



EGI-Engage

gWRF Web Portal User's Guide

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Abstract

This user guide describes the user interfaces of gWRF Web Portal. The web portal of gWRF (grid-based WRF), developed by Academia Sinica Grid Computing Centre (ASGC), utilizes the global grid computing resources for the weather simulation by the Weather Research and Forecasting (WRF) model. The gWRF web portal supports high performance simulation and significantly reduces the barrier of numeric weather analysis.



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TERMINOLOGY

A complete project glossary is provided at the following page: <http://www.egi.eu/about/glossary/>

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1 Introduction

Weather Research and Forecasting (WRF) model is a state-of-the-art regional modeling tool developed at the National Center of Atmospheric Research (NCAR) of US. It is designed to serve both operational forecasting and atmospheric research needs and it has a rapidly growing community of users all around the world.

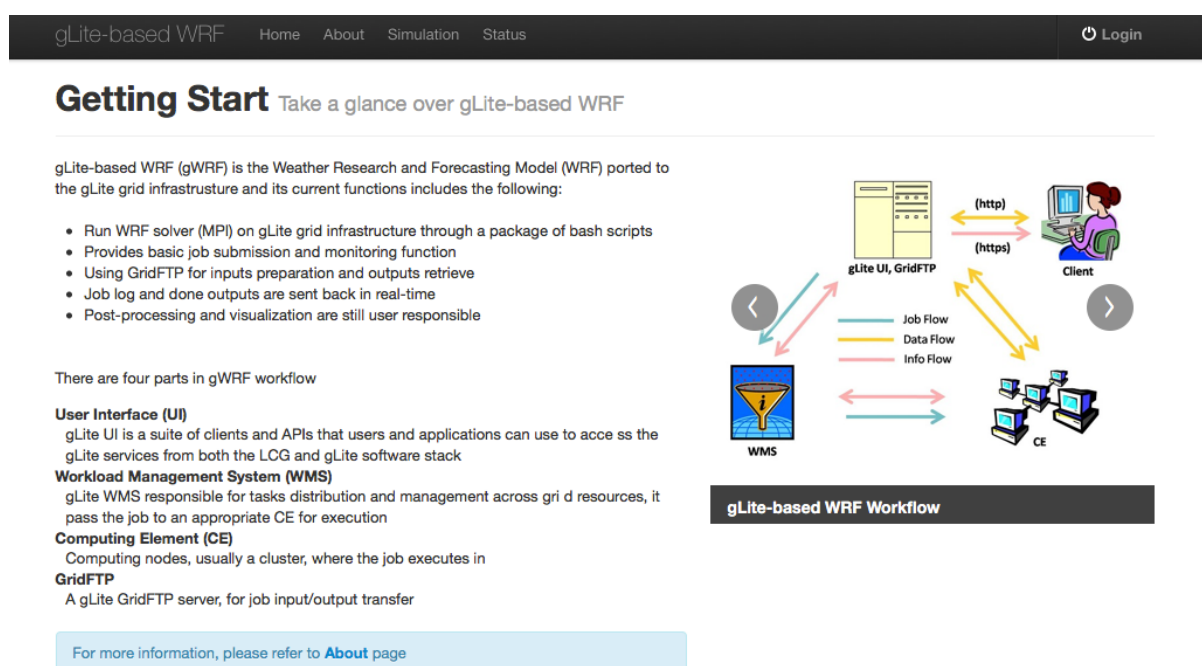
The gWRF web portal supports high performance simulation and significantly reduces the barrier of numeric weather analysis. The web portal of gWRF (grid-based WRF) utilizes the global grid computing resources for the weather simulation by the Weather Research and Forecasting (WRF) model. To improve the WRF overall efficiency, gWRF allows the most computing intensive WRF model to run on the Grids whereas users handle WPS and post-processing which do not require intensive CPU resources on a shared front-end or on their local machines. DMCC designed a package of scripts and made WRF MPI version running on EGI-based Grid infrastructure.

User only needs the web browser to access to the gWRF web portal services. The following browsers are supported:

- Chrome 3+
- Firefox 3.5+
- Opera 12+
- Safari 4+
- Internet Explorer 8+

2 Main Page

From the main page, user could login to the gWRF services with his/her personal certificate with EUAsia VO membership. Background and contact information of gWRF web portal services could be also found at the gWRF web homepage in Figure 1.



