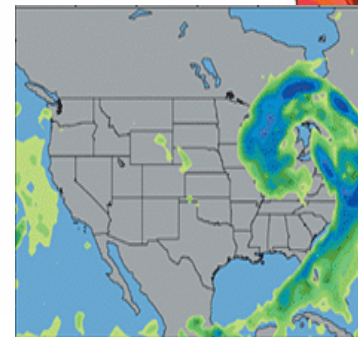
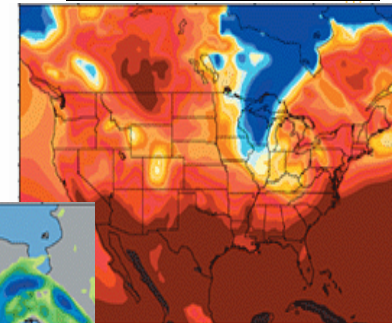
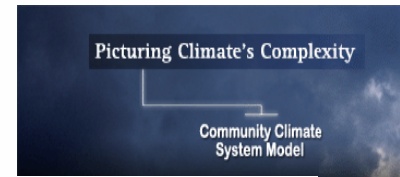


Push-button Climate Modeling on TeraGrid

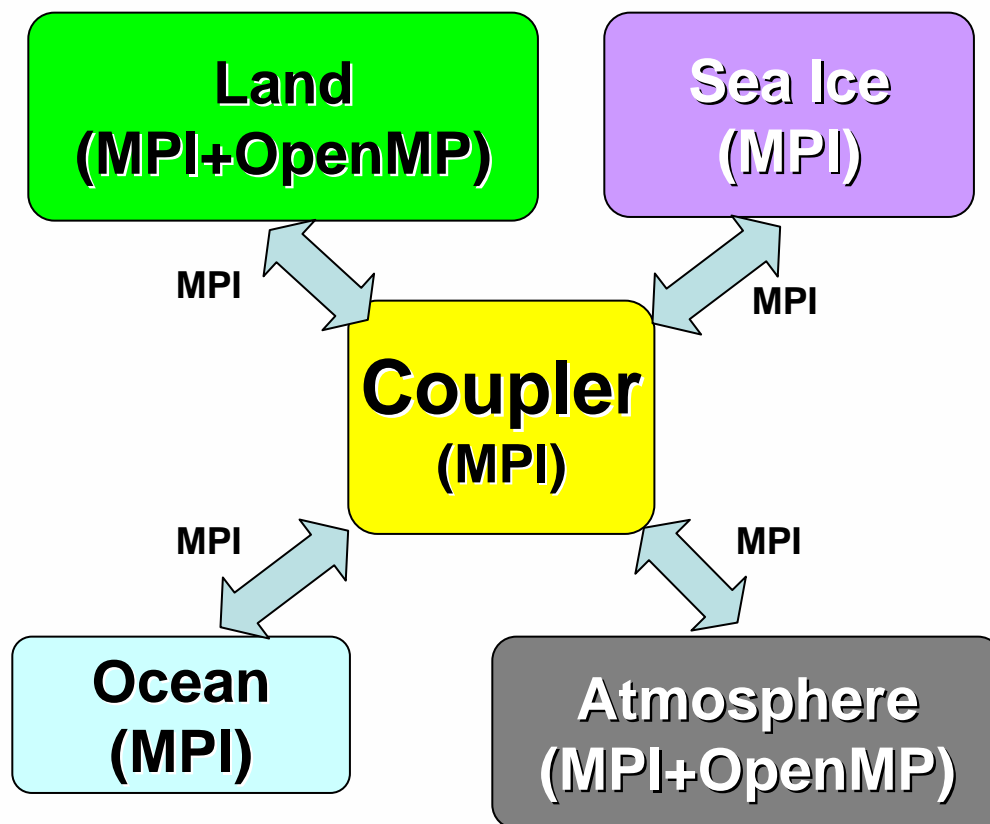
A. Basumallik, L. Zhao, C. Song (Rosen Center)
R. Sriver, M. Huber (Earth & Atmospheric
Sciences)
Purdue University

