NATIONAL OCEANOGRAPHIC DATA CENTER

MANUAL SERIES

PROCESSING PHYSICAL AND CHEMICAL DATA FROM OCEANOGRAPHIC STATIONS

PART IA

CODING AND KEYPUNCHING ELECTRONICALLY
OBTAINED SERIAL DATA

(PROVISIONAL)

PUBLICATION M-2
(SUPPLEMENT - MAY 1966)

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FOREWORD

This publication is a supplement to the NODC publication M-2, Processing Physical and Chemical Data from Oceanographic Stations, Part I, Coding and Keypunching, and describes the provisional procedures developed by the National Oceanographic Data Center (NODC) for coding and cardpunching station data obtained with continuous measuring devices. It is hoped that originators of electronically obtained serial data will be encouraged to submit their data to the NODC on the interim coding form devised for this purpose.

W. C. JACOBS
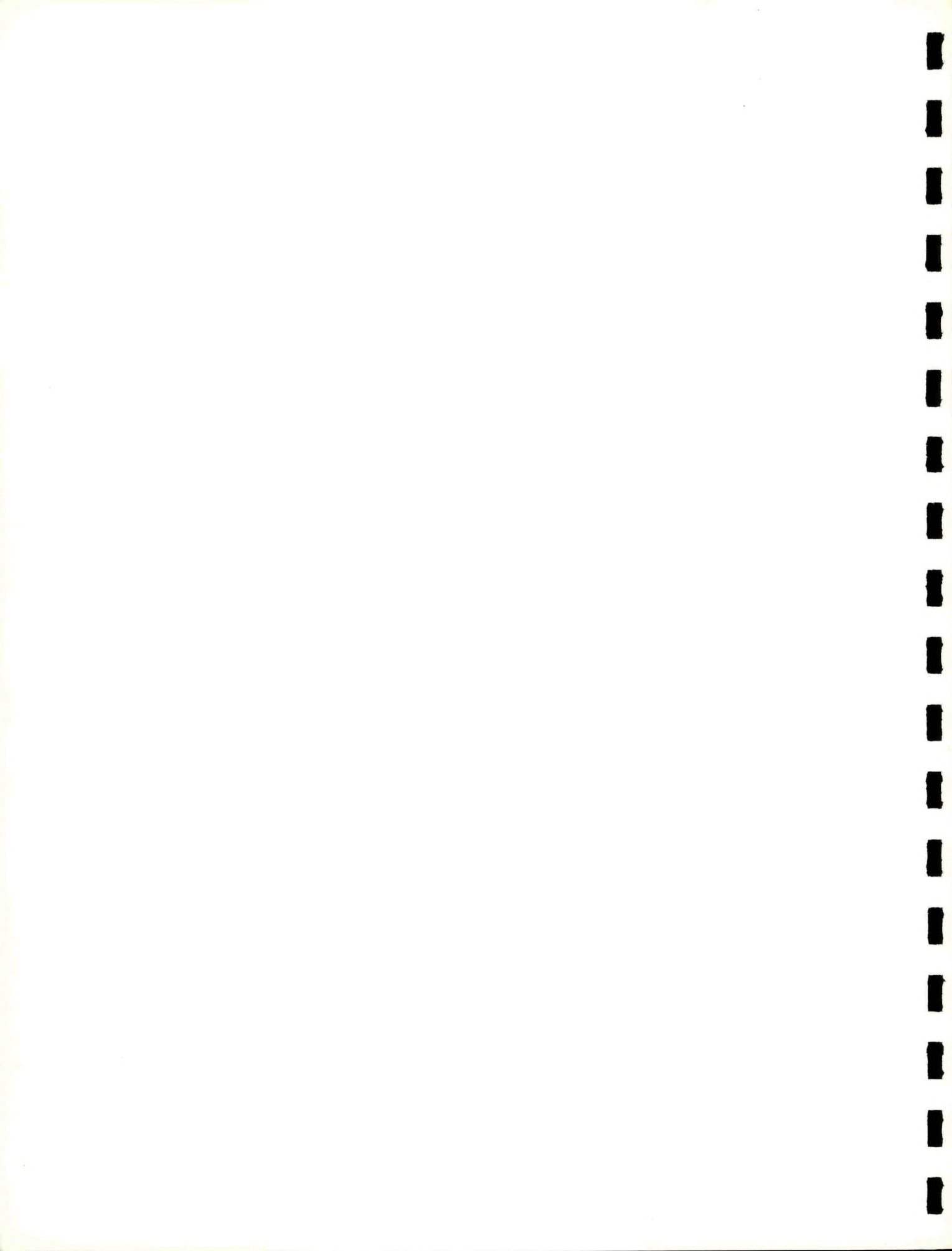Director
National Oceanographic Data Center

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INTRODUCTION

Over the past several years, a significant number of institutions have begun sampling oceanic areas by using continuous measuring devices which yield values of depth, temperature, salinity, and sound velocity. In addition, a program is now being developed by the U. S. Naval Oceanographic Office (NAVOCEANO) to measure ambient light on a continuous basis. The devices used in taking these types of measurements are generally referred to as STD (salinity, temperature, depth) systems. The letters STD, however, already are used in the NODC station data system to identify values at standard depths. In order to avoid confusion, the letters DTS will be used in this publication when referring to the continuous measuring instrumentation.

Although the use of DTS systems is at this time still in an experimental stage, the oceanographic community has already compiled several hundred stations by this means. Indications are that during the next year, several thousand such stations will be taken by both foreign and domestic institutions; within the next several years, the volume of observations made with DTS systems may reach tens of thousands.

The National Oceanographic Data Center (NODC) feels that for future output from these systems, considerable thought must be given to the possible implementation of computer techniques for data selection, processing, storage and retrieval, and data analysis. To meet the present and near future needs, the NODC has designed a form for reporting DTS data. It should be emphasized, however, that the form developed thus far is considered provisional and meets only the immediate needs of the oceanographic community.

