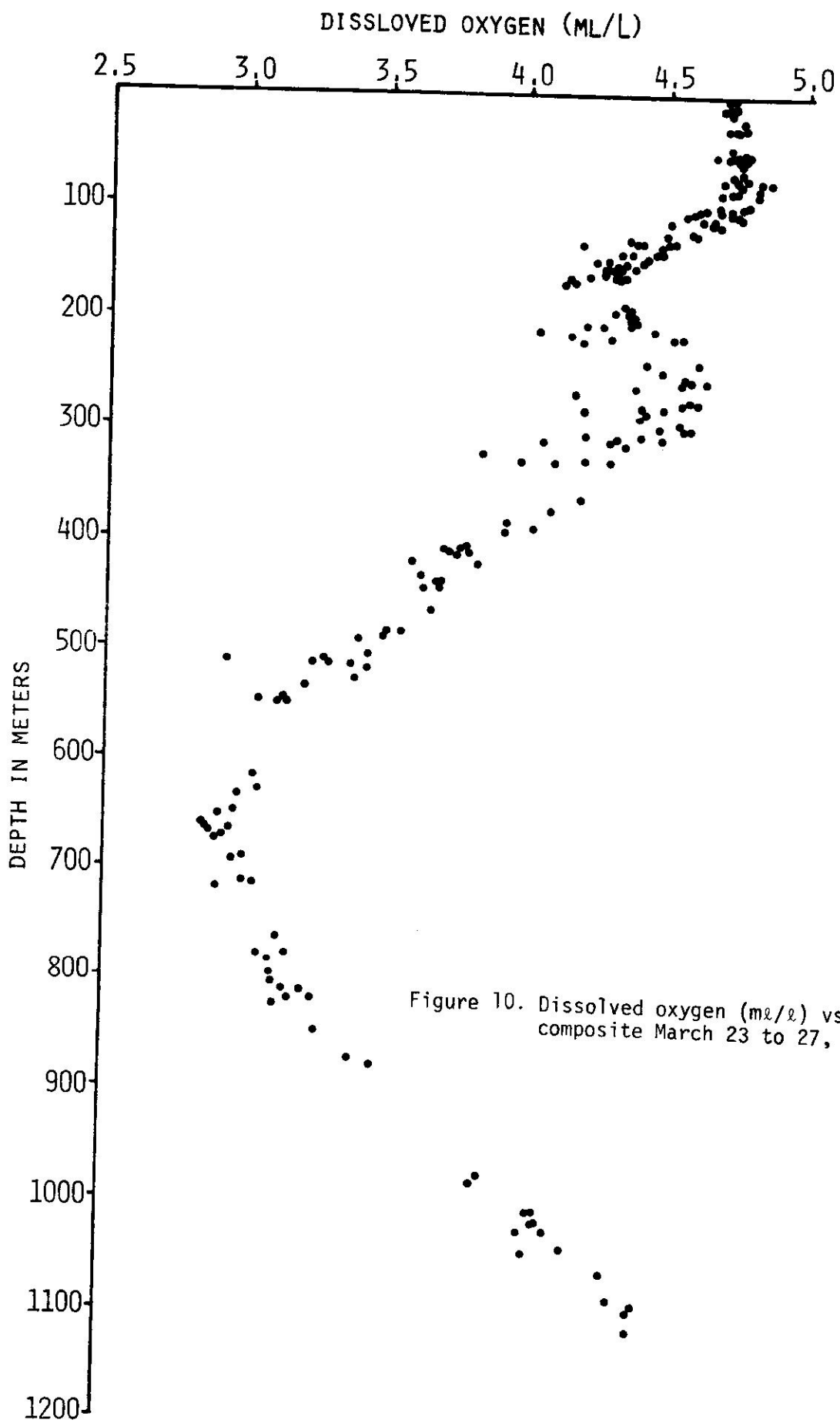
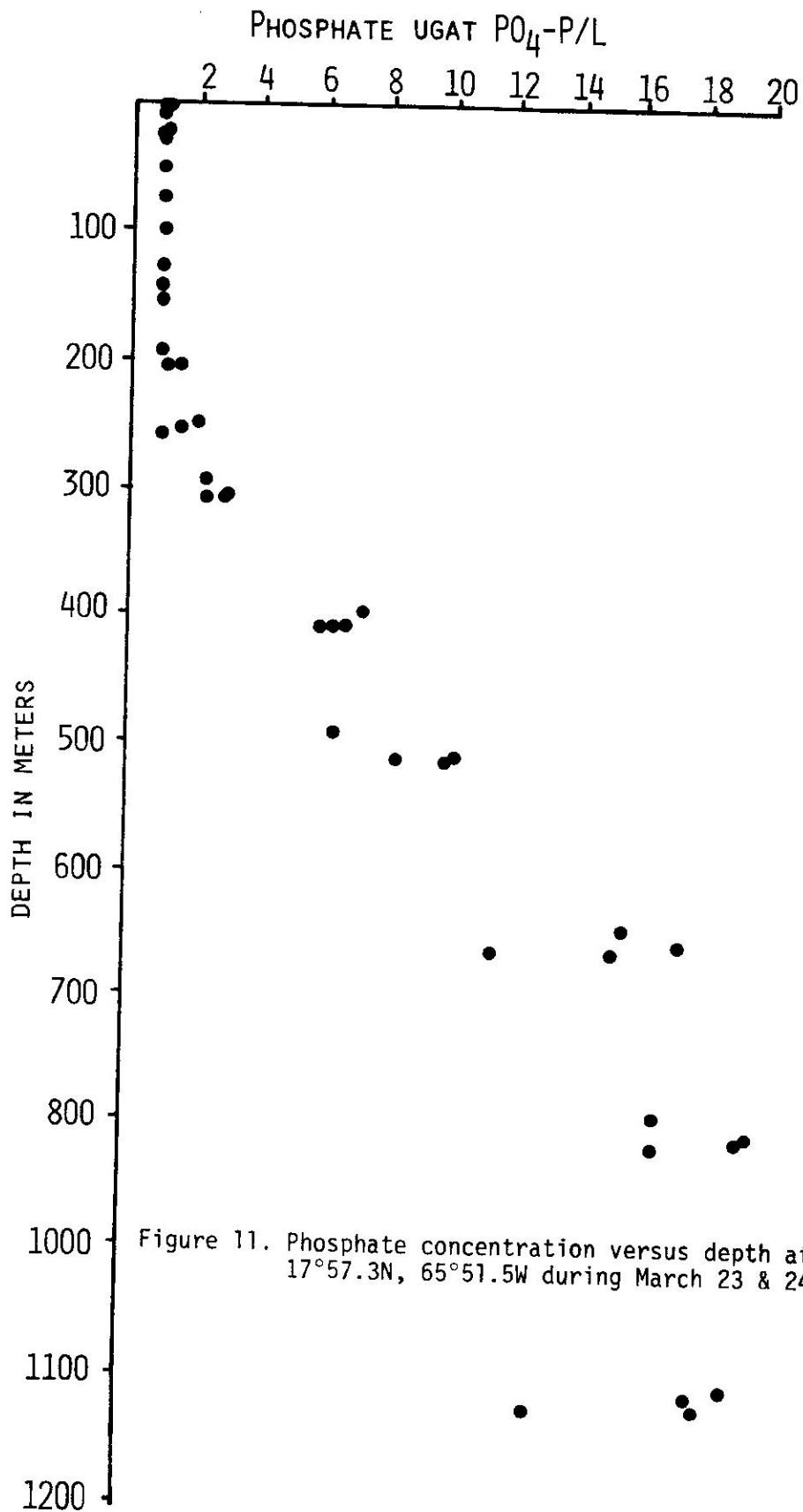


Figure 10. Dissolved oxygen (ml/l) vs Depth (m) composite March 23 to 27, 1980.





