



WRF Domain Wizard

A GUI for the WRF Preprocessing System

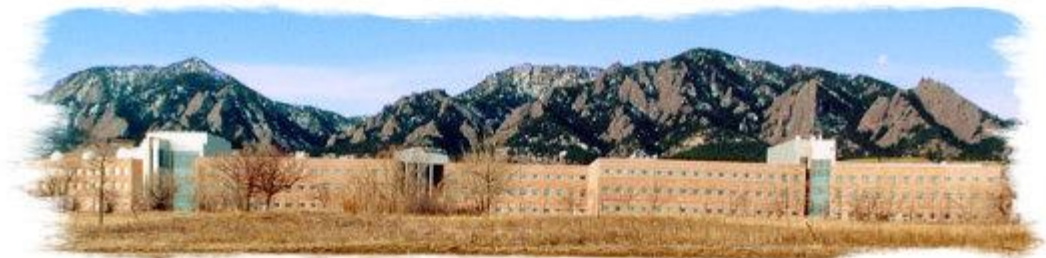
WRF Portal

A GUI for running WRF

Presented by Jeff Smith

Developed by: Mark Govett, Paula McCaslin, Craig Mattocks, Julien Lynge, Jeff Smith

July 15, 2011



NOAA's Earth System Research Lab in Boulder, CO



What is WRF Domain Wizard?

- The graphical user interface for WPS
- Used to
 - ☐ Define the region and projection of a domain on map
 - ☐ Define any nests
 - ☐ Write information to namelist.wps, namelist.input
 - ☐ Run the WPS programs
 - ☐ Visualize the netCDF output files
- Version 2.50 released on March 25, 2011
 - Supports Linux (including Ubuntu now), AIX, Mac, Windows

WRF Domain Wizard Technical Info -1

■ Software is written in Java

- Minimum (Java) JRE 1.5
- JRE 1.6 recommended for best performance
- Runs on local computer or remote computer
- Uses SFTP/SSH-2 to connect to remote computers
- Can be run “locally” on a remote computer with X display forwarding
- Can be run from web page as a Java Web Start app or download .zip file and run from the command line
- 390 MB of RAM, 1024 x 768 (or better) video display

■ Does not include WPS (must download/compile that separately)

WRF Domain Wizard Technical Info -2

■ WDW supports

- ☐ WPS/WRF 2.x, latest version of WRF/WPS 3.2
- ☐ ARW, NMM
- ☐ HWRF (Hurricane WRF, reads tcvitals file)
- ☐ GLAPS domains (writes nest7grid.parms files)
- ☐ Nests
- ☐ Projections
 - Lambert Conformal
 - Polar Stereographic
 - Mercator
 - Lat-Lon Regional (WPS 3.x)
 - Lat-Lon Global (WPS 3.x)
 - Rotated Lat-Lon for NMM

WRF Domain Wizard – How to Run

■ Run using Java Web Start (JWS)

- JWS automatically downloads your software then runs it. No need to set up directories, run installation programs, or configure anything. Just click the link and the program runs.
 - The first time you click on the link, there is a delay while the software downloads
 - When you click the link in the future, if the software has been updated, you automatically received the updated portion
- Java and Java Web Start (javaws) come standard with Linux and Mac. If you don't have Java on your system, download a Java Runtime Edition (JRE) from Sun

WRF Domain Wizard – How to Run

WRF Domain Wizard - Mozilla Firefox

File Edit View History Bookmarks Tools Help

WRF Domain Wizard

http://wrfportal.org/DomainWizard.html

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WRF Domain Wizard

GUI for the WRF Preprocessor System (WPS) and namelist.input. Go here for [LAPS Version](#)
Version 2.50 for Linux, AIX, Mac, and Windows - released March 25, 2011



WRF Domain Wizard is the successor to the [WRF GUI](#) and is a graphical user interface (GUI) for the new [WRF Preprocessing System \(WPS\)](#). It enables users to easily define and localize domains (cases) by selecting a region of the Earth and choosing a map projection. Users can also define nests using the nests editor, edit namelist.input, run the WPS programs (geogrid, ungrib, and metgrid) through the GUI, and visualize the NetCDF output. WRF Domain Wizard is also a built-in component of [WRF Portal](#). WRF Domain Wizard stores its information in namelist.wps, namelist.input (and nest7.grid.parms for LAPS users).

WRF Domain Wizard can be run as a stand-alone application or it can be run from inside the [WRF Portal](#) application. There are two ways to launch the standalone version of WRF Domain Wizard: by downloading the application and unzipping it, or by launching it with Java Web Start. The advantages of running the Java Web Start version include being able to run it without doing an installation, and automatically receiving program updates. Having trouble running Domain Wizard? Please read the [FAQ](#) or [troubleshooting tips](#).

Source Code is available [here](#). Looking for the special version for LEAD? Go [here](#).
What's [new in version 2.50](#)

Run WRF Domain Wizard using Java Web Start

[Click here to launch WRF Domain Wizard version 2.50](#) Requires Java 5 or later (go [here](#) if you can only run Java 1.4).

Help! WRF Domain Wizard doesn't launch! Here are some [trouble-shooting tips](#).

Click Here

WRF Domain Wizard – How to Run

■ Run using Java Web Start



WRF Domain Wizard – How to Run

- Run using Java Web Start



WRF Domain Wizard – How to Run

- Run using Java Web Start



WRF Domain Wizard – How to Run

- Run using Java Web Start



Trust us, we're the United States Government.

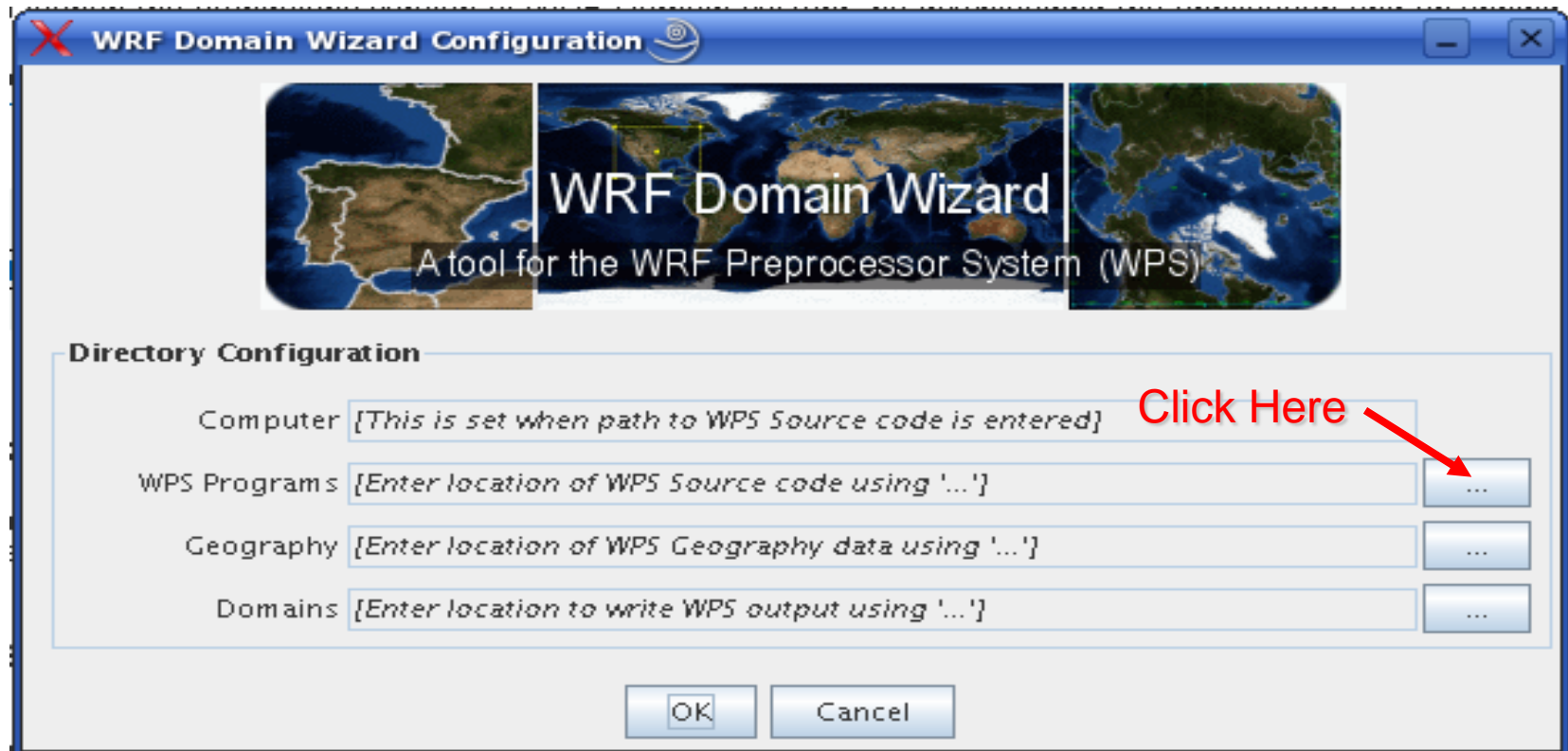
WRF Domain Wizard – How to Run (from Zip)



- Download zip file from web link and run
 - Download the **WRFDomainWizard.zip** to e.g. c:\WRFDomainWizard or /home/WRFDomainWizard
 - Follow the instructions on the web page

