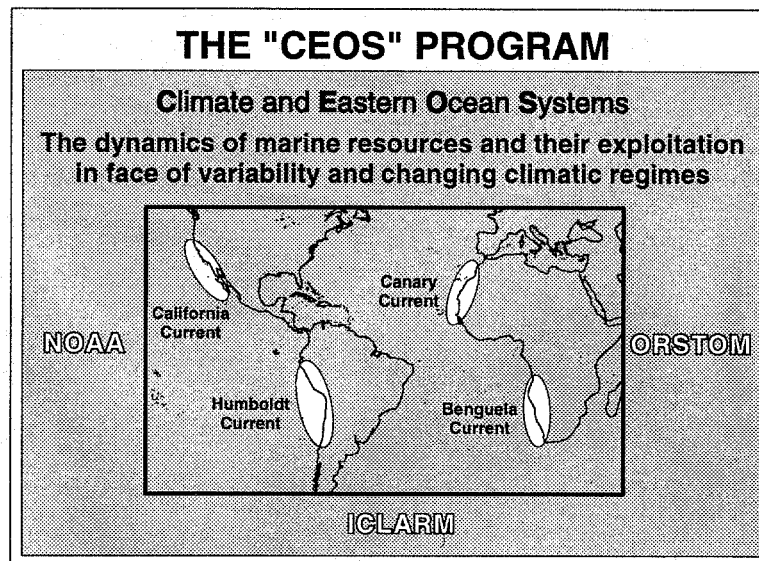


# NOAA Technical Memorandum NMFS



APRIL 1996

## COMPREHENSIVE OCEAN DATASET EXTRACTION -- USER'S GUIDE --



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Claude Roy

NOAA-TM-NMFS-SWFSC-228

U.S. DEPARTMENT OF COMMERCE  
National Oceanic and Atmospheric Administration  
National Marine Fisheries Service  
Southwest Fisheries Science Center

## NOAA Technical Memorandum NMFS

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**APRIL 1996**

# **COMPREHENSIVE OCEAN DATASET EXTRACTION -- USER'S GUIDE --**

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The CEOS project and the COADS project rely on outside agencies for funding. To encourage this type of support, we ask that you cite the references listed in the manual's introduction as well as the manual itself when you use the CODE program in your research.

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## **Table of Contents**

<b>Foreword</b> .....	1
Background .....	1
COADS Limitations.....	3
About This Manual .....	4
<b>Chapter 1: Introduction</b> .....	5
CODE Input .....	6
CODE Output.....	6
System Requirements.....	7
Installation.....	7
<b>Chapter 2: Getting Started</b> .....	10
Macintosh-only CODE .....	11
PC/Mac CODE.....	24
<b>Chapter 3: CODE Reference</b> .....	33
Space Settings .....	33
Latitude and Longitude .....	35
Space Interval.....	36
Getting Accurate Results with Space Settings .....	36
Time Settings .....	42
Start Year and End Year .....	42
Time Interval.....	42
Landlocked Flag.....	43
Selected Parameters .....	43
Trimming Flag .....	44
SST .....	44
Instrument Flag .....	44
Air Temperature .....	45
Precision Flag.....	45

Wind Variables .....	46
Measurement Device .....	46
Compass Type .....	47
Sea Level Pressure .....	47
Ship Type .....	47
File Locations .....	48
Data Directory .....	48
Output Directory .....	50
Output File Prefix .....	51
Output Format .....	51
ASCII .....	52
Map .....	53
HDF .....	53
netCDF .....	54
<b>Chapter 4: Troubleshooting</b> .....	<b>55</b>
<b>Appendix</b> .....	<b>59</b>



## Read This First

### Background

The Comprehensive Ocean-Atmosphere Data Set or COADS\* is an extensive oceanographic and meteorological dataset. COADS is the result of a continuing cooperative project between the National Oceanic and Atmospheric Administration (NOAA) - its Environmental Research Laboratories (ERL), National Climatic Data Center (NCDC), and Cooperative Institute for Research in Environmental Sciences (CIRES; joint with the University of Colorado) - and the National Science Foundation's National Center for Atmospheric Research (NCAR).

COADS was created from global marine observations recorded from 1854 to 1990. The raw data were converted from various formats, sorted, and quality controlled to eliminate duplicate reports. The initial data processing resulted in Long Marine Reports (LMR) that contain the complete observational record. The data were processed further to create various summarized and compressed data products. One of these products, CMR.5, contains the data extracted by the CODE program. CMR.5 is a packed binary version of the most commonly used parts of LMR and consists of approximately 100 million individual observations. See Figure 1 for a simplified description of COADS data processing.

---

\* For a complete description of COADS, refer to:  
Slutz, R.J., S.J. Lubker, J.D. Hiscox, S.D. Woodruff, R.L. Jenne, D.H. Joseph, P.M. Steurer, and J.D. Elms, 1985: *Comprehensive Ocean-Atmosphere Data Set; Release 1*. NOAA Environmental Research Laboratories, Climate Research Program, Boulder, CO., 268 pp.  
Woodruff, S.D., R.J. Slutz, R.L. Jenne, and P.M. Steurer, 1987: A Comprehensive Ocean-Atmosphere Data Set. *Bull. Amer. Meteor. Soc.*, **68**, 1239-1250.

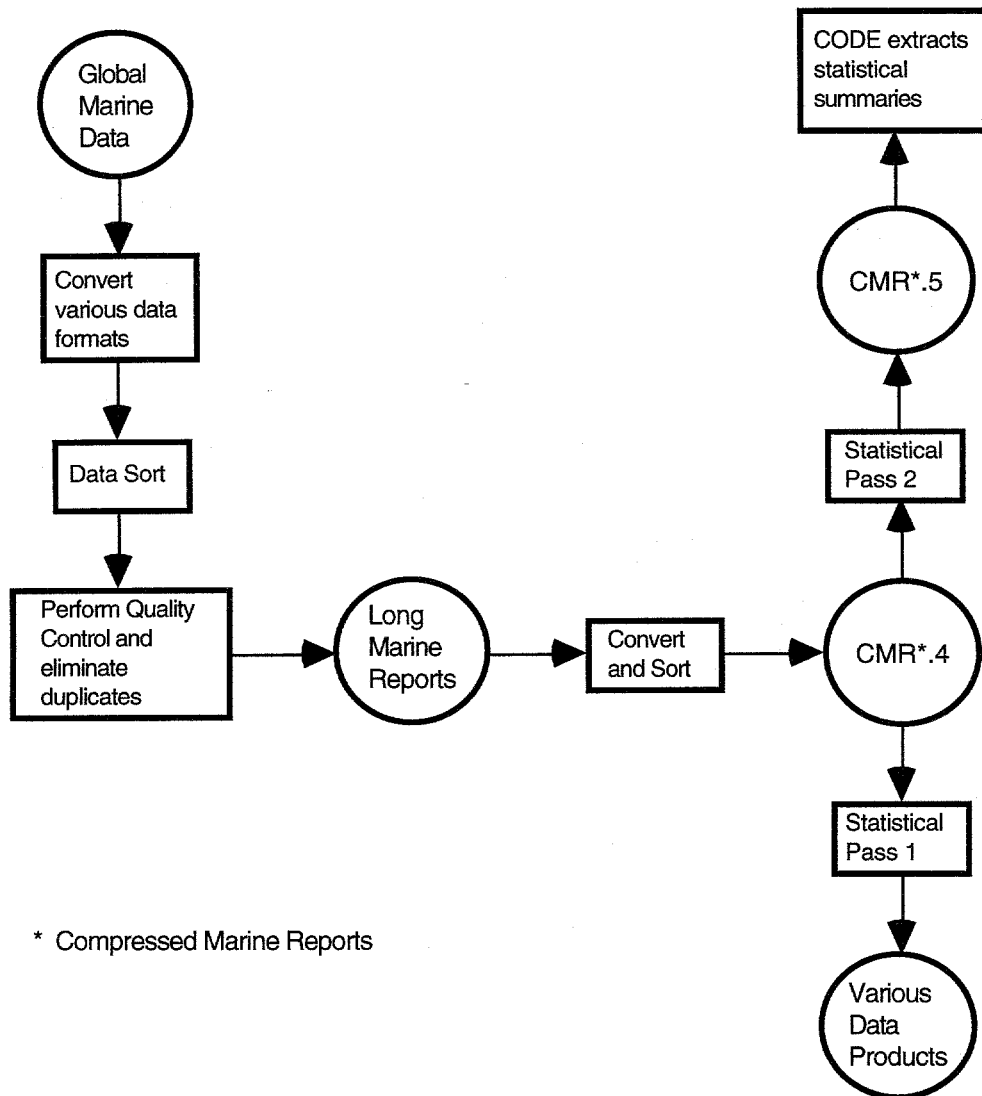


Figure 1

---

The information contained in COADS is extremely useful for a variety of areas of research, but for a number of reasons access to the dataset can be difficult when time series are desired for given local areas, rather than synoptic products. COADS Release 1 is sorted by time; obtaining time series requires reading the entire dataset. Simple, user-friendly software to produce time series of the data also is not available. And a number of studies have shown that access to the raw data is important for developing reliable time series from the COADS data.

To solve these problems, the CEOS Project reorganized the CMR.5 version of COADS and stored all of it *by area* on CD-ROM. CEOS also developed the CODE program to quickly access, process, and summarize the stored data. CODE provides the means, variances, and number of observations for selected parameters from a specified ocean region within a chosen time period. The program creates an output file that can be easily imported into spreadsheet and graphics applications for additional editing, analysis, and display.

## **COADS Limitations**

The COADS dataset is a source of valuable information; however, it is not error-free. Most errors were eliminated during the processing of the raw data, and reports with known errors have been identified. But, as noted in COADS Release 1 documentation: "some kinds of errors cannot be trapped by statistical methods." For a complete description of COADS limitations, refer to the COADS Release 1 document listed in the footnote on the first page.

## About This Manual

The *CODE User's Guide* is provided to help you learn and efficiently use the CODE program. The manual is organized as follows:

CHAPTER	CONTENTS
Chapter 1: Introduction to CODE	Introduction, System Requirements, Installation
Chapter 2: Getting Started with CODE	Performing a Simple Data Extraction
Chapter 3: CODE Reference	Detailed description of CODE operation
Chapter 4: Troubleshooting	Error Messages and Solutions
Appendix	Maps

---

## Chapter 1: Introduction

Welcome to the *CODE User's Guide*. This manual describes the installation and operation of the Beta Version of the Comprehensive Ocean Dataset Extraction (CODE) program. CODE allows quick and easy access to oceanographic and meteorological information stored in the COADS dataset.

The complete CMR.5 version of the COADS dataset is available on six CD-ROM discs. To obtain a subset of the data, refer to the maps in the appendix to determine the appropriate disc. The folders (or subdirectories) on the disc represent a  $10^\circ \times 10^\circ$  ocean square. The files in a folder contain data for each  $2^\circ \times 2^\circ$  area within the  $10^\circ \times 10^\circ$  square. Given any latitude and longitude pair, CODE quickly accesses and retrieves data stored for the specified ocean location.

There are two versions of CODE. One version runs only on the Macintosh and provides a graphic user interface with windows and pull-down menus. The other version runs on both the Mac and the PC and does not include a window-based user interface, but has some additional functions not available in the Mac-only version. Hopefully a Windows version for the PC will be available in the near future. The *CODE User's Guide* provides instructions for installing and operating both programs. The instructions are written for a user who is familiar with the basic operation of a Mac or a PC.

CODE extracts summaries of the data based on the following user specified input and generates the output listed below.

