

# WRF Overview and Compilation

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# WRF/WPS Overview

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- What is WRF?
  - **W**eather **R**esearch and **F**orecasting Model
  - Used for both research and operational forecasting
- Current Version: V3.8.1



# WRF/WPS Overview

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- What is WPS?
  - WRF Preprocessing System
  - Prepares input to WRF for real-data simulations
- Current Version: V3.8.1



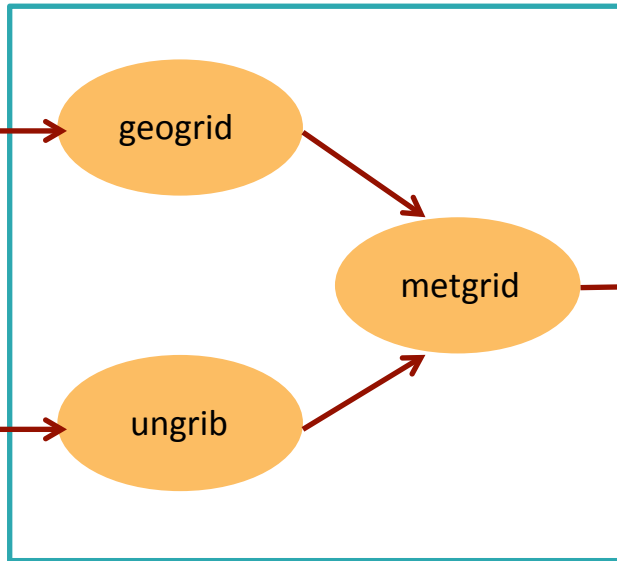
# WRF/WPS Flowchart

External Data Sources

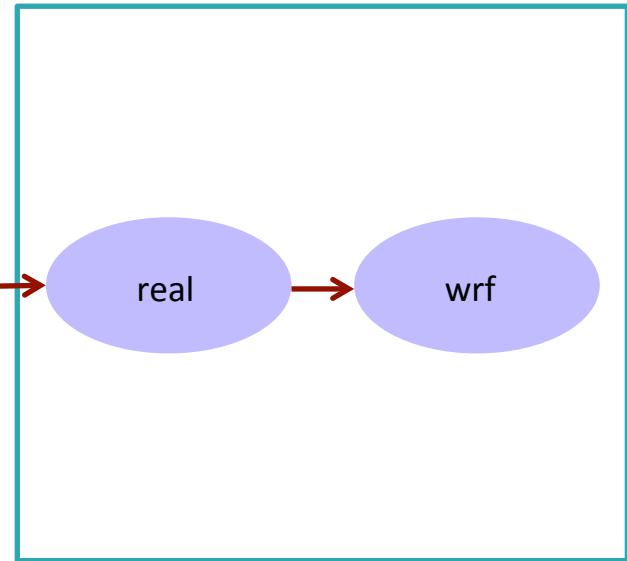
Static Geographical Data

Gridded Meteorological Data

WRF Preprocessing System



WRF Model



# Compiling WRF/WPS

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# Installing Steps

- *Check system requirements*
- Installing libraries
- Download source data
- Compile WRFV3
- Compile WPS
- Download initial/BC datasets

# 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 built parallel)
- Examples of acceptable systems:
  - Laptops, desktops, and clusters running Linux
  - Laptops and desktops running MacOS X
  - Clusters running Unix-like: Linux, AIX



# 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, a C compiler, and cpp on your system. To test whether these exist on your system, type:
  - 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

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- Scripting languages (testing available in test package):

csh

perl

sh

- UNIX commands:

ar

hostname

sort

cp

mkdir

uname

grep

rm

head

sleep

cd

make

tr

file

printf

sed

cat

ls

touch

expr

nm

which

awk

ln

tar

cut

mv

wc

gzip



# Installing Steps

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

- NetCDF (needed by WRF and WPS)
- Optional libraries for GRIB2 meteorological 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 Libraries: Compatibility

- Make sure libraries are compatible with compilers
- Test 1
  - Fortran + C + netCDF
- Test 2
  - Fortran + C + netCDF + MPI

## Library Compatibility Tests

- Once the target machine is able to make small Fortran and C executables (what was verified in the System Environment Tests section), and after the NetCDF and MPI libraries are constructed (two of the libraries from the Building Libraries section), to emulate the WRF code's behavior, two additional small tests are required. We need to verify that the libraries are able to work with the compilers that are to be used for the WPS and WRF builds. Below is a tar file that contains these tests. Download this tar file and place it in the TESTS directory:

[Fortran\\_C\\_NETCDF\\_MPI\\_tests.tar](#)

To unpack the tar file, type:

```
tar -xvf Fortran_C_NETCDF_MPI_tests.tar
```

- There are 2 tests:

### 1. Test #1: Fortran + C + NetCDF

The NetCDF-only test requires the include file from the NetCDF package be in this directory. Copy the file here:

```
cp ${NETCDF}/include/netcdf.inc .
```

Compile the Fortran and C codes for the purpose of this test (the -c option says to not try to build an executable). Type the following commands:

```
gfortran -c 01_fortran+c+netcdf.f.f
gcc -c 01_fortran+c+netcdf.c.c
gfortran 01_fortran+c+netcdf.f.o 01_fortran+c+netcdf.c.o \
  -L${NETCDF}/lib -lnetcdff -lnetcd
./a.out
```

The following should be displayed on your screen:

```
C function called by Fortran
Values are xx = 2.00 and ii = 1
SUCCESS test 1 fortran + c + netcdf
```

### 2. Test #2: Fortran + C + NetCDF + MPI

The NetCDF+MPI test requires include files from both of these packages be in this directory, but the MPI scripts automatically make the `mpif.h` file available without assistance, so no need to copy that one. Copy the NetCDF include file here:

```
cp ${NETCDF}/include/netcdf.inc .
```

Note that the MPI executables `mpif90` and `mpicc` are used below when compiling. Issue the following commands:

```
mpif90 -c 02_fortran+c+netcdf+mpi.f.f
mpicc -c 02_fortran+c+netcdf+mpi.c.c
mpif90 02_fortran+c+netcdf+mpi.f.o \
  02_fortran+c+netcdf+mpi.c.o \
  -L${NETCDF}/lib -lnetcdff -lnetcd
mpirun ./a.out
```

The following should be displayed on your screen:

```
C function called by Fortran
Values are xx = 2.00 and ii = 1
status = 2
SUCCESS test 2 fortran + c + netcdf + mpi
```



# Installing Steps

- Check system requirements
- Installing libraries
- *Download source data*
- Compile WRFV3
- Compile WPS
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# Download WRF & WPS Code

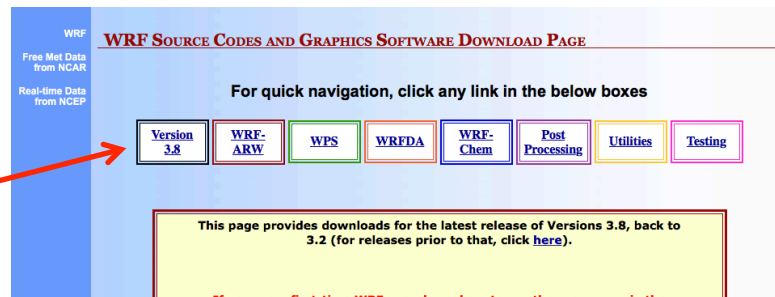
- Download WRF & WPS source code from:

[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

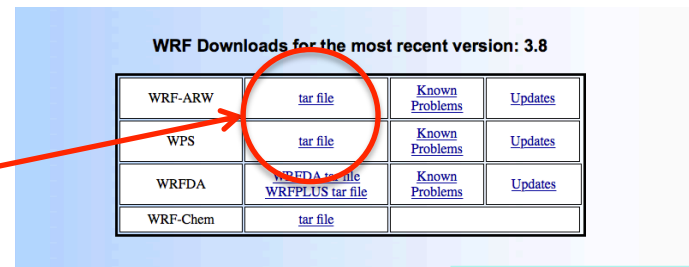
## Step 1:

Click here for the latest released code (recommended)



## Step 2:

Click on tar files to download

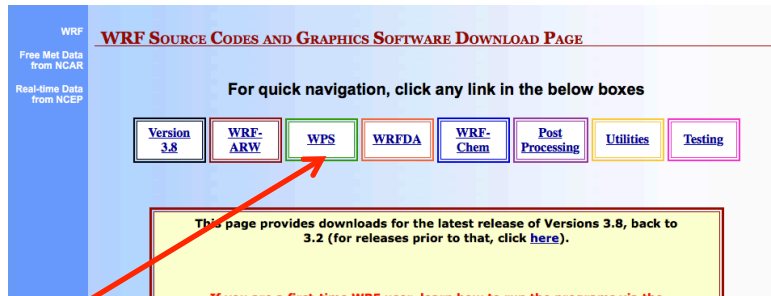


WRF Downloads for the most recent version: 3.8			
WRF-ARW	<a href="#">tar file</a>	<a href="#">Known Problems</a>	<a href="#">Updates</a>
WPS	<a href="#">tar file</a>	<a href="#">Known Problems</a>	<a href="#">Updates</a>
WRFDA	<a href="#">WRFDA tar file</a> <a href="#">WRFPLUS tar file</a>	<a href="#">Known Problems</a>	<a href="#">Updates</a>
WRF-Chem	<a href="#">tar file</a>		



