National Oceanographic Data Center • Informal Report No. 13

WORLD OCEAN ATLAS 1994
CD-ROM Data Set Documentation

National Oceanographic Data Center
Ocean Climate Laboratory

Washington, D.C.
November 1994

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Environmental Satellite, Data, and Information Service

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National Oceanographic Data Center
User Services Branch
NOAA/NESDIS E/OC21
Washington, DC 20235

Telephone: (202) 606-4549

Fax: (202) 606-4586

E-mail: services@nodc.noaa.gov

Mosaic Home Page: http://www.nodc.noaa.gov/

Gopher server: gopher.nodc.noaa.gov

Comments about the *World Ocean Atlas 1994* and associated CD-ROM data sets may be sent by e-mail to:

atlas94@nodc.noaa.gov

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U.S. DEPARTMENT OF COMMERCE
Ronald H. Brown, Secretary

National Oceanic and Atmospheric Administration
D. James Baker, Administrator

National Environmental Satellite, Data, and Information Service
Robert S. Winokur, Assistant Administrator

CONTENTS

1. INTRODUCTION

The Ocean Climate Laboratory (OCL) at the National Oceanographic Data Center (NODC) is supported by the NOAA Climate and Global Change program to produce scientifically quality controlled oceanographic databases. Work to date includes quality control of historical *in situ* temperature, salinity, oxygen, phosphate, nitrate, and silicate data and the preparation of one-degree latitude-longitude mean fields for each of these parameters using objective analysis techniques. Specifically, this project has produced four ocean atlases describing the global distributions of these parameters and two technical reports describing the quality control and processing procedures (see section 6 of this documentation for a listing of these publications).

Observed and standard level profile data (along with quality control flags) used in the production of these atlases are being made available to the international oceanographic community on the World Ocean Atlas 1994 CD-ROM series (referred to herein as WOA94). In addition, the CD-ROM series contains the objectively analyzed one-degree latitude-longitude mean fields for each of the measured parameters, and two derived parameters (Apparent Oxygen Utilization and oxygen saturation), and five-degree square statistics of standard level values.

Profile data on the CD-ROM series are recorded in ASCII format and sorted geographically, so they are easy to access and manipulate. The CD-ROMs are formatted in the ISO 9660 standard.

The Ocean Climate Laboratory expresses its thanks to all those who provided us with their comments and helped us develop an improved product.

2. DISC CONTENTS

A. DATA SOURCES

The data used in this project are all the data found in the NODC archives as of the first quarter of 1993. Levitus and Gelfeld (1992) show global distribution maps of the data held in these files for all years (1900-1992). In addition, data gathered as a result of the NODC's National Oceanographic Data Archaeology and Rescue (NODAR) and the IOC/IODE Global Oceanographic Data Archaeology and Rescue (GODAR) projects, not yet incorporated into the NODC master archives, were included in this study. A description of the NODAR and GODAR projects can be found in Levitus *et al.* (1994e). The NODAR and GODAR data sets are in separate files (since they have not yet been archived at the NODC).

Data on the CD-ROM series includes the following flagged data:

1. BOTTLE - NODC Station Data

Parameters: Station data profiles may have one or more of the following parameters:
Temperature (*in situ*)
Salinity
Oxygen
Phosphate
Silicate
Nitrate

Source: NODC Station Data

2. BOTTLE2 - Station Data not incorporated in the NODC archives as of the first quarter of 1993

Sources:
Alfred Wegner Institute for Polar Studies Southern Ocean data set
Australian station data (CSIRO)
China Sea station data (from POI, Russia)
Combined Mediterranean area station data
German station data
Icelandic station data
ICES (International Council for the Exploration of the Sea) station data
Indian NODC station data
Japanese station data (JODC)
Korean NODC station data
Miscellaneous ship of opportunity station data
Station Data from the Southtow cruise (Scripps Institution of Oceanography)

3. CTD - NODC CTD/STD (Conductivity/Salinity, Temperature, Depth probe)

Parameters: Temperature and/or salinity

Source: All data from NODC's low resolution CTD file (CTD profiles from the NODC Station Data file were transferred to this file)

4. CTD2 - CTD data not incorporated in the NODC archives as of the first quarter of 1993

Sources:
Russian Barents Sea CTD data
Eastern Arctic CTD data from the National Snow and Ice Data Center (CD-ROM)
CTD data from the Southtow cruise

5. MBT - NODC Mechanical Bathythermograph data

Parameter: Temperature

Source: NODC MBT file (Includes NODC MBT data from the NODC Selected Bathythermograph (SBT) data file that contains data at selected depths)

6. MBT2 - MBT data not incorporated in the NODC archives as of the first quarter of 1993

Sources:
Argentine MBT data
French Salinobathythermograph data
Japanese Fisheries MBT data
Canadian (MEDS) MBT data
Miscellaneous ship of opportunity MBT data
Russian MBT data
Declassified Russian Navy MBT data and Russian NODC MBT data
MBT data from Woods Hole Oceanographic Institution

7. XBT - NODC Expendable Bathythermograph data

Parameter: Temperature

Source: NODC XBT file. (Includes XBT data from NODC SBT (Selected Bathythermograph) file)

[NOTE: XBT standard level values were interpolated using observed level measurements corrected for a drop rate error for T4, T6, and T7 probes. T5 depths were not recalculated (any measurement at a depth greater than 725 m was assumed to be from a T5 probe).]

The drop rate correction applied was:

$$z_c = 6.733t - 0.00254t^2$$

where

z_c = the corrected depth

"t", the elapsed time since the instrument entered the ocean, is determined by:

$$t = 1498.14 - (2244447.430 - 462.963z_0)^{1/2}$$

where

z_0 = originally calculated depth (Szabados, personal communication).

8. XBT2 - XBT data not incorporated in the NODC archives as of the first quarter of 1993

Sources:
British XBT data
Real time GTSPP (Global Temperature-Salinity Pilot Project) XBT data
Delayed mode GTSPP XBT data
Canadian (MEDS) XBT data
Declassified US Navy XBT data

[NOTE: XBT standard level values were interpolated using observed level measurements corrected for a drop rate error for T4, T6, and T7 probes. T5 depths were not recalculated.]

9. DBT2 - Digital Bathythermograph data

Parameter: Temperature

Sources:
Canadian (MEDS) DBT data
Japanese DBT data

10. ISD - Station data from India (data set received too late to incorporate into BOTTLE2 file)

Parameters: Temperature and/or salinity

B. PARAMETER INFORMATION

Table 1 shows the units, precision, and number of profiles for each parameter.

Table 1. Precision and number of profiles for each parameter

Parameter	Unit	Maximum stored precision	# of Profiles
Temperature	°C	xx.xxx	4,553,426
Salinity	p.s.u.	xx.xxx	1,254,771
Oxygen	ml/l	xx.xx	367,635
Phosphate	micromolar	xx.xx	184,153
Silicate	micromolar	xxx.x	110,413
Nitrate	micromolar	xx.x	75,403

Each parameter is identified in the data by a numeric code. The parameters and their associated codes are listed in Table 2.

Table 2. Numeric codes associated with each parameter

Code	Parameter
0	Depth
1	Temperature (*in-situ*)
2	Salinity
3	Oxygen
4	Phosphate
6	Silicate
8	Nitrate

C. QUALITY CONTROL PROCEDURES

Observed level data were checked for quality prior to interpolation to standard levels. We call the actual measured value of an oceanographic parameter at some depth an "observed level" datum. The value interpolated to a standard level depth is referred to as a "standard level" datum.

For many analysis purposes, it is necessary to interpolate from observed level to standard depth levels. The standard depth analysis levels selected for this study are listed in Table 3 and include the 30 NODC standard depths and three additional levels at 3500, 4500, and 5500 meters. There are additional standard level depth data in some of the standard level profiles (i.e., 6000, 6500, 7000, 7500, 8000, 8500, 9000 meters, numbered 34 through 40).

Table 3. Standard levels and depths (in meters)

Level	Depth	Level	Depth
1	0	18	900
2	10	19	1000
3	20	20	1100
4	30	21	1200
5	50	22	1300
6	75	23	1400
7	100	24	1500
8	125	25	1750
9	150	26	2000
10	200	27	2500
11	250	28	3000
12	300	29	3500
13	400	30	4000
14	500	31	4500
15	600	32	5000
16	700	33	5500
17	800		

The quality of the observed and standard level data were checked using the following procedures:

At the NODC:

1. NODC Data Processing Branch checks - date/time fields (valid values, ship speed between stations). It also performs broad range checks, compares each station to an NODC T-S climatology, and checks for large density inversions.

At the NODC/Ocean Climate Laboratory:

2. Preliminary checks - checks for duplicate profiles, depth inversions;
3. Range check of the observed level data for each major basin as a function of depth;
   [Note: some temperature values reported in the XBT2 observed level file exceeded 999.999 and therefore were set to the missing value -99.999. These values are flagged with a 1 (failed range check).]
4. Large temperature inversion and gradient checks;
5. Density inversion check on the standard level data;
6. XBT drop rate correction before interpolation of observed level to standard level data for T4, T6, and T7 probes;
7. Standard deviation check;
8. Check for unrealistic features after an initial computation of the objective analysis.

Data were flagged for each quality control check. A datum or profile flagged as an outlier was excluded from further checks. A description of the flags can be found in Appendix 1. The quality control procedures have been documented in two NOAA Technical Reports (Boyer and Levitus, 1994; Conkright *et al.*, 1994).

D. AVAILABLE OBJECTIVELY ANALYZED FIELDS

Table 4 lists the mean objectively analyzed fields for each parameter.

