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)

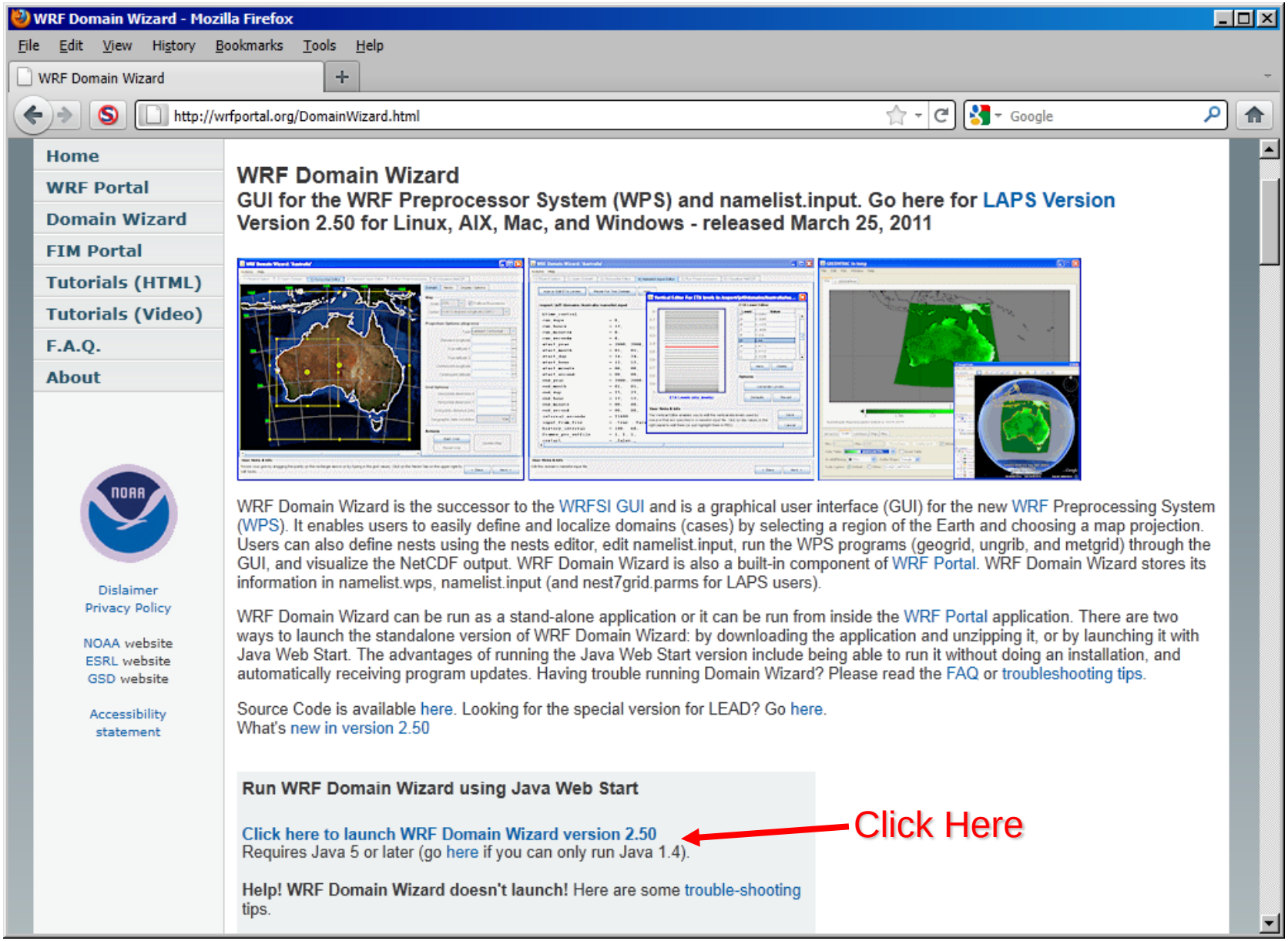
WRF Domain Wizard Technical Info -2

- 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

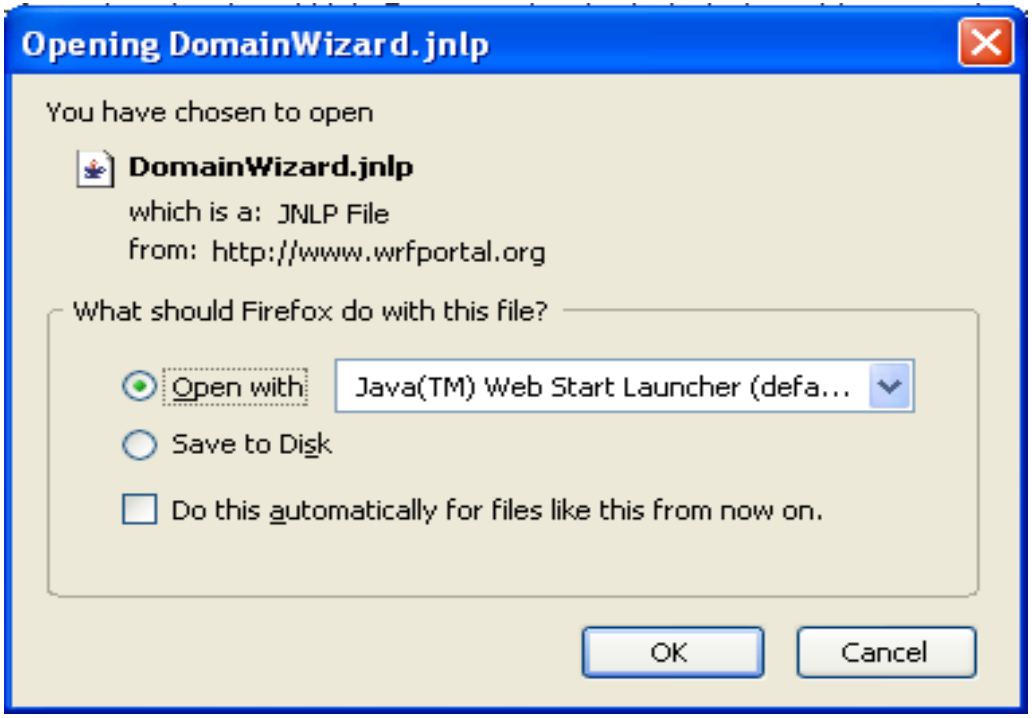
- Run using Java Web Start (JWS)
  - JWS automatically downloads your software then runs it. No need to set up directories, run installation programs, or configure anything. Just click the link and the program runs.
    - The first time you click on the link, there is a delay while the software downloads
    - 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 – How to Run

- Run using Java Web Start



WRF Domain Wizard – How to Run

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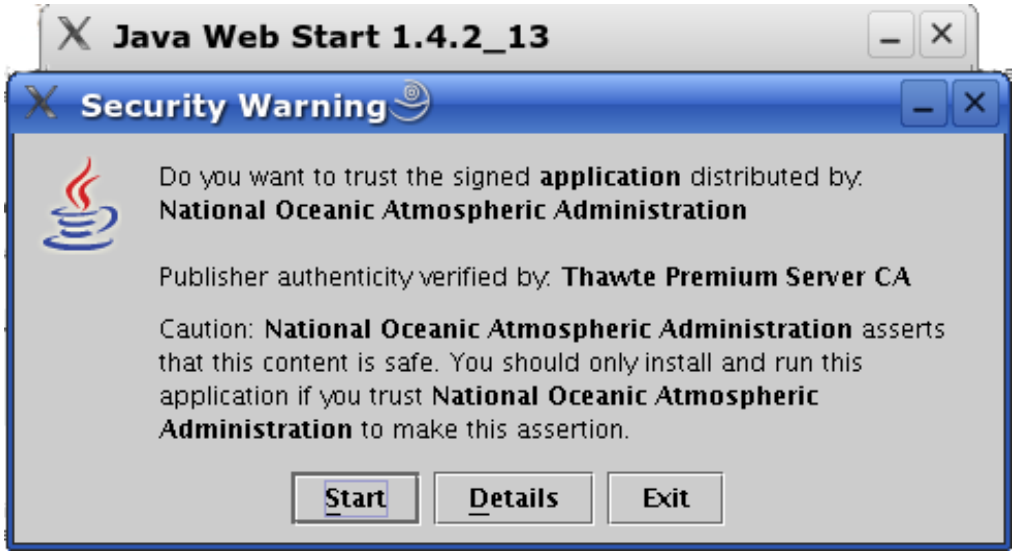


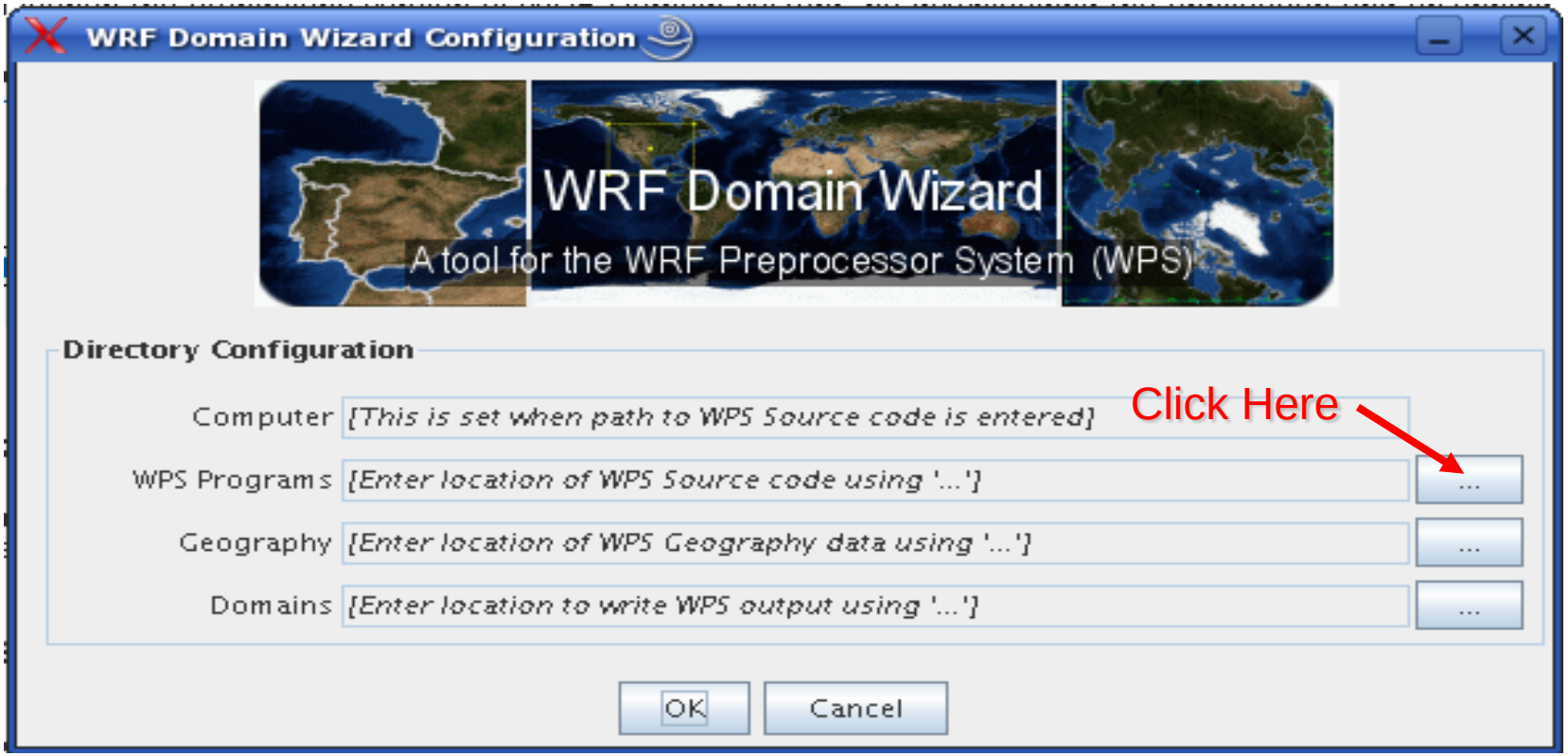
Trust us, we're the United States Government.

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

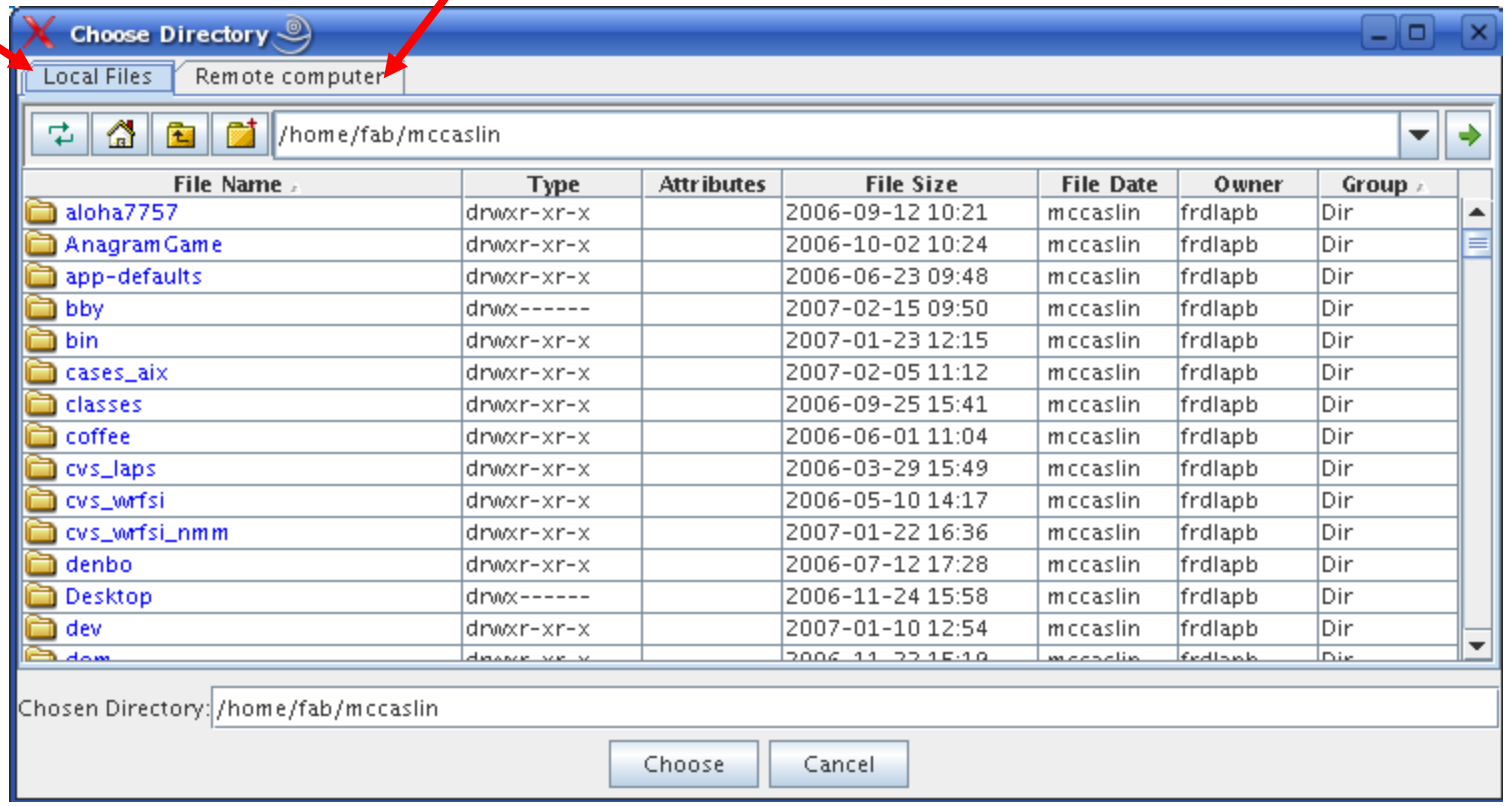


WRF Domain Wizard – How to Run

- Configuration Directory Chooser
  - Choose the computer and dir that WPS is installed on

