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 . . .

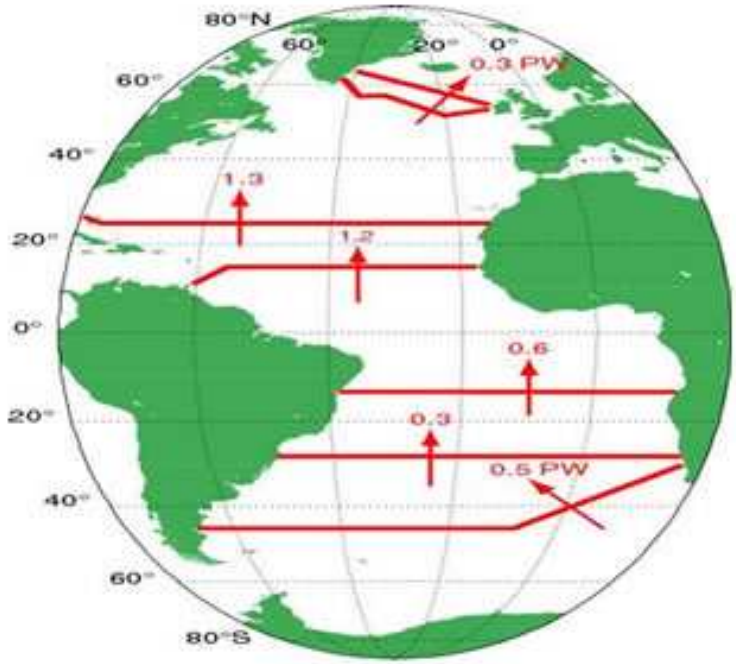
1. ESC use cases: AR5
   - Querying model characteristics
   - Regridding
2. ESC projects
   - CDP Curator
   - GFDL Curator and FRE
   - Gridspec
3. Summary

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.

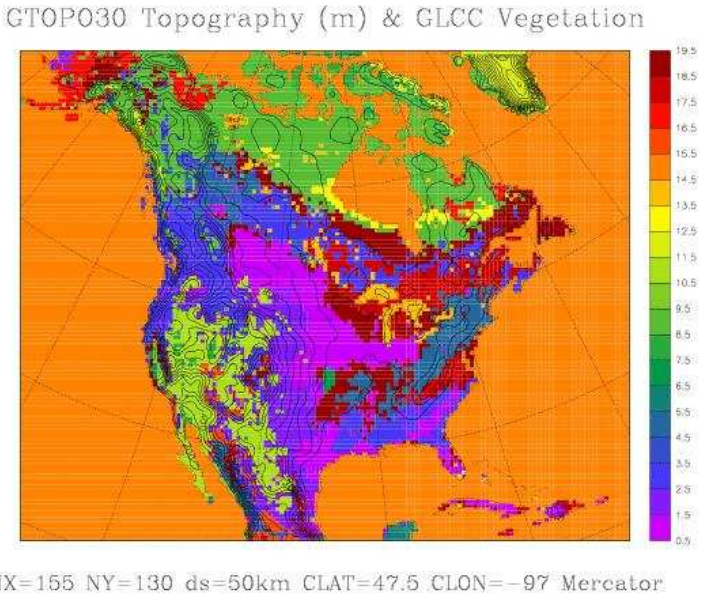
Horizontal regridding: poleward heat transport

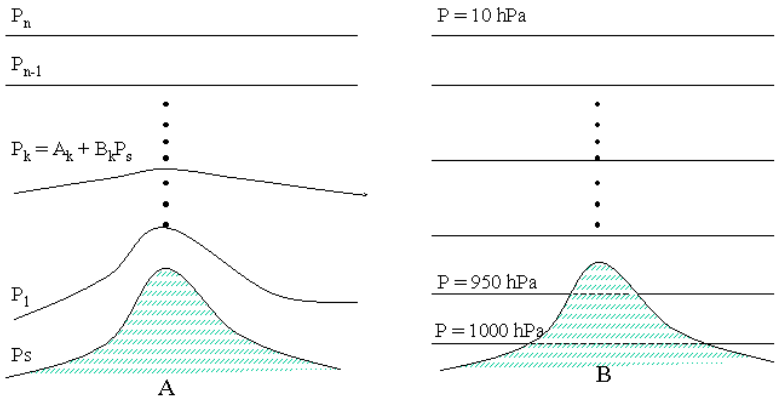
- Atmospheric data:
  - v, T, q, $\overline{v'T'}$, $\overline{v'q'}$
  - $F^{\uparrow}_{\text{sfc}}$, $F^{\uparrow}_{\text{TOA}}$
  - p_s
- Ocean data:
  - v, T, $\overline{v'T'}_{\text{total,gyre,eddy,...}}$: total and per basin.
  - meridional mass overturning circulation: total and per basin



