A USER'S GUIDE TO THE ICE-OCEAN FORECAST SYSTEM (IOFS)

B.M. DeTracey and C.L. Tang

Ocean Sciences Division
Maritimes Region
Fisheries and Oceans Canada

Bedford Institute of Oceanography
P.O. Box 1006
Dartmouth, Nova Scotia
Canada B2Y 4A2

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Coastal Ocean Science Section
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P.O. Box 1006
Dartmouth, Nova Scotia
Canada, B2Y 4A2

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ABSTRACT

DeTracey, B.M. and C.L.Tang. 1996. A user's guide to the ice-ocean forecast system (IOFS). Can. Tech. Rep. Hydrogr. Ocean. Sci. 181: 22 + iv pp.

This report is a user's guide to an ice-ocean forecast system. The forecast model consists of a baroclinic ocean component, and an ice component coupled to the ocean through a surface Ekman layer. A graphical user interface written in Microsoft Visual Basic serves as the front end for the forecast model. Sea-ice motion and ocean currents are forced by 6-hourly forecast surface wind and barometric pressure received from the Canadian Meteorological Centre. The initial ice condition for the model is based on ice charts received from the Canadian Ice Service. The report describes in detail the graphical user interface.

RÉSUMÉ

DeTracey, B.M. and C.L.Tang. 1996. A user's guide to the ice-ocean forecast system (IOFS). Can. Tech. Rep. Hydrogr. Ocean. Sci. 181: 22 + iv pp.

Le présent rapport est un guide d'utilisation d'un système de prévision des glaces de mer. Le modèle de prévision comporte une composante océanique baroclinique et une composante relative aux glaces qui est couplée à l'océan par l'intermédiaire d'une couche superficielle d'Ekman. Une interface utilisateur graphique écrite en Visual Basic de Microsoft sert de système frontal pour le modèle de prévision. Le déplacement des glaces et les courants océaniques sont calculés à partir de prévisions aux six heures des vents de surface et de la pression barométrique fournies par le Centre météorologique canadien. Les conditions initiales des glaces utilisées dans le modèle sont basées sur des cartes des glaces établies par le Service canadien des glaces. Le rapport décrit en détail l'interface utilisateur graphique.

1. Introduction to the Ice-Ocean Forecast System(IOFS)

1.1 Ice-Ocean Forecast System (IOFS)Description

The Ice-Ocean Forecast System (IOFS) is a real time ice-ocean forecast system, developed to forecast wind-driven ice motion off the Labrador and Newfoundland coast (DeTracey et. al., 1996). The core of the system is a coupled ice-ocean model written in Microsoft Powerstation FORTRAN. A user-friendly graphical user interface, written in Microsoft Visual Basic, acts as the front end to the FORTRAN code. The interface allows the user to easily set up and run forecasts, display, print and save forecast results, and manage data files. Inputs to the forecast model are forecast wind and barometric pressure from the Canadian Meteorological Centre(CMC), and ice charts from the Canadian Ice Service. A schematic of IOFS program and data flow is shown in Fig.1.1. The data archive consists of CMC forecast data, ice charts, and output saved from previous forecasts. Upon starting IOFS, the user may either proceed to set-up and run a forecast, or display any data saved in the data archive.

The coupled ice-ocean model consists of an ice and an ocean component. The ice component is based on the Hibler sea-ice model (Hibler, 1979) with simple ice thermodynamics. The ocean component is a diagnostic ocean model with a surface Ekman layer. The density field for the ocean is prescribed and time independent. Ice motion and ocean current are driven by surface wind and barometric pressure gradients at the air-sea and ice-sea interfaces. The ocean model has a constant horizontal eddy coefficient and a stress dependent vertical eddy coefficient. The air-ice stress and air-sea stress are computed using the standard bulk formulae. The ice-sea stress is parameterized by a quadratic relationship between ice velocity and water velocity at the top of the Ekman layer. The model domain is a regular Cartesian grid with 20 km resolution, measuring 1200x2240 km aligned parallel to the Labrador coast (Fig.1.2). Bathymetry is taken

from a 5'x 5' data set and is interpolated and smoothed to the model grid. A detailed description of the coupled ice-ocean model and model verification against ice drift data is given in Tang and Gui (1996.)

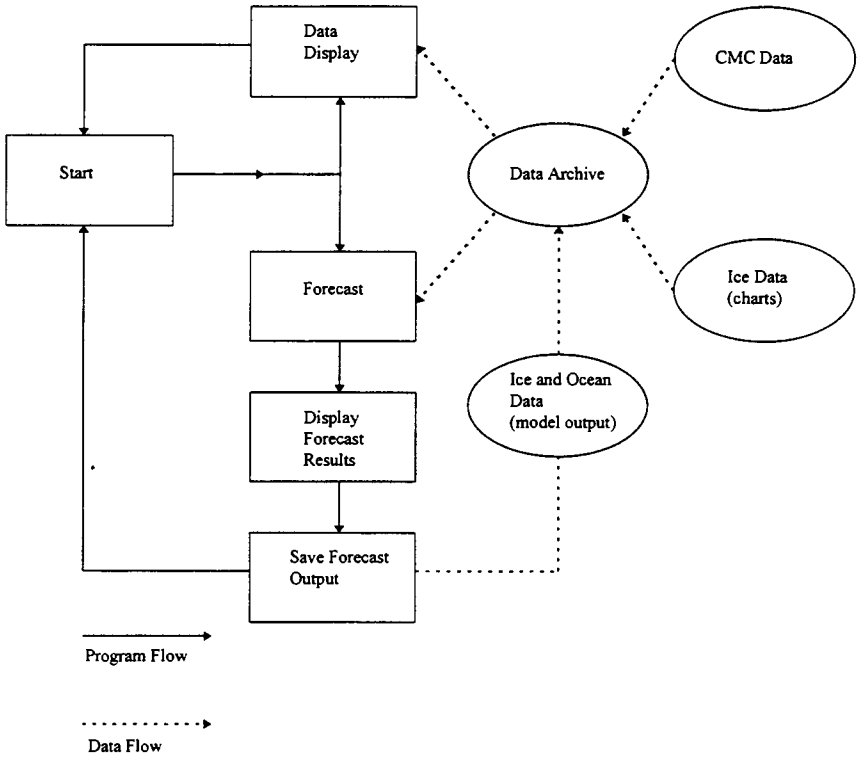

Fig. 1.1. IOFS program and data flow.

