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Technical Note

WAVEWATCH-III version 1.18 : Post-processing using NCAR graphics.[†]

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Contents

1 Introduction

This report is an addendum to the user manual and system documentation of version 1.18 of the full-spectral third-generation ocean wind-wave model WAVEWATCH III (Tolman 1999, henceforth denoted as WWATCH). It describes graphical postprocessing of fields of wave parameters and spectra using NCAR graphics routines. This software has been tested and used with NCAR graphics versions 3.1.3 and 4.0.1 on the NCEP Cray C90, and has been used to provide the graphics for the web page of the NOAA Experimental Wave model (NEW) application of WWATCH. NCAR graphics is licenced software, which cannot and will not be distributed as part of WWATCH.

Sections 2 through 4 of this report discuss the running, implementation and system documentation of the post-processing. These sections correspond to sections 4 through 6 of Tolman (1999). For comments, questions and suggestions, please send E-mail to :

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2 Running the post-processors

Graphical postprocessing using NCAR graphics software is performed by two programs that process raw gridded output from the file out_grd.ww3 and raw point output from the file out_pnt.ww3, respectively, also using the model definition file mod_def.ww3 (see Fig. 4.1 of Tolman 1999). These programs produce graphical meta files gmeta, which can be converted to the desired graphical format using the NCAR program ctrans. In the subsequent subsection example input files for both programs are presented.

2.1 Gridded output post-processor

Program	:	ncar_outf		(N3OUTF)
Code	:	ncar_outf.ftn		
Input	:	ncar_outf.inp	:	Formatted input file for program.
		mod_def.ww3	:	Model definition file.
		out_grd.ww3	:	Raw gridded output data.
Output	:	standard out	:	Formatted output of program.
		gmeta	:	NCAR graphics meta file.

start of example input file

```
$ ------------------------------------------------------------------- $
$ WAVEWATCH III Grid output post-processing (NCAR)                    $
$------------------------------------------------------------------- $
$ Time, time increment and number of outputs
$
  19680606 120000  3600. 1
$
$ Request flags identifying fields as in ww3_shel input and
$ section 2.4 fo the manual. Wave height vectors require both
$ the wave height and direction to be selected.
$
  F F T F F  T F F F F  F T F F F  F
$------------------------------------------------------------------- $
$ NCAR specific input (comment lines allowed)                         $
$------------------------------------------------------------------- $
$  - Plot title in quotes (C*30) (centered by user)
$  - Line with basic plot attributes
$     IPROJ  : Projection type in EZMAP.
$     XOP, PLON, XNP : left-center-right X range for plot
$                      (center used with IPROJ)
$     YOP, PLAT, YNP : Id. Y.
$     ROTA   : Grid rotation in degrees.
$     JGRID  : Grid line interval in degrees.
$     FLBARB : Flag for wind barbs.
$     FLCVEC : Flag for current vectors.
$     FLCOLR : Flag for color plot.
$     FLCONT : Flag for using NCAR's shore line contours.
$     FLCCLR : Flag for block-fill background map.
$               blue: sea, green: land, yellow: ice.
$     MYSIZE : Set size of labels on contours, 0 = smallest,
```

```
$
'------NCAR-GRAPHICS-PLOT------'
    9  -0.5  2.  2.75   -0.5  2.  2.75  0. 1  T T T F T  8
$
$  - The following seven lines contain for each field the following
$    seven parameters. Line 1 : lowest value for contouring.
$                      Line 2 : highest value for contouring.
$                      Line 3 : increment (0 disables contours).
$                      Line 4 : Grid point stride X (vectors).
$                      Line 5 : Grid point stride Y (vectors).
$                      Line 6 : Grid point stagger (vectors).
$                      Line 7 : Vector scale in plot.
$
   0.  0.  0. -20.  0.  0.   0.  0.   0.  0.  0.  0.  0.  0.  0.  0.
 100.  5. 50.  20.  5. 25. 250. 25. 360. 100. 1.  2.  1.  2. 99.  1.
  10. 0.5  1.  0.5 0.1  1.   5.  1.   1.  1. 0.01 1. 0.01 1.  1, 0.05
   1   1   1    1   1   1    1   1    1   1   1   1   1   1   1   1
   1   1   1    1   1   1    1   1    1   1   1   1   1   1   1   1
   0   0   0    0   0   0    0   0    0   0   0   0   0   0   0   0
 100 100 100  100 100 250  100 100  100 100 100 100 100  80 100 100
$
$ ---------------------------------------------------------------------- $
$ End of input file                                                      $
$ ---------------------------------------------------------------------- $
```