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This publication presents the form used for reporting DTS data to the NODC and outlines the coding and cardpunching instructions associated with the form. As can be seen from Appendix I, the form is very similar to the standard "Physical and Chemical Data Form for Oceanographic Stations" associated with the NODC station data processing system. This similarity is intentional for the purpose of merging DTS data with the results of standard Nansen bottle casts when desired.

Appendix II is an example of a publication listing of DTS data. For expediency, the listing scheme currently used to list Nansen bottle data is used to list DTS data. As a result, the letters DTS and the values for ambient light and measured sound velocity do not appear as discrete blocks of type on the listing. Spaces originally intended to separate fields when listing Nansen bottle data occur between the T and S in DTS, between the unit and tenths position in ambient light, and between the hundred and tens position in measured sound velocity.

In answer to the question as to how much data from each station should be recorded, the NODC recommends that all standard depth values and significant flexure point values be reported (see page 3). In the event that data are not recorded for any of the standard depths listed in Table 1, these values will be interpolated using the same formulas currently used for Nansen cast data and will be based on the observed points immediately above and below the standard depth for which a value is required.

The NODC welcomes suggestions and comments concerning material in this publication as well as desired features of a DTS data storage and retrieval system.

GENERAL INFORMATION

This interim publication is issued as a supplement to the NODC publication M-2, Processing Physical and Chemical Data from Oceanographic Stations, Part I, Coding and Keypunching. The instructions pertain only to those data fields appearing in Appendix I, "Form for Reporting Electronically Obtained Serial Data," which do not appear on the "Physical and Chemical Form for Oceanographic Stations," NODC-EXP-3167/25(3-64). Publication M-2 should be referred to for coding and cardpunching data fields common to both formats.

