Unique No.: 216975 9200158 Date of Entry: 10/23/92

DATA ENTRY INFORMATION SYSTEM
(DATASET INVENTORY - DINDB)

Accession No.: 9200158 Reference No.: TW3782
Former Accession No.: Former Reference No.: (Resub ONLY)

Media-In (DINDB): 09 - Digital Magnetic Tape

Exchange Format: E018 - STD/CTD (F022)

Processing Format: F022 - CTD/STD

* Note * If data is F022, create an additional record for C022.

Country/Institute Code: 31B7 Country/Platform Code: 314U

Platform Type (DINDB): 09 - Ship Orig. Cruise ID:

Cruise Start Date: 08/02/90 Project Code:

Cruise End Date: 08/20/90 Data Use Code (DUC): 3

Number of Stations: 68 Number of Records: 12,971

If stations/records not appropriate then:

Number: Units:

Ocean Area:

Code 1: 5 Meaning: Greenland Sea
Code 2: Meaning:
Code 3: Meaning:

DINDB Transaction Date:

ACCESSION NO. 9200158 FILETYPE F022 TRACK NO. _____ PROJECT IDENTIFICATION _____

TW3782

USN PGS

STEP	DATE	INIT.	TAPE OR DISK DSN	NO. FILES	LRECL	BLK SIZE	NO. RECORDS
ORIG. TAPE	7-14-92	FJM	D00911 (A01589)	~~88~~	74	2960	64,646
DUPLICATE ~~TAPE~~ CARTRIDGE	9-3-92	↓	W55793	↓	↓	↓	↓
REFORMATTED TAPE	10-13-92	RRS	W67972 *	1	120	12000	12,97
REFORMATTED DISK							
FIRST MULCHEK							
FINAL MULCHEK							
MPD75 OR F022							
DATA SET FINALIZED							

ERRORS REPORTED TO PRINCIPAL INVESTIGATOR:

ADDITIONAL ERRORS/CORRECTIONS (NOT REPORTED TO P.I.)

COMMENTS (TRACKS DELETED, FIELDS DELETED, ETC.)

D00911

ACH 9200158
A#1589

DEPARTMENT OF OCEANOGRAPHY
NAVAL POSTGRADUATE SCHOOL
833 Dyer Road, Room 331
Monterey, CA 93943
14 July, 1992

Chief, Data Acquisition and Management Branch
National Oceanographic Data Center
NOAA
Washington, DC 20235

9200158

Dear Sirs:

I am enclosing our data tape ARC903 containing oceanographic data taken with a Mark III NBIS CTD in the southern half of the Greenland Sea in summer 1990 on USNS BARTLETT. 3144

The characteristics of the tape are as follows:

> EBCDIC, 9-track, odd parity, 6250 bpi; record format: fixed block, logical record length 74, block length 2960 bytes. Twenty files have logical record length 20 and block length 800 (for details, see below). The tape is unlabelled, each lowering is in a separate file.

There were 45 stations, 21 of which were deep stations extending to near bottom. The deep casts of these deep stations (from 1000 dbar down) are in separate files. The station numbers on deep stations have an appended "S" for the shallow cast and "D" for the deep cast. Generally, the shallow casts are block-averaged to center on pressures spaced one dbar apart, except near the bottom and top of the cast where the topmost and bottommost data are retained. The deep casts are block-averaged to two-decibar spacings. Appended to the regular data is one station, 999N, which we used as a test. It has been calibrated as the rest of the data but given no scrutiny. Also appended are 20 files of deep station data block-averaged to 50 decibar spacings which we used in some studies of the deep water requiring high resolution. Such data are of interest to a small group doing deep-water studies. These latter stations are written with logical record length of 20 and block size of 800.

Attached is an excerpt from a manuscript submitted to the Journal of Geophysical Research (Oceans) that describes calibration procedures. The excerpt also deals with 1989 Greenland Sea data which has been sent to you in a separate package. A particular interest in the description of 1990 data is the discovery of a +0.005 to 0.007 psu error in the calibration of a down-going CTD by means of bottles tripped on the up traverse of the instrument. To what extent this error affects other Mark III CTD's we do not know. The correction was applied to our 1990 data. Our estimate of accuracy for the 1990 CTD data is ±0.0015°C and ±0.002 psu.

Attached also is a sample of data from the tape and a data interpretation.

Sincerely,

Robert H. Bourke

Robert H. Bourke
Professor of Oceanography

by Robert G. Paquette

Enclosures: 1. Data tape.
2. Excerpt from recently submitted manuscript:
DATA ACQUISITION AND ACCURACY.
3. Data sample and data description.

Excerpt from a manuscript submitted to J. Geophys. Res., 1992: R. H. Bourke, R. G. Paquette, R. F. Blythe and M. D. Stone, The deep and bottom waters of the Greenland Sea from 1989 and 1990 data.