end of example input file

2.2 Point output post-processor

Program	:	ncar_outp		(N3OUTP)
Code	:	ncar_outp.ftn		
Input	:	ncar_outp.inp	:	Formatted input file for program.
		mod_def.ww3	:	Model definition file.
		out_pnt.ww3	:	Raw point output data.
Output	:	standard out	:	Formatted output of program.
		gmeta	:	NCAR graphics meta file.

start of example input file

```
$ ------------------------------------------------------------------- $
$ WAVEWATCH III Point output post-processing                           $
$-------------------------------------------------------------------- $
$ First output time (yyyymmdd hhmmss), increment of output (s),
$ and number of output times.
$
  19680606 000000  3600. 12
$
$ Points requested ---------------------------------------------------- $
$ Define points for which output is to be generated.
$
$ 1
$ 2
  3
$ mandatory end of list
 -1
$
$ ------------------------------------------------------------------- $
$ - Output type ITYPE, 1: spectra, 2: source terms.
$ - Scaling factors for spectra and source terms. 0. gives normalized
$   plots, negarive for sourve terms gives individually normalized
$   plots.
$ - Flags for plotting F, Sin, Snl, Sds, Sbt, Stot (ITYPE =  2 only)
$
  1   0. -1.   T T T T T T
$
$ - Maximum frequency ( 0. : maximum discrete , < 0 : normalized
$   with peak frequency ).
$ - Directional shift for rectangular plots.
$ - Number of frames per page [1,4,6]
$ - Number of circles and lines in polar plot grid.
$ - Flag for polar plots.
$ - FLag for color plots.
$ - Flag for plotting zero contour.
$
  0.4  0.  6  4  24  T  T  F
$
$ ------------------------------------------------------------------- $
$ End of input file                                                   $
$ ------------------------------------------------------------------- $
```

end of example input file

3 Implementation of post-processors

3.1 Introduction

The NCAR post-processors for WWATCH are written in FORTRAN-77. As with the other elements of WWATCH, the files do not contain plain FORTRAN source code, but need to be pre-processed with the native preprocessor. Installation therefore consists of two part; a) installation of the source code files and auxiliary scripts; b) modification of the automated compile and link system to accomplish compilation of the new programs.

3.2 Installing files

In its packed version, the NCAR post-processors for WWATCH are contained in a single files:

wwatch3.ncar.tar	Archive file containing all source code and input files.

This file may be compressed with the standard UNIX commands `compress` or `gzip`, in which case the extension .Z or .gz is added. Such files can be unpacked with the standard UNIX commands `uncompress` or `gunzip`.

The installation of the new post-processors requires modifications to the compile and link system of WWATCH. Before embarking on making these modifications, it is prudent to make a backup of the present installation of WWATCH by running the archive program arc_wwatch3 (see Tolman 1999).

The first step in installing the post-processors consists of unpacking the above archive file. This file has to be copied to the WWATCH 'home' directory, i.e., the directory where the other WWATCH archive files are located. While in this directory, the files are installed by typing

```
tar -xvf wwatch3.ncar.tar
```

which will place five new source code files in the ftn directory, two new input files in the inp directory, and one new file in the bin directory. The later is

the auxiliary script run_ncar, which is provided to facilitate easy execution of the post-processors.

3.3 Compiling and linking

After the above source code files have been installed, the programs should be included in the automated compile and link system of WWATCH. This requires some minor modification of most scripts as described in section 5.3 of Tolman (1999). Note that all the necessary modifications are already included as comments in the scripts. Please follow the follow steps exactly.

1) Update make_makefile.subs in the bin directory.
   Add the appropriate file names to the shell script variable `$files` in section 2.c of this script (options 0 and 10 in he `case` statement, make sure that the syntax of the `case` statement remains correct). Execute the script to regenerate the corresponding part of the makefile. If the proper modification have not been made, are warning will be printed mentioning unprocessed files.