NITRATE/NITRITE UGAT N/L

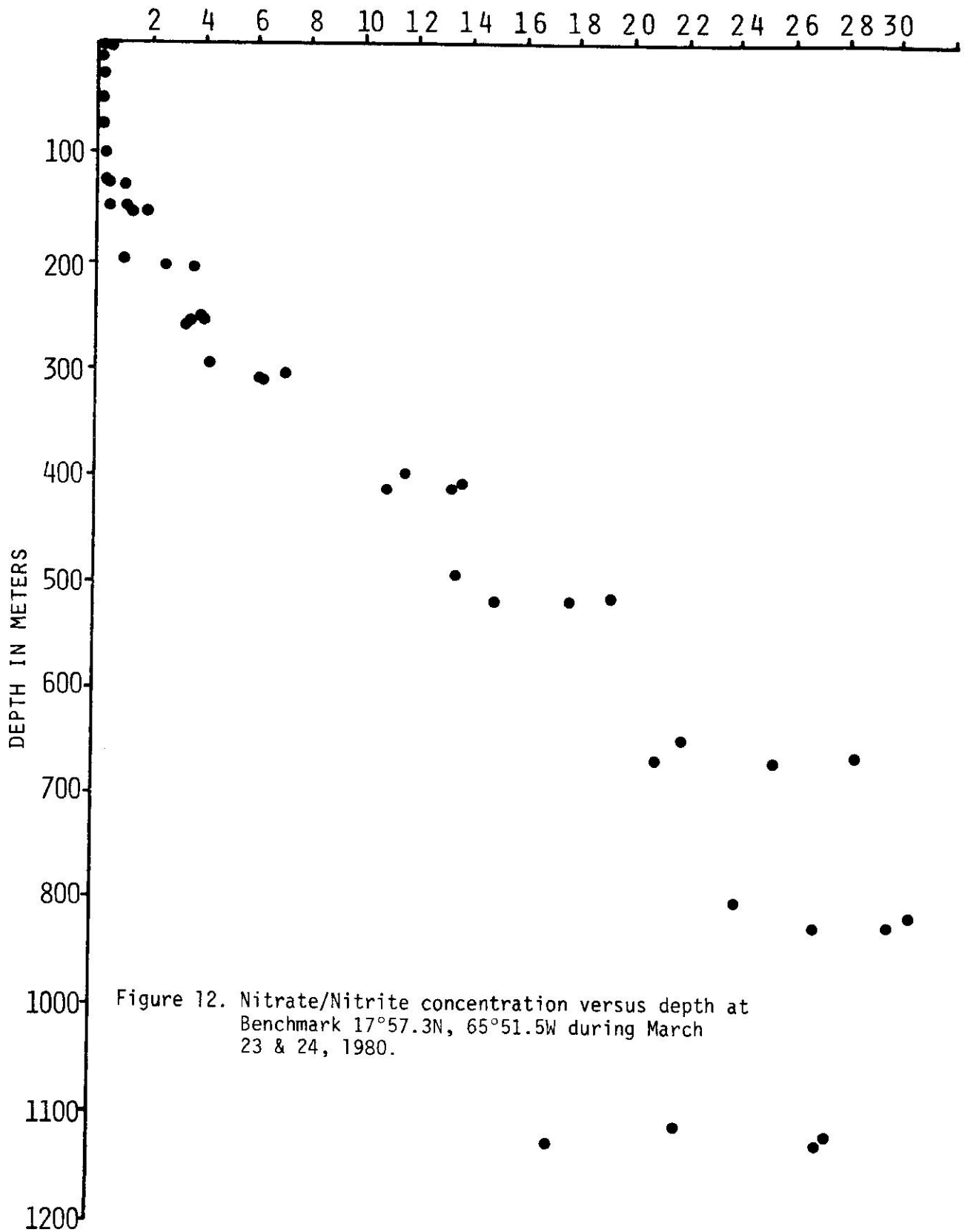
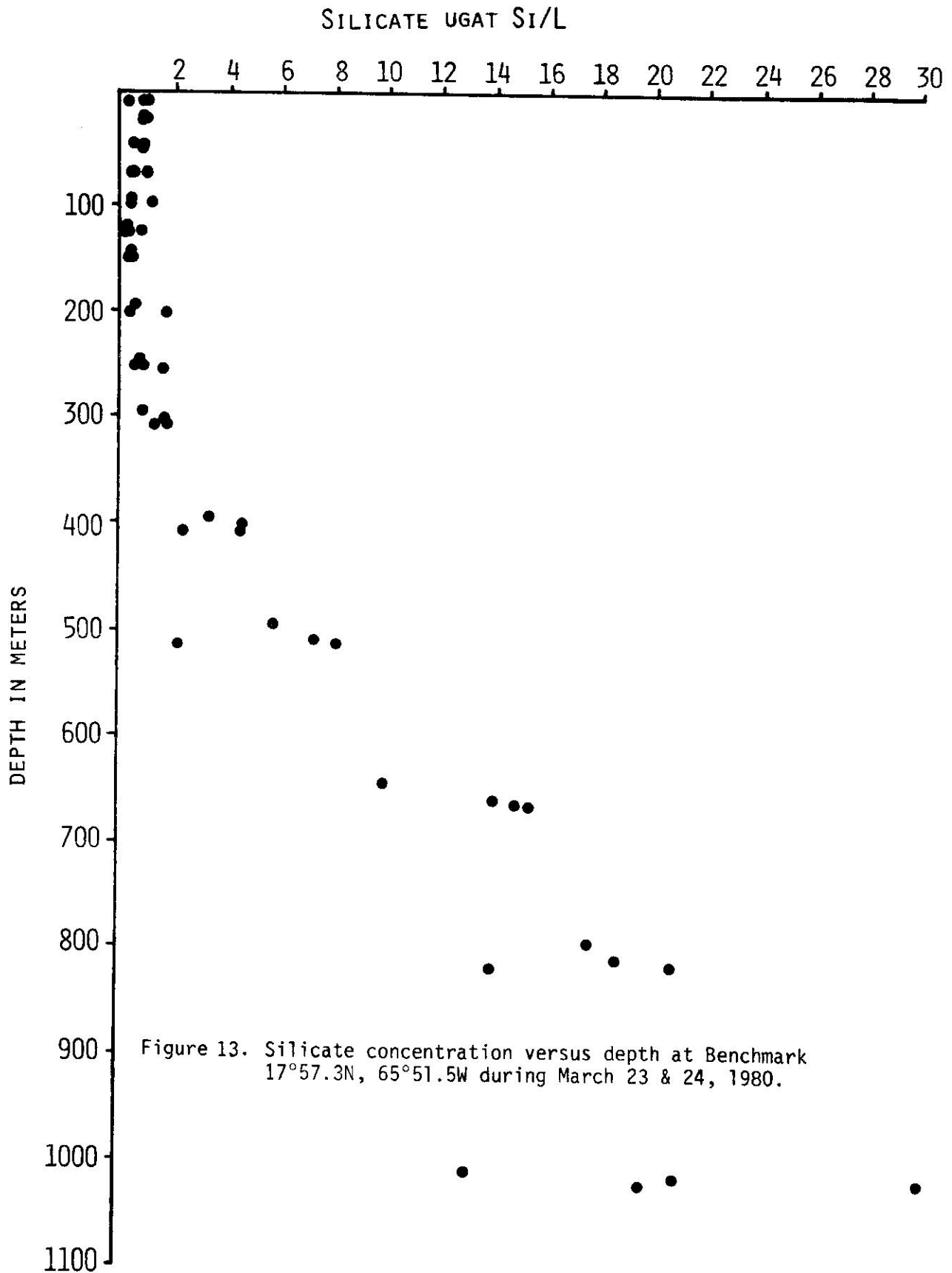
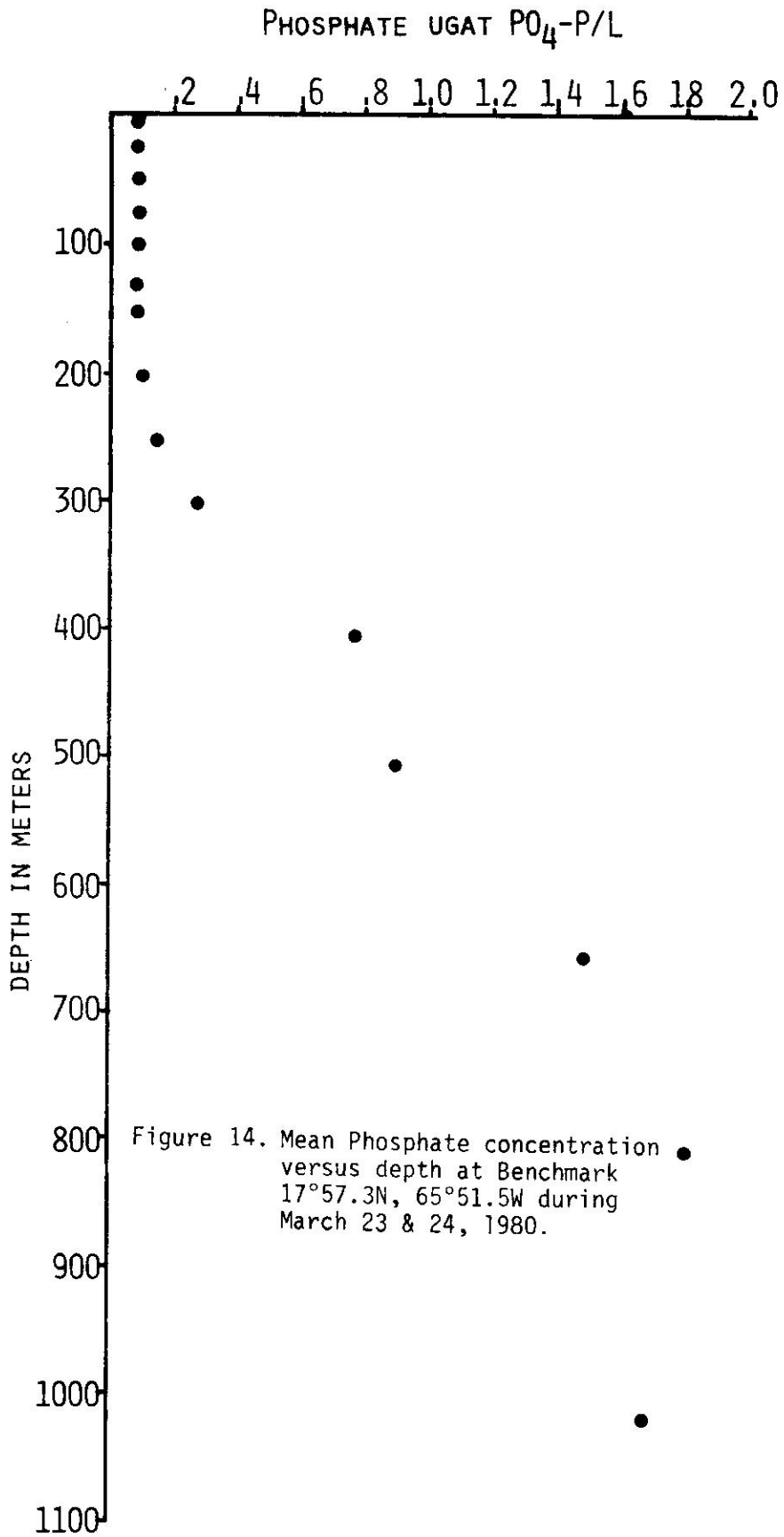


Figure 12. Nitrate/Nitrite concentration versus depth at Benchmark 17°57.3N, 65°51.5W during March 23 & 24, 1980.





