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Space Administration

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California Institute of Technology
Pasadena, California

Global Observations for Climate Model Evaluation

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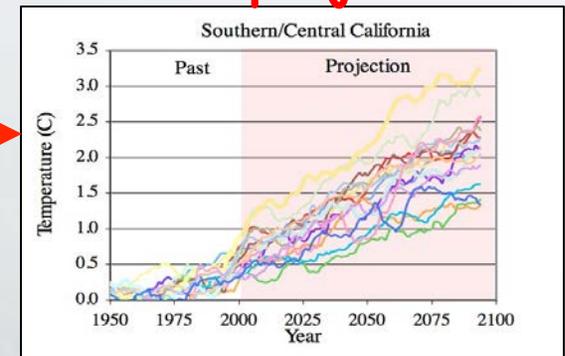
New initiative to include observations in CMIP process

Traditional model comparison path

Climate models



Model projections

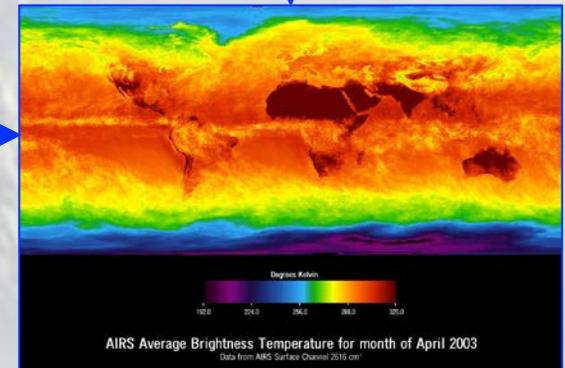


International working groups (e.g. WGCM)

New path to insert observations



Climate satellites



Satellite observations



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Observations for CMIP5 Simulations

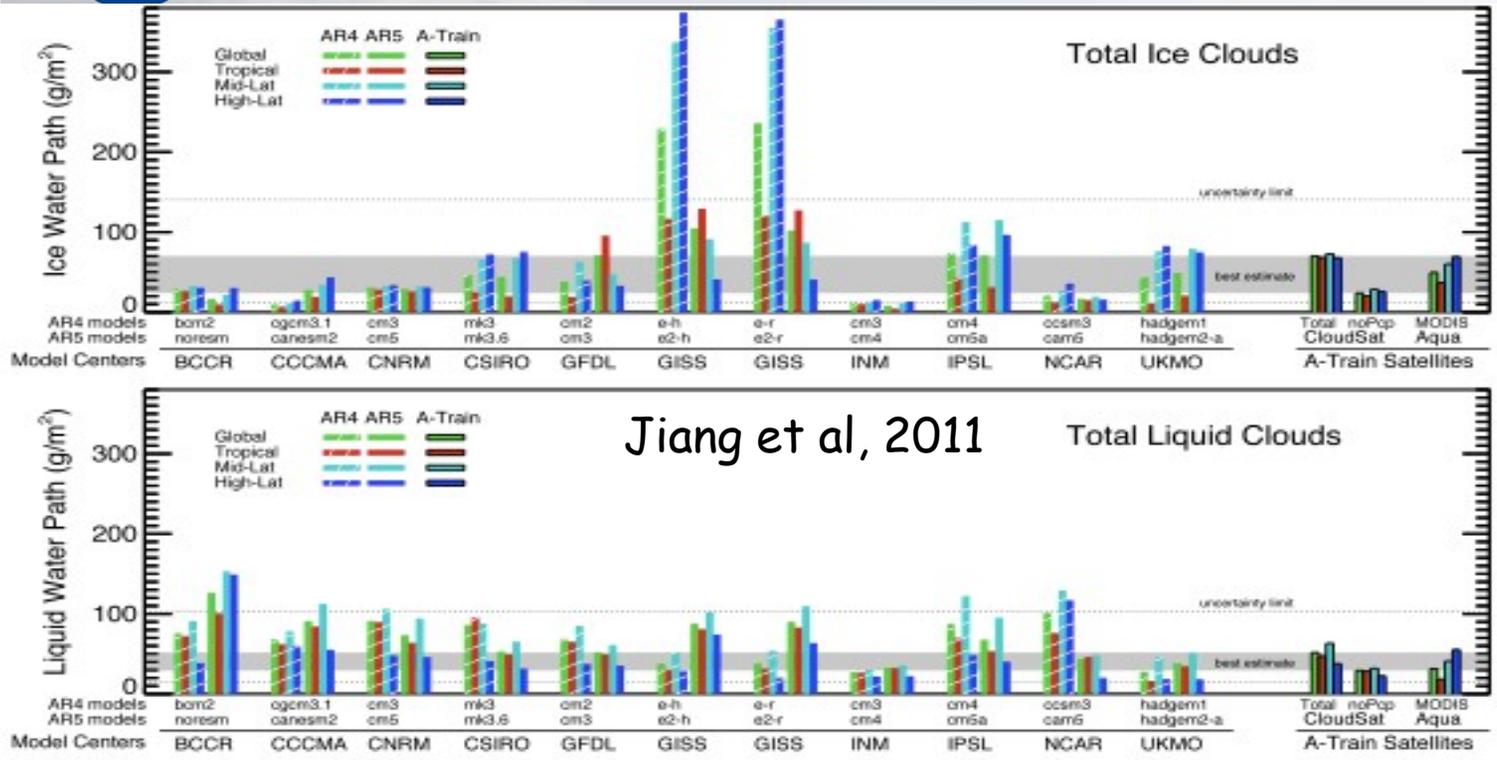
- ❑ **Objective:** to provide climate community observational data analogous to CMIP5 model data - same periods, variables, output frequency, formats
- ❑ **Key:** CMIP5 protocol document (Taylor et al., 2008) is followed strictly
- ❑ Carried out in close coordination with PCMDI/DOE and ESG
- ❑ Directly engages NASA mission and instrument science teams
- ❑ Variety of NASA observations are now available at CMIP5 websites