Table 4. Available objectively analyzed fields for each parameter

PARAMETER	ANNUAL*	SEASON**	MONTH***
Temperature	X	X	X
Salinity	X	X	X
Dissolved oxygen	X	X	
Apparent Oxygen Utilization	X	X	
Oxygen saturation	X	X	
Phosphate	X		
Nitrate	X		
Silicate	X		

*ANNUAL - composite of all data regardless of season or year
**SEASON - data composite based on seasons following the Northern Hemisphere convention. The seasons are defined as:
Winter (January - March)
Spring (April - June)
Summer (July - September)
Fall (October - December)
*** MONTH - data composite for each month. January through December analysis for 19 depth levels only (0-1000 m)

For all the files in Table 4, there are accompanying mask files. The mask file contains the number of grid points which contain data within the radius of influence surrounding each grid box. If a grid box contains three or fewer observations within its radius of influence, the mask value for that one-degree square will be zero. This file is used in plotting routines to "mask" or cover up areas with three or less observations (see maps in the World Ocean Atlases for fields plotted using these masks).

3. CD-ROM DIRECTORY STRUCTURE

There are nine CD-ROMs in the initial WOA94 CD-ROM series. A tenth CD-ROM is planned for future release.
(1) WOA94-01 contains the objectively analyzed one-degree latitude-longitude mean fields for temperature;
(2) WOA94-02 contains the mean salinity fields plus five-degree square statistics of standard levels values for all parameters;
(3) WOA94-03 contains the mean fields for oxygen, Apparent Oxygen Utilization, oxygen saturation, phosphate, silicate and nitrate.

Observed and standard level profile data (along with quality control flags) used in the production of these atlases are in WOA94-04 through WOA94-09. WOA94-10 contains objectively analyzed fields of yearly upper ocean temperature anomalies. It will be released at a later date than WOA94 01-09, and will contain its own documentation.

A brief outline of the CD-ROM contents is presented below. A 3.5" diskette distributed with the CD-ROMs contains the following:

a. An ASCII (readme.txt) and a PostScript (readme.ps) version of this document. The ASCII version contains text only and the PostScript version contains both text and appendices.
b. A FORTRAN program analyzed.for; an example program which prints user designated segments of an analyzed field. The user is prompted for a file name, depth level, and latitude and longitude. The output to the screen is a ten by ten array of analyzed values where the middle value in the 10x10 array is at the requested latitude and

longitude grid point.

c. A FORTRAN program 5degree.for; reads the five-degree square statistics; the user is prompted for a file name, depth level, and latitude and longitude. The output to the screen is a ten by ten array of either mean, standard deviation or number of observations for the selected box where the middle value in the array is at the requested latitude and longitude grid point.
d. A FORTRAN program profile.for; reads the observed and standard level profile data and prints to screen the first 10 profiles in the selected data file. The user is prompted for a file name.
e. A file profile.d; sample output from profile.for, the first 10 profiles from the file \sind\3507\3507bot.ol in WOA94-04.
f. A C program profile.c; reads the observed and standard level profile data and prints to screen the first 10 profiles in the selected data file. The user is prompted for a file name.

A. WOA94-01 through WOA94-03

Appendices 2a, 2b and 2c show an outline of the directory structure of CD-ROMs WOA94-01, WOA94-02, and WOA94-03.

The ANALYZED subdirectory of WOA94-01 contains the objectively analyzed one-degree latitude-longitude annual, seasonal, and monthly mean fields for temperature.

WOA94-02 contains the subdirectory ANALYZED which includes the mean annual, seasonal, and monthly salinity fields. The 5DEGREE subdirectory contains the five-degree square statistics at standard level depths for all analyzed parameters. The statistics are number of observations, mean, and standard deviation.

WOA94-03 contains the mean fields of oxygen, oxygen saturation, Apparent Oxygen Utilization, phosphate, silicate and nitrate.

Appendix 3 lists all the files found on discs WOA94-01 through WOA94-03.

Table 5 shows the format used to store the analyzed fields.

Table 5. Format for the analyzed data

Each data point corresponds to a one degree latitude by one degree longitude grid box. There are ten analyzed data values per line

FIELD	STARTING COLUMN	LENGTH	FORMAT
Value	1	8	F8.4
Value	9	8	F8.4
Value	17	8	F8.4
.	.	.	.
.	.	.	.
.	.	.	.
Value	73	8	F8.4

Appendices 4 and 5 show the horizontal co-ordinate system used to store the data. The first value in the analyzed files corresponds to the geographic grid box originating at the south pole with longitudes from 0° to 1°E and latitudes from -90° to -89°S. The file then loops around longitude first and then latitude. The number of data values is 360x180. The five degree statistics follow the same pattern, listing 72x36 values. The data format is the same for the 5 degree statistics, as illustrated in Table 5, except for the files containing number of observations which have a format of F8.0 .

B. WOA94-04 through WOA94-07

CD-ROMs WOA94-04 through WOA94-07 contain the flagged observed level profile data. Table 6 describes the contents of each disc.

Table 6. Contents in WOA94-04 through WOA94-07

CD-ROM	OCEANIC REGION
WOA94-04	North Atlantic (0-40°N)
	North Indian
	South Indian
WOA94-05	North Atlantic (40°N-90°N)
	South Atlantic
WOA94-06	North Pacific (0°-30°N)
	South Pacific
WOA94-07	North Pacific (30°-90°N)

The data are organized by ten-degree latitude-longitude squares, which are identified using the World Meteorological Organization (WMO) ten-degree square numbering scheme (illustrated in Appendices 6a and 6b). Within each of the WMO subdirectories are ten files containing the NODC archived data BOTTLE, CTD, XBT, and MBT and the NODAR and GODAR data which are in separate files (since they have not yet been archived at the NODC) named BOTTLE2, CTD2, MBT2, XBT2, DBT2 and ISD. Profiles in each file are sorted by date. Appendices 7a and 7b show an example of the subdirectory structure of these discs.

WOA94-04 includes parts of the Mediterranean Sea (WMOs 7300, 1300, 1301, 1302 and 1303). WOA94-05 includes the rest of the Mediterranean (WMOs 1400, 1401, and 1402) as well as the Baltic Sea, North Sea, and the Arctic Ocean from 100°W to 100°E as part of the North Atlantic (40°N-90°N) data. The North Indian Ocean data in WOA94-04 includes the Red Sea and Persian Gulf. WOA94-07 includes the Arctic Ocean from 100°E-100°W as part of the North Pacific (30°-90°N) data.

WMOs 7007, 7008, 7108 and 7109 are duplicated in WOA94-04 and WOA94-07 since the North Atlantic and North Pacific Oceans overlap in these areas.
[Note: Some of the WMO files listed in the CD-ROMs contain no data since they correspond to land areas.]

A positive longitude in the data denotes the Eastern Hemisphere, a negative longitude denotes the Western Hemisphere, a positive latitude denotes North and a negative latitude South.

C. WOA94-08 and WOA94-09

WOA94-08 and WOA94-09 contain flagged standard level profile data; all the Atlantic and Indian Ocean data are in WOA94-08 and all the Pacific Ocean standard level data are found in WOA94-09. As with the observed level data, the data are organized by WMO square, and within each WMO square are ten files containing the data associated with each probe or instrument type used in this study. WMOs 7007, 7008, 7108 and 7109 are duplicated in WOA94-08 and WOA94-09 due to an overlap between the North Pacific and North Atlantic Oceans. Appendix 8 shows an example of the directory structure in WOA94-08 and WOA94-09.

4. FILE STRUCTURE/FORMAT

All observed and standard level data files are written as a series of 80 character length ASCII records. Programs to read the data and print out the first ten profiles are found on the diskette accompanying the CD-ROM data.

[Note that when transferring the C or FORTRAN programs from the diskette to a UNIX workstation, the programs need to be stripped of the "control M" (carriage return) character added by DOS. On a DEC workstation, use the utility "dos2ult"; otherwise use the translate command as follows:

tr -d "\015" <input >output

This command will convert from the DOS (CR/LF) to the UNIX end of line convention (LF).]

In each file, each physical record is 80 bytes long. The first 80 bytes represent the profile "header" and contain descriptive information about the profile. A detailed record layout for the header data can be found in Appendix 9 and a description of the layout of the data, in Appendix 10. The header includes the country code (see Appendix 11 for a listing of these codes), NODC cruise number, position, date-time, Ocean Climate Laboratory profile number, the number of observed or standard depth levels, an identifier for observed or standard level data, number of parameters, parameter codes, and a flag if all of a parameter's data in that profile fails a quality control check (see Appendix 1 for a description of the flags).

The file naming convention is redundant so that files downloaded from the CD-ROM to DOS or UNIX storage devices can be completely identified from their names. For example, a BOTTLE (Nansen cast) file will have a fully qualified name such as \NATLEQ40\5008\5008BOT.OL if observed level data and \NATLEQ40\5008\5008BOT.SL if standard level data for DOS devices.

5. SYSTEM REQUIREMENTS

The minimum hardware requirements for accessing data and information from the CD-ROMs are:

- CD-ROM reader capable of accessing a disc formatted with the ISO 9660 standard, and
- Microsoft MS-DOS Extensions for CD-ROM, Version 2.0 or higher for DOS machines.

6. REFERENCES ASSOCIATED WITH THE DATA

A. DOCUMENTATION DESCRIBING THE QUALITY CONTROL PROCEDURES:

(a) Boyer, T.P. and S. Levitus. 1994. Quality control and processing of historical temperature, salinity and oxygen data. NOAA Technical Report NESDIS 81. 65 pp.

(b) Conkright, M.E., T.P. Boyer and S. Levitus. 1994. Quality control and processing of historical nutrient data. NOAA Technical Report NESDIS 79. 75 pp.

B. DOCUMENTATION DESCRIBING THE ANALYSIS PROCEDURES AND THE DATA DISTRIBUTION AND ANALYSIS:

(a) Conkright, M.E., S. Levitus and T.P. Boyer. 1994. World Ocean Atlas 1994 Volume 1: Nutrients. NOAA Atlas NESDIS 1. 150 pp.

(b) Levitus S. and T.P. Boyer. 1994a. World Ocean Atlas 1994 Volume 2: Oxygen. NOAA Atlas NESDIS 2. 186 pp.

(c) Levitus S., R. Burgett and T.P. Boyer. 1994b. World Ocean Atlas 1994 Volume 3: Salinity. NOAA Atlas NESDIS 3. 99 pp.