### **CODE Input**

- Latitude and Longitude
- Space Interval for data averaging: Entire Area, 2° Square, 1° Square, or .5° Square
- Start and End Years
- Time Interval: Yearly or Monthly
- Parameters, including:
  - Sea Surface Temperature
  - Air Temperature
  - Wind Variables
  - Sea Level Pressure
- Data format for output: ASCII, HDF, netCDF, and Map

**NOTE:** Any or all of the data formats can be selected for a data extraction.

### **CODE Output**

- Output file(s) in selected format(s) for importing to spreadsheet or graphic applications
- Monthly or Yearly Means and Variances for selected parameters

**NOTE:** Variances are only available in netCDF and HDF output format.

- Number of Observations for selected parameters

## System Requirements

A CD-ROM disc drive is required to access the COADS dataset stored on compact discs. The drive must read ISO 9660 standard CD-ROM discs and must interface with Mac's or PC's with MS-DOS.

CODE operates on Macintosh computers and PC's with the following minimum requirements:

	Macintosh Computers	PC's
<b>Processor</b>	68020 or above	386 and above
<b>Math Co-Proc.</b>	68881 or above	387 and above
<b>RAM</b>	at least 4 MB usable RAM	at least 4 MB usable RAM
<b>Hard Drive</b>	at least 40 MB free	at least 40 MB free
<b>Monitor</b>	12"-13" recommended	

## Installation

### Installing the CODE Program

#### Macintosh Computers

1. Create a folder for the CODE program files.
2. Insert disk containing CODE program files in the disk drive.
3. Double-click CODE floppy disk icon.

4. Copy the following files to the new folder:

- CODE
- CODE.EXE
- CODE.PRM
- CODE.MSG

#### **PC's with MS-DOS**

1. Create a subdirectory for the CODE program files.
2. Insert disk containing CODE program files in the disk drive.
3. Copy the following files to the new subdirectory:

- CODE.EXE
- CODE.PRM
- CODE.MSG

#### **Installing the COADS Dataset**

**NOTE:** Data accessed by CODE during a data extraction must be located on a single hardware storage device.

To decrease processing time, copy the information needed for a data extraction from the CD-ROM disc to the computer's hard drive. Follow the steps below to copy the appropriate folders or subdirectories to the hard drive.

**Do not copy individual files; CODE uses the folder or subdirectory name to find data. Do not change the names of folders or subdirectories when you copy them to the computer hard drive.**



**Macintosh Computers**

1. Determine the appropriate CD-ROM disc for your selected region by referring to the maps in the Appendix. The top number in each of the 10° x 10° boxes corresponds to the name of a folder stored on the CD-ROM disc. The bottom number is the Marsden Square number and is provided for reference only.
2. Insert CD-ROM disc in CD-ROM drive.
3. Display the contents of the CD-ROM disc on the computer screen.
4. Copy the appropriate folders to the hard drive.

**PC's with MS-DOS**

1. Determine the appropriate CD-ROM disc for your selected region by referring to the maps in the Appendix. The top number in each of the 10° x 10° boxes corresponds to the name of a subdirectory on the CD-ROM disc. The bottom number is the Marsden Square number and is provided for reference only.
2. Insert CD-ROM disc in CD-ROM drive.
3. Display the contents of the CD-ROM disc on the computer screen.
4. Create subdirectories on the PC hard drive using names that match the names of the subdirectories on the CD-ROM.
5. Copy the contents of the selected subdirectories to the appropriate location on the hard drive.

## Chapter 2: Getting Started

This Chapter steps you through a sample data extraction. The following paragraphs guide you on a quick tour of CODE and are not intended to provide an in-depth explanation of CODE's features. A detailed description of CODE is included in the following chapter. Simply follow the steps below to get a general idea of how the program works.

The first half of this chapter describes how the Macintosh-only version of CODE works, and the second half describes the operation of the PC/Mac version. Figure 1 gives a brief description of the two versions. **CODE.EXE** runs on the PC and the Mac; it extracts data based on selections in the **CODE.PRM** text file. **CODE** runs only on the Mac; it extracts data based on selections in the **CODE** window or in **CODE.PRM**. The PC/Mac version lets you extract data from irregular shaped areas, and the Mac-only version provides an easy way to perform multiple extractions from the data (where each extraction has different options selected and produces separate output files) without leaving the program.

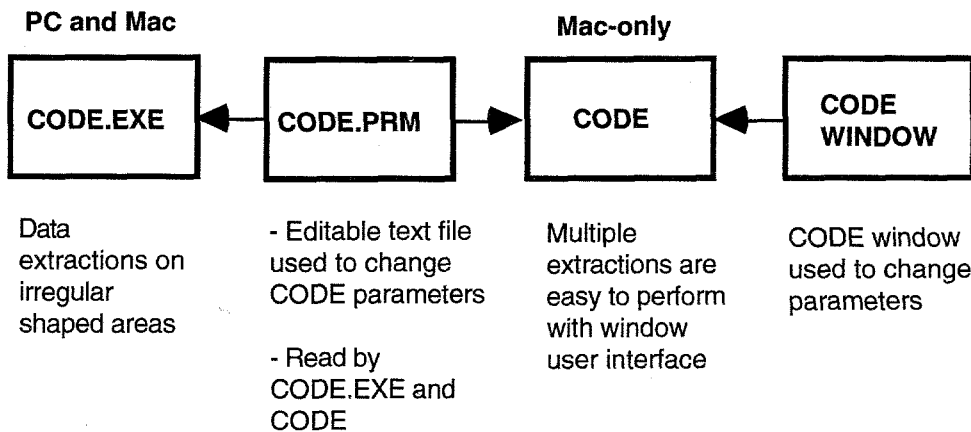


Figure 1

## Macintosh-only CODE

The Macintosh-only version of CODE runs on Macintosh computers with the minimum requirements listed in the Introduction. This version of CODE extracts data based on selections made in the CODE window (see Figure 2). Making and changing selections in the CODE.PRM file is described in the second half of this chapter.

**NOTE:** In the beta version of CODE, the default values for the CODE window are the selections saved in CODE.PRM. Selections made in the CODE window are not saved when you exit the program.

To open the CODE window, perform the following steps:

1. Open the folder that contains the CODE program.
2. Double-click the CODE icon.
3. The CODE window, Figure 2, appears on the screen.

**NOTE:** The data fields may not match those in Figure 2.

The screenshot shows a 'Settings' window with the following sections:

- Space Settings:**
  - North Latitude: 34
  - East Longitude: -136
  - South Latitude: 30
  - West Longitude: -140
  - Space Interval: 2 Degrees
- Time Settings:**
  - Start Year: 1980
  - End Year: 1982
  - Time Interval: Year
- Selected Parameters:**
  - SST
  - Air Temperature
  - Dew Point
  - Wind Components
  - Parameter Options button
- File Locations:**
  - Data Directory: MAC HD:CODE:CORDS Data:
  - Output Directory: MAC HD:CODE:Results:
  - Output File Prefix: FILE1
- Output Format:**
  - ASCII
  - HDF
  - Map
  - NetCDF

Buttons at the bottom: Quit, Extract.

Figure 2 - CODE Window

**NOTE:** In the following steps, **TIPs** are provided to help you perform a *quick* initial data extraction.

### Space Settings

#### Latitude and Longitude

**TIP:** Define a small area of ocean, such as North Latitude 34°, South Latitude 30°, East Longitude -136°, and West Longitude -140°. Make sure that the defined area corresponds to the data files installed in Chapter 1.

1. Double-click inside North Latitude box to highlight any existing value or, if box is empty, click once.

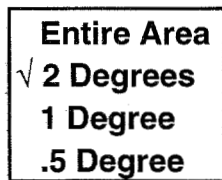
2. Enter desired North Latitude choosing an *even* number between +90° and -90°. Do not enter the degree symbol.

**NOTE:** Entering odd numbered latitudes and longitudes is explained in Chapter 3.

3. Double-click inside South Latitude box to highlight any existing value or, if box is empty, click once.
4. Enter desired South Latitude choosing an *even* number between +90° and -90°. It is important for the South Latitude to be *smaller* than the North Latitude.
5. Double-click inside East Longitude box to highlight any existing value or, if box is empty, click once.
6. Enter desired East Longitude choosing an *even* number between +180 and -180.
7. Double-click inside West Longitude box to highlight any existing value or, if box is empty, click once.
8. Enter desired West Longitude choosing an *even* number between +180 and -180. It is important for the West Longitude to be *smaller* than the East Longitude.

### **Space Interval**

1. Click and hold on arrowhead inside Space Interval box. A menu appears with four options:



2. Select **2 Degrees** by highlighting it

## Time Settings

### Start Year and End Year

**TIP:** Define a short time interval such as between 1980 and 1982.

1. Double-click inside Start Year box to highlight any existing value or, if box is empty, click once.
2. Enter desired Start Year between 1854 and 1990.
3. Double-click inside End Year box to highlight any existing value or, if box is empty, click once.
4. Enter desired End Year between 1854 and 1990.

### Time Interval

1. Click and hold on arrowhead inside Time Interval box. A menu appears with two options:

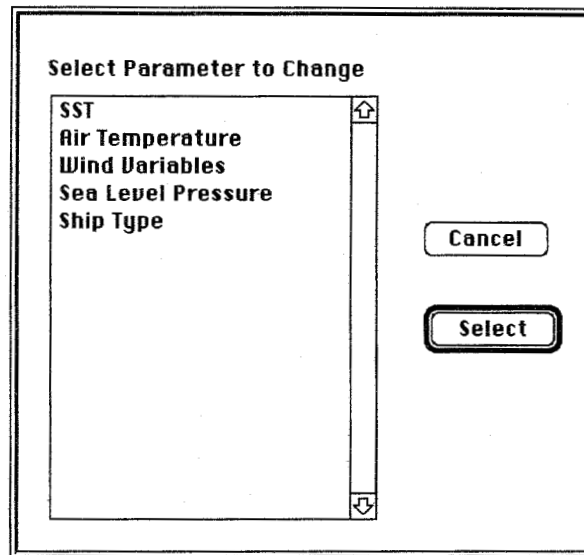


2. Select **Year** or **Month** by highlighting it

### Selected Parameters

**TIP:** Select only a few parameters for a quick extraction.

1. Click once on Parameter Options. A menu appears with the following options:



**Figure 3 - Parameter Menu**

2. Double-click to select a parameter or parameter category.

**NOTE:** Air Temperature and Wind Variables are parameter categories; more than one parameter can be selected in the applicable parameter window.

3. A window appears with parameter and flag options.
4. Click once in the box or circle next to an option to select it. An "X" or a filled-in circle indicates a selection.

**NOTE:** The following parameters and flags are discussed in detail in Chapter 3.

### **SST (Sea Surface Temperature)**

**SST Options**

Select SST

**Trimming**

All     ±2.8s  
 ±3.5s     Outside s

**Instrument**

Unknown  
 Bucket  
 Implied Bucket

Cancel    OK

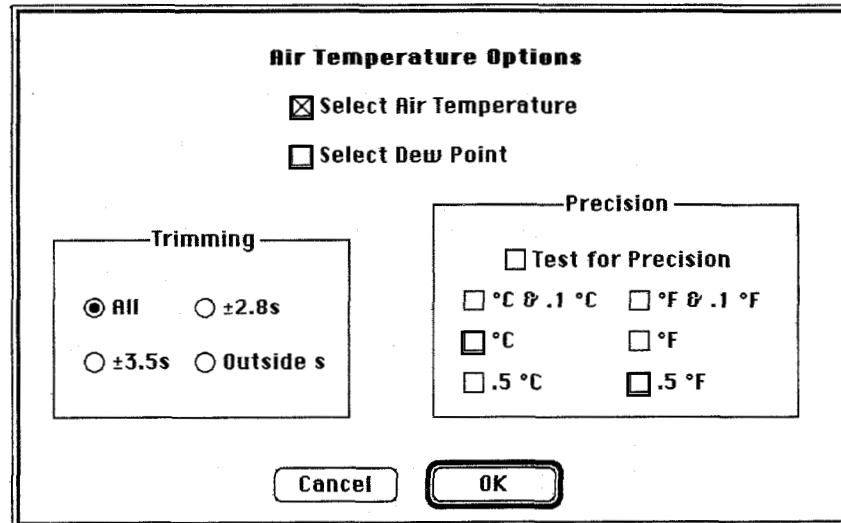
**Figure 4 - SST Options**

Perform the following:

1. Click inside **Select SST** box to select.
2. Select **All** under **Trimming**.
3. Click inside each box under **Instrument** to select.
4. Click **OK** button to return to CODE window.
5. **SST** will appear under **Selected Parameters**.



