

# WGClimate Interactions with WCRP, IPCC, and CMIP-5

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# Outline

- Status of WCRP, IPCC-5 (WG-1), and CMIP-5
- Common challenges and approaches
- Intersection with WGClimat
- Proposed collaborations

# WCRP Short Overview

- WCRP is organized into themes and cross cuts
- WCRP themes
  - CliC – cryosphere
  - SPARC – stratosphere especially chemistry
  - GEWEX – Global water and energy
  - CLIVAR – Climate variability with emphasis on oceans and air-sea coupling
- WCRP cross cuts
  - WCRP Observations and Assimilation Panel (WOAP) – recent meeting on assessing EVCs
  - WCRP modeling...
- WOAP is of particular interest in coordination of ECVs
  - Summary of results from recent WOAP meeting

# WOAP ECV Workshop

## Conclusions and Actions I

- The goal of this workshop was to establish international mechanisms to enhance the quality and utility of global climate datasets
- An inventory of the status of ECV datasets has been initiated and it should be maintained and developed to support the activities of data providers and users
- Inspection of inventory components can highlight the vulnerability of specific ECVs to potential gaps in satellite instruments

# WOAP ECV Workshop

## Conclusions and Actions II

- Independent expert-group assessments of the datasets associated with ECVs enhance the utility and encourage improvements of individual datasets
- Metrics of the maturity and uncertainty provide valuable information on the quality and utility of climate datasets
- The interdependence of ECV variables should be accounted for when developing and assessing specific datasets

# WOAP ECV Workshop

## Conclusions and Actions III

- The specific variables associated with each ECV can evolve with advancements in scientific knowledge and instrumentation, and such changes need to be accounted for to assure the long-term record of ECVs
- Atmospheric correction is a common issue across many ECVs. As corrections become estimated by forward modelling, there will be increased consistency across ECV variables
- Mechanisms should be established to enhance and promote the utility and application of global climate datasets

IPCC AR5 Schedule – Working Group 1  
***Climate Change 2013: The Physical Science Basis***

- WGI AR5 Zero Order Draft (ZOD) Due to TSU **18 March 2011**
- WGI AR5 First Order Draft (FOD) Due to TSU **18 November 2011**
- WGI AR5 cut-off for “submitted” papers **31 July 2012**
- WGI AR5 cut-off for “accepted” papers **15 March 2013**
- Little time for WGClimate to impact this activity, but WGClimate should support continued development and assessment of data sets

# Coupled Model Intercomparison Project - 5

CMIP5 promotes a standard set of model simulations in order to:

- evaluate how realistic the models are in simulating the recent past,
- provide projections of future climate change on two time scales, near term (out to about 2035) and long term (out to 2100 and beyond), and
- understand some of the factors responsible for differences in model projections, including quantifying some key feedbacks such as those involving clouds and the carbon cycle