Community Climate Simulation Model

- The **CCSM** is a coupled climate model for simulating the earth's climate system.
 - Initially developed at the National Center for Atmospheric Research (NCAR) at Boulder, Colorado.
 - Provides the modeling framework for confronting scientific questions about the Earth's past, present and future climate states
 - <http://www.ccsm.ucar.edu>



Overview of CCSM



- Four models (components)
- Each model has **Active**, **Data** and **Dead** versions
- Models communicate with a **Coupler** component every time step

CCSM and TeraGrid

- CCSM has high computational and storage needs.
- A typical model run on an IBM “bluesky” system, at a dataset resolution of T42_gx1v3, has the following requirements :
 - History-File Volume: 6.5 Gbytes/model year
 - Restart-File Volume: 0.9 Gbytes/model year
 - Simulation Years/Day: 7.5 on 104 CPUs
- TeraGrid provides suitable Computational, Storage and Networking resources to run CCSM.
 - DataStar: 6 32-way P690 compute nodes with 1.7 GHz Power4+ processors. Five nodes have 128 GB of shared memory, and one node has 256 GB of memory. Peak performance: 1.3 TFlops.
 - Access to 130 TB of GPFS

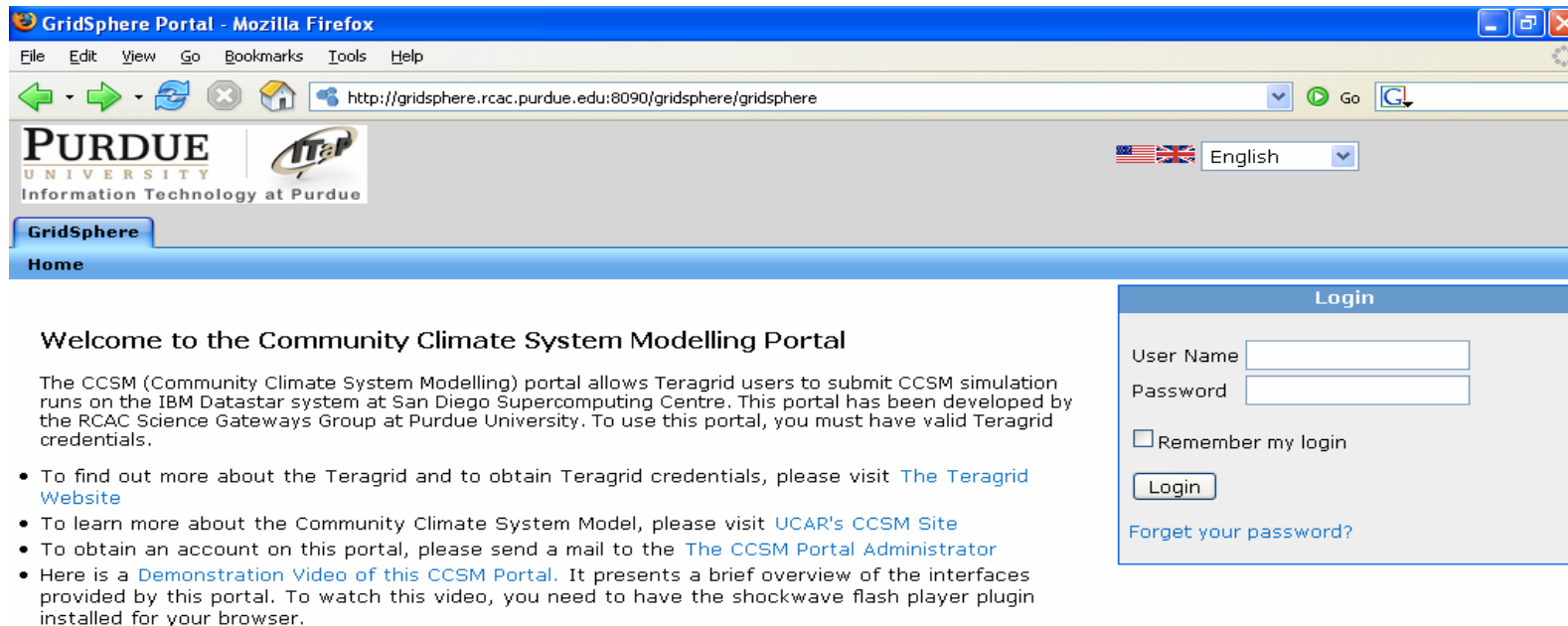
Challenges

- Even for experienced CCSM Users, the following challenges exist in using CCSM on the TeraGrid -
 - Porting and Validation on a new platform
 - Performance Tuning
 - Learning curve for TeraGrid tools, protocols, specifics of batch queuing systems
 - Making changes to CCSM software stack to accommodate specifics of TG software
 - Collaboration and dissemination of results

CCSM made easy: A TeraGrid CCSM portal

- Goal - Provide an intuitive web based interface for running CCSM simulations on the TeraGrid.
 - Correspond to the sequence of operations in a typical CCSM simulation
 - Still allow control in editing simulation configuration
 - Interfaces for moving data
 - Currently open to users with Active TeraGrid Credentials and active allocations.
 - Teragrid credentials retrieved by portal from the TeraGrid MyProxy server.
 - Easy steps for TeraGrid authentication (no ssh, commands)
- Beta version available:
 - <http://www.purdue.teragrid.org/ccsmportal>

A CCSM Portal for the TeraGrid