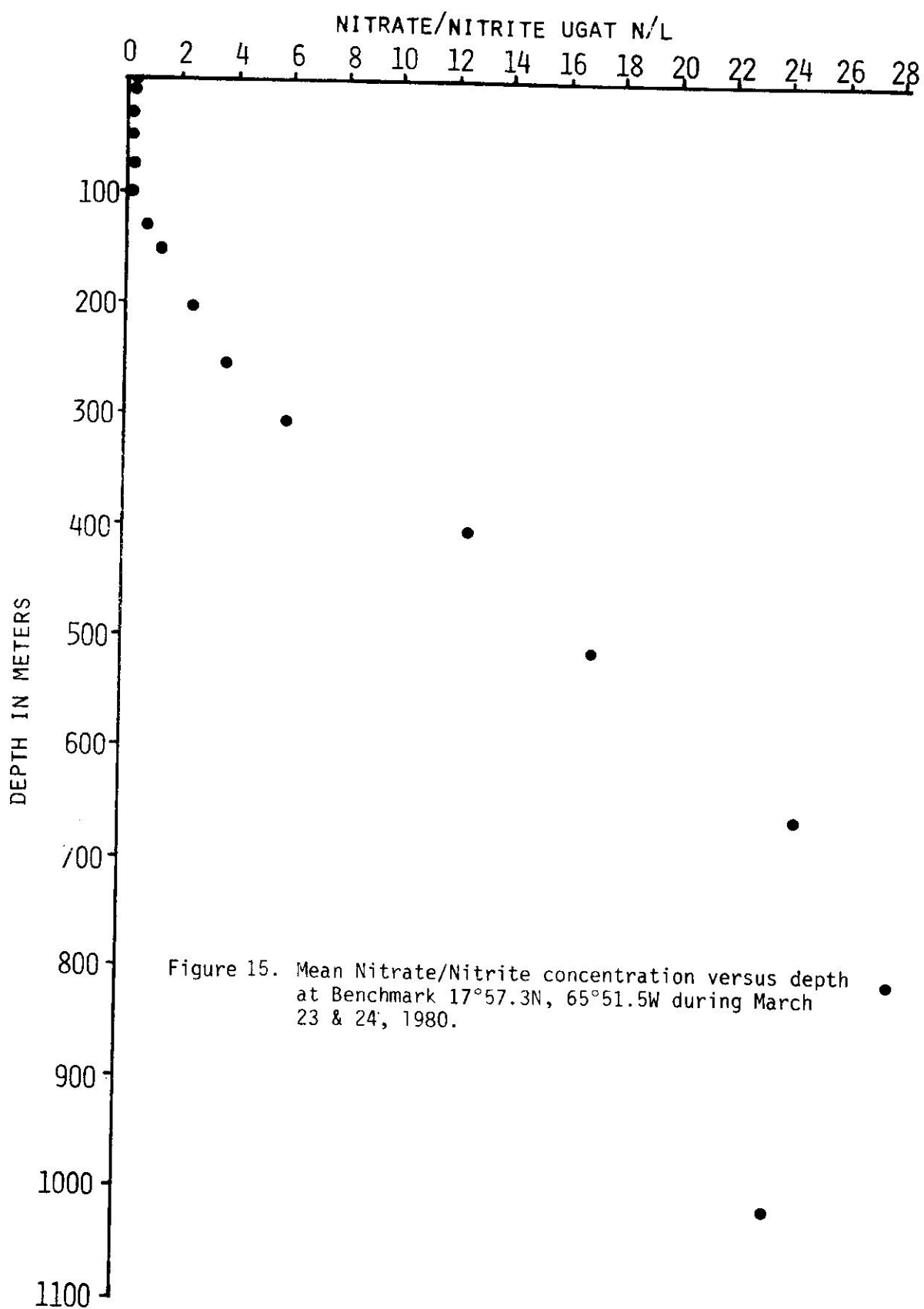


Figure 15. Mean Nitrate/Nitrite concentration versus depth at Benchmark 17°57.3N, 65°51.5W during March 23 & 24, 1980.

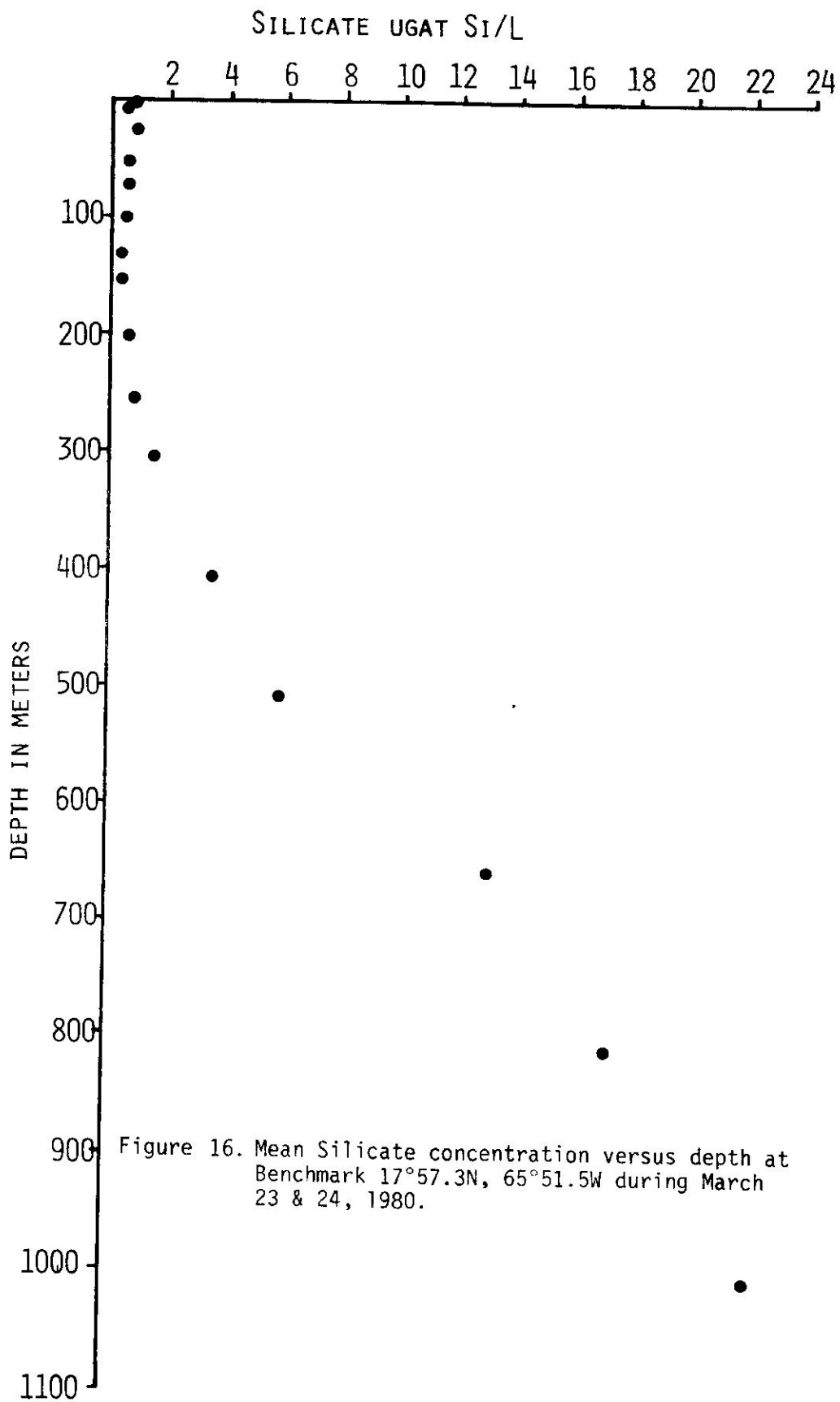


Figure 16. Mean Silicate concentration versus depth at Benchmark 17°57.3N, 65°51.5W during March 23 & 24, 1980.