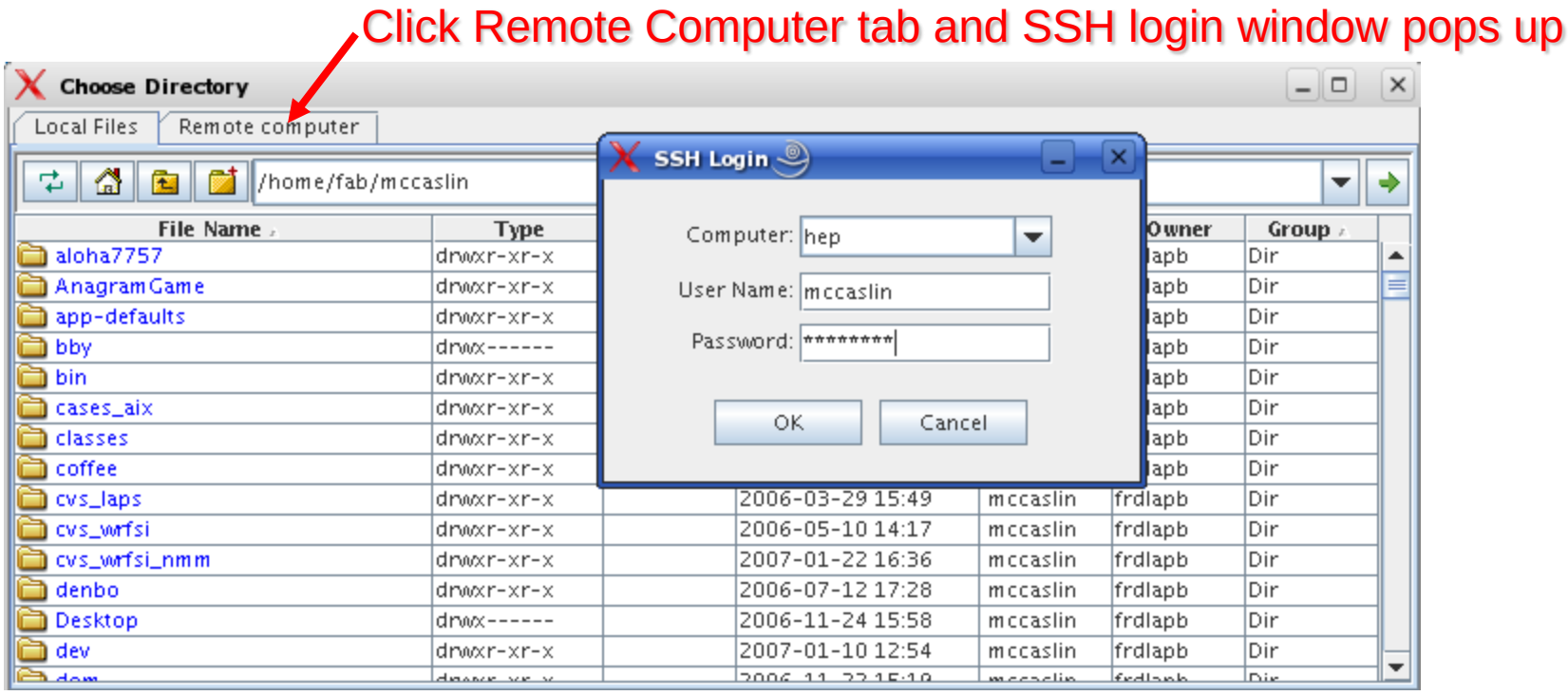
Local Computer

Remote Computer (requires SSH login)