The ocean component requires eight days of model integration to spin-up, when started from an initial rest state. The ice component requires two days of model integration time for the ice velocity field to spin-up from rest. Model output for ocean and ice states may be used as the initial states for further forecasts, to avoid integrating again from rest.

1.2 IOFS Conventions

Figure 1.3 illustrates a typical IOFS window. There are a few naming conventions used in this manual to describe window objects. Any window text that is not outlined by a border is called

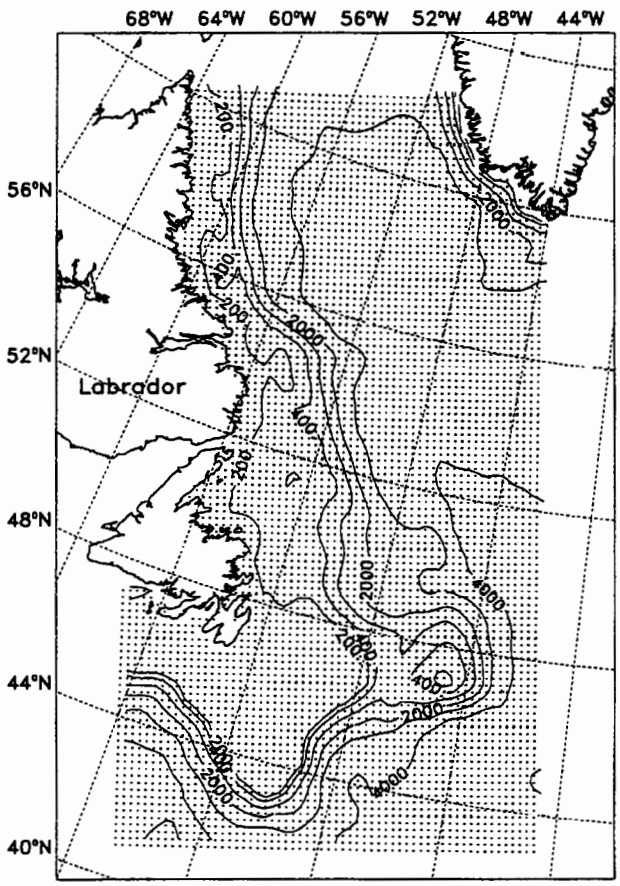

Fig. 1.2. Model grid and bathymetry contours plotted at 100, 200, 400, 1000, 2000, 3000 and 4000 m.

a label. In Figure 1.3 "Select CMC", "Select Initial Ice State", "Select Initial Ocean State", "Forecast Length (hours)", "Forecast Output Interval (hours)" are all labels.

An outlined box into which text may be entered is called a text box. A text box may be any size, and may have a vertical scroll bar. In Figure 1.3, there are three text boxes. There are two large text boxes, one under the label "Ice State Description" and one under the label "Ocean State Description". The third text box is beside the "Forecast Length (hours)" label. To enter text in a text box, position the mousepointer on the text box and press the left mouse button. A flashing cursor will appear in the text box and text may then be entered. Cursor keys, the backspace key, and the delete key may be used in a text box.

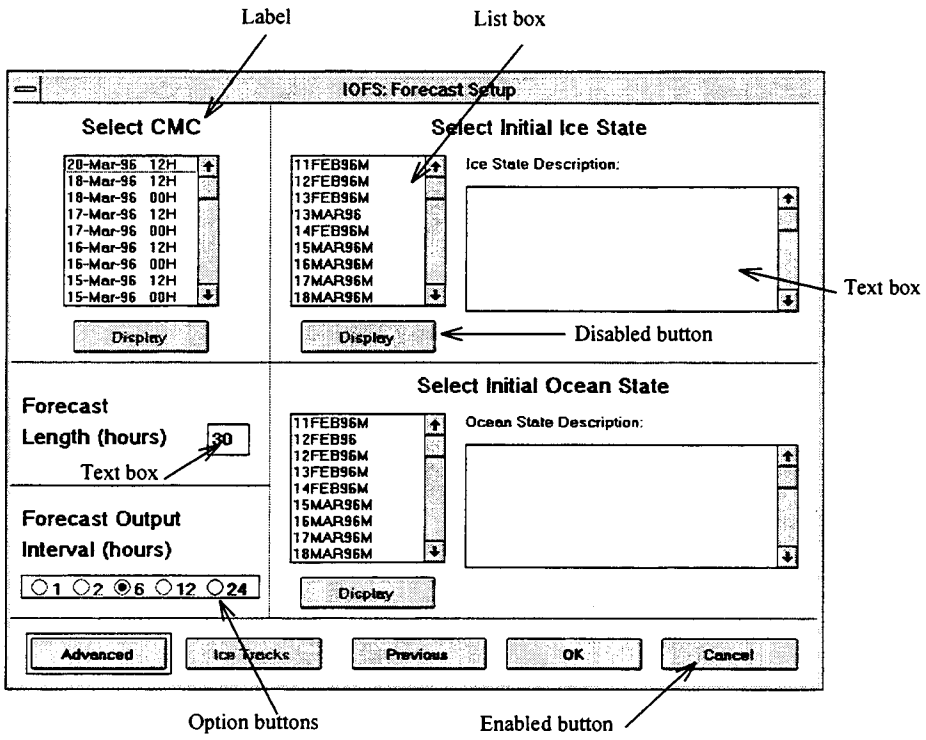

Fig. 1.3. Sample IOFS window.

A list box is an outlined box that contains a list of several choises. There are three list boxes in Figure 1.3: one under the "Select CMC Label" that contains a list of dates-times, one beneath and to the left of the "Select Initial Ice State" label that contains a list of filenames, and one beneath and to the left of the "Select Initial Ocean State" label that also contains a list of filenames. To select an item from a list box, place the mousepointer on the desired item and press the left mouse button. The selected item will be highlighted. To change the selected item in a list box place the mousepointer over the new item and press the left mouse button. The new item will be highlighted. If the number of items in a list box is larger than the list box size, a vertical scroll bar will appear beside the list box.

Below the "Forecast Output Interval (hours)" is a long thin outlined box. Inside this box are several small circles with labels to their right. These are called option buttons. To use an option button position the mousepointer over one of the circles and press the left mouse button. A small solid circle will appear inside the larger circle. The label to the right describes the option button to its left. In Figure 1.3 a forecast output interval of six hours has been selected.