PHOSPHATE UGAT PO<sub>4</sub>-P/L

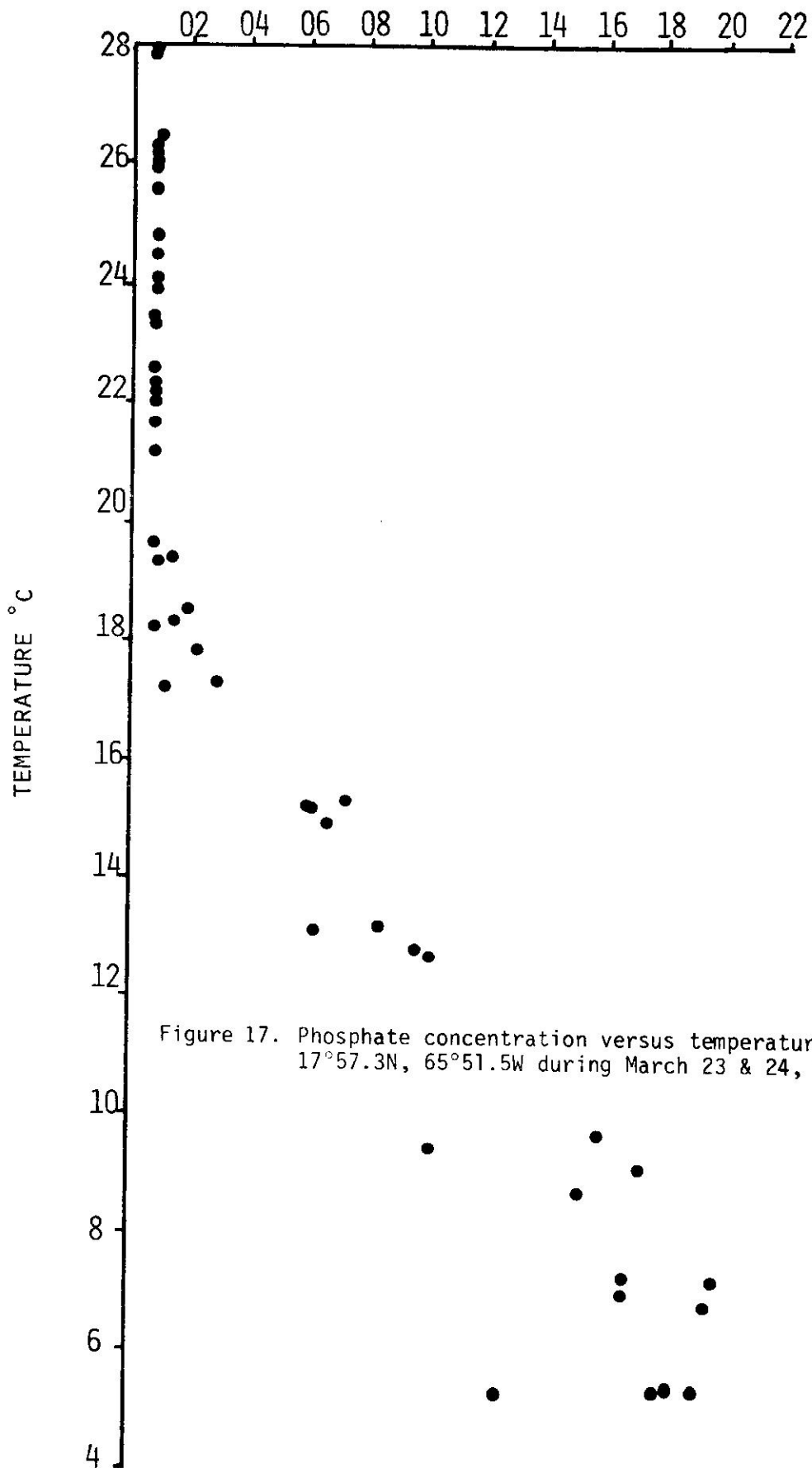
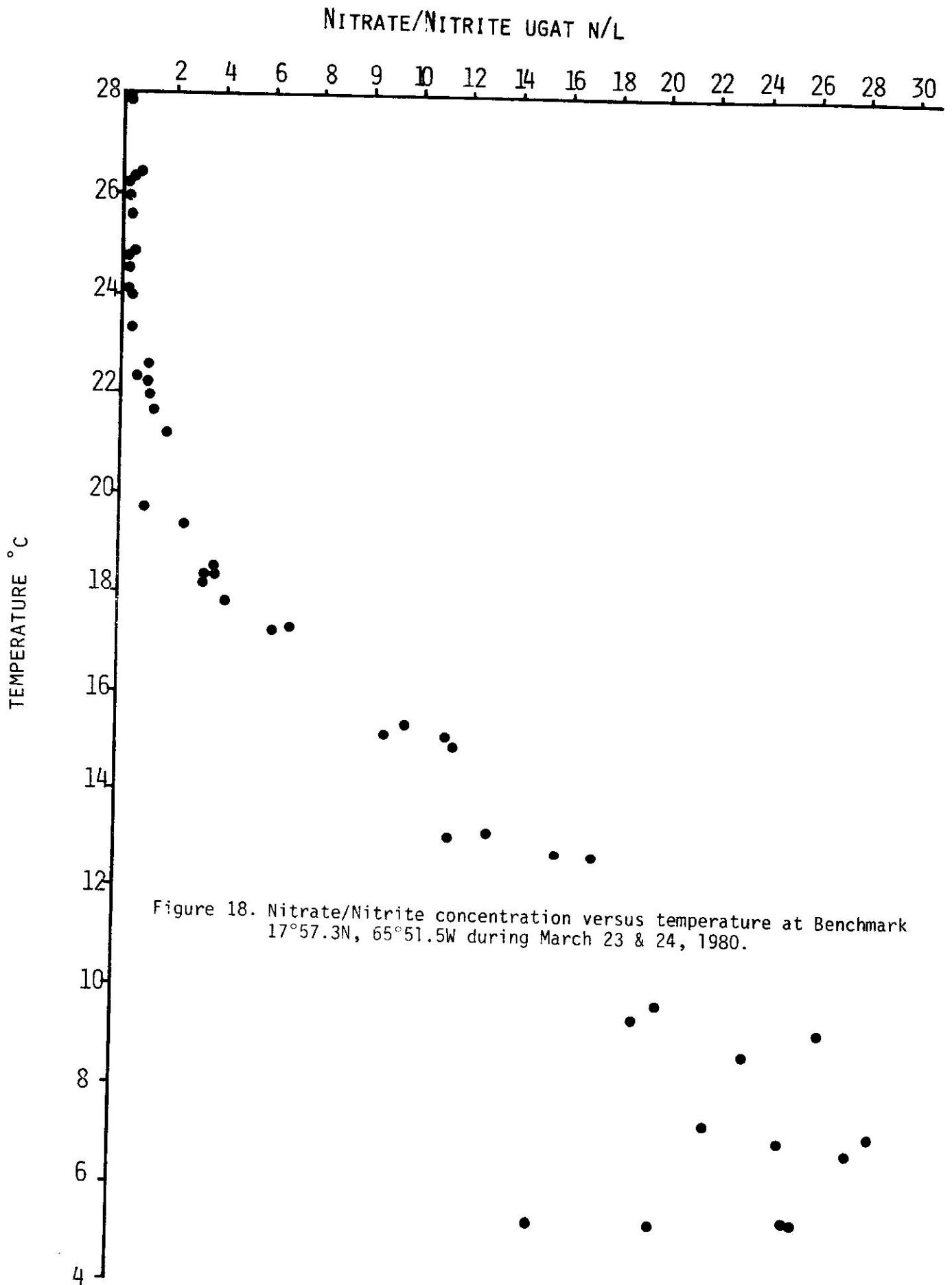


Figure 17. Phosphate concentration versus temperature at Benchmark 17°57.3N, 65°51.5W during March 23 & 24, 1980.