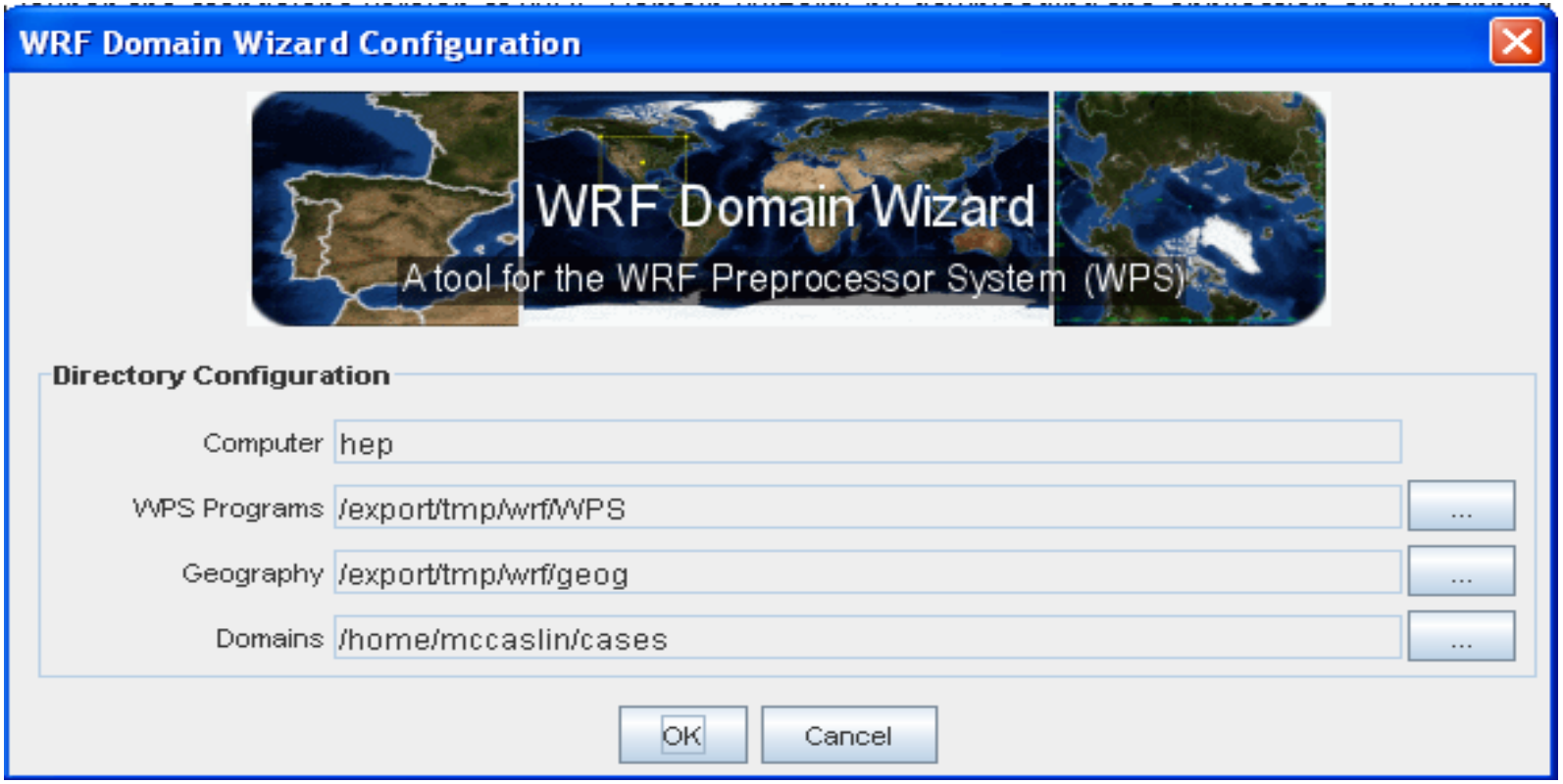
WRF Domain Wizard – How to Run

- Configuration selecting remote system



WRF Domain Wizard – How to Run

- Configuration complete



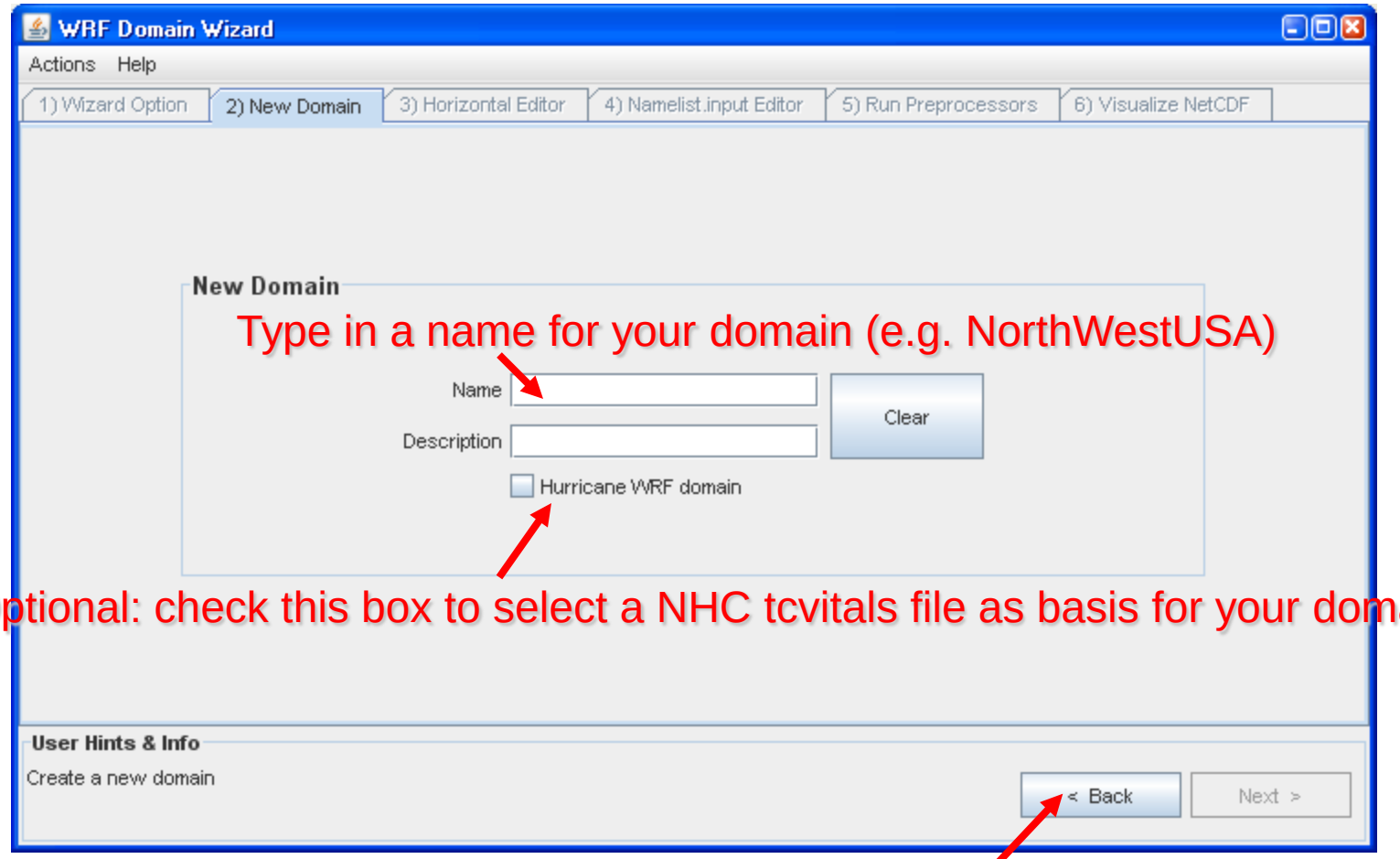
WRF Domain Wizard – How to Run

- 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
```

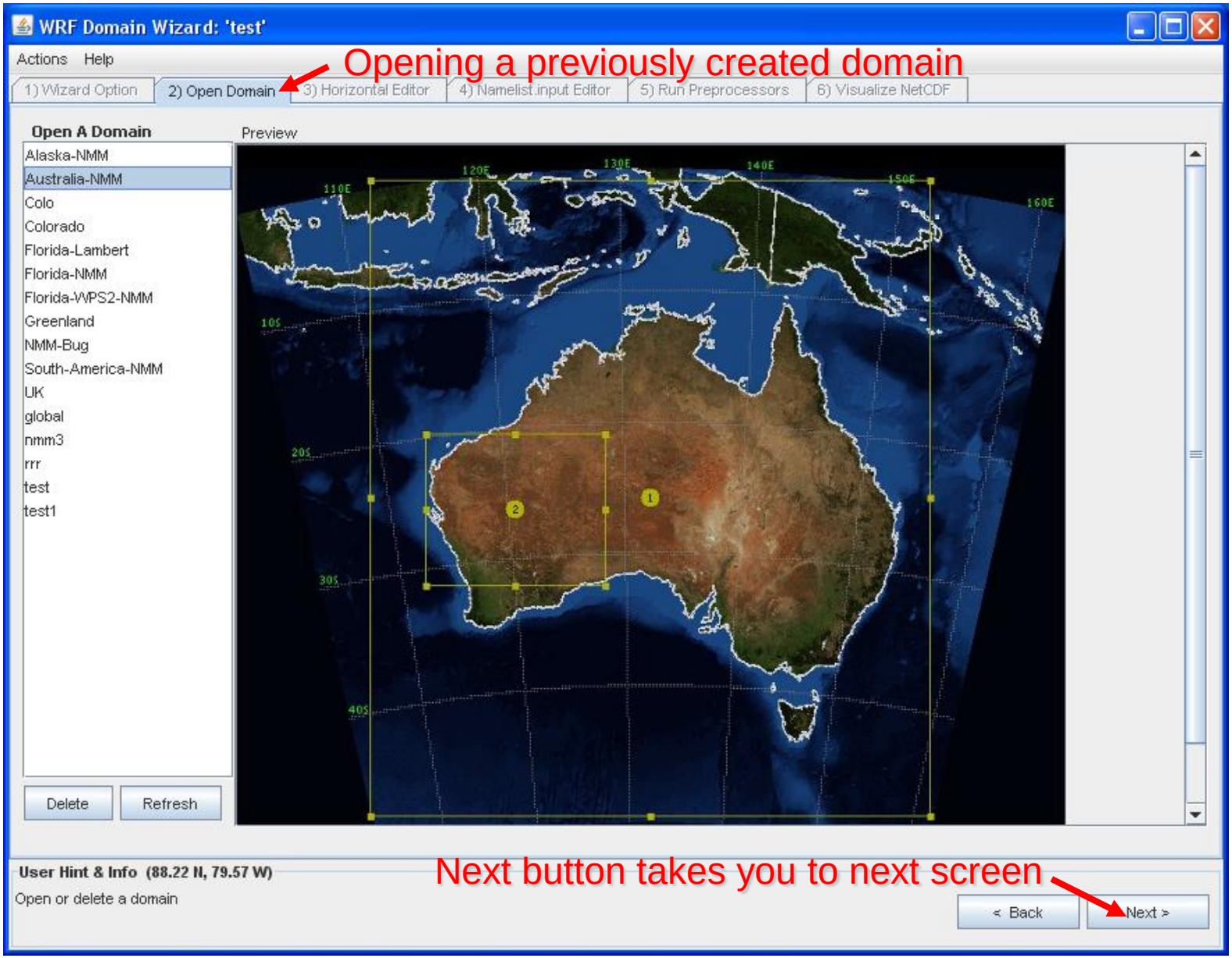
(last line indicates the last grib files dir you selected)

WRF Domain Wizard Tutorial -1

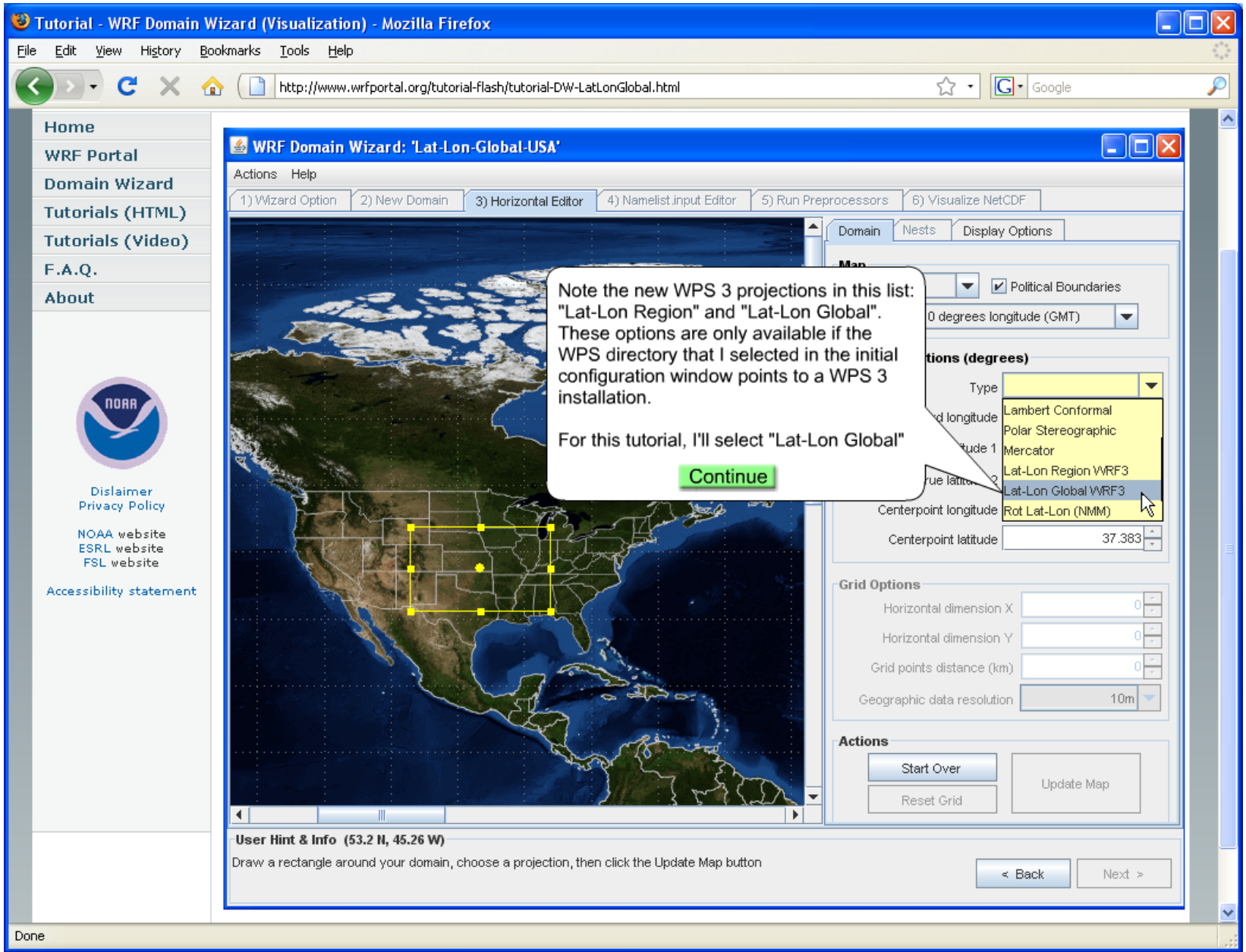


Back button takes you to previous screen

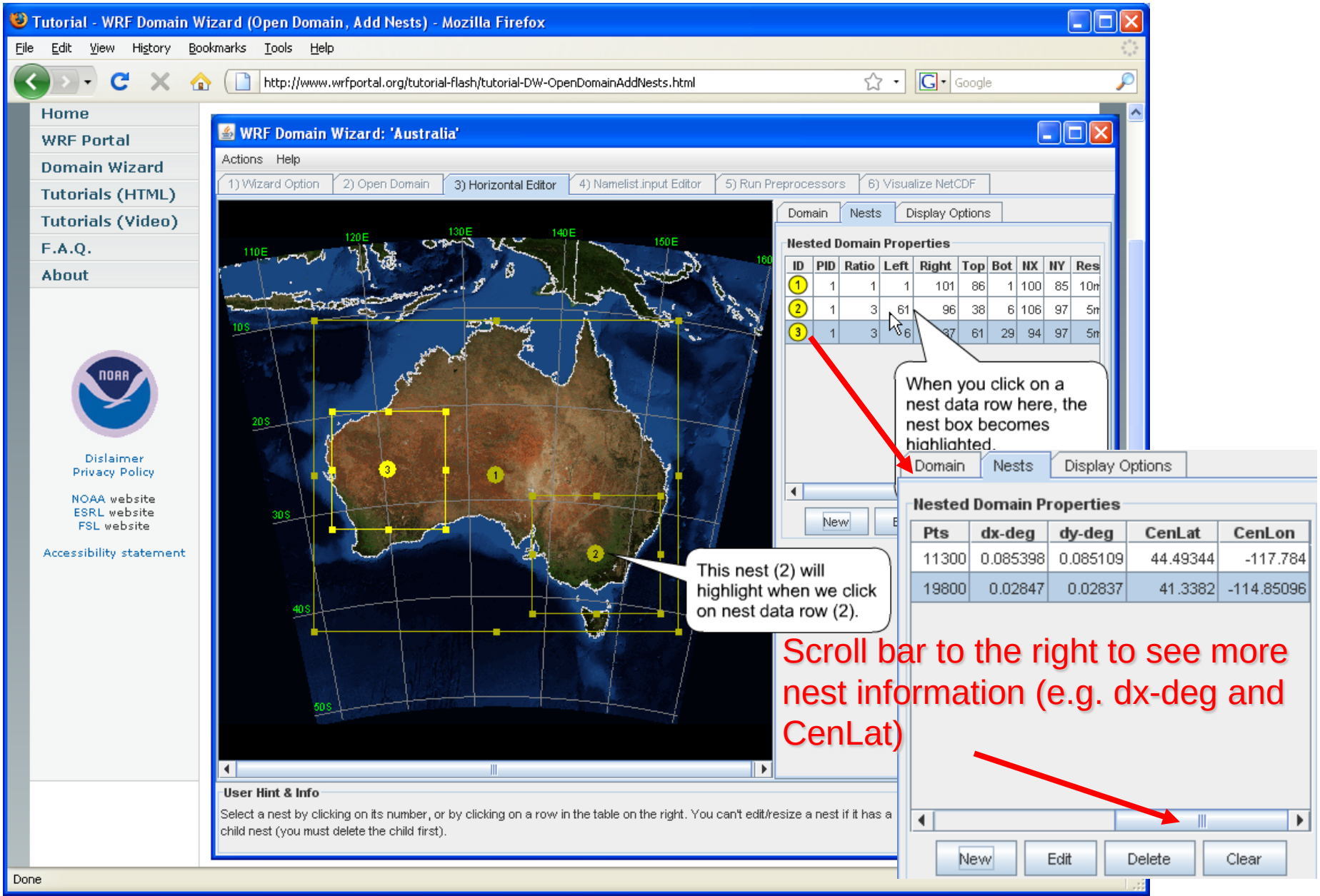
WRF Domain Wizard Tutorial -2



WRF Domain Wizard Tutorial -3



WRF Domain Wizard Tutorial -4

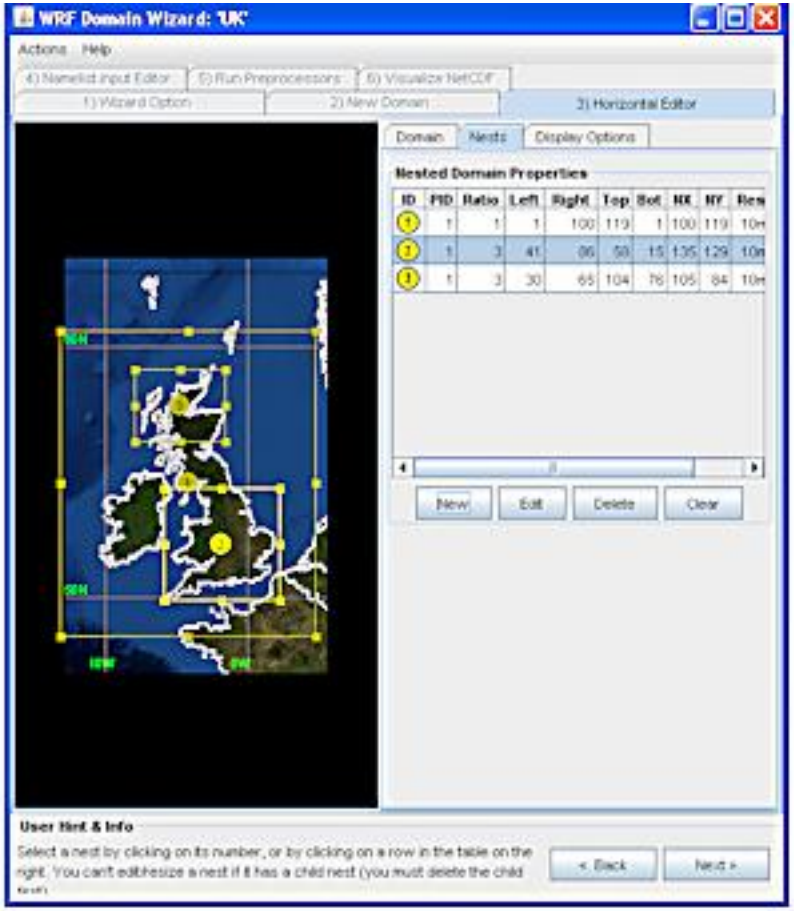


WRF Domain Wizard Tutorial -5

namelist.wps file

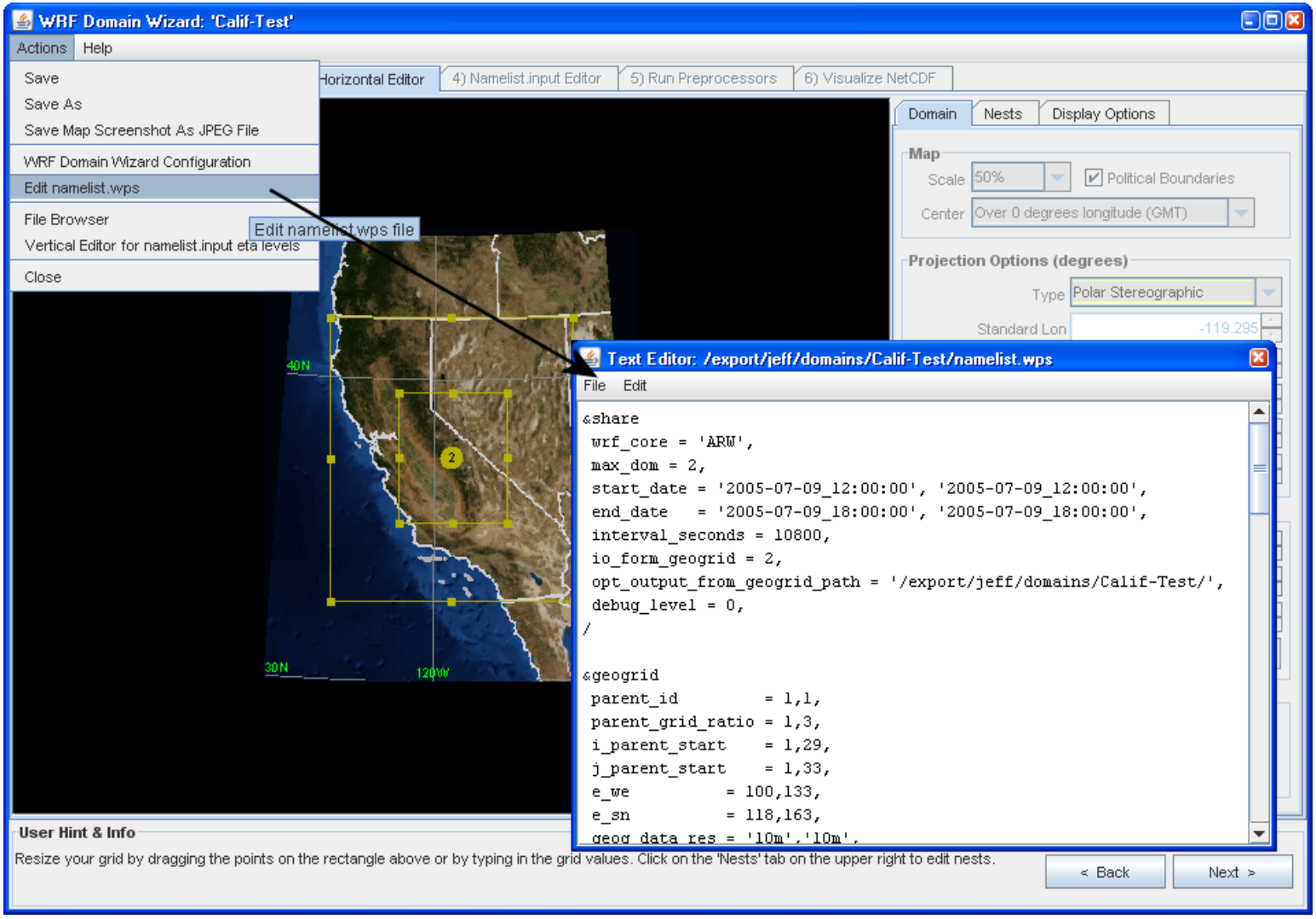
```
 interval_seconds = 10800,
 io_form_geogrid = 2,
 opt_output_from_geogrid_path = '/wrf-data/domains/UK/',
 debug_level = 0,
/

