

Earth System Curator: Status Report

METAFOR Launch Meeting, Reading, UK

V. Balaji

Princeton University

NOAA/GFDL

13 February 2008

Talk outline...

- 1 ESC use cases: AR5
 - Querying model characteristics
 - Regridding

- 2 ESC projects
 - CDP Curator
 - GFDL Curator and FRE
 - Gridspec

- 3 Summary

Talk outline ...

- 1 ESC use cases: AR5
 - Querying model characteristics
 - Regridding

- 2 ESC projects
 - CDP Curator
 - GFDL Curator and FRE
 - Gridspec

- 3 Summary

Can ESC answer these questions?

- What's the difference between the NASA GISS-EH and GISS-ER models? (*Answer: the ocean component*). (Russell et al 2006).
- Which runs from the GFDL CM2.1 model would I compare to isolate the effects of volcanoes on 20th century climate? (Stenchikov et al 2006).
- Do volcano runs from GFDL CM2.1 and HadCM3 use the same forcing dataset?
- Which runs in the database include the *indirect effect of aerosols*?
- Retrieve “high cloud amount” from multiple models.
- Return data from IPCC models on the NARCCAP grid.

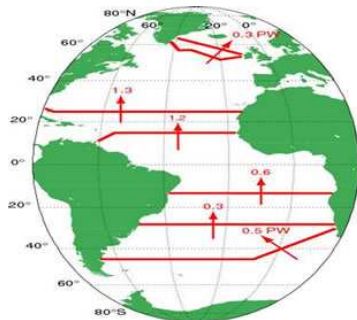
Horizontal regridding: poleward heat transport

- Atmospheric data:

- $\nu, T, q, \overline{\nu'T'}, \overline{\nu'q'}$
- $F_{\text{sfc}}^{\uparrow}, F_{\text{TOA}}^{\uparrow}$
- p_s

- Ocean data:

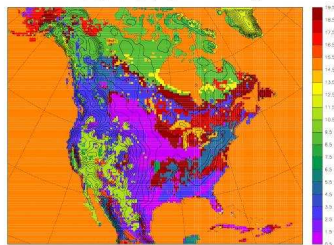
- $\nu, T, \overline{\nu'T'}_{\text{total,gyre,eddy,...}}$: total and per basin.
- meridional mass overturning circulation: total and per basin



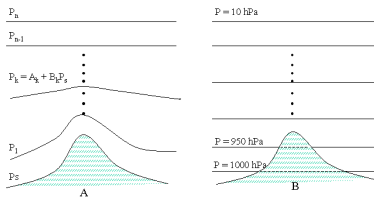
http://www-pcmdi.llnl.gov/ipcc/project_detail.php?ipcc_subproject_id=174

Vertical regridding: NARCCAP

GTOPO30 Topography (m) & GLCC Vegetation



$NX=155$ $NY=130$ $ds=50km$ $CLAT=47.5$ $CLON=-97$ Mercator



- The NARCCAP experiment is a MIP aimed at the “development of multiple high resolution regional climate scenarios for use in impacts assessments.”
- High-resolution models requires forcing data from global models and analysis in specified resolution, projection, and vertical levels.
- Data volumes are high: GFDL has chosen to supply data on its native grid (24 levels) instead of the required 40; in conjunction with a program for converting data from σ -hybrid to pressure.

Talk outline ...

- 1 ESC use cases: AR5
 - Querying model characteristics
 - Regridding

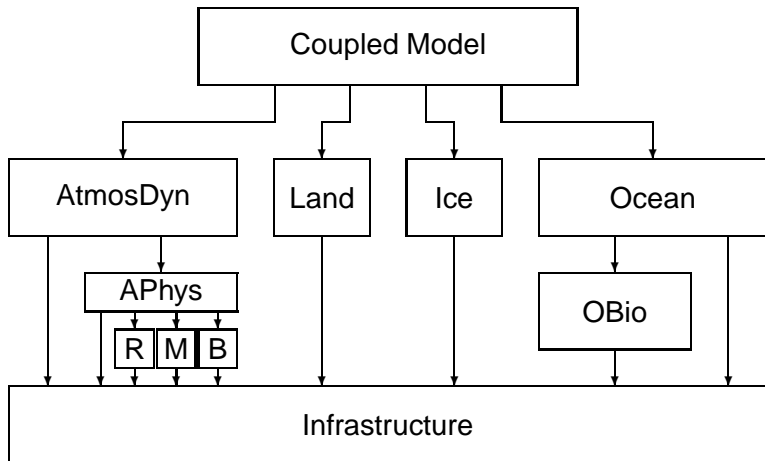
- 2 ESC projects
 - CDP Curator
 - GFDL Curator and FRE
 - Gridspec