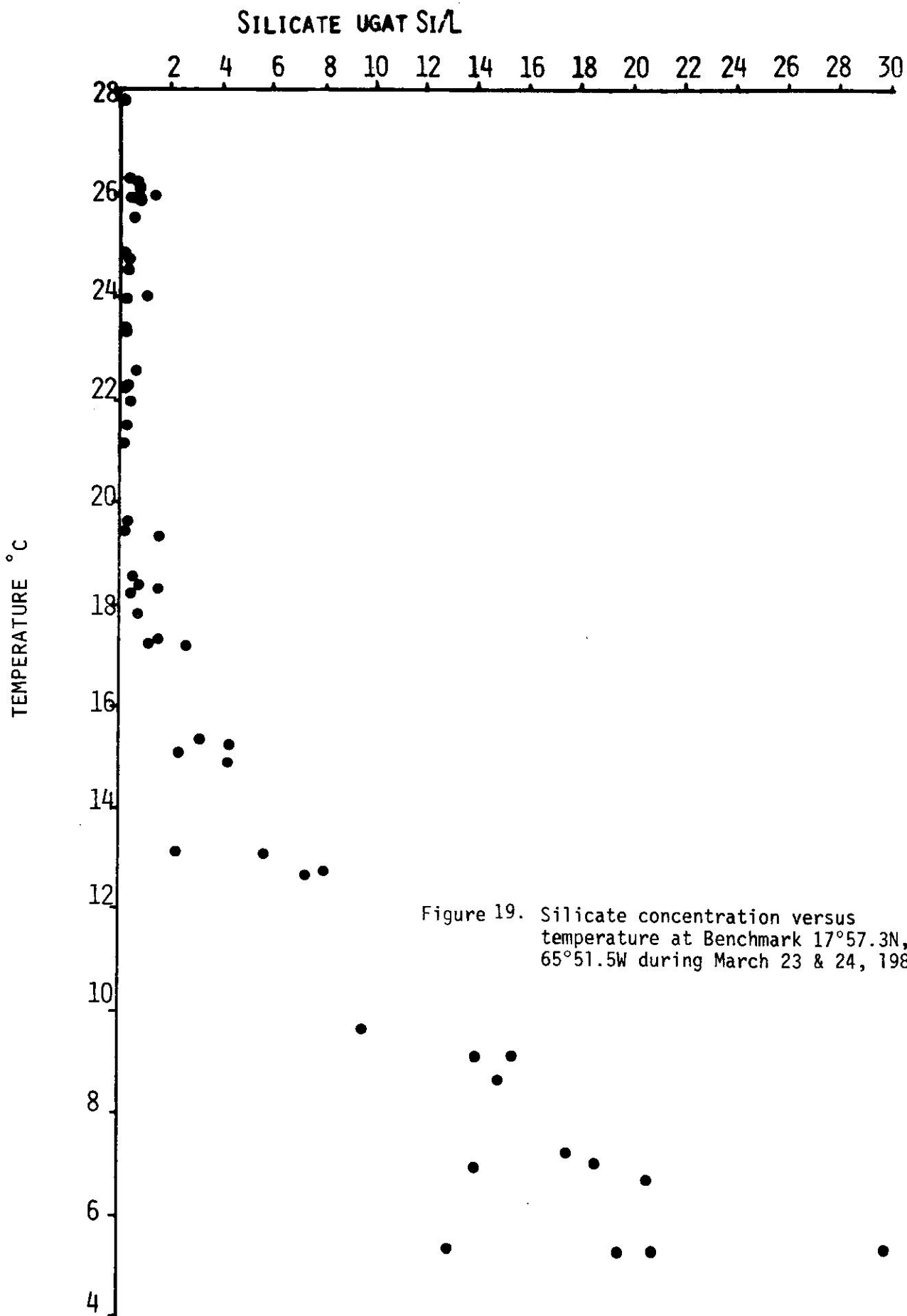
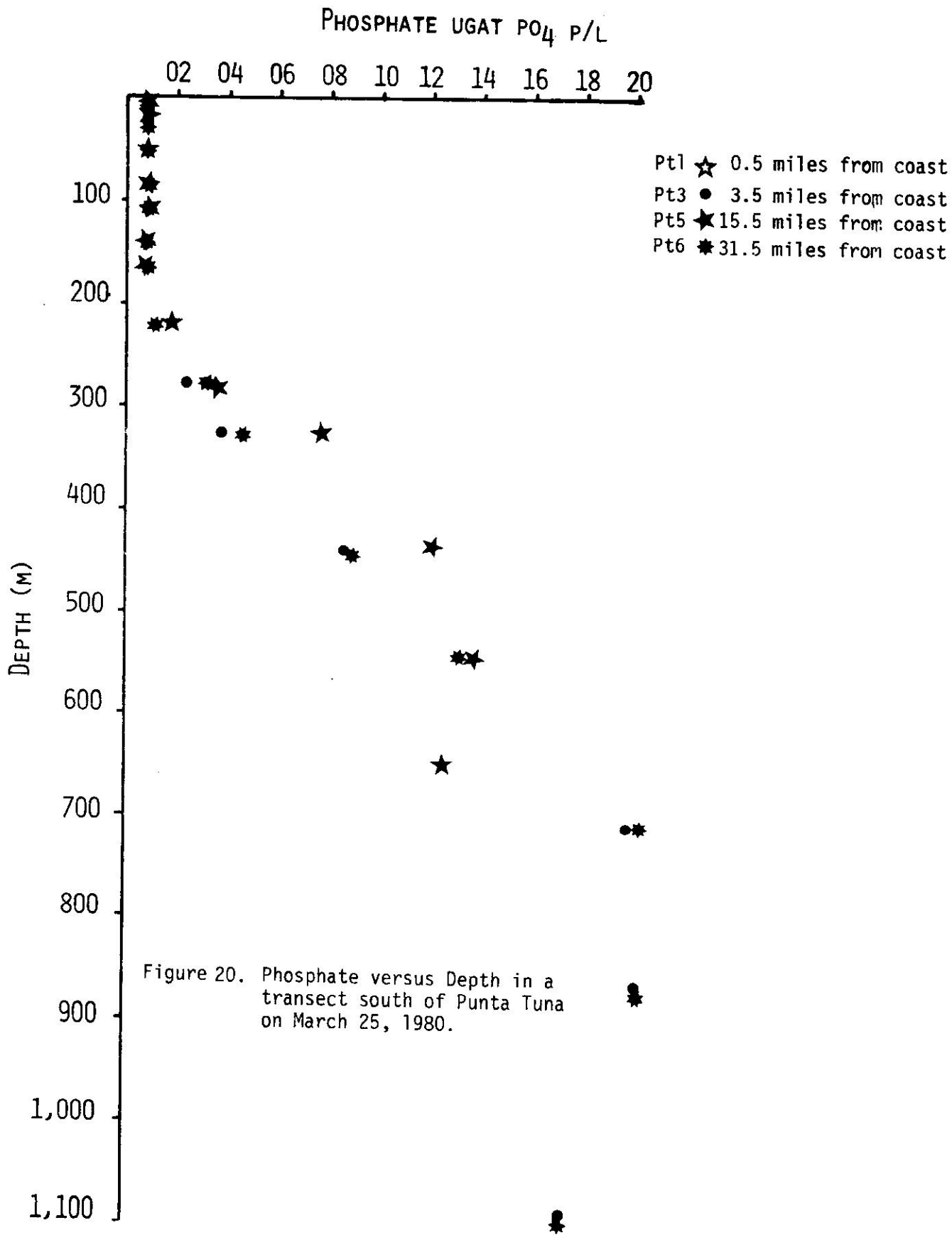
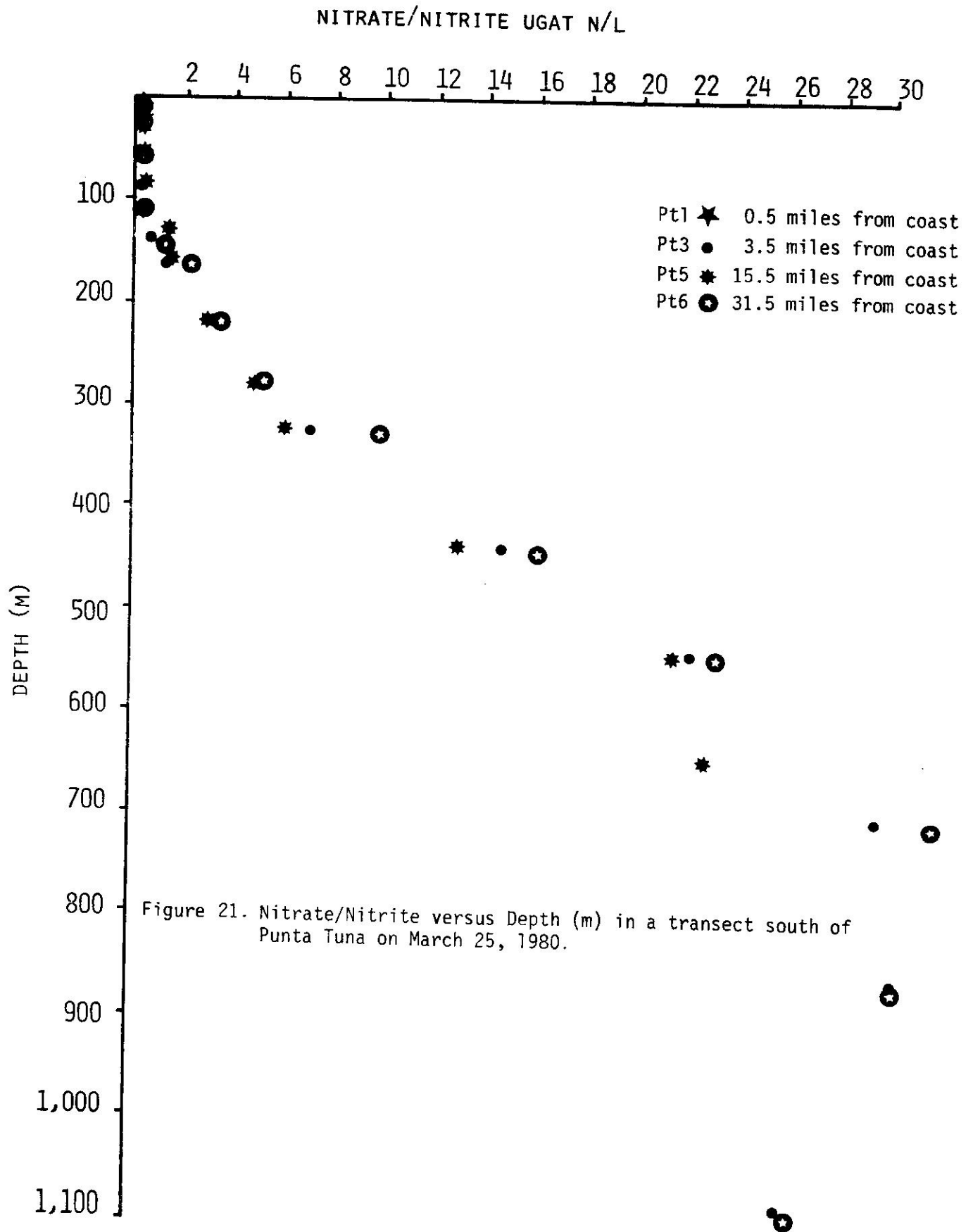
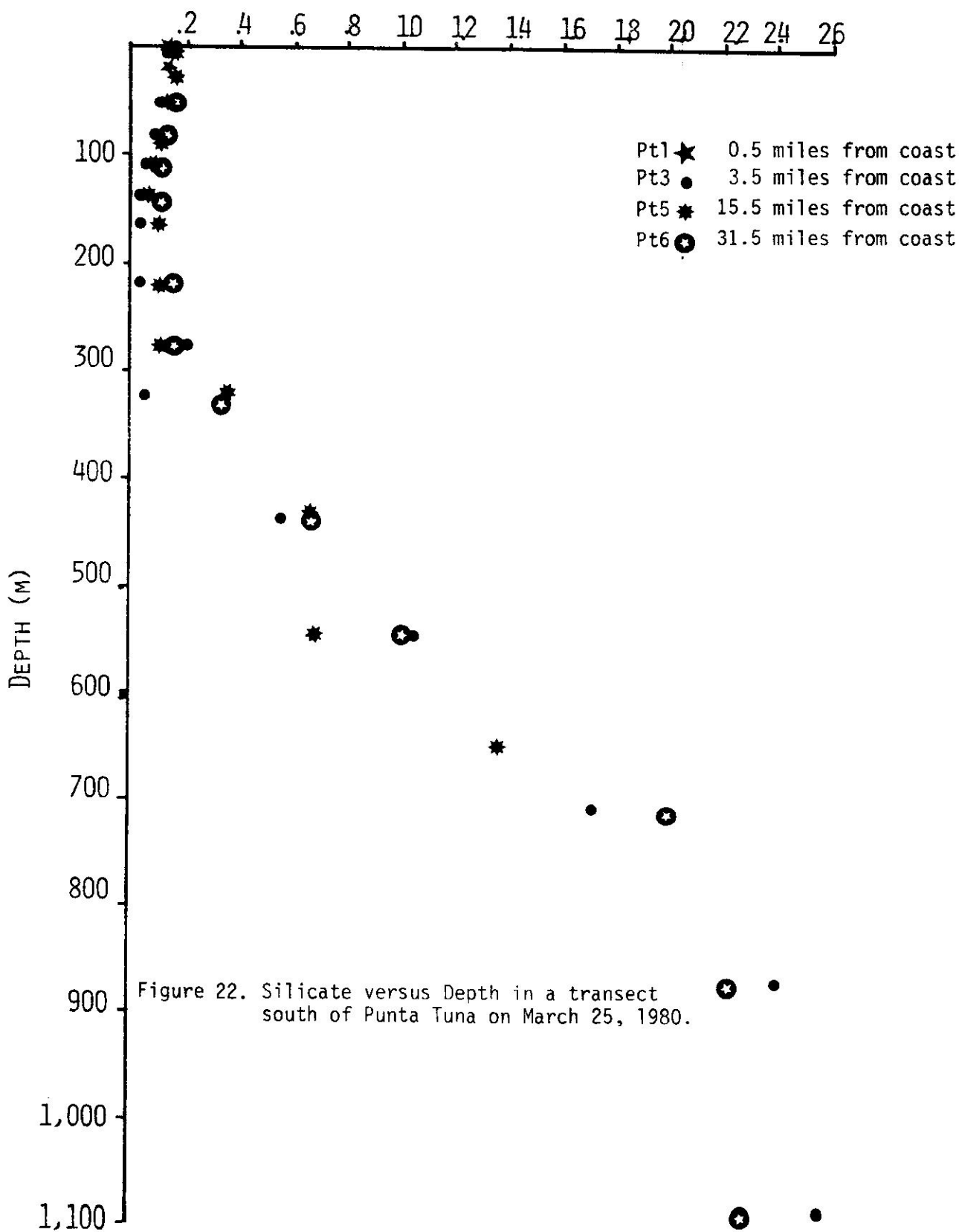