&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,
/
```

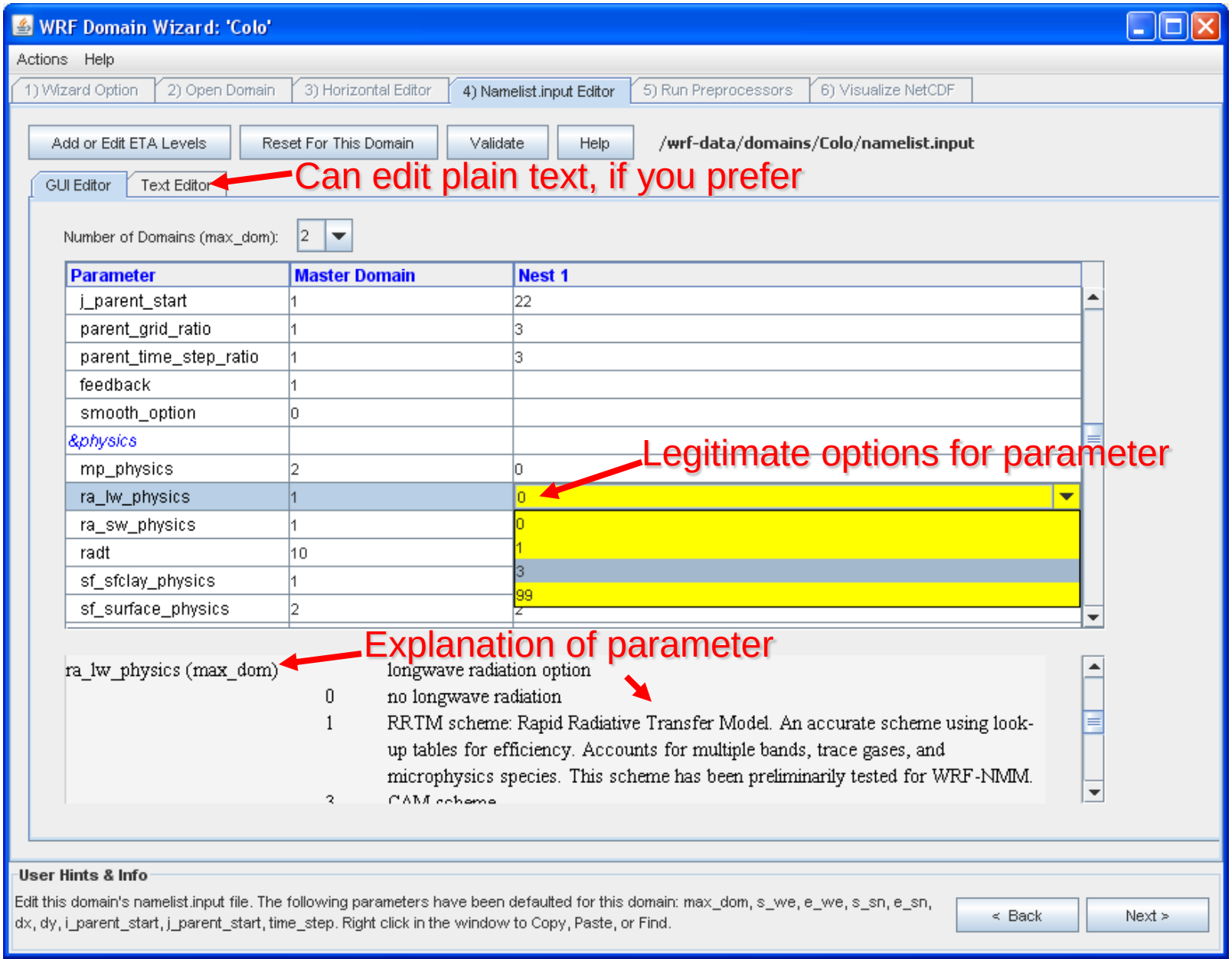


WRF Domain Wizard Tutorial -6

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



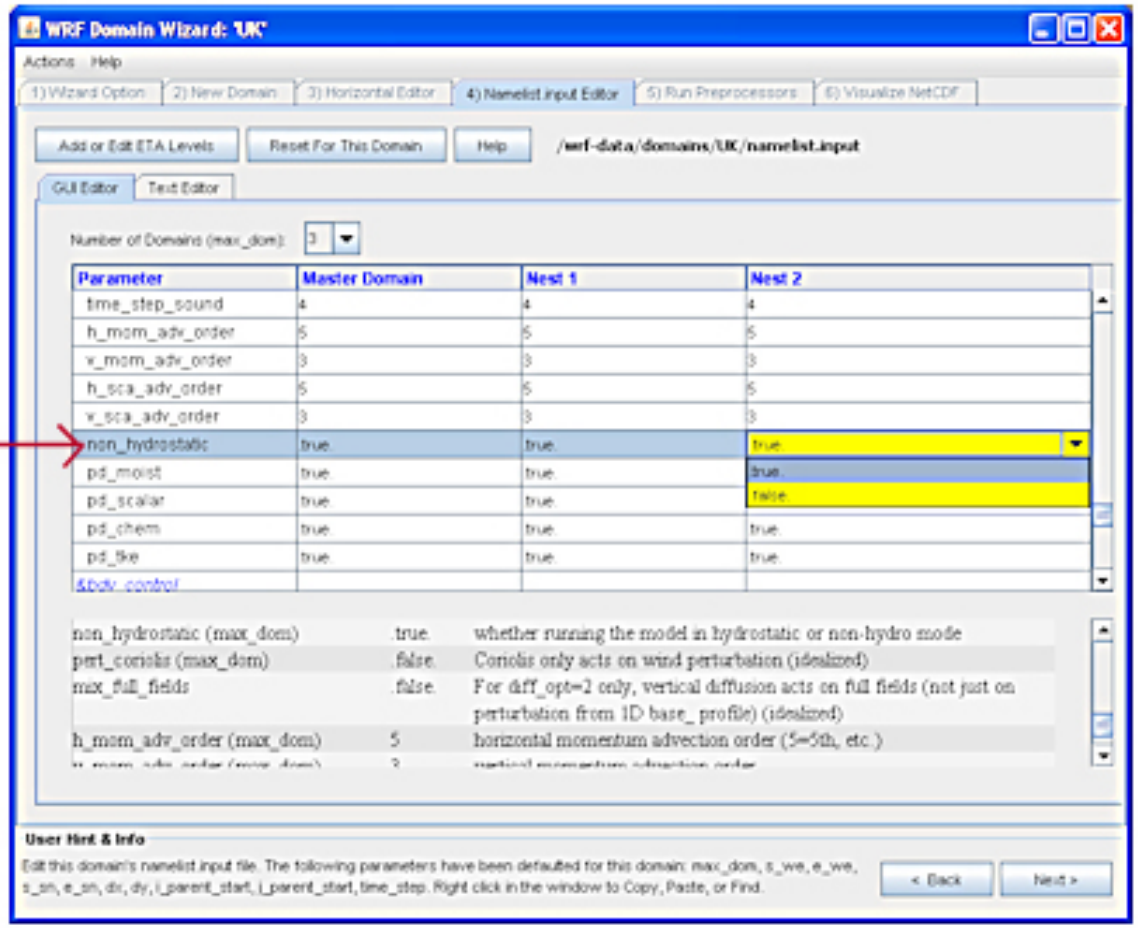
WRF Domain Wizard Tutorial -7



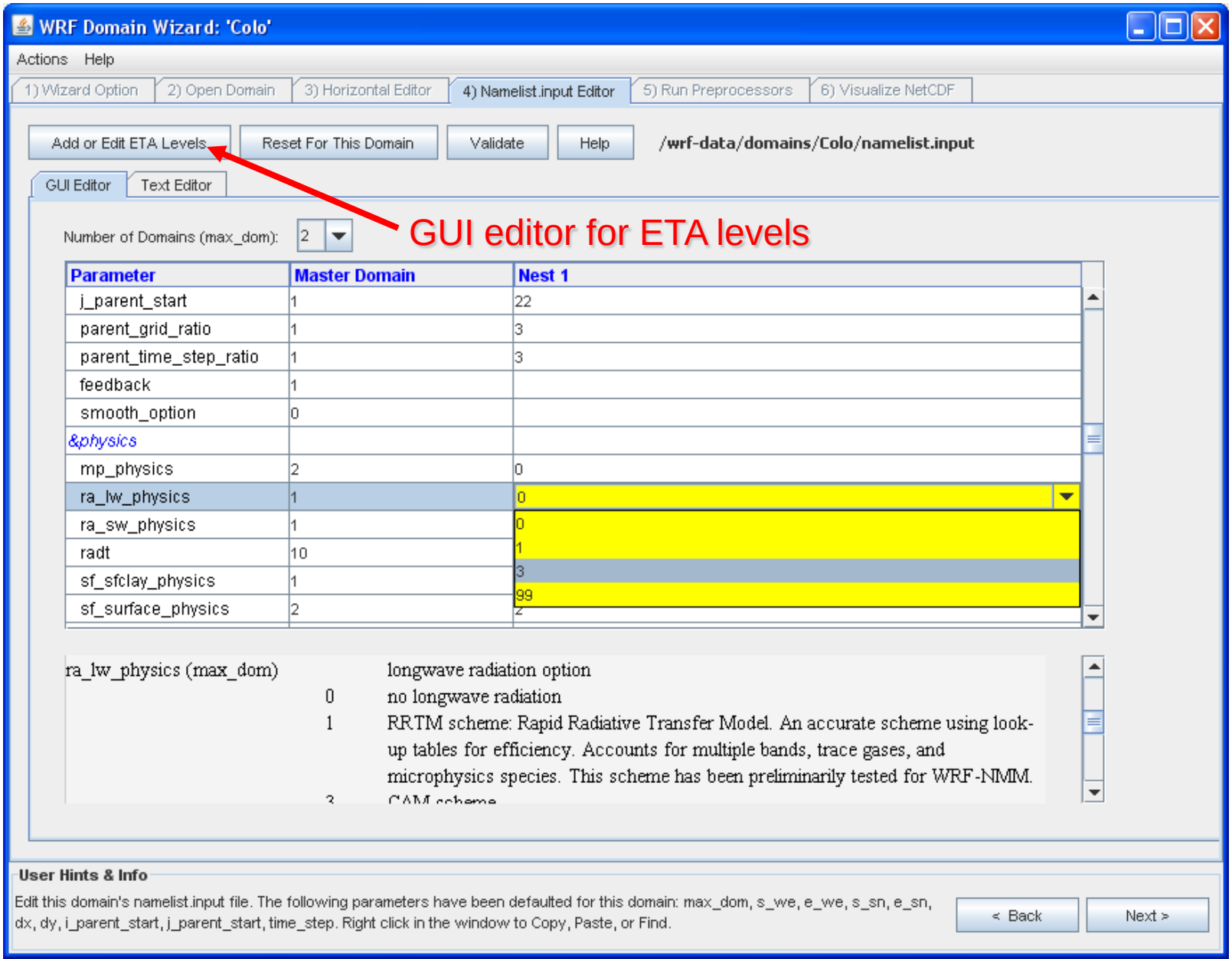
WRF Domain Wizard Tutorial -8

namelist.input file

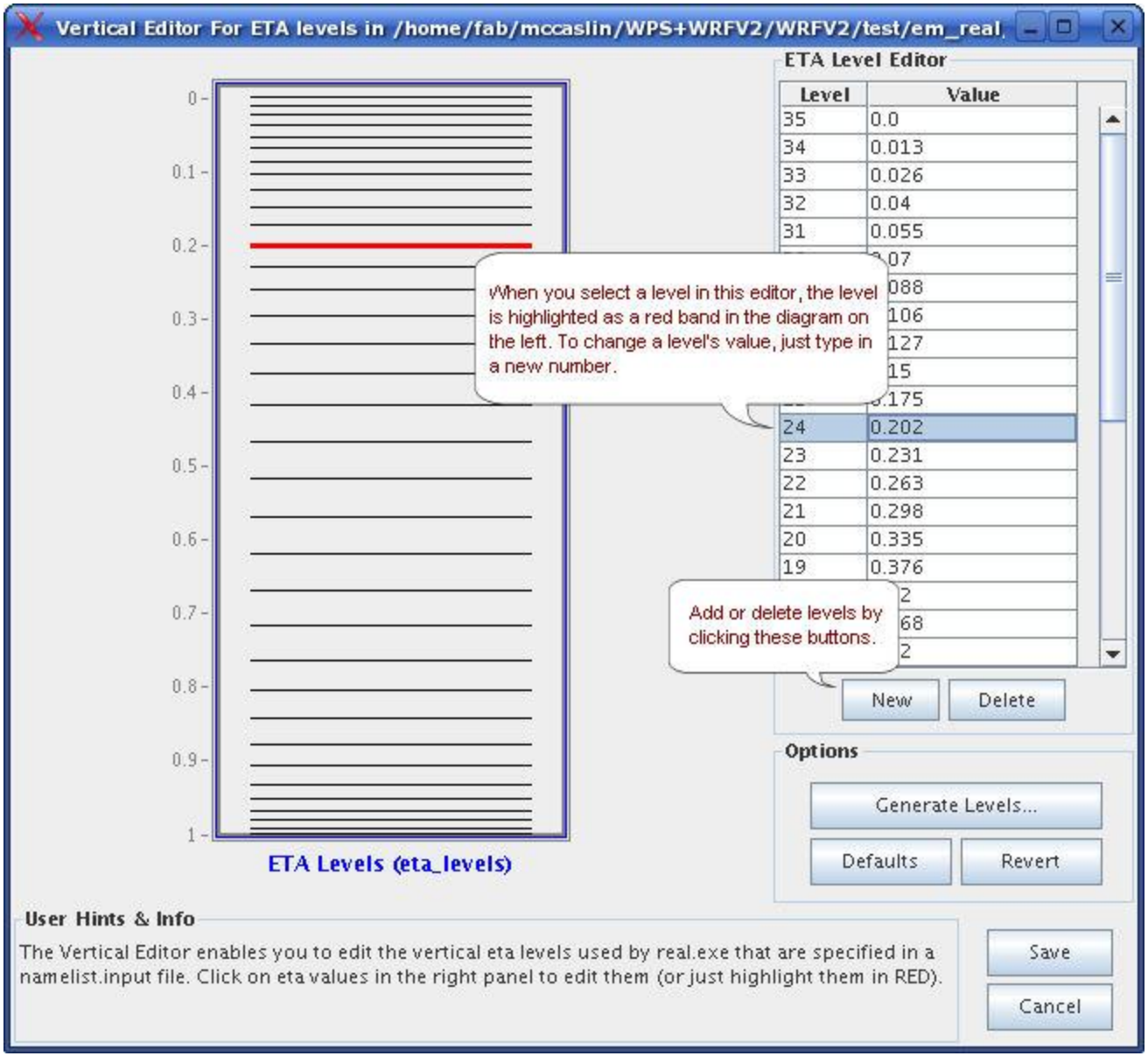
```
&dynamics
w_damping             = 0,
diff_opt              = 1,
km_opt                = 4,
base_temp             = 290.,
damp_opt              = 0,
zdamp                 = 5000.,   5000.,   5000.,
dampcoef              = 0.01,    0.01,    0.01,
khdif                 = 0,       0,       0,
kvdif                 = 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 Tutorial -9