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CMIP3 versus CMIP5: Models and Observations



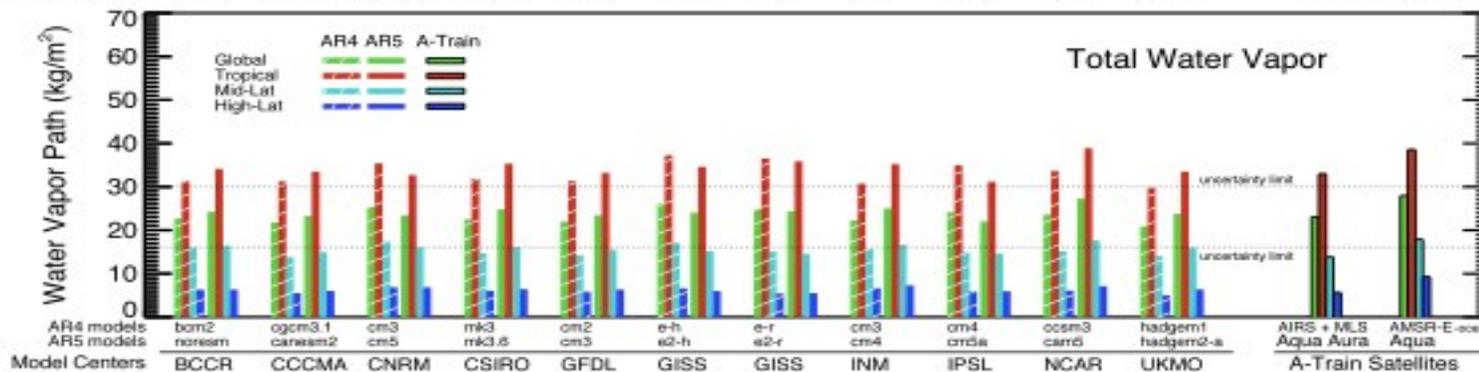
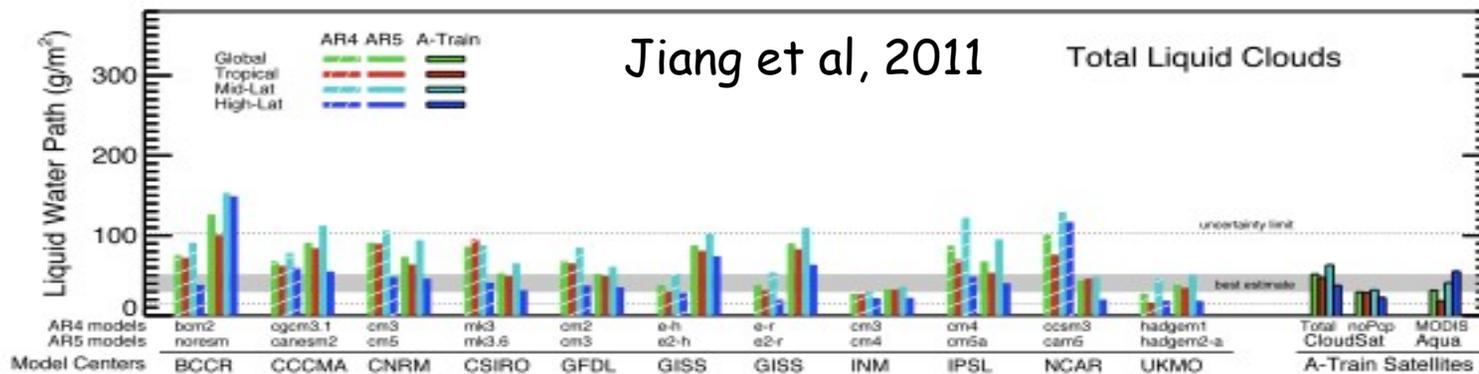
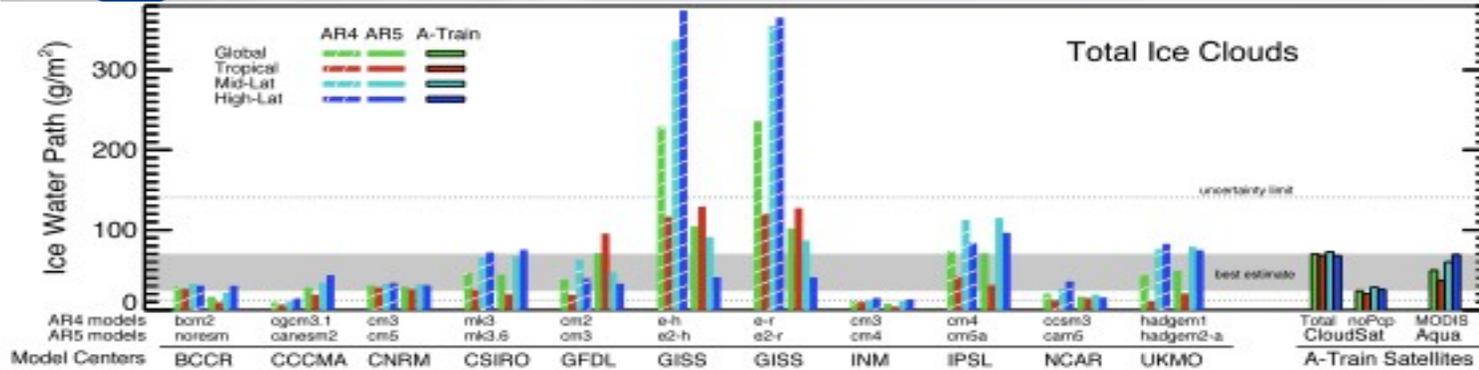
Significant uncertainty in cloud water ...





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CMIP3 versus CMIP5: Models and Observations



Significant uncertainty in cloud water ...