## Air Temperature



The dialog box is titled "Air Temperature Options". It contains two checked checkboxes: "Select Air Temperature" and "Select Dew Point". Below these are two sub-sections: "Trimming" and "Precision".

**Trimming**

- All
- ±2.8s
- ±3.5s
- Outside s

**Precision**

- Test for Precision
- °C @ .1 °C
- °F @ .1 °F
- °C
- °F
- .5 °C
- .5 °F

At the bottom are "Cancel" and "OK" buttons.

Figure 5 - Air Temperature Options

Perform the following:

1. Click inside **Select Air Temperature** box to select.
2. Select **All** under **Trimming**.
3. Click **OK** button to return to CODE window.
4. **Air Temperature** will appear under **Selected Parameters**.

### Wind Variables

**Wind Options**

Select Wind Components     Select Wind Speed Cubed

Select Wind Speed             Select Pseudo-Stress

Trimming

All     ±2.8s

±3.5s     Outside s

Measurement Device

Estimated or Unknown

Measured

Compass Type

Select by Compass Type

8 pt     36 pt     16 of 32 pt

32 pt     360 pt     16 of 36 pt

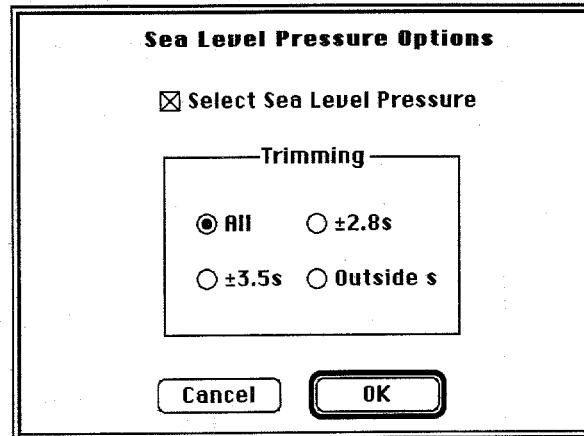
Cancel    **OK**

**Figure 6 - Wind Options**

Perform the following:

1. Click inside **Select Wind Components** box to select.
2. Select **All** under **Trimming**.
3. Click inside each box under **Measurement Device** to select.
4. Click **OK** button to return to CODE window.
5. **Wind Components** will appear under **Selected Parameters**.

### Sea Level Pressure



**Figure 7 - Sea Level Pressure Options**

Perform the following:

1. Click inside **Select Sea Level Pressure** box to select.
2. Select **All** under **Trimming**.
3. Click **OK** button to return to CODE window.
4. **Sea Level Pressure** will appear under **Selected Parameters**.

## Ship Type

**Ship Type Options**

Select by Ship Type

<input type="checkbox"/> US Navy or Unknown	<input type="checkbox"/> Buoy
<input type="checkbox"/> Merchant or Foreign Military	<input type="checkbox"/> Ocean station - off station
<input type="checkbox"/> Research	<input type="checkbox"/> Ocean station - on station
<input type="checkbox"/> Lightship	<input type="checkbox"/> HBT or MBT

Cancel OK

**Figure 8 - Ship Type Options**

Perform the following:

1. Click inside **Select by Ship Type** box to *deselect*..

**NOTE:** Deselecting Ship Type, selects all types.

2. Click **OK** button to return to CODE window.

## File Locations

### Data Directory

1. Click inside Data Directory box and drag through to highlight any existing value or, if box is empty, click once.
2. Enter the pathname for the COADS data including the CD-ROM or hard disk drive as shown in the example in Figure 9.

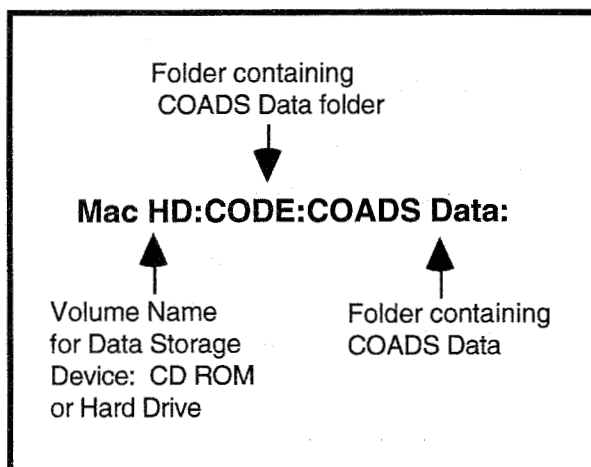


Figure 9

### Output Directory

1. Click inside Output Directory box and drag through to highlight any existing value or, if box is empty, click once.
2. Enter the pathname for the CODE output file including the computer hard disk drive as shown in the example in Figure 10.

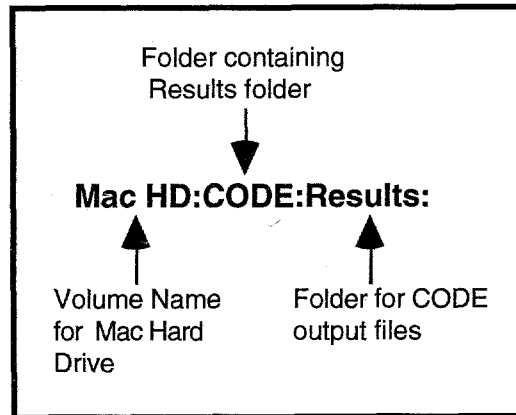


Figure 10

### Output File Prefix

1. Click inside Output File Prefix box and drag through to highlight any existing value or, if box is empty, click once.
2. Enter the prefix for the CODE output file.

### **Output Format**

Click inside **ASCII** box to select output format. Do not select other formats at this time.

### **Extract**

1. Click **EXTRACT** button to start CODE.
2. The Extract Log window appears and the files read by CODE are listed. See Figure 11.

**NOTE:** Figure 11 shows the Extract Log window *after* CODE has completed the data extraction.

In the beta version of CODE, the **CANCEL** button does not work. To stop CODE, the following key sequence *may* abort the program:

control-option-command-esc

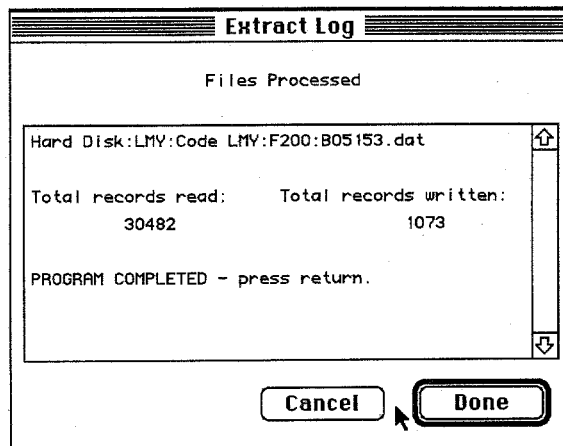


Figure 11- Extract Log

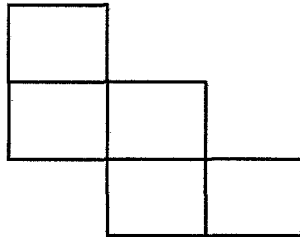
3. The extraction is done when the message **PROGRAM COMPLETED** appears in the Extract Log window.
4. Select the **DONE** button to return to CODE window.

### Quit

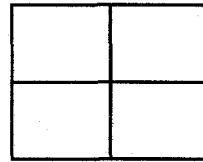
Click **QUIT** button to exit the CODE window.

## PC/Mac CODE

CODE for the PC/Mac runs on PC's and Macintosh computers with the minimum requirements listed in the Introduction. This version of CODE consists of CODE.PRM, an editable text file, and CODE.EXE, an executable file that extracts data based on the selections made in CODE.PRM. PC/Mac CODE allows you to extract data from an irregular shaped area, such as along a coastline, as shown below. This section includes PC and Mac instructions on editing CODE.PRM and on running CODE.EXE.



CODE for PC and Mac



CODE for Mac-only

**Do not change the name of the CODE.PRM file, and use uppercase "Y" or "N" to indicate your selections.**

### Editing CODE.PRM on the Mac

1. Open the folder containing CODE.PRM.
2. Double-click the CODE.PRM icon. A screen similar to Figure 12 appears. Use the scroll bars to view the entire file.

**NOTE:** CODE.PRM is a text file that can be edited and saved. If you edit CODE.PRM with a word processing application, save it as a text file with line breaks.



3. Edit the file as described below starting with **Define Region**. Use the **TIPs** to perform a quick initial extraction. Save and exit CODE.PRM after making your selections.

```

code.prm
0/0 Hard Disk:LMV:CODE LMY:code.prm

COMMENT -> Define region. Repeat values for each rectangle.
1 /* Number of rectangles
-138 /* Longitude - western boundary (DDD.D)
-136 /* Longitude - eastern boundary (DDD.D)
32 /* Latitude - southern boundary (DDD.D)
34 /* Latitude - northern boundary (DDD.D)

COMMENT -> Define time period.
1 /* Start month (MM)
1980 /* Start year (YYYY)
12 /* End month (MM)
1981 /* End year (YYYY)

COMMENT -> Define space step for the means.
3 /* 1 = no step (all area), 2 = 2°x2°, 3 = 1°x1°, 4 = .5°x.5°

COMMENT -> Define time step for the means.
1 /* 1 = year, 2 = month, 3 = day

COMMENT -> Landlocked flag and trimmed flags.
Y /* Test for landlocked flag Y/N

COMMENT -> Sea Surface Temperature
Y /* Select SST parameter Y/N
Y /* Select instrument : unknown : Y/N
Y /* bucket : Y/N
Y /* implied bucket : Y/N
A /* Trimming test : A(all),B(±2.8s),C(±3.5s),D(outside s)

COMMENT -> air temperature
Y /* Select air temperature parameter Y/N
A /* Trimming test : A(all),B(±2.8s),C(±3.5s),D(outside s)
N /* Select dew point depression parameter Y/N
C /* Trimming test : A(all),B(±2.8s),C(±3.5s),D(outside s)
N /* Test for Precision - Yes or No

```

Figure 12 - CODE.PRM

### Editing CODE.PRM on the PC

Any text editor or word processing application can be used to edit CODE.PRM on the PC. The file must be saved as a text file with line breaks. Edit the file as described below starting with **Define Region**. Use the **TIPs** to perform a quick initial extraction. Save and exit CODE.PRM after making your selections.

### Define Region

**TIP:** Define a small area of ocean, such as North Latitude 34°, South Latitude 30°, East Longitude -136°, and West Longitude -140°

1. Enter "1" for number of rectangles.
2. Enter desired West Longitude choosing an *even* number between +180 and -180. It is important that the West Longitude is *smaller* than the East Longitude.

**NOTE:** Entering odd numbered latitudes and longitudes is explained in Chapter 3.

3. Enter desired East Longitude choosing an *even* number between +180 and -180.
4. Enter desired South Latitude choosing an *even* number between +90° and -90°. It is important that the South Latitude is *smaller* than the North Latitude.
5. Enter desired North Latitude choosing an *even* number between +90° and -90°. Do not enter the degree symbol.

### Define Time Period

**TIP:** Define a short time interval such as between 1980 and 1982.

1. Start Month must be "1" for January and End Month must be "12" for December.
2. Enter desired Start Year between 1854 and 1990.
3. Enter desired End Year between 1854 and 1990.

### Define Space Step for the Means

Enter "2" to define a space step of 2° x 2°.

