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A COMPILATION OF MOORED CURRENT METER AND
WIND OBSERVATIONS, VOLUME VIII
(1970 ARRAY EXPERIMENT)

By

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TECHNICAL REPORT

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ABSTRACT

Summaries of wind and current measurements made with current meters and wind recorders by the Woods Hole Oceanographic Institution during June, July and August of 1970 are presented.

Averaged quantities are presented in computer-generated output as basic statistics, spectra, demodulation plots, progressive vector diagrams, and east-north component plots.

CONTENTS

Preface	iii
Introduction	v
Figures	xix
References	xxii
Mooring Diagram of 338	1
Mooring 338	2
3381	3
3383	7
3385	11
3386	15
3387	19
Mooring Diagram of 339	23
Mooring 339	24
3391	25
3393	29
3394	33
3395	37
3396	41
3397	45
Mooring Diagram of 340	49
Mooring 340	50
3401	51
3402	55
3403	59
3404	63
3406	67
3407	71
Composite Provecs	75
Composite vectors	76

PREFACE

This volume of wind and current records differs from previous volumes in several respects:

(1) It is out of order, chronologically. It has been thought preferable to publish these data rather than to wait for the data from previous years, much of which has to be rechecked and re-edited before publication.

(2) It contains not a complete year of data, but the results of only one experiment. The size of this experiment, plus a substantial improvement in data recovery, make this desirable.

(3) A change in the format of data presentation has been made which is specific to this volume. Since the primary purpose of the experiment was to investigate inertial oscillations, histograms of speed have been replaced by plots of the amplitude and phase of oscillations of inertial period as functions of time.

Acknowledgments

As always, the collection and presentation of these data has required the combined efforts of the whole of the buoy group. These include those responsible for instrument preparation, mooring and hardware design, hardware preparation, mooring setting and retrieval, data reduction, and data presentation. This work is funded by the Office of Naval Research under Contract N00014-66-C0241 NR 083-004.

INTRODUCTION

Between 27th June and 18th August 1970 three similar surface moorings, numbered 338, 339, and 340 were set in the vicinity of Site D ($39^{\circ}10'N$, $70^{\circ}W$). The geographical positions of the moorings, and the approximate bottom contours (in meters) are shown in Fig. 1. Mooring 338 is 51 km north and slightly east of 339; 340 is 47 km due west of 339. The continental shelf is about 20 km north of 338.

Each mooring had a wind recorder, four current meters near the surface at depths of 12, 32, 52, and 72 m, and a fifth current meter about 150 m above the bottom. The distribution of the data from the instruments is shown schematically in Fig. 2. Of these 18 records, only one (3384) returned no data and one (3383) was short and required extensive editing. The other 16 records were nearly perfect.

Purpose of experiment:

The experiment was designed to investigate the horizontal and vertical structure of oscillations of near inertial period (18.78 hours at latitude $39^{\circ} 07.6'N$) in the top 100 m of the ocean, their generation by winds, and dispersion. It is the purpose of this report only to present the data. It will be discussed in a separate paper.

Other data:

Other instruments on these moorings included two thermographs, a wave amplitude recorder, and a pyranometer (solar irradiance detector), none of which returned data of sufficient quality.

Extensive BT, XBT, and STD surveys were made in the vicinity of the moorings on several occasions while the moorings were in position. These will be documented in a separate report

Data reduction:

All the data in this report were collected by instruments that recorded information on magnetic tape cartridges with interval mode (Webster, 1967). That is, bursts of rapid samples are separated by intervals in which no samples are taken. The data on the tape cartridges were transcribed onto computer compatible magnetic tape in the W.H.O.I. standard format described by Maltais (1969).

The data are edited to remove bad values, such as erroneously high speeds. The data are then vector-averaged over each burst to give one velocity vector per interval. These vectors are listed in terms of speed and direction and obvious bad points are deleted and replaced by values linearly interpolated from the east and north Cartesian components. The resultant data is an evenly spaced time series which is used as the basic input for all further processing and graphic displays. This series may be further averaged to reduce the amount of data and to smooth high frequency noise which is sometimes evident in the basic vector series.

After the data had been edited and plotted it was discovered that an instrument correction factor had been applied incorrectly. In early 1973 the factor was corrected from $-7 \sin\theta$ to $+7 \sin\theta$, where θ = direction. The maximum error, 14° , occurred when the vane was due east or west, the minimum error, 0° , when the vane was due north or south.

To insure that each data series has a unique identifier, a set of informal guidelines has been established. For example, 3381WE900.

338 - The first three digits are the mooring number.

1 - The fourth digit indicates the position of the instrument on the mooring counting from the top down.

W - When present 'W' signifies a wind recorder.

E - The version of the data. The presence of a letter indicates that some editing of the data has been done.

900 - Indicates that the data series has been averaged over 900 seconds.

3381WE1H is the 1-hour averaged series derived from 3381WE900.

Timing:

High precision Bulova crystal clocks were used in all the instruments mentioned below. All were synchronized to begin recording exactly on the hour, and quarter-hourly thereafter. Since the time to record 23 or 24 strobes is about two minutes, the midpoint times used in the averaged records are all about a minute past multiples of quarter hours. (e.g. 3381 has a start time of 19 hours, 15 minutes, 57 seconds). Clock drifts between when the clocks were set on 25th June and when they were checked on 17th or 18th August (53 or 54 days) were as follows:

3387 42 secs slow

3407 1 sec slow

3383 3 secs fast

3385 3 secs fast

3402 8 secs fast

3397 16 secs fast

3381 18 secs fast

3394 22 secs fast

3395 23 secs fast

3396 27 secs fast

3403 33 secs fast

3401 38 secs fast

3404 48 secs fast

3406 53 secs fast

3393 57 secs fast

3386 58 secs fast

3391 70 secs fast

In two cases, 3381 and 3406, one or more bits in the clock-word malfunctioned. This did not affect the clock accuracy, and it was possible to correct the clock information by adding suitable powers of two to the clock count.

Wind records:

The toroidal surface buoys standardly used have a superstructure held in position by three heavy metal struts forming a triangular pyramid (Richardson, Stimson, & Wilkins, 1963). The wind recorder is placed within this pyramid, and spurious effects have resulted in the past caused by a strut lying upwind of the sensors. In the present experiment a large plywood fin was attached to one of the struts of each toroid to orientate it so that the wind impinged on the sensors from a point midway between two struts (which are 120° apart). Because the wind recorder is rigidly attached to the buoy, the vane gives the wind direction relative to the buoy. Examination of the vane records shows that 90% of the vane readings were within 30° of the optimum position. We conclude that the fins are a satisfactory solution to the problem of strut interference.