The screenshot shows a Mozilla Firefox browser window titled "GridSphere Portal - Mozilla Firefox". The address bar contains the URL "http://gridsphere.rcac.purdue.edu:8090/gridsphere/gridsphere". The page header includes the Purdue University logo and "Information Technology at Purdue". A language dropdown menu is set to "English". Below the header, there is a "GridSphere Home" button. The main content area features a "Welcome to the Community Climate System Modelling Portal" section with a paragraph of text and a list of four links. To the right, there is a "Login" form with fields for "User Name" and "Password", a "Remember my login" checkbox, a "Login" button, and a "Forgot your password?" link.

Welcome to the Community Climate System Modelling Portal

The CCSM (Community Climate System Modelling) portal allows TeraGrid users to submit CCSM simulation runs on the IBM Datastar system at San Diego Supercomputing Centre. This portal has been developed by the RCAC Science Gateways Group at Purdue University. To use this portal, you must have valid TeraGrid credentials.

- To find out more about the TeraGrid and to obtain TeraGrid credentials, please visit [The TeraGrid Website](#)
- To learn more about the Community Climate System Model, please visit [UCAR's CCSM Site](#)
- To obtain an account on this portal, please send a mail to the [The CCSM Portal Administrator](#)
- Here is a [Demonstration Video of this CCSM Portal](#). It presents a brief overview of the interfaces provided by this portal. To watch this video, you need to have the shockwave flash player plugin installed for your browser.

powered by gridsphere

Authentication (TG)

```
basumall@tg-login64 /home/ba01/u102/basumall
> myproxy-init
Your identity: /CN=Ayon Basumallik/OU=Purdue TeraGrid/O=Purdue University/ST=Indiana/C=US
Creating proxy ..... Done
Proxy Verify OK
```

Purdue RCAC CCSM Portal - Mozilla Firefox

File Edit View Go Bookmarks Tools Help

http://gridsphere.rcac.purdue.edu:8090/gridsphere/gridsphere?cid=credentialportlet&gs_mode=view&gs_state=resizing

PURDUE UNIVERSITY
Information Technology at Purdue

Logout
Welcome, Ayon Basumallik

Welcome Administration Grid **CCSM Grid Portlets**

Welcome to CCSM Portlets **Credential Manager** Create Case Configure Case Run Case Transfer Files TeraGrid File Browser

