

# Installing WRF & WPS

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January 2015



# Installing Steps

- *Check system requirements*
- Installing Libraries
- Download source data
- Download datasets
- Compile WRFV3
- Compile WPS



# System Requirements

- On what kinds of systems will WRF run?
  - Generally any 32- or 64-bit hardware, running a UNIX-like operating system
  - You may also use dual-booting into a UNIX-like OS (e.g., Windows with Linux build parallel)
- Examples of acceptable systems:
  - Laptops, desktops, and clusters running Linux
  - Laptops and desktops running MacOS X
  - Clusters running Linux or AIX (Cray, IBM, SGI, etc.)



# Check System Requirements

- Webpage:  
[http://www2.mmm.ucar.edu/wrf/OnLineTutorial/compilation\\_tutorial.php](http://www2.mmm.ucar.edu/wrf/OnLineTutorial/compilation_tutorial.php)



This page is meant to provide guidance through the steps of compiling WRF. It will take a beginning user through the processes of ensuring the computer environment is set up correctly, to testing the components and their compatibility with each other, then to installing WRFV3 and WPS, and finally to some guidance for preparing to run WPS and then WRFV3.

Click on a tab below for quick navigation. If you are a beginner, it is recommended to start at the beginning and follow through each step.



## **\*\*IMPORTANT NOTES: PLEASE READ BEFORE CONTINUING!**

- In order to use personal machines, you must have all the pre-required programs and compilers built, as well as their functionality/compatibility verified through testing. We cannot be responsible or provide assistance for the installation of Linux, Linux utilities, or the compilers.
- We are attempting to walk you through the steps for building necessary libraries (netCDF, MPICH, JasPer, Libpng, and Zlib); however, if you experience errors, we cannot be responsible for helping to correct the errors, as these are related to your particular system, and are not supported by our wrfhelp group. You will need to contact someone in your systems administration office, or go to the library websites to contact someone in their support group for assistance.
- All of the examples given here are in tcsh. If you are very familiar with another shell (e.g., bash), and feel comfortable making the necessary alterations to the commands, then feel free to use your other shell. If not, however, we recommend using tcsh.



# Check System Requirements

- It is mandatory to have a Fortran (e.g., gfortran) compiler, gcc, and cpp on your system. Check by typing:
  - `which gfortran`
  - `which cpp`
  - `which gcc`
  - If installed, you will be given a path for each
- Fortran compiler should be version 4.4.0, or later  
Check this by typing  
(for csh):  
`gcc --version`
- Tests available for checking that your fortran compiler is built properly, and that it is compatible with the C compiler.

## System Environment Tests

1. First and foremost, it is very important to have a gfortran compiler, as well as gcc and cpp. To test whether these exist on the system, type the following:

```
• which gfortran
• which cpp
• which gcc
```

If you have these installed, you should be given a path for the location of each.

We recommend using gfortran version 4.4.0 or later. To determine the version of gfortran you have, type:

```
gcc --version
```

2. Create a new, clean directory called `Build_WRF`, and another one called `TESTS`.

3. There are a few simple tests that can be run to verify that the fortran compiler is built properly, and that it is compatible with the C compiler. Below is a tar file that contains the tests. Download the tar file and place it in the `TESTS` directory.

[Fortran and C Tests Tar File](#)

To unpack the tar file, type:

```
tar -xf Fortran_C_tests.tar
```

There are 7 tests available, so start at the top and run through them, one at a time.

**Test #1: Fixed Format Fortran Test:** `TEST_1_fortran_only_fixed.f`

Type the following in the command line:

```
gfortran TEST_1_fortran_only_fixed.f
```

Now type:

```
./a.out
```

The following should print out to the screen:

```
SUCCESS test 1 fortran only fixed format
```



# Additional Necessary Requirements

- Scripting languages (testing available in test package):

csch

perl

sh

- UNIX commands:

ar

head

sed

awk

hostname

sleep

cat

ln

sort

cd

ls

tar

cp

make

touch

cut

mkdir

tr

expr

mv

uname

file

nm

wc

grep

printf

which

gzip

rm



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# Installing Libraries

- NetCDF (needed by WRF and WPS)
- Optional libraries for GRIB2 met data support
  - JasPer (JPEG 2000 “lossy” compression library)
  - PNG (“lossless” compression library)
  - Zlib (compression library used by PNG)
- Optional MPI library (for building in parallel):
  - MPICH2