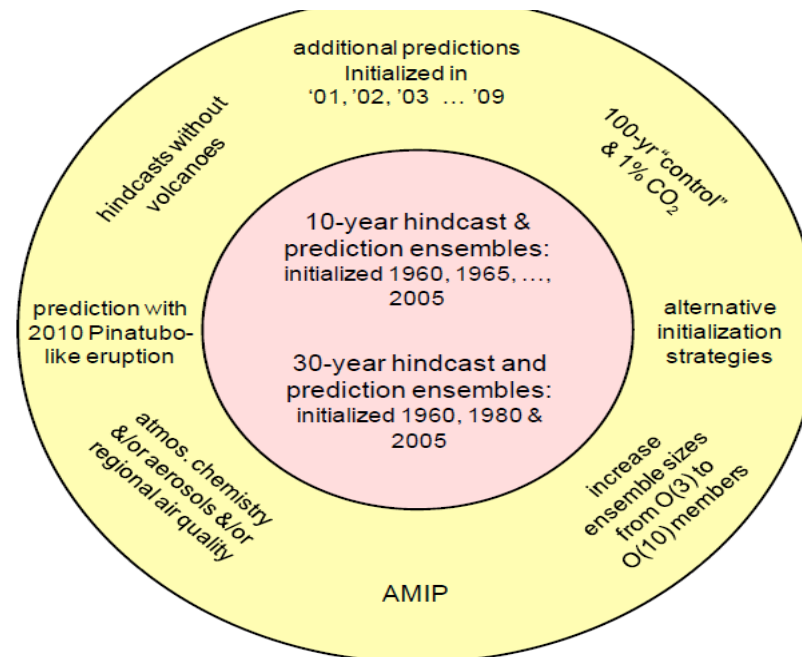
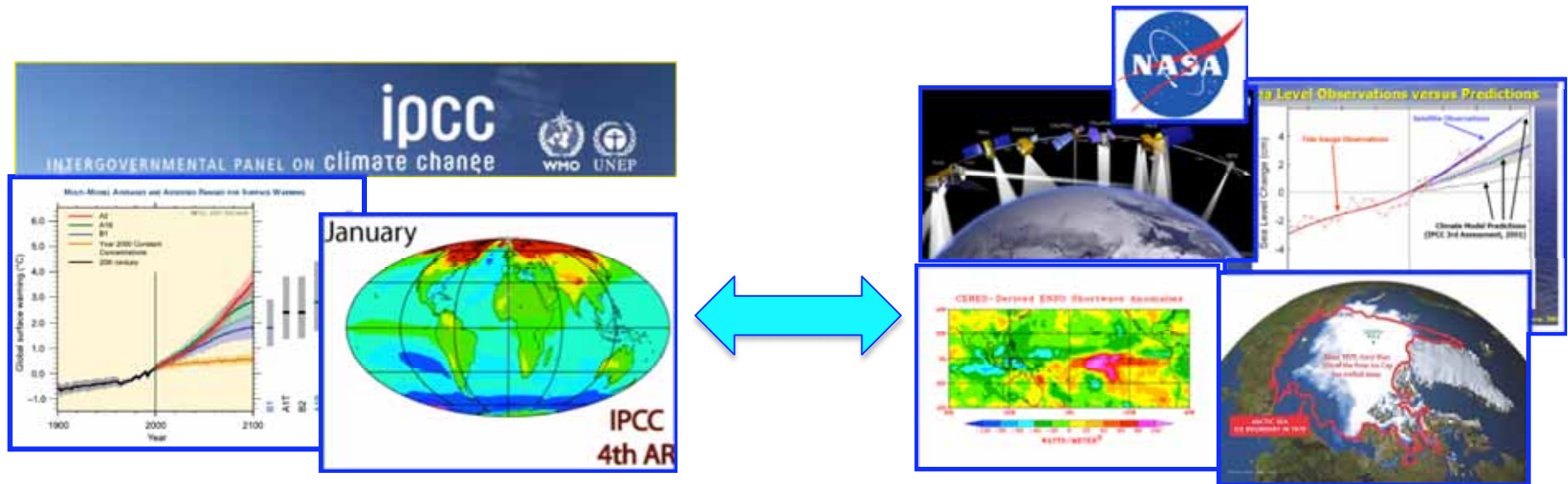


Figure 2. Schematic summary of CMIP5 decadal prediction experiments.