Credential Manager Portlet

List Credentials New Credential

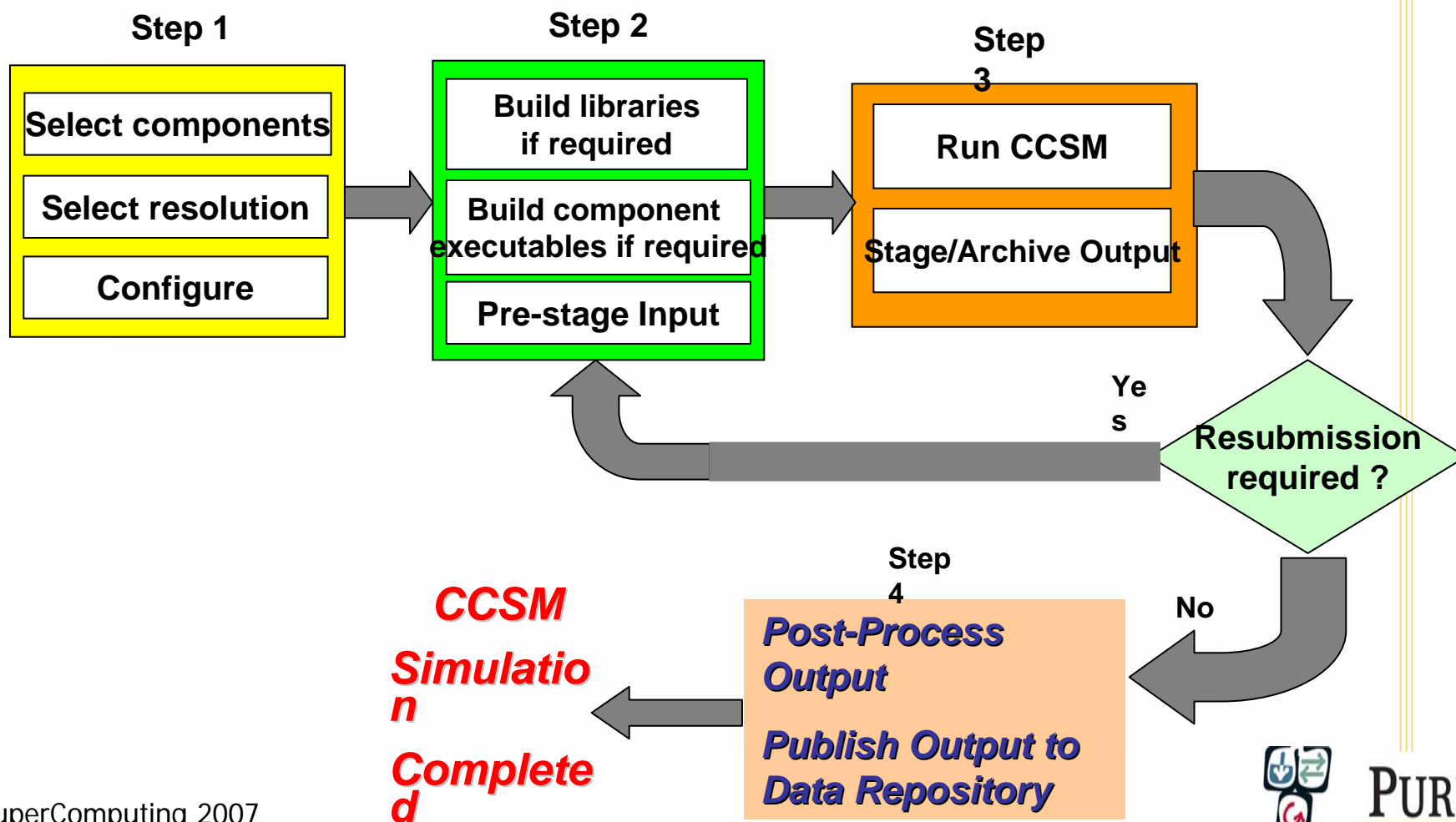
The following credentials can be retrieved from myproxy.teragrid.org.