# Installing Libraries

- Installation of these libraries (MPICH2, NetCDF, JasPer, zlib, and libpng) is NOT part of the WPS and WRF installation scripts
- VERY IMPORTANT!
  - Make sure these libraries are installed using the same compilers as will be used to install WRF and WPS
- Downloads for the libraries, with installation instructions, and library compatibility tests are also included on the compilation website



# Installing Libraries: NetCDF

```
setenv DIR directory-where-your-tar-files-are
setenv CC gcc
setenv CXX g++
setenv FC gfortran
setenv FCFLAGS -m64      # FCFLAGS may be needed on some systems
setenv F77 gfortran
setenv FFLAGS -m64       # FFLAGS may be needed on some systems

tar xzvf netcdf-4.1.3.tar.gz      # no '.gz' if downloaded to most Macs
cd netcdf-4.1.3
./configure --prefix=$DIR/netcdf --disable-dap --disable-netcdf-4 --
disable-shared
make
make install
setenv PATH $DIR/netcdf/bin:$PATH
setenv NETCDF $DIR/netcdf
cd ..
```



# Installing Libraries: MPICH2

- In principle, any implementation of the MPI-2 standard should work with WRF; however, we have the most experience with MPICH
- *Assuming environment variables for netCDF install are already set:*

```
tar xzvf mpich-3.0.4.tar.gz    # no '.gz' if downloaded to most Macs
cd mpich-3.0.4
./configure --prefix=$DIR/mpich
make
make install
setenv PATH $DIR/mpich/bin:$PATH
cd ..
```



# Installing Libraries: zlib

- *Assuming environment variables from netCDF install are already set:*

```
tar xzvf zlib-1.2.7.tar.gz          # no '.gz' if downloaded to most Macs
cd zlib-1.2.7
./configure --prefix=$DIR/zlib
make
make install
cd ..
```



# Installing Libraries: libpng

- *Assuming environment variables from netCDF install are already set*

```
tar xzvf libpng-1.2.50.tar.gz      # no '.gz' if downloaded to most Macs
cd libpng-1.2.50
./configure --prefix=$DIR/libpng
make
make install
cd ..
```



# Installing Libraries: Jasper

- *Assuming environment variables from netCDF install are already set*

```
tar xzvf jasper-1.900.1.tar.gz      # no '.gz' if downloaded to most Macs
cd jasper-1.900.1
./configure --prefix=$DIR/jasper
make
make install
cd ..
```



# Installing Steps

- Check system requirements
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- *Download source data*
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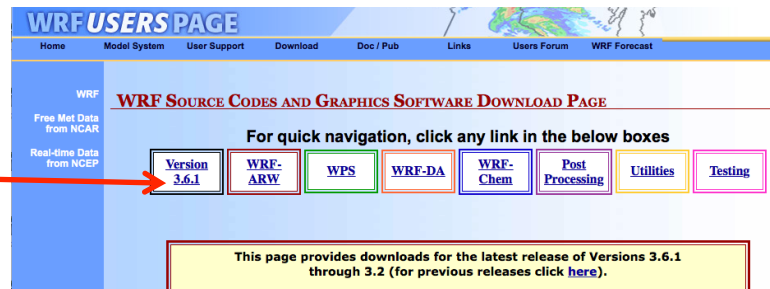


# Download WRF & WPS Code

- Download WRF & WPS source code from:  
[http://www2.mmm.ucar.edu/wrf/users/download/get\\_source.html](http://www2.mmm.ucar.edu/wrf/users/download/get_source.html)
  - Click 'New User,' register and download, or
  - Click 'Returning User,' enter your email, and download

## Step 1:

Click here for  
the latest  
released code  
(recommended)



## Step 2:

Click on tar  
files to  
download

The screenshot shows a table titled 'WRF Downloads for the most recent version: 3.6.1'. The table has four rows and three columns. The first column lists the software components: 'WRF-ARW', 'WPS', 'WRF-DA', and 'WRF-Chem'. The second column contains links to 'tar file' for each component. The third column contains links to 'Known Problems' and 'Updates' for each component. A red circle highlights the 'tar file' links for 'WRF-ARW' and 'WPS', and a red arrow points from the text 'Click on tar files to download' to the 'tar file' link for 'WRF-ARW'.