### Define Time Step for the Means

Enter "1" to select year or "2" to select month; "3" (day) is not available in the beta version.

### Landlocked Flag and Trimmed Flags

Enter "Y" to test for landlocked flag.

**TIP:** The following four selections are the data parameters. Select one or two parameters for a quick initial extraction.

### Sea Surface Temperature

1. Enter "Y" to select SST parameter.
2. Enter "Y" to select each instrument flag.
3. Enter "A" to select "All" for Trimming flag.

### Air Temperature

1. Enter "Y" to select air temperature parameter.
2. Enter "A" to select "All" for Trimming flag.
3. Enter "N" to deselect dew point depression parameter.
4. Enter "N" to deselect Test for Precision flag.

**NOTE:** If "N" is entered for the precision test flag, the precision values that follow will not be selected. If "Y" is entered, each value can be selected or deselected by entering "Y" or "N", respectively.

### Wind Parameters

1. Enter "Y" to select east-west and north-south wind components parameter.
2. Enter "N" to deselect scalar wind speed parameter.
3. Enter "N" to deselect wind speed cubed parameter.
4. Enter "N" to deselect east-west and north-south wind stress components parameter.
5. Enter "N" to deselect Compass type flag.

**NOTE:** If "N" is entered for the compass flag, the compass types that follow will not be selected. If "Y" is entered, each type can be selected or deselected by entering "Y" or "N", respectively.

6. Enter "Y" to select both wind speed measurement flags.
7. Enter "A" to select "All" for Trimming flag.

### Sea Level Pressure

1. Enter "Y" to select sea level pressure parameter.
2. Enter "A" to select "All" for Trimming flag.

### Ship Type

Enter "N" to select *all* ship types.

**NOTE:** When "N" is entered for the ship type parameter, all the ship types listed are automatically selected; you do not need to select or deselect each type.

### Output Options

1. Enter "Y" to select ASCII output format.
2. Enter "N" to deselect 3-D HDF output format.
3. Enter "N" to deselect netCDF output format.
4. Enter "N" to deselect ASCII map output format.

### Default Input Directory, Output Pathname

1. Enter the input pathname for the COADS data including the CD-ROM or hard disk drive as shown in the examples in Figures 13 and 14.

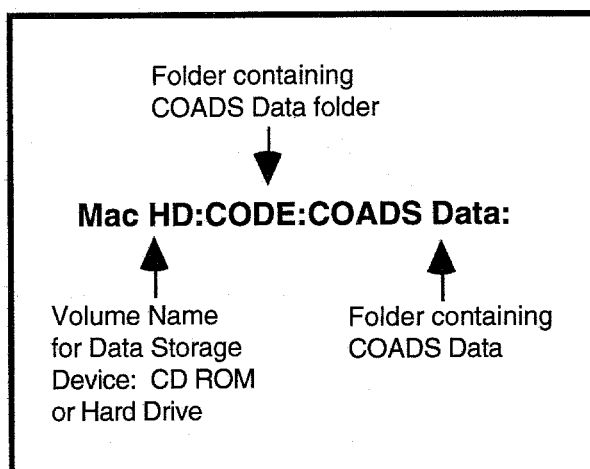
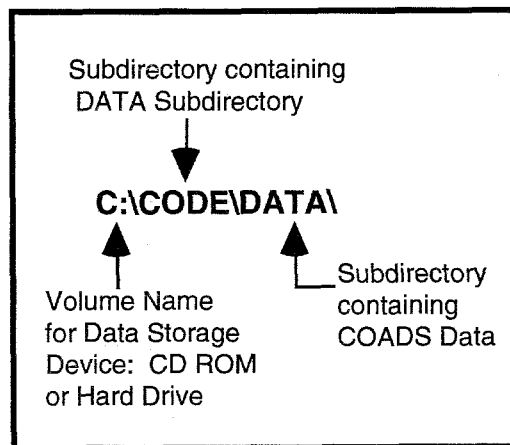
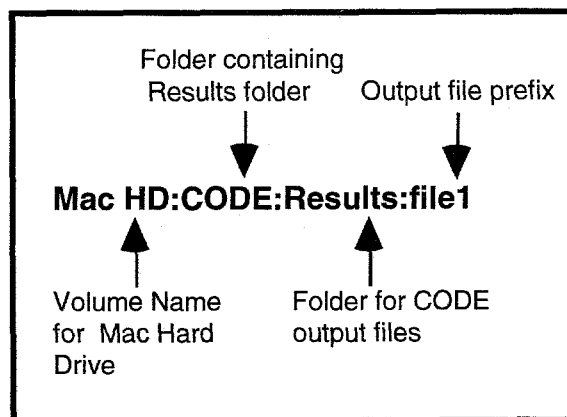


Figure 13 - Macintosh



**Figure 14 - PC**

2. Enter the pathname for the CODE output file as shown in the examples in Figures 15 and 16.



**Figure 15 - Macintosh**

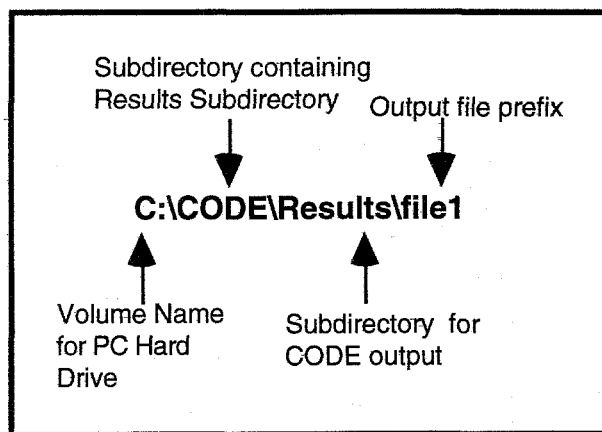


Figure 16 - PC

### Save and Exit

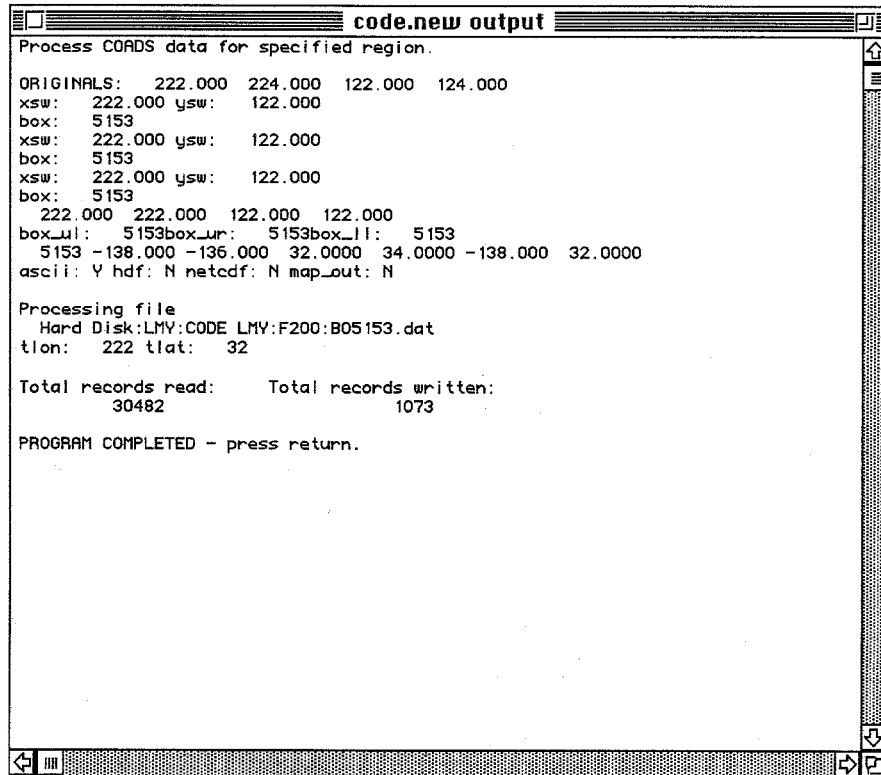
Save and then exit CODE.PRM.

### Starting CODE.EXE on the Mac

1. Double-click the CODE.EXE icon.
2. The CODE.EXE output window appears and the data files read by CODE are listed. See Figure 17.

**NOTE:** Figure 17 shows the output window *after* CODE has completed the data extraction.

3. The extraction is done when the message **PROGRAM COMPLETED** appears in the output window.
4. Save the output file if you want a record of the data files processed.
5. Exit the output window.



```
code.new output
Process COADS data for specified region.
ORIGINALS: 222.000 224.000 122.000 124.000
xsw: 222.000 ysw: 122.000
box: 5153
xsw: 222.000 ysw: 122.000
box: 5153
xsw: 222.000 ysw: 122.000
box: 5153
222.000 222.000 122.000 122.000
box_ul: 5153box_lr: 5153box_ll: 5153
5153 -138.000 -136.000 32.0000 34.0000 -138.000 32.0000
ascii: Y hdf: N netcdf: N map_out: N

Processing file
Hard Disk:LMY:CODE LMY:F200:B05153.dat
tlon: 222 tlat: 32

Total records read:      Total records written:
      30482                      1073

PROGRAM COMPLETED - press return.
```

Figure 17 - CODE.EXE Output Window

### Starting CODE.EXE on the PC

Type "code.exe" at the DOS prompt. The files processed by CODE during the data extraction are listed on the screen. The extraction is complete when the DOS prompt appears on the screen.



---

## Chapter 3: CODE Reference

This chapter provides a detailed description of CODE operation. The descriptions presented in this chapter are based on the choices available in the Mac-only CODE window. In some cases, the choices available in this version of CODE do not match those in the PC/Mac version. The significant differences between the two programs are explained.

### Space Settings

**NOTE:** In CODE.PRM, Space Settings are included in "Define Region" and "Define Space Step for the Means".

Space Settings include North Latitude, South Latitude, East Longitude, West Longitude, and Space Interval. These data fields allow you to specify the boundaries of the ocean region and the space interval over which the data will be averaged. Figure 1 shows the four choices for the space interval. Each file within the COADS dataset contains data for a 2° x 2° ocean square defined by *even* numbered latitude and longitude values. All of the files represent the entire area in which data was collected. The latitude/longitude (lat/lon) values and the space interval must be chosen carefully to obtain accurate results, and in some cases, you must perform manual calculations to get the expected output. The section, **Getting Accurate Results with Space Settings**, describes these special cases.

