Observations for CMIP5 Simulations
JPL, GSFC and PCMDI Collaboration

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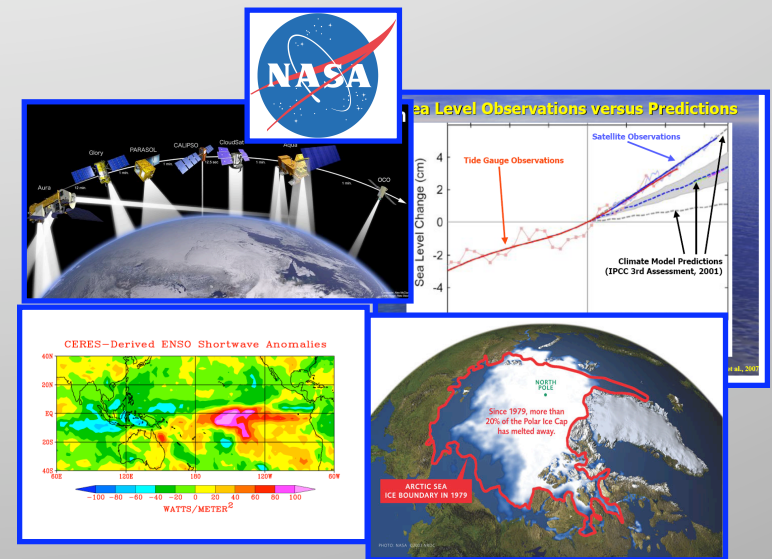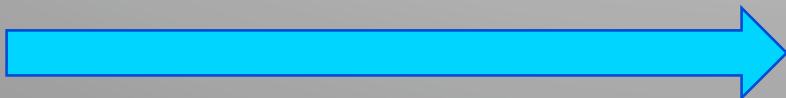
D. Williams, P. Gleckler, K. Taylor

Program on Climate Modeling Diagnostics and Intercomparison (PCMDI), Livermore, CA

CERES Science Team Meeting. April 28, 2010

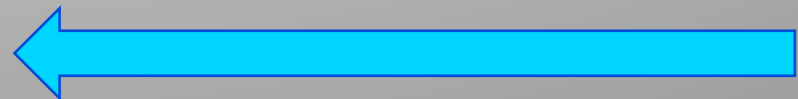# Observations for CMIP5 Simulations

MOTIVATION
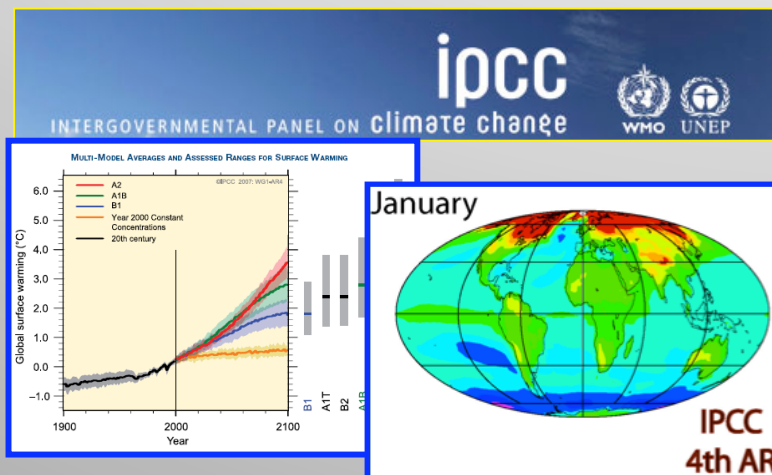
How to bring as much observational scrutiny as possible to the IPCC process?

How to best utilize the wealth of NASA Earth science information for the IPCC process?

Observations for CMIP5 Simulations

• Taylor et al (2008) have defined the protocol for the CMIP5 simulations that will be used for the next IPCC Assessment Report, AR5.

• The protocol defines the scope of simulations that will be undertaken by the participating modeling groups.

• For several of the prescribed retrospective simulations (e.g, decadal hindcasts, AMIP and 20th Century coupled simulations) observational data sets can be used to evaluate and diagnose the simulation outputs.

• However, to date, the pertinent observational data sets to perform these particular evaluations have not been optimally identified and coordinated to readily enable their use in the context of CMIP5.

Objectives

- To provide the community of researchers that will access and evaluate the CMIP5 model results access to analogous sets of observational data.

- Analogous sets in terms of periods, variables, temporal/ spatial frequency

- This activity will be carried out in close coordination with the corresponding CMIP5 modeling entities and activities

- It will directly engage the observational (e.g. mission and instrument) science teams to facilitate production of the corresponding data sets.

Observations for CMIP5 Simulations

- Given the complexity of the observational datasets, a simple framework to identify, organize and disseminate them for CMIP5 will be developed.

- Use the CMIP5 simulation protocol (Taylor et al. 2008) as guideline for deciding which observations to stage in parallel to model simulations.

The main tasks are:

- Work with modeling/observation communities to identify data sets;

    - [Initial contacts: AIRS, MLS, TES, QuikSCAT, CloudSat, Topex/Jason, CERES, TRMM, AMSR-E]

- Work with observational teams to produce 2-3 page technical document describing strengths/weaknesses, uncertainties, dos/don'ts regarding interpretations comparisons with models. Transform into CF compliant format. [Planned with above observations/teams]

Observations for CMIP5 Simulations

- MERRA is available in its entirety from the GES DISC* and *also* will will be on the NCCS ESG node – using a pointer to the existing data

- On the ESG node CMIP5 variables will be mapped for easy access
  - NOTE: ESG publishing is an NCCS activity – not part of the GES DISC

- Organize these datasets and provide a strategy for accessing them that has close parallels to the model data archive. [Ongoing collaboration with PCMDI]

- Advertise availability of observations for use in CMIP5 analysis.