Figure 19. Silicate concentration versus temperature at Benchmark 17°57.3N, 65°51.5W during March 23 & 24, 1980.





SILICATE UGAT Si/L



ZOOPLANKTON DATA

THIRD CRUISE

| Station   | Date    | Local Time | Depth (m) | Latitude | Longitude | Water Filtered (m <sup>3</sup> ) | Tow Length (min) | Biomass (ml/1000 m <sup>3</sup> ) | Total Copepods (#/m <sup>3</sup> ) | Total Larvacgan (#/m <sup>3</sup> ) | Total Chaetognaths (#/m <sup>3</sup> ) | Total Ichthyoplankton |
|-----------|---------|------------|-----------|----------|-----------|----------------------------------|------------------|-----------------------------------|------------------------------------|-------------------------------------|--|-----------------------|
| Benchmark | 3/23/80 | 0910       | 0-100     | 17°57.3N | 65°51.5W  | 384.6                            | 15.49            | 52.7                              | 327.0                              | 50.0                                | 15.6                                   | .8                    |
| Benchmark | 3/23/80 | 1116       | 1000-200  |          |           | 534.3                            | 40.49            | 9.8                               | 9.2                                |                                     | .28                                    | --                    |
| Benchmark | 3/23/80 | 0150       | 0-100     |          |           | 341.5                            | 16.40            | 96.0                              | 472.0                              | 100.0                               | 18.4                                   | --                    |
| Benchmark | 3/23/80 | 0150       | 100-200   |          |           | 637.0                            | 16.40            | 15.7                              | 45.6                               | 1.3                                 | 1.1                                    | .4                    |
| Benchmark | 3/23/80 | 0236       | 1000-200  |          |           | 342.0                            | 44.30            | 3.7                               | 5.1                                | .4                                  | --                                     | --                    |
| Benchmark | 3/23/80 | 0335       | 0-100     |          |           | 309.5                            | 15.17            | 158.3                             | 488.5                              | 74.0                                | 5.5                                    | 2.0                   |
| Benchmark | 3/23/80 | 0335       | 100-200   |          |           | 578.0                            | 15.17            | 12.1                              | 26.0                               | 1.3                                 | 2.0                                    | --                    |
| Benchmark | 3/23/80 | 0520       | 1000-200  |          |           | 564.2                            | 39.35            | 11.1                              | 18.1                               | .5                                  | --                                     | --                    |
| Benchmark | 3/23/80 | 0750       | 1000-200  |          |           | 298.5                            | 38.02            | 16.8                              | 53.6                               | 3.4                                 | 1.3                                    | --                    |
| Benchmark | 3/23/80 | 0910       | 0-100     |          |           | 372.6                            | 15.58            | 161.0                             | 435.0                              | 124.0                               | 33.8                                   | 1.6                   |
| Benchmark | 3/23/80 | 0910       | 100-200   |          |           | 563.2                            | 15.58            | 22.2                              | 62.5                               | 3.6                                 | 3.9                                    | .7                    |
| Benchmark | 3/23/80 | 0953       | 1000-200  |          |           | 507.2                            | 39.01            | 5.4                               | 9.7                                | 1.7                                 | .5                                     | --                    |
| Benchmark | 3/23/80 | 1052       | 0-100     |          |           | 392.0                            | 16.54            | 180.0                             | 453.1                              | 73.5                                | 24.5                                   | 1.5                   |
| Benchmark | 3/23/80 | 1050       | 100-200   |          |           | 586.5                            | 16.54            | 55.3                              | 101.6                              | 14.1                                | 9.1                                    | 0.3                   |
| Benchmark | 3/23/80 | 1133       | 1000-200  |          |           | 562.0                            | 39.10            | 9.8                               | 10.2                               | .6                                  | .2                                     | --                    |
| Benchmark | 3/24/80 | 0035       | 0-100     |          |           | 428.4                            | 15.24            | 144.0                             | 335.0                              | 44.1                                | 12.6                                   | .7                    |
| Benchmark | 3/24/80 | 0035       | 100-200   |          |           | 489.4                            | 15.24            | 39.8                              | 76.6                               | 6.1                                 | 4.6                                    | .6                    |
| S-1       | 3/24/80 | 0718       | 0-100     | 17°52.7N | 65°53.9W  | 413.6                            | 14.30            | 67.7                              | 362.7                              | 40.6                                | 16.0                                   | --                    |
| S-2       | 3/24/80 | 0814       | 0-100     | 17°54.0N | 65°50.0W  | 392.3                            | 14.50            | 62.5                              | 262.3                              | 61.2                                | 20.0                                   | 1.7                   |
| S-3       | 3/24/80 | 0914       | 0-100     | 17°55.9N | 65°46.4W  | 433.0                            | 15.06            | 83.1                              | 345.0                              | 52.7                                | 20.8                                   | 2.1                   |
| S-4       | 3/24/80 | 1048       | 0-100     | 17°56.1N | 65°55.3W  | 342.0                            | 14.22            | 93.6                              | 233.0                              | 58.4                                | 10.5                                   | 1.2                   |
| Benchmark | 3/24/80 | 1138       | 0-100     | 17°57.3N | 65°51.5W  | 328.0                            | 14.00            | 168.0                             | 387.0                              | 93.3                                | 23.8                                   | 1.8                   |
| S-6       | 3/24/80 | 1227       | 0-100     | 17°58.8N | 65°48.2W  | 301.3                            | 14.12            | --                                | --                                 | --                                  | --                                     | --                    |
| S-1       | 3/24/80 | 1923       | 0-100     | 17°52.7N | 65°53.9W  | 246.5                            | 17.80            | --                                | --                                 | --                                  | --                                     | --                    |
| S-2       | 3/24/80 | 2110       | 0-100     | 17°54.0N | 65°50.0W  | 343.3                            | 15.05            | 66.3                              | 417.0                              | 57.7                                | 20.1                                   | 1.7                   |
| S-3       | 3/24/80 | 2210       | 0-100     | 17°55.9N | 65°46.4W  | 348.2                            | 14.18            | 100.5                             | 267.1                              | 60.3                                | 13.0                                   | 0.9                   |
| S-4       | 3/25/80 | 0102       | 0-100     | 17°56.1N | 65°55.3W  | 305.0                            | 14.30            | 98.4                              | 423.0                              | 39.3                                | 9.8                                    | --                    |
| Benchmark | 3/25/80 | 0141       | 0-100     | 17°57.3N | 65°51.5W  | 348.0                            | 14.35            | 90.5                              | 395.7                              | 41.4                                | 7.8                                    | 2.6                   |
| S-6       | 3/25/80 | 0233       | 0-100     | 17°58.9N | 65°48.2W  | 318.0                            | 14.17            | 97.5                              | 348.1                              | 80.2                                | 18.0                                   | 1.9                   |
| V-1       | 3/25/80 | 0555       | 8.0       | 18°04.4N | 65°32.6W  | 259.1                            | 15.00            | 208.4                             | 646.1                              | 187.6                               | 64.8                                   | 7.0                   |
| V-2       | 3/25/80 | 0627       | 0-100     | 18°03.6N | 65°32.6W  | 346.1                            | 16.00            | 133.0                             | 488.0                              | 76.3                                | 10.4                                   | 6.1                   |
| V-3       | 3/25/80 | 0652       | 0-100     | 18°01.8N | 65°32.7W  | 285.0                            | 15.16            | 102.6                             | 323.2                              | 68.4                                | 27.4                                   | 1.1                   |
| V-4       | 3/25/80 | 0945       | 0-100     | 17°57.7N | 65°32.6W  | 311.4                            | 17.00            | 77.1                              | 258.2                              | 30.0                                | 21.2                                   | --                    |
| V-5       | 3/25/80 | 1137       | 0-100     | 17°48.5N | 65°32.6W  | 295.2                            | 17.00            | 79.6                              | 247.3                              | 30.5                                | 11.5                                   | 2.0                   |