- 3 Summary

ESC schema status

- ESC not to define a single monolithic schema, but an aggregation of multiple overlapping schemata (Curator-NMM, ESG, Genie-Gridspec, CIAO, FRE)
- Use of RDF/OWL for semantic mediation.
- *ESC use profiles* define RDF subsets tailored to particular end use.
- Advanced prototype: generation of ESG *model* schema from `modelcomponent` schema, using GEOS5 as a dense component tree example.
- GEOS5 coupling semantics under CIAO soon to follow.
- FRE use profile describes FMS workflow from model assembly to harvesting by ESG.
- Draft governance mechanism.

Component hierarchy



Coupling fields between components using CIAO by mid-2008.

Curator Faceted Search

The screenshot shows a web browser window with the address bar displaying `http://cdp.ucar.edu:28080/query/queryESC.htm`. The browser's menu bar includes File, Edit, View, Go, Bookmarks, Tools, and Help. The address bar also shows a search engine dropdown set to 'princeton junction nj'. The browser's toolbar contains various icons for navigation and search. The main content area displays the 'Earth System Grid' header with a world map background. Below the header, there are navigation links: Home, Data, About, and Login. A secondary navigation bar includes links for Collection Browsing, Simple Search, Power Search (1), Power Search (2), and Data Visualization. The main search area is titled 'CDP-Curator Search' and features a 'START OVER' button and a 'TEXT SEARCH' input field. Below the search area, there is a list of 'COMPONENT TYPE' options, including Atmosphere, Atmospheric Chemistry, Atmospheric Dynamical Core, Atmospheric Dynamics, Atmospheric Physics, Biogeochemistry, Climate, Coastal Ocean, Coupled Atmosphere/Ocean General Circulation, Fisheries, General Circulation, Hydrology, Ice, Land, Land Ice, Magneto Hydro Dynamics, Ocean, Radiation, Sea Ice, Space Weather, Storm Surge, and Turbulence. The browser's status bar at the bottom shows 'Done'.

File Edit View Go Bookmarks Tools Help

`http://cdp.ucar.edu:28080/query/queryESC.htm` Go princeton junction nj

Arts Books Canada Commercial DIY Film GFDL Google Libraries Mail Manuals Music News Photos Politics Princeton Science Sports Technology Tlemcen Weather

Google `http://...sg.owll` WonderWe... Submit XML Proposed C... Metaedit Problem Ioa... Use Case Sc... Earth Syste... Google Cale... NCAR/UCAR... CDP-Curat...

Earth System Grid

Home Data About Login

Collection Browsing | Simple Search | Power Search (1) | Power Search (2) | Data Visualization

CDP-Curator Search

START OVER TEXT SEARCH

Select All Model Components Models Datasets Software Simulations

COMPONENT TYPE

- Atmosphere
- Atmospheric Chemistry
- Atmospheric Dynamical Core
- Atmospheric Dynamics
- Atmospheric Physics
- Biogeochemistry
- Climate
- Coastal Ocean
- Coupled Atmosphere/Ocean General Circulation
- Fisheries
- General Circulation
- Hydrology
- Ice
- Land
- Land Ice
- Magneto Hydro Dynamics
- Ocean
- Radiation
- Sea Ice
- Space Weather
- Storm Surge
- Turbulence

Done

Component schema harvesting

File Edit View Go Bookmarks Tools Help

http://www.earthsystemcurator.org:8080/metaedit-yui/submit.html

Go princeton junction nj

Arts Books Canada Commercial DIY Film GFDL Google Libraries Mail Manuals Music News Photos Politics Princeton Science Sports Technology Tlemcen Weather

Google http://data...mas/esg.owl WonderWeb OWL Ont... Submit XML

Submit Curator Use-Profile XML

This submitted XML will be validated against the Curator Use Profiles and the converted to RDF. Your XML should conform to the following schemas:

- Model Components: [modelcomponent.xsd](#)
- Resource: [resource.xsd](#) (required by modelcomponent.xsd)

Submit a local XML file

Submit a file on the WWW (by URL) [not yet implemented]

Copy/paste XML

Done

FRE: model production workflow

- fremake** Checkout an appropriate subset of the FMS source code for an experiment and create an executable;
- frerun** run an experiment in multiple *segments*; resubmit if necessary;
- frestatus** check the status of an experiment that is underway;
- frelist** list available experiments;
- frepriority** switch a job sequence between queues;
- frecheck** run RTS checks for bitwise accuracy;
- frepp** FRE post-processing: create time series, time averages, and plots;
- frescrub** remove intermediate and redundant files;
- freppcheck** RTS checks on history and post-processing files.
- freversion** tool to upgrade the XML, should the syntax change.