The grey buttons are called, simply enough, buttons. A button may be disabled or enabled by IOFS. In Figure 1.3 all three **Display** buttons are disabled because no items have been selected from the accompanying list boxes. On a disabled button the text is greyed out. On enabled buttons, such as the **Advanced**, **Previous**, **OK**, and **Cancel** buttons in Figure 1.3, the button text is black. To press a button place the mousepointer over the desired button and press the left mouse button.

The TAB key may be used to move between window objects, excluding labels. To move backwards to the previous window object, hold down the SHIFT key and press the TAB key. Finally, throughout this documentation, the phrase "click" means that the user is to position the mousepointer over the designated object and push the LEFT mouse button. The right mouse button is rarely used, and this documentation will explicitly specify when it is used.

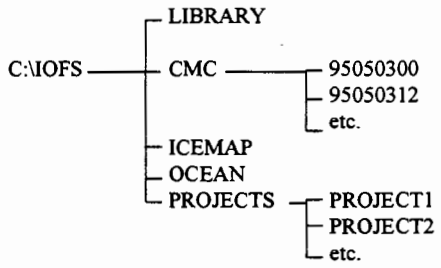

Fig. 2.1. IOFS Directory Structure

2. IOFS Directory Structure

IOFS has a strict directory structure for the location of its files. This structure is shown in Figure 2.1. A description of the directories follows:

main directory - The main directory is "C:\IOFS". This directory contains only the IOFS executable and all the IOFS subdirectories.

LIBRARY - The LIBRARY subdirectory contains IOFS system files.

CMC subdirectory - The CMC subdirectory contains the user's archive of Canadian Meteorological Centre (CMC) forecast data. Each CMC forecast dataset has its own subdirectory that is named according to the starting date-time of the forecast. A forecast starting March 5, 1995 at 00Z would correspond to the directory named

"C:\IOFS\CMC\95030500". The last subdirectory, "95030500", is the forecast starting date-time in the format "yymmddhh" (year year month month day day hour hour) where the hour is the forecast starting hour and must be either 00 or 12. Any CMC subdirectories not named in this format will generate an error.

ICEMAP subdirectory - The ICEMAP subdirectory contains the user's archive of initial ice states.

OCEAN subdirectory - The OCEAN subdirectory contains the user's archive of initial ocean states.

PROJECTS subdirectory - The PROJECTS subdirectory contains all of the user's project subdirectories. Every project is stored in a subdirectory of the PROJECTS subdirectory.

3. Canadian Meteorological Centre (CMC) Forecast Data Format

IOFS uses 48 hour CMC forecast datasets. The CMC runs forecasts at 00Z and 12Z each day. IOFS requires that CMC data used conform to the following standards. The CMC dataset must be in CMC standard format for a latitude longitude grid with its bottom left corner at (40N,66W) its top right corner at (64N,40W) and a grid spacing of 1 degree (Note: the grid is 27x25). The dataset must be from a 48 hour forecast with output every six hours. This means there should be 9 data files per forecast.

All the following fields must be in the CMC dataset: near surface air temperature, dew-point temperature,10m eastward wind component, 10m northward wind component, mean sea level pressure, cloud cover, surface solar flux, surface latent heat flux, surface sensible heat flux, surface infrared flux. The CMC codes for these fields are "TT", "TD", "UU", "VV", "PN", "NT", "FS", "FV", "FC" and "FI" respectively.

The nine CMC files in the dataset must be renamed according to IOFS convention, and may not be longer than the eight characters allowed by DOS. For a forecast starting on March 5, 1995 at 00Z the nine files must be renamed: "95030500.00H", "95030500.06H", "95030500.12H", "95030500.18H", "95030500.24H", "95030500.32H", "95030500.40H" and "95030500.48H" and

stored in the CMC directory "C:\IOFS\CMC\95030500". For a forecast starting on February 15, 1995 at 12Z the nine files must be renamed: "95021512.00H", "95021512.06H", "95021512.12H", "95021512.18H", "95021512.24H", "95021512.32H", "95021512.40H" and "95021512.48H" and stored in the CMC subdirectory "C:\IOFS\CMC\95021512". The files are renamed in the "yymmddhh.ffH" format (year year month month day day hour hour . forecasthour forecasthour 'H'). Here the hour is the forecast starting hour which is either 00 or 12. The forecast hour is between 00 and 48.

4. Starting IOFS

IOFS must be run in Windows. Simply click on the IOFS icon in the IOFS program group, or run "C:\IOFS\IOFS.EXE" from the Windows program manager.

5. Main Menu

The main menu has four options: **Forecast**, **Data Archive**, **Digitize** and **Quit** (Fig.5.1). The **Forecast** option allows the user to set up a forecast using a CMC 48 hour forecast dataset. **Forecast** is also used to redisplay the results of previous forecasts. The **Data Archive** option allows the user to enter the user's archives of CMC data, and of initial ice and ocean states. Archived data may be displayed and/or deleted. The **Digitize** option (this option not yet available in Version 2.0) extracts digitized icemaps, and converts them to IOFS format initial ice states. The **Quit** option exits IOFS.

6. Forecast

6.1 Project

Pressing **OK** on the main menu displays the *Project* window (Fig.6.1). A project is a directory in which a forecast is going to be, or has been run. When a forecast is run the results are stored in the designated project directory.

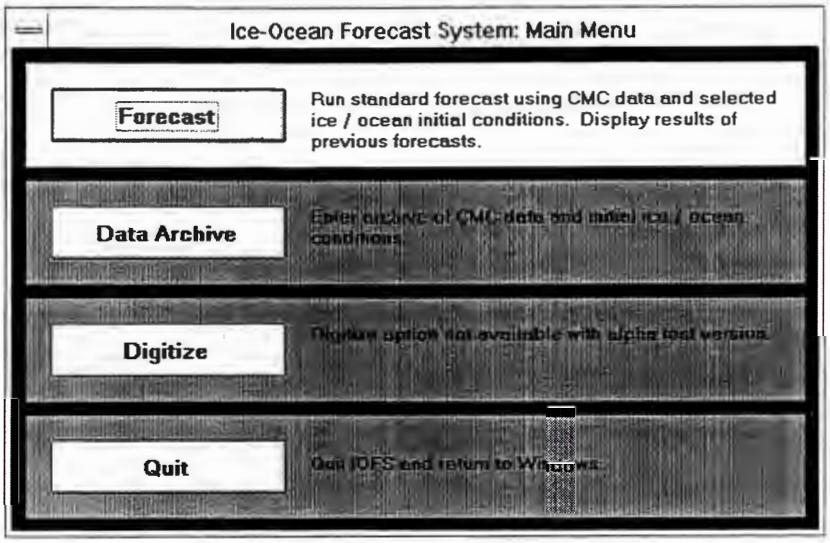

Fig. 5.1. IOFS Main Menu.