When being lowered or raised, all DTS sensors of which the NODC has knowledge provide completely separate records. A comparison of these records normally reveals significant changes in the structure of the water column, even when the time interval between lowering and raising the sensor is small. For this reason, the NODC will process data from the down and up casts as separate stations, even though the position remains relatively unchanged. The meteorological data observed at the station need to be recorded only once, preferably with the data obtained when the sensor is lowered. Sufficient identification entries, such as location, date, time, station number, and cast, must be made on the form for reporting the data obtained when the sensor is raised.

For reporting the observed data from DTS systems on Appendix I, the NODC recommends that all values be reported for the standard depths given in Table 1. In addition, sufficient flexure point values should be included to adequately describe the vertical structure of the water column.

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INSTRUCTIONS FOR CODING THE MASTER CARD INFORMATION
(See Appendix I)

Columns 1-41

    Code according to instructions in NODC publication M-2, part I.

Columns 42-44   DTS INDICATOR

    No entry is required on the coding form.

Column 45   CAST

    The entry in this field indicates whether the data were taken while lowering (D) or raising (U) the DTS sensor. Cross out the letter that does not apply.

Columns 46-64

    Code according to instructions in NODC publication M-2, Part I.

Columns 65-66   INSTRUMENT

    Enter the identifying code of the instrument package or device used according to Table 2. If Table 2 does not include this information, record the complete name of the instrument in the Remarks space of the coding form.

Columns 67-80

    Code according to instructions in NODC publication M-2, part I.

INSTRUCTIONS FOR CODING THE DETAIL CARD INFORMATION

Columns 1-24 are omitted from the coding form. The entries for these columns on the Detail Card are identical in those of the Master Card.

Columns 25-27   CAST TIME AND DURATION OF CAST

Data collected when lowering and raising the sensor are processed at the NODC as separate stations. See General Information, page 3.

CAST TIME

Enter hours and tenths of hours in GMT to show the beginning time of lowering or raising the sensor.

DURATION OF CAST

Enter in hours and tenths of hours the time interval required to lower or raise the sensor.

Columns 28-32   DEPTH OF SAMPLE

Enter depth of sample in meters in Columns 28-31. (When sample depths are greater than 9999 meters, enter the extra digit in Column 28.) Column 32 may be used to enter tenths of a meter or to enter a question mark for doubtful depths.

Columns 33-42

Code according to instructions in NODC publication M-2, part I.

Columns 43-49 do not appear on the coding form. On the punch card, these columns are reserved for computed sigma-t (σt) and computed sound velocity (V_f).

Columns 51-53

Code according to instructions in NODC publication M-2, part I.

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<u>Columns 54-58</u>   AMBIENT LIGHT

Enter ambient light in lumens and tenths of lumens. If measured in whole lumens, leave Column 58 blank.

<u>Columns 59-66</u>

No entries required.

<u>Columns 67-71</u>   SOUND VELOCITY

Enter measured sound velocity in meters and tenths of meters per second. Enter thousands, hundreds, tens, units, and tenths digits.

Columns 72-79 are omitted from the data form. The entries in these columns of the Detail Card are identical to the entries in the Master Card; the information must be reproduced in each Detail Card from the Master Card.

<u>Column 80</u>   CARD TYPE

No entry is required on the coding form.

INSTRUCTIONS FOR CARDPUNCHING DTS DATA

The form for reporting electronically obtained serial data is arranged in such a manner that most entries can be punched directly into the corresponding columns of the punch card.

The following card punching instructions are only for those fields of the "Form for Reporting Electronically Obtained Serial Data" which are not covered in the NODC publication M-2, part I; for further instructions, refer to that publication.

MASTER CARD

Entry on Data Form	Entry on Punch Card
Letters DTS in Columns 42, 43, and 44.	Letters DTS punched in Columns 42, 43, and 44.
Letter U crossed out in Column 45.	Letter D punched in Column 45.
Letter D crossed out in Column 45.	Letter U punched in Column 45.