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Figure 1 gWRF Web Portal Homepage

3 Simulation Workflow

Running WRF simulation involves execution of several pre-processing steps for the input data, initial conditions and boundary conditions at first. The second step is running the WRF core which is computing intensive to generate simulation results of every certain number of time steps and output several result files. The last step is to hide the complexity of both Grid and WRF, gWRF provides the Web Portal Services to integrate numerical weather pre-diction tools and the e-Infrastructure. The general workflow running WRF is shown in Figure 2.

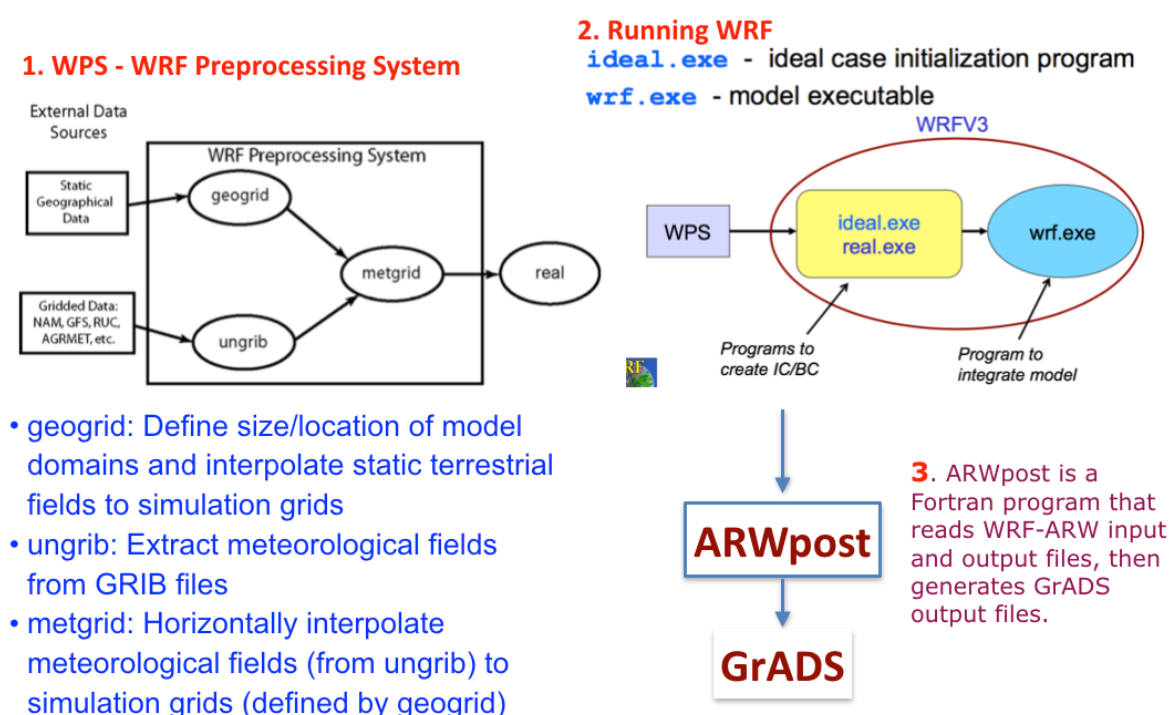


Figure 2 Workflow of running WRF

For the pre-processing, user could run DomainWizard at his/her own computer or using the DMCC front-end server with the terrestrial data and Gridded data as Figure 3. WRF Prepro-cessing System (WPS) is used to define simulation domain area and nests, produce static fields such as terrain, land use, soil type on the simulation domain, and interpolate meteoro-logical data (such as wind speed, pressure, temperature, etc.) to WRF model grid.