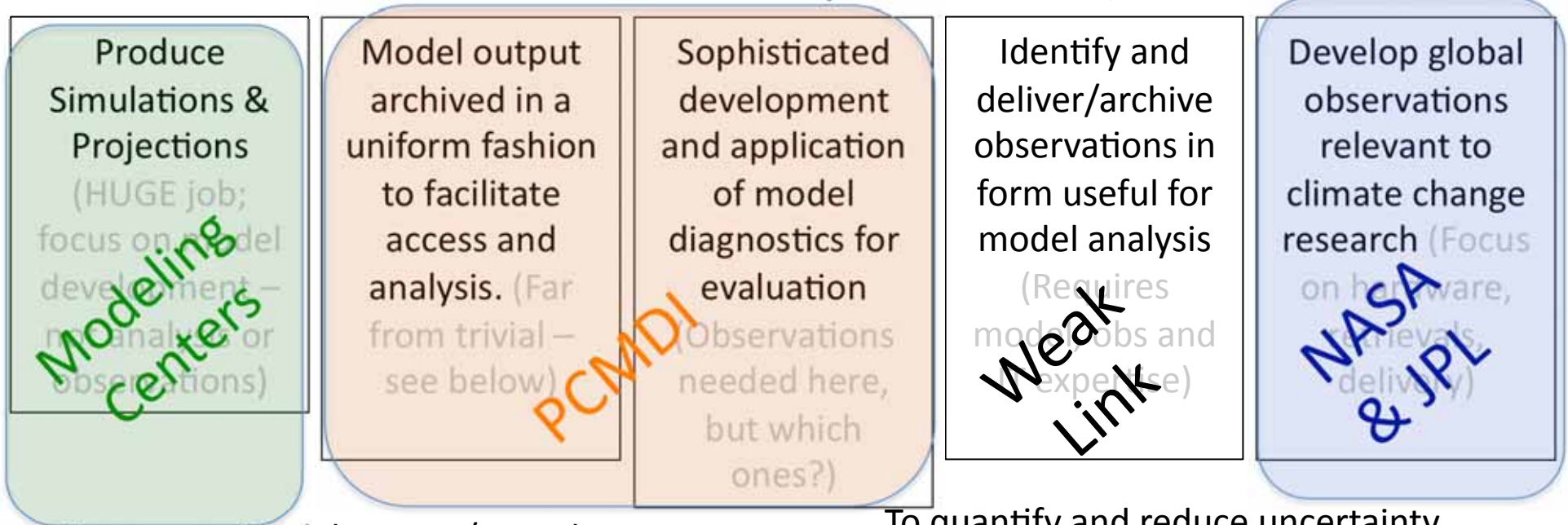
# NASA and CMIP/IPCC: Better Linkage (from Waliser)



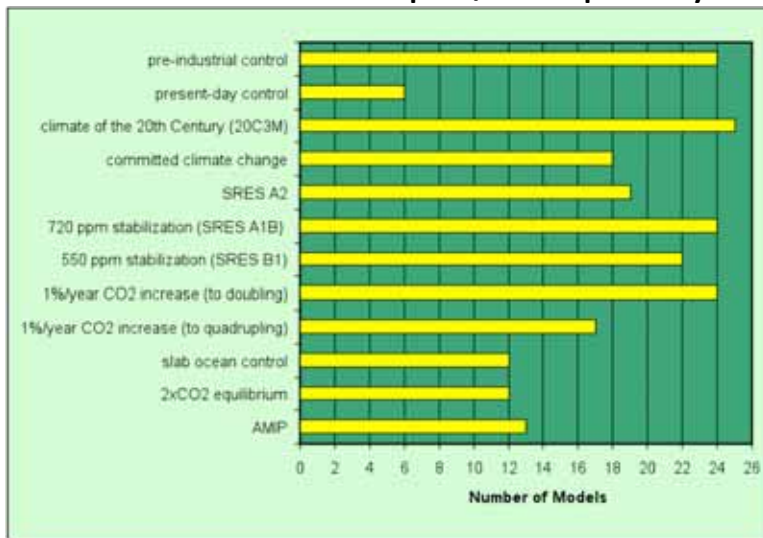
How to bring as much observational scrutiny as possible to the IPCC process?

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

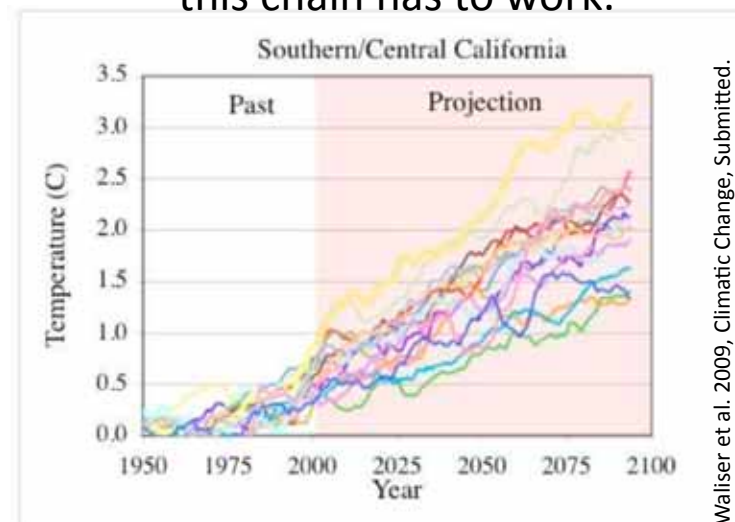
# Modelers, PCMDI, JPL/NASA, Community Who does what? (from Waliser)



Enormous Model Output/Complexity



To quantify and reduce uncertainty, this chain has to work.