WRF Domain Wizard Configuration Window

- This window pops up when you start WDW



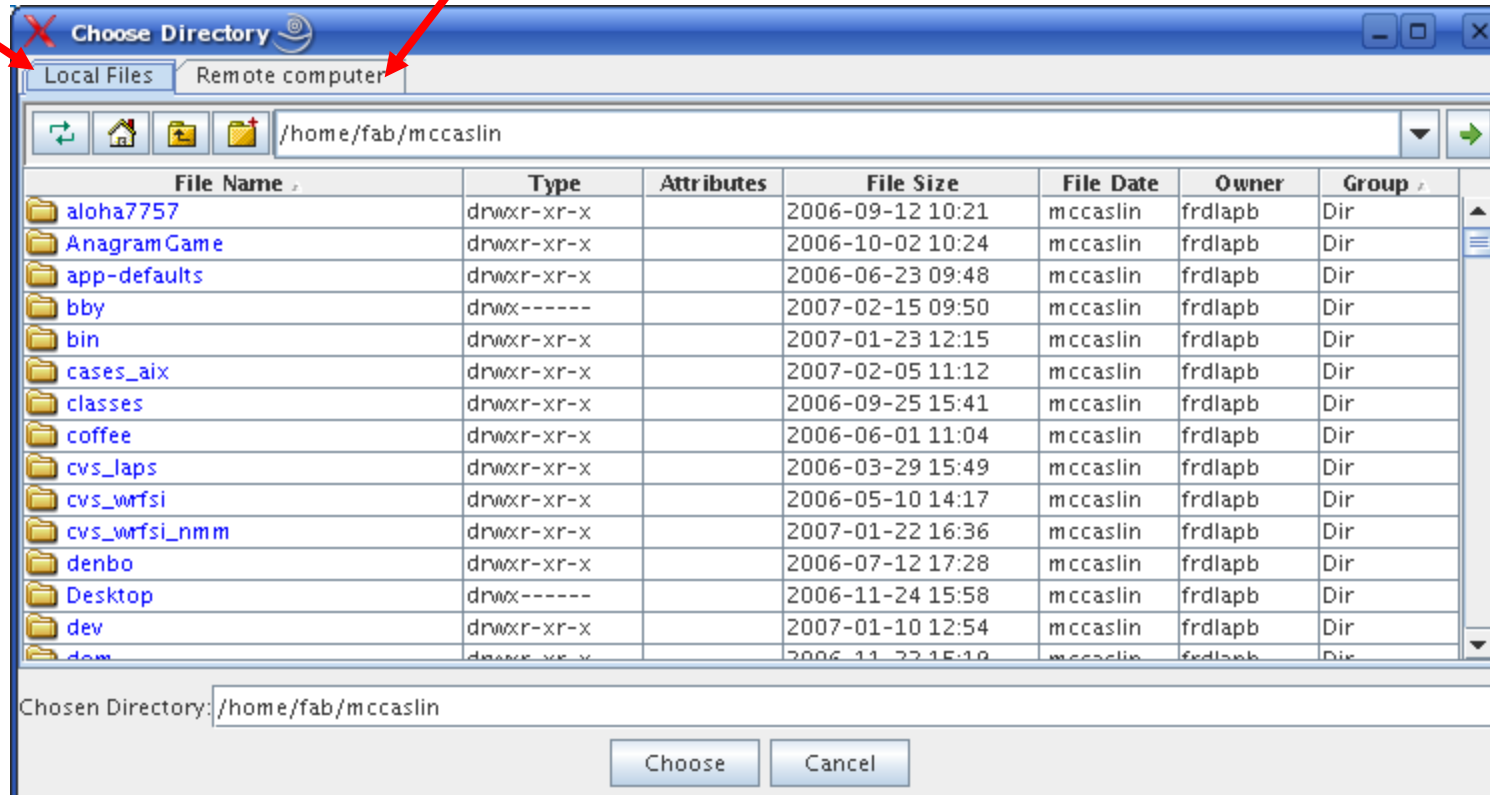
WRF Domain Wizard – How to Run

■ Configuration Directory Chooser

- ☐ Choose the computer and dir that WPS is installed on

Local Computer

Remote Computer (requires SSH login)



■ Configuration selecting remote system

The screenshot shows a file manager window titled "Choose Directory" with a red 'X' icon. The "Remote computer" tab is selected, showing a directory listing for "/home/fab/mccaslin". The listing includes files like "aloha7757", "AnagramGame", "app-defaults", "bby", "bin", "cases_aix", "classes", "coffee", "cvs_laps", "cvs_wrf", "cvs_wrf_nmm", "denbo", "Desktop", "dev", and "dom".

An "SSH Login" dialog box is overlaid on the file manager. It contains the following fields:


- Computer: hep
- User Name: mccaslin
- Password: *****

The dialog box has "OK" and "Cancel" buttons.

WRF Domain Wizard – How to Run

■ Configuration complete

WRF Domain Wizard Configuration



WRF Domain Wizard
A tool for the WRF Preprocessor System (WPS)

Directory Configuration

Computer

WPS Programs ...

Geography ...

Domains ...

WRF Domain Wizard – How to Run

- WDW writes configuration info to DomainWizard.cfg
 - Located in your home directory
 - Sample file:
 hep.fsl.noaa.gov
 /export/tmp/wrf/WPS
 /export/tmp/wrf/geog
 /export/jeff/domains
 /data/public/data/grib/ftp/7/0/84/211

(last line indicates the last grib files dir you selected)

WRF Domain Wizard Tutorial -1

WRF Domain Wizard

Actions Help

1) Wizard Option 2) New Domain 3) Horizontal Editor 4) Namelist.input Editor 5) Run Preprocessors 6) Visualize NetCDF

New Domain

Type in a name for your domain (e.g. NorthWestUSA)

Name

Description

☐ Hurricane WRF domain

Clear

User Hints & Info

Create a new domain

< Back Next >

Optional: check this box to select a NHC tcvitals file as basis for your domain

Back button takes you to previous screen

WRF Domain Wizard Tutorial -2

WRF Domain Wizard: 'test'

Actions Help

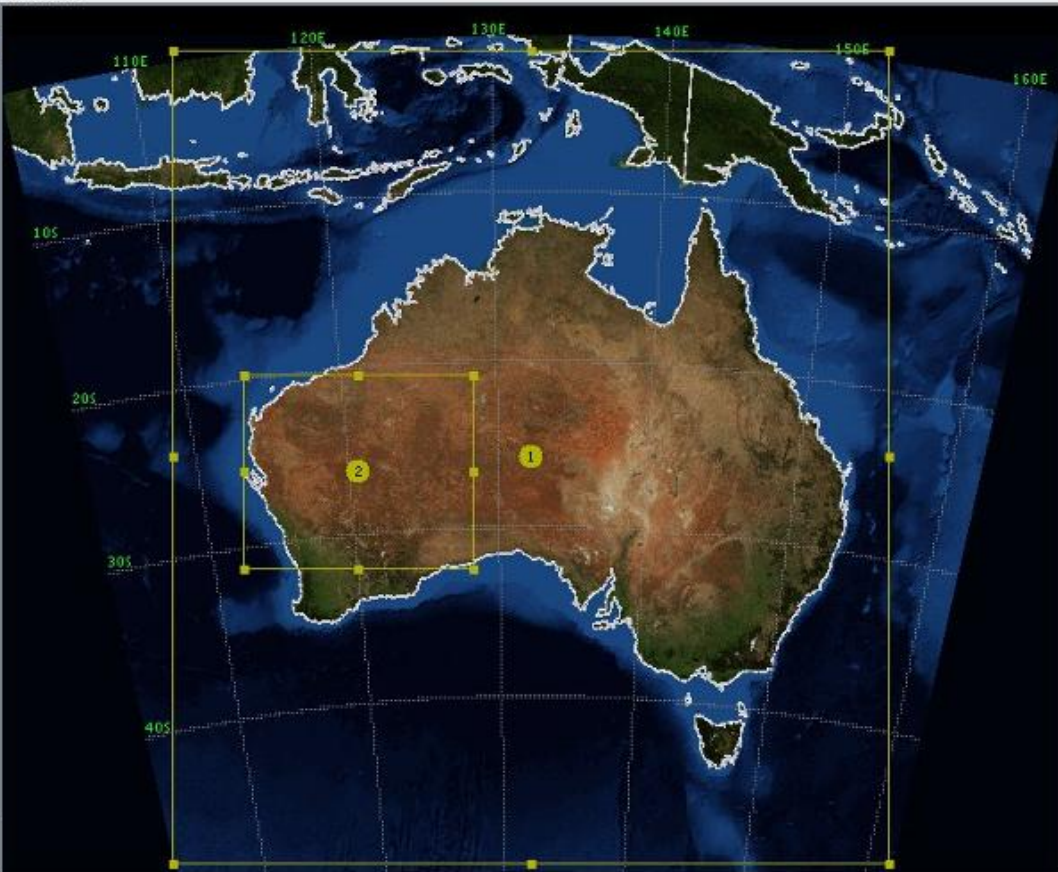
1) Wizard Option 2) Open Domain 3) Horizontal Editor 4) Namelist.input Editor 5) Run Preprocessors 6) Visualize NetCDF

Opening a previously created domain

Open A Domain

- Alaska-NMM
- Australia-NMM
- Colo
- Colorado
- Florida-Lambert
- Florida-NMM
- Florida-WPS2-NMM
- Greenland
- NMM-Bug
- South-America-NMM
- UK
- global
- nmm3
- rrr
- test
- test1

Preview



Delete Refresh

User Hint & Info (88.22 N, 79.57 W)
Open or delete a domain

Next button takes you to next screen

< Back Next >

WRF Domain Wizard Tutorial -3

Tutorial - WRF Domain Wizard (Visualization) - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://www.wrfportal.org/tutorial-flash/tutorial-DW-LatLonGlobal.html

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WRF Domain Wizard: 'Lat-Lon-Global-USA'

Actions Help

1) Wizard Option 2) New Domain 3) Horizontal Editor 4) Namelist.input Editor 5) Run Preprocessors 6) Visualize NetCDF

Domain Nests Display Options

Note the new WPS 3 projections in this list: "Lat-Lon Region" and "Lat-Lon Global". These options are only available if the WPS directory that I selected in the initial configuration window points to a WPS 3 installation.