Jiang et al, 2011

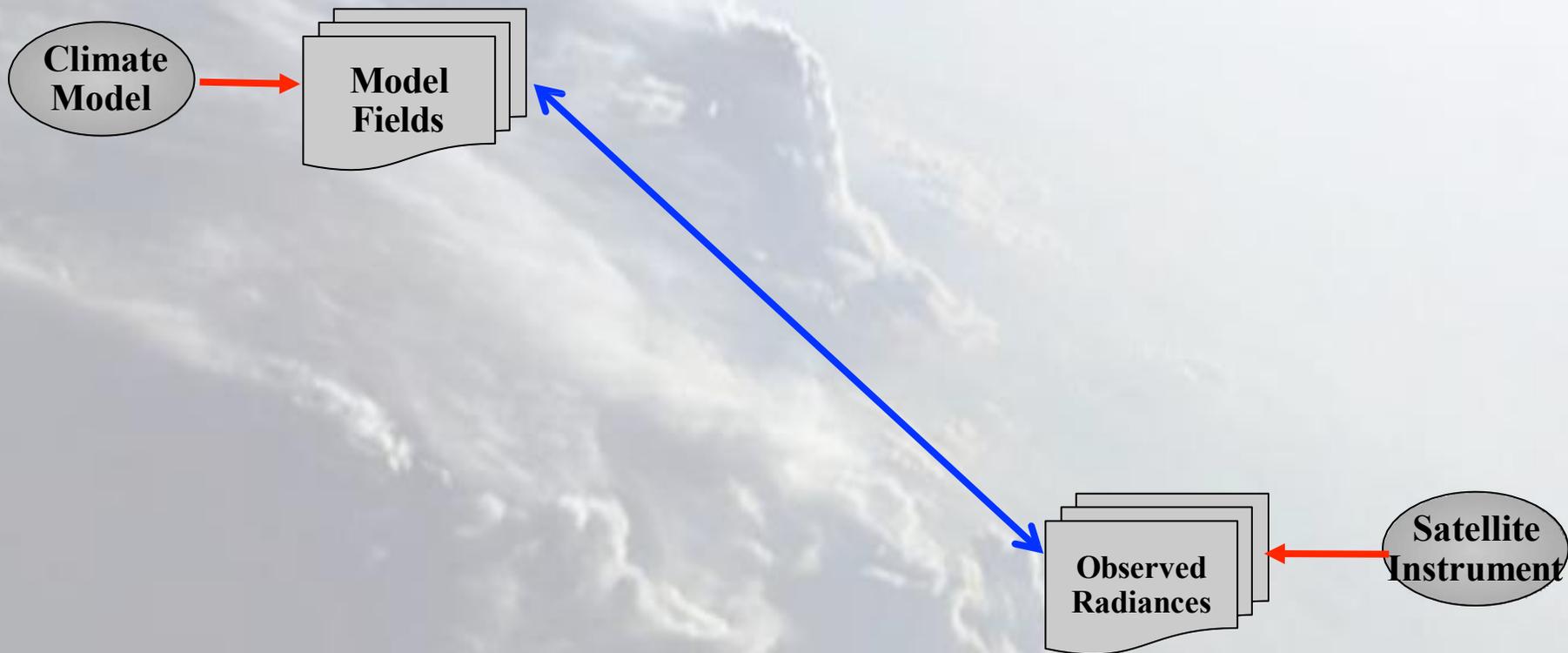
But large uncertainty in water vapor