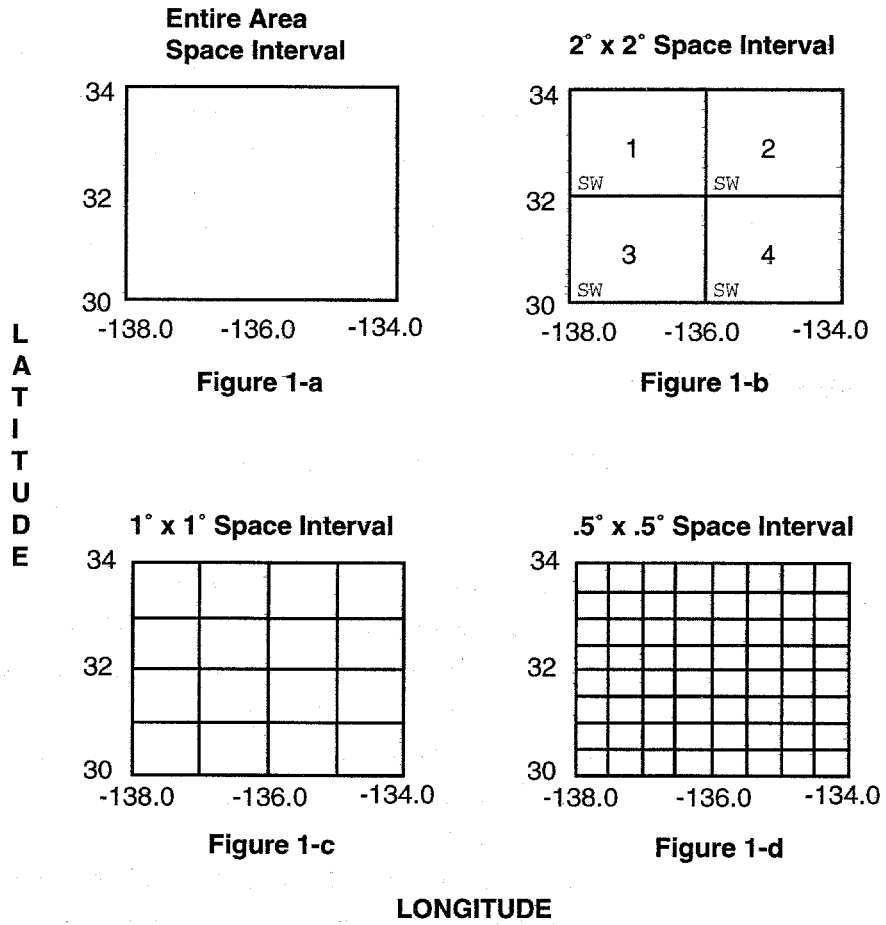


Figure 1

## Latitude and Longitude

The following lat/lon values are accepted by CODE:

### Latitude

- $-90^{\circ}$  to  $+90^{\circ}$  where " - " refers to an area south of the equator and " + " refers to an area north of the equator
- Even and Odd values  $\pm.5$ , for example  $30.5^{\circ}$

### Longitude

- $-180^{\circ}$  to  $+180^{\circ}$  where " - " refers to an area west of the Greenwich meridian and " + " refers to an area east of the Greenwich meridian
- Even and Odd values  $\pm.5$ , for example  $-138.5^{\circ}$

It is important to understand exactly what area is being defined when entering lat/lon values. For example, to define the area in Figure 1-b, the following lat/lon values must be entered:

North Latitude:	34	South Latitude:	30
West Longitude:	-138	East Longitude:	-134

In Figure 1-b, the area is divided into four  $2^{\circ} \times 2^{\circ}$  squares with southwest corners indicated by "SW". The southwest corner is used as the origin for each square. The data is averaged over each of these squares, and the output file will include data for each of the four squares as follows:

<b>Square 1</b>	Data from $2^{\circ} \times 2^{\circ}$ box with SW corner:	Longitude:	-138
		Latitude:	32
<b>Square 2</b>	Data from $2^{\circ} \times 2^{\circ}$ box with SW corner:	Longitude:	-136
		Latitude:	32
<b>Square 3</b>	Data from $2^{\circ} \times 2^{\circ}$ box with SW corner:	Longitude:	-138
		Latitude:	30
<b>Square 4</b>	Data from $2^{\circ} \times 2^{\circ}$ box with SW corner:	Longitude:	-136
		Latitude:	30

### Space Interval (or Step)

The space interval defines the area over which the means (and variances) are calculated. The following choices are available:

**NOTE:** In CODE.PRM, 1= No Step, selects Entire Area.

- Entire Area
- 2° x 2°
- 1° x 1°
- .5° x .5°

For a given region, as shown in Figure 1, the amount of data output increases as the space interval gets smaller. For the area in Figure 1-a, a single mean is calculated for each parameter. For the area in Figure 1-d, a mean is calculated for each parameter in every .5° x .5° square for a total of sixty four means per parameter.

### Getting Accurate Results with Space Settings

#### Defining Irregular Areas with CODE.PRM

**NOTE:** This function is available only in PC/Mac CODE.

This function allows you to define an irregular shaped area, such as along a coastline, for the data extraction. See Figure 2. The Space Step, "1=no step (all area)", must be selected when using this function. Perform the following steps to define an irregular shaped area:

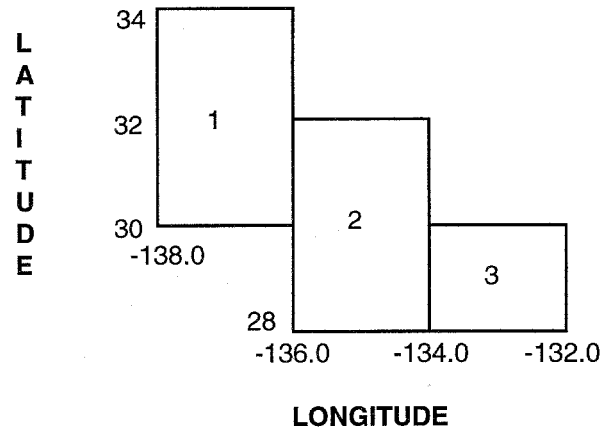


Figure 2

**NOTE:** The area in Figure 2 is used as an example in the following steps.

1. In the "Define Region" field, enter "3" to specify the three rectangles in Figure 2.
2. Enter the following lat/lon values for the three rectangles:

**NOTE:** CODE does not allow overlapping of lat/lon values and the rectangles must be entered in a North-South and West-East order.

- **Rectangle 1**

Longitude, Western Boundary:	-138
Longitude, Eastern Boundary:	-136
Latitude, Southern Boundary:	30
Latitude, Northern Boundary:	34

- **Rectangle 2**

Longitude, Western Boundary:	-136
Longitude, Eastern Boundary:	-134
Latitude, Southern Boundary:	28
Latitude, Northern Boundary:	32

- **Rectangle 3**

Longitude, Western Boundary:	-134
Longitude, Eastern Boundary:	-132
Latitude, Southern Boundary:	28
Latitude, Northern Boundary:	30

3. In the "Define Space Step for the Means" data field, select "1" for "no step (all area)".
4. Finish making selections in CODE.PRM as described in Chapter 2, Getting Started, and run the CODE program.

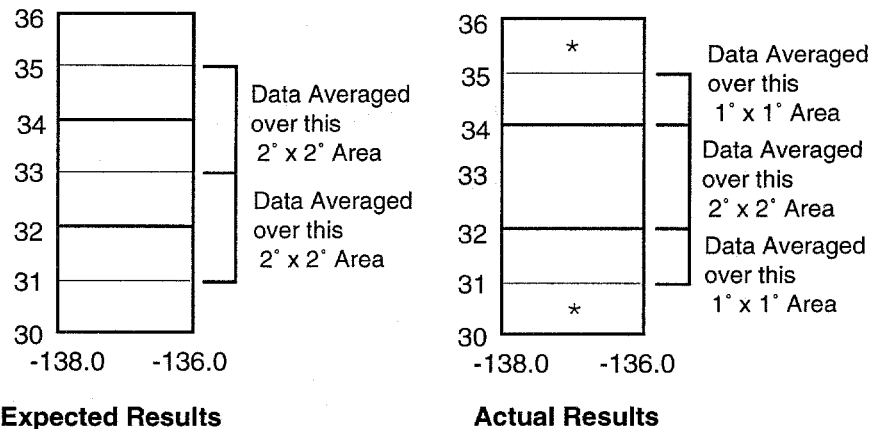
### Selecting Lat/Lon and Space Interval

The following combinations of lat/lon values and space intervals are possible with CODE. An asterisk indicates a special case that will produce inaccurate results unless the space interval is changed. These special cases are explained below.

	Even Lat/Lon	Odd Lat/Lon	Even/Odd ± .5 Lat/Lon
Entire Area	X	X	X
2° x 2° Square	X	*	*
1° x 1° Square	X	X	*
.5° x .5° Square	X	X	X
X=Accurate Results		*=See below for explanation	

The following space settings were selected for the example in Figure 3:

N Lat: 35  
 S Lat: 31  
 W Lon: -138  
 E Lon: -136  
 Space Interval: 2° x 2°

**2° x 2° Space Interval****Figure 3**

Based on this input, the *expected* results would include data averaged over the following:

- 2° x 2° square with SW corner -138 and 31
- 2° x 2° square with SW corner -138 and 33

However, in this case, CODE looks for the 2° x 2° data files defined by *even* numbered lat/lon's that contain data for the entered area. For this example, three files are processed containing data for the following areas:

- 2° x 2° square with SW corner -138 and 30
- 2° x 2° square with SW corner -138 and 32
- 2° x 2° square with SW corner -138 and 34

Data found *outside* the specified lat/lon values (indicated by the asterisk in Figure 3) are *not* included in the average but may appear in the output file as -9999.99.

To obtain the expected results, you can either select a smaller space interval and perform a few manual calculations, or perform multiple extracts using "Entire Area" as the space interval. These two options are described here:

### Selecting a Smaller Space Interval

1. Enter the same lat/lon values:  
     N Lat:           35  
     S Lat:           31  
     W Lon:          -138  
     E Lon:          -136
2. Select a *smaller* space interval:  
     Space Interval:  1° x 1°
3. Perform the data extraction.
4. The output file will include data for the areas indicated in Figure 4. Data from the area indicated by the asterisk may appear in the output file as -9999.99.

#### 1° x 1° Space Interval

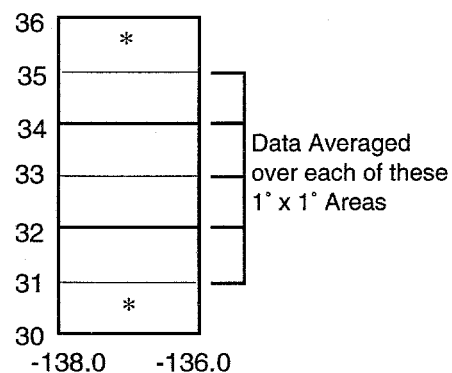


Figure 4



5. To obtain averages for

- $2^\circ \times 2^\circ$  square with SW corner -138 and 31  
and
- $2^\circ \times 2^\circ$  square with SW corner -138 and 33,

use the average and the number of observations given in the output file for each of the four  $1^\circ \times 1^\circ$  squares to compute the desired averages for the two  $2^\circ \times 2^\circ$  squares.

### Selecting "Entire Area" and Performing Multiple Extractions

1. Enter the following lat/lon values:

N Lat:           33  
S Lat:           31  
W Lon:          -138  
E Lon:          -136

2. Select "Entire Area" for the space interval.

3. Perform the data extraction.

4. The output file will include data for the area labeled Extraction 1 in Figure 5. Data from the area indicated by the asterisk may appear in the output file as -9999.99.

5. Enter the following lat/lon values:

N Lat:           35  
S Lat:           33  
W Lon:          -138  
E Lon:          -136

6. Select "Entire Area" for the space interval.

7. Perform the data extraction.

8. The output file will include data for the area labeled Extraction 2 in Figure 5. Data from the area indicated by the asterisk may appear in the output file as -9999.99.

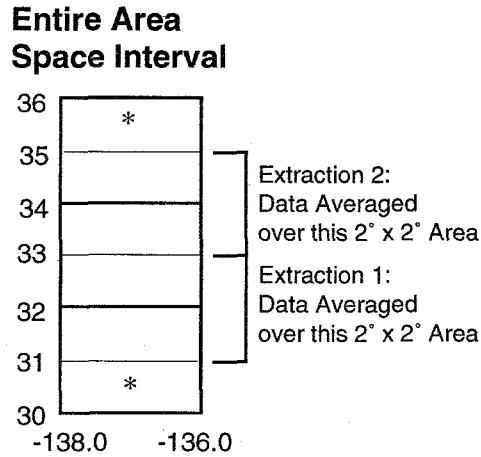


Figure 5

## Time Settings

**NOTE:** In CODE.PRM, Time Settings are included in "Define Time Period" and "Define Time Step for the Means".

Time Settings include Start Year, End Year, and Time Interval. These data fields allow you to define the time period in years and the time interval (yearly or monthly) for the data extraction. In the beta version of CODE, it is not possible to extract data for a time period smaller than a month.

### Start Year and End Year

Any year from 1854 to 1990 is accepted by CODE.