For this tutorial, I'll select "Lat-Lon Global"

Continue

Political Boundaries
0 degrees longitude (GMT)

Projections (degrees)
Type
Lambert Conformal
Polar Stereographic
Mercator
Lat-Lon Region WRF3
Lat-Lon Global WRF3
Rot Lat-Lon (NMM)

Centerpoint longitude
Centerpoint latitude 37.383

Grid Options
Horizontal dimension X
Horizontal dimension Y
Grid points distance (km)
Geographic data resolution 10m

Actions
Start Over
Reset Grid
Update Map

User Hint & Info (53.2 N, 45.26 W)
Draw a rectangle around your domain, choose a projection, then click the Update Map button

< Back Next >

Done

WRF Domain Wizard Tutorial -4

Tutorial - WRF Domain Wizard (Open Domain, Add Nests) - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://www.wrfportal.org/tutorial-flash/tutorial-DW-OpenDomainAddNests.html

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WRF Domain Wizard: 'Australia'

Actions Help

1) Wizard Option 2) Open Domain 3) Horizontal Editor 4) Namelist.input Editor 5) Run Preprocessors 6) Visualize NetCDF

Domain Nests Display Options

Nested Domain Properties

ID	PID	Ratio	Left	Right	Top	Bot	NX	NY	Res
1	1	1	1	101	86	1	100	85	10m
2	1	3	61	96	38	6	106	97	5m
3	1	3	6	37	61	29	94	97	5m

When you click on a nest data row here, the nest box becomes highlighted.

Domain Nests Display Options

Nested Domain Properties

Pts	dx-deg	dy-deg	CenLat	CenLon
11300	0.085398	0.085109	44.49344	-117.784
19800	0.02847	0.02837	41.3382	-114.85096

This nest (2) will highlight when we click on nest data row (2).

Scroll bar to the right to see more nest information (e.g. dx-deg and CenLat)

User Hint & Info

Select a nest by clicking on its number, or by clicking on a row in the table on the right. You can't edit/resize a nest if it has a child nest (you must delete the child first).

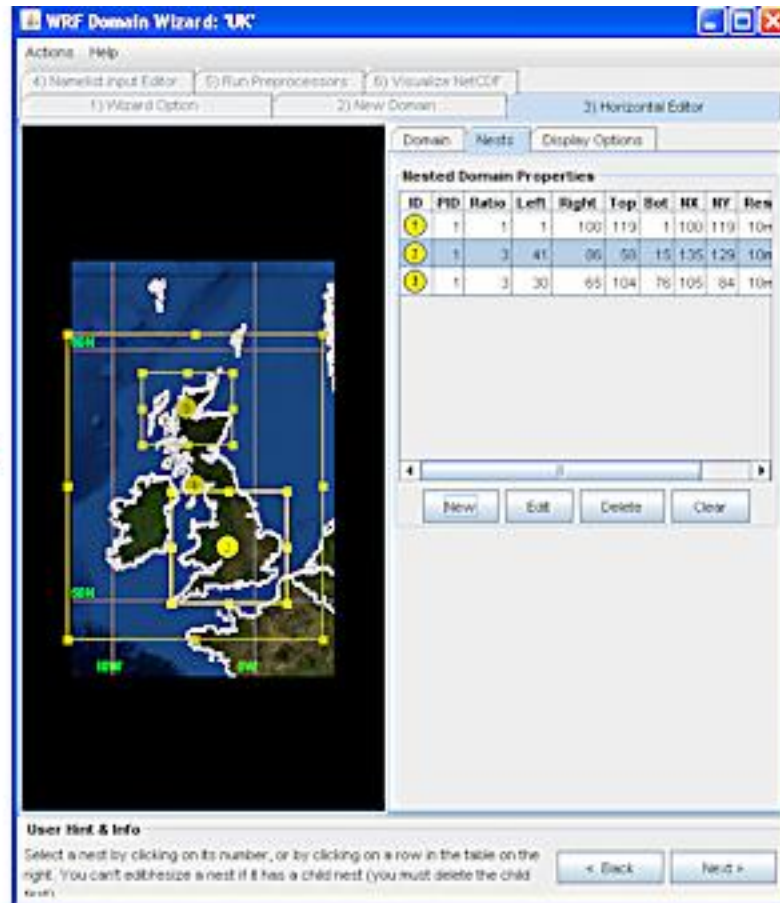
Done

WRF Domain Wizard Tutorial -5

namelist.wps file

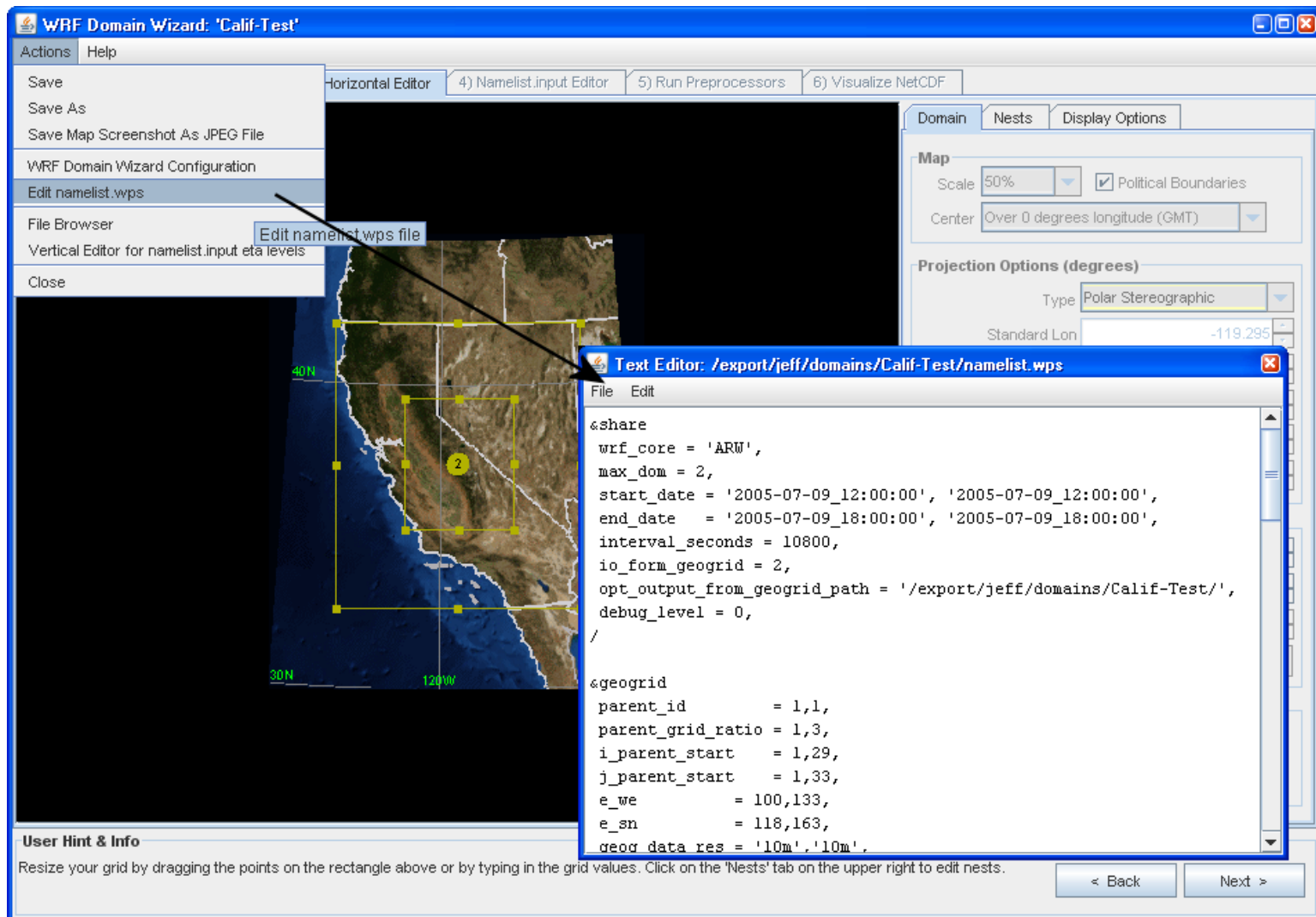
```
interval_seconds = 10800,  
io_form_geogrid = 2,  
opt_output_from_geogrid_path = '/wrf-data/domains/UK',  
debug_level = 0,  
/
```

```
&geogrid  
parent_id      = 1,1,1,  
parent_grid_ratio = 1,3,3,  
i_parent_start = 1,41,30,  
j_parent_start = 1,15,76,  
e_we          = 100,136,106,  
e_sn          = 119,130,85,  
geog_data_res = '10m','10m','10m',  
dx = 11400,  
dy = 11400,  
map_proj = 'mercator',  
ref_lat = 54.804,  
ref_lon = -4.195,  
truelat1 = 54.804,  
truelat2 = 0,  
stand_lon = -4.195,  
geog_data_path = '/wrf-data/geog10m',  
opt_geogrid_tbl_path = '/wrf-data/domains/UK',  
ref_x = 50.0,  
ref_y = 59.5,  
/
```



