GFDDL’s Role in CMIP: 
A Look Back
A Look Ahead

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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.
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.
Summary

• 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.