Credential	Certificate	Status	Time left	
tgproxy	/CN=Ayon Basumallik/OU=Purdue TeraGrid/O=Purdue University/ST=Indiana/C=US	Active	2 hours 14 minutes 59 seconds	Deactivate

Passphrase: ***** Retrieve Credentials

May 31, 2007

Steps in a typical CCSM Simulation



- Case Creation
- Case Configuration
- Build and Run a Case
- Email notification about results

Run an Existing CCSM Case

Teragrid Project Number (Optional)

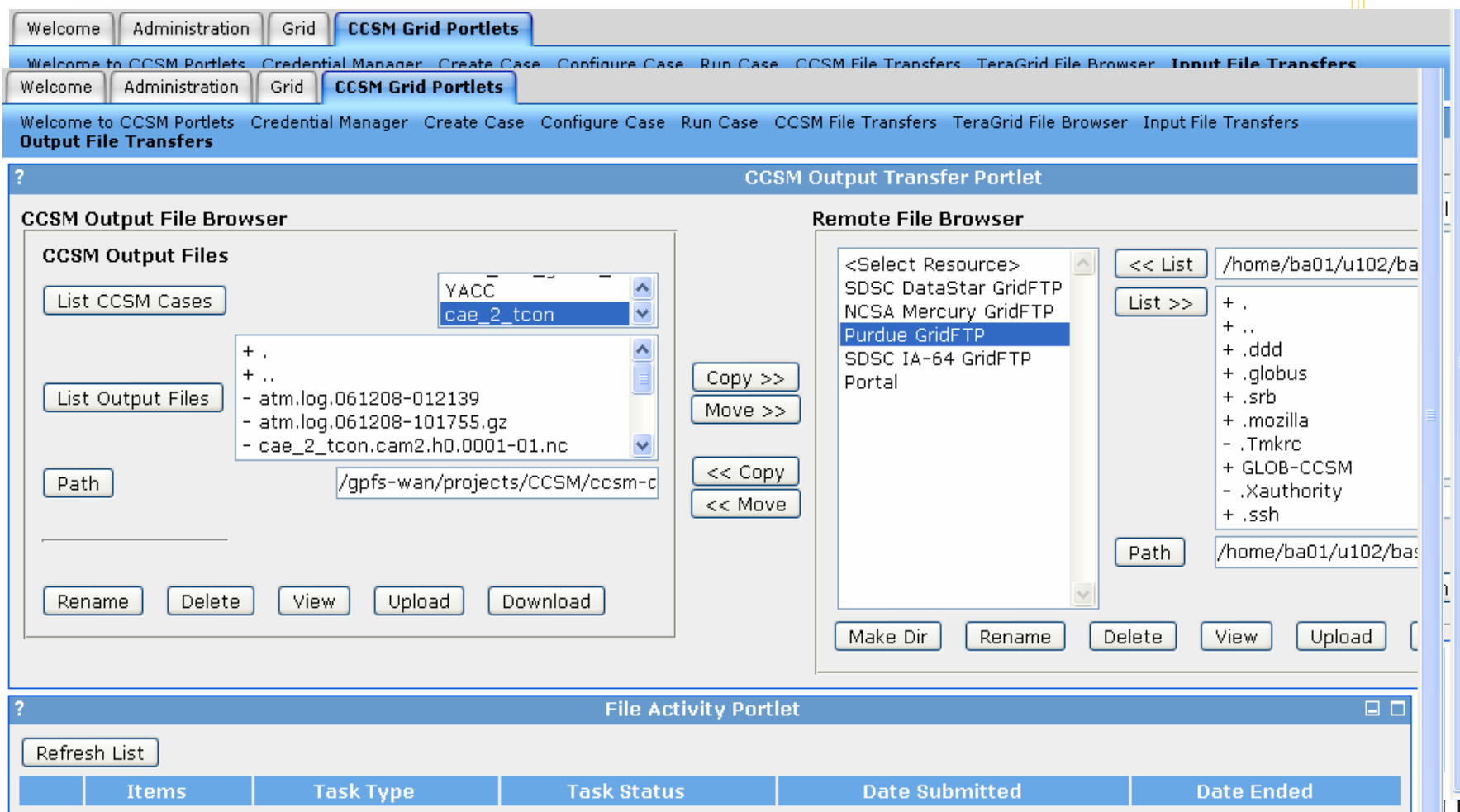
Select a Case to Build or Run (Running also rebuilds the case).