### Time Interval (or Step)

The following time intervals are accepted by CODE:

- **Year:** data is averaged for the start year, end year, and all years in between.
- **Month:** data is averaged for every month in every year.

## Landlocked Flag

**NOTE:** This option is available only in PC/Mac CODE.

Data for rivers and lakes are flagged as landlocked in the COADS dataset. To include landlocked data in the extraction, enter "Y", or to ignore landlocked data, enter "N".

## Selected Parameters

This option allows you to select the parameters for the CODE extraction.

The following parameters (•) and parameter flags (-) can be selected:

- Sea Surface Temperature
  - Trimming
  - Instrument
- Air Temperature and Dew Point Depression
  - Trimming
  - Precision
- Wind Variables include: Wind Components, Wind Speed, Wind Speed Cubed, and Pseudo-Stress
  - Trimming
  - Measurement Device
  - Compass Type
- Sea Level Pressure
  - Trimming
- Ship Type

The parameters and associated flags are described below under the appropriate heading. Parameter flags allow you to perform an extraction on a subset of the data. The "trimming" flag is common to all parameters and is described only once to avoid redundancy. In the

Mac-only version of CODE, select the window's **CANCEL** button to cancel any changes made to a parameter window.

### **Trimming Flag**

As described in COADS Release 1 documentation, during the generation of the COADS CMR.5 dataset: "variables outside 2.8 or 3.5 (trimmed from statistics) estimated standard-deviations about a smoothed median were retained but flagged in a fixed-length format."

The following trimming choices are available:

**NOTE:** Only one trimming flag can be selected at a time.

- **All:** means and variances are computed for all parameter data
- **±3.5s:** means and variances are computed for parameter data within ±3.5 estimated standard deviations
- **±2.8s:** means and variances are computed for parameter data within ±2.8 estimated standard deviations
- **Outside s:** means and variances are computed for data outside 2.8 or 3.5 estimated standard deviations

### **SST (Sea Surface Temperature)**

Sea Surface Temperature output is in degrees Celsius and the mean is calculated to the nearest .1°. Trimming and Instrument flags can be selected for Sea Surface Temperature. See above for description of Trimming.

### **Instrument Flag**

The Instrument Flag allows you to select data for CODE processing based on the method used to collect sea surface temperature. The following choices are available:

**NOTE:** Any combination of the following can be selected.

- **Unknown:** The instrument used to collect sea surface temperature is unknown.
- **Bucket:** The bucket method was used to collect sea surface temperature data.
- **Implied Bucket:** The method used to collect sea surface temperature data was not recorded; however, based on historical knowledge, it is assumed to be the bucket method.

### **Air Temperature**

Air Temperature and Dew Point Depression parameters can be selected; output is in degrees Celsius. Trimming and Precision flags can be selected for both parameters. See above for description of Trimming.

#### **Precision Flag**

The Precision flag allows you to select data for CODE processing based on the original precision and units used to record air temperature and dew point depression. The following choices are available:

**NOTE:** Any combination of the following can be selected.

- **°C and .1 °C:** degrees Celsius and tenths
- **°C:** whole degrees Celsius
- **.5° C:** half degrees Celsius
- **°F and .1°F:** degrees Fahrenheit and tenths
- **°F:** whole degrees Fahrenheit
- **.5°F:** half degrees Fahrenheit

### Wind Variables

The following Wind Parameters can be selected:

- **East-West and North-South Wind Components**, output is in meters/sec
- **Scalar Wind Speed**, output is in meters/sec  
Wind speed is calculated by taking the Euclidean Distance of the two components for each observation, and averaging these values .
- **Wind Speed Cubed**, output is in m<sup>3</sup>/sec<sup>3</sup>  
Wind speed cubed is calculated by cubing the scalar wind speed calculated from each observation, and then averaging the result.
- **East-West and North-South Pseudo-Stress**, output is in m<sup>2</sup>/sec<sup>2</sup>  
Pseudo-Stress is calculated by averaging the following components:

$$\tau^x = 1/N \sum_{i=1}^N [W_i^x]^2 \quad \text{and} \quad \tau^y = 1/N \sum_{i=1}^N [W_i^y]^2$$

where  $W_i$  is the wind velocity of the  $i$ th observation of a total of  $N$  being considered, and  $W_i^x$ ,  $W_i^y$  the zonal and meridional wind components, respectively. To obtain a dimensionally correct value of wind stress,  $\tau^x$  and  $\tau^y$  must be multiplied by an air density and drag coefficient.

Trimming, Measurement Device, and Compass Type flags can be selected for all parameters. See above for description of Trimming.

#### Measurement Device

The Measurement Device flag allows you to select data for CODE processing based on the method used to collect wind speed data. The following choices are available:

**NOTE:** One or both of the following choices *must* be selected.

- **Estimated or Unknown:** Wind data were either estimated or an unknown method of data collection was used.
- **Measured:** Wind variables were measured.

### **Compass Type**

The Compass Type flag allows you to select data for CODE processing based on the compass type used to record wind data. The following choices are available:

**NOTE:** Any combination of the following can be selected.

- 8 pt
- 32 pt
- 36 pt
- 360 pt
- 16 of 32 pt
- 16 of 36 pt

### **Sea Level Pressure**

Sea Level Pressure output is in mb. The Trimming flag can be selected for Sea Level Pressure. See above for description of Trimming.

### **Ship Type**

The type of observing vessel used to collect the data can be selected. In CODE.PRM entering "N" for Ship Type will select all ship types. In the Ship Type window, deselecting "Select by Ship Type" selects all ship types. To select specific ship types, choose "Select by Ship Type" and then select the specific vessel(s). The following choices are available:

- **US Navy or Unknown**
- **Merchant or Foreign Military**
- **Research**
- **Lightship**
- **Buoy**
- **Ocean Station - off station or station proximity unknown**
- **Ocean Station - on station**
- **XBT or MBT (Expendable or mechanical bathythermograph)**

## **File Locations**

This option lets you specify the pathname for COADS data and CODE output as well as the prefix for the output file.

### **Data Directory**

#### **Macintosh**

The pathname for the COADS data must be entered as shown in the example in Figure 6.

**NOTE:** Data accessed by CODE during a data extraction must be located on a single hardware storage device.



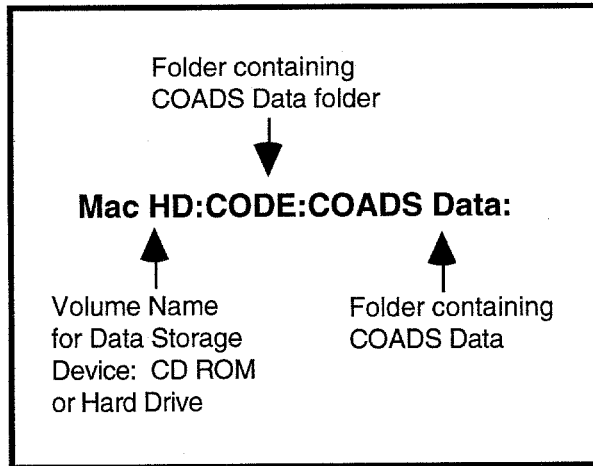


Figure 6

### PC's running MS-DOS

The pathname for the COADS data must be entered as shown in the example in Figure 7.

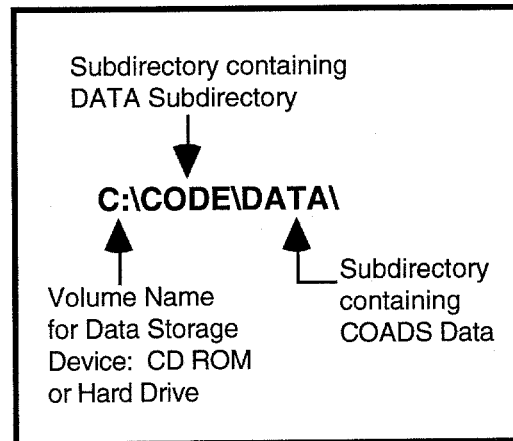


Figure 7

## Output Directory

### Macintosh

The pathname for CODE output must be entered as shown in the example in Figure 8.

**NOTE:** If you are making selections in CODE.PRM, the output file prefix must also be specified in the pathname.

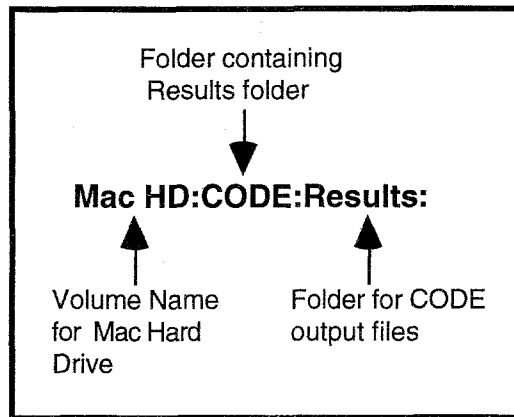


Figure 8

### PC's running MS-DOS

The pathname for CODE output and the output file prefix must be entered as shown in the example in Figure 9.

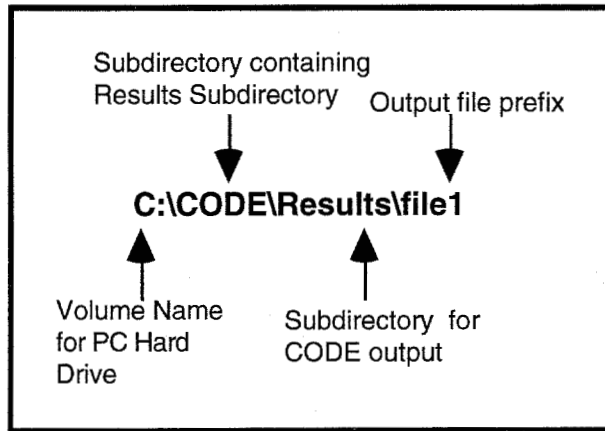


Figure 9

### Output File Prefix

**NOTE:** A separate field for specifying the output file prefix is available only in the Mac CODE window. In CODE.PRM, the prefix is part of the output pathname.

This field allows you to enter the output file prefix. An error message will occur if a file already exists in the specified folder with the selected prefix. The output file suffix is assigned by CODE based on the type of output requested.

### Output Format

This option allows you to specify the format for CODE output files. The files are meant to be imported into spreadsheet and graphics applications for editing and analysis. A summary of the selections made in the CODE window or in CODE.PRM is included in the output file for all formats. Annotations included in HDF and netCDF files follow some of the conventions established by the Pacific Marine Environmental Laboratory for their EPIC program. Output files in any

or all of the formats can be generated from a single data extraction. The four formats available are described below:

If you plan on running large data extractions, make sure you have sufficient space available on the hard drive. CODE will *crash without displaying any warning messages* if there is not enough space for temporary scratch files and the output files. The CODE hard disk drive requirement of at least 40 MBs free should be sufficient for most data extractions. If you plan on extracting data from a large area over many time intervals and have specified netCDF, HDF, or ASCII Map format, you may want to perform the following calculation:

(# of latitude intervals) x (# of longitude intervals) x (# of time intervals)

CODE will crash if the result of this calculation exceeds 789,120.

### **ASCII**

These files can be read by any application that accepts tab delimited input. A file with the suffix ".ANN" for annual is created when "Year" is selected as the time interval. This file lists the means and number of observations for each parameter within the selected space interval for every specified year. If "Month" is selected as the time interval, two files are created: one with the suffix ".MON" and one with the suffix ".ANN". Both files list the means and number of observations for each parameter within the selected space interval for every month in the specified years. The only difference between the two files is the way the data is ordered.

Data outside the specified lat/lon boundary *or* missing data is represented as -9999.99.

