

WRF User Support

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1. Introduction

In this paper we are going to describe the user support effort that is being carried out at MMM/NCAR. We will discuss what the function of 'wrfhelp' is? What does it do for users? What do we support in terms of WRF software and what is the status of the WRF documentation effort?

2. What is *wrfhelp*?

Wrfhelp is mostly an email account that we use to provide support service to WRF users. If users have any questions regarding WRF, the first place the questions should be directed to is *wrfhelp@ucar.edu*. The advantage of directing emails to *wrfhelp* is that there will always be someone there to answer your question.

Wrfhelp also maintains two email lists which users can subscribe to. One of them is *wrf-news@ucar.edu*, which has been established since the first WRF release back in 2000. This email list is used by us to communicate with users about new WRF code releases, bug fixes, and WRF community events (such as WRF workshop and tutorial announcements). The other email list, *wrf-users@ucar.edu* has just been created. This list may be used by users to post WRF use questions, and share experiences with other users on the list. Both email accounts maintain a record of emails sent to the list which can be accessed on the web using password.

3. Users' Web Page

The WRF Users' Web page has just been updated (<http://www.mmm.ucar.edu/wrf/users>). The page provides information on many user-interested areas. The pages will be continuously under development as more material related to WRF software become available.

There are six major areas outlined on the Web page: Model System, User Support, Software Download, Publications and Documentation, Other Links and WRF Real-Time Forecasting.

Under the 'Model System' menu, descriptions about the WRF model, WRF SI, and WRF 3DVAR are provided (SI's page is currently supported by FSL/NOAA). Instructions on how to compile, set up and run the modeling system software are also given. For post-processing,

several graphics tools are described and illustrated.

Other important pages from this menu are the "WRF Update" and "Known Problems/Fixes" pages. The updates for any newer, minor release will be published under "WRF Update", and for bug fixes, and known problems in the current release, one may check the "Known Problems/Fixes" page.

If you are interested in becoming a registered user, or you would like to know the next WRF event, take a look at the 'Support' menu. A description about what *wrfhelp* is, and what we support can be found there. If you would like to report a problem, a guideline is provided which helps you to explain the problem, and us to understand it better.

The links to downloading WRF software, free NCEP datasets available via NCAR/SCD and NCEP real-time data are provided under the 'Download' menu.

All available documentation on WRF is provided under the 'Pub / Doc' menu. This will continually be enhanced as time goes on.

Real-time WRF forecasts can be found under 'WRF Forecast' menu. There are a few organizations that are currently running WRF in real-time. The NCAR 4 km WRF domain is being run this summer and posted on the Web: <http://rain.mmm.ucar.edu/wrf/>.

A planned addition to the Web page is the online tutorial. This should be completed by fall 2004.

4. Supported Software

We recently released WRF V2.0, which includes the following programs: WRF model (Advanced Research WRF core [Eulerian mass currently]), WRF SI, and WRF 3DVAR. These are the major programs we provide support for at MMM. In addition, we are supporting a few graphics tools, including RIP4, NCAR NCL scripts, and conversion programs to GrADS and Vis5D.

Planned updates will include updating NCL scripts to better utilize the resources developed by other NCAR divisions, unified conversion programs so that more diagnostics may be included in the converted datasets for GrADS and Vis5D. A vertical interpolation program will also be added to ingest MM5 pressure-level data to WRF model.

* The National Center for Atmospheric Research is sponsored by the National Science Foundation.

5. WRF Documentation

We are in the process of developing a more complete set of WRF documentation. In particular a user' guide that deals with the practical side of the WRF system, an NCAR technical note that describes the WRF modeling system and a software developer's guide are under development. The goal is to consolidate many writings and notes that have been written in the past couple of years and provide them in a few well-defined documents.

At this time various levels of documentation exist. At the code level, in-line documentation has been enhanced, and it will be updated continuously. Using a tool provided in the WRF code tar file, a html code documentation file can be generated. Subroutine descriptions can be found via html file browsing. One can also find this page on the WRF Users' Web page (under Pub/Doc menu).

Also in the code tar file, README files are provided to explain the namelist variables (in *run/* directory), test cases (top and *test/* directories) and basic instructions on how to build and run the model (top directory).

On the WRF Users' Web page, a description of the current WRF release can be found, and detailed instructions are provided to guide a user through compiling and running WRF in a single domain, two-way nested, or one-way nested run, and running the idealized cases and real-data cases.

For model dynamics and numerics, one can refer to a draft paper by Klemp, Skamarock and Dudhia, and a paper published in *Monthly Weather Review* by Wicker and Skamarock (2002). A physics document, written by Chen and Dudhia, is also available, and we will soon be updating it for WRF V2.0. For users who are interested in incorporating a new physics package, this is the reference document. For post-processing, a complete document on RIP4 is provided. For other graphics tools, instructions can be found on the Web. All of above are available from the User's Web page under Pub / Doc menu.

Several software documents are also available on the same Web page. These include a WRF code browser (courtesy of Brian Fiedler, Rafal Jabrzemski, and Chris Hudgin at the School of Meteorology at the University of Oklahoma), WRF I/O and Model Coupling API, a description of the WRF lateral boundary conditions (by Sundararaman G. Gopalakrishnan of NOAA/NCEP). An older version of the software design and implementation document (including the description of Registry) is on the page too.

Three documents are currently under development. The first one is a WRF Modeling System User's Guide. This document will be available to the participants at this sum-

mer's tutorial. At the present, this document provides the basic information on how to use the WRF modeling system. It will be gradually expanded to include more detail and cover more subjects. A second document is a description of the WRF Model which will provide details of model equations, numerics, physics parameterization and software framework. A third document is the software development guide which will provide documentation of WRF framework.

6. Summary

We are making progress on all fronts regarding WRF user support. Like a new user, we are also learning as we go along. Comments and feedback are welcome.

Reference:

Wicker, L. J., and W. C. Skamarock, 2002: Time Splitting Methods for Elastic Models Using Forward Time Schemes. *MWR*, 2088 - 2097.