*http://disc.sci.gsfc.nasa.gov/daac-bin/DataHoldings.pl

NASA/JPL, GSFC, PCMDI and ESG

- JPL, GSFC, and PCMDI have established a collaboration through the ESG to share satellite observations and reanalysis to support *model-to-data comparison*
  - A prototype ESG node was established at JPL in 2009, on internal funds, demonstrating sharing of AIRS data between JPL and the ESG
  - A similar ESG node has also been established at GSFC
  - GSFC GES DISC also supports observational data though a variety of interfaces

- Provide access to a *wealth of NASA observations* through the ESG
  - AIRS will be the first planned test data set that will be operationally available when the gateway is released in June 2010
  - PCMDI and JPL are planning enhancements to the ESG portal to improve access to observations in conjunction with the models
  - Additional observational data sets will be subsequently added through March 2011, pending NASA support.

ESG – primary Gateways
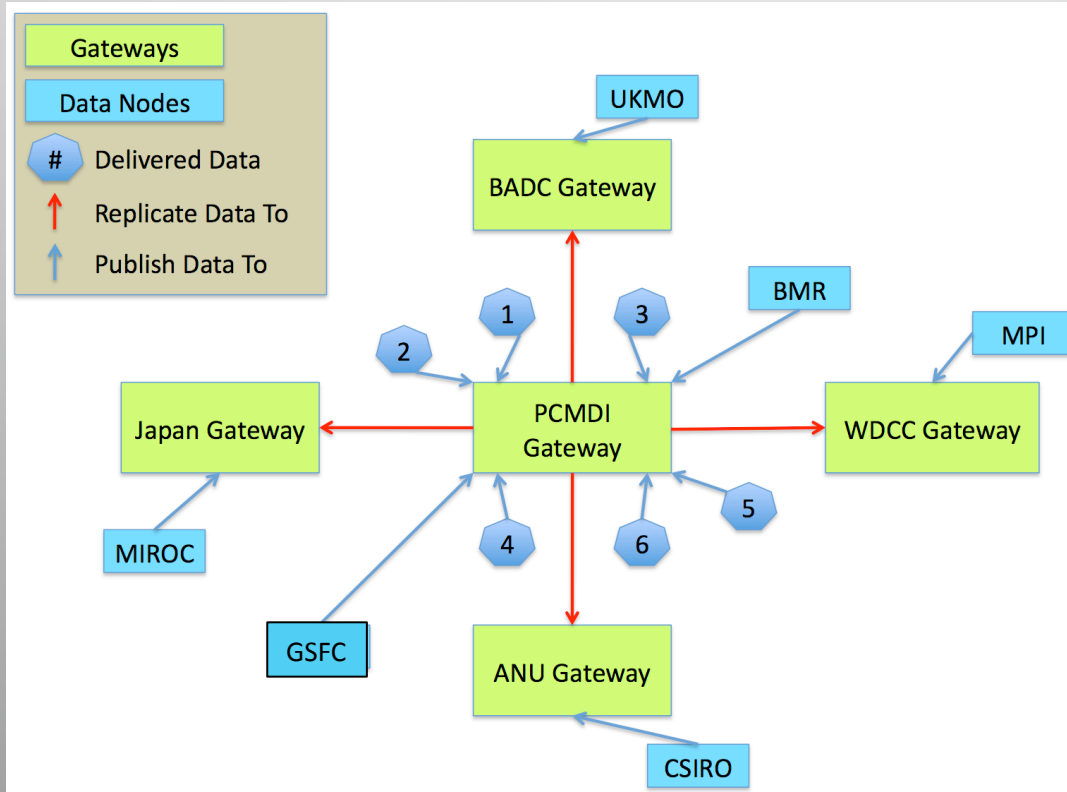
ESG nodes at
numerous sites:

Including:
JPL
GSFC (NCCS)
LARC?

JPL will install
Gateway for
observations

Summary

• A collaborative effort between various NASA labs and PCMDI is underway to provide the community of researchers that will access and evaluate the CMIP5 model results access to analogous sets of observational data.

• A number of NASA satellite data sets have been identified that have model equivalents. Thus far: AIRS, MLS, TES, QuikSCAT, CloudSat, Topex/Poseidon, CERES, TRMM, AMSR-E.

• The entire MERRA data set is available from the GES DISC and will also be made available through the NCCS ESG node.

• Plans have been developed for converting the data into CF-compliant format, documenting it for technical details for their use/application to IPCC model assessment, and to make them available via ESG and links from PCMDI model access web portal.

• This activity is being carried out in coordination with the corresponding CMIP5 modeling entities and activities (e.g. WGCM, PCMDI).

The ESG team welcomes the addition of data nodes

- 2 choices of installation
  - Install a virtual OS using VMWARE
  - Install all components on a server
    - Only issues may be Postgress version
- Publish meta-data
- Decide on access – any restrictions
  - Version control

Current "target" list

AIRS – *temperature profiles and tropospheric water vapor profiles*

MLS – upper troposphere / lower stratosphere temperature, water vapor and ozone

TES – tropospheric ozone

QuikSCAT – surface wind vectors

CloudSat – reflectivity profiles and ice water content profiles

Topex/Jason – sea level

CERES* – top of the atmosphere and surface longwave and shortwave radiation and cloud forcing

TRMM - precipitation

AMSR-E – total column water vapor

MERRA - Reanalysis

* To be done at NASA Langley
More being considered…..