## Map

These files are ASCII format and can be read by any application that accepts tab delimited input. When this output format is selected, a file for each parameter is created. The filename is as follows:

file prefix.parameter.map

For example, if you select Sea Surface Temperature and Air Temperature parameters and specify "FILE1" as the file prefix, the two files created will be:

FILE1.SST.map

FILE1.AIR\_TEMPERATURE.map

The data in these files are ordered in a map-like form as follows:

<u>LAT/LON</u>	_____ 28.0 (lon)
34.0(lat)	18.71 (parameter mean)

Data outside the specified lat/lon boundary *or* missing data is represented as -9999.99. Large temporary scratch files are created and automatically deleted during the generation of map files. These files are created on the volume from which the program is run, and may use a large amount of space. It is important that adequate space is available for these files.

## Hierarchical Data Format (HDF)

These files are in HDF format, which is a binary format for storing data and images. The filename is as follows:

file prefix.hdf

CODE HDF files include the mean, variance, and number of observations for all selected parameters. These files can be imported

into Spyglass Transform or Spyglass Dicer. In Spyglass Transform, latitude and longitude will be transposed; to reverse them, select the TRANSPOSE option.

**NOTE:** For experienced HDF users, each parameter is treated as a separate SDS.

Large temporary scratch files are created and automatically deleted during the generation of HDF files. These files are created on the volume from which the program is run, and may use a large amount of space. It is important that adequate space is available for these files.

### **netCDF**

These files are in the netCDF format developed by Unidata for the transparent sharing of data across a network. The filename is as follows:

file prefix.nc

CODE netCDF files include the mean, variance, and number of observations for all selected parameters. Large temporary scratch files are created and automatically deleted during the generation of netCDF files. These files are created on the volume from which the program is run, and may use a large amount of space. It is important that adequate space is available for these files.

## Chapter 4: Troubleshooting

This chapter lists error messages that may occur during CODE execution. In the Mac-only version of CODE, when an *input* error message appears, you can click on OK, and return to the CODE window to correct the error. In the PC/Mac version of CODE, when an *input* error message appears, the program briefly pauses to allow you to stop by pressing "ctrl-c". After stopping the program, return to CODE.PRM to correct the error. During the extraction process, error messages are displayed, but the program does not terminate. Data for any areas associated with the error messages will be missing from the output file. To terminate CODE during the extraction process in the Mac-only version, try pressing "control-option-command-esc". To terminate extraction in the PC/Mac version, press "ctrl-c".

ERROR: North Latitude is below South Latitude

**Solution:** Check latitude input and enter correct values.

ERROR: West Longitude is East of East Longitude

**Solution:** Check longitude input and enter correct values.

ERROR: Inconsistent Time Values Given

**Solution:** Check Start Year and End Year input and enter correct values.

ERROR: Illegal Space Step Given

**Solution:** Check Space Step input and enter correct value.

ERROR: Illegal Time Step Given

**Solution:** Check Time Step input and enter correct value. In CODE.PRM, "3" is not available in the beta version of CODE.

ERROR: Illegal Parameter Flag - Must be "Y" or "N"

**Solution:** Use uppercase "Y" or "N".

ERROR: Illegal Trim Flag - Must be "A", "B", "C", "D"

**Solution:** Use uppercase "A", "B", "C", or "D".

ERROR: Illegal Instrument Flag - Must be "Y" or "N"

**Solution:** Use uppercase "Y" or "N".

ERROR: SST Selected but no instrument selected

**Solution:** Select at least one instrument flag.

ERROR: Illegal Precision Flag - Must be "Y" or "N"

**Solution:** Use uppercase "Y" or "N".

ERROR: Air Temperature Selected but no precision selected

**Solution:** Select at least one precision flag.

ERROR: Illegal Compass Flag - Must be "Y" or "N"

**Solution:** Use uppercase "Y" or "N".

ERROR: Wind Variable Selected but no compass type selected

**Solution:** Select at least one compass type flag or deselect by Compass Type.



ERROR: Illegal Wind Measurement Flag: Must be "Y" or "N"

**Solution:** Use uppercase "Y" or "N".

ERROR: Wind Variable Selected but no measurement type selected

**Solution:** Select at least one wind measurement flag.

ERROR: Illegal Ship Type Flag: Must be "Y" or "N"

**Solution:** Use uppercase "Y" or "N".

ERROR: No Ship Type Selected

**Solution:** Select a ship type or deselect by Ship Type.

ERROR: Illegal Output File Flag: Must be "Y" or "N"

**Solution:** Use uppercase "Y" or "N".

ERROR: No Output File Type Selected

**Solution:** Select output file format.

ERROR: Creating Output File - Check Pathname

**Solution:** An existing file has the same name, or specified volume or folder does not exist. Enter a new file prefix, or specify correct volume or folder name.

ERROR: Opening Data File - Check Pathname and Lat.-Long. Input

**Solution:** Enter the correct input directory pathname. Check lat/lon input and enter correct values.

ERROR: One of the Latitude or Longitude Values out of Range

**Solution:** Check lat/lon input and enter as follows:

Latitude

- $-90^{\circ}$  to  $+90^{\circ}$  where " - " refers to an area south of the equator and " + " refers to an area north of the equator
- Even and Odd values  $\pm.5$ , for example  $30.5^{\circ}$

Longitude

- $-180^{\circ}$  to  $+180^{\circ}$  where " - " refers to an area west of the Greenwich meridian and " + " refers to an area east of the Greenwich meridian
- Even and Odd values  $\pm.5$ , for example  $-138.5^{\circ}$

ERROR: None of the parameters are selected for retrieval

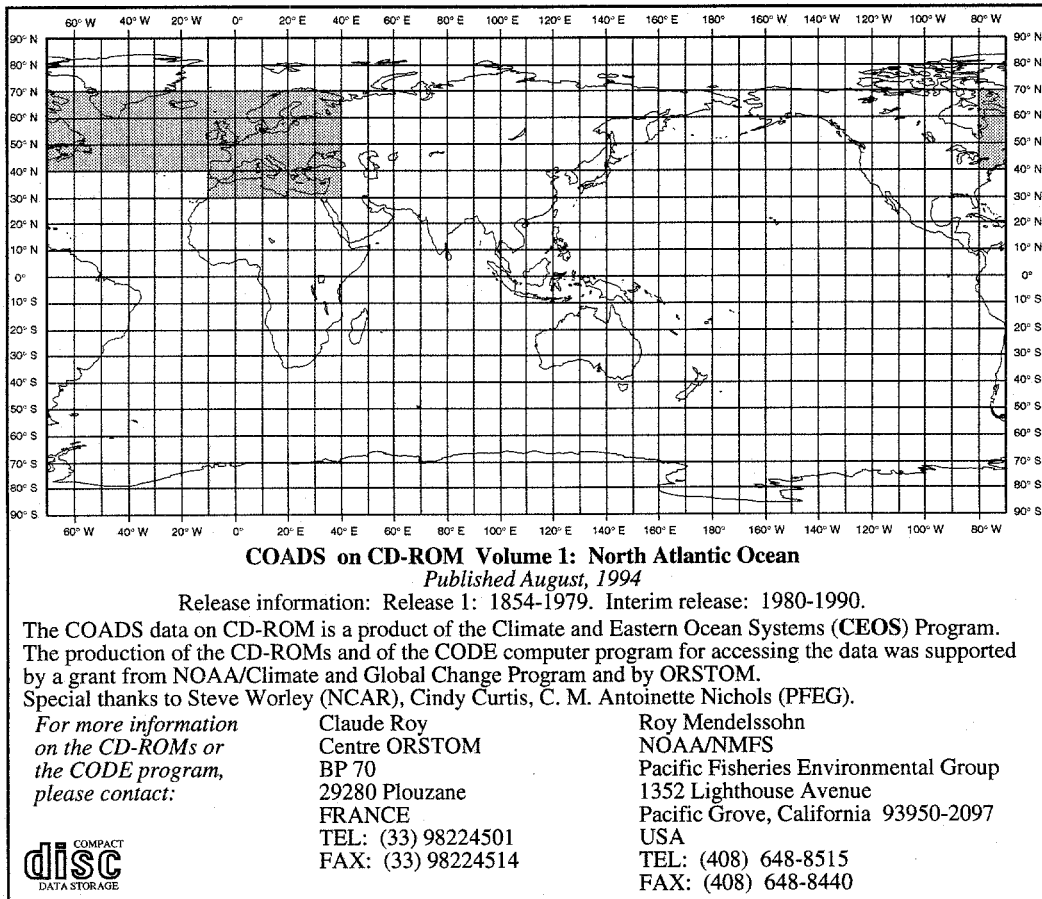
**Solution:** Select at least one parameter.

ERROR: Not enough memory available for HDF, NetCDF or ASCII  
Map options

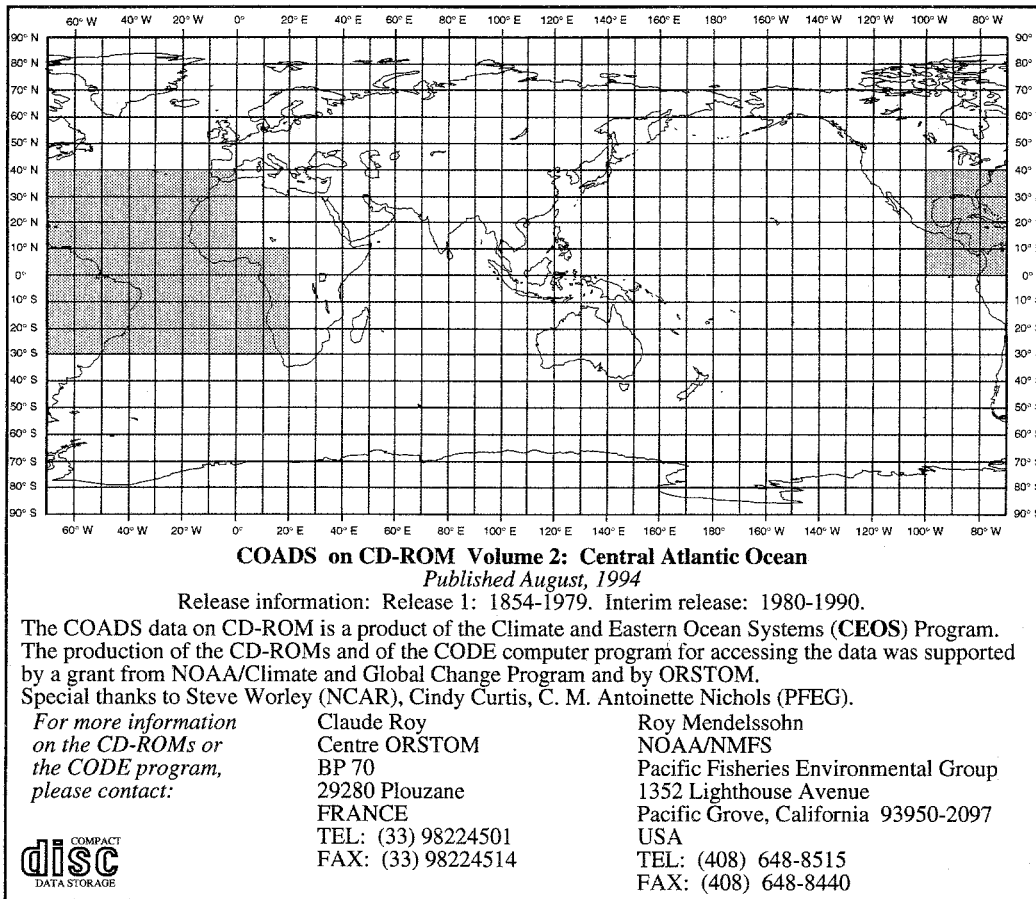
**Solution:** The calculation:

(# of latitude intervals) x (# of longitude intervals) x (# of time intervals)