In a further attempt to improve the wind records, the anemometers were individually calibrated in the M.I.T. Flutter Tunnel (working cross-section 5 feet by 7 feet) over a tunnel air speed range of 2 to 27 m/sec. The number of anemometer revolutions (counted over 30 seconds) is plotted in Fig. 3 against the tunnel speed for the three instruments, W-169X (3381), W-143X (3391), and W-101X (3401), used in this experiment. The calibration curves used were the best eyeball-fitted straight lines drawn on Fig. 3. Their zero offsets,

displacement constants (i.e., slopes), and maximum deviations of the data from the straight lines at speeds less than 25 m/sec are given below.

Instrument No.	Stall Speed (m/sec)	Displacement constant (m/rev)	Max. deviation from linearity (m/sec)
W-169X	1.00	1.61	0.41
W-143X	0.82	1.58	0.44
W-101X	0.82	1.73	0.67

There would be differences of up to 1.3 m/sec between instruments at 15 m/sec (the maximum speeds observed in the experiment) if a single straight-line calibration were attempted for all instruments. In fact, a total of six anemometers was tested as above, and stall speeds ranged from 0.82 to 1.20 m/sec with displacement constants between 1.54 and 1.73 m/sec. The above calibration constants were used for the entire runs, and the calibrations were not repeated after the experiment. However, it must be cautioned that the calibrations may well change as functions of exposure time due to wear, salt encrustation, etc.

Data presentation:

There is a two-page mooring summary for each mooring. This is followed by a four-page data summary for each instrument on the mooring that is presented in the report.

Mooring summary:

The first page of the mooring summary is a diagram of the mooring with the lengths of the line measured in metres. The second page contains the particulars of the mooring: where and when it was set, what was set and why, and comments about what happened. There were six types of instruments set in this array. Magnetic tape recording wind recorders (MWR), magnetic tape recording current meters (MCM), temperature recorders (TEMP), a tensiometer (TENS), wave recorder (WVR) and a pyranometer. An asterisk (*) following the data number indicates that the data are presented in this report. The depth is in meters. In the top 100 m it is accurate to within a few meters. The depth between adjacent instruments is accurate to a meter. Since the deep instruments are about 150 m above the bottom, their depths are probably accurate to within 10 m.

Data summary:

The first page of the data summary lists the particulars of that instrument which recorded the data. The duration is the length of good data without launch and retrieval transients. The start and stop times of the good data are in Greenwich mean time as are all the times in this report. The sampling scheme is basically the same for all the instruments presented. The only difference is the result of an instrument modification which causes some instruments to have 24 strobes per interval instead of 23. Other peculiarities of the instrument or the data are noted under COMMENTS on this sheet. The last section on the first page is a summary of various statistics. The remaining pages of the data summary contain computer presentations of the data which are described below.

STATISTICS (STATS):

Standard statistical parameters are calculated for data in the time-range given at the bottom of the table. If there are n speed and direction values in a sample, and we define $E_i = S_i \sin \theta_i$, $N_i = S_i \cos \theta_i$, then for $A = E, N$, and S ,

$$\text{mean, } \bar{A} = \frac{1}{n} \sum_{i=1}^n A_i$$

$$\text{variance, } \sigma_A^2 = \frac{1}{n} \sum_{i=1}^n A_i^2 - \bar{A}^2$$

$$\text{standard error of the mean} = \frac{\sigma_A}{\sqrt{n}}$$

$$\text{standard deviation} = \sigma_A$$

$$\text{skewness} = \frac{1}{\sigma_A^3} \left[\frac{1}{n} \sum_{i=1}^n A_i^3 - \frac{3\bar{A}}{n} \sum_{i=1}^n A_i^2 + 2\bar{A}^3 \right]$$

$$\text{kurtosis} = \frac{1}{\sigma_A^4} \left[\frac{1}{n} \sum_{i=1}^n A_i^4 - \frac{4\bar{A}}{n} \sum_{i=1}^n A_i^3 + \frac{6\bar{A}^2}{n} \sum_{i=1}^n A_i^2 - 3\bar{A}^4 \right].$$

The program also calculates "East and North" statistics,

$$\text{covariance, } M = \frac{1}{n} \sum_{i=1}^n E_i N_i - \bar{E} \bar{N}$$

$$\text{standard deviation of covariance, } \sigma_m = \sqrt{\frac{1}{n} \sum_{i=1}^n (E_i N_i)^2 - \bar{E}_i \bar{N}_i^2}$$

$$\text{standard error of covariance} = \frac{\sigma_m}{\sqrt{n}}$$

$$\text{correlation coefficient, } M' = \frac{M}{\sigma_E \sigma_N}.$$

The program also calculates parameters related to vector quantities: the scalar amplitude of the vector mean, $V_m = \sqrt{\bar{E}^2 + \bar{N}^2}$; vector variance, $V_V^2 = \frac{1}{2} (\sigma_E^2 + \sigma_N^2)$; standard deviation = V_V .

SPECTRUM

Spectra are plotted in log-log format, the scale being 1" per decade. (A log-log grid suitable for overlaying is inserted in the back of the report for convenience.) The program uses the Fast Fourier Transform algorithm (Singleton, 1969) and is restricted to the set of numbers that can be factored by 2, 3, 4 or 5. Thus the time range is usually shorter than the length of good record. The number of degrees of freedom (d.f.) for the plotted points for low-frequency values on the plot is given by (4 x number of pieces x number of frequency bands averaged over). Since the log-log plot bunches points closer together as the frequency increases, averaging over more frequency bands is done for larger values of the frequency. This smooths the plot and increases the number of degrees of freedom for the larger frequency values. It has the further advantage of resolving the low-frequency peaks (usually inertial and semidiurnal) as finely as possible while increasing the number of degrees of freedom in the internal wave region of the spectra. The algorithm is as follows: counting from the left of the plot, the first 40 plotted points are averaged as stated in the label, the next 15 points are averaged over twice as many frequency bands, the next 6 points over 5 times as many, the next 30 over 10 times as many, the next 15 points over 20 times as many, the next 6 points over 50 times as many, and further points, if any, over 100 times as many.

COMPLEX DEMODULATION (DEMODO):

The technique described by Perkins (1970) has been used to obtain plots of the amplitude and phase of near-inertial-period oscillations as functions of time.

A harmonic oscillation of 18.78 hours period is least squares fitted to 37.56 hours of east velocity data at the same time that a similar oscillation is fitted to corresponding north velocity data. The amplitudes of the fitted oscillations are the same, but the phase difference is forced to be 90° . Thus we fit a clockwise rotating vector of constant amplitude and 18.78 hours period to the observed horizontal velocity vector. This is equivalent to filtering the data with a cosine window peaked at 18.78 hours. The piece length is such that the first zero of the filter to the right of the peak falls at about the semidiurnal tidal frequency, and the second zero to the left falls at zero frequency. Since the inertial oscillations frequently dominate the record this technique gives a good approximation to the amplitude of any oscillation whose frequency is within 10% of inertial frequency when the oscillation has significant amplitude and does not change its amplitude greatly over the piece length.

