

Geophysical Fluid Dynamics Laboratory Review

June 30 - July 2, 2009



GFDL's Response to IPCC AR5 and CMIP5

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New for AR5/CMIP5: Near Term Experiments

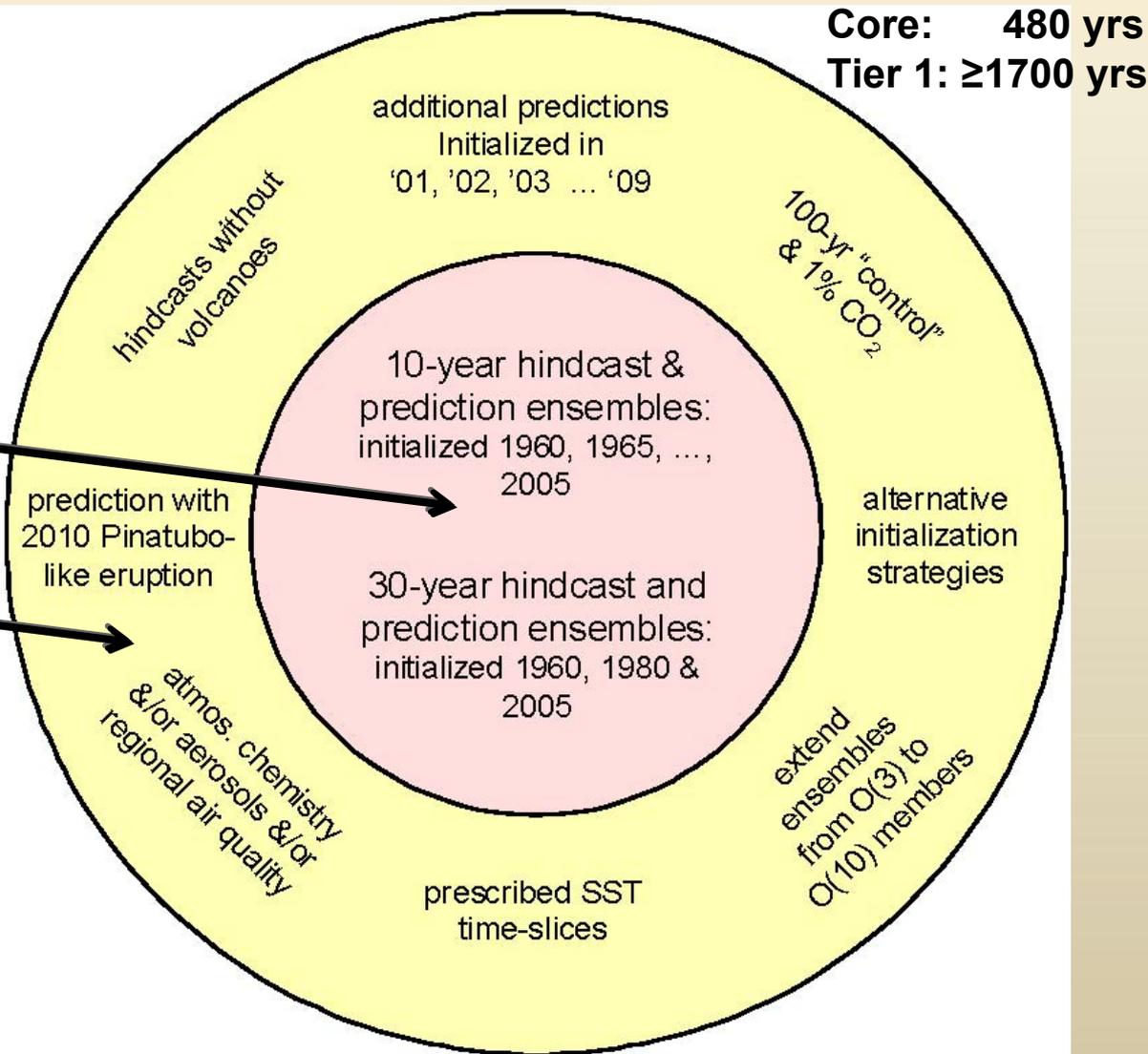
Foci

- Regional information
- Short lived species
- Decadal Prediction

Core

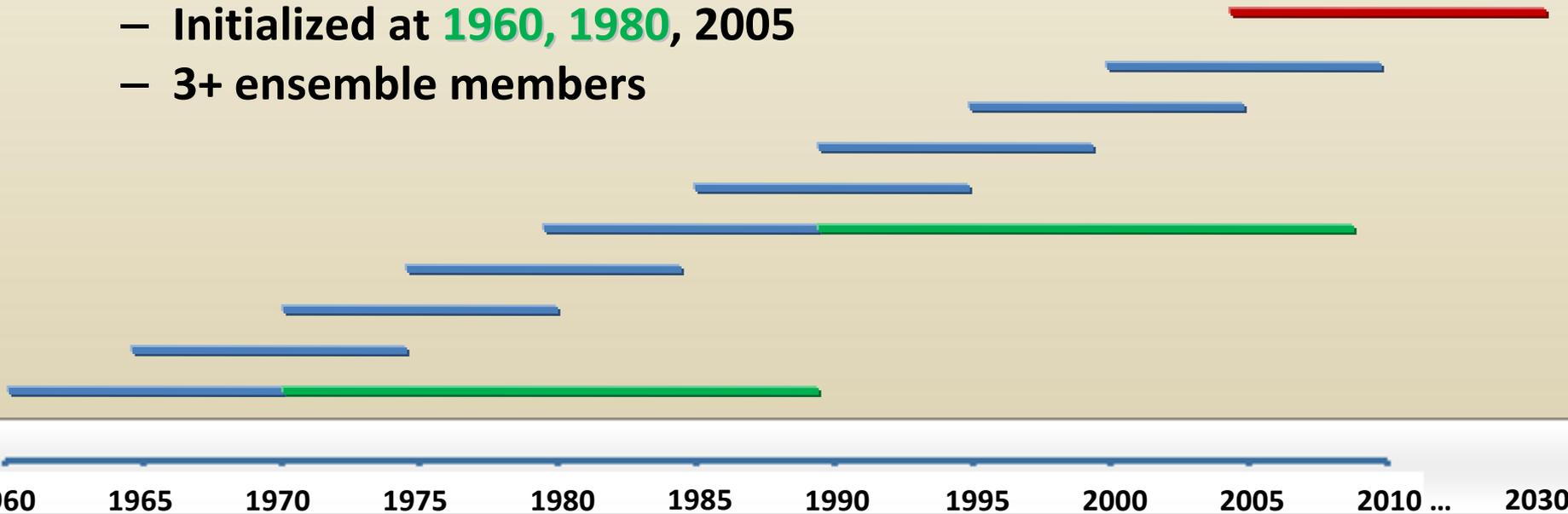
Tier 1

Key Question:
Are decadal predictions skillful?



Near Term Experiments - Core

- **10 year hindcasts**
 - Initialized at 1960, 1965, 1970 ...
 - 3+ ensemble members
- **30 year forecasts**
 - Initialized at 1960, 1980, 2005
 - 3+ ensemble members



Near Term – Tier 1 Time Slice Experiments

- **Time slice = atm-only using prescribed SSTs**
- **Time periods**
 - AMIP (1979-2008) and 2026-2035
 - Overlap with decadal prediction exps
- **High atmospheric resolution**
- **Atmospheric chemistry experiments**