(d) Levitus S. and T.P. Boyer. 1994c. World Ocean Atlas 1994 Volume 4: Temperature. NOAA Atlas NESDIS 4. 117 pp.

C. DOCUMENTATION DESCRIBING THE NON-ARCHIVED NODC DATA USED:

Levitus, S., R. Gelfeld, T. Boyer and D. Johnson. 1994e. Results of the NODC and IOC Oceanographic Data Archaeology and Rescue Projects. Key to Oceanographic Records Documentation No. 19, NODC, Washington, D.C.

D. DOCUMENTATION DESCRIBING THE NODC ARCHIVED DATA USED:

Levitus, S. and R. Gelfeld. 1992. NODC Inventory of Physical Oceanographic Profiles. Key to Oceanographic Records Documentation No. 18, NODC, Washington, D.C.

Appendix 1. Description of flags used in the quality check of observed and standard level data.

ERROR FLAGS

WHOLE-PROFILE FLAGS (AS A FUNCTION OF PARAMETER)

0 - accepted profile
1 - failed annual standard deviation check
2 - two or more density inversions (Levitus 1982 criteria)
3 - flagged cruise
4 - failed seasonal standard deviation check
5 - failed monthly standard deviation check
6 - failed annual and seasonal standard deviation check
7 - failed annual and monthly standard deviation check
8 - failed seasonal and monthly standard deviation check
9 - failed annual, seasonal, and monthly standard deviation check

FLAGS ON INDIVIDUAL DEPTHS AND OBSERVATIONS

Depth Flags:

0 - accepted value
1 - error in recorded depth (same or less than previous depth)
2 - temperature inversion of magnitude > 0.3 degrees/meter
3 - temperature gradient of magnitude > 0.7 degrees/meter
4 - temperature gradient (of > 0.7 degrees/meter) followed closely by a temperature inversion (of > 0.3 degrees/meter) or vice versa

Observed Level Flags:

0 - accepted value
1 - range outlier (outside of range check)
2 - density inversion
3 - failed range check and density inversion check

Standard Level Flags:

0 - accepted value
1 - bullseye marker
2 - density inversion
3 - failed annual standard deviation check
4 - failed seasonal standard deviation check
5 - failed monthly standard deviation check
6 - failed annual and seasonal standard deviation check
7 - failed annual and monthly standard deviation check
8 - failed seasonal and monthly standard deviation check
9 - failed annual, seasonal and monthly standard deviation check

EXPLANATION OF ERROR FLAGS

A. CHECK FOR DEPTH INVERSIONS AND DUPLICATE DEPTHS

Depth error flags:

(1) If the second of two successive depths is shallower than the first (a depth inversion), the second depth will be marked with a flag value = 1.

(2) If two successive depths are shallower than the first depth, every depth reading following the first will be marked with a flag value = 1.

(3) If two successive depth readings are equal, the second reading will be marked with a flag value = 1.

(4) All correct depths are marked with a flag value = 0.

B. STANDARD DEVIATION CHECK ON STANDARD LEVEL DATA

This check calculates the mean and standard deviation of five-degree square latitude-longitude boxes for annual (all parameters), seasonal (temperature, salinity, and oxygen), and monthly (temperature and salinity) periods.

Data are flagged if

(1) a value is five standard deviations away from the mean in coastal waters (defined as any five-degree grid box adjacent to a land grid point or any five-degree grid box with a bottom depth of less than 200 m).

(2) a value is four standard deviations away from the mean in near coastal waters or near the ocean floor (defined as any one-degree grid point where the depth is equal to or less than the depth in an adjacent one-degree box) or any adjacent five-degree grid box is designated coastal.

(3) a value is three standard deviations away from the mean in open ocean.

(4) if a profile contains two or more standard deviation failures, the whole profile is flagged.

C. DENSITY CHECKS FOR TEMPERATURE AND SALINITY PROFILES

The criteria for an instability are described by Levitus (1982).

Flags are assigned

(1) for density inversions at the depths where they occur in the observed and standard level profiles.

(2) when two or more density inversions (or instabilities) occur in a standard level profile. The entire profile is then flagged.

[Note: Stability checks were performed on observed as well as standard level data. Observed level flags are included for information only, since they were not used to exclude any data from the profile data sets. Whole-profile flags for stability and standard deviation checks are for standard level data only. For informational purposes, if a standard level profile includes a whole profile density flag (or standard deviation flag), the observed level data will also include a whole profile flag.]

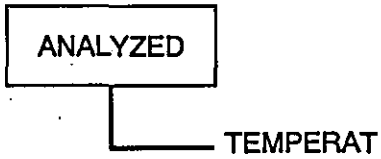
D. CRUISE FLAGS

Indicates all profiles from a cruise have anomalous data.

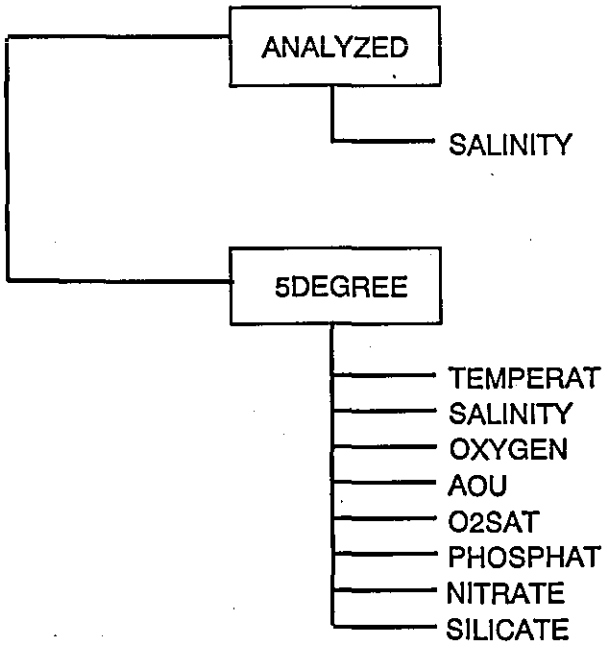
E. BULLSEYE FLAGS

Flags individual depths with anomalous data which cause ripple effects or "bullseyes" in the contoured objectively analyzed data.

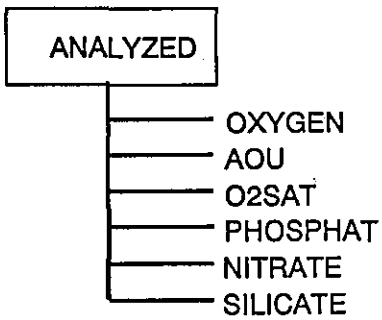
Appendix 2a. Subdirectory structure of CD-ROM WOA94-01



Appendix 2b. Subdirectory structure of CD-ROM WOA94-02



Appendix 2c. Subdirectory structure of CD-ROM WOA94-03



Appendix 3. Listing of files in WOA94-01 through WOA94-03.

WOA94-01

I. ANALYZED - Directory contains objectively analyzed one-degree latitude-longitude mean fields and masks. The file naming convention is as follows: abbreviated parameter name, 00= annual, 1-12= monthly, 13-16= seasonal (winter, spring, summer, fall), obj= objectively analyzed mean fields, msk= mask fields.

A. TEMPERAT

a. temp00.obj - annual temperature analyses
b. temp00.msk - annual temperature gridpoint mask
c. temp13.obj - winter temperature analyses
d. temp13.msk - winter temperature gridpoint mask
e. temp14.obj - spring temperature analyses
f. temp14.msk - spring temperature gridpoint mask
g. temp15.obj - summer temperature analyses
h. temp15.msk - summer temperature gridpoint mask
i. temp16.obj - fall temperature analyses
j. temp16.msk - fall temperature gridpoint mask
k. temp01.obj to temp12.obj - monthly temperature analyses
l. temp01.msk to temp12.msk - monthly temperature gridpoint mask

WOA94-02

I. ANALYZED - Directory contains objectively analyzed one-degree latitude-longitude mean fields and masks. The file naming convention is as follows: abbreviated parameter name, 00= annual, 1-12= monthly, 13-16= seasonal (winter, spring, summer, fall), obj= objectively analyzed mean fields, msk= mask fields.

A. SALINITY

a. sal00.obj - annual salinity analyses
b. sal00.msk - annual salinity gridpoint mask
c. sal13.obj - winter salinity analyses
d. sal13.msk - winter salinity gridpoint mask
e. sal14.obj - spring salinity analyses
f. sal14.msk - spring salinity gridpoint mask
g. sal15.obj - summer salinity analyses
h. sal15.msk - summer salinity gridpoint mask
i. sal16.obj - fall salinity analyses
j. sal16.msk - fall salinity gridpoint mask

k. sal01.obj to sal12.obj - monthly salinity analyses
l. sal01.msk to sal12.msk - monthly salinity gridpoint mask

II. 5DEGREE - Directory contains the 5-degree square statistics of quality controlled standard level data. The file naming conventions is as follows: abbreviated parameter name, 00= annual, 1-12= monthly, 13-16= seasonal (winter, spring, summer, fall), M= mean, SD= standard deviation, N= number of observations, 5d= 5-degree square statistics.