To create a new project, type a name of eight characters or less in the create project text box at the top of the *Project* window to the left of the **Create Project** button. When a name has been typed the **Create Project** button is enabled. Pressing the button creates the named project directory and adds it to the selection list box.

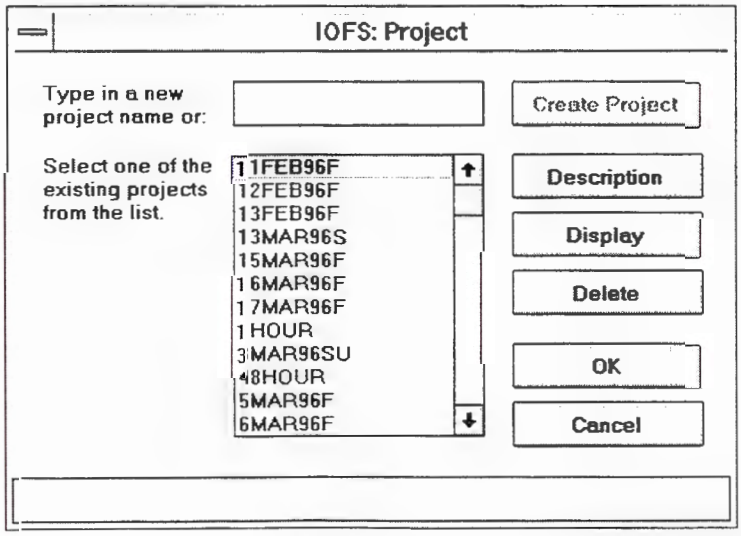

Fig. 6.1. Project window.

To select a project, click on the desired project in the select project list box. The grey message box at the bottom of the window indicates whether or not the chosen project is empty.

When a project is selected, the **Description** button is enabled. To aid the user, each project has a corresponding description. Pressing the **Description** button opens a *Project Description* window. The description may be edited, and then saved by pressing **OK**.

Pressing the **Delete** button deletes the chosen project directory, and all files within the directory. If the project is not empty, that is a forecast has previously been run in the project, the **Display** button is also enabled. Pressing the **Display** button allows the user to review the results of the forecast. See Section 6.6 for a description of the IOFS *Display* window.

When a project is selected, pressing **OK** opens the *Forecast Setup* window. If the chosen project is not empty, its contents will be overwritten by the new forecast. Pressing **Cancel** returns to the main menu.

6.2 Forecast Setup

Pressing **OK** on the *Project* window displays the *Forecast Setup* window (Figure 6.2). On this window the user selects the desired datasets with which to initialize and run the forecast.

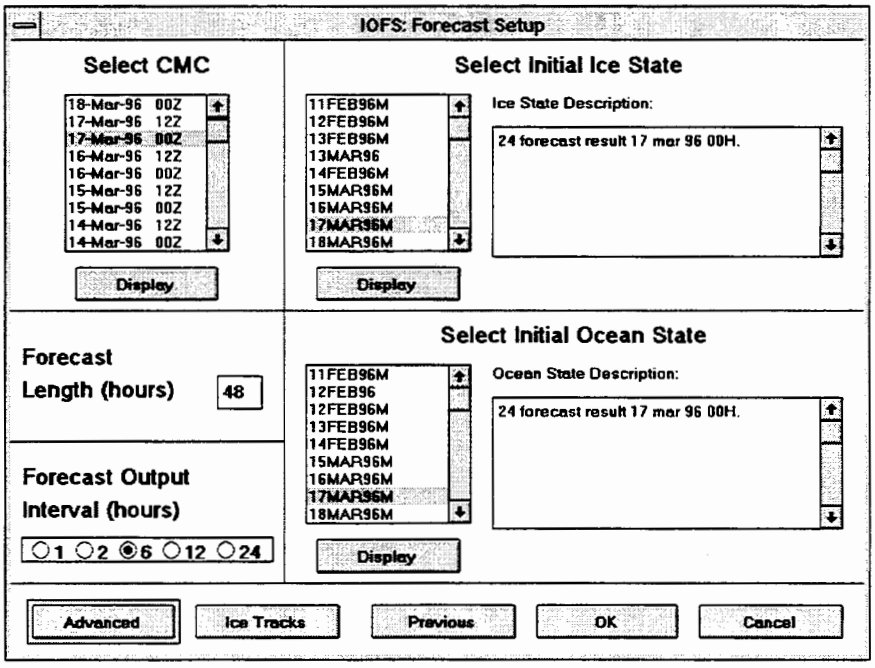

Fig. 6.2. Forecast Setup window.

Select CMC - Click on the desired CMC forecast date. For example the date and time "03-May-95 12Z" corresponds to the 48 hour CMC forecast starting at 12Z on May 3 1995. Once a date has been chosen the CMC **Display** button is enabled. Pressing the CMC **Display** button allows the user to view the CMC dataset. See Section 7.1.1 for details of the *CMC Display* window.

Select Initial Ice State - Click on the name of the desired initial ice state. It is the user's responsibility to keep track of stored ice states. To aid the user, each stored ice state has a corresponding description which is displayed in the text box beside the "Select Initial Ice State" list box. This description may be edited. Once an initial ice state is selected the "Select Ice State" **Display** button becomes enabled. Pressing this **Display** button allows the user to view the initial ice conditions i.e. ice thickness, concentration and velocity. (Note: initial ice states produced from digitization will have a zero velocity field.) See Section 6.6 for a description of the IOFS *Display* window.

Select Initial Ocean State - Click on the name of the desired initial ocean state. It is the user's responsibility to keep track of stored ocean states. To aid the user, each stored ocean state has a corresponding description which is displayed in the text box beside the "Select Initial Ocean State" list box. This description may be edited. Once an initial ocean state is selected the "Select Ocean State" **Display** button is enabled. Pressing this **Display** button allows the user to view the initial ocean conditions i.e. barotropic currents and surface elevation. See Section 6.6 for a description of the IOFS *Display* window.

Forecast Length (hours) - Enter in this text box the number of hours to forecast. This number cannot exceed 48 hours since that is the length of the CMC forecast. The default is 48 hours.