THIRD CRUISE

| Station | Date    | Local Time | Depth (m) | Latitude | Longitude | Water Filtered (m <sup>3</sup> ) | Tow Length (min) | Biomass (ml/1000 m <sup>3</sup> ) | Total Copepods (#/m <sup>3</sup> ) | Total Larvacan (#/m <sup>3</sup> ) | Total Chaetognaths (#/m <sup>3</sup> ) | Total Ichthyoplankton |
|---------|---------|------------|-----------|----------|-----------|----------------------------------|------------------|-----------------------------------|------------------------------------|------------------------------------|--|-----------------------|
| V-6     | 3/25/80 | 0545       | 0-100     | 17°32.5N | 65°32.8W  | 360.4                            | 13.57            | 62.4                              | 248.1                              | 25.0                               | 10.0                                   | --                    |
| PL-5    | 3/25/80 | 0945       | 0-100     | 17°44.2N | 65°53.0W  | 311.2                            | 13.30            | 120.5                             | 378.0                              | 39.5                               | 17.4                                   | 2.9                   |
| PL-4    | 3/26/80 | 0101       | 0-100     | 17°52.0N | 65°53.0W  | 398.0                            | 16.13            | 88.0                              | 364.8                              | 31.7                               | 12.1                                   | 2.3                   |
| PL-3    | 3/26/80 | 0200       | 0-100     | 17°56.0N | 65°53.0W  | 448.0                            | 16.24            | 87.1                              | 450.0                              | 43.0                               | 26.8                                   | 8.0                   |
| PL-2    | 3/26/80 | 0422       | 0-100     | 17°58.1N | 65°53.0W  | 338.5                            | 35.33            | 159.5                             | 638.1                              | 37.2                               | 17.7                                   | 11.5                  |
| PL-1    | 3/26/80 | 0502       | 0-15      | 17°58.2N | 65°53.0W  | 301.6                            | 17.30            | 34.8                              | 169.1                              | 30.3                               | 2.0                                    | 1.5                   |
| J-1     | 3/26/80 | 0815       | 10.0      | 17°54.8N | 66°16.0W  | 306.3                            | 14.00            | 163.2                             | 844.3                              | 189.0                              | 8.8                                    | 13.7                  |
| J-2     | 3/26/80 | 0849       | 10.0      | 17°53.7N | 66°16.1W  | 233.0                            | 14.46            | 210.0                             | 788.0                              | 231.8                              | 11.6                                   | 19.3                  |
| J-3     | 3/26/80 | 1130       | 0-100     | 17°48.7N | 66°16.1W  | 345.1                            | 14.56            | 101.4                             | 346.0                              | 54.0                               | 17.4                                   | 1.7                   |
| J-4     | 3/26/80 | 1158       | 0-100     | 17°47.7N | 66°16.0W  | 345.5                            | 13.45            | 86.8                              | 261.4                              | 51.2                               | 17.4                                   | --                    |
| J-5     | 3/26/80 | 0225       | 0-100     | 17°38.7N | 66°16.0W  | 373.0                            | 15.15            | 83.1                              | 313.7                              | 56.3                               | 19.3                                   | --                    |
| J-6     | 3/26/80 | 0540       | 0-100     | 17°24.5N | 66°16.0W  | 436.3                            | 15.30            | 82.5                              | 339.0                              | 33.7                               | 12.4                                   | 2.1                   |
| G-6     | 3/26/80 | 0845       | 0-100     | 17°26.5N | 66°45.0W  | 330.0                            | 14.00            | 106.1                             | 261.0                              | 27.3                               | 12.7                                   | .9                    |
| G-5     | 3/27/80 | 0045       | 0-100     | 17°41.6N | 66°45.0W  | 444.6                            | 14.36            | 99.0                              | 302.3                              | 27.0                               | 10.1                                   | .7                    |
| G-4     | 3/27/80 | 0315       | 0-100     | 17°49.3N | 66°45.0W  | 339.1                            | 14.49            | 110.6                             | 425.5                              | 36.3                               | 22.1                                   | .9                    |
| G-3     | 3/27/80 | 0443       | 0-100     | 17°53.4N | 66°45.0W  | 350.3                            | 15.36            | 217.0                             | 515.6                              | 176.4                              | 36.0                                   | 3.4                   |
| G-2     | 3/27/80 | 0630       | 0-100     | 17°54.9N | 66°45.0W  | 326.3                            | 14.10            | 110.3                             | 402.7                              | 92.9                               | 13.8                                   | 2.8                   |
| G-1     | 3/27/80 | 0659       | 0-100     | 17°56.0N | 66°45.0W  | 374.5                            | 15.35            | 107.0                             | 492.0                              | 194.0                              | 48.1                                   | 6.4                   |
| G-0     | 3/27/80 | 0852       | 0-100     | 17°58.0N | 66°45.7W  | 377.6                            | 14.00            | 106.0                             | 505.3                              | 143.0                              | 52.4                                   | 4.8                   |

THIRD CRUISE (cont.)

| Station   | <i>Clausocalanus furcatus</i> (#/m) | <i>Paracalanus parvus</i> (#/m) | <i>Calocalanus pax</i> (#/m) | <i>Oithona plumifera</i> (#/m) | <i>Temora turbinata</i> (#/m) | <i>Undinula vulgaris</i> (#/m) | Alliquot (ml) |
|-----------|-------------------------------------|---------------------------------|------------------------------|--------------------------------|-------------------------------|--------------------------------|---------------|
| Benchmark | 62.4                                | 6.2                             | 8.1                          | 84.2                           | --                            | --                             | 5             |
| Benchmark | 0.3                                 | 0.4                             | --                           | 1.1                            | --                            | --                             | 20            |
| Benchmark | 101.2                               | 16.2                            | 5.6                          | 42.2                           | --                            | --                             | 5             |
| Benchmark | 3.6                                 | 1.7                             | 0.2                          | 7.2                            | --                            | --                             | 10            |
| Benchmark | 0.5                                 | .06                             | --                           | 1.8                            | --                            | --                             | 60            |
| Benchmark | 95.4                                | 11.6                            | 5.4                          | 56.6                           | 2.3                           | --                             | 5             |
| Benchmark | 3.0                                 | 2.0                             | 0.1                          | 3.8                            | --                            | --                             | 20            |
| Benchmark | 1.9                                 | 0.4                             | --                           | 2.2                            | --                            | --                             | 20            |
| Benchmark | 0.8                                 | 0.4                             | 2.0                          | --                             | --                            | --                             | 20            |
| Benchmark | 98.0                                | 14.2                            | 8.4                          | 43.2                           | --                            | .6                             | 5             |
| Benchmark | 12.6                                | 1.9                             | 0.2                          | 8.3                            | 0.2                           | --                             | 10            |
| Benchmark | 0.5                                 | 0.4                             | --                           | 1.1                            | --                            | --                             | 20            |
| Benchmark | 66.1                                | 14.7                            | 3.7                          | 50.2                           | 0.6                           | --                             | 5             |
| Benchmark | 10.7                                | 3.4                             | 1.8                          | 8.9                            | 1.0                           | --                             | 10            |
| Benchmark | 8.1                                 | 1.7                             | --                           | 14.1                           | --                            | --                             | 5             |
| Benchmark | 43.7                                | 3.9                             | 6.7                          | 20.2                           | 1.1                           | --                             | 5             |
| Benchmark | 16.9                                | 3.9                             | --                           | 6.1                            | --                            | --                             | 10            |
| S-1       | 52.8                                | 5.8                             | 8.1                          | 52.8                           | 2.3                           | --                             | 5             |
| S-2       | 42.2                                | 4.3                             | 5.0                          | 30.0                           | 1.8                           | --                             | 5             |
| S-3       | 63.2                                | 3.3                             | 9.4                          | 46.6                           | --                            | --                             | 5             |
| S-4       | 21.8                                | 5.6                             | 7.7                          | 35.8                           | --                            | --                             | 5             |
| Benchmark | 60.7                                | 5.1                             | 1.5                          | 59.3                           | 6.6                           | 2.2                            | 5             |
| S-6       | --                                  | --                              | --                           | --                             | --                            | --                             | --            |
| S-1       | --                                  | --                              | --                           | --                             | --                            | --                             | --            |
| S-2       | 51.7                                | 5.0                             | 2.8                          | 42.0                           | --                            | 1.4                            | 5             |
| S-3       | 35.8                                | 6.2                             | 4.8                          | 31.7                           | 1.4                           | 2.8                            | 5             |
| S-4       | 77.1                                | 6.3                             | 8.0                          | 60.6                           | 8.0                           | 3.1                            | 5             |
| Benchmark | 64.1                                | 4.1                             | 9.0                          | 58.0                           | 2.8                           | 1.4                            | 5             |
| S-6       | 74.7                                | 5.3                             | 7.5                          | 6.0                            | 4.5                           | 3.8                            | 5             |
| V-1       | 321.4                               | 7.4                             | 5.6                          | 38.0                           | 3.7                           | 6.5                            | 5             |
| V-2       | 135.2                               | 8.3                             | 4.2                          | 62.4                           | 3.5                           | 5.5                            | 5             |
| V-3       | 51.4                                | 4.2                             | 7.6                          | 78.3                           | --                            | 3.4                            | 5             |
| V-4       | 47.0                                | 3.9                             | 7.0                          | 71.7                           | --                            | 2.3                            | 5             |
| V-5       | 33.3                                | 3.3                             | 1.6                          | 42.3                           | --                            | 5.7                            | 5             |



THIRD CRUISE (cont.)