WRF Domain Wizard Tutorial -6

Can edit namelist.wps manually file in built-in text editor



WRF Domain Wizard Tutorial -7

WRF Domain Wizard: 'Colo'

Actions Help

1) Wizard Option 2) Open Domain 3) Horizontal Editor 4) Namelist.input Editor 5) Run Preprocessors 6) Visualize NetCDF

Add or Edit ETA Levels Reset For This Domain Validate Help /wrf-data/domains/Colo/namelist.input

GUI Editor Text Editor

Number of Domains (max_dom): 2

Parameter	Master Domain	Nest 1
j_parent_start	1	22
parent_grid_ratio	1	3
parent_time_step_ratio	1	3
feedback	1	
smooth_option	0	
&physics		
mp_physics	2	0
ra_lw_physics	1	0
ra_sw_physics	1	0
radt	10	1
sf_sfclay_physics	1	3
sf_surface_physics	2	99

Legitimate options for parameter

ra_lw_physics (max_dom)

0	longwave radiation option
1	no longwave radiation
2	RRTM scheme: Rapid Radiative Transfer Model. An accurate scheme using look-up tables for efficiency. Accounts for multiple bands, trace gases, and microphysics species. This scheme has been preliminarily tested for WRF-NMM.
3	CAM scheme

Explanation of parameter

User Hints & Info

Edit this domain's namelist.input file. The following parameters have been defaulted for this domain: max_dom, s_we, e_we, s_sn, e_sn, dx, dy, i_parent_start, j_parent_start, time_step. Right click in the window to Copy, Paste, or Find.

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WRF Domain Wizard Tutorial -8

namelist.input file

```
&dynamics
w_damping      = 0,
diff_opt       = 1,
km_opt         = 4,
base_temp      = 290.,
damp_opt       = 0,
zdamp          = 5000., 5000., 5000.,
dampcoef       = 0.01, 0.01, 0.01,
khdif          = 0, 0, 0,
kvdif          = 0, 0, 0,
smdiv         = 0.1, 0.1, 0.1,
emdiv         = 0.01, 0.01, 0.01,
epssm         = 0.1, 0.1, 0.1,
time_step_sound = 4, 4, 4,
h_mom_adv_order = 5, 5, 5,
v_mom_adv_order = 3, 3, 3,
h_sca_adv_order = 5, 5, 5,
v_sca_adv_order = 3, 3, 3,
non_hydrostatic = .true., .true., .true.,
pd_moist       = .true., .true., .true.,
pd_scalar      = .true., .true., .true.,
pd_chem        = .true., .true., .true.,
pd_tke         = .true., .true., .true.,
/
```

WRF Domain Wizard: UK

Actions: Help

1) Wizard Option 2) New Domain 3) Horizontal Editor 4) Namelist Input Editor 5) Run Preprocessors 6) Visualize NetCDF

Add or Edit ETA Levels Reset For This Domain Help /wrf-data/domains/UK/namelist.input

GUI Editor Text Editor

Number of Domains (max_dom): 3

Parameter	Master Domain	Nest 1	Nest 2
time_step_sound	4	4	4
h_mom_adv_order	5	5	5
v_mom_adv_order	3	3	3
h_sca_adv_order	5	5	5
v_sca_adv_order	3	3	3
non_hydrostatic	true	true	true
pd_moist	true	true	true
pd_scalar	true	true	false
pd_chem	true	true	true
pd_tke	true	true	true

&dyn_control

non_hydrostatic (max_dom)	true	whether running the model in hydrostatic or non-hydro mode
prt_coriolis (max_dom)	false	Coriolis only acts on wind perturbation (idealized)
max_full_fields	false	For diff_opt=2 only, vertical diffusion acts on full fields (not just on perturbation from 1D base_profile) (idealized)
h_mom_adv_order (max_dom)	5	horizontal momentum advection order (5=5th, etc.)
v_mom_adv_order (max_dom)	3	vertical momentum advection order

User Hint & Info

Edit this domain's namelist input file. The following parameters have been defaulted for this domain: max_dom, s_we, e_we, s_sn, e_sn, dx, dy, i_parent_start, j_parent_start, time_step. Right click in the window to Copy, Paste, or Find.

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WRF Domain Wizard Tutorial -9

WRF Domain Wizard: 'Colo'

Actions Help

1) Wizard Option 2) Open Domain 3) Horizontal Editor 4) Namelist.input Editor 5) Run Preprocessors 6) Visualize NetCDF

Add or Edit ETA Levels Reset For This Domain Validate Help /wrf-data/domains/Colo/namelist.input

GUI Editor Text Editor

Number of Domains (max_dom): 2

GUI editor for ETA levels

Parameter	Master Domain	Nest 1
j_parent_start	1	22
parent_grid_ratio	1	3
parent_time_step_ratio	1	3
feedback	1	
smooth_option	0	
&physics		
mp_physics	2	0
ra_lw_physics	1	0
ra_sw_physics	1	0
radt	10	1
sf_sfclay_physics	1	3
sf_surface_physics	2	99

ra_lw_physics (max_dom)

0	longwave radiation option
1	no longwave radiation
2	RRTM scheme: Rapid Radiative Transfer Model. An accurate scheme using look-up tables for efficiency. Accounts for multiple bands, trace gases, and microphysics species. This scheme has been preliminarily tested for WRF-NMM.
3	CAM scheme

User Hints & Info

Edit this domain's namelist.input file. The following parameters have been defaulted for this domain: max_dom, s_we, e_we, s_sn, e_sn, dx, dy, i_parent_start, j_parent_start, time_step. Right click in the window to Copy, Paste, or Find.

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WRF Domain Wizard Tutorial -10

Vertical Editor For ETA levels in /home/fab/mccaslin/WPS+WRFV2/WRFV2/test/em_real

ETA Level Editor

Level	Value
35	0.0
34	0.013
33	0.026
32	0.04
31	0.055
30	0.07
29	0.088
28	0.106
27	0.127
26	0.15
25	0.175
24	0.202
23	0.231
22	0.263
21	0.298
20	0.335
19	0.376
18	0.42
17	0.468
16	0.52

When you select a level in this editor, the level is highlighted as a red band in the diagram on the left. To change a level's value, just type in a new number.

Add or delete levels by clicking these buttons.

New Delete

Options

Generate Levels...

Defaults Revert

Save Cancel

User Hints & Info

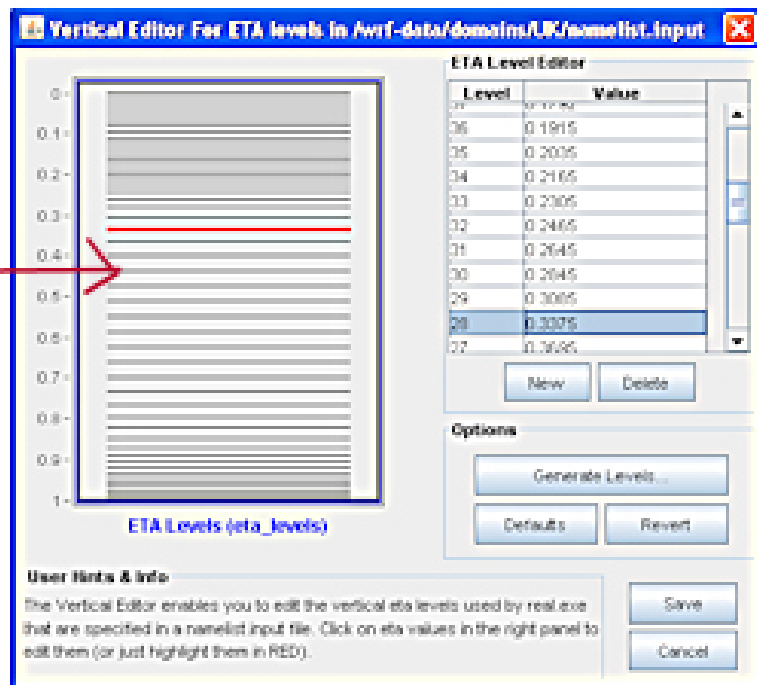
The Vertical Editor enables you to edit the vertical eta levels used by real.exe that are specified in a namelist.input file. Click on eta values in the right panel to edit them (or just highlight them in RED).