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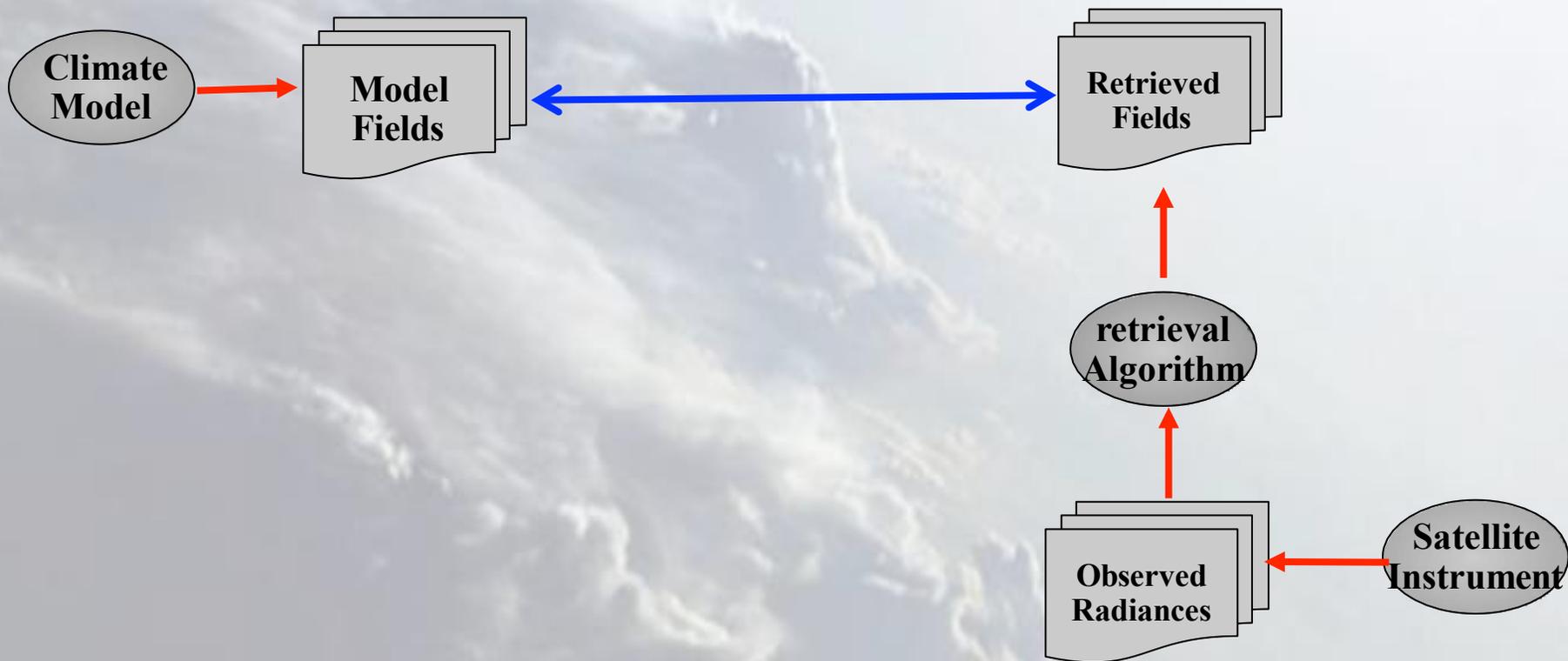
Climate Models versus Satellite Observations: Stage 1