WRF Domain Wizard Tutorial -10

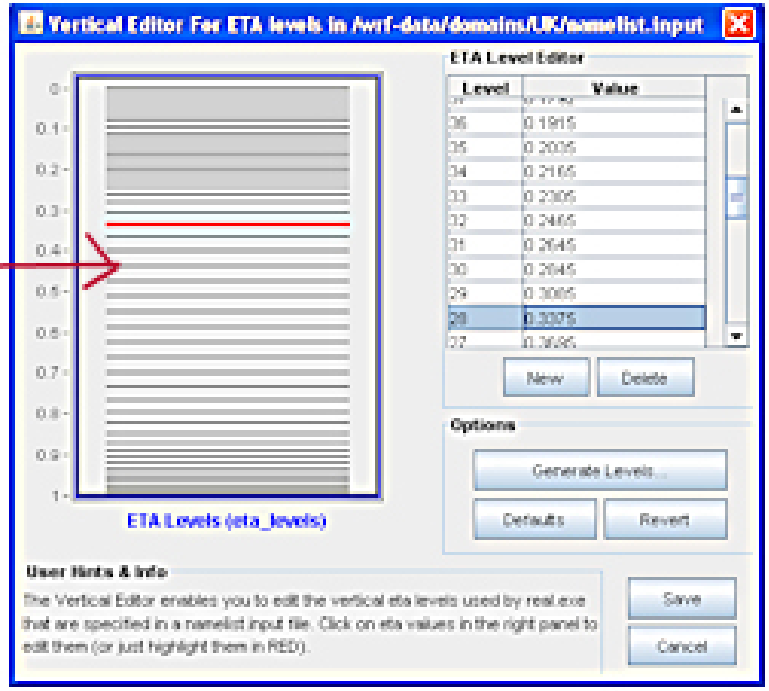


WRF Domain Wizard Tutorial -11

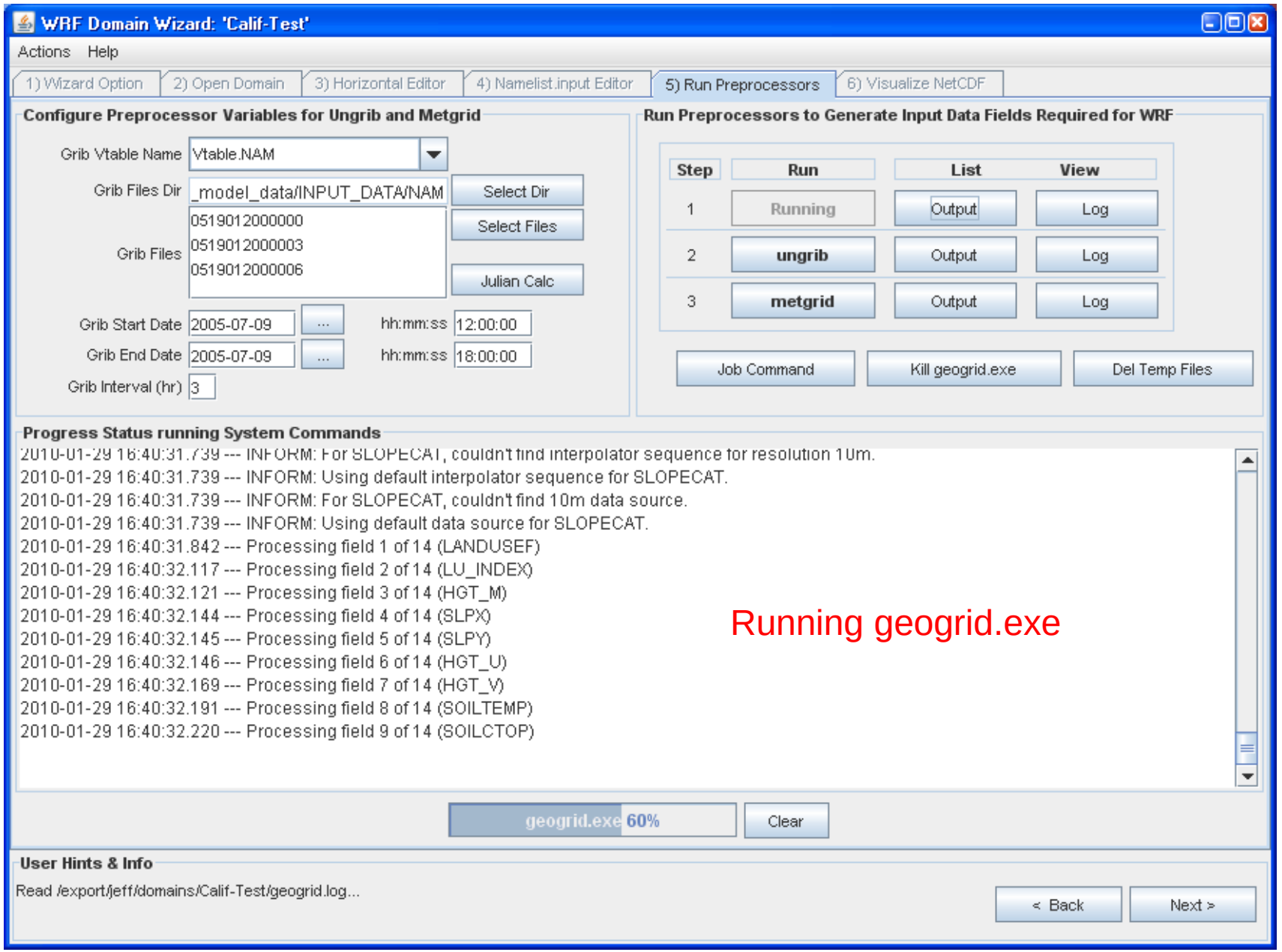
GUI editor for ETA levels

namelist.wps file

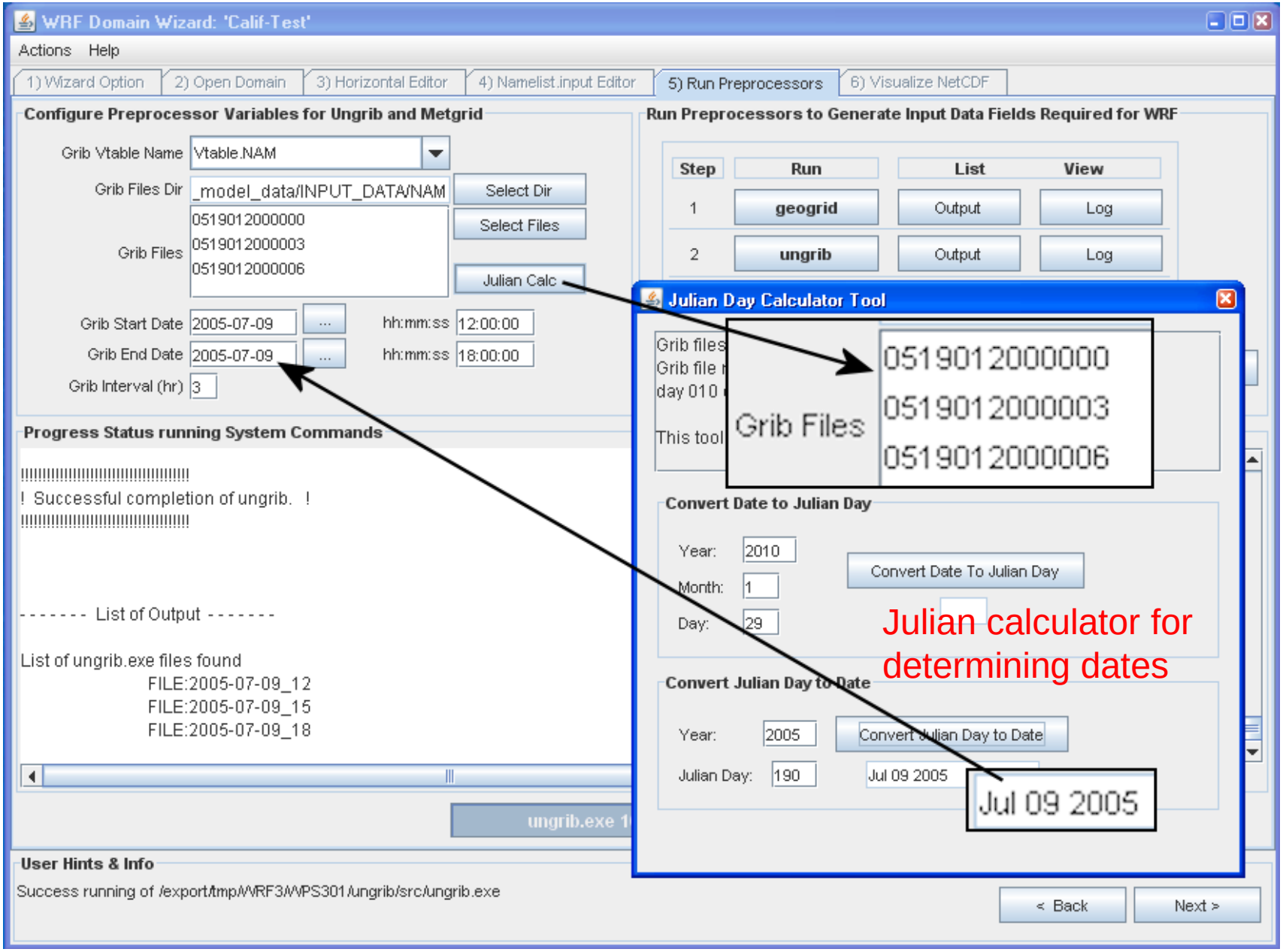
```
&domains
eta_levels   = 1.000, 0.994, 0.987, 0.979, 0.97,
               0.96, 0.949, 0.937, 0.924, 0.909,
               0.892, 0.873, 0.851, 0.826, 0.798,
               0.768, 0.736, 0.702, 0.666, 0.629,
               0.5915, 0.5536, 0.5153, 0.4773, 0.44,
               0.404, 0.3695, 0.3375, 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,
```