WRF Domain Wizard Tutorial -11

GUI editor for ETA levels

namelist.wps file

```
&domains  
eta_levels = 1.000, 0.994, 0.987, 0.979, 0.97,  
            0.96, 0.949, 0.937, 0.924, 0.909,  
            0.892, 0.873, 0.851, 0.826, 0.798,  
            0.768, 0.736, 0.702, 0.666, 0.629,  
            0.5915, 0.5536, 0.5153, 0.4773, 0.44,  
            0.404, 0.3695, 0.3375, 0.3085, 0.2845,  
            0.2645, 0.2465, 0.2305, 0.2165, 0.2035,  
            0.1915, 0.1792, 0.1667, 0.1539, 0.1407,  
            0.1272, 0.1134, 0.0995, 0.0855, 0.0713,  
            0.0571, 0.0429, 0.0287, 0.0145, 0.000,  
time_step = 68,  
time_step_fract_num = 0,  
time_step_fract_den = 1,  
max_dom = 3,  
s_we = 1, 1, 1,  
e_we = 100, 136, 106,
```



WRF Domain Wizard Tutorial -12

WRF Domain Wizard: 'Calif-Test'

Actions Help

1) Wizard Option 2) Open Domain 3) Horizontal Editor 4) Namelist.input Editor 5) Run Preprocessors 6) Visualize NetCDF

Configure Preprocessor Variables for Ungrib and Metgrid

Grib Vtable Name:

Grib Files Dir:

Grib Files:

Grib Start Date: hh:mm:ss:

Grib End Date: hh:mm:ss:

Grib Interval (hr):

Run Preprocessors to Generate Input Data Fields Required for WRF

Step	Run	List	View
1	Running	<input type="button" value="Output"/>	<input type="button" value="Log"/>
2	<input type="button" value="ungrib"/>	<input type="button" value="Output"/>	<input type="button" value="Log"/>
3	<input type="button" value="metgrid"/>	<input type="button" value="Output"/>	<input type="button" value="Log"/>

Progress Status running System Commands

2010-01-29 16:40:31.739 --- INFORM: For SLOPECAT, couldn't find interpolator sequence for resolution 10m.
2010-01-29 16:40:31.739 --- INFORM: Using default interpolator sequence for SLOPECAT.
2010-01-29 16:40:31.739 --- INFORM: For SLOPECAT, couldn't find 10m data source.
2010-01-29 16:40:31.739 --- INFORM: Using default data source for SLOPECAT.
2010-01-29 16:40:31.842 --- Processing field 1 of 14 (LANDUSEF)
2010-01-29 16:40:32.117 --- Processing field 2 of 14 (LU_INDEX)
2010-01-29 16:40:32.121 --- Processing field 3 of 14 (HGT_M)
2010-01-29 16:40:32.144 --- Processing field 4 of 14 (SLPX)
2010-01-29 16:40:32.145 --- Processing field 5 of 14 (SLPY)
2010-01-29 16:40:32.146 --- Processing field 6 of 14 (HGT_U)
2010-01-29 16:40:32.169 --- Processing field 7 of 14 (HGT_V)
2010-01-29 16:40:32.191 --- Processing field 8 of 14 (SOILTEMP)
2010-01-29 16:40:32.220 --- Processing field 9 of 14 (SOILCTOP)

Running geogrid.exe

geogrid.exe 60%

User Hints & Info

Read /export/jeff/domains/Calif-Test/geogrid.log...

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WRF Domain Wizard Tutorial -13

The screenshot displays the WRF Domain Wizard interface for a configuration named 'Calif-Test'. The '5) Run Preprocessors' tab is active, showing options for running 'geogrid' and 'ungrib'. A 'Julian Day Calculator Tool' window is overlaid on the main interface, showing the conversion of the date 2005-07-09 to the Julian Day 190, which corresponds to 'Jul 09 2005'. The main window also shows the 'Grib Files' list and the 'Progress Status' section.

WRF Domain Wizard: 'Calif-Test'

Actions Help

1) Wizard Option 2) Open Domain 3) Horizontal Editor 4) Namelist.input Editor 5) Run Preprocessors 6) Visualize NetCDF

Configure Preprocessor Variables for Ungrib and Metgrid

Grib Vtable Name:

Grib Files Dir:

Grib Files:

Grib Start Date: hh:mm:ss:

Grib End Date: hh:mm:ss:

Grib Interval (hr):

Run Preprocessors to Generate Input Data Fields Required for WRF

Step	Run	List	View
1	<input type="button" value="geogrid"/>	<input type="button" value="Output"/>	<input type="button" value="Log"/>
2	<input type="button" value="ungrib"/>	<input type="button" value="Output"/>	<input type="button" value="Log"/>

Julian Day Calculator Tool

Grib files:
Grib file:
day 010:

This tool:

Convert Date to Julian Day

Year: Month: Day:

Convert Julian Day to Date

Year: Julian Day:

Jul 09 2005

Progress Status running System Commands

!!!!!!!!!!!!!!!!!!!!!!!!!!!!

! Successful completion of ungrib. !

!!!!!!!!!!!!!!!!!!!!!!!!!!!!

----- List of Output -----

List of ungrib.exe files found

FILE:2005-07-09_12
FILE:2005-07-09_15
FILE:2005-07-09_18

User Hints & Info

Success running of /export/tmp/WRF3/WPS301/ungrib/src/ungrib.exe

WRF Domain Wizard Tutorial -14

The screenshot shows the 'WRF Domain Wizard: 'Calif-Test'' application. The 'Visualize NetCDF' tab is selected, indicated by a red arrow and the text 'Visualize Tab'. Below the tabs, a blue text box states: 'Important: after clicking 'View in Panoply' button, you must 'Quit' the map window before visualizing another netCDF file.'

The 'Datasets Browser' window is open, displaying a list of NetCDF files in the directory '/export/jeff/domains'. The files listed are 'geo_em.d01.nc' and 'geo_em.d02.nc'. The 'temp.nc' file is expanded, showing a list of variables: 'ALBEDO12M', 'CLAT', 'CLONG', 'COSALPHA', 'E', 'F', 'GREENFRAC', 'HGT_M', and 'HGT_U'. The 'GREENFRAC' variable is selected, and its details are shown in the 'Dataset/Variable CDL Info' panel on the right. The details include: 'Variable "GREENFRAC"', 'float GRE', ':FieldI', ':Memory', ':units', ':descri', and ':stagge'.

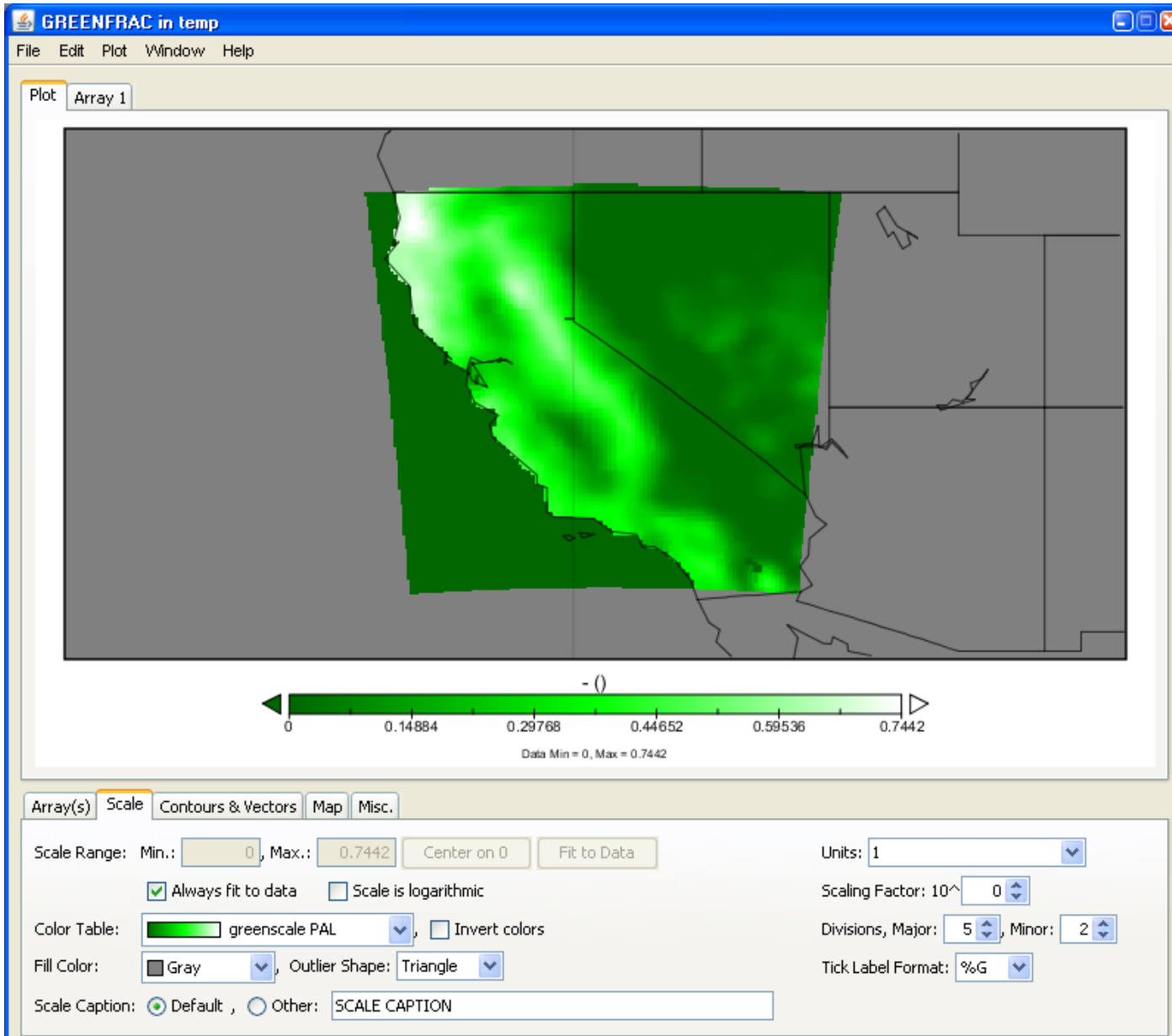
At the bottom of the 'Datasets Browser' window, there is a 'List:' dropdown menu set to 'Only Plottable Variables'. Below the 'Datasets Browser' window, there are two buttons: 'Download File' and 'View in Panoply (and Google Earth)'. An arrow points from the 'View in Panoply (and Google Earth)' button to the 'View in Panoply' button in the 'User Hints & Info' section.

User Hints & Info

Choose a netCDF file and click 'View in Panoply' button. When the Datasets Browser window pops up, simply double-click on a field of interest (e.g. GREENFRAC) to view your map. Then, select File menu, 'Export to KMZ' to export to a Google Earth .kmz file.