Waliser et al. 2009, Climatic Change, Submitted.

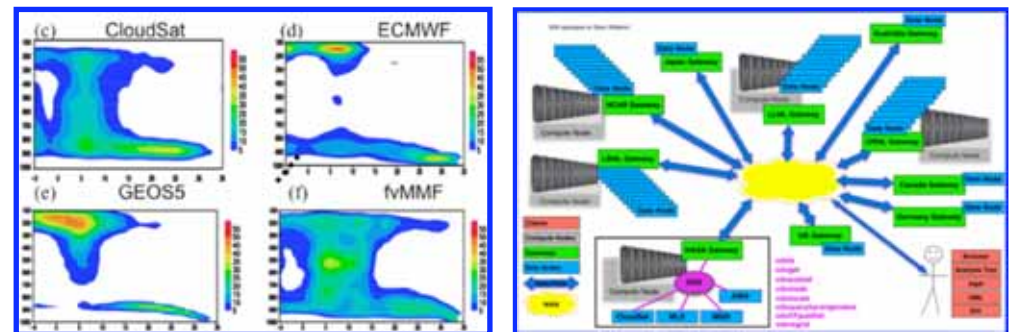
# IPCC AR5 – Making Better Use of Observations

## Characterizing and Reducing Uncertainties (from Waliser)

- JPL/NASA is leading an effort with PCMDI/DOE to identify and deliver a number of NASA satellite data tailored for IPCC model-data comparison.
- **Community** to have simultaneous access to model output and satellite observations similarly formatted to **facilitate model evaluation**.
- Use observation-based “**metrics**” to assess model capabilities of representing past climate -> use to **weight models’ climate projections**.
- Need by Spring/Summer 2011 for model evaluations and timely submission of research articles -> **IPCC AR5 to be published in 2013**.

### Science + Observations + IT

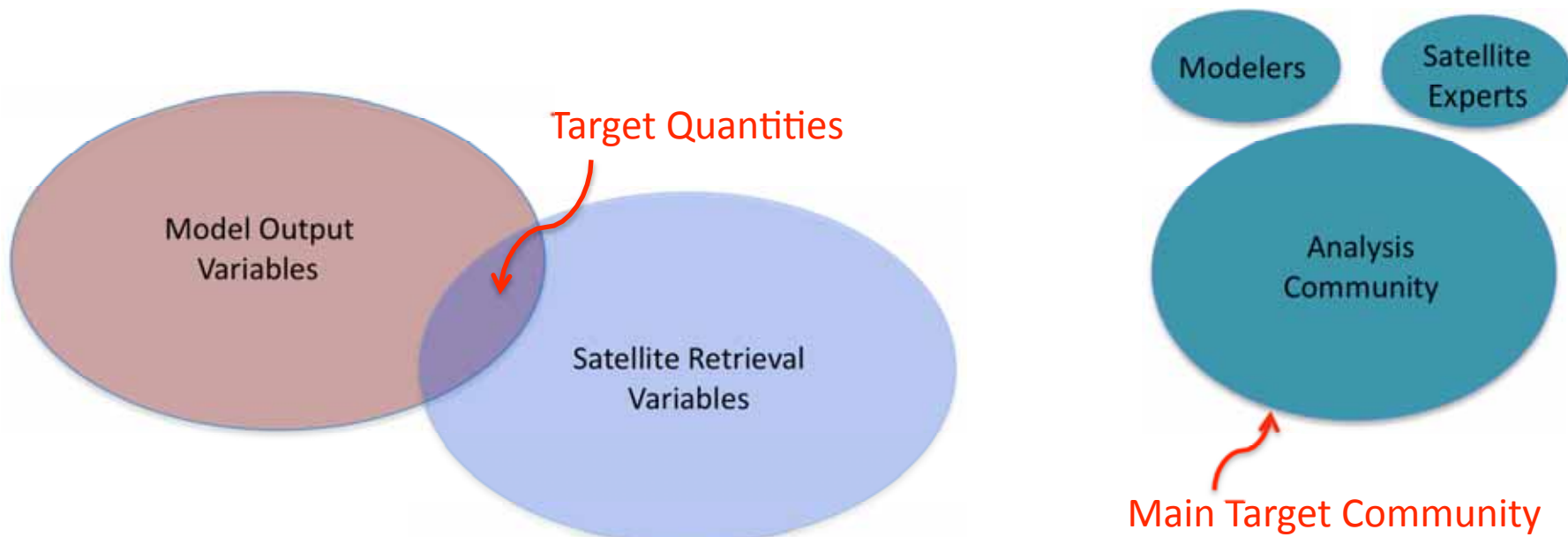
- NASA funded JPL study to prototype, identify & deliver satellite data.
- JPL led organization of two workshops
  - 1) Mission/Science -> Data Sets
  - 2) Mission/IT -> Infrastructure
- Hoping for future R&A Program