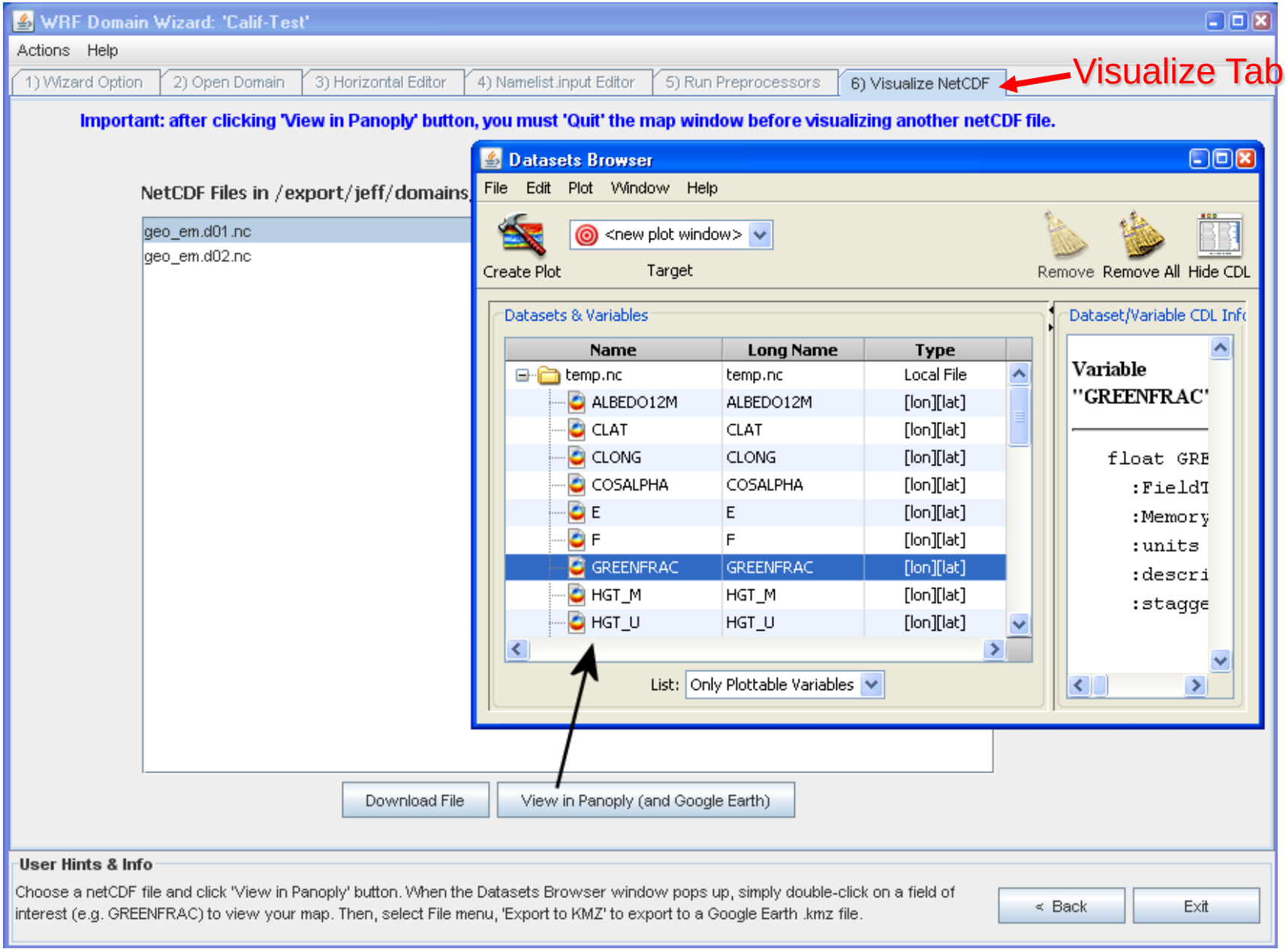
WRF Domain Wizard Tutorial -12



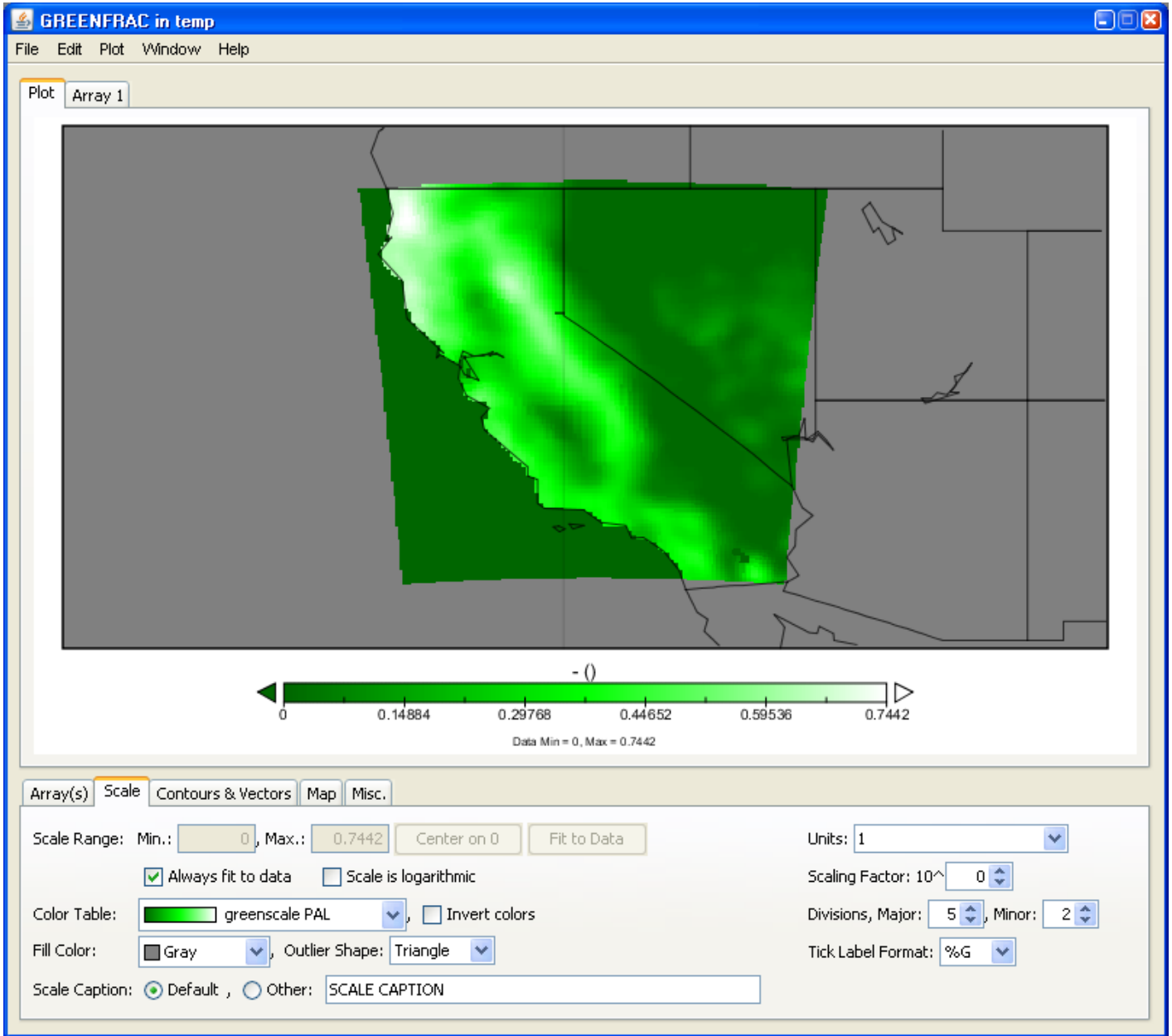
WRF Domain Wizard Tutorial -13



WRF Domain Wizard Tutorial -14



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

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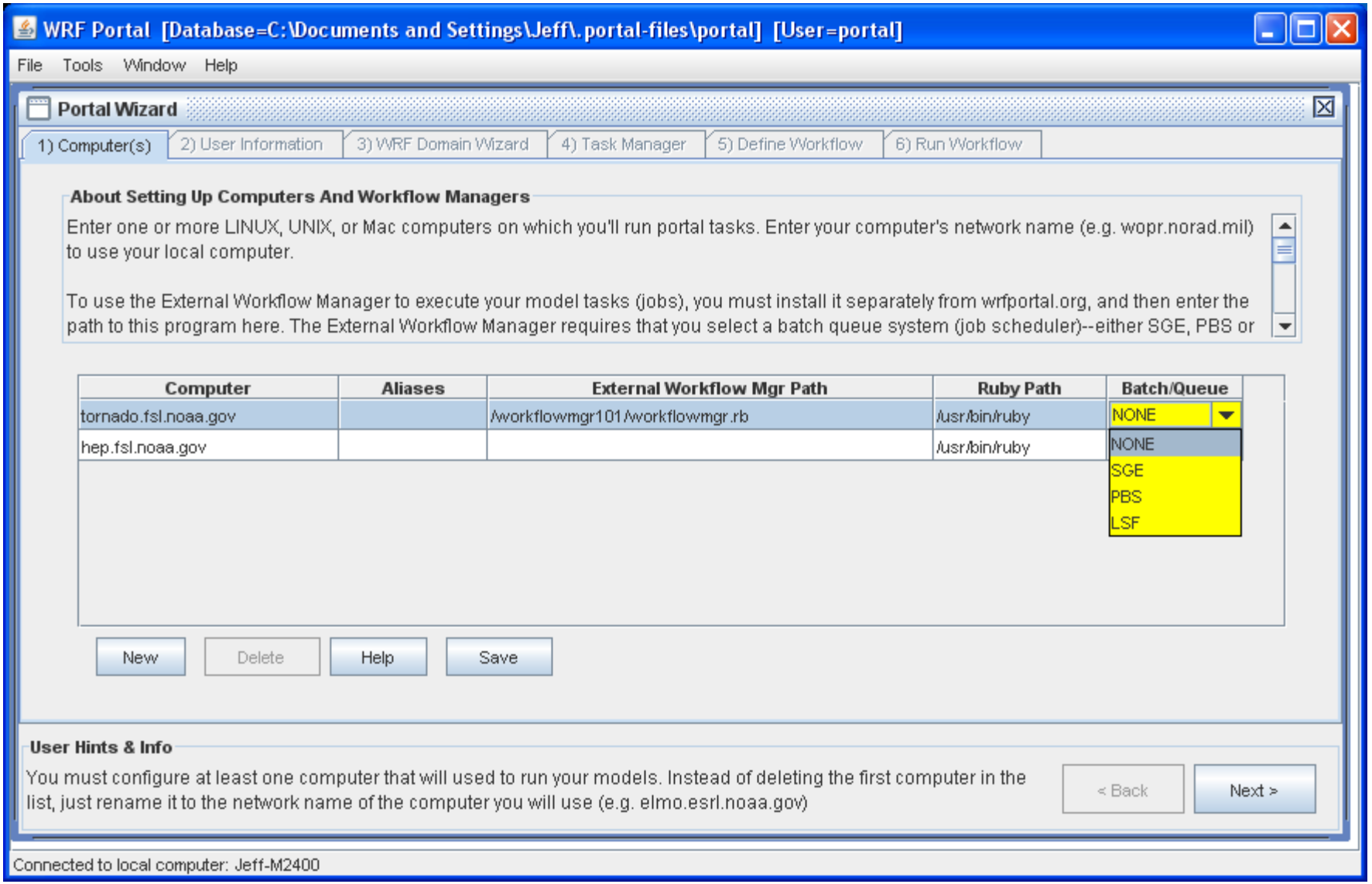
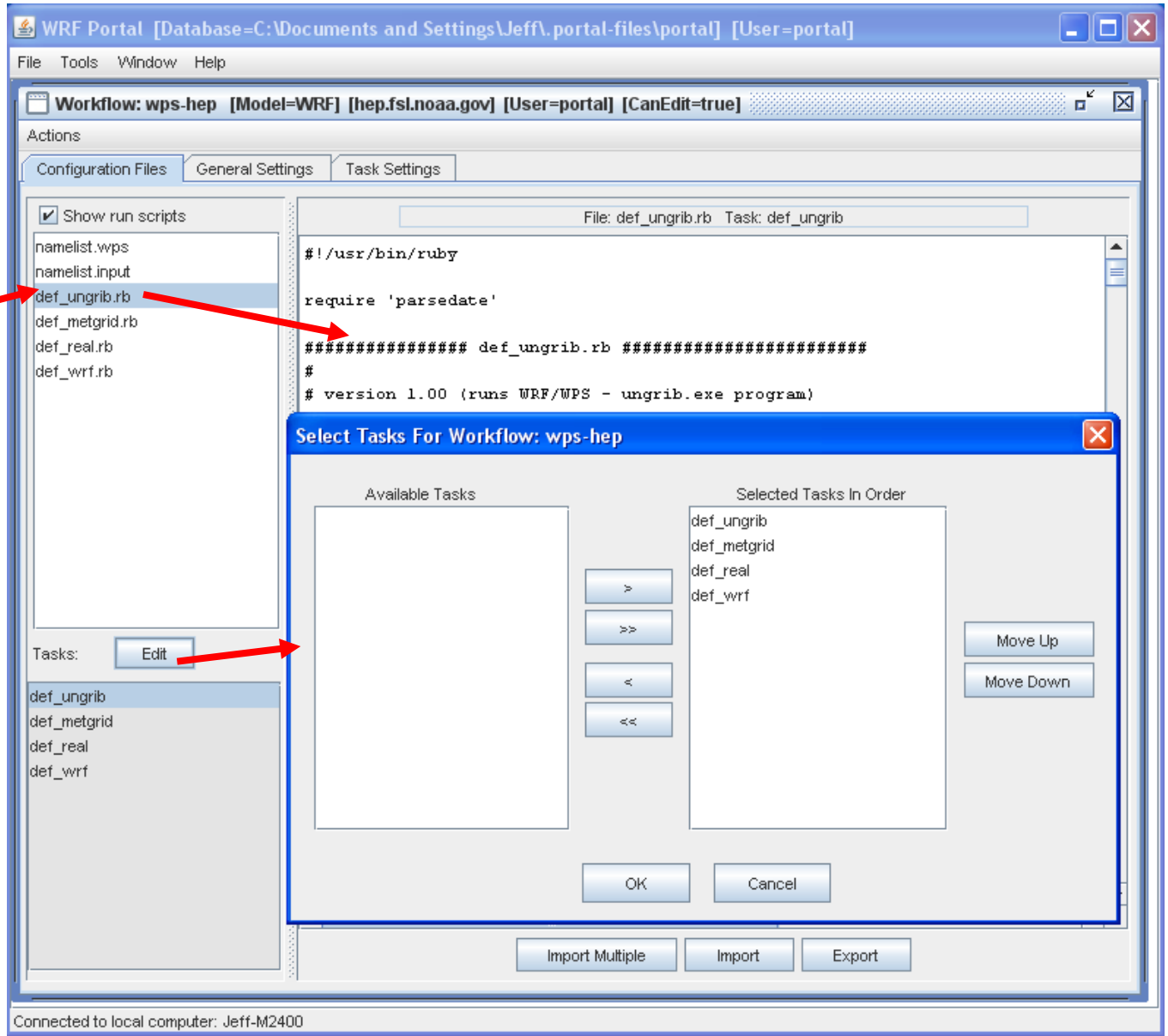
- Graphical file browsers to quickly locate files
- Robust job managers for running and managing tasks
- Progress monitor for tracking the progress of runs
- Graphical netcdf/grib viewers to visualize model input/output
- Captures system information upon launch (OS version, WRF version, path, env vars)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