Buttons at the bottom right: '< Back' and 'Exit'.

WRF Domain Wizard Tutorial -15



Panoply is a slick tool/library for viewing NetCDF, HDF, Grib1, Grib2 files.

It has many display options, including selecting color tables like this greenscale.



WRF Domain Wizard

A GUI for the WRF Preprocessing System

WRF Portal

A GUI for running WRF

Presented by Jeff Smith

Developed by: Mark Govett, Paula McCaslin, Craig Mattocks, Julien Lynge, Jeff Smith

July 15, 2011



NOAA's Earth System Research Lab in Boulder, CO

What is WRF Portal? -1

- A graphical user interface for running WRF
 - Also being used to run FIM (as FIM Portal)
- Also a Java Web Start program
- It simplifies and automates:
 - configuring and running of model workflows
 - launching and monitoring runs
 - halting or canceling runs/jobs
 - visualization of your model's output
 - capturing all information about your run which you can view through an HTML report
 - includes WDW (you can just download WRF Portal and you'll also have WRF Domain Wizard)

What is WRF Portal? -1

- Does not include WRF (you must download and compile that separately)
- Includes an internal workflow manager that works “out of the box” and supports SGE, LSF, PBS, and Torque.
- Optional external workflow manager (‘WFM’, written by Chris Harrop at ESRL) must be installed separately and is more powerful and robust. It supports SGE, LSF, Load Leveler, Torque
 - More info here: <http://wrfportal.org/ExternalWorkflowManager.html>
- WRF Portal is running on these supercomputers: NCAR bluefire, NOAA/GSD Jet, TACC Ranger



Why Use WRF Portal?

- Saves user's time by automating tedious and repetitive tasks and providing time saving features
- Portal Wizard that walks the user through the steps of configuring computers, user preferences, and tasks



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- "Diff" tool for comparing different workflows and runs
- Graphical file browsers to quickly locate files
- Robust job managers for running and managing tasks
- Progress monitor for tracking the progress of runs



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- "Diff" tool for comparing different workflows and runs
- Graphical file browsers to quickly locate files
- Robust job managers for running and managing tasks
- Progress monitor for tracking the progress of runs
- Graphical netcdf/grib viewers to visualize model input/output
- Captures system information upon launch (OS version, WRF version, path, env vars) plus all the info related to your run (workflow log output, output directory listings, etc.). You can view this info in an HTML report

- **Portal Wizard** walks you through the process of configuring your computers and the tasks in your workflows

WRF Portal [Database=C:\Documents and Settings\Jeff\portal-files\portal] [User=portal]

File Tools Window Help

Portal Wizard

1) Computer(s) 2) User Information 3) WRF Domain Wizard 4) Task Manager 5) Define Workflow 6) Run Workflow

About Setting Up Computers And Workflow Managers

Enter one or more LINUX, UNIX, or Mac computers on which you'll run portal tasks. Enter your computer's network name (e.g. wopr.norad.mil) to use your local computer.

To use the External Workflow Manager to execute your model tasks (jobs), you must install it separately from wrfportal.org, and then enter the path to this program here. The External Workflow Manager requires that you select a batch queue system (job scheduler)--either SGE, PBS or LSF

Computer	Aliases	External Workflow Mgr Path	Ruby Path	Batch/Queue
tornado.fsl.noaa.gov		/workflowmgr101/workflowmgr.rb	/usr/bin/ruby	NONE
hep.fsl.noaa.gov			/usr/bin/ruby	NONE

New Delete Help Save

User Hints & Info

You must configure at least one computer that will used to run your models. Instead of deleting the first computer in the list, just rename it to the network name of the computer you will use (e.g. elmo.esrl.noaa.gov)

< Back Next >

Connected to local computer: Jeff-M2400

- **Workflow Window** is where you add tasks (scripts) to your workflow, configure any required env vars, etc.

The screenshot shows the WRF Portal interface. The main window is titled "Workflow: wps-hep [Model=WRF] [hep.fsl.noaa.gov] [User=portal] [CanEdit=true]". It has tabs for "Configuration Files", "General Settings", and "Task Settings". The "Task Settings" tab is active, showing a list of tasks on the left and a script editor on the right. The task list includes "namelist.wps", "namelist.input", "def_ungrib.rb", "def_metgrid.rb", "def_real.rb", and "def_wrf.rb". The "def_ungrib.rb" task is selected, and its script is displayed in the editor. A red arrow points to the "def_ungrib.rb" task in the list, with the text "List of tasks" next to it. Another red arrow points to the "Edit" button in the "Tasks:" section. A dialog box titled "Select Tasks For Workflow: wps-hep" is open, showing a list of available tasks and a list of selected tasks in order. The available tasks are "def_ungrib", "def_metgrid", "def_real", and "def_wrf". The selected tasks in order are "def_ungrib", "def_metgrid", "def_real", and "def_wrf". The dialog box has buttons for "Move Up", "Move Down", "OK", and "Cancel".

WRF Portal [Database=C:\Documents and Settings\Jeff\portal-files\portal] [User=portal]

File Tools Window Help

Workflow: wps-hep [Model=WRF] [hep.fsl.noaa.gov] [User=portal] [CanEdit=true]

Actions

Configuration Files General Settings Task Settings

☒ Show run scripts

namelist.wps
namelist.input
def_ungrib.rb
def_metgrid.rb
def_real.rb
def_wrf.rb

File: def_ungrib.rb Task: def_ungrib

```
#!/usr/bin/ruby  
  
require 'parsedate'  
  
##### def_ungrib.rb #####  
#  
# version 1.00 (runs WRF/WPS - ungrib.exe program)
```

Select Tasks For Workflow: wps-hep

Available Tasks

Selected Tasks In Order

def_ungrib
def_metgrid
def_real
def_wrf

Move Up
Move Down

OK Cancel

Import Multiple Import Export

Connected to local computer: Jeff-M2400

- **Run Workflow** window is where a user selects the workflow, computer, tasks, number of processors allocated to each task, & dates

The screenshot shows the 'Run Workflow: wrf-run [User:portal]' window. It contains fields for Run Name, Note, Computer (tornado.fsl.noaa.gov), Status (NOT_RUN), Workflow (wrf), Workflow Mgr (Internal-SGE), Acct (mapp), and Flow Rate. Below these is a table of tasks and their processor allocations.

Task	Procs	MaxTime	Queue
def_ungrib	1	06:00	make
def_metgrid	1	06:00	make
def_real	1	06:00	make
def_wrf	64	06:00	make

Below the table is an 'Edit or Reorder Tasks' button. Further down are sections for 'Input Data' (NameList selected) and 'Output Data Directory (Data Root)' with a location path. At the bottom, there's a 'Dates/Times' section with a list box showing '2008-10-16 12:00:00' and buttons for 'Add', 'Del', and 'Del All'.

Two sub-dialogs are open:

- Enter A Date/Time**: Fields for From Date (2008-10-16), To Date (2008-10-16), Initial Time(s) (12 hours), and Interval (24 hours). Buttons for OK and Cancel.
- Choose A Date**: A calendar view for October 2008. The date 16 is selected. Buttons for OK and Cancel.

At the bottom of the main window, it says 'Connected to local computer: Jeff-M2400'.

Run Monitor enables a user to follow the progress of runs

WRF Portal [Database=C:\Documents and Settings\Jeff\.portal-files\portal] [User=portal]

File Tools Window Help

Run Monitor

Search Criteria

Run between: ... Model Cfg: And: ... Note: Status: Computer: tornado.fsl.noaa.gov Search

Run Config	Run Date	Status	Run Time	Date Started	Elapsed Time	Model
wrf-run1	2005-07-11 00:00:00.0	RUNNING	00:02	2008-10-16 15:25:16.0	00:02	wrf
hello-test-run1	2008-10-09 12:00:00.0	DONE	00:00	2008-10-09 17:36:21.0	00:00	hello-test
wrf-run	2008-10-16 12:00:00.0	ERROR	00:00			wrf

Details for Run Workflow: 'wrf-run1' on 2005-07-11 00:00:00.0

Task	Job ID	Job Started	Run Time	Est. Time	Status
def_ungrib	186	2008-10-16 15:25 MDT	00:01		done
def_metgrid	187	2008-10-16 15:26 MDT	00:01		done
def_real	188	2008-10-16 15:26 MDT	00:02		running
def_wrf					

Refresh View Files/Logs/nc Delete Halt Run Close

File Browser

Local Files (Jeff-M2400) tornado.fsl.noaa.gov

/wrf-data/wrfportal-runs/wrf-run1/2005071100logs/

File Name	Attr	File Size	File Date	Owner
def_metgrid_200507110000.log	-rw-r--r--	1 KB	2008-10-16 15:26:46	smith
def_real_200507110000.log	-rw-r--r--	7 KB	2008-10-16 15:27:30	smith
def_ungrib_200507110000.log	-rw-r--r--	92 KB	2008-10-16 15:25:36	smith
workflow.log	-rw-r--r--	1 KB	2008-10-16 15:28:17	smith

View as Text View NetCDF Close

Connected to remote computer: tornado.fsl.noaa.gov

List of runs

Tasks in run

Log files

NetCDF and GRIB Viewer

WRF Portal [Database=C:\Documents and Settings\Jeff\portal-files\portal] [User=portal]