A. TEMPERAT

a. temp00M.5d - annual temperature 5-degree square means
b. temp00SD.5d - annual temperature 5-degree square standard deviations
c. temp00N.5d - annual temperature 5-degree square number of observations
d. temp13M.5d - winter temperature 5-degree square means
e. temp13SD.5d - winter temperature 5-degree square standard deviations
f. temp13N.5d - winter temperature 5-degree square number of observations
g. temp14M.5d - spring temperature 5-degree square means
h. temp14SD.5d - spring temperature 5-degree square standard deviations
i. temp14N.5d - spring temperature 5-degree square number of observations
j. temp15M.5d - summer temperature 5-degree square means
k. temp15SD.5d - summer temperature 5-degree square standard deviations
l. temp15N.5d - summer temperature 5-degree square number of observations
m. temp16M.5d - fall temperature 5-degree square means
n. temp16SD.5d - fall temperature 5-degree square standard deviations
o. temp16N.5d - fall temperature 5-degree square number of observations

B. SALINITY

a. sal00M.5d - annual salinity 5-degree square means
b. sal00SD.5d - annual salinity 5-degree square standard deviations
c. sal00N.5d - annual salinity 5-degree square number of observations

d. sal13M.5d - winter salinity 5-degree square means
e. sal13SD.5d - winter salinity 5-degree square standard deviations
f. sal13N.5d - winter salinity 5-degree square number of observations
g. sal14M.5d - spring salinity 5-degree square means
h. sal14SD.5d - spring salinity 5-degree square standard deviations
i. sal14N.5d - spring salinity 5-degree square number of observations
j. sal15M.5d - summer salinity 5-degree square means
k. sal15SD.5d - summer salinity 5-degree square standard deviations
l. sal15N.5d - summer salinity 5-degree square number of observations
m. sal16M.5d - fall salinity 5-degree square means
n. sal16SD.5d - fall salinity 5-degree square standard deviations
o. sal16N.5d - fall salinity 5-degree square number of observations

C. OXYGEN

a. oxy00M.5d - annual dissolved oxygen 5-degree square means
b. oxy00SD.5d - annual dissolved oxygen 5-degree square standard deviations
c. oxy00N.5d - annual dissolved oxygen 5-degree square number of observations
d. oxy13M.5d - winter dissolved oxygen 5-degree square means
e. oxy13SD.5d - winter dissolved oxygen 5-degree square deviations
f. oxy13N.5d - winter dissolved oxygen 5-degree square number of observations
g. oxy14M.5d - spring dissolved oxygen 5-degree square means
h. oxy14SD.5d - spring dissolved oxygen 5-degree square standard deviations
i. oxy14N.5d - spring dissolved oxygen 5-degree square number of observations
j. oxy15M.5d - summer dissolved oxygen 5-degree square means
k. oxy15SD.5d - summer dissolved oxygen 5-degree square standard deviations
l. oxy15N.5d - summer dissolved oxygen 5-degree square number of observations
m. oxy16M.5d - fall dissolved oxygen 5-degree square means
n. oxy16SD.5d - fall dissolved oxygen 5-degree square standard deviations
o. oxy16N.5d - fall dissolved oxygen 5-degree square number of observations

D. AOU - Apparent oxygen utilization (AOU)

a. aou00M.5d - annual AOU 5-degree square means
b. aou00SD.5d - annual AOU 5-degree square standard deviations
c. aou00N.5d - annual AOU 5-degree square number of observations
d. aou13M.5d - winter AOU 5-degree square means
e. aou13SD.5d - winter AOU 5-degree square standard deviations
f. aou13N.5d - winter AOU 5-degree square number of observations
g. aou14M.5d - spring AOU 5-degree square means
h. aou14SD.5d - spring AOU 5-degree square standard deviations
i. aou14N.5d - spring AOU 5-degree square number of observations
j. aou15M.5d - summer AOU 5-degree square means
k. aou15SD.5d - summer AOU 5-degree square standard deviations
l. aou15N.5d - summer AOU 5-degree square number of observations
m. aou16M.5d - fall AOU 5-degree square means
n. aou16SD.5d - fall AOU 5-degree square standard deviations
o. aou16N.5d - fall AOU 5-degree square number of observations

E. O2SAT - oxygen saturation

a. os00M.5d - annual oxygen saturation 5-degree square means
b. os00SD.5d - annual oxygen saturation 5-degree square standard deviations
c. os00N.5d - annual oxygen saturation 5-degree square number of observations
d. os13M.5d - winter oxygen saturation 5-degree square means
e. os13SD.5d - winter oxygen saturation 5-degree square standard deviations
f. os13N.5d - winter oxygen saturation 5-degree square number of observations
g. os14M.5d - spring oxygen saturation 5-degree square means
h. os14SD.5d - spring oxygen saturation 5-degree square standard deviations
i. os14N.5d - spring oxygen saturation 5-degree square number of observations
j. os15M.5d - summer oxygen saturation 5-degree square means
k. os15SD.5d - summer oxygen saturation 5-degree square standard deviations
l. os15N.5d - summer oxygen saturation 5-degree square number of observations
m. os16M.5d - fall oxygen saturation 5-degree square means
n. os16SD.5d - fall oxygen saturation 5-degree square standard deviations
o. os16N.5d - fall oxygen saturation 5-degree square number of observations

F. PHOSPHAT

a. po400M.5d - annual phosphate 5-degree square means
b. po400SD.5d - annual phosphate 5-degree square standard deviations
c. po400N.5d - annual phosphate 5-degree square number of observations

G. NITRATE

a. no300M.5d - annual nitrate 5-degree square means
b. no300SD.5d - annual nitrate 5-degree square standard deviations
c. no300N.5d - annual nitrate 5-degree square number of observations

H. SILICATE

a. si00M.5d - annual silicate 5-degree square means
b. si00SD.5d - annual silicate 5-degree square standard deviations
c. si00N.5d - annual silicate 5-degree square number of observations

WOA94-03

I. ANALYZED -

A. OXYGEN

a. oxy00.obj - annual oxygen analyses
b. oxy00.msk - annual oxygen gridpoint mask
c. oxy13.obj - winter oxygen analyses
d. oxy13.msk - winter oxygen gridpoint mask
e. oxy14.obj - spring oxygen analyses
f. oxy14.msk - spring oxygen gridpoint mask
g. oxy15.obj - summer oxygen analyses
h. oxy15.msk - summer oxygen gridpoint mask
i. oxy16.obj - fall oxygen analyses
j. oxy16.msk - fall oxygen gridpoint mask

B. AOU - Apparent Oxygen Utilization (AOU)

a. aou00.obj - annual AOU analyses
b. aou00.msk - annual AOU gridpoint mask
c. aou13.obj - winter AOU analyses
d. aou13.msk - winter AOU gridpoint mask
e. aou14.obj - spring AOU analyses
f. aou14.msk - spring AOU gridpoint mask
g. aou15.obj - summer AOU analyses
h. aou15.msk - summer AOU gridpoint mask

i. aou16.obj - fall AOU analyses
j. aou16.msk - fall AOU gridpoint mask

C. O2SAT - oxygen saturation
a. os00.obj - annual oxygen saturation analyses
b. os00.msk - annual oxygen saturation gridpoint mask
c. os13.obj - winter oxygen saturation analyses
d. os13.msk - winter oxygen saturation gridpoint mask
e. os14.obj - spring oxygen saturation analyses
f. os14.msk - spring oxygen saturation gridpoint mask
g. os15.obj - summer oxygen saturation analyses
h. os15.msk - summer oxygen saturation gridpoint mask
i. os16.obj - fall oxygen saturation analyses
j. os16.msk - fall oxygen saturation gridpoint mask

D. PHOSPHAT
a. po400.obj - annual phosphate analyses
b. po400.msk - annual phosphate gridpoint mask

E. NITRATE
a. no300.obj - annual nitrate analyses
b. no300.msk - annual nitrate gridpoint mask

F. SILICATE
a. si00.obj - annual silicate analyses
b. si00.msk - annual silicate gridpoint mask

Appendix 4. One-degree horizontal co-ordinate system of the analyzed fields

Each element F(i,j) of an analyzed field F, where F is dimensioned F(360,180), is considered to represent the value at the center of a one-degree latitude longitude square

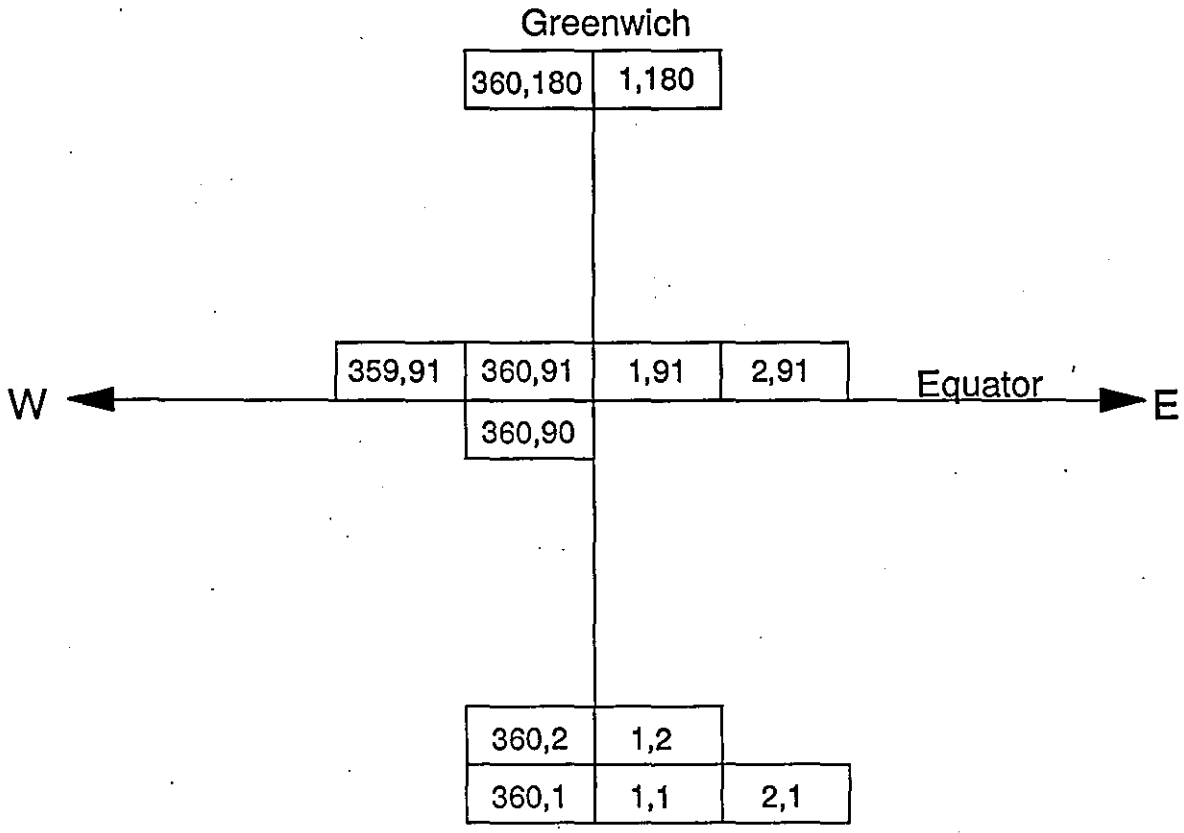
Longitude denoted by the variable "i", varies from 1 at 0.5 °E to 360 at 0.5°W