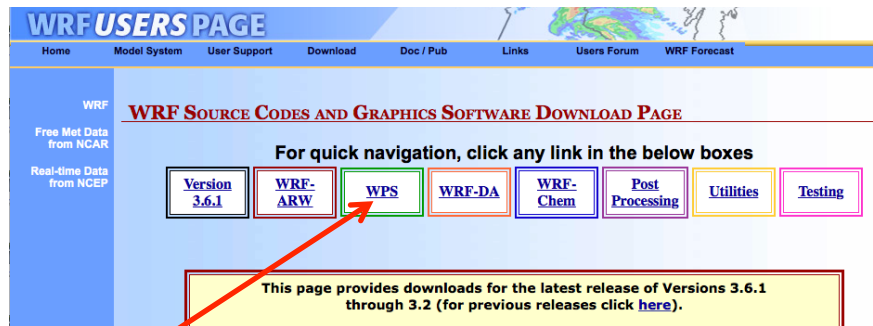
WRF Downloads for the most recent version: 3.6.1		
WRF-ARW	<a href="#">tar file</a>	<a href="#">Known Problems</a> <a href="#">Updates</a>
WPS	<a href="#">tar file</a>	<a href="#">Known Problems</a> <a href="#">Updates</a>
WRF-DA	<a href="#">tar file</a>	<a href="#">Updates</a>
WRF-Chem	<a href="#">tar file</a>	





# Download Static Geographical Data

- From the WRF Download page:  
[http://www.mmm.ucar.edu/wrf/users/download/get\\_sources.html](http://www.mmm.ucar.edu/wrf/users/download/get_sources.html)



**Step 1:** Click 'WPS' box

**Step 2:** Click 'here' to get geography data

## WRF Preprocessing System (WPS) Code Downloads

Version 3.6.1	August 14, 2014	<a href="#">tar file</a>
Version 3.6	April 18, 2014	<a href="#">tar file</a>
Version 3.5.1	September 23, 2013	<a href="#">tar file</a>
Version 3.5	April 18, 2013	<a href="#">tar file</a>
Version 3.4.1	August 16, 2012	<a href="#">tar file</a>
Version 3.4 (Updated)	June 5, 2012	<a href="#">tar file</a>
Version 3.4	April 6, 2012	<a href="#">tar file</a>
Version 3.3.1	September 22, 2011	<a href="#">tar file</a>
Version 3.3	April 6, 2011	<a href="#">tar file</a>
Version 3.2.1	August 18, 2010	<a href="#">tar file</a>
Version 3.2	April 2, 2010	<a href="#">tar file</a>

**\*\*IMPORTANT:** Before running WPS, you will need to download the WPS Geography data, which you can find [here](#).



# Download Static Geographical Data

- Geographical Input and Data Download Page:

[http://www.mmm.ucar.edu/wrf/users/download/get\\_sources\\_wps\\_geog.html](http://www.mmm.ucar.edu/wrf/users/download/get_sources_wps_geog.html)

geog.tar.gz  
~ 15 GB when  
uncompressed

This is the one  
you want

WRF Preprocessing System (WPS) Geographical Input Data Downloads

All Available Files	<a href="#">Download Complete Dataset</a>	<a href="#">Download Lowest Resolution of Each Mandatory Field</a>	<a href="#">Download New Static Data Released With v3.6</a>
<a href="#">NUDAPT44_1km</a>	x		
<a href="#">albedo_ncep</a>	x	x	
<a href="#">clayfrac_5m</a>	x	x	
<a href="#">greenfrac</a>	x	x	
<a href="#">greenfrac_fpar_modis</a>	x		
<a href="#">hagl</a>	x	x	
<a href="#">hanis</a>	x	x	
<a href="#">hasynw</a>	x	x	
<a href="#">hasys</a>	x	x	
<a href="#">hasysw</a>	x	x	
<a href="#">hasyw</a>	x	x	
<a href="#">hcnvx</a>	x	x	