File Tools Window Help

File Browser

Local Files (Jeff-M2400) tornado.fsl.noaa.gov

/wrf-data/wrfportal-runs/wrf-run1/2005071100/wps-output/

File Name	Attr	File Size	File Date	Owner
namelist.wps	-rw-rw-r--	2 KB	2008-10-16 15:26:29	smith
geo_em.d01.nc	-rw-r--r--	3,146 KB	2008-10-10 16:26:25	smith
geo_em.d02.nc	-rw-r--r--	5,508 KB	2008-10-10 16:26:27	smith
NAM:2005-07-11_00	-rw-rw-r--	20,187 KB	2008-10-16 15:25:32	smith
NAM:2005-07-11_03	-rw-rw-r--	20,187 KB	2008-10-16 15:25:33	smith

View as Text View NetCDF Close

Datasets Browser

File Edit Plot Window Help

Create Plot Target

Datasets & Variables

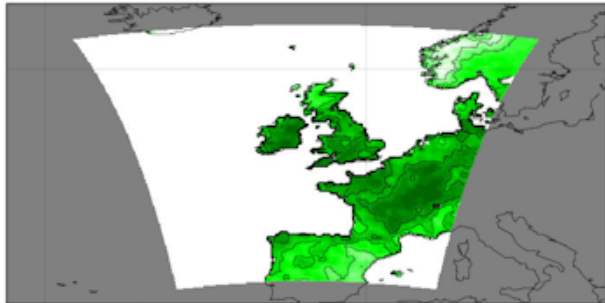
Name	Long Name	Type
temp.nc	temp.nc	Local File
ALBEDO12M	-	[lon][lat]
CLAT	-	[lon][lat]
CLONG	-	[lon][lat]
COSALPHA	-	[lon][lat]
E	-	[lon][lat]
F	-	[lon][lat]
GREENFRAC	-	[lon][lat]
HGT_M	-	[lon][lat]
HGT_U	-	[lon][lat]

List: Only Plottable Variables

GREENFRAC in temp

File Edit Plot Window Help

Plot 1: GREENFRAC



Equidistant (Polar) projection centered on 0.07546, 0.07546

Array(s) Scale Map Contours Colors Captions

Plot Map of Array 1 Only Interpolate

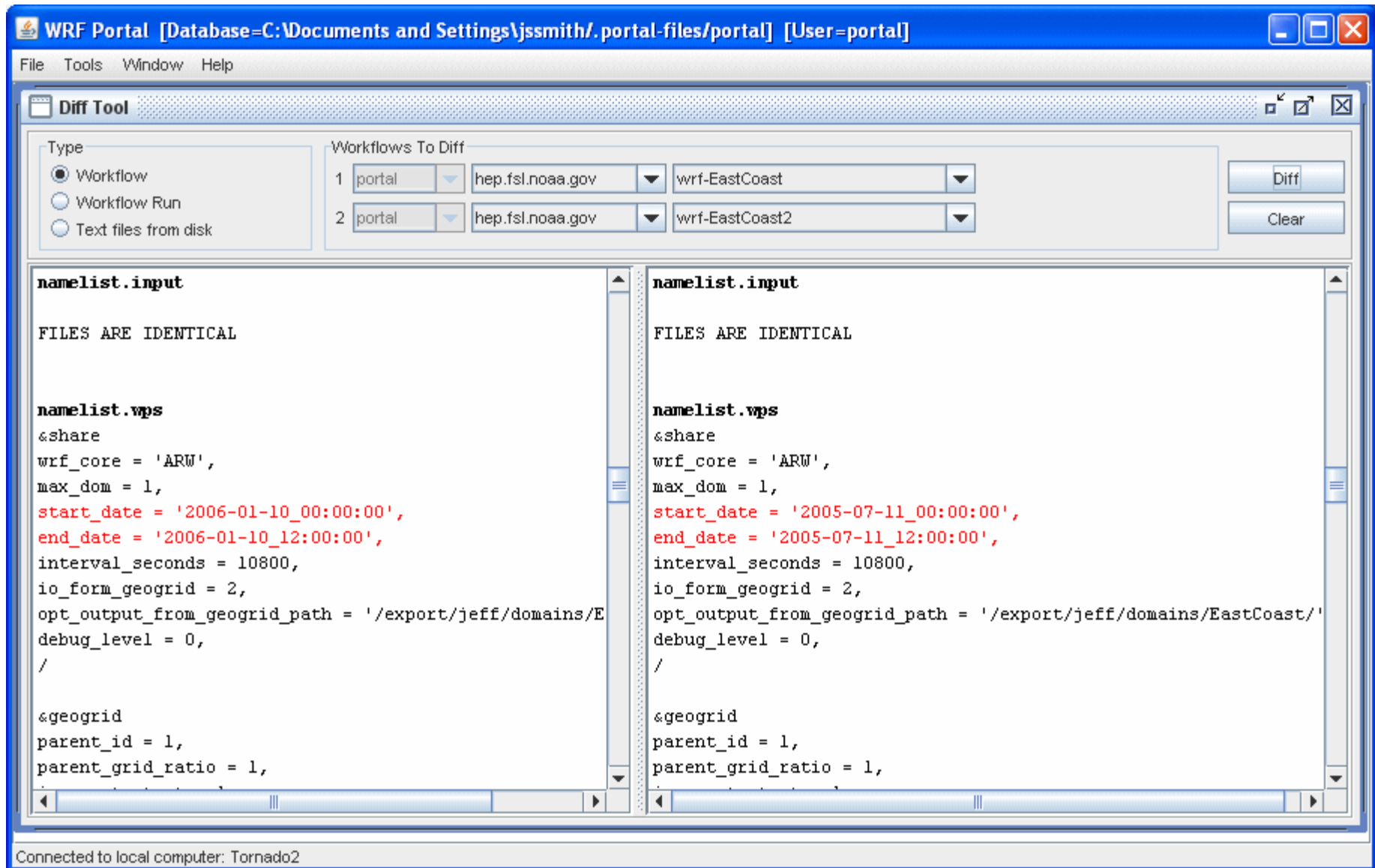
Array 1: GREENFRAC

Synthesized time coordinate from Timesdim0: 1 of 1 = 1905-05-03 18:35:44

Month: 5 of 12 = 5 of 12

Connected to remote computer: tornado.fsl.noaa.gov

Diff Tool compares workflows, runs, text files (e.g. namelists)



Report Tool

Firefox

http://wrfportal.org/sample-report.html

Run Monitor

Search Criteria

Run between [] [] Workflow []

And []

Status []

Run Name	Run Date
AAutomatedTestCO-run	2005-07-09 12:0

Details for Run Wc

Task	Job ID	Status
def_ungrib	31	20
def_metgrid	33	2011-03-25 14:52 MDT
def_real	32	2011-03-25 14:53 MDT

Create Workflow Run Report

☒ Include config files (namelists)

☒ Include workflow log files

☒ Include output directories / listings

Building Workflow Run Report...

Create Report Cancel

Refresh View Files Report Delete Halt Run Close

Connected to remote computer: hepp.fsl.noaa.gov

Sample Run Report: 'AAutomatedTestCO-run'

Workflow was launched Fri Mar 25 14:52:22 MDT 2011

WorkflowName AAutomatedTestCO

Computer hepp.fsl.noaa.gov (Linux)

Account Name portal-acct

Workflow Mgr Internal SGE

Output Dir /export/wrf/wrfportal-runs/AAutomatedTestCO-run

WRF Root Dir /export/WRF32/WRV3 (WRF Model Version 3.2 -April 2, 2010)

uname -a Linux hepp.fsl.noaa.gov 2.6.18-194.26.1.el5 #1 SMP Fri Oct 29 14:21:16 EDT 2010 x86_64 x86_64 x86_64 GNU

Filesystem	1K-blocks	Used	Available	Use%	Mounted on
/dev/sda8	91222912	3939940	82649028	5%	/scratch

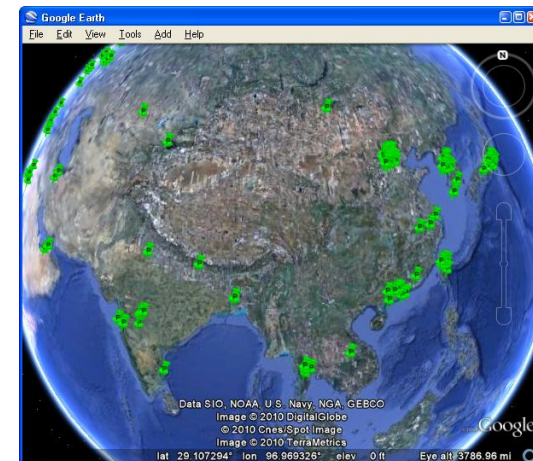
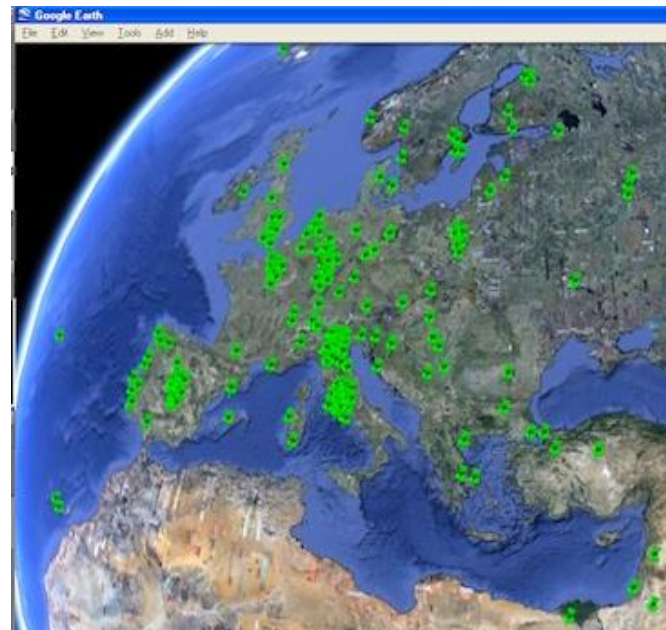
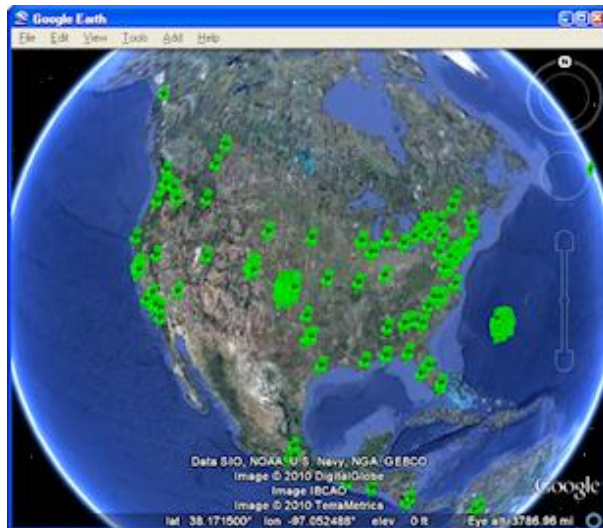
BASH=/bin/bash

Who uses WRF Domain Wizard and WRF Portal?