Forecast Output Interval (hours) - Click on the option button to the right of the desired output interval. This interval is in forecast hours and has preset values of 1, 2, 6, 12 and 24

hours with a default of 6 hours. If the forecast output interval is greater than the forecast length, it is set to the forecast length.

After choosing the CMC dataset, and the initial ice and ocean states, pressing **OK** continues with the forecast. Pressing **Cancel** returns to the main menu.

6.2.1 Advanced Control File Setup

In the bottom left hand corner of the Forecast Setup window is the **Advanced** button (Fig.6.2). Pressing advanced shows the *Advanced Control File Setup* window (Fig.6.3). This window allows the user to change the control file parameters of the coupled ice-ocean model. (Note: changing default values may lead to numerical instabilities during model integration.) To reset values simply press the **Use Default Values** button. Pressing **OK** records the changes to the control file and returns to the *Forecast Setup* window. Pressing **Cancel** returns to the *Forecast Setup* window without recording any changes to the control file.

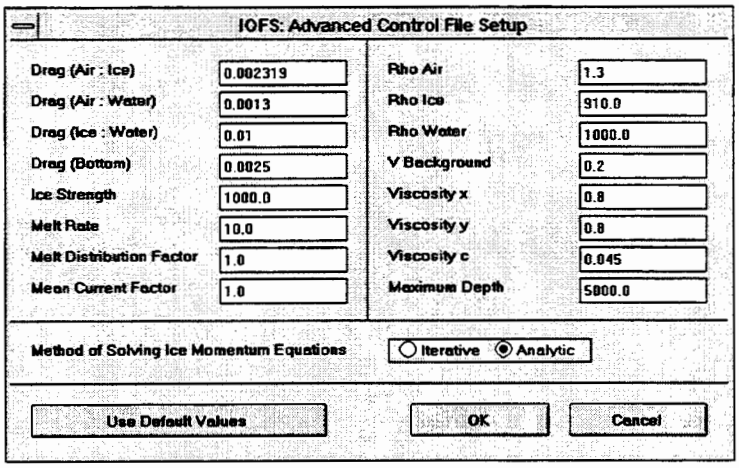

Fig. 6.3.. Advanced setup window.

6.2.2 Ice Track Setup

Pressing the **Ice Tracks** button on the *Forecast Setup* window opens the *Ice Track Setup* window (Fig.6.4). Given an initial position within the ice pack, and an initial time, IOFS forecasts

the change of that position due to ice drift. This is similar to placing a beacon on an ice flow and following its change in position with time. IOFS can follow five such "ice tracks".

At the top of the *Ice Track Setup* window is the forecast start date and time. Beneath this are five rows, each corresponding to separate ice track. For each ice track the user must enter a starting Latitude (degrees N) and Longitude (degrees W), and a starting date and time. IOFS does not accept starting positions outside the model domain, or a starting time not within the forecast. However, IOFS does not check to see if the starting position is within the ice edge of the chosen initial ice state, or if it is on land or on water. It is the user's responsibility to ensure that the track starts within the ice. If the track is started on land it will not move. If the track is started in water, but not on ice, it will remain motionless unless ice passes under it during the forecast. Each track may be given a Track ID which is used solely to label the tracks when plotted. If no Track ID is assigned, the track will be labelled by the track number to the right of the Track ID text box. Each track has a **Clear** button to clear it. Pressing **OK** stores the ice track information and returns to the *Forecast Setup* window. Pressing **Cancel** returns to the *Forecast Setup* window without saving the ice track changes.

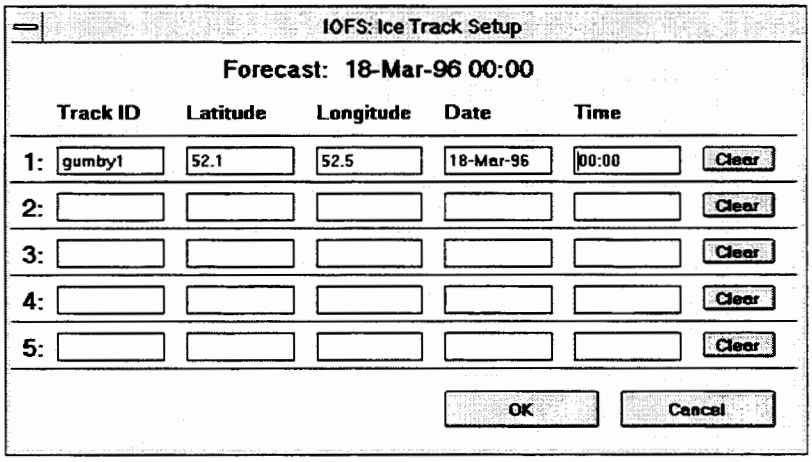

Fig. 6.4. Ice Track Setup window.

6.2.3 NO_ICE

In the *Select Initial Ice State* list box there is the selection "NO_ICE". Choosing this for the initial ice state runs the forecast without ice, i.e. only the ocean component will be forecast.

6.2.4 SPIN_UP

In the *Select Initial Ocean State* list box there is the selection "SPIN_UP". Choosing this option runs a full ocean/ice spin up. The ocean state spin up starts eight days prior to the selected CMC forecast date and runs for eight forecast days. If there is not eight days of stored CMC forecast data prior to the forecast date an error message will appear. After the eight day ocean spin up, IOFS starts an ice spin up beginning on the selected CMC forecast date, using the selected initial ice state. The ice spin up runs for whatever forecast length the user has specified, but a value of 48 hours is recommended. When finished, the results of the 48 hour ice spin up are displayed and may be saved (see Secs. 6.4,6.5). The final ice/ocean states of this spin up are suitable initial conditions for a forecast starting at the end date of the ice spin up. Example: a user selects a CMC forecast date-time of 09-Mar-96 00Z, the "SPIN_UP" option, a 48 hour forecast length and an arbitrary initial ice state. IOFS runs an eight day ocean spin up from rest, without ice, for 01-Mar-96 00Z to 08-Mar-96 00Z. IOFS then runs a 48 hour ice spin up starting 09-Mar-96 00Z, using the ocean spin up final ocean state and the user selected initial ice state as its initial conditions. The final ice/ocean states are for 11-Mar-96 00Z, and are suitable initial conditions for a forecast starting at that time.