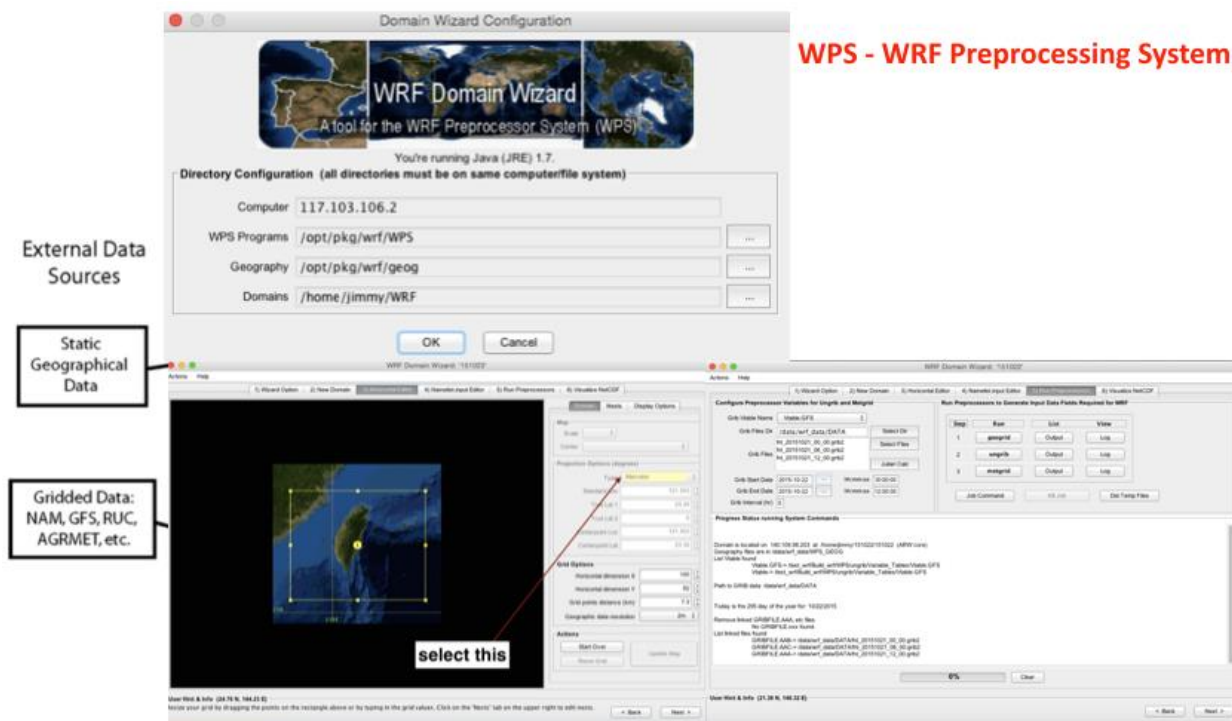


Figure 3WRF Preprocessing System by DomainWizard

Then, running core WRF processes involves two steps. First steps are to create initial condition and boundary condition files according to model levels defined. The second step is to integrate models. In gWRF web portal, user could choose Simulation from the Menu bar to create a new simulation job as Figure 4.