`http://www-pcmdi.llnl.gov/ipcc/project_detail.php?ipcc_-subproject_id=174`

Vertical regridding: NARCCAP





- 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.

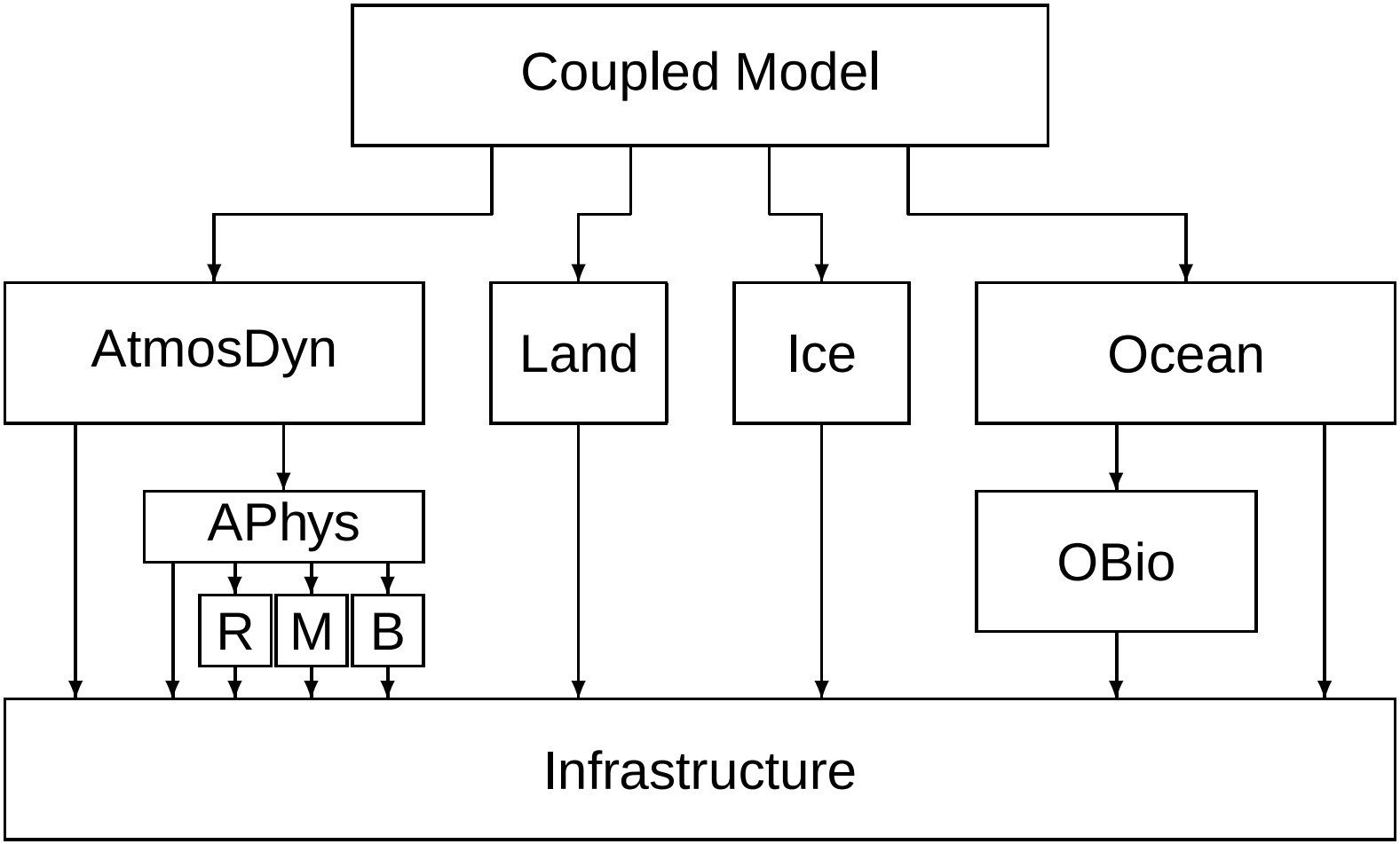
Talk outline . . .

