

GFDL's Role in CMIP: A Look Back A Look Ahead

Presented by

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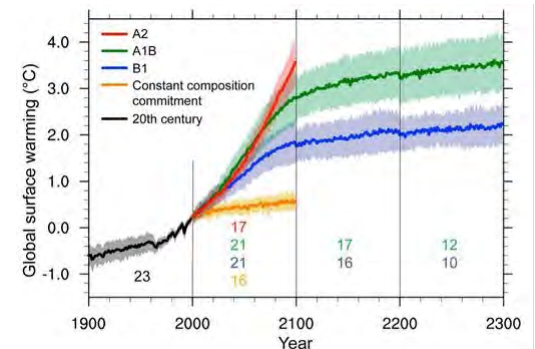
Geophysical Fluid Dynamics Laboratory Review

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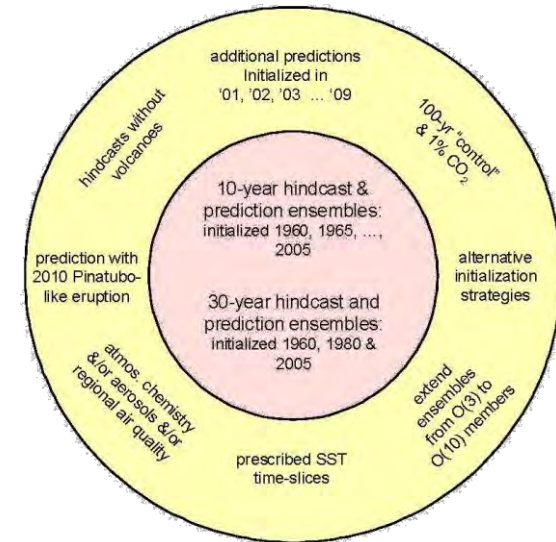
CMIP Background

- Coupled Model Intercomparison Project
- Started in 1995
- Overseen by the World Climate Research Programme's (WCRP) Working Group on Coupled Models (WGCM)
- Process managed by the CMIP Panel
 - I have been a member since it was created and am the past chair.



Coupled Model Intercomparison Project version 5 (CMIP5)

- CMIP5 is an international scientific activity
 - Consists of a set of coordinated experiments
 - Database supports IPCC and other assessments
 - Distributed data system
- CMIP5 goals and new activities
 - Provide data for new science
 - 300 or more peer-reviewed papers
 - Investigate decadal prediction
 - Study carbon response/feedbacks in climate change
 - Include atmospheric chemistry and stratosphere-troposphere interactions

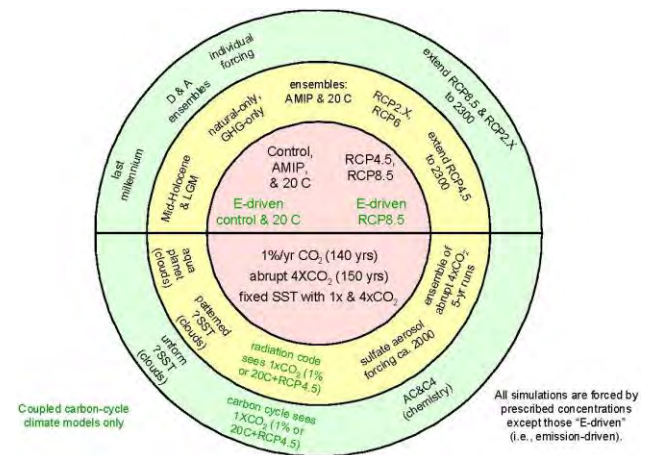


GFDL's High Level of Activity in CMIP5

- Involved most of the lab
- Process took several years
 - Several years to build models
 - About 1 year to run model integrations
 - Another year to post-process/error check/put data on server
- Currently analyzing results and performing “1-off” experiments to study important science questions

GFDL contributions to CMIP5

- 4 streams or activities with independent models
 - Investigate decadal prediction – (CM2.1)
 - Study carbon response/feedbacks in climate change – Earth System Models (ESM2M and ESM2G)
 - Include atmospheric chemistry and stratosphere-troposphere interactions – Atmosphere-Ocean-GCM (CM3)
- Understanding changes in weather extremes – High resolution atmosphere-only model (HiRAM)



GFDL's CMIP5 data contribution about equal to all modeling groups for CMIP3/AR4

- GFDL data available
 - Decadal Prediction - 10TB
 - Earth System Models – 128TB
 - CM3 – 30TB
 - High Resolution atm-only (HiRAM) – 22TB
- Total = 188TB (slightly less than 10% of CMIP5 archive)



GFDL's CMIP5 data is being used!