Latitude denoted by the variable "j", varies from 1 at 89.5 °S to 180 at 89.5°N

The point F(1,1) is the value at 0.5°E, 89.5°S

The point F(218,20) is the value at 142.5°W, 70.5°S

The point F(360,91) is the value at 0.5°W, 0.5°N

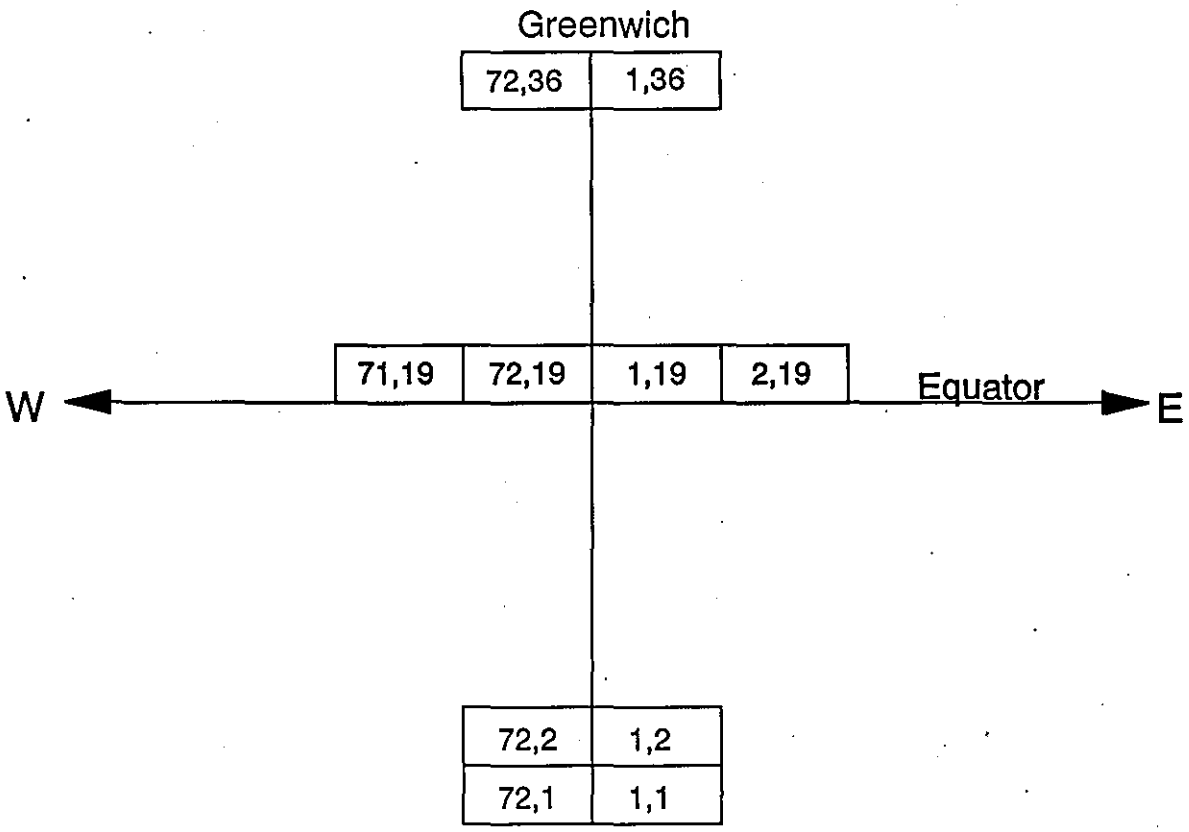


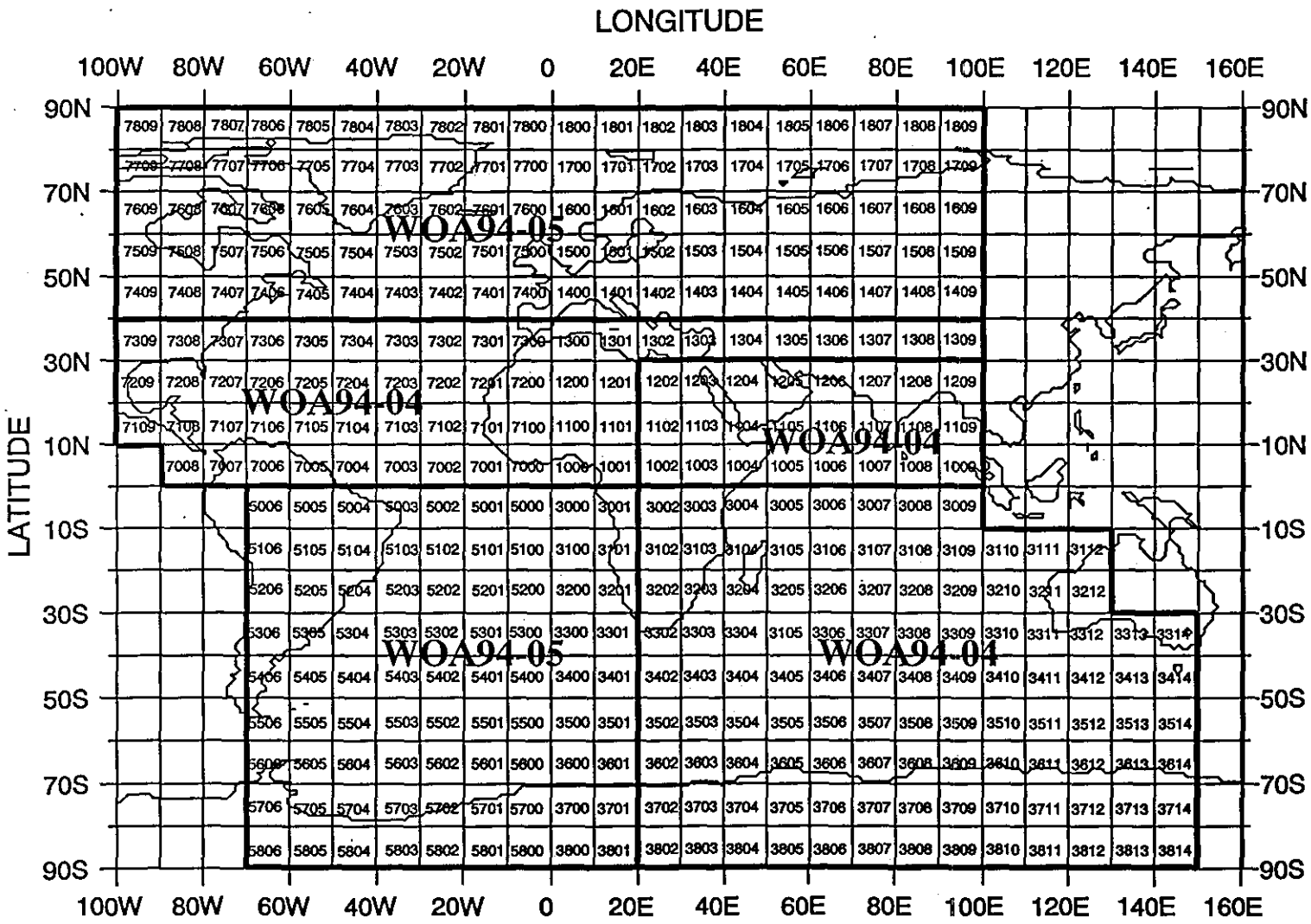
Appendix 5. Five-degree horizontal co-ordinate system of the analyzed fields

Each element F(i,j) of an analyzed field F, where F is dimensioned F(72,36), is considered to represent the value at the center of a five-degree latitude longitude square