The phase is the angle by which the oscillating vector lags a vector rotating with exactly inertial frequency.

Thus if the phase is constant, the observed frequency's inertial, and if it increases (decreases) with a constant slope, the observed frequency is constant and less than (greater than) inertial. While the initial phase of the reference inertial rotation is arbitrary, it has been made the same for all DEMODs in this report. Finally, when the amplitude is low, the phase becomes erratic and is meaningless.

The least squares values for each piece are plotted against the midpoint time of the piece. For successive points the piece is shifted by half its length, giving a point every 18.78 hours.

EAST vs. NORTH SCATTERPLOT:

The east and north components from the 1-hour vector averaged series are plotted against each other to give a pictorial indication of the direction and speed of the velocity vectors. This type of plot is helpful in finding instrument characteristics not easily noticed elsewhere. This plot uses data in the same time range used by the SPECTRA and STATS presentations.

PROGRESSIVE VECTOR DIAGRAM (PROVEC):

The east and north progressive displacements are computed from speed and direction values which were derived from the 1-hour vector averaged series. The plot begins with an asterisk (*) on a day boundary. Following day boundaries are indicated with a plus (+). Data collected from the same depth are plotted with the same km/inch scale for ease in cross comparison except for data number 3407 (depth 2620 m) which has a scale twice the size of the others at that depth.

EAST and NORTH vs. TIME PLOT:

This is a diagram of EAST and NORTH components plotted as functions of time. The plot is generated from the 1-hour vector averaged series. The horizontal (TIME) scale is the same on all plots. The vertical scale is the same only for data collected at similar depths.

Site D Area

Figure 1

	<u>MOORING</u>	<u>LOCATION</u>
338	39°34.5'N, 69°55.5'W
339	39°07.6'N, 70°02.3'W
340	39°07.5'N, 70°35.2'W

Figure 2
xx

Figure 3
xxi

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Ph.D. thesis, M.I.T.-W.H.O.I. Joint Program
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A scheme for sampling deep-sea currents from moored buoys.
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STATION 338

5/16" 3 x 19 WIRE

9/16 NYLON,
USED

LIGHT
RADIO
WIND RECORDER - 3381

7 m CHAIN

TEMPERATURE RECORDER - 3382

CURRENT METER - 3383

18 m 3 x 19 WIRE

CURRENT METER - 3384

18 m 3 x 19 WIRE

CURRENT METER - 3385

18 m 3 x 19 WIRE

CURRENT METER - 3386

430 m

500 m

500 m

519 m

80 m

CURRENT METER - 3387

TENSIOMETER - 3388

20 m

85 m 9/16" NYLON WITH 30 GLASS
SPHERES SPACED 2 m APART

ACOUSTIC RELEASE,
TRANSPONDING

30 m 3/4" NYLON

3 m CHAIN

STIMSON ANCHOR, 3,000 LBS.

Mooring No. 338

Set:

<u>39° 34.5'N</u>	<u>70</u>	<u>June</u>	<u>27</u>	<u>15</u>	<u>GMT</u>
Latitude	Year	Month	Day	Hour	

Retrieved:

<u>69° 55.5'W</u>	<u>70</u>	<u>Aug.</u>	<u>17</u>	<u>14</u>	<u>GMT</u>
Longitude	Year	Month	Day	Hour	

Set
by: R. Heinmiller Ship R.V. KNORR Cruise 5

Mooring:

Surface toroid with fin, 5/16" torque balanced wire with jacket and boots. 9/16" used plaited nylon, 30 glass spheres for backup recovery system (Berteaux, Heinmiller, 1969), 3/4" plaited nylon and 3000 pound anchor.

<u>Data Number</u>	<u>Instru- ment Number</u>	<u>Type</u>	<u>Depth Meters</u>	<u>Comments</u>
3381*	W-169X	MWR	Surface	
3382	T-463	Temp	10 m	No data, instrument failure
3383*	M-226	MCM	12 m	Short - electronic problem
3384	M-232	MCM	32 m	No data - clock malfunction
3385*	M-212	MCM	52 m	
3386*	M-173	MCM	72 m	
3387	M-203	MCM	2167 m	
3388	1029	Tens	2169 m	

PURPOSE OF MOORING:

Three mooring array (338, 339, 340) to gather wind, near surface current and deep current measurements. A test of used nylon characteristics. Thermograph experiment with 339.

COMMENTS ON RESULTS:

Mooring towed for about one hour to get in position for anchor drop, otherwise normal set and recovery.

Data Number: 3381

Instrument No.: W-169X

Type: Magentic tape wind recorder

Depth: Surface

Water depth: 2322 m

Start time: 70-VI-27 19.15.57

Stop time: 70-VIII-17 14.00.57

Duration: 50 days, 19 hours

Sampling scheme: Interval

Time between strobes = 5.27 seconds

No. of strobes per interval = 24

Interval time = 900 seconds

COMMENTS:

Bad clock words caused by the 6th bit being stuck. This was corrected by subtracting 2^5 from the clock count where necessary. Timing accuracy is not affected.

Units for wind are decimeters/sec (dm/s). Contrary to meteorological conventions the wind vectors indicate the direction towards which the wind blew.

STATS

DATA/ 3381WE900

MEAN	"	EAST	NORTH	SPEED	"	*****	EAST & NORTH	*****
STD. ERR.	"	3.50	12.84	62.17	"	COVARIANCE	"	538.08
VARIANCE	"	.56	.81	.41	"	STD. ERR. OF COVARIANCE	"	29.20
STD. DEV.	"	1461.87	3000.24	776.58	"	STD. DEV. OF COVARIANCE	"	1882.08
KURTOSIS	"	38.24	54.77	27.87	"	CORRELATION COEFFICIENT	"	.257
SKEWNESS	"	3.33	2.45	3.07	"	VECTOR MEAN	"	13.41
	"	-.05	-.40	.48	"	VECTOR VARIANCE	"	2231.11
					"	STD. DEV.	"	47.23

UNITS OF RAW DATA VARIABLES = DM/SEC

SAMPLE SIZE = 4608 POINTS

SPANNING RANGE

FROM 70-VI-20 16.15.50
TO 70-VIII-15 16.00.50

AUTO SPECTRUM
 3381WE900 EAST COMP
 3381WE900 NORTH COMP
 WIND
 70-VI-27 TO 70-VIII-14
 2 PIECES WITH 1152 ESTIMATES
 PER PIECE. AVERAGED OVER
 3 ADJACENT FREQUENCY BANDS

0 3000.
KILOMETERS

3381WE1H

WIND

70- VI -28 TO 70-VIII-17

3381WE1H

Data Number: 3383

Instrument No.: M-226

Type: Magnetic tape current meter

Depth: 12 m.