DATA ACQUISITION AND ACCURACY

Measurements were made with a Neil Brown Instrument Systems Mark III conductivity-temperature-depth recorder (CTD) lowered at the rate of 1 m s^{-1} and recording 8616 records per lowering. Salinity control was by means of a rosette sampler collecting about 12 samples per lowering. The measurements down to 1000 m were done in a separate lowering from those from 1000 m to near bottom. In 1989 the salinities were determined aboard ship by a technician from the Calibration Laboratory of Scripps Institution of Oceanography (SIO). In 1990 they were determined by our laboratory on samples stored in bottles. Calibrations of temperature and pressure were done before and after the cruises at SIO in 1989 and in our laboratory in 1990. After all possible refinement of the 1990 calibrations, it was found that the salinities were still 0.007 psu high with respect to the high-quality deep-water bottle samples of HÅKON MOSBY 1989 at the intercalibration site. A -0.007 psu correction was applied without at first understanding its cause. More on this topic is presented below.

The data were initially block-averaged to one-meter spacings on the shallow lowering (8.6 times condensation) and to two-meter spacings on the deep lowerings (3.4 to 7 times condensation). For purposes of the present paper, the data from the deep lowerings were further block-averaged to 50-m spacings, giving an over-all condensation of 85 to 175 times. Various non-idealities in the calibration procedures caused us to use only the deep bottle data in 1989. In 1990 the twice-averaged CTD results were more accurate than individual bottle salinities and they were used instead. Our estimated accuracies are as follows: 1989 salinities, ±0.0015 psu; 1990 salinities, ±0.002 psu if the CTD is stable, as it seems to be. The temperature accuracy in both years was about ±0.0015°C. The internal consistency of the results is better than the accuracy, so much so that we considered it justifiable to carry the fourth decimal place in salinity and σ_2 for some purposes.

In the pressure accuracy lies the cause for the +0.007 psu salinity error mentioned above. The cause is in the hysteresis of the pressure sensor. The pressure reading on the CTD, set at zero at the surface on the down traverse, consistently read close to +9.2 dbar when coming through the air-water interface on the up traverse, implying a first-order pressure lag constant of 9.2 sec at a 1 dbar sec^{-1} hauling rate. Due to the pressure terms in the conductivity-to-salinity conversion, there is a pressure dependency under Greenland Sea conditions of -0.0005 psu $dbar^{-1}$. Consequently, when the CTD is going down, the pressure is reading 9.2 dbar low and the salinity 0.0046 psu high.

Comparison with the bottle samples is done on the up traverse where the pressure is too high and the salinity too low. However, the error is then smaller than -0.0046 psu because at a bottle-

tripping depth the CTD has been stopped and part of the error dissipates. The error may be expected not to dissipate so fast as the first-order response equation indicates because all real spring materials (except possibly quartz) fail to strictly follow a first-order curve. We have observed the retention of the previous pressure history of the pressure sensor during routine pressure calibrations in our laboratory. Calibrations done on a rising pressure are, on the average, about 3 dbar lower than those measured on a falling pressure. Because the period during which the pressure has been maintained static or near-static during calibration is of the order of one minute, which is comparable to the static period during bottle tripping, we estimate the pressure error during bottle tripping to be +1.5 dbar and the salinity error -0.0008 psu. Thus the total error of the down-going salinities with respect to the bottle salinities is +0.0046 + 0.0008 = +0.0054 psu, sufficiently close to our empirically determined correction.

FILE: STOOOD 90DATA A1

```
    71005N003580E 900803201   000D   3129000010  11.1 8.9                992
1021.0 0.16834.9081466.5328.0225         29.56714 0.12028.025   8.235 0.000
1022.0 0.16334.9061466.5328.0212         29.56183 0.11528.024   8.342 0.000
1024.0 0.15334.9061466.5128.0221         29.55455 0.10628.025   8.236 0.000
1026.0 0.14034.9041466.4928.0215         29.54330 0.09328.024   8.253 0.000
 ..............
 ..............
2996.1-0.87634.9081495.0328.0742         29.47682-1.04028.081  -3.949-0.012
2998.0-0.87634.9081495.0628.0739         29.47751-1.04028.081  -3.923-0.012
2999.5-0.87534.9091495.0928.0743         29.47870-1.04028.081  -3.966-0.012
3000.0-0.87534.9091495.1028.0744         29.47896-1.04028.081  -3.975-0.012
```

CODING AS FOLLOWS:

HEADING:

COLUMNS	DESCRIPTION
5-6	LATITUDE, DEGREES
7-9	LATITUDE, MINUTES AND TENTHS, FORMAT F3.1. N HEMISPHERE ABSENT.
10	LATITUDE HEMISPHERE, ONE CHARACTER, E OR W
11-13	LONGITUDE, DEGREES
14-14	LONGITUDE, MINUTES AND TENTHS, FORMAT F3.1
17	LONGITUDE HEMISPHERE: E OR W.
19-20	YEAR, 2-DIGIT NUMERAL
21-22	MONTH, 2-DIGIT NUMERAL
23-24	DAY, 2-DIGIT NUMERAL
25-27	TIME AT START OF STATION, GMT, HOURS AND TENTHS
31-36	STATION NUMBER, NUMERALS AND ALPHABETICS
38-41	BOTTOM DEPTH, M, BY ECHO SOUNDER.
42-44	WIND SOURCE DIRECTION, DEGREES TRUE, 3 NUMERALS
45-47	WIND SPEED, KNOTS, 3 DIGITS
50-53	AIR TEMPERATURE, DEGREES C. AND TENTHS, DECIMAL POINT IN FIELD
54-57	DEW POINT, DEGREES C AND TENTHS, DECIMAL POINT IN FIELD
71-74	NUMBER OF RECORDS, 4 NUMERALS

NUMERICAL DATA, WRITTEN WITH DECIMAL POINT IN THE FIELD:
(SHALLOW STATIONS HAVE TYPICAL 1 M SPACING EXCEPT AT BEGINNING AND END;
DEEPER THAN 1000 M, THE SPACING IS 2 M)

1-6	PRESSURE IN DECIBARS
7-12	TEMPERATURE DEGREES C TO THOUSANDTHS
13-18	SALINITY, PSU TO THOUSANDTHS
19-25	SOUND SPEED, METERS/SEC TO HUNDREDTHS
26-32	SIGMA-T, KG/M**3
41-48	ELECTRICAL CONDUCTIVITY, DECI-SIEMENS/M
49-54	THETA, DEGREES C.
55-60	SIGMA-THETA, KG/M**3
61-68	SPECIFIC VOLUME ANOMALY X 1.E8, M**3/KG
69-74	DYNAMIC DEPTH, DYNAMIC M (1 DYN M=10.0 JOULES/KG) REFERENCED TO ZERO DEPTH BY EXTRAPOLATION ON SHALLOW CASTS; REFERENCED TO TOP OF CAST ON DEEP CASTS.

```
    1       @RUN,N/R D3782C,EG12008N3AV1,DNODC,040/,199
    2       @SYM PRINT$,1,PR5
    3       @X$*COVER.COVER BIN-09,CH3782,LST
    4       @PRT,S DNODC*CLIFT.022CHECK2
    5       @ASG,T PRINT-OUT.
    6       @XQT  DNODC*ABS$.GET-SYS
    7       F022
    8       M201600         89
    9       M2023000        179
   10       M204670         94
   11       N301600000      60000
   12       N302610000      37500
   13       N304610000      37500
   14       N306610000      37500
   15       N308610000      37500
   16       N310610000      37500
   17       N602610000      37500
   18       N604610000      37500
   19       N606610000      37500
   20       N608610000      37500
   21       N610610000      37500
   22       N802610000      37500
   23       N804610000      37500
   24       N806610000      37500
   25       N808610000      37500
   26       N810610000      37500
   27       @EOF
   28       @ASG,A DNODC*NUMCODEISAM.
   29       @USE  ISAM,DNODC*NUMCODEISAM.
   30       @DFP,E DNODC*MPD75.TW3782/F022,TPF$.IN
   31       FILE=/PAR
   32       @END
   33       @USE SYSIN,PRINT-OUT.
   34       @ASG,T  SORTIN.,F///6000
   35       @XQT  DNODC*ABS$.MULCHEK
   36       @FREE ISAM.
   37       @ASG,A  DNODC*TAXISAM.
   38       @USE ISAM,DNODC*TAXISAM.
   39       @ASG,T  SORTOUT.,F///8000
   40       @XQT  DNODC*ABS$.STATAX
   41       @FREE ISAM.
@ASG,T PRINT-OUT.
@XQT  DNODC*ABS$.GET-SYS
F022
M201600         89
M2023000        179
M204670         94
N301600000      60000
N302610000      37500
N304610000      37500
N306610000      37500
N308610000      37500
N310610000      37500
N602610000      37500
N604610000      37500
N606610000      37500
N608610000      37500
N610610000      37500
N802610000      37500
N804610000      37500
```

```
Password:
 accNo   fleA refNo  proj inst ship    startDate  cruise   catId
 ------- ---- ------ ---- ---- ------- ---------- -------- ----------
 9200158 F022 TW3782 9999 31B7 314U    1990/08/02 NULL          207788
 9200158 C022 310073 9999 31B7 314U    1990/08/02 TW3782        207787

(2 rows affected)
```

```
Password:
 accNo   fleA refNo  ship staCnt recCnt startDate  endDate
 ------- ---- ------ ---- ------ ------ ---------- ----------
 9200158 F022 TW3782 314U 68     12970  90/08/02   90/08/20
 9200158 C022 310073 314U 68     114    90/08/02   90/08/20

(2 rows affected)
```