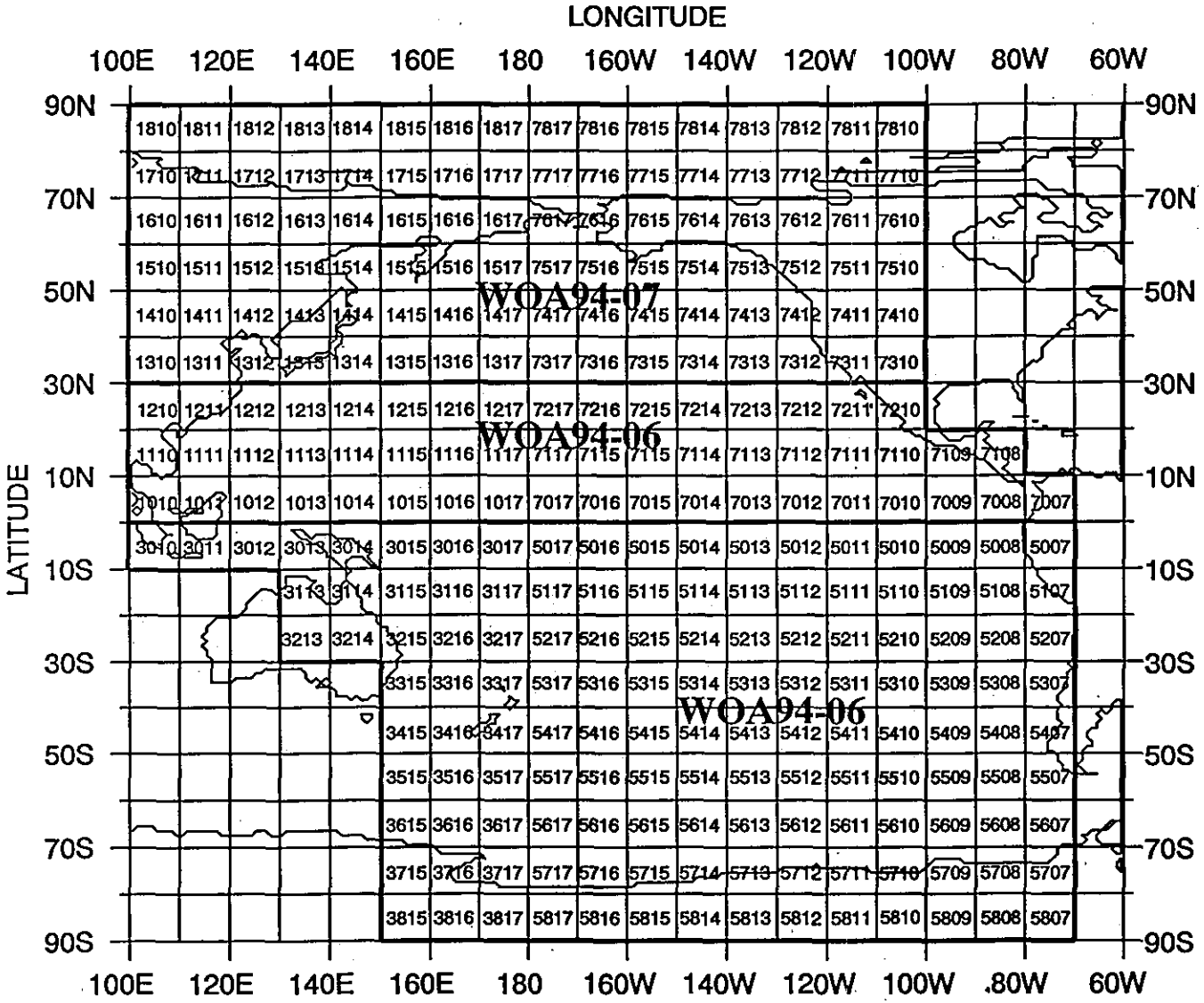
Longitude denoted by the variable "i", varies from 1 at 2.5 °E to 72 at 2.5 °W

Latitude denoted by the variable "j", varies from 1 at 87.5 °S to 36 at 87.5 °N



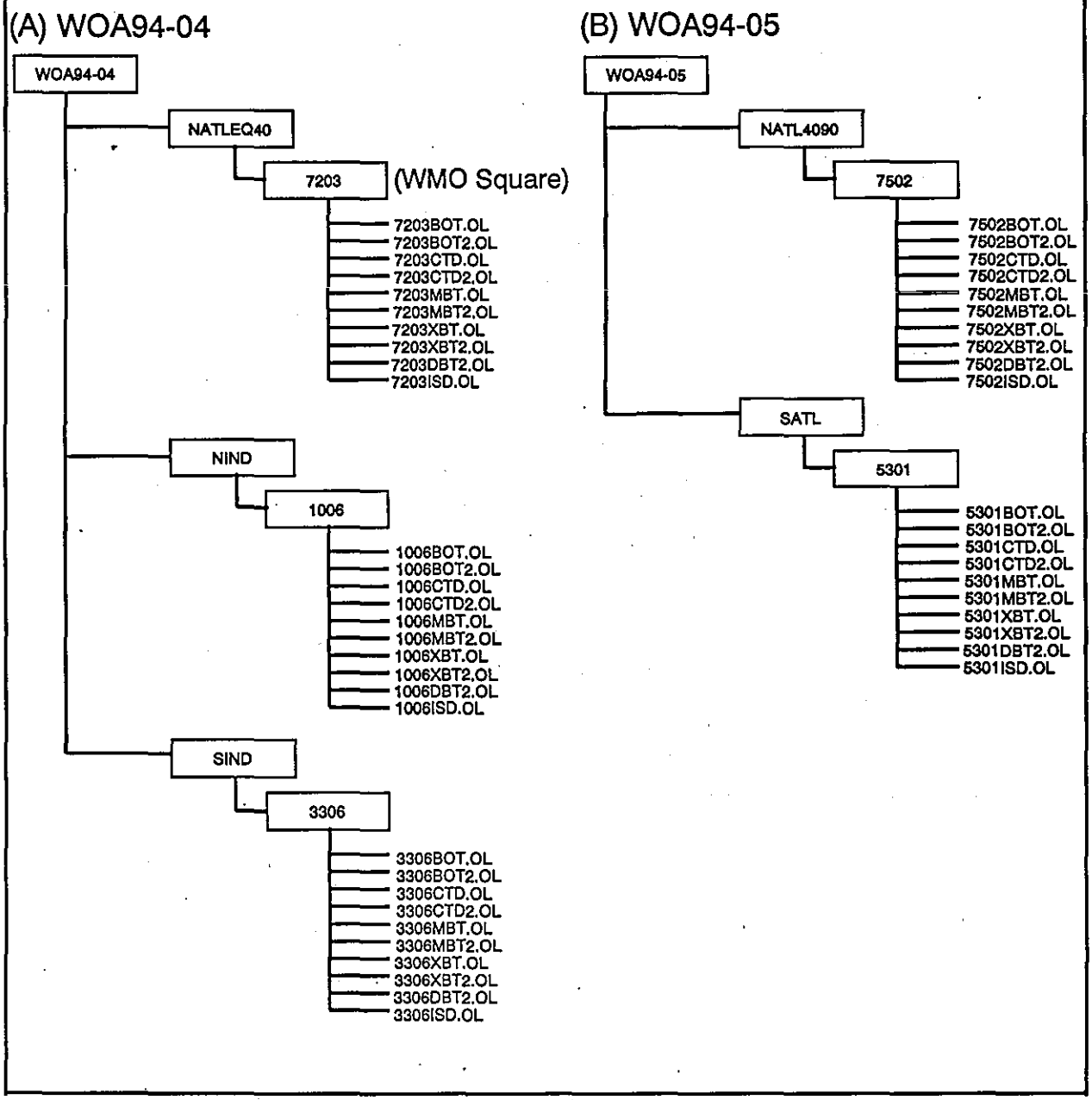


Appendix 6a. WMO squares for the Atlantic and Indian Oceans



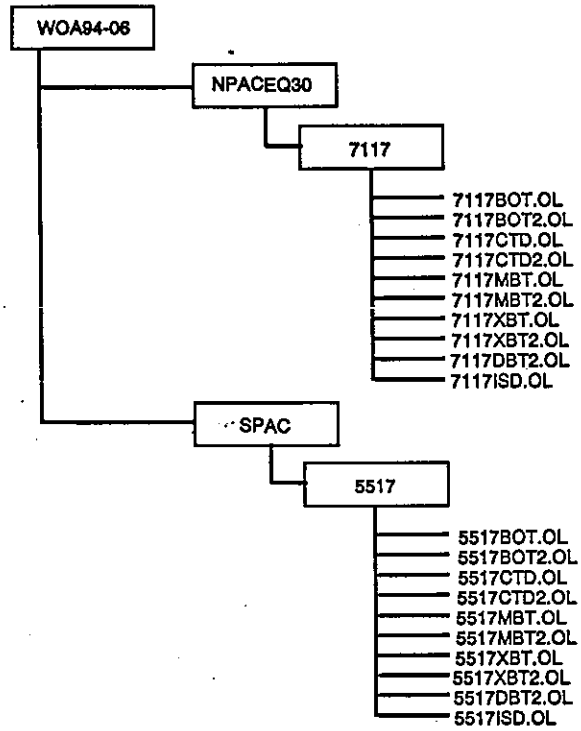
Appendix 6b. WMO squares for the Pacific Ocean