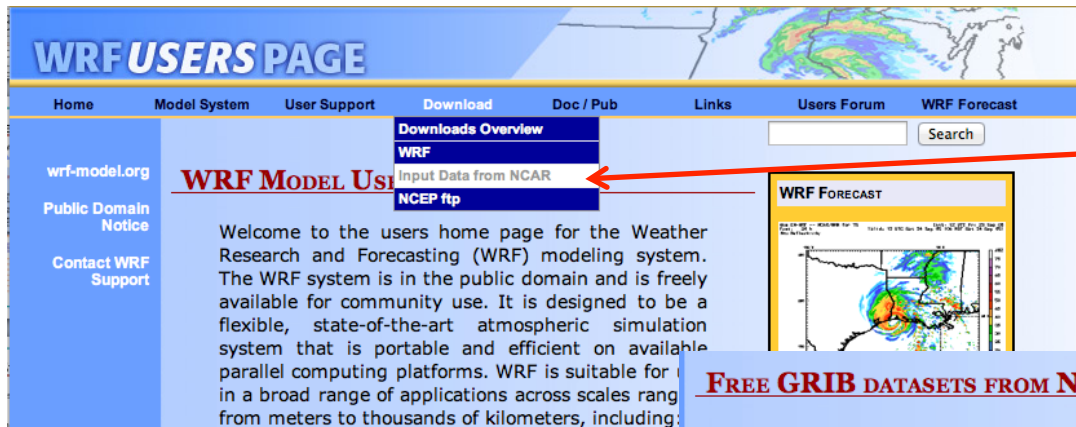
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# Download Datasets

- From the WRF Users' page: <http://www.mmm.ucar.edu/wrf/users/>



**Step 1:** Click Download, then scroll down and click 'Input Data from NCAR'

**Step 2:** Click the dataset you wish to use (for this example, we will use 'FNL from GFS')

## FREE GRIB DATASETS FROM NCAR/DSS

A number of datasets which can be used as input to WPS can now be downloaded directly from the [NCAR/CISL](http://www.mmm.ucar.edu/dss/) web site:

- You must register with a user name and password to access the data
- Only a limited number of datasets are available online
- Click on the 'Data Access' tab once on the page
- The data is free for all users to download

### Available GRIB datasets: (for input to WPS)

- NCEP Final Analysis (FNL from GFS) (ds083.2): 1 degree resolution, every 6 hours  
◦ <http://rda.ucar.edu/datasets/ds083.2/>
- NCEP/NCAR Reanalysis (ds090.0): 2.5 degree resolution, every 6 hours  
◦ <http://rda.ucar.edu/datasets/ds090.0/>
- NCEP GRIB GDAS (ds083.0): 2.5 degree resolution, every 12 hours. - you may be able to use it if your entire domain stays in one hemisphere.  
◦ <http://rda.ucar.edu/datasets/ds083.0/>
- NCEP Eta/NAM (ds609.2): 40 km resolution, every 6 hours.  
◦ <http://rda.ucar.edu/datasets/ds609.2/>

**\*Note:** NOMADS site has several types of useful data:  
<http://nomads.ncdc.noaa.gov>



# Download Datasets (continued)

**Step 3:** Register, or sign in, if you already have an account

**Step 4:** Click 'Data Access'

Hello Guest [Register Now](#) [Sign In](#) | [Forgot Password?](#)

**CISL Research Data Archive**  
Managed by NCAR's Data Support Section  
Data for Atmospheric and Geosciences Research

Go to Dataset:

[Home](#) [Find Data](#) [Ancillary Services](#) [About/Contact](#) [Data Citation](#) [For Staff](#)

**NCEP FNL Operational Model Global Tropospheric Analyses, continuing from July 1999**  
ds083.2

For assistance, contact [Kevin Manross](#) (303-497-1218).

[Description](#) [Data Access](#) [Documentation](#) [Software](#)

**Abstract:** These NCEP FNL (Final) Operational Global Analysis data are on 1.0x1.0 degree grids prepared operationally every six hours. This product is from the Global Data Assimilation System (GDAS), which continuously collects observational data from the Global Telecommunications System (GTS), and other sources, for many analyses. The FNLs are made with the same model which NCEP uses in the Global Forecast System (GFS), but the FNLs are prepared about an hour or so after the GFS is initialized. The FNLs are delayed so that more observational data can be used. The GFS is run earlier in support of time critical forecast needs, and uses the FNL from the previous 6 hour cycle as part of its initialization.