Study regional impacts

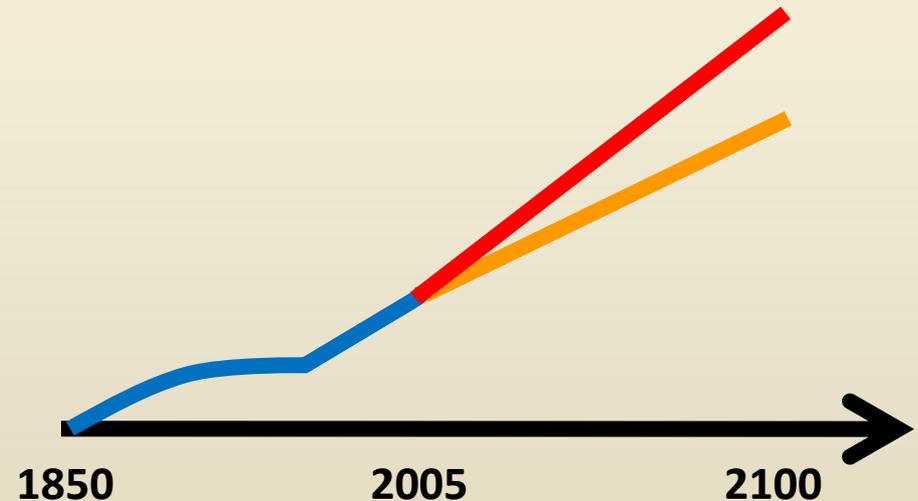
Study extreme events

GFDL's Near Term Experiment Plans

- **CM2.1 using Coupled Data Assimilation with ensemble filter techniques**
 - Investigate predictability and prediction on decadal time scales
- **High resolution atmosphere-land-only models in time slice mode (25km, HIRAM+)**
 - Investigate regional changes, extreme events
- **Potentially use high resolution physical climate models (CM2.5, CM2.6)**
 - Importance of resolution on predictability/prediction

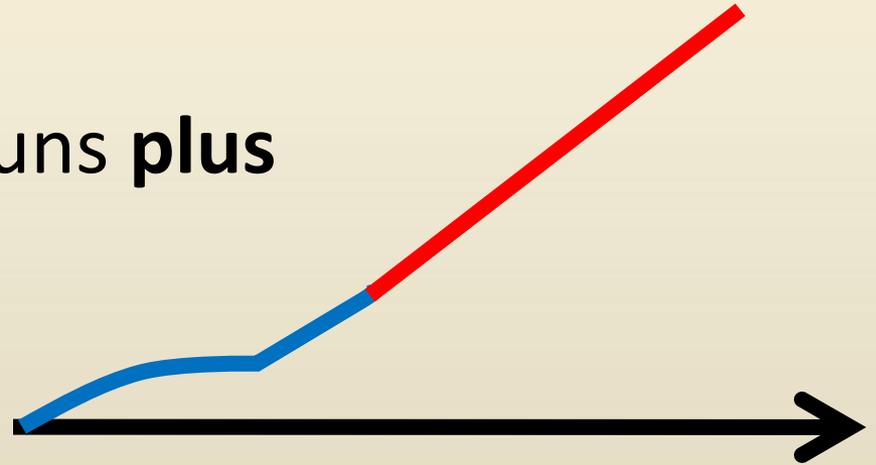
Long Term Experiments AOGCM Core (concentration driven)

- Control
 - 500+ years
- **Historical**
 - ~1850 to 2005
- Projection
 - 2006 to 2100
 - **RCP4.5** (stabilization near 2100)
 - **RCP8.5** (GHG continue to increase)
- AMIP – Atmosphere-land model,
 - Observed SST + sea ice
 - 1979 to 2008



Long Term Experiments - ESM Core

- All AOGCM long term runs **plus**
- Control with pCO₂ free
 - 500+ years
- **Historical – emission driven**
 - ~1850 to 2005
- Projection – emission driven
 - **RCP8.5** (2006 to 2100)



GFDL's Long Term Experiment Plans

- **CM3 using GHG concentrations and aerosol emissions**
 - Study aerosol-cloud interactions and impact on climate and climate change
- **ESM2M and ESM2G**
 - Study carbon cycle feedbacks on climate change
 - Study impact of increasing carbon on ecosystems
 - Study impact of using differing ocean vertical coordinates on simulation and response

GFDL Data Serving is an important part of our plans

- **Node on PCMDI's network (ESG) of data servers for CMIP5**
 - Also provides an independent path to GFDL data
- **Currently serving tens of TB to external users**
 - Potentially hundreds of CMIP5/AR5 TB available
- **Time line**
 - Jan 2013 – WGI public
 - Spring 2011 – papers accepted
 - End of 2010 – data available in archive



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