Appendix 7a. Example of subdirectory structure for CD-ROMs WOA94-04 and WOA94-05

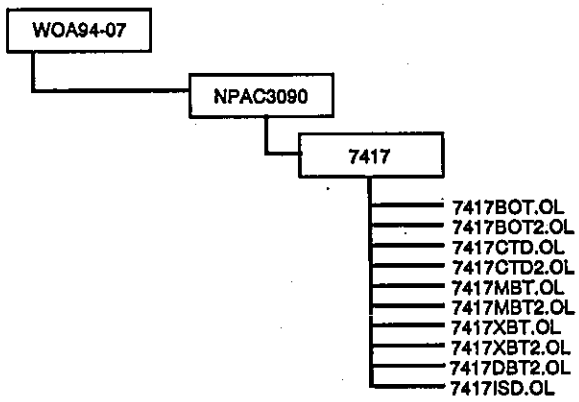


Appendix 7b. Example of subdirectory structure for CD-ROMs WOA94-06 and WOA94-07

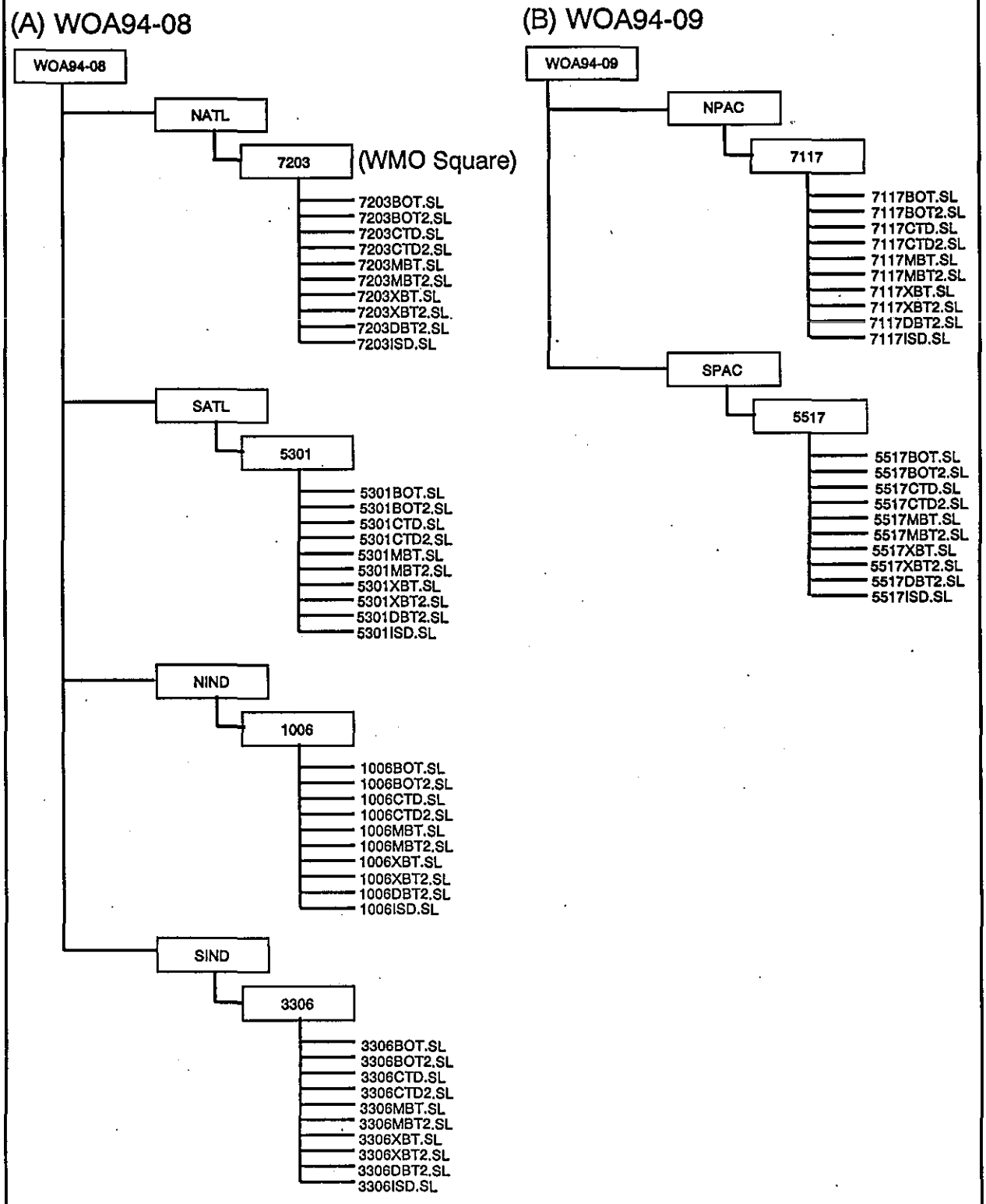
(C) WOA94-06



(D) WOA94-07



Appendix 8. Example of subdirectory structure for CD-ROMs WOA94-08 and WOA94-09



Appendix 9. Header format for observed and standard level profile data

FIELD	STARTING COLUMN	LENGTH	DESCRIPTION	FORMAT
Country code	1	2	(listed in App. 11)	A2
Cruise	3	5	NODC cruise number	I5
Latitude	8	7	Latitude (to thousands)	F7.3
Longitude	15	8	Longitude (to thousands)	F8.3
Year	23	4	Year (YYYY)	I4
Month	27	2	Month (MM)	I2
Day	29	2	Day (DD)	I2
Time*	31	6	GMT (hours to thousands) (blank if not recorded)	A6
Profile number	37	8	OCL assigned number	I8
Number of depths	45	4	Depths in profile	I4
Data type	49	1	Observed (0) or standard (1) level data	I1
Number of parameters	50	2	Parameters in profile	I2
Parameter code**	52	2	(see Table 2 for codes)	I2
Parameter flag**	54	1	Quality control flag	I1

* Note that although time is read in as a character (A6), it is actually a real variable with format F6.3. It is read in as a character because if the variable time is not recorded in the profile, there is a blank which may cause problems were it read in as a real variable.

** these fields are repeated for all subsequent parameters in the profile; thus each additional parameter will add three bytes to the end of the header line

Appendix 10. Format for observed and standard level profile data and sample profiles

FIELD	STARTING COLUMN	LENGTH	FORMAT
The following fields will be repeated based on number of parameters and depths			
Depth	1	7	F7.1
Depth flag	8	1	I1
Parameter	9	7	F7.3
Parameter flag	16	1	I1
Parameter	17	7	F7.3
Parameter flag	24	1	I1
⋮			
Standard level parameter data will start at byte one. There are no depths since there is a value for every standard depth level listed in Table 3			

SAMPLE OBSERVED LEVEL DATA PROFILE (same as first profile in profile.d)

```
06  44 24.467 -30.4501911 61912.000  10930  140 3 10 20 30
     0.00 23.7800 37.2900  5.0200  10.00 22.6400 37.2300  5.0200  25.00 21.7300
  37.1900  5.0700  50.00 21.5100 37.1700  5.1300  75.00 20.6800 37.0700  5.1900
 100.00 20.3500 37.0500  5.1100  150.00 18.3400 36.5800  4.6000  200.00 17.4600
 36.5100  4.5900  400.00 13.9900 35.9100  4.2600  600.00 11.1900 35.5600  3.5400
  800.00  8.8400 35.3000  3.2600 1000.00  6.8300 35.1400  3.6300 1500.00  5.1400
 35.1600  4.8500 5990.00-99.9990 34.8900-99.9990
```

SAMPLE STANDARD LEVEL DATA PROFILE

```
06  44 24.467 -30.4501911 61912.000  10930  241 3 10 20 30
  23.7800 37.2900  5.0200 22.6400 37.2300  5.0200 21.9410 37.1980  5.0540 21.6390
  37.1820  5.0820 21.5100 37.1700  5.1300 20.6800 37.0700  5.1900 20.3500 37.0500
   5.1100 19.3180 36.8110  4.8730 18.3400 36.5800  4.6000 17.4600 36.5100  4.5900
-99.9990-99.9990-99.9990 15.7150 36.2740  4.4830 13.9900 35.9100  4.2600 12.5170
  35.7080  3.9060 11.1900 35.5600  3.5400  9.9650 35.4180  3.3290  8.8400 35.3000
   3.2600  7.7930 35.2080  3.3640  6.8300 35.1400  3.6300-99.9990-99.9990-99.9990
-99.9990-99.9990-99.9990-99.9990-99.9990-99.9990-99.9990-99.9990-99.9990  5.1400
  35.1600  4.8500
```

Appendix 11. NODC Country Codes

*	CODE	NAME
*	AG	ANTIGUA
*	AL	ALGERIA
*	AN	ANGOLA
*	BA	BARBADOS
*	BH	BAHAMAS
*	BN	BONAIRE
*	CA	CURACAO
*	CI	CAYMAN ISLANDS
*	CR	COSTA RICA
*	CU	CUBA
*	CV	CAPE VERDE
*	CY	CYPRUS
*	ES	ESTONIA
*	ET	ETHIOPIA
*	FJ	FIJI ISLANDS
*	GA	GABON
*	GH	GHANA
*	GM	GAMBIA
*	GN	GUINEA-BISSAU
*	GR	GRENADA
*	GU	GUINEA
*	GY	GUYANA
*	HO	HONDURAS
*	IC	IVORY COAST
*	IN	INTERNATIONAL
*	JA	JAMAICA
*	KE	KENYA
*	LA	LATVIA
*	LT	LITHUANIA
*	MA	MAURITIUS
*	ML	MALTA
*	MO	MONACO
*	MS	MALAYSIA
*	MU	MAURITANIA
*	MZ	MOZAMBIQUE
*	NC	NICARAGUA
*	NI	NIGERIA
*	OM	OMAN
*	PA	PANAMA
*	QA	QUATAR
*	RC	CONGO
*	RU	RUSSIA
*	SA	SAUDI ARABIA
*	SC	SEYCHELLES
*	SE	SENEGAL
*	SI	SINGAPORE
*	SL	SIERRA LEONE
*	SM	SOMALIA
*	SO	SOLOMON ISLANDS
*	SU	SUDAN
*	SV	SAINT VINCENT
*	TN	TONGA
*	TT	TRINIDAD/TOBAGO
*	UA	U. ARAB EMIRATES
*	UR	UKRAINE
*	WS	WESTERN SAMOA
*	YM	YEMEN
*	ZA	TANZANIA
*	ZZ	MISCELLANEOUS ORGANIZATIONAL UNITS
*	06	GERMANY, FEDERAL REPUBLIC OF
*	07	GERMANY, DEMOCRATIC REPUBLIC OF
*	08	ARGENTINA
*	09	AUSTRALIA
*	10	AUSTRIA
*	11	BELGIUM
*	12	BURMA
*	13	BOLIVIA
*	14	BRAZIL
*	15	BULGARIA
*	17	CAMEROON
*	18	CANADA
*	19	SRI LANKA
*	20	CHILE
*	21	TAIWAN
*	22	COLOMBIA

* 24	KOREA REPUBLIC OF
* 26	DENMARK
* 27	ARAB REPUBLIC OF EGYPT
* 28	ECUADOR
* 29	SPAIN
* 31	UNITED STATES
* 32	UNITED STATES
* 33	UNITED STATES
* 34	FINLAND
* 35	FRANCE
* 36	GREECE
* 37	GUATEMALA
* 38	HAITI
* 41	INDIA
* 42	INDONESIA
* 43	IRAQ
* 44	IRAN
* 45	IRELAND
* 46	ICELAND
* 47	ISRAEL
* 48	ITALY
* 49	JAPAN
* 50	JORDAN
* 51	JAPAN
* 52	LEBANON
* 53	LIBYA
* 54	LIBERIA
* 55	MALAGASY REPUBLIC
* 56	MOROCCO
* 57	MEXICO
* 58	NORWAY
* 59	NEW CALEDONIA
* 60	JAPAN
* 61	NEW ZEALAND
* 62	PAKISTAN
* 64	NETHERLANDS
* 65	PERU
* 66	PHILIPPINES
* 67	POLAND
* 68	PORTUGAL
* 70	DOMINICAN REPUBLIC
* 72	ALBANIA
* 73	ROMANIA
* 74	UNITED KINGDOM
* 75	EL SALVADOR
* 76	CHINA, THE PEOPLE'S REPUBLIC
* 77	SWEDEN
* 78	SWITZERLAND
* 79	SURINAM
* 80	SYRIA
* 86	THAILAND
* 87	TOGO
* 88	TUNISIA
* 89	TURKEY
* 90	UNION OF SOVIET SOCIALIST REPUBLICS
* 91	SOUTH AFRICA
* 92	URUGUAY
* 93	VENEZUELA
* 94	VIET-NAM
* 95	YUGOSLAVIA
* 99	UNKNOWN

ERRATA

Errors in the World Ocean Atlas 1994 CD-ROM Data

Version 2

A. Missing depths in WOA94-05/SATL/5504/5504bot.ol

OCL profile number 68099 is missing a depth value between 50 and 80 meters. The missing value is 60.00 meters. Profile 68099 is listed below with the problem in line 6 of the profile (after the first 18.00 value in line 6). The "18.00..00" needs to be replaced with "18.0000 60.00".