**CISL Research Data Archive**  
Managed by NCAR's Data Support Section  
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Go to Dataset:

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[Description](#) [Data Access](#) [Documentation](#) [Software](#)

Mouse over the table headings for detailed descriptions

Data Description		Data File Downloads		Customizable Data Requests	Other Access Methods	NCAR-Only Access	
		Web Server Holdings	Data Format Conversion	Subsetting	THREDDS Data Server	Central File System (GLADE) Holdings	Tape Archive (HPSS) Holdings
Union of Available Products		Web File Listing	Get Converted Files			GLADE File Listing	HPSS File Listing
P R O D U C T S	GRIB1 6 HOURLY FILES begin 1999.07.30	Web File Listing	Get Converted Files	Get a Subset	TDS Aggregation	GLADE File Listing	HPSS File Listing
	GRIB2 6 HOURLY FILES begin 2007.12.06	Web File Listing	Get Converted Files			GLADE File Listing	HPSS File Listing

**Step 5:** Click 'Web File Listing' for the span of years you need



# Download Datasets (continued)

**Step 6:** Click 'Complete File List'

Home Find Data Ancillary Services About/Contact Data Citation For Staff

**NCEP FNL Operational Model Global Tropospheric Analyses, continuing from July 1999**  
ds083.2

For assistance, contact [Kevin Manross](#) (303-497-121)

Description Data Access Documentation Software

View listings of our Internet-accessible data file holdings and download the files. You can download files one-by-one by clicking their links, or you can take advantage of the tools that we provide that will allow you to easily download many files. Your options are:

<a href="#">Faceted Browse</a> Interactively browse the Internet-accessible files and make selections to create the files you need. <i>Please note</i> that this service. You will still receive whole files in our archive.	<a href="#">Complete File List</a> View a hierarchical listing of the full collection of data files
---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	--------------------------------------------------------------------------------------------------------

[ Web server holdings ]

GRIB2 - GRIB2 6 HOURLY FILES begin 2007.12.06

GRIB2 files can be used in the WRF. GRIB2 files have same data as G

## Subgroup Summary

Group ID	Data Description	FILE COUNT
<a href="#">View More Detail</a>		
GRIB2 2007	GRIB2 6 HOURLY FILES for 2007	102
GRIB2 2008	GRIB2 6 HOURLY FILES for 2008	1465
GRIB2 2009	GRIB2 6 HOURLY FILES for 2009	1460
GRIB2 2010	GRIB2 6 HOURLY FILES for 2010	1460
GRIB2 2011	GRIB2 6 HOURLY FILES for 2011	1460
GRIB2 2012	GRIB2 6 HOURLY FILES for 2012	1464
GRIB2 2013	GRIB2 6 HOURLY FILES for 2013	1460
GRIB2 2014	GRIB2 6 HOURLY FILES for 2014	30
TOTAL	8/74 Subgroups	8901

**Step 7:** Click the year you need. After this, You will click the month you need (not shown)



# Download Datasets (continued)

**Step 8:** Click a box for each time span that you need

## GRIB2 2012.06 - GRIB2 6 HOURLY FILES for 2012.06

GRIB2 files can be used in the WRF. GRIB2 files have same data as GRIB1, with more compression.

All analysis times are available for this month.

Files have 328 fields in 52 levels/layers.

[View Selected Files/Get As a Tar File](#) [Perl Download Script](#) [Csh Download Script](#) ⓘ

- Total **120 Files (2.0G)** are listed below
- Click a file name to download a single file
- Currently **3 Files (50.89M)** selected [Clear Selection in this List](#)

[ Scroll to **END** of the filelist ]