# Download Static Geographical Data

- From the WRF Download page:  
[http://www2.mmm.ucar.edu/wrf/users/download/get\\_sources.html](http://www2.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 3.8	April 8, 2016	<a href="#">tar file</a>	<a href="#">Updates</a> **Note: topography data has been updated
Version 3.7.1	August 14, 2015	<a href="#">tar file</a>	<a href="#">Updates</a>
Version 3.7	April 20, 2015	<a href="#">tar file</a>	<a href="#">Updates</a>
Version 3.6.1	August 14, 2014	<a href="#">tar file</a>	<a href="#">Updates</a>
Version 3.6	April 18, 2014	<a href="#">tar file</a>	<a href="#">Updates</a>
Version 3.5.1	September 23, 2013	<a href="#">tar file</a>	<a href="#">Updates</a>
Version 3.5	April 18, 2013	<a href="#">tar file</a>	<a href="#">Updates</a>
Version 3.4.1	August 16, 2012	<a href="#">tar file</a>	<a href="#">Updates</a>
Version 3.4 (Updated)	June 5, 2012	<a href="#">tar file</a>	<a href="#">Updates</a>
Version 3.4	April 6, 2012	<a href="#">tar file</a>	<a href="#">Updates</a>
Version 3.3.1	September 22, 2011	<a href="#">tar file</a>	<a href="#">Updates</a>
Version 3.3	April 6, 2011	<a href="#">tar file</a>	<a href="#">Updates</a>
Version 3.2.1	August 18, 2010	<a href="#">tar file</a>	<a href="#">Updates</a>
Version 3.2	April 2, 2010	<a href="#">tar file</a>	<a href="#">Updates</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://www2.mmm.ucar.edu/wrf/users/download/get\\_sources\\_wps\\_geog.html](http://www2.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> <small>*Note: if using this dataset, you will need this <a href="#">namelist.wps</a></small>	<a href="#">Download New Static Data Released With v3.8</a>
<a href="#">NoDAPT44_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="#">hangl</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	
<a href="#">hlennw</a>	x	x	
<a href="#">hlens</a>	x	x	

# Installing Steps

- Check system requirements
- Installing libraries
- Download source data
- *Compile WRFV3*
- Compile WPS
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# Choosing a Compiler

Compiler	Compile Time	Run Time
GNU 4.8.2 **FREE**	12.63 Mins	4.18 Mins
Intel 12.1.5	27.75 Mins	3.88 Mins
PGI 13.3-0	24.86 Mins	4.25 Mins

\*Compile: dmpar/nesting, no large-file support

\*Run: single domain, small domain (74x61), 6 hours, 16 processors



# 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: /glade/apps/opt/netcdf/4.3.0/intel/12.1.5
PHDF5 not set in environment. Will configure WRF for use without.
Will use 'time' to report timing information
$JASPERLIB or $JASPERINC not found in environment, configuring to build without grib2 I/O...
-----
Please select from among the following Linux x86_64 options:

  1. (serial)   2. (smpar)   3. (dmpar)   4. (dm+sm)   PGI (pgf90/gcc)
  5. (serial)   6. (smpar)   7. (dmpar)   8. (dm+sm)   PGI (pgf90/pgcc): SGI MPT
  9. (serial)  10. (smpar)  11. (dmpar)  12. (dm+sm)   PGI (pgf90/gcc): PGI accelerator
 13. (serial)  14. (smpar)  15. (dmpar)  16. (dm+sm)   INTEL (ifort/icc)
                                     17. (dm+sm)   INTEL (ifort/icc): Xeon Phi (MIC architecture)
 18. (serial)  19. (smpar)  20. (dmpar)  21. (dm+sm)   INTEL (ifort/icc): Xeon (SNB with AVX mods)
 22. (serial)  23. (smpar)  24. (dmpar)  25. (dm+sm)   INTEL (ifort/icc): SGI MPT
 26. (serial)  27. (smpar)  28. (dmpar)  29. (dm+sm)   INTEL (ifort/icc): IBM POE
 30. (serial)                                     31. (dmpar)   PATHSCALE (pathf90/pathcc)
 32. (serial)  33. (smpar)  34. (dmpar)  35. (dm+sm)   GNU (gfortran/gcc)
 36. (serial)  37. (smpar)  38. (dmpar)  39. (dm+sm)   IBM (xlf90_r/cc_r)
 40. (serial)  41. (smpar)  42. (dmpar)  43. (dm+sm)   PGI (ftn/gcc): Cray XC CLE
 44. (serial)  45. (smpar)  46. (dmpar)  47. (dm+sm)   CRAY CCE (ftn/gcc): Cray XE and XC
 48. (serial)  49. (smpar)  50. (dmpar)  51. (dm+sm)   INTEL (ftn/icc): Cray XC
 52. (serial)  53. (smpar)  54. (dmpar)  55. (dm+sm)   PGI (pgf90/pgcc)
 56. (serial)  57. (smpar)  58. (dmpar)  59. (dm+sm)   PGI (pgf90/gcc): -f90=pgf90
 60. (serial)  61. (smpar)  62. (dmpar)  63. (dm+sm)   PGI (pgf90/pgcc): -f90=pgf90

Enter selection [1-63] :

Compile for nesting? (0=no nesting, 1=basic, 2=preset moves, 3=vortex following) [default 0]:
```

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



# Configure Options for WRFV3

## Debugging Options

- `./configure -d`
  - No optimization
  - Extra debugging
- `./configure -D`
  - No optimization
  - Checks uninitialized variables, floating point traps, etc.
  - Useful for adding/updating new code
- `./configure -r8`
  - Double precision for Intel and PGI
  - Does not work with GNU

## Large File Support

- `setenv WRFIO_NCD_LARGE_FILE_SUPPORT 1`
  - > 2GB
  - Before configuring



## Parallel Compile Option for WRFV3

- To build WRF in parallel
  - *setenv J "-j 2"*

# of Processors	Time to Compiler
1	22.8 Mins
2	14.92 Mins
3	9.33 Mins
4	8.02 Mins
5	7.23 Mins
6	6.68 Mins

\*Around 4 processors, it reaches state of equilibrium

\* This test done with GNU compiler



## configure.wrf File: Useful Tips

- NETCDFPATH : internally set by build system based on \$NETCDF
- PNETCDF = For users who have access to parallel netcdf, use the environment variable PNETCDF identically to how NETCDF is set (point to the PNETCDF top-level directory)

## 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**

**em\_convrad**

3d Ideal

**em\_hill2d\_x**

**em\_squall2d\_x**

**em\_squall2d\_y**

**em\_grav2d\_x**

**em\_seabreeze2d\_x**

2d Ideal

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

**\*\* Compilation should take at most ~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.



# Unsuccessful Compilation

- Use your 'log.compile' file to search for errors!
  - Search for 'Error' with a capital 'E'
- Use our Frequently Asked Questions web page for help
  - [www2.mmm.ucar.edu/wrf/users/FAQ\\_files/FAQ\\_wrf\\_intallation.html](http://www2.mmm.ucar.edu/wrf/users/FAQ_files/FAQ_wrf_intallation.html)
- Before recompiling:
  - issue a 'clean -a'
  - If you need to make changes to the configure.wrf file, do this after the 'clean -a', and then save the edited file.
  - Recompile
- Contact [wrfhelp@ucar.edu](mailto:wrfhelp@ucar.edu)



# Installing Steps

- Check system requirements
- Installing libraries
- Download source data
- Compile WRFV3
- *Compile WPS*
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# Step 1: Configure for WPS

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

```
Will use NETCDF in dir: /glade/apps/opt/netcdf/4.3.0/intel/12.1.5
$JASPERLIB or $JASPERINC not found in environment. Using default values for library paths...
-----
Please select from among the following supported platforms.