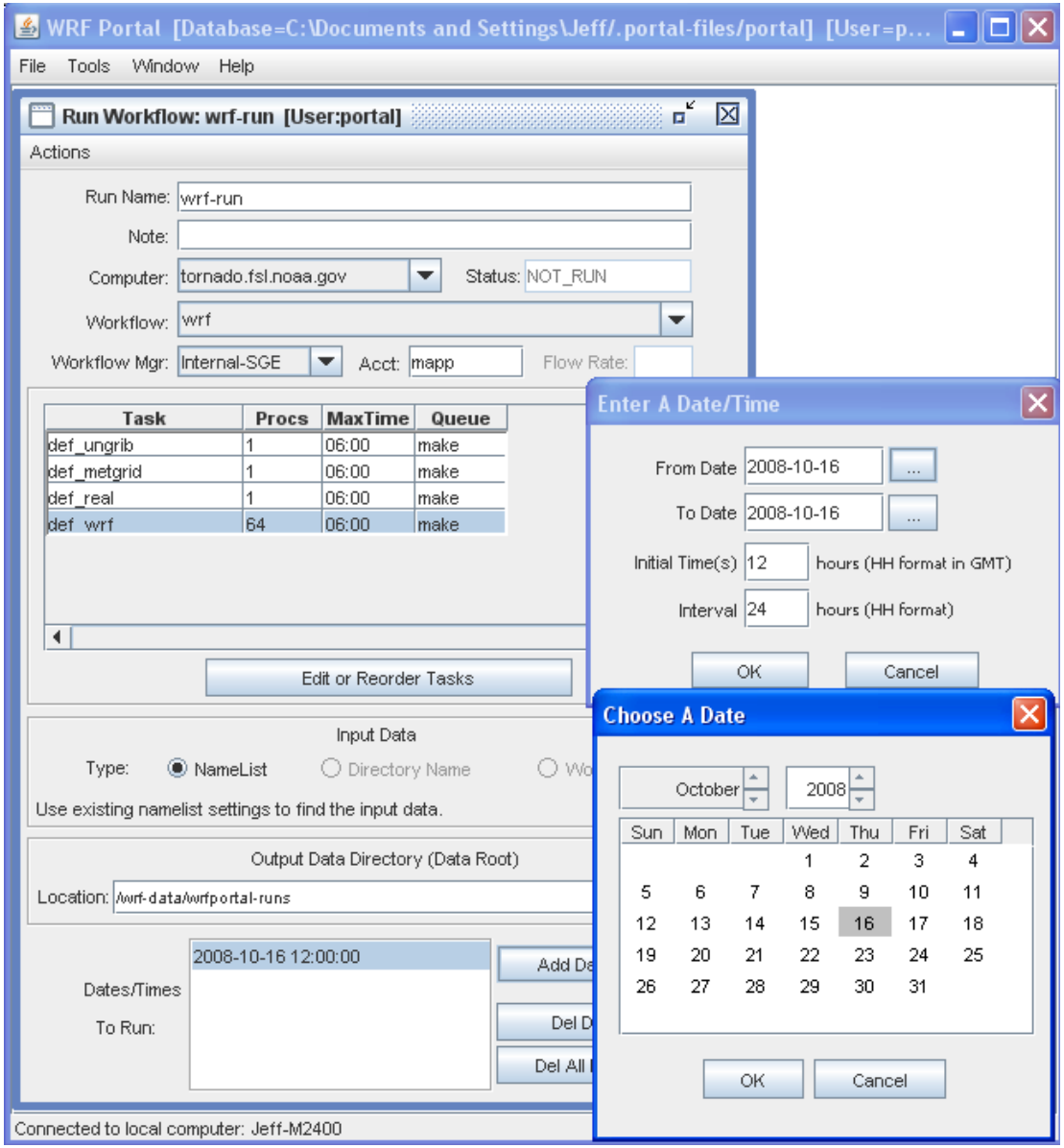
- **Portal Wizard** walks you through the process of configuring your computers and the tasks in your workflows



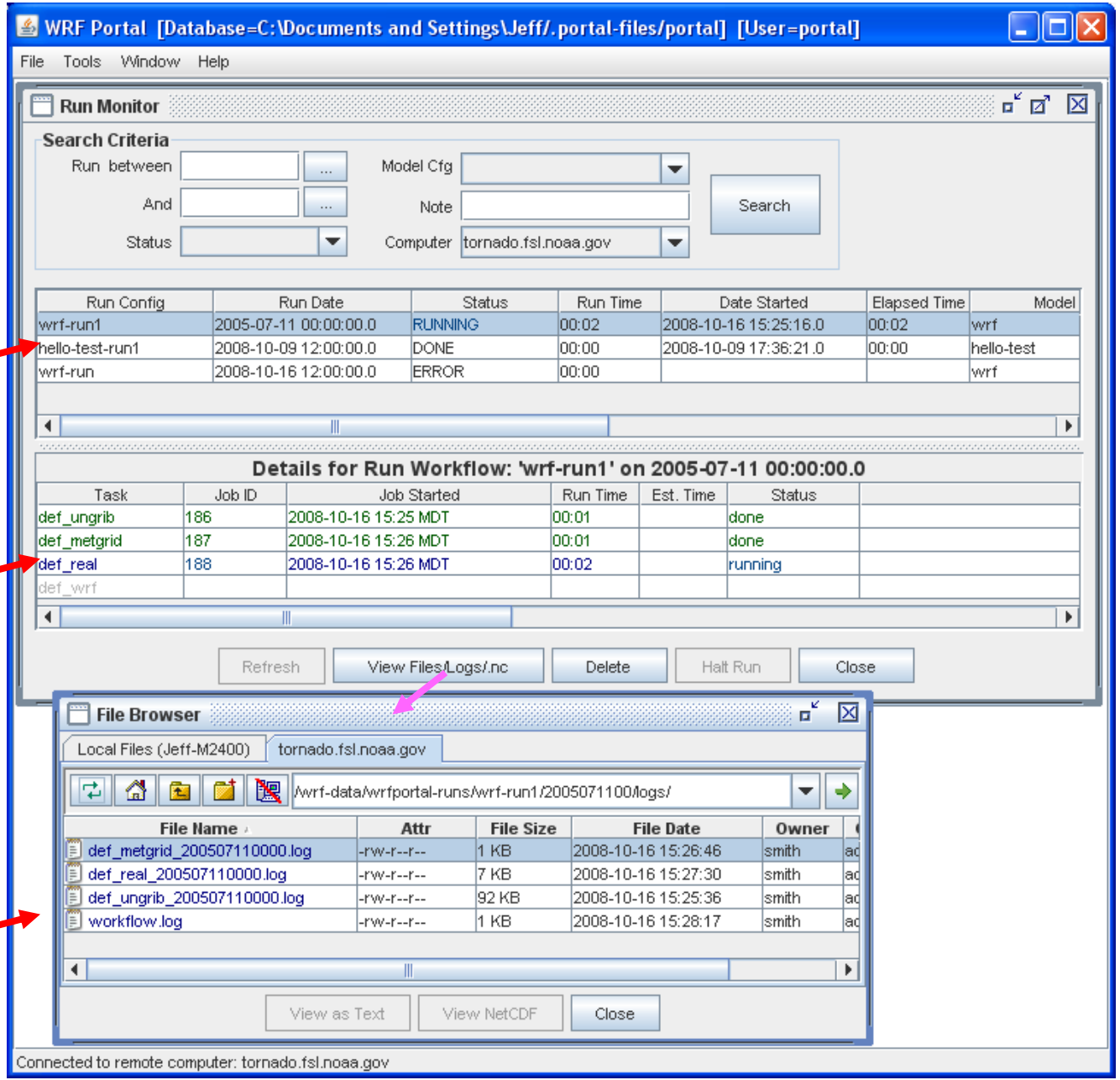
- **Workflow Window** is where you add tasks (scripts) to your workflow, configure any required env vars, etc.