<input type="checkbox"/> ⓘ	INDEX	File Name ⓘ	Size ⓘ	Data Format	Date Archived ⓘ	Group ID
<input checked="" type="checkbox"/>	1	fnl_20120601_00_00 ⓘ	17.0M	GRIB2	06/01/2012	GRIB2 2012.06
<input checked="" type="checkbox"/>	2	fnl_20120601_06_00 ⓘ	16.9M	GRIB2	06/01/2012	GRIB2 2012.06
<input checked="" type="checkbox"/>	3	fnl_20120601_12_00 ⓘ	17.0M	GRIB2	06/01/2012	GRIB2 2012.06
<input type="checkbox"/>	4	fnl_20120601_18_00 ⓘ	17.0M	GRIB2	06/01/2012	GRIB2 2012.06
<input type="checkbox"/>	5	fnl_20120602_00_00 ⓘ	16.8M	GRIB2	06/02/2012	GRIB2 2012.06
<input type="checkbox"/>	6	fnl_20120602_06_00 ⓘ	16.6M	GRIB2	06/02/2012	GRIB2 2012.06
<input type="checkbox"/>	7	fnl_20120602_12_00 ⓘ	16.8M	GRIB2	06/02/2012	GRIB2 2012.06
<input type="checkbox"/>	8	fnl_20120602_18_00 ⓘ	16.8M	GRIB2	06/02/2012	GRIB2 2012.06

**Step 9:** Once you have chosen All your times, click on the 'View Selected Files/Get As a Tar File' button  
To download one tar file with all your Dates/times



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- *Compile WRFV3*
- Compile WPS





# Before Compiling

- Check where your netCDF library and include file are. If it is not in the usual location (i.e., `/usr/local/netcdf`), then use the NETCDF environment variable to set the path. e.g., for a C-shell environment:

```
setenv NETCDF /where-netcdf-is
```

- Unpack your remaining tar files:

You should now have the following directories:

```
gunzip WPSV3.6.1.TAR.gz
```

```
tar -xf WPSV3.6.1.TAR ----->
```

WPS

```
gunzip WRFV3.6.1.TAR.gz
```

```
tar -xf WRFV3.6.1.TAR ----->
```

WRFV3

```
gunzip geog.tar.gz
```

```
tar -xf geog.tar ----->
```

WPS\_GEOG



**\*Useful Tip:**

Create another directory inside here, called 'TAR\_FILES' and place all the tar files in there to keep things organized.

# Compile WRFV3

- It is important to compile WRFV3 **first**, before WPS
  - WPS makes use of the external I/O libraries in the *WRFV3/external* directory
  - The libraries are built when WRF is installed
- Two steps to compiling:
  - 1) Create a configuration file for your computer and compiler  
`./configure`
  - 2) Compile the code  
`./compile test_case >& log.compile`



# Step 1: Configure for WRFV3

- Inside the WRFV3/ directory, type: `./configure`

```
checking for perl5... no
checking for perl... found /usr/bin/perl (perl)
Will use NETCDF in dir: /usr/local/netcdf
PHDF5 not set in environment. Will configure WRF for use without.
configure: WRF operating system set to "Linux" via environment variable $WRF_OS
configure: WRF machine set to "i686" via environment variable $WRF_MACH
$JASPERLIB or $JASPERINC not found in environment, configuring to build without grib2 I/O...
```

-----  
Please select from among the following supported platforms.

1. Linux i486 i586 i686, gfortran compiler with gcc (serial)
2. Linux i486 i586 i686, gfortran compiler with gcc (smpar)
3. **Linux i486 i586 i686, gfortran compiler with gcc (dmpar)**
4. Linux i486 i586 i686, gfortran compiler with gcc (dm+sm)
5. Linux i486 i586 i686, g95 compiler with gcc (serial)
6. Linux i486 i586 i686, g95 compiler with gcc (dmpar)
7. Linux i486 i586 i686, PGI compiler with gcc (serial)
8. Linux i486 i586 i686, PGI compiler with gcc (smpar)
9. Linux i486 i586 i686, PGI compiler with gcc (dmpar)
10. Linux i486 i586 i686, PGI compiler with gcc (dm+sm)
11. Linux x86\_64 i486 i586 i686, ifort compiler with icc (serial)
12. Linux x86\_64 i486 i586 i686, ifort compiler with icc (smpar)
13. Linux x86\_64 i486 i586 i686, ifort compiler with icc (dmpar)
14. Linux x86\_64 i486 i586 i686, ifort compiler with icc (dm+sm)

Enter selection [1-16] :

Compile for nesting? (**1=**basic, 2=present moves, 3=vortex following) [default 1]:

- Output from configuration: a file called 'configure.wrf'



## Step 2: Compile WRFV3

- In the WRFV3/ directory, type:

```
./compile em_case >& log.compile
```

Important in case  
there are compile  
problems

Where **em\_case** is one of the following  
(type `./compile` to see all options)