INCORRECT PROFILE 68099

```
74   39-53.200 -43.3671934101023.000   68099  170 5 10 20 30 40 60
    0.00  0.7400 33.9800  7.5700  2.0900 16.0000    5.00 0.7400-99.9990-99.9990
-99.9990-99.9990   10.00  0.7400 33.9800-99.9990  2.0900 17.0000   20.00 0.7400
 33.9800  7.5800  2.0900 17.0000   30.00  0.7200 33.9800-99.9990  2.0900 17.0000
   40.00  0.6500 33.9800  7.5400  2.1500 18.0000   50.00  0.5900 33.9900-99.9990
  2.1500 18.00..00  0.5800 33.9900  7.5200  2.1500 18.0000   80.00 0.5800
 33.9900-99.9990  2.1500 19.0000  100.00  0.5600 34.0100  7.4300  2.1500 24.0000
  150.00  0.3100 34.0500  7.0500  2.2600 27.0000  195.00  1.0200 34.1500 6.0800
  2.4000 28.0000  290.00  1.8300 34.3700  4.7400  2.6800 45.0000  390.00 1.9400
 34.4300  4.3700  2.6800 45.0000  580.00  2.0500 34.6200-99.9990-99.9990-99.9990
  780.00  1.9700 34.6900  3.8200  2.7400 60.0000  970.00  1.7900 34.7000 3.8800
  2.5100 66.0000
```

CORRECTED PROFILE 68099

```
74   39-53.200 -43.3671934101023.000   68099  170 5 10 20 30 40 60
    0.00  0.7400 33.9800  7.5700  2.0900 16.0000    5.00  0.7400-99.9990-99.9990
-99.9990-99.9990   10.00  0.7400 33.9800-99.9990  2.0900 17.0000   20.00  0.7400
 33.9800  7.5800  2.0900 17.0000   30.00  0.7200 33.9800-99.9990  2.0900 17.0000
   40.00  0.6500 33.9800  7.5400  2.1500 18.0000   50.00  0.5900 33.9900-99.9990
  2.1500 18.0000   60.00  0.5800 33.9900  7.5200  2.1500 18.0000   80.00  0.5800
 33.9900-99.9990  2.1500 19.0000  100.00  0.5600 34.0100  7.4300  2.1500 24.0000
  150.00  0.3100 34.0500  7.0500  2.2600 27.0000  195.00  1.0200 34.1500  6.0800
  2.4000 28.0000  290.00  1.8300 34.3700  4.7400  2.6800 45.0000  390.00  1.9400
 34.4300  4.3700  2.6800 45.0000  580.00  2.0500 34.6200-99.9990-99.9990-99.9990
  780.00  1.9700 34.6900  3.8200  2.7400 60.0000  970.00  1.7900 34.7000  3.8800
  2.5100 66.0000
```

OCL profile number 482193 has an incorrect data value between 50 and 75 meters. The correct value is 34.2000. Profile 482193 is listed below with the problem in line 4 of the profile (value "34.20.4000 40 "). This value needs to be replaced with "34.2000 ".

INCORRECT PROFILE 482193

```
90  182-59.950 -49.0001967 2 7 2.000  482193  140 5 10 20 30 40 60
    0.00  1.1400 34.1700  7.3700  0.5300149.0001   10.00  1.0000 34.1700  7.3400
 0.8300149.0001   25.00  0.7900 34.1800  7.1600  0.8300141.0001   50.00  0.5800
34.20.4000 40  7.0000  0.8300126.0001   75.00  0.5200 34.2200  7.0000  0.83001+
 100.00  0.2600 34.3100  6.5400  0.8300126.0001  150.00  0.2500 34.3300  6.5000
 0.8300126.0000  198.00  0.2000 34.3600  6.4800  0.8300126.0000  295.00-99.9990
34.4800  5.6300  0.8300126.0000  393.00  0.2600 34.5300-99.9990-99.9990-99.9990
 491.00  0.2900 34.5600  5.4500  0.8300126.0000  737.00  0.3700 34.6200  5.1900
 0.8300126.0000  984.00  0.3500 34.6400  5.1600  0.8300143.0000 1178.00  0.2900
34.6800-99.9990-99.9990-99.9990
```

CORRECTED PROFILE 482193

```
90  182-59.950 -49.0001967 2 7 2.000  482193  140 5 10 20 30 40 60
    0.00  1.1400 34.1700  7.3700  0.5300149.0001   10.00  1.0000 34.1700  7.3400
 0.8300149.0001   25.00  0.7900 34.1800  7.1600  0.8300141.0001   50.00  0.5800
34.2000  7.0000  0.8300126.0001   75.00  0.5200 34.2200  7.0000  0.8300126.0001
 100.00  0.2600 34.3100  6.5400  0.8300126.0001  150.00  0.2500 34.3300  6.5000
 0.8300126.0000  198.00  0.2000 34.3600  6.4800  0.8300126.0000  295.00-99.9990
34.4800  5.6300  0.8300126.0000  393.00  0.2600 34.5300-99.9990-99.9990-99.9990
 491.00  0.2900 34.5600  5.4500  0.8300126.0000  737.00  0.3700 34.6200  5.1900
 0.8300126.0000  984.00  0.3500 34.6400  5.1600  0.8300143.0000 1178.00  0.2900
34.6800-99.9990-99.9990-99.9990
```

This data file can be obtained on-line from NODC. Please follow the instructions listed below for World Wide Web access or anonymous FTP.

B. Missing data in WOA94-07

Data in WMO 10-degree squares 7007, 7008, 7108 and 7109 should be duplicated in CD-ROMs WOA94-04 and WOA94-07 since these squares include portions of both the North Atlantic and North Pacific Oceans. Data for these WMO squares are found in WOA94-04 but not in WOA94-07. For those interested in all the North Pacific data, the data for these WMO squares will be placed on-line and also made available on a diskette upon request.

Location of on-line data:

World Wide Web: http://www.nodc.noaa.gov/
click on "<NODC On CD-ROM>"
go to World Ocean Atlas 1994 CD-ROM and look for
data to download

anonymous ftp: ftp ftp.nodc.noaa.gov
login: anonymous
password: <your e-mail address>
cd /dist/WOAERRORS/NPAC/7007/ or
/dist/WOAERRORS/NPAC/7008/ or
/dist/WOAERRORS/NPAC/7108/ or
/dist/WOAERRORS/NPAC/7109/ or

/dist/WOAERRORS/SATL/5504/5504bot.ol
get filename (or mget for multiple files)
bye (to log off)

C. Data with incorrect directory structure in WOA94-09

The following data have an incorrect directory structure and are incorrectly placed in WOA94-09.

\SPAC\5713\3512\3512bot.sl
\SPAC\5713\3512\3512bot2.sl
\SPAC\5713\3512\3512mbt.sl
\SPAC\5713\3512\3512mbt2.sl
\SPAC\5713\3512\3512xbt.sl
\SPAC\5713\3512\3512xbt2.sl

The correct directory structure is in WOA94-08 \SIND\3512\

D. The following three data sets are incorrectly duplicated in WOA94-09.

\SPAC\5713\5309\5309bot.sl
\SPAC\5713\5309\5309bot2.sl
\SPAC\5713\5309\5309mbt.sl
\SPAC\5713\5309\5309mbt2.sl
\SPAC\5713\5309\5309xbt.sl
\SPAC\5713\5309\5309xbt2.sl

The correct directory structure is WOA94-09 \SPAC\5309\

\SPAC\5713\5414\5414bot.sl
\SPAC\5713\5414\5414bot2.sl
\SPAC\5713\5414\5414mbt.sl
\SPAC\5713\5414\5414mbt2.sl
\SPAC\5713\5414\5414xbt.sl
\SPAC\5713\5414\5414xbt2.sl

The correct directory structure is WOA94-09 \SPAC\5414\

\SPAC\5713\5608\5608bot.sl
\SPAC\5713\5608\5608bot2.sl
\SPAC\5713\5608\5608mbt.sl
\SPAC\5713\5608\5608mbt2.sl
\SPAC\5713\5608\5608xbt.sl
\SPAC\5713\5608\5608xbt2.sl

The correct directory structure is WOA94-09 \SPAC\5608\

E. Truncation of CTD profiles

About one-third of all WOA94 CTD profiles were truncated due to a programming error that was believed to have been corrected. Thus, some of the profiles in the CTD files are listed to depths shallower than they were actually measured. This error affects the profiles in the CTD files only and not the Station Data files. As soon as possible we will list all truncated profile numbers and distribute new CTD files.

We apologize for the inconvenience caused by this mistake. Please check the NODC Home Page on the World Wide Web (*http://www.nodc.noaa.gov/*) or the NODC Ocean Bulletin Board Service for further details.

We thank John Klinck, Ricardo Locarnini, Norman Hall, George Heimerdinger, and Theresa McKee for bringing these problems to our attention.