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Technical Note

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

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Contents

1 Introduction ............................................. 1

2 Running the post-processors ......................... 1
   2.1 Gridded output post-processor ................. 2
   2.2 Point output post-processor ................... 3

3 Implementation of post-processors ................. 5
   3.1 Introduction ........................................ 5
   3.2 Installing files .................................... 5
   3.3 Compiling and linking ............................. 6
   3.4 Model options ..................................... 8

4 System documentation ................................ 8

5 References ............................................. 8
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:

wavewatch@ncep.noaa.gov

This documentation and the accompanying software is covered by the disclaimers in section 1.2 of Tolman (1999)

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.f
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 T F 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.$
$ $ X0P, PLOM, XNP : left-center-right X range for plot$
$ (center used with IPROJ)$
$ $ Y0P, PLAT, YNP : Id. Y.$
$ $ ROTA : Grid rotation in degrees.$
$ $ JGRID : Grid line interval in degrees.$
$ $ PLBARB : Flag for wind barbs.$
$ $ PLCVEC : Flag for current vectors.$
$ $ PLCLR : Flag for color plot.$
$ $ PLCNT : Flag for using NCAR’s shore line contours.$
$ $ PLCCLR : Flag for block-fill background map.$
$ $ MYSIZE : Set size of labels on contours, 0 = smallest,
2.2 Point output post-processor

Program : ncar_outp
Code : ncar_outp.f90
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 (yyymmd hhmss), 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, negative for source 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 $  
$ - 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 parts: 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 file:

```
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 `arcwwatch3` (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

Figure 1: Subroutine structure for the postprocessors.