**em\_real** (3d real case)

**em\_quarter\_ss**

**em\_b\_wave**

**em\_les**

**em\_heldsuarez**

**em\_tropical\_cyclone**

3d Ideal

**em\_hill2d\_x**

**em\_squall2d\_x**

**em\_squall2d\_y**

**em\_grav2d\_x**

**em\_seabreeze2d\_x**

**em\_scm\_xy** (1d ideal)

2d Ideal

- Compilation should take at most 20-30 mins



# Successful Compilation

- If the compilation is successful, you should find these executables in **WRFV3/main** (non-zero size):

## Real data case:

**wrf.exe** – model executable  
**real.exe** – real data initialization  
**ndown.exe** – one-way nesting  
**tc.exe** – for tc bogusing (serial only)

## Ideal case:

**wrf.exe** – model executable  
**ideal.exe** – ideal case initialization

**\*Note:** Each ideal case compile creates a different executable, but with the same name



- These executables are linked to 2 different directories (**WRFV3/run** and **WRFV3/test/em\_real**). You can go to either place to run WRF.

# Installing Steps

- Check system requirements
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- *Compile WPS*



# Compile WPS

- Once WRFV3 is successfully compiled, change directory to WPS prior to compiling

```
cd ../WPS
```

- Two steps to compiling WPS, as well:
  - 1) Create a configuration file for your computer

```
./configure
```

- 2) Compile the code

```
./compile >& log.compile
```



# Step 1: Configure for WPS

- Inside the WPS/ directory, type: `./configure`

```
Will use NETCDF in dir: /usr/local/netcdf-pgi
$JASPERLIB or $JASPERINC not found in environment. Using /usr/local for library paths...
-----
Please select from among the following supported platforms.
  1. Linux i486 i586 i686, PGI compiler      (serial)
  2. Linux i486 i586 i686, PGI compiler      (serial_NO_GRIB2)
  3. Linux i486 i586 i686, PGI compiler      (dmpar)
  4. Linux i486 i586 i686, PGI compiler      (dmpar_NO_GRIB2)
  5. Linux i486 i586 i686, Intel compiler    (serial)
  6. Linux i486 i586 i686, Intel compiler    (serial_NO_GRIB2)
  7. Linux i486 i586 i686, Intel compiler    (dmpar)
  8. Linux i486 i586 i686, Intel compiler    (dmpar_NO_GRIB2)
  9. Linux i486 i586 i686, g95              (serial)
 10. Linux i486 i586 i686, g95              (serial_NO_GRIB2)
 11. Linux i486 i586 i686, g95              (dmpar)
 12. Linux i486 i586 i686, g95              (dmpar_NO_GRIB2)
 13. Linux i486 i586 i686, gfortran         (serial)
 14. Linux i486 i586 i686, gfortran         (serial_NO_GRIB2)
 15. Linux i486 i586 i686, gfortran         (dmpar)
 16. Linux i486 i586 i686, gfortran         (dmpar_NO_GRIB2)
Enter selection [1-16] :
```

- Choose to compile WPS **serially** (even if you compiled WRFV3 in parallel), unless you plan to use very large domains
  - \*NOTE: If you compile WPS in parallel, ungrib.exe must still be run serially
- Output from configuration: a file called 'configure.wps'





## Step 2: Compile WPS

- In the WPS/ directory, type:  
`./compile >& log.compile`
- Compilation should only take a few minutes
- If successful, these executables should be in your WPS/ directory (and they are linked, respectively, from their source code directories):

`geogrid.exe` -> `geogrid/src/geogrid.exe`

`ungrib.exe` -> `ungrib/src/ungrib.exe`

`metgrid.exe` -> `metgrid/src/metgrid.exe`



## ./clean -a

- The './clean -a' command is something that should be used when you have made corrections to your configure.wrf file, configure.wps file, or any changes to the registry. If you have made any of these changes, or if you plan to recompile your code from scratch, you must issue a 'clean -a' before recompiling.
- If you made any changes to any subroutines within the code, you will need to recompile your code, but you do NOT need to issue the 'clean -a' command, nor do you need to reconfigure. You will simply just recompile. This compilation should take a lot less time than a clean compile.



# Questions?