DETAIL CARD

Entry on Data Form	Entry on Punch Card
"Cast Time" in Columns 25-27 at first (zero meter) depth level.	Punch digits as entered in first Detail Card in Columns 25-27.
"Duration of Cast" in Columns 25-27 at third depth level.	Punch digits as entered in third Detail Card in Columns 25-27.
Digits entered under "Ambient Light," Columns 54-58.	Punch digits as entered in Columns 54-58.
Digits entered under "Sound Velocity," Columns 67-71.	Punch digits as entered in Columns 67-71.
Numeral 3 entered in Column 80.	Punch as entered in Column 80.

TABLE 1

List of Standard Depths (Meters)

0000	0125	0600	1300	4000
0010	0150	0700	1400	5000
0020	0200	0800	1500	6000
0030	0250	0900	1750	7000
0050	0300	1000	2000	8000
0075	0400	1100	2500	9000
0100	0500	1200	3000	

TABLE 2

Instrument Code

Name of Instrument	Code
NAVOCEANO Shipboard Oceanographic Survey System (Texas Instruments, Inc.)	01
NAVOCEANO Shipboard Oceanographic Synoptic System (Bissett-Berman Corporation)	02
Model 9006 Hytech Instrument (Bissett-Berman Corporation) . . .	03
Hytech Multisampler Instrument (Bissett-Berman Corporation) . .	04
NAVOCEANO AGOR Oceanographic Digital Data System (AGODDS) . . .	05
Other (describe fully in Remarks space of coding form)	09

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APPENDIX I
FORM FOR REPORTING ELECTRONICALLY OBTAINED SERIAL DATA
(PROVISIONAL)
NATIONAL OCEANOGRAPHIC DATA CENTER
WASHINGTON, D. C. 20390

NODC-EXP-3167/40 (4-66)

SURFACE ENVIRONMENTAL INFORMATION   (MASTER CARD)

COUNTRY		SHIP			LATITUDE S=X8				N S	LONGITUDE E=X14					E W	MARSDEN SQUARE			DATE						TIME GMT			ORIGINATOR'S CRUISE NO.			ORIGINATOR'S STATION NO.			DEPTH TO BOTTOM (M)				MAX. SAMPLE
																			YEAR		MONTH		DAY	HR	1/10												
COL. 1	2	3	4	5	6	7	8	9	N S	10	11	12	13	14	15	E W	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34 35 36 37	38	39

(latitude: ' 1/10; longitude: ' 1/10)

NO. OBS. LEVELS		TYPE OF DATA		CAST	WAVE DIR.		H A	P	WIND DIR.		SPEED FORCE	BAR. (MBS)			AIR TEMPERATURE °C DRY B			WET B			WEATHER WW OR W		INSTRUMENT	VIS.	SPECIAL OBS.			PROCESSING NOS. REF. ID. NO.			CONSEC. NO.			C T
COL. 40	41	42	43	44	45	46	47	48	49	50	51	52 53	54	55	56	57	58	59	60	61	62	63	64	65	66 67	68	69 70 71	72	73 74	75	76 77 78	79	80
		D	T	S	U/D																													1

(SUBSURFACE OBSERVATIONS—(DETAIL CARDS))

CAST TIME HR.		1/10	DEPTH (M)					TEMP °C					SAL %₀			O₂			AMBIENT LIGHT								SOUND VELOCITY (M/S)					C T
COL. 25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40 41 42	51	52	53	54	55	56	57	58	59	60 61 62 63 64 65 66	67	68	69	70	71	80
																															3
DURATION																															3
																															3

(remaining rows each end with "3" in CT column)

IF MORE THAN 3 DIGITS, USE SPECIAL OBS. FIELD

COUNTRY

INSTITUTE

VESSEL

CRUISE OR PROJECT NO.