Water depth: 2322

Start time: 70-VI-27 19.15.57

Stop time: 70-VIII-05 03.15.57

Duration: 3 days, 8 hours

Sampling scheme: Interval

time between strobes = 5.27 seconds
no. of strobes per interval = 23
interval time = 900

COMMENTS:

This record is shorter than the others in this array because instrument changed to continuous mode and ran out of recording tape.

One of the higher order bits in the rotor counter board was bad. Thus whenever a rotor count equivalent to 28.8 cm/sec (or integer multiple thereof) was reached the count reverted to zero. The record was edited as follows: Since the speeds increase or decrease smoothly with time it was possible to add the correct multiple of 28.8 cm/sec to the recorded speeds except during periods when the scatter of speed values due to high wave noise was more than 28.8 cm/sec. The speeds and hence the averaged vectors can therefore be taken as good approximations except during the periods: from June 27, 1900 hrs. to June 29, 0000 hrs.; from June 30, 1300 hrs. to July 02, 0500 hrs.; from July 04, 2300 hrs. to July 05, 1800 hrs.; from July 10, 1200 hrs. to July 17, 1600 hrs.; from July 20, 0800 hrs. to July 22, 1700 hrs.; and from July 31, 1100 hrs. to Aug. 05, 0300 hrs.; when there may be large errors (tens of cm/sec and tens of degrees). Thus a little over half the data is reasonably accurate.

STATS

DATA/ 3383H900

MEAN	=	EAST	NORTH	SPEED	* *****	EAST & NORTH	*****
STD. ERR.	=	71.84	178.51	308.99	* COVARIANCE	=	-292.66
VARIANCE	=	3.29	3.18	2.16	* STD. ERR. OF COVARIANCE	=	823.54
STD. DEV.	=	38940.96	36340.42	16832.25	* STD. DEV. OF COVARIANCE	=	48391.68
KURTOSIS	=	197.33	180.63	128.74	* CORRELATION COEFFICIENT	=	-.008
SKEWNESS	=	3.00	3.64	2.43	* VECTOR MEAN	=	192.43
		-.20	-.75	.06	* VECTOR VARIANCE	=	37640.69
					* STD. DEV.	=	194.01

UNITS OF RAW DATA VARIABLES = MM/SEC

SAMPLE SIZE = 3597 POINTS

SPANNING RANGE

FROM 70-VI-28 16.15.58
TO 70-VIII-05 03.15.58

AUTO SPECTRUM
 3383H900 EAST COMP
 3383H900 NORTH COMP
 12 METERS
 70-VI-27 TO 70-VII-21
 1 PIECES WITH 1152 ESTIMATES
 PER PIECE. AVERAGED OVER
 3 ADJACENT FREQUENCY BANDS

3383J1H
12 M

0. 80.
KILOMETERS

3383J1H
12 M

70- VI -28 TO 70-VIII-05

3383J1H
12 M

Data Number: 3385

Instrument No.: M-212

Type: Magnetic tape current meter

Depth: 52 m

Water depth: 2322 m

Start time: 70-VI-27 19.15.57

Stop time: 70-VIII-17 14.00.57

Duration: 50 days, 18 hours, 45 minutes

Sampling scheme: Interval

Time between strobes = 5.27 seconds

No. of strobes per interval = 24

Interval time = 900 seconds

COMMENTS:

STATS

DATA/ 3305F900

MEAN	=	EAST	NORTH	SPEED	=	*****	EAST & NORTH	*****
STD. ERR.	=	8.91	76.17	114.95	=	COVARIANCE	=	152.08
VARIANCE	=	1.02	1.05	.75	=	STD. ERR. OF COVARIANCE	=	102.50
STD. DEV.	=	4020.65	5087.38	2593.81	=	STD. DEV. OF COVARIANCE	=	6957.64
KURTOSIS	=	68.43	71.33	50.93	=	CORRELATION COEFFICIENT	=	.031
SKEWNESS	=	2.83	3.11	2.87	=	VECTOR MEAN	=	76.81
	=	-.06	-.34	.36	=	VECTOR VARIANCE	=	4954.02
					=	STD. DEV.	=	70.38

UNITS OF RAW DATA VARIABLES = MM/SEC

SAMPLE SIZE = 4608 POINTS

SPANNING RANGE

FROM 70- VI -20 16.15.50
TO 70-VIII-15 16.00.50

AUTO SPECTRUM
 3385F900 EAST COMP
 3385F900 NORTH COMP
 52 METERS
 70-VI-27 TO 70-VIII-14
 2 PIECES WITH 1152 ESTIMATES
 PER PIECE. AVERAGED OVER
 3 ADJACENT FREQUENCY BANDS

3385F1H
52 M

Data Number: 3386

Instrument No.: M-173

Type: Magnetic tape current meter

Depth: 72 m

Water depth: 2322 m

Start time: 70-VI-27 19.15.57

Stop time: 70-VIII-17 14.00.57

Duration: 50 days, 18 hours, 45 minutes

Sampling scheme: Interval

Time between strobes = 5.27 seconds

No. of strobes per interval = 24

Interval time = 900 seconds

COMMENTS:

STATS

DATA/ 3386F900

MEAN	=	EAST	NORTH	SPEED	=	*****	EAST & NORTH	*****
STD. ERR.	=	8.23	54.01	108.45	=	COVARIANCE	=	-266.48
VARIANCE	=	1.08	1.16	.75	=	STD. ERR. OF COVARIANCE	=	85.85
STD. DEV.	=	5390.86	6200.28	2587.24	=	STD. DEV. OF COVARIANCE	=	6513.53
KURTOSIS	=	73.42	78.74	50.86	=	CORRELATION COEFFICIENT	=	-.046
SKEWNESS	=	2.78	2.67	2.64	=	VECTOR MEAN	=	54.63
		.08	-.22	.30	=	VECTOR VARIANCE	=	5795.63
					=	STD. DEV.	=	76.13

UNITS OF RAW DATA VARIABLES = MM/SEC

SAMPLE SIZE = 4608 POINTS

SPANNING RANGE

FROM 70-VI-28 16.15.58
TO 70-VIII-15 16.00.58

AUTO SPECTRUM
 3386F900 EAST COMP
 3386F900 NORTH COMP
 72 METERS
 70-VI-27 TO 70-VIII-14
 2 PIECES WITH 1152 ESTIMATES
 PER PIECE. AVERAGED OVER
 3 ADJACENT FREQUENCY BANDS

3386F1H
72 H

Data Number: 3387

Instrument No.: M-203

Type: Magnetic tape current meter

Depth: 2167 m

Water depth: 2322 m

Start time: 70-VI-27 19.15.57

Stop time: 70-VIII-17 14.00.57

Duration: 50 days, 18 hours, 45 minutes

Sampling scheme: Interval

Time between strobes = 5.27 seconds

No. of strobes per interval = 24

Interval time = 900 seconds

COMMENTS:

STATS

DATA/ 3307F900

MEAN	"	EAST	NORTH	SPEED	"	*****	EAST & NORTH	*****
STD. ERR.	"	-30.70	12.75	66.95	"	COVARIANCE	"	-334.09
VARIANCE	"	.66	.54	.34	"	STD. ERR. OF COVARIANCE	"	30.20
STD. DEV.	"	2010.30	1340.55	535.73	"	STD. DEV. OF COVARIANCE	"	2050.26
KURTOSIS	"	44.84	36.61	23.15	"	CORRELATION COEFFICIENT	"	-.204
SKEWNESS	"	3.03	2.32	3.72	"	VECTOR MEAN	"	40.82
	"	.60	-.10	.79	"	VECTOR VARIANCE	"	1675.43
					"	STD. DEV.	"	40.93

UNITS OF RAW DATA VARIABLES = MM/SEC

SAMPLE SIZE = 4600 POINTS

SPANNING RANGE

FROM 70- VI -20 16.15.50
TO 70-VIII-15 16.00.50

AUTO SPECTRUM
 3387F900 EAST COMP
 3387F900 NORTH COMP
 2167 METERS
 70-VI-27 TO 70-VIII-14
 2 PIECES WITH 1152 ESTIMATES
 PER PIECE. AVERAGED OVER
 3 ADJACENT FREQUENCY BANDS

3387F1H
2167 M

0. 80.

KILOMETERS

3387F1H

2167 M

70- VI -28 TO 70-VIII-17

3387F1H
2167 M

STATION 339

5/16" WIRE

Mooring No. 339

Set:

<u>39° 07.6'N</u>	<u>70</u>	<u>June</u>	<u>28</u>	<u>04</u>	<u>GMT</u>
Latitude	Year	Month	Day	Hour	

Retrieved:

<u>70° 02.3'W</u>	<u>70</u>	<u>Aug</u>	<u>17</u>	<u>05</u>	<u>GMT</u>
Longitude	Year	Month	Day	Hour	

Set

by: R. Heinmiller Ship R.V. KNORR Cruise 5

MOORING:

Surface toroid with fin, 5/16" torque balanced wire with jacket and boots, new 5/8" plaited nylon, used 5/8" plaited nylon with 32 glass spheres for back-up recovery system (Berteaux, Heinmiller, 1969), 3/4" plaited nylon and 3000 pound anchor.

<u>Data Number</u>	<u>Instru- ment Number</u>	<u>Type</u>	<u>Depth Meters</u>	<u>Comments</u>
3391*	W-143X	MWR	Surface	
3392	T-459	Temp	10 m.	no data - instrument failure
3393*	M-249	MCM	12 m.	
3394*	M-227	MCM	32 m	
3395*	M-255	MCM	52 m	
3396*	M-177	MCM	72 m	
3397*	M-206	MCM	2545 m	

PURPOSE OF MOORING:

Three mooring array (338, 339, 340) to gather wind, near-surface current and deep current measurements. Thermograph experiment with 338. Pressure case test (no data number) and a pyranometer test (no data number).

COMMENTS ON RESULTS:

Normal set and retrieval. Pyranometer test failed due to malfunction of the sensor.

Data Number: 3391

Instrument No.: W-143X

Type: Magnetic tape wind recorder

Depth: Surface

Water depth: 2682 m

Start time: 70-VI-28 06.30.57

Stop time: 70-VIII-18 03.00.57

Duration: 50 days, 20 hours, 30 minutes

Sampling scheme: Interval

Time between strobos = 5.27 seconds

No. of strobos per interval = 23

Interval time = 900 seconds

COMMENTS:

Units for wind are decimeters/sec (dm/s). Contrary to meteorological conventions the wind vectors indicate the direction towards which the wind blew.

STATS

DATA/ 3391HC900

	EAST	NORTH	SPEED	EAST & NORTH	
MEAN	7.14	6.42	51.69		661.84
STD. ERR.	.54	.60	.44		25.25
VARIANCE	1339.33	2114.44	874.08		1714.31
STD. DEV.	36.60	45.88	29.56		.989
KURTOSIS	3.27	2.73	2.58		8.81
SKEWNESS	-.09	-.29	.36		1726.88
					41.56

UNITS OF RAW DATA VARIABLES = DM/SEC

SAMPLE SIZE = 4608 POINTS

SPANNING RANGE
FROM 70- VI -28 16.15.58
TO 70-VIII-18 16.00.58

AUTO SPECTRUM
 3391WC900 EAST COMP
 3391WC900 NORTH COMP
 WIND
 70-VI-28 TO 70-VIII-15
 2 PIECES WITH 1152 ESTIMATES
 PER PIECE. AVERAGED OVER
 3 ADJACENT FREQUENCY BANDS

N

0. 3000.
KILOMETERS

3391WC1H

WIND

70- VI -29 TO 70-VIII-17

3391WC1H

Data Number: 3393

Instrument No.: M-249

Type: Magentic tape current meter

Depth: 12 m

Water depth: 2682 m

Start time: 70-VI-28 06.30.57

Stop time: 70-VIII-18 03.15.57

Duration: 50 days, 20 hours, 45 minutes

Sampling scheme: Interval

Time between strobos = 5.27 seconds

No. of strobos per interval = 23

Interval time = 900 seconds

COMMENTS:

STATS

DATA/ 3393E900

MEAN	=	EAST	NORTH	SPEED	* *****	EAST & NORTH	*****
STD. ERR.	=	-58.14	-9.59	218.70	* COVARIANCE	=	701.24
VARIANCE	=	2.53	2.59	1.87	* STD. ERR. OF COVARIANCE	=	487.11
STD. DEV.	=	29583.84	30880.09	16105.91	* STD. DEV. OF COVARIANCE	=	39744.77
KURTOSIS	=	172.00	175.73	126.81	* CORRELATION COEFFICIENT	=	.023
SKEWNESS	=	3.20	3.43	3.27	* VECTOR MEAN	=	58.92
		-.08	-.35	.78	* VECTOR VARIANCE	=	30231.97
					* STD. DEV.	=	173.87

UNITS OF RAW DATA VARIABLES = MM/SEC

SAMPLE SIZE = 4608 POINTS

SPANNING RANGE

FROM 70- VI -28 16.15.58
TO 70-VIII-15 16.00.58

AUTO SPECTRUM
 3393E900 EAST COMP
 3393E900 NORTH COMP
 12 METERS
 70-VI-28 TO 70-VIII-15
 2 PIECES WITH 1152 ESTIMATES
 PER PIECE. AVERAGED OVER
 3 ADJACENT FREQUENCY BANDS

3393E1H
12 M

0 80.
KILOMETERS

3393E1H

12 M

70- VI -29 TO 70-VIII-18

3393E1H
12 M

Data Number: 3394

Instrument No.: M-227

Type: Magnetic tape current meter

Depth: 32 m

Water depth: 2682 m

Start time: 70-VI-28 06.30.57

Stop time: 70-VIII-18 03.15.57

Duration: 50 days, 20 hours, 45 minutes

Sampling scheme: Interval

Time between strobes = 5.27 seconds

No. of strobes per interval = 24

Interval time = 900 seconds

COMMENTS:

STATS

DATA/ 3394E900

	EAST	NORTH	SPEED	*****	EAST & NORTH	*****
MEAN	= -88.69	26.56	168.83	= COVARIANCE	=	-523.86
STD. ERR.	= 1.81	1.67	1.28	= STD. ERR. OF COVARIANCE	=	240.45
VARIANCE	= 15165.41	12818.60	7725.78	= STD. DEV. OF COVARIANCE	=	16322.40
STD. DEV.	= 123.15	113.66	87.90	= CORRELATION COEFFICIENT	=	-.037
KURTOSIS	= 2.62	3.29	2.44	= VECTOR MEAN	=	82.30
SKEWNESS	= .03	-.14	.37	= VECTOR VARIANCE	=	14042.00
				= STD. DEV.	=	118.50

UNITS OF RAW DATA VARIABLES = MM/SEC

SAMPLE SIZE = 4608 POINTS

SPANNING RANGE

FROM 70- VI -28 16.15.50
TO 70-VIII-15 16.00.50

AUTO SPECTRUM
 3394E900 EAST COMP
 3394E900 NORTH COMP
 32 METERS
 70-VI-28 TO 70-VIII-15
 2 PIECES WITH 1152 ESTIMATES
 PER PIECE. AVERAGED OVER
 3 ADJACENT FREQUENCY BANDS

3394E1H

32 M

70-VI-29

70-VII-01

70-VIII-01

0 80

KILOMETERS

3394E1H

32 M

70-VI -29 TO 70-VIII-18

3394E1H
32 M

Data Number: 3395

Instrument No.: M-255

Type: Magentic tape current meter

Depth: 52 m

Water depth: 2682 m

Start time: 70-VI-28 06.30.57

Stop time: 70-VIII-18 03.15.57

Duration: 50 days, 20 hours, 45 minutes

Sampling scheme: Interval

Time between strobos = 5.27 seconds

No. of strobos per interval = 23

Interval time = 900 seconds

COMMENTS:

STATS

DATA/ 33950900

	EAST	NORTH	SPEED	*****	EAST & NORTH	*****
MEAN	= -84.77	-3.35	133.93	=	COVARIANCE	= 286.91
STD. ERR.	= 1.40	1.17	1.00	=	STD. ERR. OF COVARIANCE	= 130.72
VARIANCE	= 8978.34	6358.39	4595.96	=	STD. DEV. OF COVARIANCE	= 8873.46
STD. DEV.	= 94.75	79.75	67.79	=	CORRELATION COEFFICIENT	= .038
KURTOSIS	= 2.63	2.97	2.55	=	VECTOR MEAN	= 84.83
SKEWNESS	= -.02	.23	.98	=	VECTOR VARIANCE	= 7668.86
				=	STD. DEV.	= 87.57

UNITS OF RAW DATA VARIABLES = MM/SEC

SAMPLE SIZE = 4608 POINTS

SPANNING RANGE

FROM 70-VI-28 16.15.58
TO 70-VIII-15 16.00.58

AUTO SPECTRUM
 3395D900 EAST COMP
 3395D900 NORTH COMP
 52 METERS
 70-VI-28 TO 70-VIII-15
 2 PIECES WITH 1152 ESTIMATES
 PER PIECE. AVERAGED OVER
 3 ADJACENT FREQUENCY BANDS

N

0. 80.

KILOMETERS

3395D1H

52 M

70- VI -29 TO 70-VIII-18

339501H
52 M

Data Number: 3396

Instrument No.: M-177

Type: Magnetic tape current meter

Depth: 72 m

Water depth: 2682 m

Start time: 70-VI-28 06.30.57

Stop time: 70-VIII-18 03.15.57

Duration: 50 days, 20 hours, 45 minutes

Sampling scheme: Interval

Time between strobes = 5.27 seconds

No. of strobes per interval = 24

Interval time = 900 seconds

COMMENTS:

STATS

DATA/ 33960900

MEAN	=	EAST	NORTH	SPEED	* *****	EAST & NORTH	*****
STD. ERR.	=	-93.02	7.60	136.16	* COVARIANCE	=	2.84
VARIANCE	=	1.37	1.14	1.02	* STD. ERR. OF COVARIANCE	=	133.66
STD. DEV.	=	8655.82	5988.34	4813.74	* STD. DEV. OF COVARIANCE	=	8073.08
KURTOSIS	=	93.04	77.38	68.38	* CORRELATION COEFFICIENT	=	.000
SKEWNESS	=	2.59	2.73	2.55	* VECTOR MEAN	=	93.33
		-.10	-.02	.40	* VECTOR VARIANCE	=	7322.08
					* STD. DEV.	=	85.57

UNITS OF RAW DATA VARIABLES = MM/SEC

SAMPLE SIZE = 4608 POINTS

SPANNING RANGE

FROM 70- VI -28 16.15.58
TO 70-VIII-15 16.00.58

AUTO SPECTRUM
 3396D900 EAST COMP
 3396D900 NORTH COMP
 72 METERS
 70-VI-28 TO 70-VIII-15
 2 PIECES WITH 1152 ESTIMATES
 PER PIECE, AVERAGED OVER
 3 ADJACENT FREQUENCY BANDS

N

0. 80.

KILOMETERS

3396D1H

72 M

70- VI -29 TO 70-VIII-18

3396D1H
72 H

Data Number: 3397

Instrument No.: M-206

Type: Magnetic tape current meter

Depth: 2545 m

Water depth: 2682 m

Start time: 70-VI-28 06.30.58

Stop time: 70-VIII-18 03.15.58

Duration: 50 days, 20 hours, 45 minutes

Sampling scheme: Interval

Time between strobes = 5.27 seconds

No. of strobes per interval = 24

Invertal time = 900 seconds

COMMENTS:

STATS

DATA/ 3397E900

MEAN	=	EAST	NORTH	SPEED	*****	EAST & NORTH	*****
STD. ERR.	=	-22.01	-1.35	78.18	=	COVARIANCE	= 876.01
VARIANCE	=	.69	1.02	.54	=	STD. ERR. OF COVARIANCE	= 48.06
STD. DEV.	=	2183.81	4751.29	1318.61	=	STD. DEV. OF COVARIANCE	= 3262.71
KURTOSIS	=	46.84	68.93	36.33	=	CORRELATION COEFFICIENT	= .271
SKEWNESS	=	3.32	2.66	3.39	=	VECTOR MEAN	= 22.05
		-.03	-.07	.96	=	VECTOR VARIANCE	= 3472.55
					=	STD. DEV.	= 58.93