From 2012 to 2014, GFDL is averaging about:

- 400,000 downloads per year
 - Much more in 2014
- 360,000 files transferred per year
 - 600,000+ in 2014
- 80 TB of data transferred per year
 - 125 TB in 2014

* 2014 data as of April 25, 2014

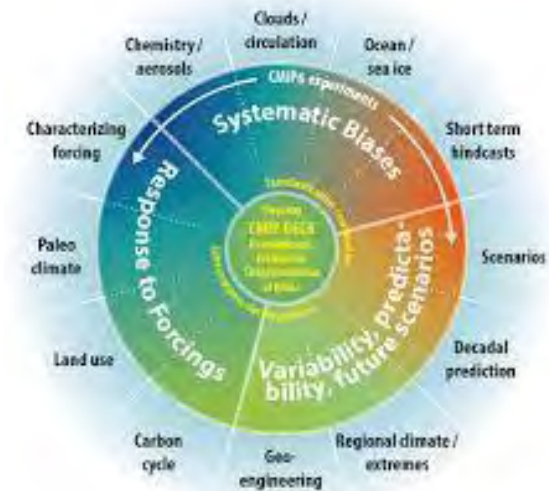
GFDL has many contributions to IPCC AR5

- Science papers (WG 1 and 2)
 - ~200 GFDL peer-reviewed in AR5 WG1
 - Many papers are integral parts of the IPCC reports
- Model data (WG 1, 2, 3)
- Chapter Lead Authors (LAs WG 1)
 - Gabriel Vecchi, Gabriel Lau
- Review editors (WG 1)
 - Ramaswamy, Held
- Contributors and reviewers (WG 1, 2)
- Other important assessments: e.g. US National Assessment



Looking towards CMIP6/AR6

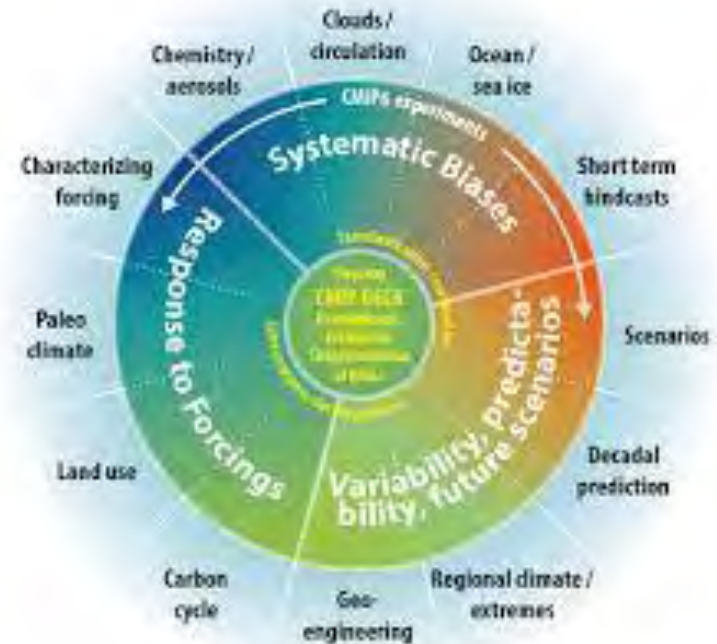
- Several teams working on building components of next generation GFDL climate model.
- Goal is to merge best of 4 stream models into 1 model plus advance state of art in all components
 - Have models write standardized output directly
 - Take advantage of common analysis packages and contribute to those
 - Prototype atmosphere, ocean and sea ice components developed



Looking towards CMIP6/AR6

GFDLers are active in helping:

- Design CMIP6
- Working on inputs needed for various experiments
- Test inputs in running models (land use, aerosols, etc.)
- Participants in newly formed WGCM Infrastructure Panel (WIP) which provides input to the distributed software efforts.



- GFDL has always been a major player in CMIP
 - Helping design experiments
 - Helping to manage process
 - Modeling side
 - Data serving side
 - Contributing model data
- GFDL has always had important role in IPCC
 - Authors – CLAs, LAs, Contributors, Review editors, etc.
 - Scientific results – papers, understanding
- We look forward to participating in these processes in the future.