1. ESC use cases: AR5
   - Querying model characteristics
   - Regridding
2. ESC projects
   - CDP Curator
   - GFDL Curator and FRE
   - Gridspec
3. Summary

ESC schema status

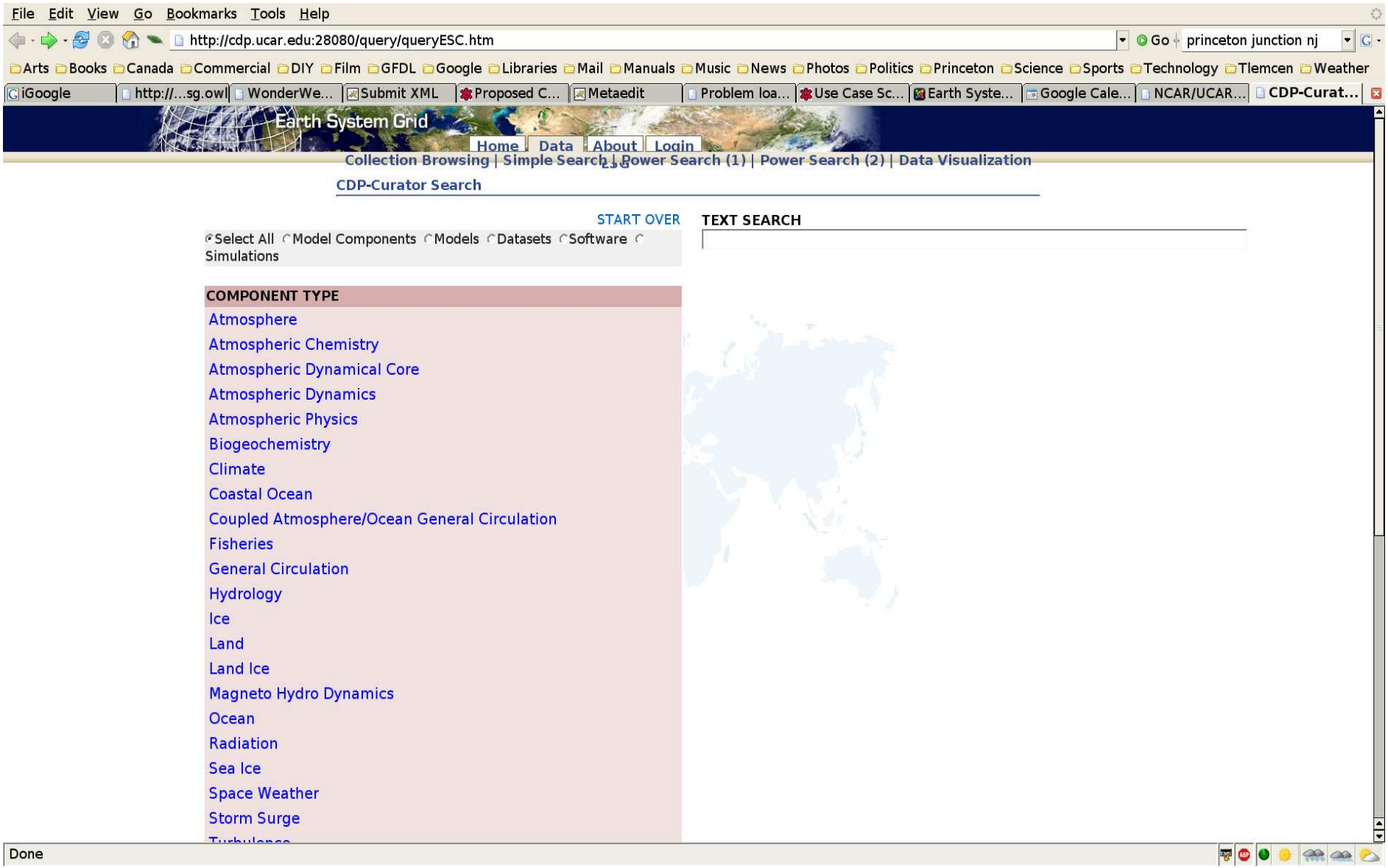
- ESC not to define a single monolithic schema, but an aggregation of multiple overlapping schemata (Curator-NMM, ESG, Genie-Gridspec, CIAO, FRE)
- Use of RDF/OWL for semantic mediation.
- *ESC use profiles* define RDF subsets tailored to particular end use.
- Advanced prototype: generation of ESG *model* 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