6.3 Running Forecast...

After pressing **OK** on the *Forecast Setup* window, IOFS prompts the user to start the forecast. Pressing **OK** starts the forecast. Pressing **Cancel** returns to the main menu. Once the forecast is started the *Running Status* window opens (Fig.6.5). There are three stages to the IOFS forecast. First IOFS converts the CMC data to IOFS format by interpolating it to the model grid. Secondly, IOFS opens a DOS shell window to run the coupled ice-ocean model (CIOM) (Fig.6.6). Lastly, IOFS takes the CIOM output and generates graphics display files.

During the first and last stages, IOFS must run in the foreground, and the user will not have access to Windows. During the second stage, the user has access to Windows, because the model is running in a DOS shell. However, the use of other programs in Windows will slow model execution considerably, and could possibly lead to memory problems.

When all three stages are complete a "Finished" prompt will appear in the Running Status window, and the **OK** button will be enabled. Pressing **OK** will open the *Display* window.

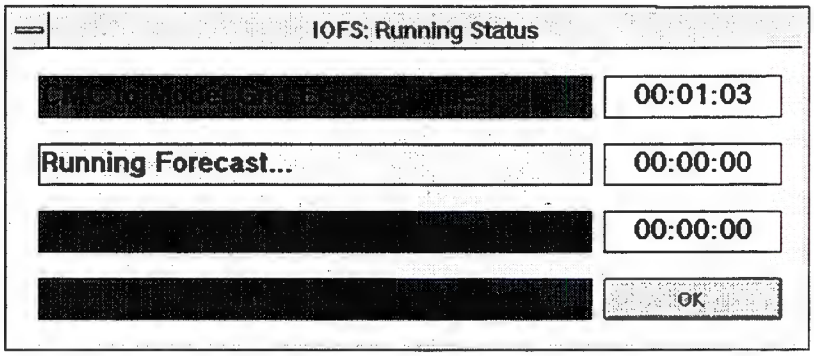

Fig. 6.5. Running Status window.

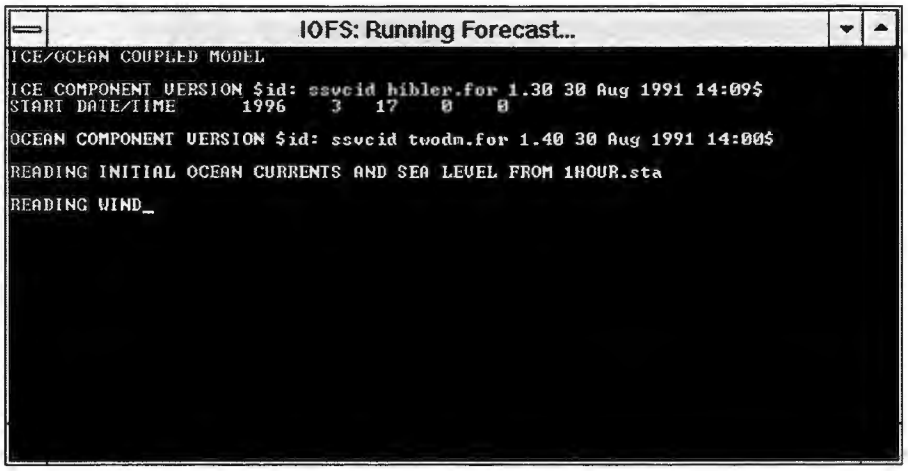

Fig. 6.6. Running Forecast window.

6.4 Display

The *Display* window allows the user to view the results of an IOFS forecast (Fig.6.7). The window consists of a control panel and a map display. The starting date and time of the present frame are displayed on the left hand side of the screen. Beside the date and time is the forecast hour. Note that when the mousepointer is moved over the map display the cursor changes from an arrow to a crosshair, and the crosshair coordinates are displayed in Latitude (deg N) and Longitude (deg W) on the control panel. Also displayed on the control panel are the present frame and the total number of frames. The number of frames is determined by the forecast length and output interval that were chosen on the *Forecast Setup Screen* (e.g if the Forecast Length was set to

48 hours and the Forecast Output Interval was set to 6 hours there will be 9 frames to display). Frame 1 corresponds to the forecast initial conditions.

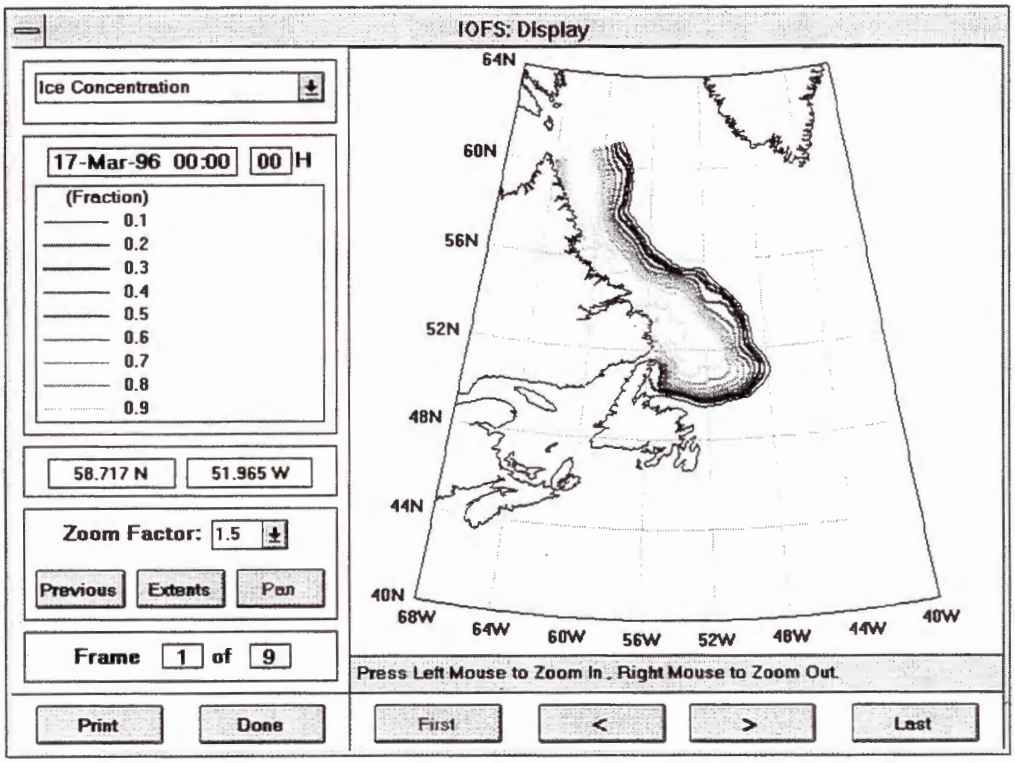

Fig. 6.7. Display window.