UNITS OF RAW DATA VARIABLES = MM/SEC

SAMPLE SIZE = 4608 POINTS

SPANNING RANGE

FROM 70- VI -28 16.15.58
TO 70-VIII-15 16.00.58

AUTO SPECTRUM
 3397E900 EAST COMP
 3397E900 NORTH COMP
 2545 METERS
 70-VI-28 TO 70-VIII-15
 2 PIECES WITH 1152 ESTIMATES
 PER PIECE. AVERAGED OVER
 3 ADJACENT FREQUENCY BANDS

3397E1H
2545 M

Mooring No. 340

Set:

<u>39° 07.5'N</u>	<u>70</u>	<u>June</u>	<u>28</u>	<u>13</u>	<u>GMT</u>
Latitude	Year	Month	Day	Hour	

Retrieved:

<u>70° 35.2'W</u>	<u>70</u>	<u>Aug.</u>	<u>18</u>	<u>17</u>	<u>GMT</u>
Longitude	Year	Month	Day	Hour	

Set

by: R. Heinmiller Ship R.V. KNORR Cruise 5

MOORING:

Surface toroid with fin, 5/16" torque balanced wire with jacket and boots, 5/8" plaited nylon, 32 glass spheres for back-up recovery system (Berteaux, Heinmiller, 1969), 3/4" plaited nylon and 3000 pound anchor.

<u>Data</u> <u>Number</u>	<u>Instru-</u> <u>ment</u> <u>Number</u>	<u>Type</u>	<u>Depth</u> <u>Meters</u>	<u>Comments</u>
3401*	W-101X	MWR	Surface	
3402*	M-205	MCM	12 m	
3403*	M-248	MCM	32 m	
3404*	M-170	MCM	52 m	
3405	X-30	WVR	62 m	Chart drive failed
3406*	M-204	MCM	72 m.	
3407*	M-213	MCM	2620 m.	

PURPOSE OF MOORING:

Three mooring array (338, 339, 340) to gather wind, near-surface current and deep current measurements.

COMMENTS ON RESULTS:

Routine set. On recovery release mechanism did not work so mooring was hauled. Anchor had fouled on chain. There was mud on the top of the anchor.

Data Number: 3401

Instrument No.: W-101X

Type: Magnetic tape wind recorder

Depth: Surface

Water depth: 2754 m

Start time: 70-VI-28 16.15.57

Stop time: 70-VIII-18 13.30.58

Duration: 50 days, 21 hours, 15 minutes

Sampling scheme: Interval

Time between strobos = 5.27 seconds

No. of strobos per interval = 24

Interval time = 900 seconds

COMMENTS:

Units for wind are decimeters/sec (dm/s). Contrary to meteorological conventions the wind vectors indicate the direction towards which the wind blew.

STATS

DATA/ 3401W0900

	EAST	NORTH
MEAN	1.12	15.70
STD. ERR.	.55	.70
VARIANCE	1410.24	2801.21
STD. DEV.	37.55	52.93
KURTOSIS	3.69	2.40
SKEWNESS	-.12	-.39

SPEED	*****	EAST & NORTH	*****
60.20	=	COVARIANCE	= 522.81
.43	=	STD. ERR. OF COVARIANCE	= 20.38
834.91	=	STD. DEV. OF COVARIANCE	= 1827.14
20.89	=	CORRELATION COEFFICIENT	= .263
3.09	=	VECTOR MEAN	= 15.74
.39	=	VECTOR VARIANCE	= 2105.72
	=	STD. DEV.	= 45.89

UNITS OF RAW DATA VARIABLES = DM/SEC

SAMPLE SIZE = 4608 POINTS

SPANNING RANGE

FROM 70-VI-28 16.15.50
TO 70-VIII-15 16.00.50

AUTO SPECTRUM
 3401WD900 EAST COMP
 3401WD900 NORTH COMP
 WIND
 70-VI-28 TO 70-VIII-15
 2 PIECES WITH 1152 ESTIMATES
 PER PIECE. AVERAGED OVER
 3 ADJACENT FREQUENCY BANDS

0. 3000.
KILOMETERS

3401WD1H

WIND

70- VI -29 TO 70-VIII-18

3401WD1H

Data Number: 3402

Instrument No.: M-205

Type: Magnetic tape current meter

Depth: 12 m

Water depth: 2754 m

Start time: 70-VI-28 16.15.58

Stop time: 70-VIII-18 13.30.58

Duration: 50 days, 21 hours, 15 minutes

Sampling scheme: Interval

Time between strokes = 5.27 seconds

No. of strokes per interval = 24

Interval time = 900 seconds

COMMENTS:

On recovery the lower rotor bearing was found to be fouled by a length of fishing line. However, the rotor values show no evidence of sticking until 1900 hours on 16th August. At that time the rotor stalled for six hours, then picked up again, but with rather low mean and high scatter. Although the stalled portion of the record has been linearly interpolated, the last two days of data must be viewed with caution.

STATS

DATA/ 3402H900

	EAST	NORTH	SPEED	*****	EAST & NORTH	*****
MEAN	= -66.40	52.54	277.08	* COVARIANCE	=	2204.26
STD. ERR.	= 3.33	3.00	2.23	* STD. ERR. OF COVARIANCE	=	759.83
VARIANCE	= 51110.37	41459.76	22860.88	* STD. DEV. OF COVARIANCE	=	51505.82
STD. DEV.	= 226.08	203.62	151.53	* CORRELATION COEFFICIENT	=	.040
KURTOSIS	= 3.02	3.45	3.74	* VECTOR MEAN	=	84.67
SKEWNESS	= -.34	-.36	.03	* VECTOR VARIANCE	=	48205.07
				* STD. DEV.	=	215.14

UNITS OF RAW DATA VARIABLES = MM/SEC

SAMPLE SIZE = 4608 POINTS

SPANNING RANGE

FROM 70- VI -28 16.15.58
TO 70-VIII-15 16.00.58

AUTO SPECTRUM
 3402H900 EAST COMP
 3402H900 NORTH COMP
 12 METERS
 70-VI-28 TO 70-VIII-15
 2 PIECES WITH 1152 ESTIMATES
 PER PIECE. AVERAGED OVER
 3 ADJACENT FREQUENCY BANDS

3402H1H
12 M

Data Number: 3403

Instrument No.: M-248

Type: Magnetic tape current meter

Depth: 32 m

Water depth: 2754 m

Start time: 70-VI-28 16.15.57

Stop time: 70-VIII-18 13.30.57

Duration: 50 days, 21 hours, 15 minutes

Sampling scheme: Interval

Time between strobes = 5.27 seconds

No. of strobes per interval = 23

Interval time = 900 seconds

COMMENTS:

STATS

DATA/ 3403G900

	EAST	NORTH	SPEED	*****	EAST & NORTH	*****
MEAN	= -40.73	-41.00	152.52	= COVARIANCE	=	1247.05
STD. ERR.	= 1.82	1.60	1.24	= STD. ERR. OF COVARIANCE	=	218.43
VARIANC	= 15182.00	11783.37	7053.78	= STD. DEV. OF COVARIANCE	=	14895.13
STD. DEV.	= 123.26	108.55	83.99	= CORRELATION COEFFICIENT	=	.083
KURTOSIS	= 2.65	3.43	9.10	= VECTOR MEAN	=	57.80
SKEWNESS	= -.25	-.15	.69	= VECTOR VARIANCE	=	13487.68
				= STD. DEV.	=	116.14

UNITS OF RAW DATA VARIABLES = MM/SEC

SAMPLE SIZE = 4608 POINTS

SPANNING RANGE

FROM 70-VI-28 16.15.58

TO 70-VIII-15 16.00.58

AUTO SPECTRUM
 3403G900 EAST COMP
 3403G900 NORTH COMP
 32 METERS
 70-VI-28 TO 70-VIII-15
 2 PIECES WITH 1152 ESTIMATES
 PER PIECE. AVERAGED OVER
 3 ADJACENT FREQUENCY BANDS

Data Number: 3404

Instrument No.: M-170

Type: Magnetic tape current meter

Depth: 52 m

Water depth: 2754 m

Start time: 70-VI-28 16.15.57

Stop time: 70-VIII-18 13.30.57

Duration: 50 days, 21 hours, 15 minutes

Sampling scheme: Interval

Time between strobes = 5.27 seconds

No. of strobes per interval = 24

Interval time = 900 seconds

COMMENTS:

STATS

DATA/ 34040900

MEAN	=	EAST	NORTH	SPEED	=	*****	EAST & NORTH	*****
STD. ERR.	=	-60.62	-13.88	134.86	=	COVARIANCE	=	2150.13
VARIANCE	=	1.69	1.21	1.11	=	STD. ERR. OF COVARIANCE	=	151.46
STD. DEV.	=	13183.86	6787.10	5652.11	=	STD. DEV. OF COVARIANCE	=	10281.69
KURTOSIS	=	114.82	82.38	75.18	=	CORRELATION COEFFICIENT	=	.227
SKEWNESS	=	2.24	3.12	2.46	=	VECTOR MEAN	=	62.18
	=	-.14	-.47	.51	=	VECTOR VARIANCE	=	9985.48
					=	STD. DEV.	=	99.93

UNITS OF RAW DATA VARIABLES = MM/SEC

SAMPLE SIZE = 4608 POINTS

SPANNING RANGE

FROM 70- VI -28 16.15.58
TO 70-VIII-15 16.00.58

AUTO SPECTRUM
 3404D900 EAST COMP
 3404D900 NORTH COMP
 52 METERS
 70-VI-28 TO 70-VIII-15
 2 PIECES WITH 1152 ESTIMATES
 PER PIECE. AVERAGED OVER
 3 ADJACENT FREQUENCY BANDS

0 80

KILOMETERS

3404D1H

52 M

70- VI -29 TO 70-VIII-18

70-VI-29

70-VII-01

340401H
52 M

Data Number: 3406

Instrument No.: M-204

Type: Magnetic tape current meter

Depth: 72 m

Water depth: 2754 m

Start time: 70-VI-28 16.15.58

Stop time: 70-VIII-18 13.30.58

Duration: 50 days, 21 hours, 15 minutes

Sampling scheme: Interval

Time between strobes = 5.27 seconds

No. of strobes per interval = 24

Interval time = 900 seconds

COMMENTS:

7th and 8th bits of clock word malfunctioned, but clock values were corrected by adding suitable powers of 2 to the clock count. Timing accuracy is not affected.

STATS

DATA/ 3406E900

	EAST	NORTH	SPEED	EAST & NORTH	
MEAN	-63.73	-18.78	128.09	COVARIANCE	1593.37
STD. ERR.	1.67	1.07	1.13	STD. ERR. OF COVARIANCE	132.87
VARIANCE	12784.03	5324.19	5056.95	STD. DEV. OF COVARIANCE	9026.27
STD. DEV.	113.07	72.97	76.53	CORRELATION COEFFICIENT	.183
KURTOSIS	2.72	2.93	3.61	VECTOR MEAN	66.44
SKEWNESS	-.38	-.21	.09	VECTOR VARIANCE	9054.11
				STD. DEV.	95.15

UNITS OF RAW DATA VARIABLES = MM/SEC

SAMPLE SIZE = 4608 POINTS

SPANNING RANGE

FROM 70-VI-28 16.15.58
TO 70-VIII-15 16.00.58

AUTO SPECTRUM
 3406E900 EAST COMP
 3406E900 NORTH COMP
 72 METERS
 70-VI-28 TO 70-VIII-15
 2 PIECES WITH 1152 ESTIMATES
 PER PIECE. AVERAGED OVER
 3 ADJACENT FREQUENCY BANDS

3406E1H

72 M

70- VI -29 TO 70-VIII-18

3406E1H
72 M

Data Number: 3407

Instrument No.: M-213

Type: Magnetic tape current meter

Depth: 2620 m

Water depth: 2754 m

Start time: 70-VI-28 16.15.58

Stop time: 70-VIII-18 13.30.58

Duration: 50 days, 21 hours, 15 minutes

Sampling scheme: Interval

Time between strobes = 5.27 seconds

No. of strobes per interval = 24

Interval time = 900 seconds

COMMENTS:

STATS

DATA/ 3407H900

	EAST	NORTH	SPEED	*****	EAST & NORTH	*****
MEAN	= -10.40	-8.64	70.19	= COVARIANCE	=	-260.13
STD. ERR.	= .04	.66	.34	= STD. ERR. OF COVARIANCE	=	37.20
VARIANCE	= 3265.42	1802.54	524.50	= STD. DEV. OF COVARIANCE	=	2530.70
STD. DEV.	= 57.14	44.53	22.80	= CORRELATION COEFFICIENT	=	-.102
KURTOSIS	= 1.76	2.02	6.75	= VECTOR MEAN	=	14.24
SKEWNESS	= -.01	.09	1.24	= VECTOR VARIANCE	=	2623.90
				= STD. DEV.	=	51.22

UNITS OF RAW DATA VARIABLES = MM/SEC

SAMPLE SIZE = 4600 POINTS

SPANNING RANGE

FROM 70-VI-28 16.15.50
TO 70-VIII-15 16.00.50

AUTO SPECTRUM
 3407H900 EAST COMP
 3407H900 NORTH COMP
 2620 METERS
 70-VI-28 TO 70-VIII-15
 2 PIECES WITH 1152 ESTIMATES
 PER PIECE. AVERAGED OVER
 3 ADJACENT FREQUENCY BANDS

3407H1H
2620 M

Composite of PROVACS for moorings 338, 339, 340.

Composite of vectors
averaged over 24 hours
on moorings

° 338

340° ° 339

Depth 72 meters

0 50 km
0 25 cm/s

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