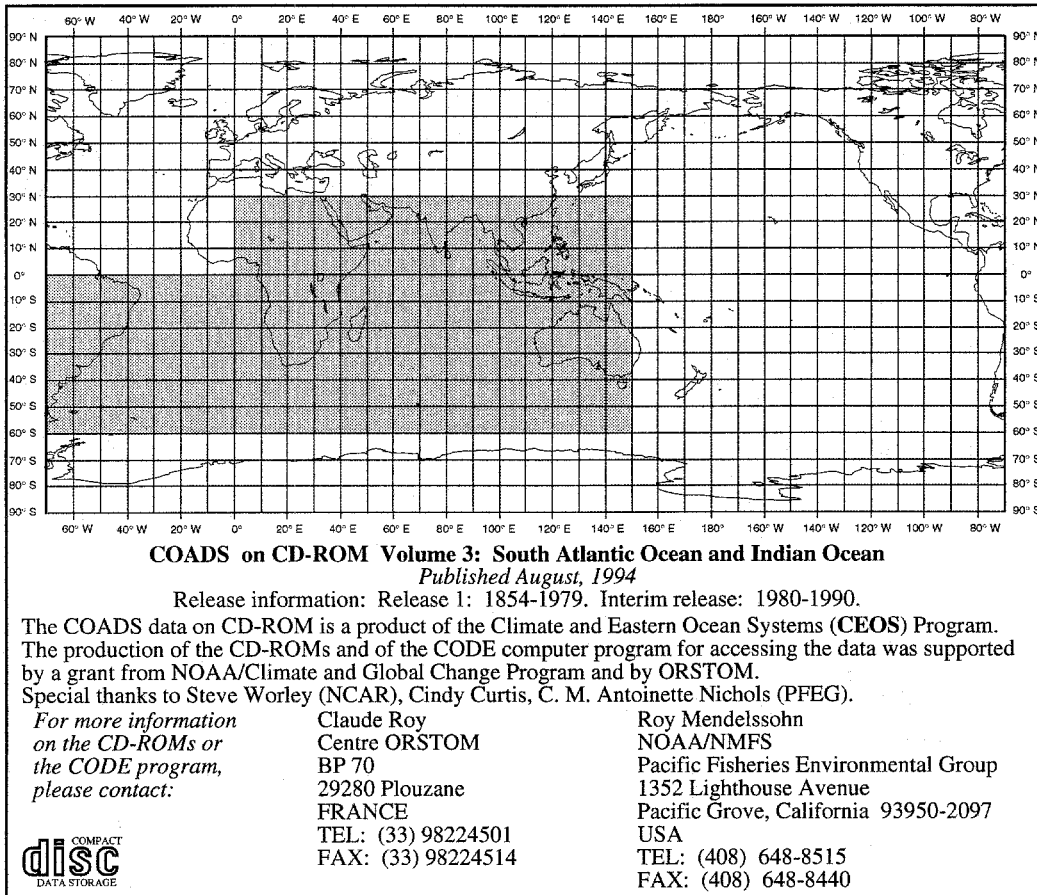
exceeds 789,120. Reduce either the size of the region or the number of time intervals.



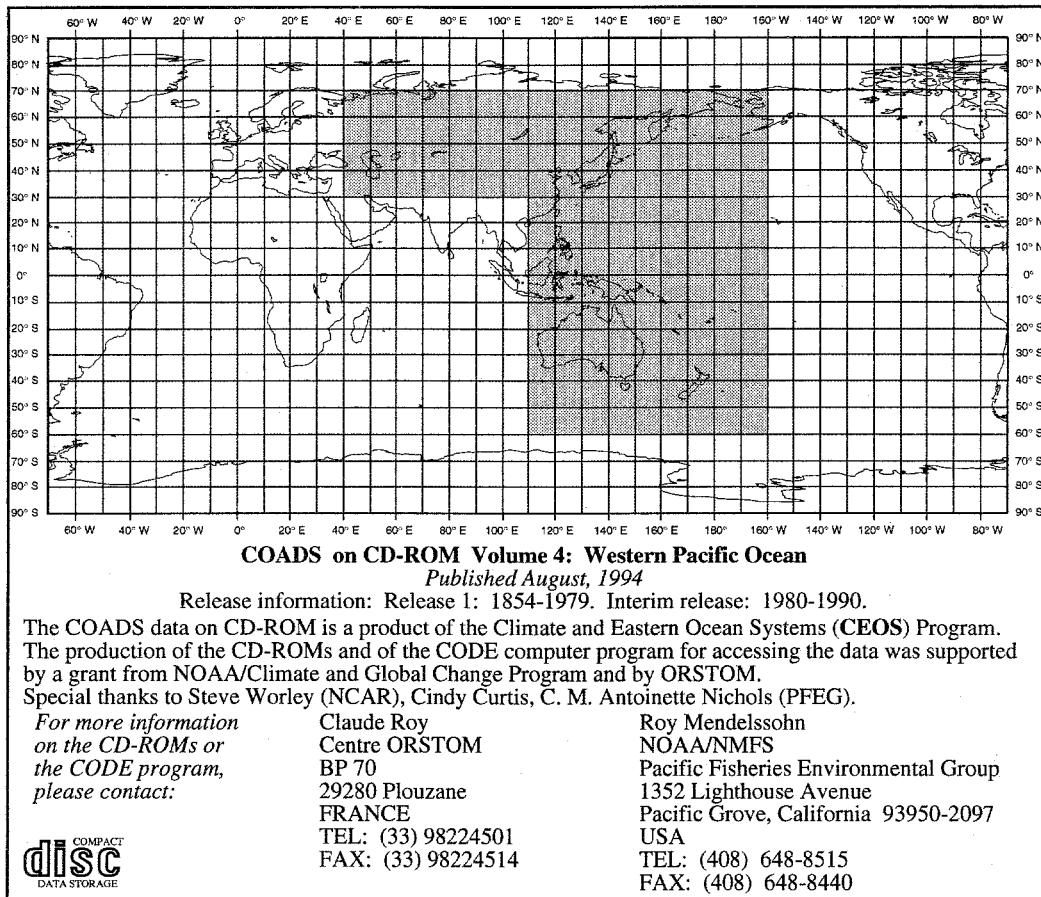
Map 1. Locations of Data Contained on Volume 1.



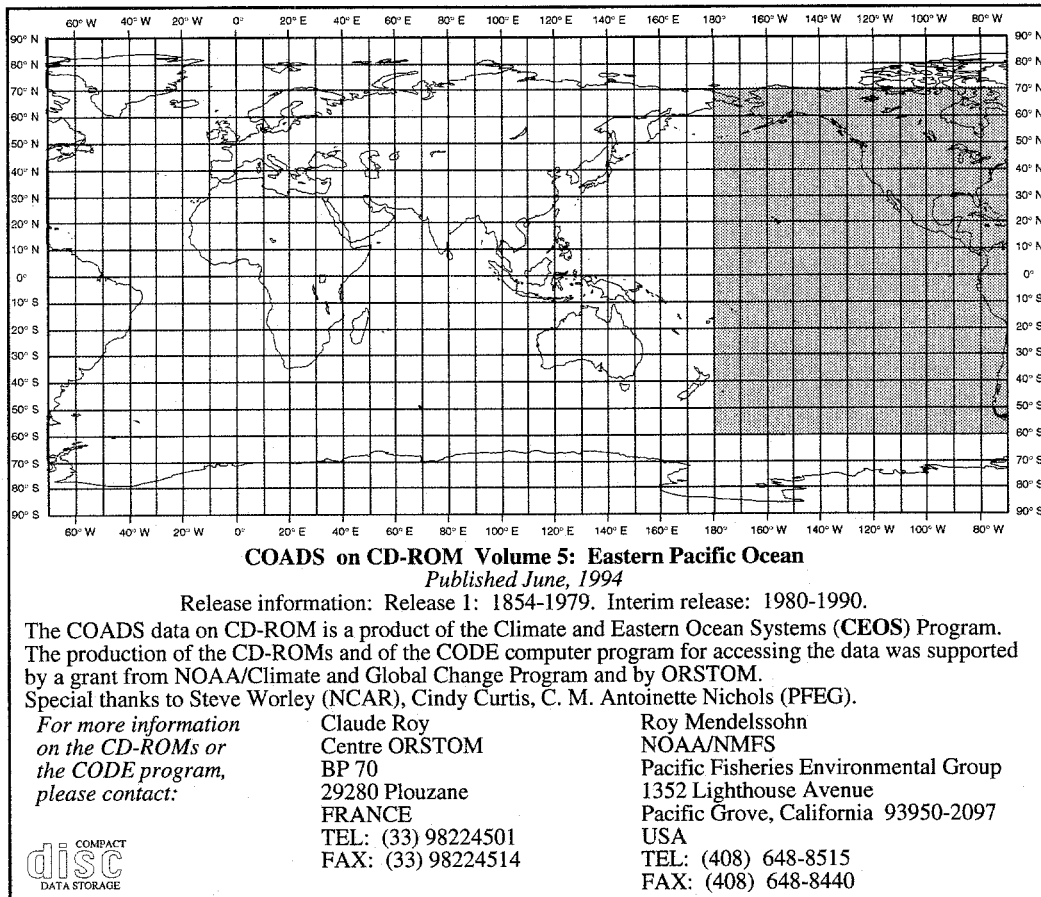
Map 2. Locations of Data Contained on Volume 2.



Map 3. Locations of Data Contained on Volume 3.



Map 4. Locations of Data Contained on Volume 4.



Map 5. Locations of Data Contained on Volume 5.





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## **Index**

Air Temperature, 17, 27, 45  
ASCII, 52

CD-ROM, 5, 7  
CEOS Project, 3  
CMR.5, 1, 3, 5  
COADS, 1, 3, 5  
COADS limitations, 3  
COADS Release 1 document, 3  
CODE, 3, 5, 10  
CODE Input, 6  
CODE Output, 6  
CODE User's Guide, 4, 5  
CODE window, 11  
CODE.EXE, 8, 10, 24, 31, 32  
CODE.MSG, 8  
CODE.PRM, 8, 10, 24  
Compass Type, 47  
Cooperative Institute for Research in Environmental Sciences, 1

Data Directory, 21, 48  
Default Input Directory, Output Pathname, 29  
Define Region, 26  
Define Space Step for the Means, 26  
Define Time Period, 26  
Define Time Step for the Means, 27  
Defining Irregular Areas with code.prm, 36  
Dew Point Depression, 45

East-West and North-South Pseudo-Stress, 46  
East-West and North-South Wind Components, 46  
Environmental Research Laboratories, 1  
EPIC, 51  
error messages, 55  
Extract, 22  
Extract Log, 23

File Locations, 21, 48

Hierarchical Data Format (HDF), 53

Installation, 7

Instrument Flag, 44

Landlocked Flag, 43

Landlocked Flag and Trimmed Flags, 27

Latitude and Longitude, 12, 35

Long Marine Reports, 1

Macintosh-only CODE, 11

Map, 53

Measurement Device, 46

National Center for Atmospheric Research, 1

National Climatic Data Center, 1

National Oceanic and Atmospheric Administration, 1

netCDF, 54

Output Directory, 21, 50

Output File Prefix, 22, 51

Output Format, 22, 51

Output Options, 29

Pacific Marine Environmental Laboratory, 51

Parameters, 15, 43

PC/Mac CODE, 24

Precision Flag, 45

Quit, 23

Save and Exit, 31

Scalar Wind Speed, 46

Sea Level Pressure, 19, 28, 47

Sea Surface Temperature, 27

Selecting Lat/Lon and Space Interval, 38

Ship Type, 20, 28, 47

Space Interval, 13

Space Interval (or Step), 36

Space Settings, 12, 33

Spyglass Dicer, 54

Spyglass Transform, 54

SST (Sea Surface Temperature), 16, 44

Start Year and End Year, 14, 42

System Requirements, 7

temporary scratch files, 53, 54

Time Interval, 14

**CODE User's Guide**

Time Interval (or Step), 42

Time Settings, 14, 42

Trimming Flag, 44

Troubleshooting, 55

Unidata, 54

Wind Parameters, 28

Wind Speed Cubed, 46

Wind Variables, 18, 46

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