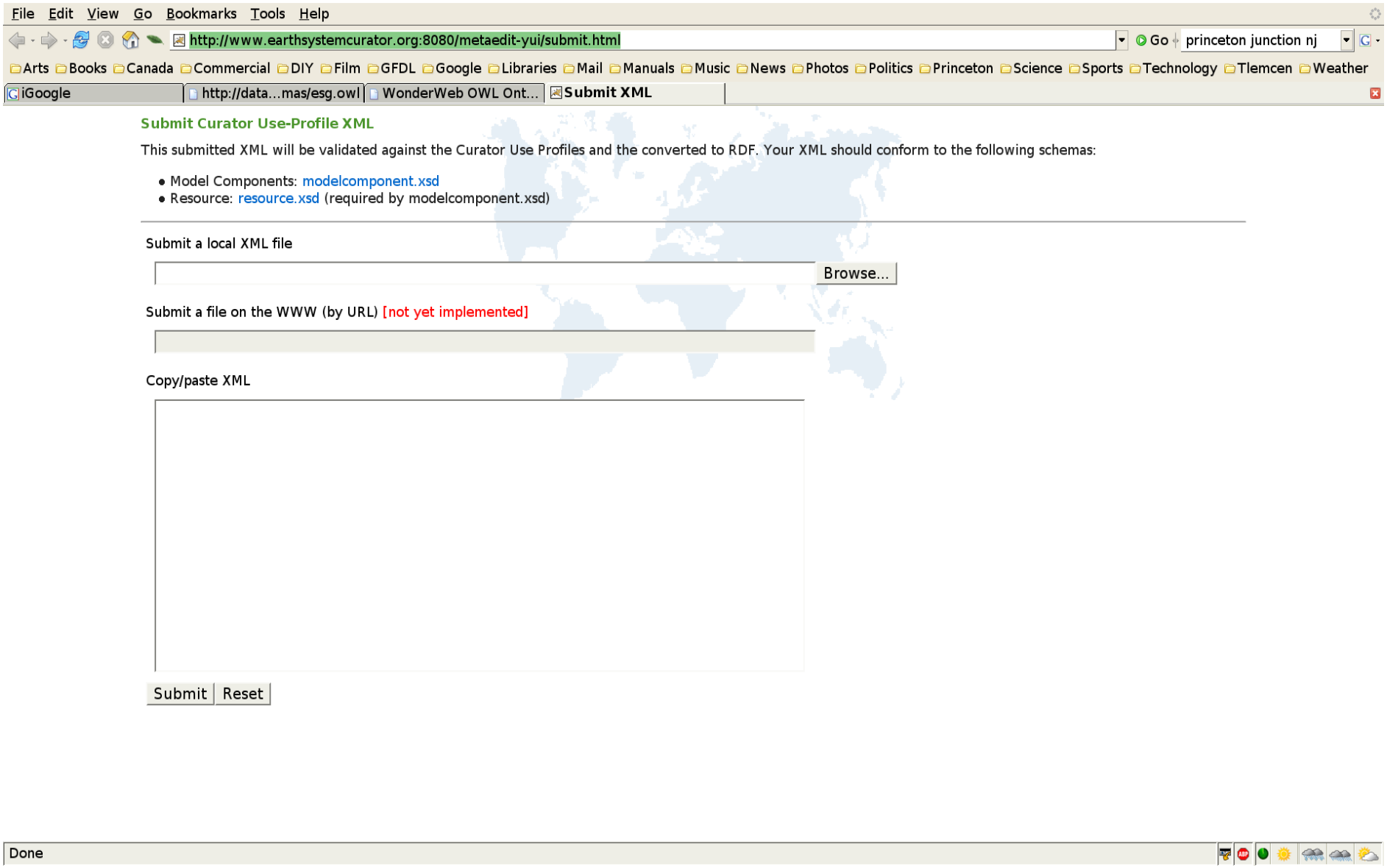


Coupling fields between components using CIAO by mid-2008.