URL: <http://www.gfdl.noaa.gov/fms/fre>
FRE schema ("XML 4.0") is a Curator use profile.

GFDL Curator

The screenshot shows a web browser window with the address bar displaying <http://nomads.gfdl.noaa.gov/CM2.X/>. The browser's bookmark bar includes links to various categories like Arts, Books, Canada, Commercial, DIY, Film, GFDL, Google, Libraries, Mail, Manuals, Music, News, Photos, Politics, Princeton, Science, Sports, Technology, Tlencen, and Weather. The page header features the GFDL logo and navigation links: About us, Research, Products and Services, Reference, and GFDL Only. A search bar is located in the top right corner. The main content area displays the breadcrumb trail: [gfdl's home page](#) > [products and services](#) > [data portal](#) > [deccen coupled climate models](#) > [CM2.X Coupled Climate Models](#). Below this, the heading "gfdl cm2.x coupled climate models" is shown. The page is organized into sections with expandable icons (circles with a plus sign). The first section, "GFDL CM2.X Coupled Climate Models", contains a list of links: [Documentation and References](#) (published or submitted to journals), [FAQ List](#), [Things to consider before downloading CM2.X model output](#), [Two page brochure: GFDL's CM2.0 & CM2.1 Models: Efforts in Support of the IPCC AR4](#) (from IPCC WG1 Workshop, March 2005) [450KB pdf], and [Brief overview of GFDL deccen models](#). The second section, "CM2.0", includes links for [Info on the CM2.0 Experiments for which Model Output is Available](#), [Info on CM2.0 Data Variables Available by Experiment](#), [Download CM2.0 netCDF files via ftp](#) from the GFDL data portal, [Download CM2.0 netCDF files via http](#) from the GFDL data portal, and [Download CM2.X data from PCMDI/IPCC archive](#) data portal (registration with IPCC/WGCM required). The third section, "CM2.1", contains links for [Info on the CM2.1 Experiments for which Model Output is Available](#), [Info on CM2.1 Data Variables Available by Experiment](#), [Download CM2.1 netCDF files via ftp](#) from the GFDL data portal, [Download CM2.1 netCDF files via http](#) from the GFDL data portal, and [Download CM2.X data from PCMDI/IPCC archive](#) data portal (registration with IPCC/WGCM required). The fourth section, "CM2.X Interactive Data Downloads and Browsing", is partially visible. On the right side of the page, there is a sidebar with a search bar and several expandable sections: "Public Data Files" (containing links to DecGen Coupled Climate Experiments, Ocean Data Assimilation Experiments, Ocean Simulation, Flexible Modeling System, and Public Source Code), "Public Source Code" (containing links to MOM4 registration, MOM4 related data sets, HIM registration, and HIM beta source code), and "Related Sites" (containing links to National Oceanic and Atmospheric Administration, OAR, and Dept. of Commerce).

File Edit View Go Bookmarks Tools Help

Go [princeton junction nj](#)

Arts Books Canada Commercial DIY Film GFDL Google Libraries Mail Manuals Music News Photos Politics Princeton Science Sports Technology Tlencen Weather

Google Gmail eTicket Itinera... CM2.X Coupled Cli...

geophysical fluid dynamics laboratory

About us Research Products and Services Reference GFDL Only

search gfdl: go

smaller bigger reset

Public Data Files

DecGen Coupled Climate Experiments

Ocean Data Assimilation Experiments

Ocean Simulation

Flexible Modeling System

Public Source Code

MOM4 registration

MOM4 related data sets

HIM registration

HIM beta source code

Related Sites

National Oceanic and Atmospheric Administration

OAR

Dept. of Commerce

[gfdl's home page](#) > [products and services](#) > [data portal](#) > [deccen coupled climate models](#) > [CM2.X Coupled Climate Models](#)

gfdl cm2.x coupled climate models

GFDL CM2.X Coupled Climate Models

- [Documentation and References](#) (published or submitted to journals)
- [FAQ List](#)
- [Things to consider before downloading CM2.X model output](#)
- Two page brochure: [GFDL's CM2.0 & CM2.1 Models: Efforts in Support of the IPCC AR4](#) (from IPCC WG1 Workshop, March 2005) [450KB pdf]
- [Brief overview of GFDL deccen models](#)