TestPort

- TestPort
- TestPort2
- NewTest
- YACC
- Test_T31_gx3v5_B
- Test_T31_gx3v5_K
- AR_T31_B
- mytest1
- CASE-B
- test_B_7dec
- cae_2_tcon
- Ayon_T31_B

ed cas

Portal Front End



The screenshot displays the CCSM Grid Portlets web interface. At the top, there is a navigation menu with tabs for Welcome, Administration, Grid, and CCSM Grid Portlets. Below the menu, a breadcrumb trail reads: Welcome to CCSM Portlets > Credential Manager > Create Case > Configure Case > Run Case > CCSM File Transfers > TeraGrid File Browser > Input File Transfers > Output File Transfers.

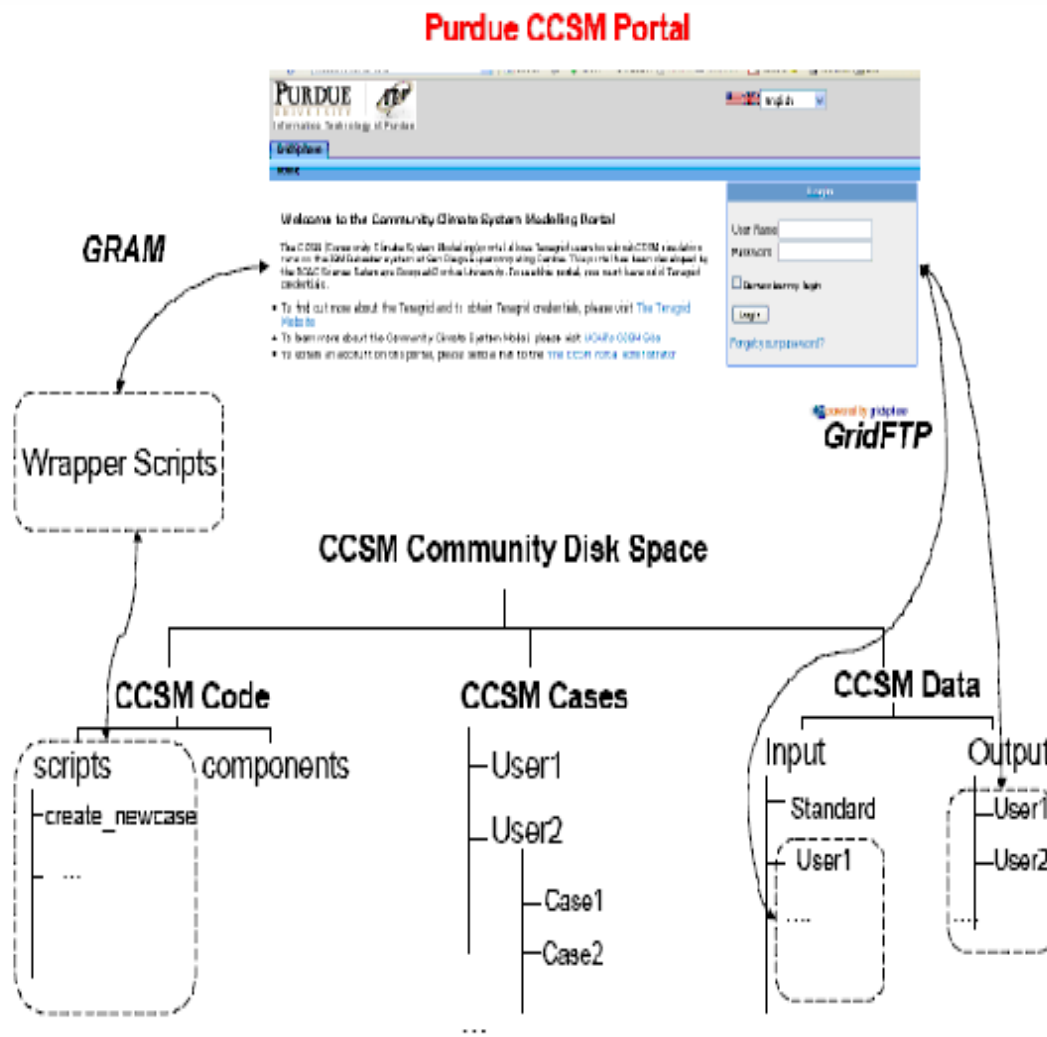
The main content area is titled "CCSM Output Transfer Portlet" and is divided into two panels:

- CCSM Output File Browser:** This panel shows a list of CCSM Output Files. A dropdown menu is set to "YACC" and "cae_2_tcon" is selected. The file list includes:
 - atm.log.061208-012139
 - atm.log.061208-101755.gz
 - cae_2_tcon.cam2.h0.0001-01.nc
 Below the list is a "Path" field containing "/gpfs-wan/projects/CCSM/ccsm-c". Action buttons for "Rename", "Delete", "View", "Upload", and "Download" are provided.
- Remote File Browser:** This panel shows a list of remote resources. "Purdue GridFTP" is selected. The file list includes:
 - + .
 - + ..
 - + .ddd
 - + .globus
 - + .srb
 - + .mozilla
 - .Tmkrc
 - + GLOB-CCSM
 - .Xauthority
 - + .ssh
 The "Path" field contains "/home/ba01/u102/ba...". Action buttons for "Make Dir", "Rename", "Delete", "View", and "Upload" are provided.

Between the two panels are buttons for "Copy >>", "Move >>", "<< Copy", and "<< Move".

At the bottom, there is a "File Activity Portlet" with a "Refresh List" button and a table with the following columns: Items, Task Type, Task Status, Date Submitted, and Date Ended.

Design of Portal Back-end



GRAM

Wrapper Scripts