- Our users come from many different countries and their backgrounds run the gamut of academia, government and private industry
- See <http://wrfportal.org/about.html>

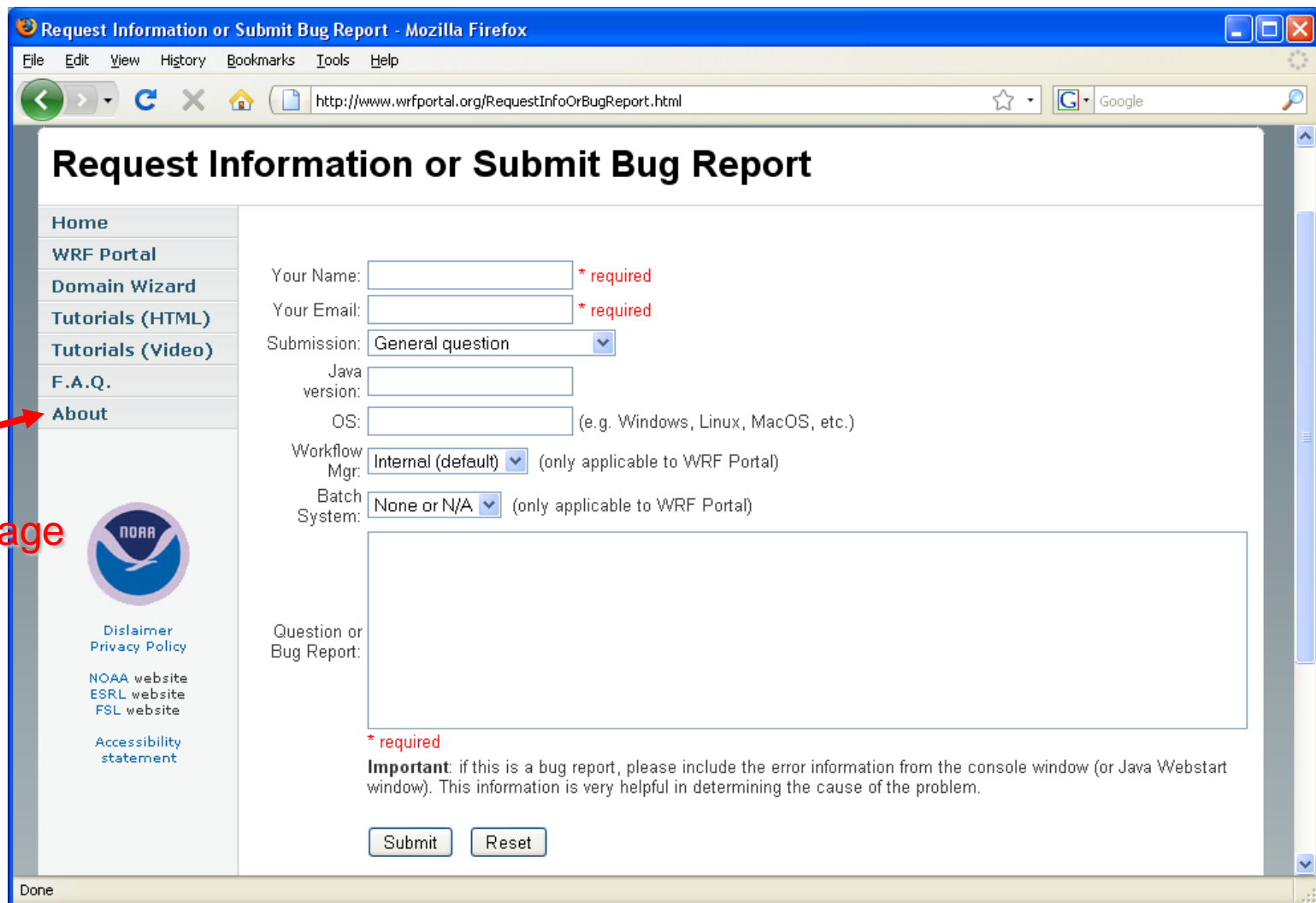
Estimated Worldwide Users of This Software

Software	Est. Users	Countries	Google Earth
WRF Portal	964	66	open in Google Earth
WRF Domain Wizard	1472	69	open in Google Earth
Ext. Workflow Mgr	74	18	open in Google Earth



WRF Portal and WDW Support

- Web form for submitting bug reports or to ask questions:
<http://wrfportal.org/RequestInfoOrBugReport.html>



The screenshot shows a Mozilla Firefox browser window with the address bar displaying <http://www.wrfportal.org/RequestInfoOrBugReport.html>. The page title is "Request Information or Submit Bug Report". The left sidebar contains a navigation menu with links: Home, WRF Portal, Domain Wizard, Tutorials (HTML), Tutorials (Video), F.A.Q., and About. Below the menu is the NOAA logo and links for Disclaimer, Privacy Policy, NOAA website, ESRL website, FSL website, and Accessibility statement. The main content area contains a form with the following fields: "Your Name:" (required), "Your Email:" (required), "Submission:" (dropdown menu with "General question" selected), "Java version:", "OS:" (with a note "(e.g. Windows, Linux, MacOS, etc.)"), "Workflow Mgr:" (dropdown menu with "Internal (default)" selected, with a note "(only applicable to WRF Portal)"), and "Batch System:" (dropdown menu with "None or N/A" selected, with a note "(only applicable to WRF Portal)"). Below these fields is a large text area labeled "Question or Bug Report:". At the bottom of the form are "Submit" and "Reset" buttons. A red arrow points to the "About" link in the sidebar, with the text "Link on About Page" next to it.

Request Information or Submit Bug Report - Mozilla Firefox

File Edit View History Bookmarks Tools Help

[http://www.wrfportal.org/RequestInfoOrBugReport.html](#)

Request Information or Submit Bug Report

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[ESRL website](#)
[FSL website](#)
[Accessibility statement](#)

Your Name: * required

Your Email: * required

Submission:

Java version:

OS: (e.g. Windows, Linux, MacOS, etc.)

Workflow Mgr: (only applicable to WRF Portal)

Batch System: (only applicable to WRF Portal)

Question or Bug Report:

* required

Important: if this is a bug report, please include the error information from the console window (or Java Webstart window). This information is very helpful in determining the cause of the problem.

Done

Link on About Page

Tutorials on wrfportal.org

WRF Portal - Demos / Tutorials - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://wrfportal.org/flash-tutorial.html

WRF Portal - Demos / Tutorials

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Quick Overview Videos

[WRF Portal \(133 seconds\)](#)
[WRF Domain Wizard \(105 seconds\)](#)

How To Launch Software

[How to launch WRF Portal or WRF Domain Wizard from Firefox browser](#)

WRF Portal Tutorials

These Flash tutorials demonstrate how to use WRF Portal.

- 1) Portal Wizard (configures WRF Portal)
- 2) Define a workflow
- 3) Run a workflow, Diagnose and Fix Errors
- 4) Diff tool
- 5) Visualize NetCDF/GRIB output files (maps) in Panoply
- 6) Download Jan 2000 test data, and run real and wrf
Note: if you get the fatal error "not enough info for a p sfc computation", add the following flag to the "domains" section of namelist.input:
sfc_to_sfcop = .true.
Note: if you get a seg fault fatal error from wrf.exe, try running "ulimit -s unlimited" from a startup script and then re-running WRF.
- 7) Run WRF Portal "locally" on a remote machine using X forwarding
You might do this if WRF Portal's built-in SSH support doesn't work with the token card security of the computer that WRF is installed on.
- 8) How to determine which run date to use (using File Browser and Julian Day Calc Tool)
- 9) How to create custom tasks (scripts), add them to a workflow, run them, view the log files and output.

WRF Domain Wizard Tutorials

These Flash tutorials demonstrate how to use WRF Domain Wizard.

>>NEW VIDEO>> [Domain Wizard 2.00 In A Nutshell](#) (installing, configuring, creating domain, running WPS, visualizing NetCDF output)

- 1) Configuring WRF Domain Wizard

About The Tutorial Videos

These video tutorials require the Macromedia Flash player in order to run. If the Flash plugin isn't already part of your browser, you can download it from [here](#).

Most of the videos are reasonably small (around 2-3 Mb in size) and run a few minutes long.

Done



Thank you!

You can contact me at wrfportal.org
jeff.s.smith@noaa.gov