CM2.0

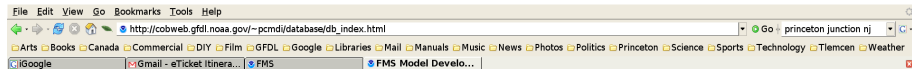
- [Info on the CM2.0 Experiments for which Model Output is Available](#)
- [Info on CM2.0 Data Variables Available by Experiment](#)
- [Download CM2.0 netCDF files via ftp](#) from the GFDL data portal
- [Download CM2.0 netCDF files via http](#) from the GFDL data portal
- [Download CM2.X data from PCMDI/IPCC archive](#) data portal (registration with IPCC/WGCM required)

CM2.1

- [Info on the CM2.1 Experiments for which Model Output is Available](#)
- [Info on CM2.1 Data Variables Available by Experiment](#)
- [Download CM2.1 netCDF files via ftp](#) from the GFDL data portal
- [Download CM2.1 netCDF files via http](#) from the GFDL data portal
- [Download CM2.X data from PCMDI/IPCC archive](#) data portal (registration with IPCC/WGCM required)

CM2.X Interactive Data Downloads and Browsing

Done



The GFDL FMS Model Development Database

[Experiment Overview](#) ·
 [Database Login](#) ·
 [Supported web browsers](#) ·
 [User Guide](#) ·
 [GFDL Utilities](#) ·
 [Feedback/Support](#)

▶ AM2p1
 ▶ AM2p2
 ▶ AM2p3
 ▶ AM2p4
 ▶ AM2p5
 ▶ AM2p6
 ▶ AM2p7
 ▶ AM2p8
 ▶ AM2p9
 ▶ AM2p10
 ▶ AM2p11
 ▶ AM2p12
 ▶ AM2p13
 ▶ AM2p14
 ▶ AM2_strat1
 ▶ AM3p1
 ▶ AM3p2
 ▶ AM3p3
 ▶ AM3p4
 c48_am3p4
 c48_am3p4_lm2_3
 c48_am3p4_lm3r659
 c48_am3p4_lm3r670c48
 c48_am3p4_rich_crit_10
 c48_am3p4_snowlogged
 c48_am3p4_ss2_off_warm
 c48_am3p4_ss4_13b
 c48_L48_am3p4
 c48_L48_am3p48
 ▶ AM3_configuration
 ▶ AMIP
 ▶ CM2
 ▶ CM2p1
 ▶ CM2p2
 ▶ CM3_configuration
 ▶ FMS2n1
 Done

Submission Information

Date and time of submission: 2008-01-09 11:24:27
 Contact name: Ming, Yi
 Contact e-mail: Yi.Ming@noaa.gov

Source Code Information

Model type: AMIP
 FMS release version: omsk

Checkout Procedures

See the xml file

Compile Procedures

see the xml file

Input Files

Input Files	Original File Path
Run script	/home/yim/fms/omsk/scripts/c48_am3p4_ss2_off_warm
RTS XML file	/home/yim/fms/omsk/c48_am3p4_ss2_off.xml

Output Files

Archive files	/archive/yim/fms/omsk/c48_am3p4_ss2_off_warm
Diagnostic figures	/net2/yim/fms/omsk/c48_am3p4_ss2_off_warm/analysis

Experiment Timing

Gridspec: latest status

- Tools released:

- `make_hgrid`: specify a horizontal grid.
- `make_vgrid`: specify a vertical grid.
- `make_solo_mosaic`: make a mosaic file out of a list of grid tile files.
- `make_topog`: specify topography and a land-sea mask.
- `make_coupler_mosaic`: create exchange grids between input mosaics.
- `fregrid`: interpolate input data fields from source to target gridspec.

<http://www.gfdl.noaa.gov/~vb/grids/gridspec-tools.html>

- Progress on unstructured grids (in conjunction with Rich Signell, USGS).
- Paper, CF proposal to follow.

Talk outline ...

- 1 ESC use cases: AR5
 - Querying model characteristics
 - Regridding

- 2 ESC projects
 - CDP Curator
 - GFDL Curator and FRE
 - Gridspec

- 3 Summary

Summary

- The boundary between discovery and use metadata is fuzzy: many relatively simple applications require more metadata than is currently available.
- The information model consists of multiple overlapping schema using RDF/OWL for semantic mediation.
- Curator use profiles produce XML or RDF output tailored to output application.
- CDP Curator and GFDL Curator attempt to produce metadata for harvesting by ESG.
- Future directions:
 - Embedding of pre-configuration metadata in framework standards (ESMF, PRISM).
 - Semantic mediation extension to include Metafor CIM.

ESC team: Aaron, Amy, Balaji, Cecelia, Don, Julien, Luca, Rocky, Sergey, Spencer, Sylvia, ...