Selecting a field - In the uppermost left corner of the *Display* window is the field selection box. Clicking on this box will show a list of the model input and output fields. Click on the desired field and it will be displayed in the map display.

Frame controls - At the bottom of the *Display* window are four buttons labelled **First**, < ,> , and **Last**. Pressing **First** will display the first frame i.e. the forecast initial conditions. Pressing **Last** will display the last frame i.e. the forecast final conditions. The < and > buttons will move one frame backward or forward respectively. The frame counter, and the date-time of the present frame, will change accordingly.

Zoom controls - Select a zoom factor by clicking on the selection box beside the "Zoom Factor" caption. The zoom factor will be the factor by which the map display is enlarged or reduced. After selecting a zoom factor move the mousepointer to the map display. Clicking the left mouse button will zoom in. Clicking the right mouse button will zoom out. The location of the crosshair when the mouse button is clicked will be at the centre of the map display when the map display is redrawn.

Previous - Pressing the **Previous** button will redraw the map at its previous zoom.

Extents - Pressing **Extents** will zoom the map out to its maximium extents.

Pan - To pan the map display at its present zoom, press the **Pan** button. When the pan is activated a red border will appear around the **Pan** button. Move the mousepointer to the map display and push the left mouse button. The location of the crosshair when the mouse button is pushed will be centred in the map display when the map display is redrawn. If you want to cancel the pan, press **Pan** button again and the red border will disappear. (note: the **Previous** button also to recalls the previous pan.)

Vector controls - If the field being viewed is a vector field, the vector scale and skip controls will become visible.

Vector Scale - When displaying a vector field, the length of the vectors will be set to the default value. To change the vector scale, click on the number beside the label "Vector Scale:". The vector lengths displayed will be multiplied by the chosen scale factor. A vector scale of 2 will display the vectors at twice the default scale length; a vector scale of 0.5 will display the vectors at half the vector scale length.

Vector Skip - Vector skip will thin out the number of vectors in the map display. This is desirable since displaying every vector will probably crowd the map display. Click on the number beside the label "Vector Skip:", and choose a new vector skip value. The vector

skip value is the number of vectors skipped between displayed vectors. For example, a value of 0 would display every vector, a value of 1 would display every other vector(every second vector) , a value of 2 would display every third vector.

Print - To print what is in the map display, simply press the **Print** button. IOFS will use whatever printer is set as the Windows default in the Windows Control Panel.

Done - Press **Done** when finished viewing.

6.5 Archive Ice/Ocean Output

This window allows the user to archive model results to use as initial states for future forecasts (Fig.6.8). This window is divided in half with the ice archive controls on the left hand side of the window, and the ocean archive controls on the right. For both ice and ocean states, a list is displayed of all the output dates and times. To archive an output ice state click on the desired date and time. A description of the ice state may be entered in the text box under the label "Enter Ice State description:". This description is not used in any way by IOFS, but allows the user a verbose description of the ice state saved. After entering a description, enter a filename of eight characters or less in the text box to the right of the label "Ice State Filename:". If the filename is valid (i.e. unused) the **Save to ICE Archive** button is enabled. Pressing this button saves the ice state selected and the ice state description. This process may be repeated to save any of the ice states. The same ice state may also be saved more than once, under different filenames. To archive ocean states follow the same procedure, but use the ocean archive controls on the right hand side of the window.

Previous - Pressing **Previous** takes the user back to the *Display* window. This allows the user to review ice and ocean states before archiving them.

Done - Pressing **Done** will conclude the forecast and return to the main menu. Make sure that all desired ice and ocean states have been archived. The forecast results will be left stored in the

project directory, and may be redisplayed or deleted from the *Project* window (Sec.6.1). This window is reached by choosing the **Forecast** option on the main menu.

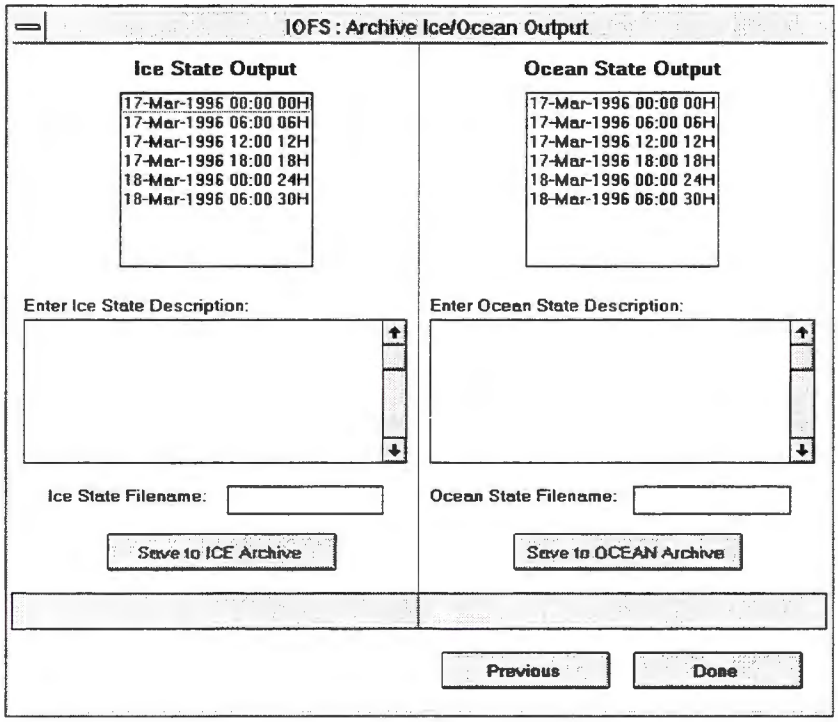

Fig. 6.8. Save Ice/Ocean Output window.

7. Data Archive

Pressing **Data Archive** on the main menu displays the *Data Archive* main menu (Fig.7.1). There are three data archives: **CMC**, **ICE**, and **OCEAN**. Pressing **Cancel** will return to the main menu.