2) Update make_makefile.prog in the bin directory.
   Add the appropriate file names to the shell script variable `$progs` in section 2.c of this script. Execute the script to regenerate the corresponding part of the makefile. The script should generate no output.

3) Update w3_new in the bin directory.
   Activate keyword '`ncar`' in the `case` statement in section 2.

4) Update w3_make and w3_source in the bin directory.
   Add the appropriate names to the shell script variable `$progs` in section 1.c and to the shell scripts variable `$checks` in section 2.b.

5) Update link in the bin or work directory.
   Add the appropriate NCAR settings and libraries in section 3.

This completes the modifications to the compile and link system. The compilation of the new programs can be tested by typing

```
w3_make
```

which will respond that all the old programs are up to date, and will compile and link the two new programs. Note that some warning might be expected for the unit w3ncar. As an additional test, the entire set of programs can be recompiled by typing

```
w3_new all
w3_make
```

The programs can be tested by making a link to the input files in the work directory

```
ln -s ../inp/ncar_*.inp .
```

after which the post-processors can be executed by executing the

```
run_ncar outp
```

```
run_ncar outf
```

if the necessary raw data file are available in the work directory. Please inspect this script to include the proper path to access NCAR graphics on your machine.

Additional modifications are necessary for the install and archive system.

6) Update arc_wwatch3 in the bin directory.
   Add run_ncar to the shell script variable `$files` in section 3.c.

7) Update install_wwatch3 in the main directory.
   Add the appropriate names to the shell script variable `$files` in section 3.c (option 3 in the case statement) and to the shell script variable `$files` in section 4.c.

A full backup of WWATCH including the NCAR graphics post-processors can now be made by typing

```
arc_wwatch3
```

and the command

```
install_wwatch3
```

will now install the complete set of WWATCH programs including the NCAR post-processors.

3.4 Model options

Only one compile level model switch is available for the new post-processors :

HDR	Switches on header information for gridded output plots.

4 System documentation.

The NCAR post-processors have been fully documented within their source code. Here, only the contents of the different files will be discussed, as well as their relation (see Fig. 1). For a more complete documentation of the new programs, reference is made to the source codes. Basic system documentation regarding grid layouts etc. can be found in Tolman (1999)

The five files that constitute the post-processors have the following contents:

ncar_outf.ftn	The main program for processing gridded output N3OUTF.
ncar_outp.ftn	The main program for processing point output N3OUTP.
ncexgo.ftn	Execution subroutine for gridded output.
ncexpo.ftn	Execution subroutine for point output.
w3ncar.ftn	NCAR add-ons and modified NCAR routines (multiple routines in file).

5 References

Tolman, H.L., 1999: User manual and system documentation of WAVEWATCH III version 1.18. NOAA/NWS/NCEP Technical note, 110 pp.

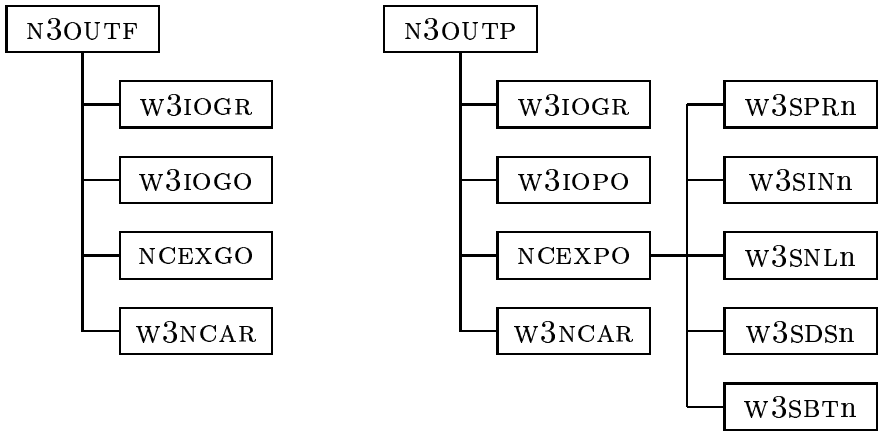

Figure 1: Subroutine structure for the postprocessors.