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



Run Monitor enables a user to follow the progress of runs

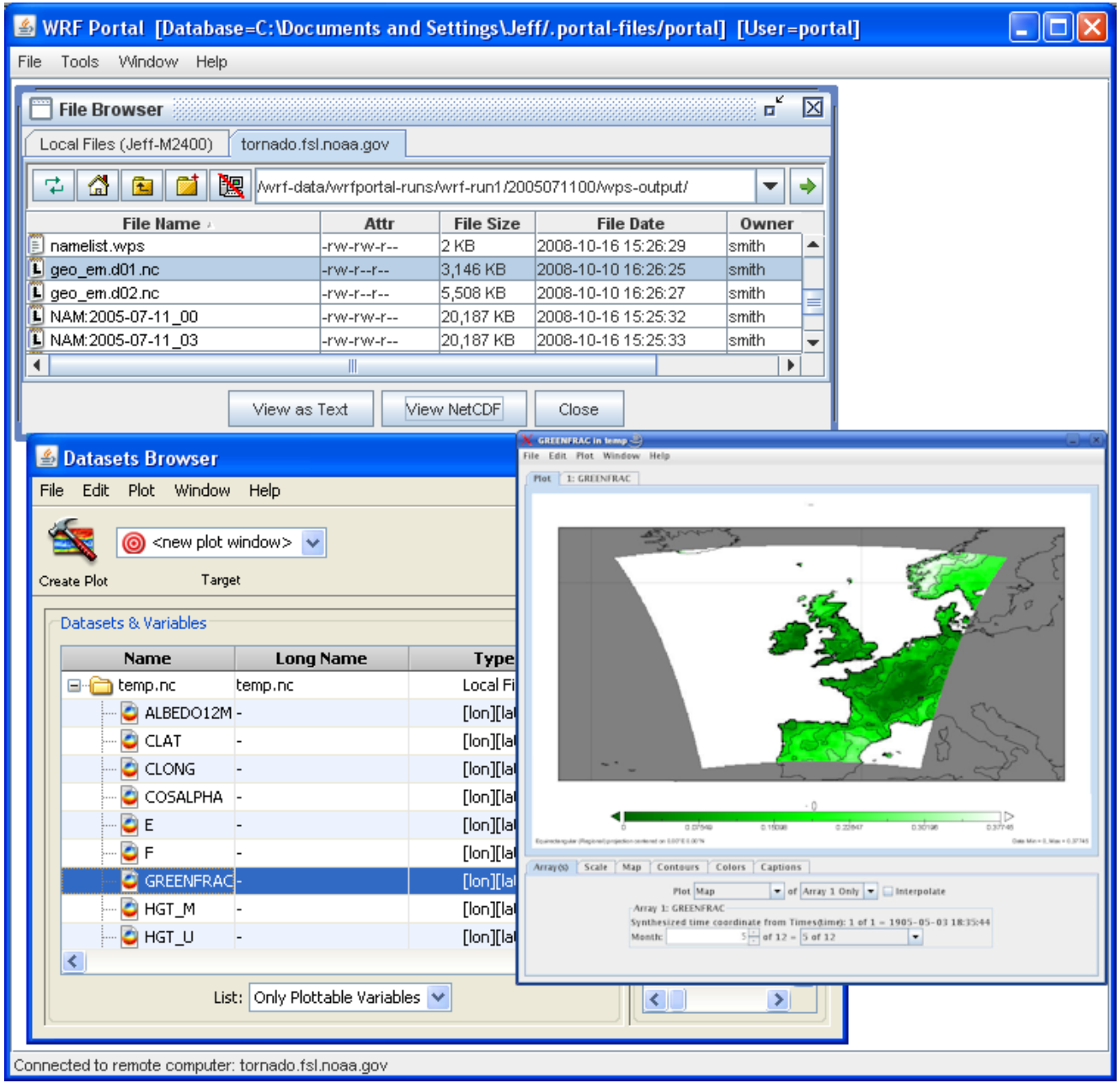


List of runs

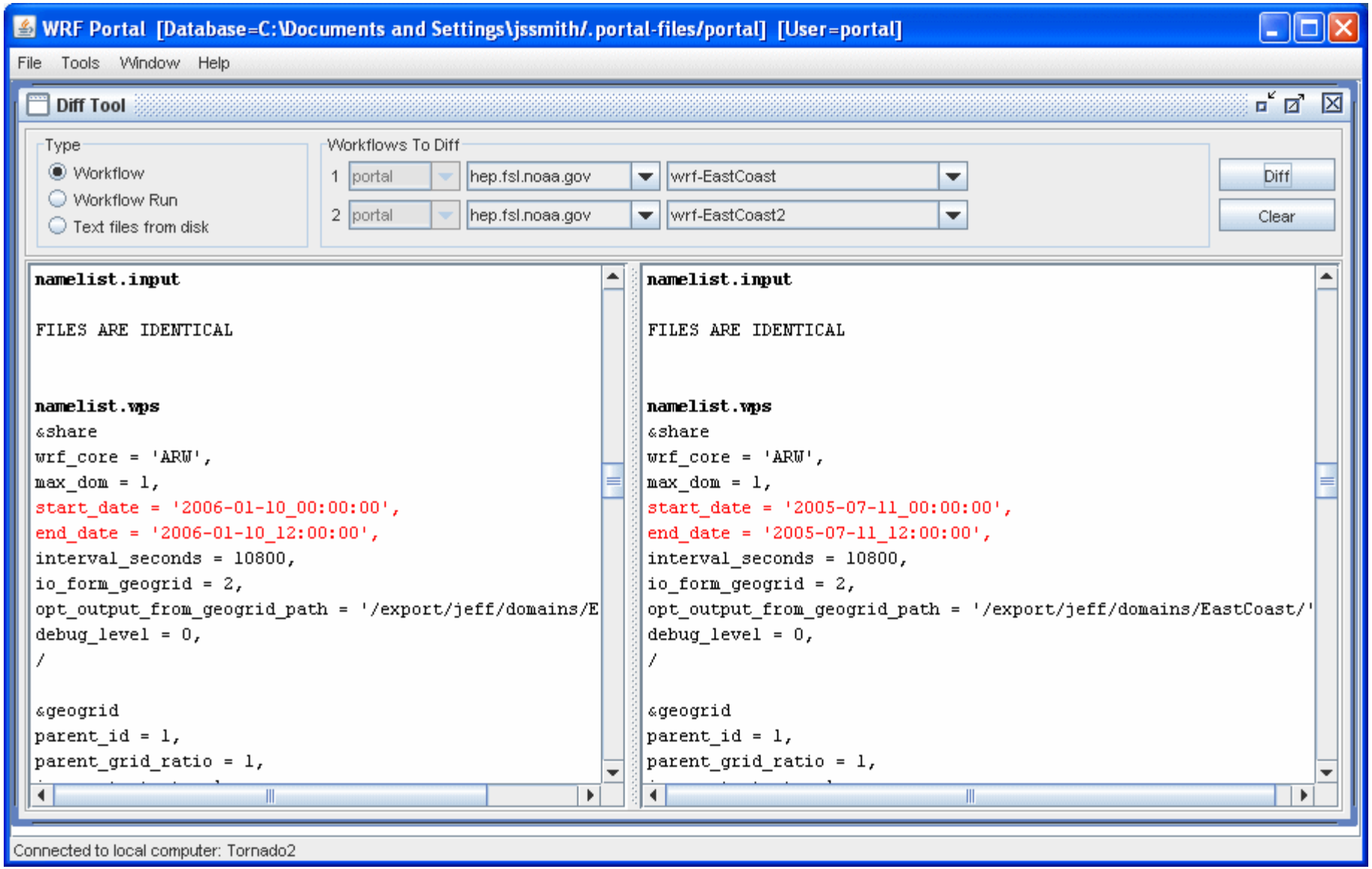
Tasks in run

Log files

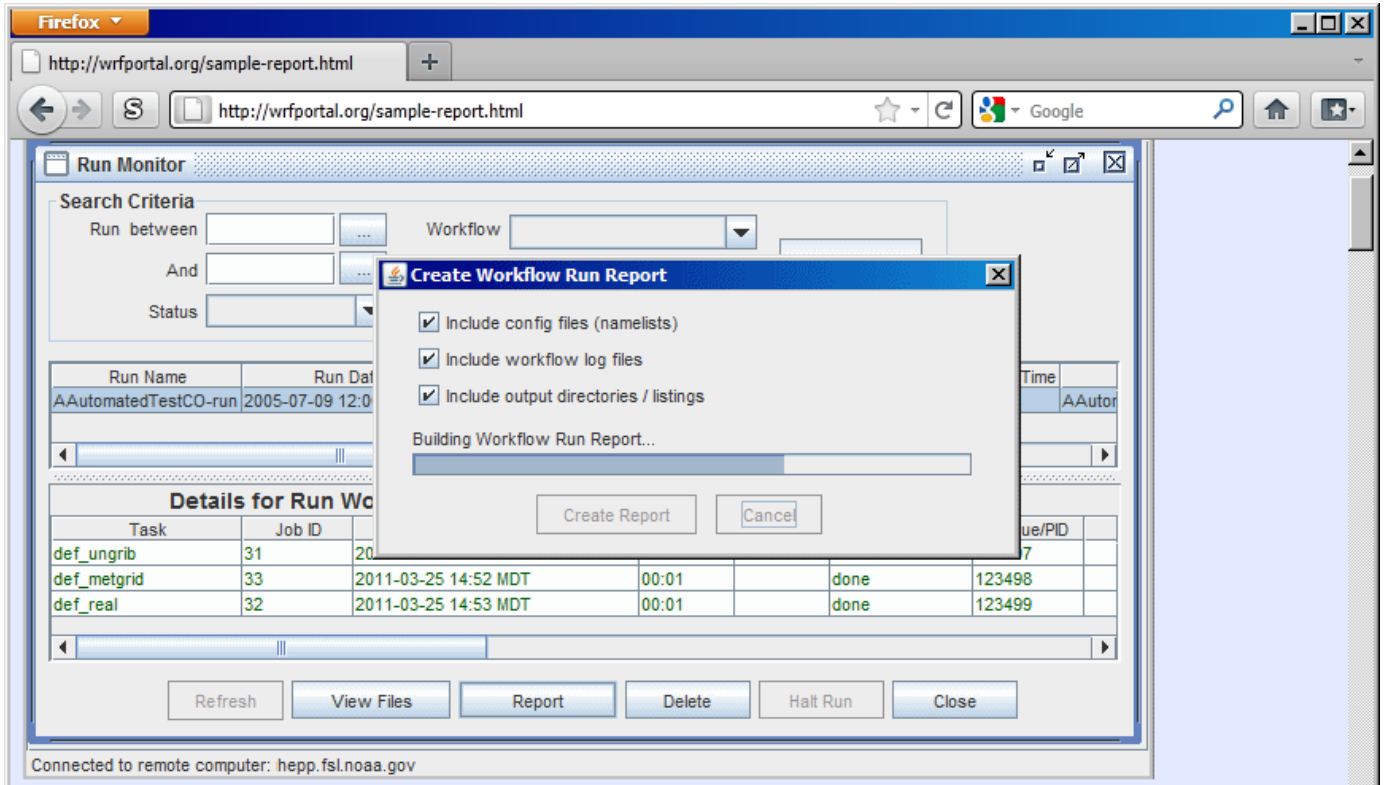
NetCDF and GRIB Viewer



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



Report Tool



Sample Run Report: 'AAutomatedTestCO-run'

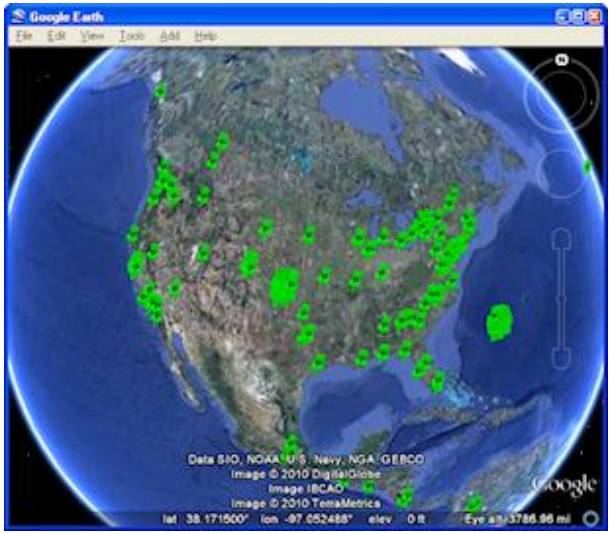
Workflow was launched Fri Mar 25 14:52:22 MDT 2011	
WorkflowName	AAutomatedTestCO
Computer	hepp.fsl.noaa.gov (Linux)
Account Name	portal-acct
Workflow Mgr	Internal SGE
Output Dir	/export/wrf/wrfportal-runs/AAutomatedTestCO-run
WRF Root Dir	/export/WRF32/WRFV3 (WRF Model Version 3.2 -April 2, 2010)
uname -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 GN
Free disk space	Filesystem 1K-blocks Used Available Use% Mounted on /dev/sda8 91222912 3939940 82649028 5% /scratch
	BASH=/bin/bash

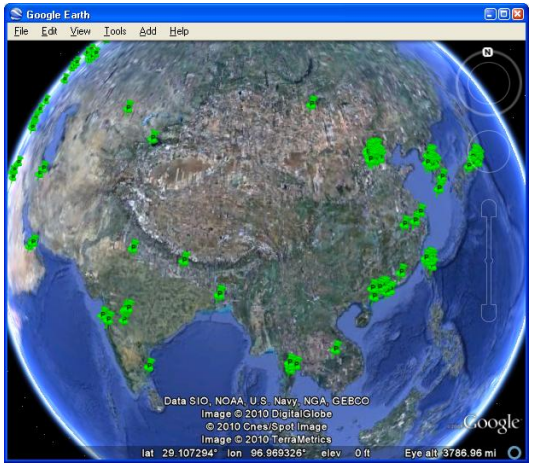
Who uses WRF Domain Wizard and WRF Portal?

- 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

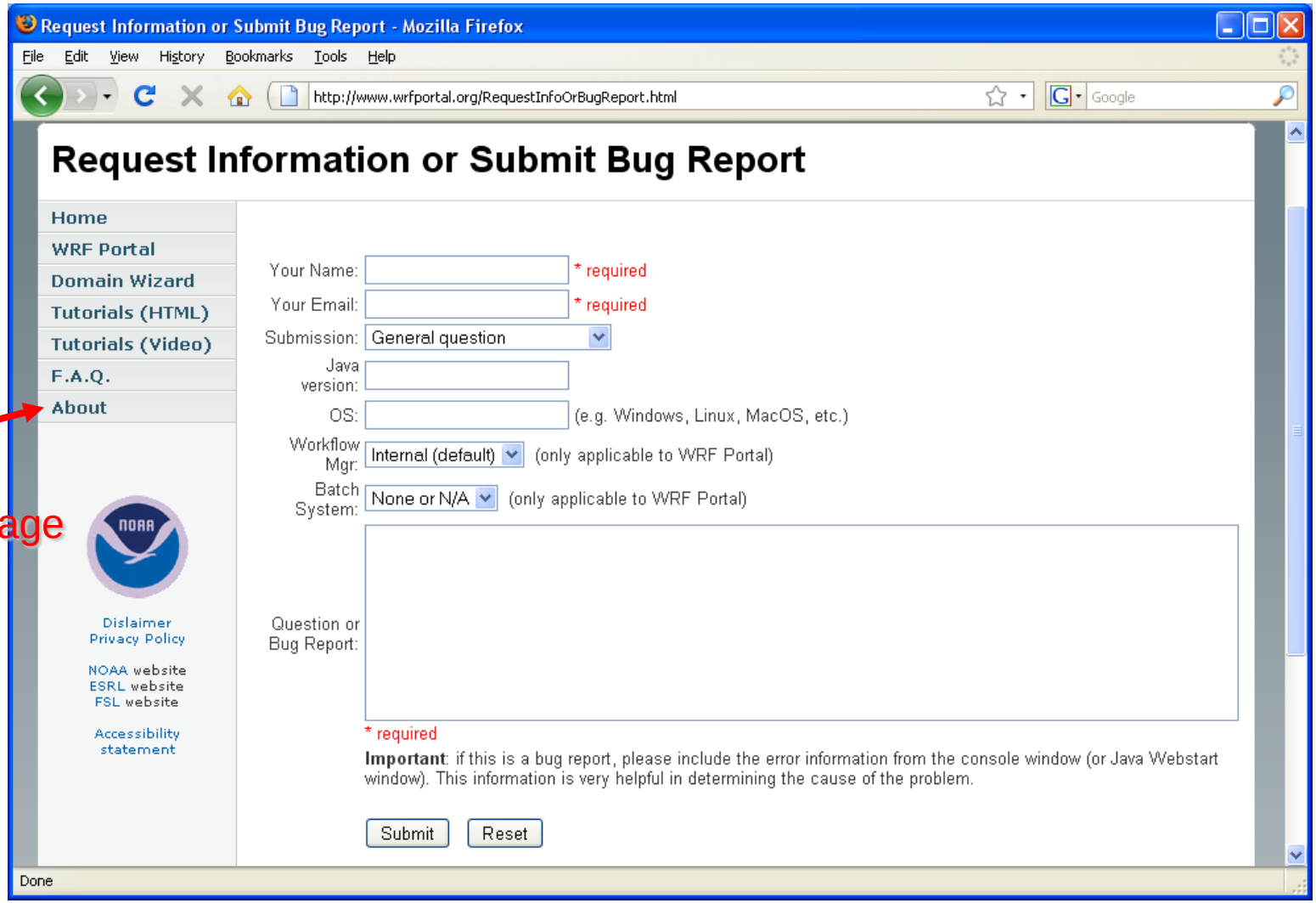




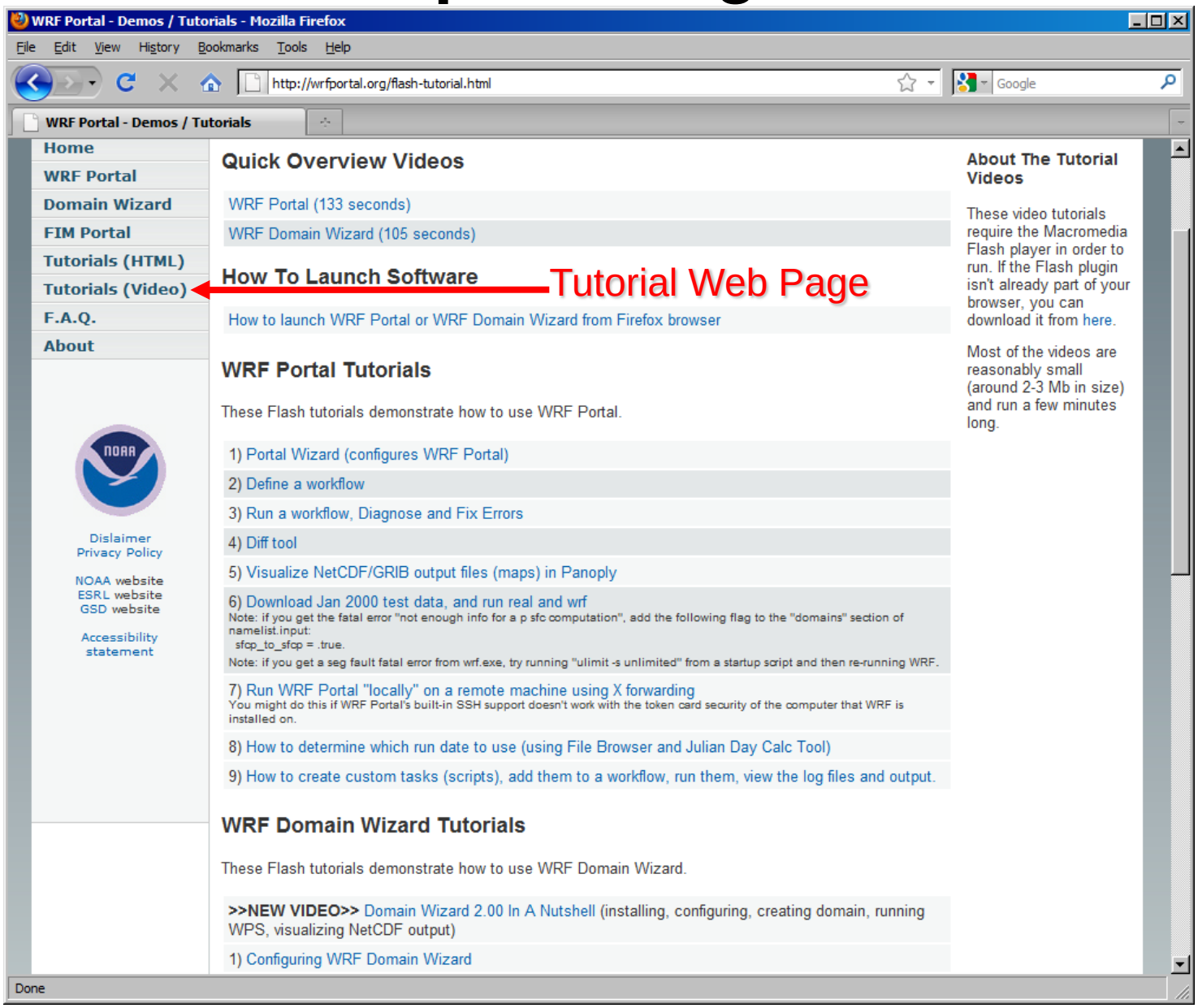
WRF Portal and WDW Support

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

Link on About Page



Tutorials on wrfportal.org



Thank you!

You can contact me at wrfportal.org

jeff.s.smith@noaa.gov