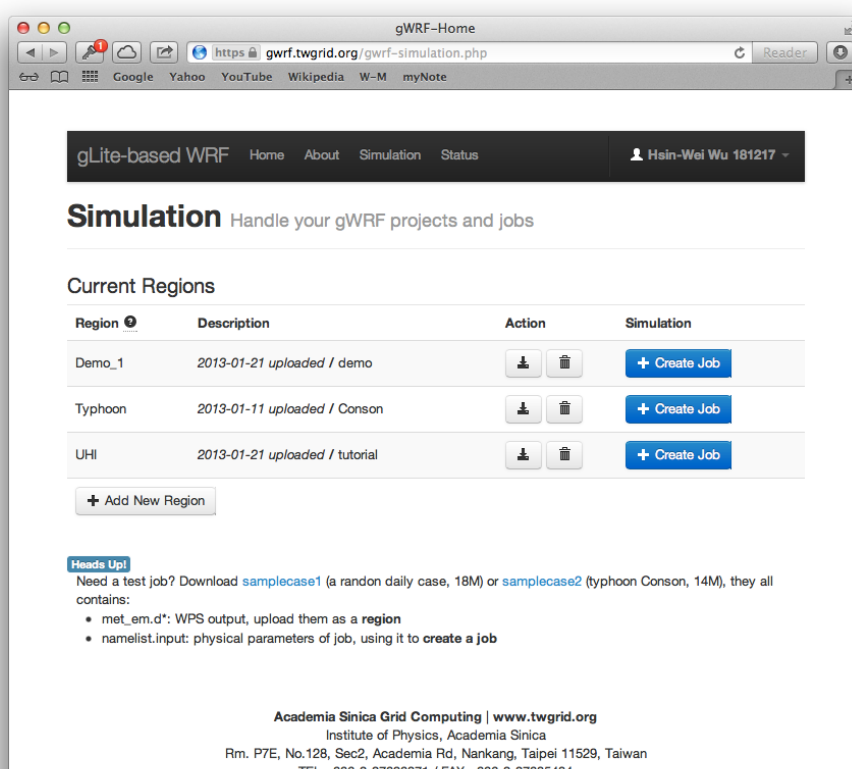


Figure 4 Running WRF simulation by gWRF

gWRF provides two samples for user's reference in job submission. One is random selection of daily data; the other one is the typhoon Conson which hit Taiwan in 2010. Results from the preprocessing stage should be uploaded as a region. Once all required data are ready, user could create a job to submit it to the Grid/Cloud. From gWRF web portal, when choose 'Status' from the top menu, user could check his job status and get output as Figure 5.

The screenshot shows a web browser window titled "gWRF-Home" with the URL "https://gwrf.twgrid.org/gwrf-status.php?page=1". The browser's address bar and search bar are visible. The page content includes a navigation bar with links for "gLite-based WRF", "Home", "About", "Simulation", and "Status". A user profile "Hsin-Wei Wu 181217" is logged in. The main heading is "Status Job Status and Output". Below this, a section titled "Current Jobs" contains a table with the following data:

Job ID	Region	Submit on	Status	Action	Output
test_1-0	Demo_2	2013-01-21 05:15:06			
UHI_1-0	UHI	2013-01-21 01:50:57	Done(Success)		
Typhoon_1-0	Typhoon	2013-01-16 07:02:15	Done(Success)		
3-0	Typhoon	2013-01-14 07:52:58	Done(Success)		
dave3-0	Aug24	2012-08-27 02:04:33	Done(Success)		

Below the table, there are navigation buttons: "Prev", "1", and "Next".

Figure 5 Job status and output checking

4 Result Visualization

Simulation results include the pressure and precipitation (Figure 6), temperature and wind map (Figure 7), could be accessed from the Status page once the job is done. WRF output data files are generally in NetCDF format. To visualise the final output, usually the output data will be converted into GrADS format by ARWpost and then visualize by GrADS.