REMARKS

SPECIFY OPTIONAL ITEMS OR SPECIAL CODES

GENERAL REMARKS

REFERENCE		SHIP CODE	LATITUDE ° '1/10	LONGITUDE ° '1/10	DRIFT INDICATOR	MARSDEN SQUARE		STATION TIME (GMT)			YEAR	ORIGINATOR'S		DEPTH TO BOTTOM	MAX. DEPTH OF SAMPLES	WAVE OBSERVATIONS				WEATHER CODE	INSTR. CODE			NODC STATION NUMBER
COUNTRY CODE	IDENTITY NUMBER					10°	1°	MONTH	DAY	HR. 1/10		CRUISE NUMBER	STATION NUMBER			DIR.	HGT.	PER.	SEA AMT.					
31	000	GI	5235 N	01904 W		182	29	07	23	210	1965	002	065		06	35	1	1		X1	0	2			0001

DT	S U/D		WIND		BAROMETER (mbs)	AIR TEMP. °C		VIS. CODE	NO. OBS. LEVELS	SPECIAL OBSERVATIONS
		DIR.	SPEED OR FORCE			DRY BULB	WET BULB			
DT	SD	35	S04		064	128	106	9	25	

CAST TIME HR. 1/10	CARD TYPE	DEPTH (m)	T °C	S %o	SIGMA—T	SPECIFIC VOLUME ANOMALY—X10^7	Σ Δ D DYN. M X10^3	COMPUTED SOUND VELOCITY M/SEC	O$_2$ ml/l	AMBIENT LIGHT			MEASURED SOUND VELOCITY M/SEC
	STD	0000	1484	3543	2636	0016776	0000	15074					
210	OBS	0003	1484	3543	2636			15075		201	0		15 077
	STD	0010	1464	3542	2639	0016479	0017	15069					
	OBS	0015	1452	3541	2641			15066		112	5		15 070
	STD	0020	1443	3542	2644	0016062	0033	15064					
DURATION HR. 1/10	STD	0030	1425	3543	2648	0015651	0049	15060					
015	OBS	0030	1425	3543	2648			15060		087	3		15 065
	OBS	0045	1292	3545	2678			15019		035	0		15 023
	STD	0050	1287	3547	2680	0012692	0077	15018					
	OBS	0060	1264	3550	2687			15013		022	5		15 017
	STD	0075	1198	3554	2703	0010576	0106	14993					
	OBS	0075	1198	3554	2703			14993		007	6		14 997
	OBS	0090	1178	3556	2708			14989		004	9		
	STD	0100	1169	3556	2710	0009963	0132	14987					
	OBS	0110	1161	3556	2712			14986		003	8		14 991
	STD	0125	1153	3555	2712	0009810	0157	14986					
	OBS	0140	1144	3554	2713			14985		001	9		14 986
	STD	0150	1137	3554	2715	0009658	0181	14984					
	OBS	0170	1121	3552	2716			14982					14 983
	STD	0200	1093	3546	2716	0009587	0229	14976					
	OBS	0200	1093	3546	2716			14976					14 980
	OBS	0230	1092	3548	2718			14981					14 985
	STD	0250	1087	3547	2718	0009527	0277	14982					
	OBS	0260	1084	3546	2718			14983					14 983
	OBS	0290	1071	3545	2720			14983					14 985
	STD	0300	1064	3544	2720	0009461	0324	14982					
	OBS	0320	1052	3543	2722			14981					14 986
	OBS	0350	1036	3541	2723			14980					14 983
	OBS	0380	1023	3540	2724			14980					14 982
	STD	0400	1019	3540	2725	0009202	0418	14982					
	OBS	0410	1013	3540	2726			14981					14 983
	OBS	0440	0979	3536	2729			14973					14 976
	OBS	0470	0950	3533	2731			14967					14 973
	STD	0500	0921	3531	2735	0008426	0506	14961					
	OBS	0510	0912	3530	2735			14959					14 966
	OBS	0530	0895	3527	2736			14956					14 962
	OBS	0560	0876	3526	2738			14954					14 960
	OBS	0590	0838	3522	2741			14944					14 958
	STD	0600	0841	3522	2740	0007990	0588	14946					
	OBS	0600	0841	3522	2740			14946					14 951

1. Oceanography - data processing

1. Title: Processing Physical and
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