7.1 CMC Archive

Pressing the **CMC** button on the *Data Archive* main menu opens the CMC data archive (Fig.7.2). This archive is used to store CMC 48 hour forecast datasets. To create a new CMC directory enter the forecast start date in the first text box to the left of the label "Type in a new CMC directory". Enter the forecast start time in the second text box. This start time must be either 00 or 12. When a valid date and time are entered, the **Create** button is enabled. Pressing the **Create** button creates a CMC directory using the given date and time.

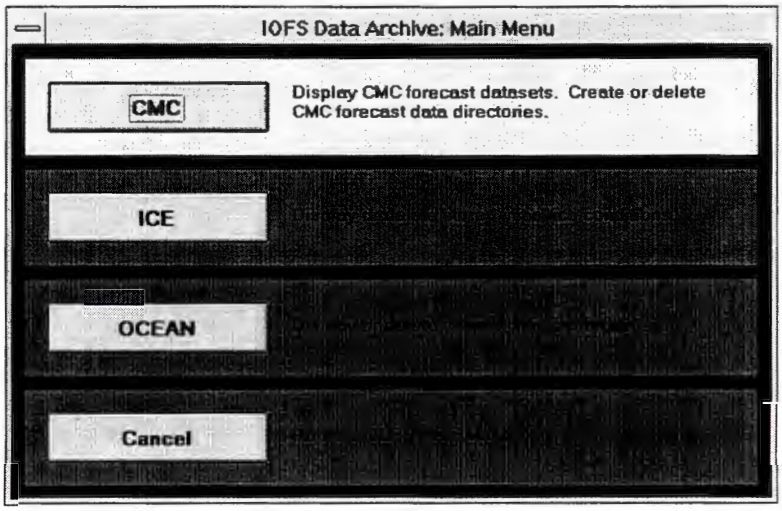

Fig. 7.1. Data Archive: Main Menu.

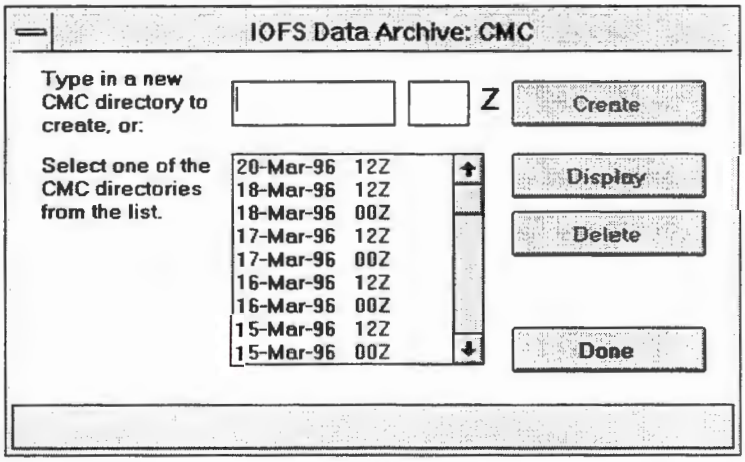

Fig. 7.2. Data Archive: CMC window.

CMC data may also be displayed. Select an entry from the list box of CMC directories by clicking on the desired date and time. After a directory is chosen, the **Display** and **Delete** buttons are enabled. Pressing **Display** opens the *CMC Display* (Sec.7.1.1), pressing **Delete** deletes the selected directory and its contents.

7.1.1 CMC Display

The *CMC Display* window is identical to the *Display* window used to display forecast results (Sec.6.4) except that the data fields are different. Otherwise all controls function as described in Section 6.4.

Pressing **Done** returns to the *Data Archive* main menu.

7.2 ICE Archive

Pressing the **ICE** button on the *Data Archive* main menu opens the *ICE* state archive.(Fig. 7.3) This archive contains all output ice states that a user has saved after an IOFS forecast or any initial ice states created by digitization. Select an ice state by clicking on one of the filenames in the list box on the left hand side of the window. After an ice state is selected, its description appears in the text box under the "Ice State Description:" label, if a description exists. To edit the description enter the new text in the text box, and press the **Save Description** button to save.

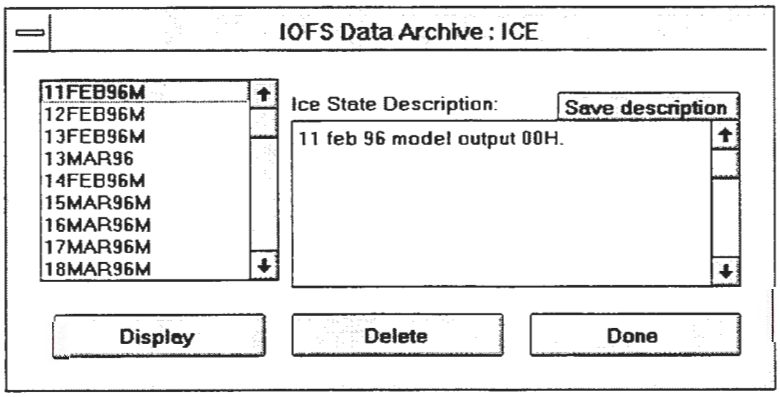

Fig. 7.3. Data Archive: ICE window.

Once an ice state is selected, the **Display** and **Delete** buttons are enabled. Pressing the **Display** button opens the *ICE Display* window. Pressing **Delete** erases the selected ice state.

7.2.1 ICE Display

The *ICE Display* window is identical in function to the *Display* window described in Section 6.4. The only fields available for display are, obviously, ice concentration, ice thickness, and ice velocity. Pressing **Done** returns to the *ICE* archive window.

7.3 OCEAN Archive

Pressing the **OCEAN** button on the *Data Archive* main menu opens the *OCEAN* state archive, which is almost identical to the *ICE* state archive. This archive contains all output ocean

states that a user has saved after an IOFS forecast. Select an ocean state by clicking on one of the filenames in the listbox on the left hand side of the window. After an ocean state is selected, its description appears in the text box under the "Ocean State Description:" label, if a description exists. To edit the description enter the new text in the text box, and press the **Save Description** button to save.

Once an ocean state is selected, the **Display** and **Delete** buttons are enabled. Pressing the **Display** button opens the *OCEAN Display* window. Pressing **Delete** erases the selected ocean state.

7.3.1 OCEAN Display

The *OCEAN Display* window is identical in function to the *Display* window described in Section 6.4. The only fields available for display are barotropic current and sea surface elevation. Pressing **Done** returns to the *OCEAN* archive window.

8. Digitize

Not yet available.

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