GridFTP

CCSM Community Disk Space

CCSM Code

CCSM Cases

CCSM Data

scripts components

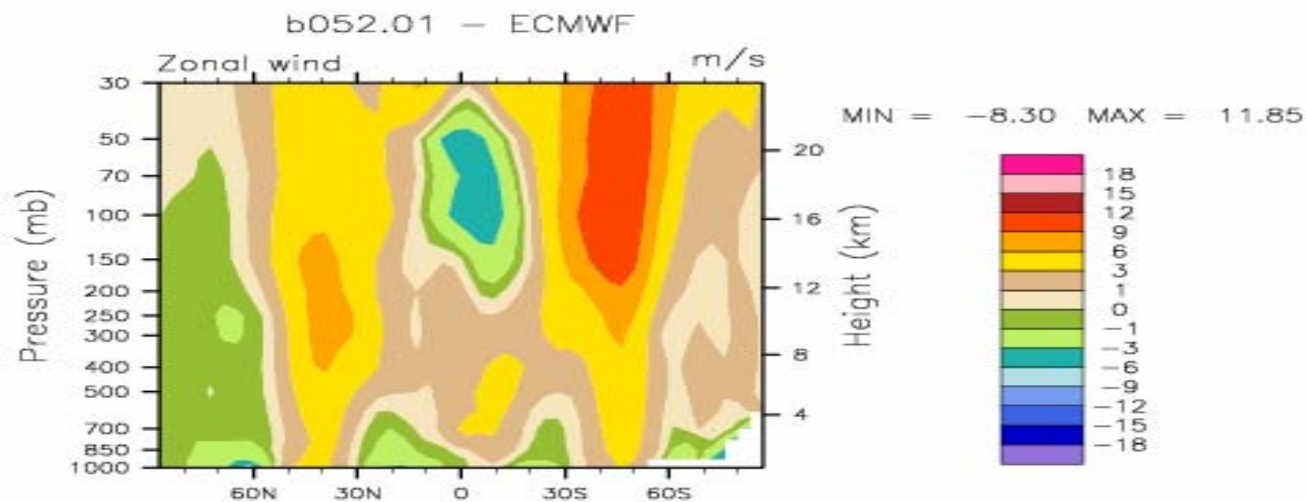
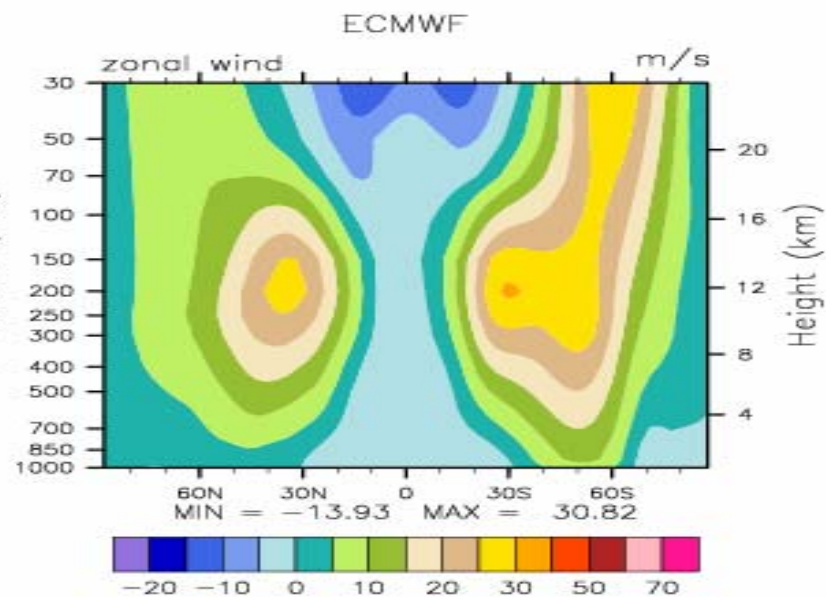
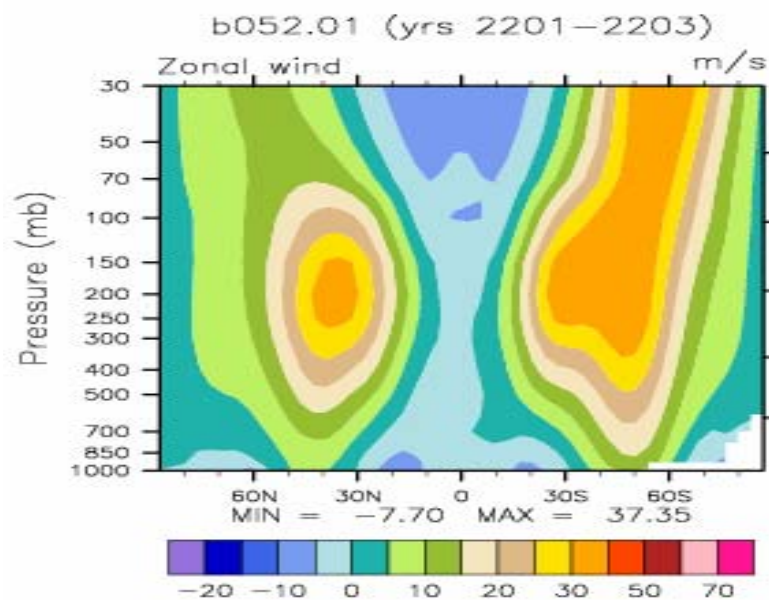
User1 User2

Input Output

Standard

User1 User2

ANN



Summary

- The CCSM Portal
 - Provides an intuitive web based interface for running CCSM on the Teragrid.
 - Provides interfaces for staging in input and moving output to other data repositories.
 - Already in use at Dept. of EAS, Purdue University. Simulations have generated several Terabytes of output.
- Future
 - Making it easier for TG users – simple setup
 - Enable access for non-TG users (community access)
 - Integration of CCSM portal, Climate Data Repository and post-processing workflow.

Thanks

- Try the portals

CCSM Portal

<http://www.purdue.teragrid.org/ccsmportal>

- The login page includes a video tutorial.

Purdue Environmental Data Portal

<http://www.purdue.teragrid.org/portal>

- Paper: TeraGrid'07 (contact us)
- For more details, contact
 - Lan Zhao lanzha@purdue.edu
 - Matthew Huber huberm@purdue.edu