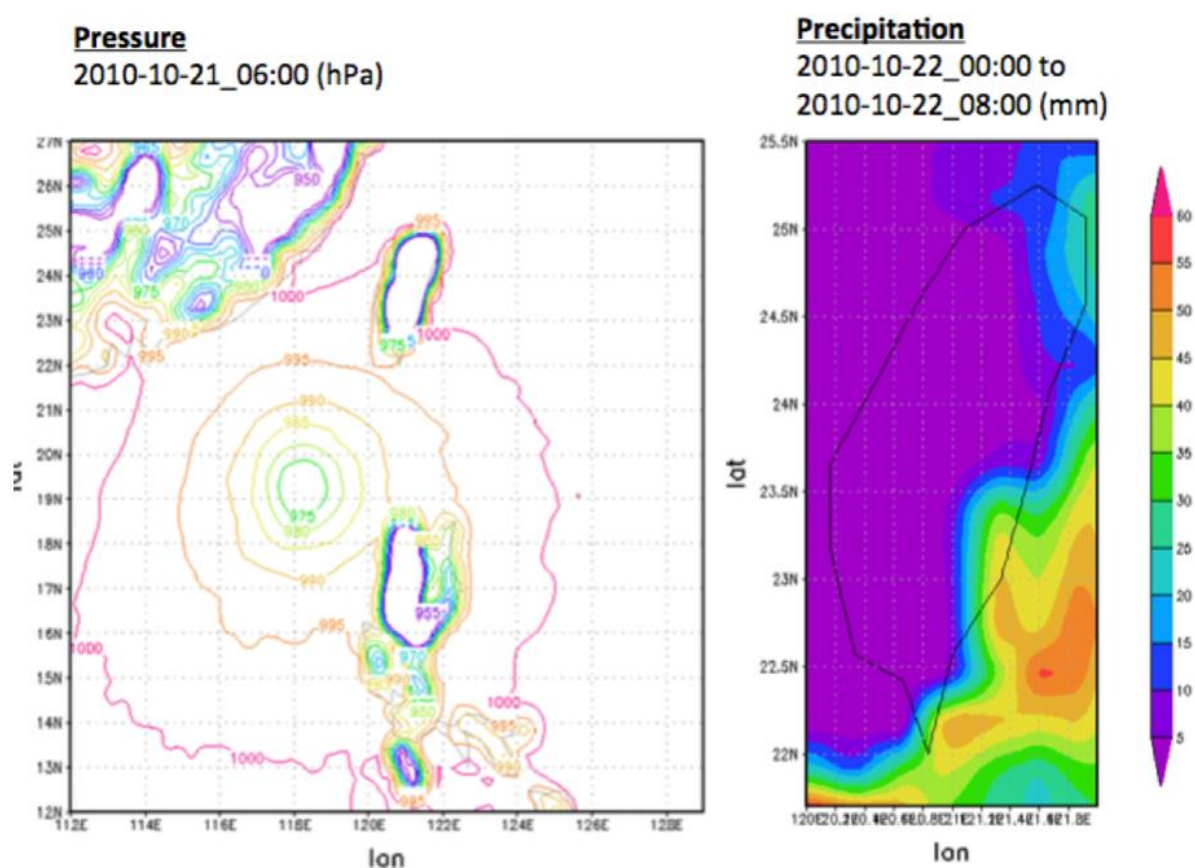


Figure 6 Result Visualization of Pressure and Precipitation by GrADS on a specific time slice of series results

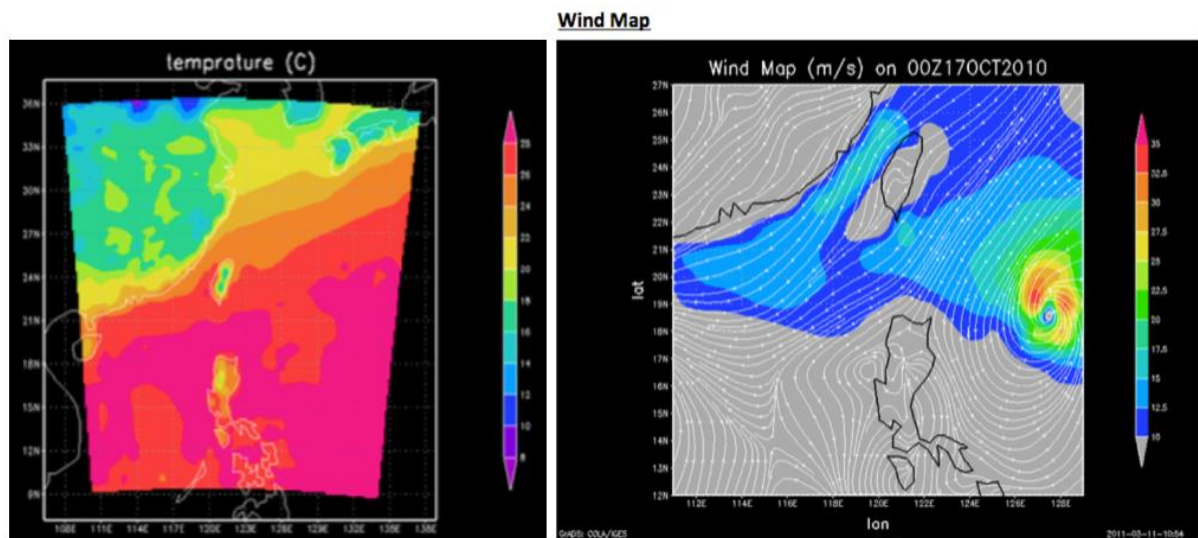


Figure 7 Result Visualization of Temperature and Wind Map by GrADS on a specific time slice of series results