Curator Faceted Search



Component schema harvesting

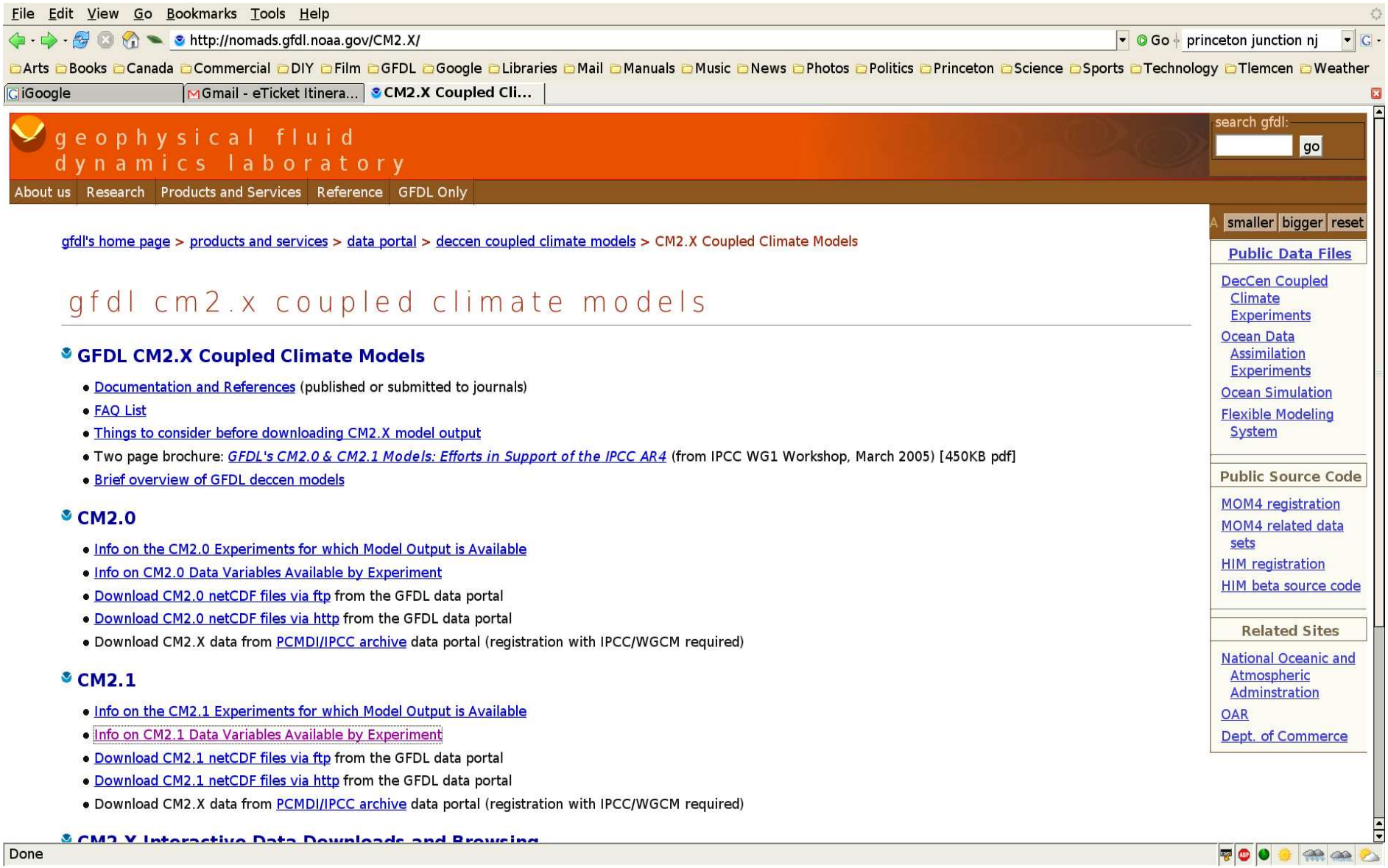


FRE: model production workflow

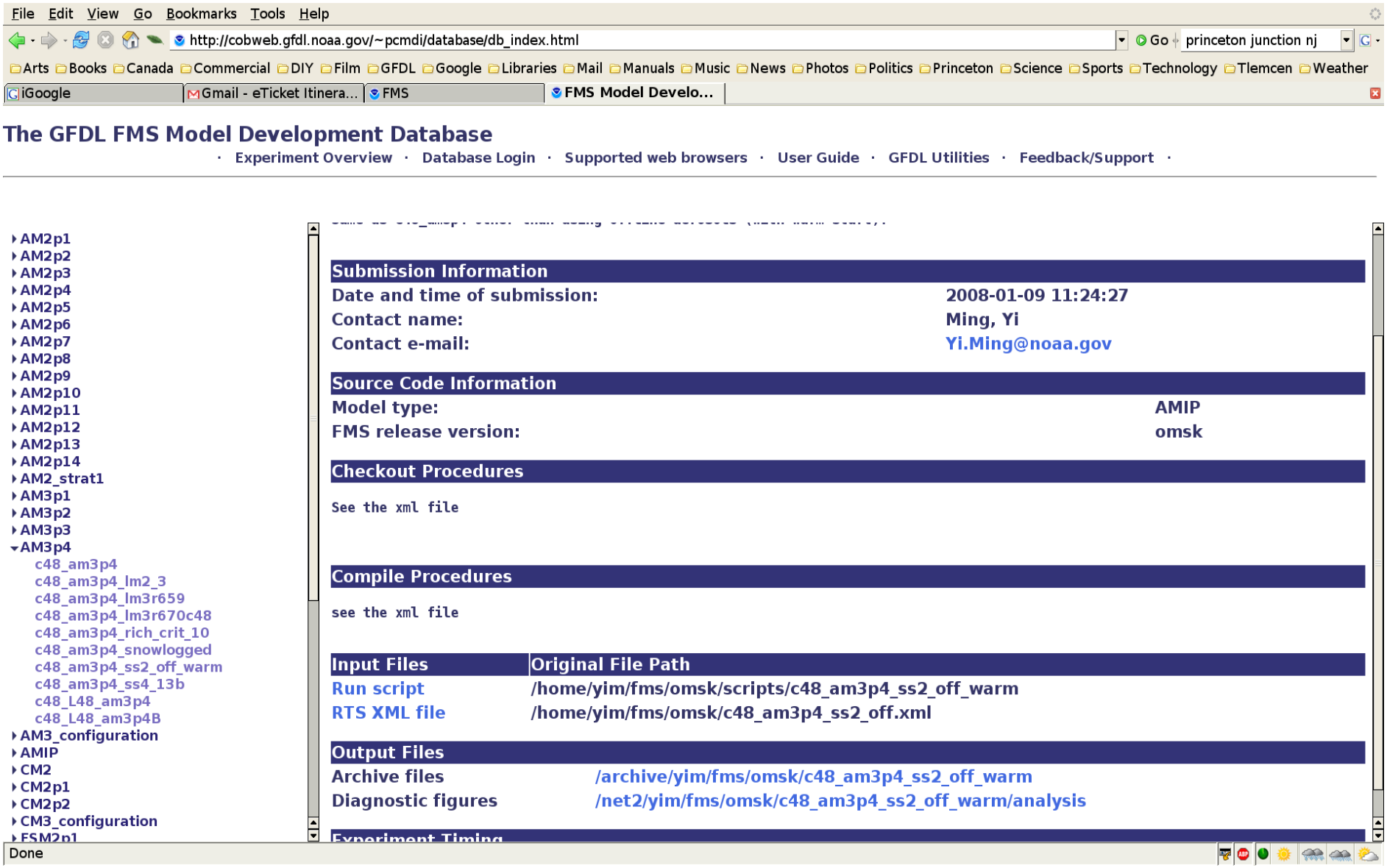
fremake	Checkout an appropriate subset of the FMS source code for an experiment and create an executable;
frerun	run an experiment in multiple *segments*; resubmit if necessary;
frestatus	check the status of an experiment that is underway;
frelist	list available experiments;
frepriority	switch a job 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



(fredb)


File Edit View Go Bookmarks Tools Help
http://cobweb.gfdl.noaa.gov/~pcmdi/database/db_index.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
iGoogle
Gmail - eTicket Itinera...
FMS
FMS Model Develo...
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_am3p4B
AM3_configuration
AMIP
CM2
CM2p1
CM2p2
CM3_configuration
ESM2p1
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
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
Done

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, . . .