

OC4610 - WAVE AND SURF PREDICTION
LAB #3 – February 19, 2004

I. INTRODUCTION/BACKGROUND

In this weeks lab students will examine results of the Wavewatch III model as applied to an area off the east coast of the US. In this lab students will observe the differences between model runs made with different wind conditions. Students will be able to examine how the wave field changes over time under the conditions of a uniform wind and how the different wind speeds and directions affect the resulting wave field.

For the purposes of this lab, Wavewatch III was run using the WAM source terms, a uniform wind field, no initial swell input, and local bathymetry (i.e. true bathymetry rather than flat bottom).

II. LAB GOALS/REQUIREMENTS

The purpose of this lab is to familiarize the student with how the Wavewatch III model results are affected by varying wind conditions. Each student will be responsible for examining the model results for several different wind conditions and describing the characteristics and evolution of the wave field under the different conditions. The bathymetry of the region is shown in Fig. 1 and may be of help in answering the questions below.

1) Run the model for the 10m/s and 20m/s wind speeds with a direction of 270 degrees (offshore). For both of these cases address the following questions:

- A)** Describe the evolution (in time) of the wave field in terms of the significant wave height, the mean direction and the peak period.
- B)** How long does it take for the wave field to fully develop?
- C)** When fully developed, what are the maximum significant wave heights near the coast and offshore?
- D)** Explain the different wave directions observed at different locations along the coast.
- E)** What are the differences (if any) in the fully developed wave fields for the 10m/s vs. 20m/s wind speeds?

2) Run the model for the 315 degree and 225 degree wind cases (10 and 20 m/s speeds) and address the same questions as above.

3) Run the model for some of the other directions. How are boundary effects manifested in these cases?

III. PROCEDURES

The model runs can be displayed by running the matlab program “ww3_view”. To access this program start matlab and type the command: **addpath(‘~jessen/oc4610/mfiles/ww3’)**. Alternatively you can edit the file ‘startup.m’ in you matlab directory and add the above command to that file. The result would be that the above directory would be added to your matlab path every time you started matlab.

To run the program type “ww3_view” from the matlab prompt. A GUI window will come up with the various model options displayed. For now the student only has the option of changing the wind conditions. Click on the “Wind/Stability terms” pulldown menu and choose “Homogeneous”. This will enable the pulldown menus for wind speed and direction. The user should then choose the desired homogeneous wind conditions and click on the “Run” button.

When the “Run” button is pushed a listing of files will appear for the student to choose from. These are the model result files for the different times that are available. The file names define the time, i.e. file “ww3.99110314.hs” refers to Nov. 14, 1999 at 1400 hours. By default the files listed are the one containing significant wave height as designated by the “.hs” file suffix.

Pick any one of the files (you will be able to choose times and data types in the next menu) and click on “Open”. This brings up another GUI window containing the available display options. The different buttons, pulldown menus, and checkboxes are described below:

Pulldown menu:

Plot type – Available options: Filled contours – create filled contour plots
Open contours – create regular contour plots
Pcolor – create pcolor plots
gray scale – create gray scale filled contour plots

I suggest using filled contours for display or gray scale if printing on a black and white printer.

Checkbox:

Overlay Winds – Overlay winds on current plot

Buttons:

View Winds – Plot wind vectors on the plot
View Bathy – Overlay bathymetry on existing plot
Get points – Allows user to list data values associated with points chosen with the mouse
keyboard – takes user to a matlab command prompt. (Not useful here)
Sig. Wv. Hgt. – Display significant wave height
Mean Ev. Dir. – Display mean wave direction
Peak Freq. – Display peak frequency
Previous – Display data from the previous time step
Return – returns to main menu to choose new wind conditions

Next – Display data from the next time.