1. Linux x86_64, gfortran (serial)
2. Linux x86_64, gfortran (serial_NO_GRIB2)
3. Linux x86_64, gfortran (dmpar)
4. Linux x86_64, gfortran (dmpar_NO_GRIB2)
5. Linux x86_64, PGI compiler (serial)
6. Linux x86_64, PGI compiler (serial_NO_GRIB2)
7. Linux x86_64, PGI compiler (dmpar)
8. Linux x86_64, PGI compiler (dmpar_NO_GRIB2)
```

- Choose to compile WPS **serially**, even if you compile WRFV3 in parallel (unless you have a very large domain)
  - \*\*NOTE: if you do compile WPS in parallel, ungrib.exe must 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`



# Unsuccessful WPS Compilation

## No geogrid.exe or metgrid.exe

- WPS makes use of the external I/O libraries in the *WRFV3/external/* directory - The libraries are built when WRF is installed
- Check that you used the exact same compiler (and version) as you used to compile WRFV3
- Check that you are using the same netCDF that you used to build WRFV3
- Have you changed the name or path of the WRFV3/ directory?
  - If so, you need to change the following line in the `configure.wps` file:  
`WRF_DIR = ../WRFV3`
  - Save the file and recompile



# Unsuccessful WPS Compilation

## No ungrib.exe

- Make sure you have installed your jasper, zlib, and libpng libraries correctly.
- Make sure that you are using the correct path and format for the following lines in the configure.wps file

```
COMPRESSION_LIBS = -L/${DIR}/UNGRIB_LIBRARIES/lib -ljasper -lpng -lz
```

```
COMPRESSION_INC = -I/${DIR}/UNGRIB_LIBRARIES/include
```

Save configure.wps and recompile



## ./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.

# Installing Steps

- Check system requirements
- Installing libraries
- Download source data
- Compile WRFV3
- Compile WPS
- *Download initial/BC datasets*

# Download Datasets

- From the WRF Users' page: <http://www2.mmm.ucar.edu/wrf/users/>

**WRF USERS PAGE**

Home Model System User Support **Download** Doc / Pub Links Users Forum WRF Forecast

wrf-model.org  
Public Domain Notice  
Contact WRF Support

**WRF MODEL USER**

Welcome to the users home page for the Weather Research and Forecasting (WRF) modeling system. The WRF system is in the public domain and is freely available for community use. It is designed to be flexible, state-of-the-art atmospheric simulation system that is portable and efficient on available parallel computing platforms. WRF is suitable for use in a broad range of applications across scales ranging from meters to thousands of kilometers, including:

**Downloads Overview**  
WRF  
Input Data from NCAR  
NCEP ftp

**WRF FORECAST**

**GRIB DATASETS FROM NCAR RESEARCH DATA ARCHIVE**

A number of datasets which can be used as input to WPS can now be downloaded directly from the [NCAR Research Data Archive \(NCAR RDA\)](#) web site:

- You must register with a user name and password to access the data (registration is free).
- Click on the 'Data Access' tab once on the data set home page.
- Most of the RDA data is free for all users. A very few are restricted to university users or researchers. Read the individual data set home pages for usage restrictions, if any, that apply to the data set.

**Available GRIB Datasets from NCAR**

Dataset	Spatial Resolution	Temporal Resolution	Temporal Availability
<a href="#">NCEP Final Analysis (GFS-FNL) ds083.0</a>	2.5 degree	12-hourly	1997-04-01 to 2007-06-30
<a href="#">NCEP Final Analysis (GFS-FNL) ds083.2</a>	1 degree	6-hourly	1999-07-30 to current
<a href="#">NCEP GDAS Final Analysis ds083.3</a>	0.25 degree	6-hourly	2015-07-08 to current
<a href="#">NCEP GFS ds084.1</a>	0.25 degree	3-hourly (for first 240 hrs) 12-hourly (hrs 240-384)	2015-01-15 to current
<a href="#">NCEP/NCAR Reanalysis (NNRP) ds090.0</a>	209 km	6-hourly	1948-01-01 to current
<a href="#">NCEP Climate Forecast System</a>	0.3, 0.5, 1.0, 1.9, &		

**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')

**\*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

[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.

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

**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**  
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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
<b>Union of Available Products</b>		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 as you need. <i>Please note</i> that this service. You will still receive whole list in our archive.	<a href="#">Complete File List</a> View a hierarchical listing of the full collection of data files
---	--

Description Data Access Documentation

[ 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 compress:

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

# Steps to Run WRF

- Run WPS processes from the *WPS/* directory
  - See details in the WPS presentation
- `cd` to *WRFV3/run* or *WRFV3/test/em\_real*
- Link files from WPS to running directory
- Make appropriate edits to `namelist.input` file
- Run `real.exe`: `mpirun -np n ./real.exe`
- Run `wrf.exe`: `mpirun -np n ./wrf.exe`



# Questions?