# Satellite Observations for CMIP5 Simulations

## Some Basic Tenets of this Proposed Activity (from Waliser)

- To provide the community of researchers that will access and evaluate the CMIP5 model results access to analogous sets (in terms periods, variables, temporal/spatial frequency, dissemination) of satellite data.
- To be carried out in close coordination with the corresponding CMIP5 modeling entities and activities - in this case PCMDI and WGCM.
- To directly engage the observational (e.g. mission and instrument) science teams to facilitate production of the corresponding data sets and documentation.



# Satellite Observations for CMIP5 Simulations (from Waliser)

## *Main Tasks for CMIP5 – Some Done/Underway*

1. Use the **CMIP5 simulation protocol** (Taylor et al. 2008) as guideline for deciding which observations to stage in parallel to model simulations.
2. Work with satellite community to **identify data sets** [e.g., AIRS, MLS, TES, QuikSCAT, CloudSat, Topex/Jason, CERES, TRMM, AMSR-E, TRMM]
3. Work with observational teams to produce 2-3 page **technical document** describing strengths/weaknesses, uncertainties, dos/don'ts regarding interpretations comparisons with models. **(at graduate student level)**
4. Transform satellite observations into netcdf CF compliant format.
5. Provide a strategy for accessing them that has close parallels to the model data archive (e.g. ESG).
6. Advertise availability of observations for use in CMIP5 analysis **(e.g. summer school at JPL, special journal issue)**.

# Considerations for Interactions

- Suggest that WGClimate use first informal mechanisms to collaborate with external groups
  - That is, identify WGClimate members who already may have connections with external groups; identify gaps; inform external leadership of how we would like to coordinate (i.e., manage expectations of external groups)
- Identify a select few ‘targets of opportunity’ where collaboration makes most sense or there is an emerging, urgent need
  - For example, WOAP assessment of ECVs
  - Coordinate with CEOS SEC

# Discovery and Access to Model and Observational Data – Common Themes

- There is convergence by many groups, CMIP-5, GSICS, SCOPE-CM, in adopting the NetCDF CF standard
  - The NetCDF Climate-Forecast CF convention includes variable name conventions, units conventions, a coordinate system, and data model
- Discovery and sharing mechanisms continue to proliferate, but adoption of NetCDF CF standard will make this less of a problem
  - There will continue to be a challenge with sharing, however, as a CEOS WG we should endeavor to use CEOS mechanisms
  - We should work with CEOS groups, particularly WGISS, to ensure it's systems can communicate with others (e.g., establish a Earth System Grid gateway on behalf of CEOS)

# Federating Archives - Models

- The Earth System Grid (ESG) integrates supercomputers with large-scale data and analysis servers located at numerous national labs and research centers to create a powerful environment for next generation climate research.
- Access to ESG is provided through a system of federated Data Gateways, that collectively allow access to massive data and services for Climate Global and Regional Models, IPCC research, and analysis and visualization software.