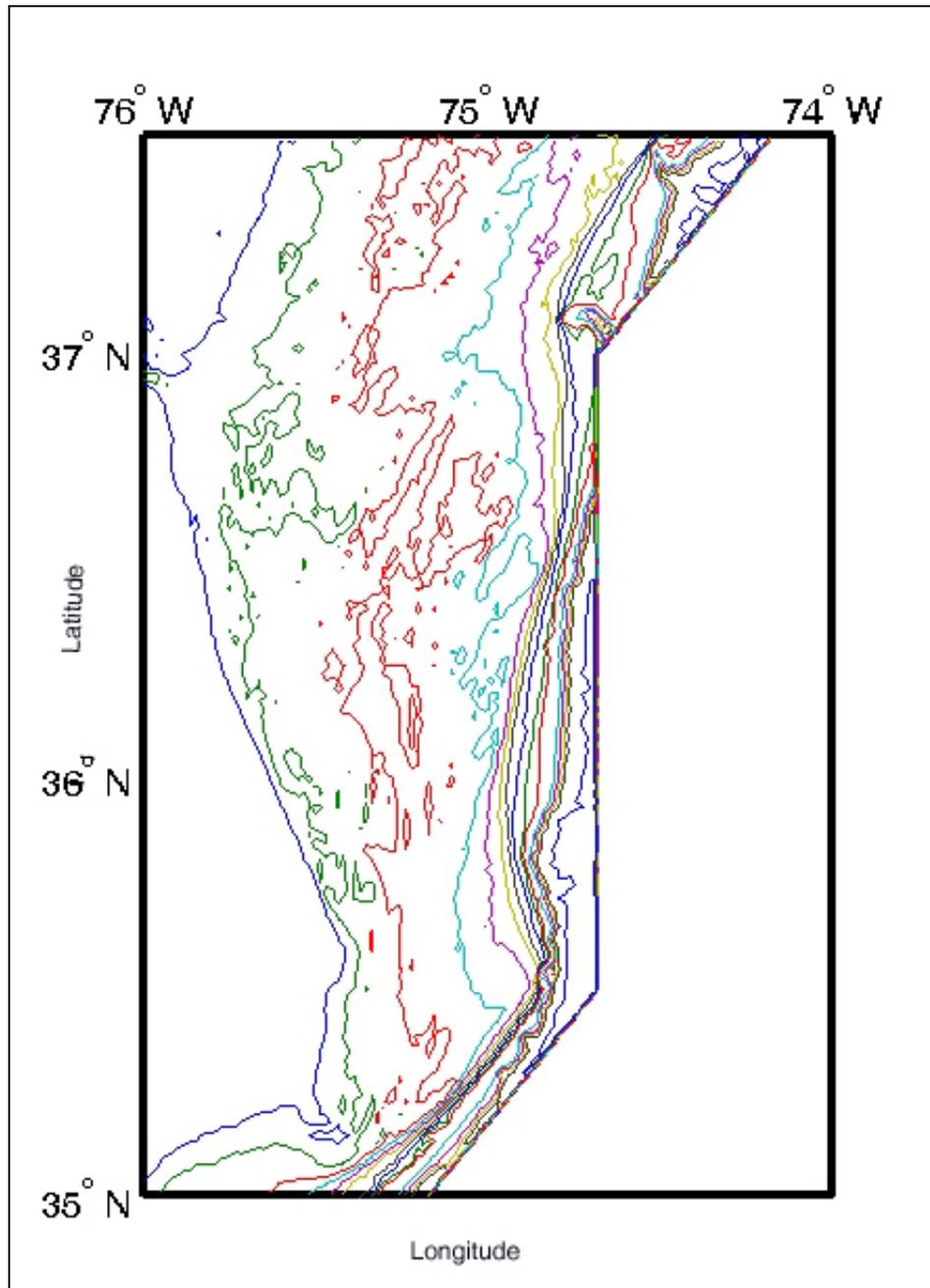


Figure 1 – Bathymetry of the continental shelf off the eastern mid-Atlantic coast of the United States.