| Station | <u>Clausocalanus</u><br><u>furcatus</u><br>(#/m <sup>3</sup> ) | <u>Paracalanus</u><br><u>parvus</u><br>(#/m <sup>3</sup> ) | <u>Calocalanus</u><br><u>pavo3</u><br>(#/m <sup>3</sup> ) | <u>Oithona</u><br><u>plumifera</u><br>(#/m <sup>3</sup> ) | <u>Temora</u><br><u>turbingta</u><br>(#/m <sup>3</sup> ) | <u>Undinula</u><br><u>vulgaris</u><br>(#/m <sup>3</sup> ) | Aliquot<br>(ml) |
|---------|--|--|---|---|--|---|-----------------|
| V-6     | 53.3   | 2.0  | 1.3   | 46.6  | 1.3  | 3.3   | 5               |
| Pt-5    | 62.5   | 3.1  | 8.5   | 37.8  | 3.1  | 7.0   | 5               |
| Pt-4    | 52.0   | 4.2  | 4.8   | 42.8  | 1.2  | 3.0   | 5               |
| Pt-3    | 71.8   | 1.6  | 7.5   | 47.7  | 1.6  | 1.6   | 5               |
| Pt-2    | 86.5   | 158.8  | 7.8   | 23.4  | 3.5  | 5.7   | 5               |
| Pt-1    | 47.7   | 25.5   | 3.6   | 0.8   | 0.8  | 1.2   | 10              |
| J-1     | 125.4  | 97.2   | --  | 13.3  | 27.4   | 22.7  | 5               |
| J-2     | 92.7   | 24.7   | 11.3  | 12.4  | 3.1  | 9.3   | 5               |
| J-3     | 52.2   | 7.6  | 9.0   | 49.4  | --   | 1.4   | 5               |
| J-4     | 41.7   | 6.9  | 6.3   | 34.0  | 2.1  | 2.1   | 5               |
| J-5     | 36.7   | 4.5  | 4.0   | 46.3  | --   | 0.6   | 5               |
| J-6     | 49.0   | 16.5   | 4.0   | 52.8  | --   | 1.1   | 5               |
| G-6     | 31.3   | 10.9   | 6.5   | 46.5  | 2.2  | 4.4   | 5               |
| G-5     | 49.5   | 10.9   | 10.9  | 43.7  | 5.9  | 7.0   | 5               |
| G-4     | 78.0   | 7.1  | 3.5   | 43.2  | 12.0   | 2.1   | 5               |
| G-3     | 77.8   | 7.5  | 1.4   | 24.0  | 8.2  | 2.7   | 5               |
| G-2     | 39.7   | 6.6  | 2.2   | 34.6  | 7.4  | 1.5   | 5               |
| G-1     | 43.6   | 14.7   | 4.5   | 24.4  | 2.6  | 1.3   | 5               |
| G-0     | 36.9   | 35.6   | 1.9   | 15.3  | 14.6   | 3.8   | 5               |

APPENDIX

MARCH 1980 CRUISE PLAN (CRUISE 8003)

DAY 0

1600 Depart Malecón

DAY 1

0600 Arrive Benchmark station 17°57.3N 65°51.5W  
XBT  
hydrocast (primary productivity), 15 depths

0800 XBT

1000 oblique net tows (0-100, 100-200m)

1100 vertical net tow (1000-200m), XBT

1200 light profile, secchi

1300 oblique net tows (0-100, 100-200m)

1400 vertical net tow (1000-200m), XBT

1500 oblique net tow (0-100, 100-200m)

1600 vertical net tow (1000-200m)

1700 hydrocast  
XBT

1930 vertical net tow (1000-200m), XBT

2030 oblique net tows (0-100, 100-200m)

2130 vertical net tow (1000-200m)

2230 oblique net tows (0-100, 100-200m)

2330 vertical net tow (1000-220m)  
XBT

DAY 2

0030 oblique net tows (0-11, 100-200m)

0130 hydrocast

0330 XBT

0530 Begin small scale pattern study  
steam for station S-1

0630 Arrive S-1 17°52.7N 65°53.9W  
hydrocast at station S-1 (primary productivity)

0830 station S-1

DAY 2 (cont)

0915 oblique net tow (0-100m) station S-1  
steam for S-2

1000 station S-2 17°54.3N 65°57.4W

1045 oblique net tow (0-100m)  
steam for S-3

1130 station S-3 17°56.0N 65°46.7W

1215 oblique net tow (0-100m)  
steam for S-4

1300 station S-4 17°56.2N 65°55.4W

1345 oblique net tow (0-100m)  
steam for S-5

1430 station S-5 (Benchmark) 17°57.3N 65°52.0W

1515 oblique net tow  
steam for S-6

1600 station S-6 17°58.8N 65°48.2W

1645 oblique net tow  
return to benchmark

1730 hydrocast

1930 begin night series 17°52.5N 65°53.6W  
steam for S-1

2000 oblique net tow (0-100m)  
steam for S-2

2100 oblique net tow (0-100m) 17°54N 65°50W  
steam for S-3

2200 oblique net tow (0-100m) 17°55.9N 65°46.4W  
hydrocast  
steam for S-4 17°56.1N 65°55.3W

2400 oblique net tow (0-100m)  
steam for S-5 (benchmark)

DAY 3

0000 oblique net tow (0-100m) 17°57.3N 65°52.0W  
steam for S-6

0100 oblique net tow (0-100m)

0200 steam to Vieques  
Begin large scale study

DAY 3 (cont.)

0330 XBT (underway)  
 0345 arrive station V-1 18°04.4N 65°32.6W  
 hydrocast (2 depths)  
 shallow net tow  
 steam for V-2 18°03.6N 65°32.6W  
 shallow net tow  
 0515 steam for V-3 18°01.8N 65°32.7W  
 hydrocast  
 oblique net tow (0-100m)  
 steam for V-4 17°57.7N 65°32.6W  
 0830 oblique net tow (0-100m)  
 steam for V-5 17°48.5N 65°32.6W  
 oblique net tow (0-100m)  
 1200 hydrocast  
 1500 steam for V-6  
 hydrocast 17°32.5N 65°32.8W  
 oblique net tow (0-100m)  
 steam for PT-6  
 1750 XBT (underway)  
 2000 arrive PT-6 17°28'N 65°53'W  
 hydrocast net tow  
 oblique net tow (0-100m)  
 2300 steam for PT-5  
 arrive PT-5  
 oblique net tow (0-100m) 17°44.2'N 65°53'W  
 hydrocast  
 steam for PT-4

DAY 4

0100 arrive PT-4 17°52.0N 65°53'W  
 oblique net tow (0-100m)  
 steam for PT-3 (benchmark)  
 0200 arrive PT-3 17°56.0N 65°53'W  
 hydrocast  
 oblique net tow (0-100m)  
 steam for PT-2

DAY 4 (cont.)

0430 arrive PT-2 17°58.1N 65°53W  
 oblique net tow  
 steam for PT-1

0630 arrive PT-1 17°58.2'N 65°53'W  
 shallow hydrocast (2 depths)  
 shallow net tow  
 steam for J-1

0930 arrive J-1 17°54.8'N 66°16.N  
 shallow hydrocast (2 depths)  
 shallow net tow  
 steam for J-2

1000 arrive J-2 17°53.7'N 66°16.1'W  
 oblique net tow

1055 steam for J-3

1100 arrive J-3 17°48.7'N 66°16.1N  
 oblique net tow (0-100m)  
 steam for J-4

1430 arrive J-4 17°47.7N 66°16.0W  
 oblique net tow (0-100m)  
 steam for J-5

1700 arrive J-5 17°39.7N 66°16.0W  
 oblique net tow (0-100m)  
 steam for J-6

1800 arrive J-6 17:24.5N 66°16.0W  
 hydrocast  
 oblique net tow (0-100m)

1930 Depart for G-6

2100 XBT (underway)

2230 arrive G-6 17°26.5'N 66°45'W  
 oblique net tow (0-100m)  
 hydrocast  
 depart for G-5

0200 arrive G-5 17°41.6'N 66°45'W  
 hydrocast  
 oblique net tow (0-100m)  
 depart for G-4

DAY 4 (cont.)

0430 arrive G-4 17°49.3'N 66°45'W  
oblique net tow (0-100m)  
depart for G-3

0600 arrive G-3 17°53.4'N 66°45'W  
oblique net tow (0-100m)  
hydrocast  
depart for G-2

0730 arrive G-2 17°54.9'N 66°45'W  
oblique net tow  
depart for G-1

0815 arrive G-1 17°56'N 66°45'W  
oblique net tow  
shallow hydrocast  
depart G-0

0845 arrive G-0 17°58'N 66°45.7'W  
oblique net tow

0915 depart for Malecón

## List of Participants

Crawford Cruise 22-27 March 1980

|     |                  |                 |
|-----|------------------|-----------------|
| 1.  | José M. López    | Chief Scientist |
| 2.  | Juan G. González | Scientist       |
| 3.  | Paul M. Yoshioka | Scientist       |
| 4.  | Daniel Pesante   | Scientist       |
| 5.  | George Anderson  | Head Technician |
| 6.  | José A. Ramírez  | Technician      |
| 7.  | Jorge Capella    | Technician      |
| 8.  | Jorge García     | Technician      |
| 9.  | Angel Nazario    | Technician      |
| 10. | Dennis Corales   | Technician      |
| 11. | Edwin González   | Technician      |
| 12. | Carlos Bonafé    | Technician      |
| 13. | Carlos Aranda    | Technician      |
| 14. | Nana Pérez       | Technician      |
| 15. | Migdalia Alvarez | Technician      |



WEATHER CODE

- 0 Clear (no cloud at any level)
- 1 Partly cloudy (scattered or broken clouds)
- 2 Continuous layer (s) of cloud (s)
- 3 Sandstorm, duststorm, or blowing snow
- 4 Fog, thick dust, or haze
- 5 Drizzle
- 6 Rain
- 7 Snow, or rain and snow mixed
- 8 Shower (s)
- 9 Thunderstorm (s)