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Climate Models versus Satellite Observations: Stage 2

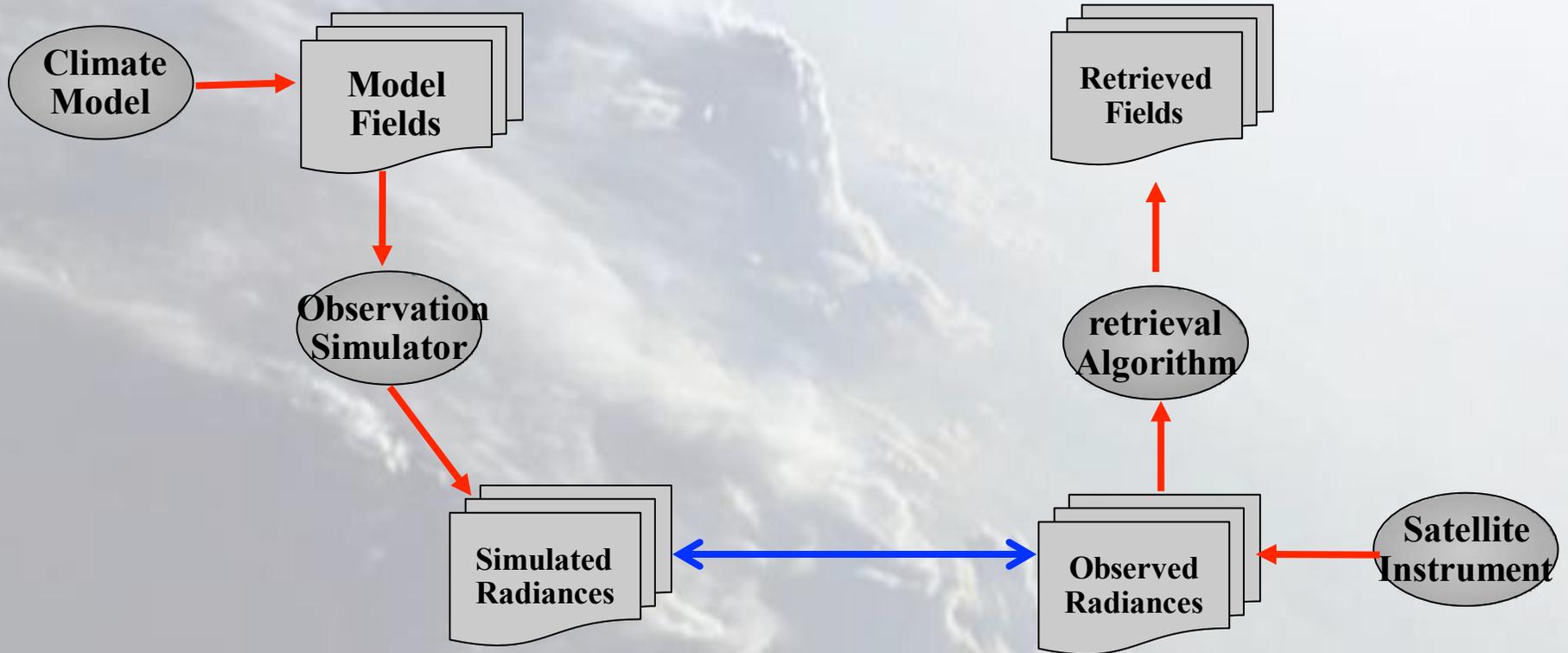




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Climate Models versus Satellite Observations: Stage 3

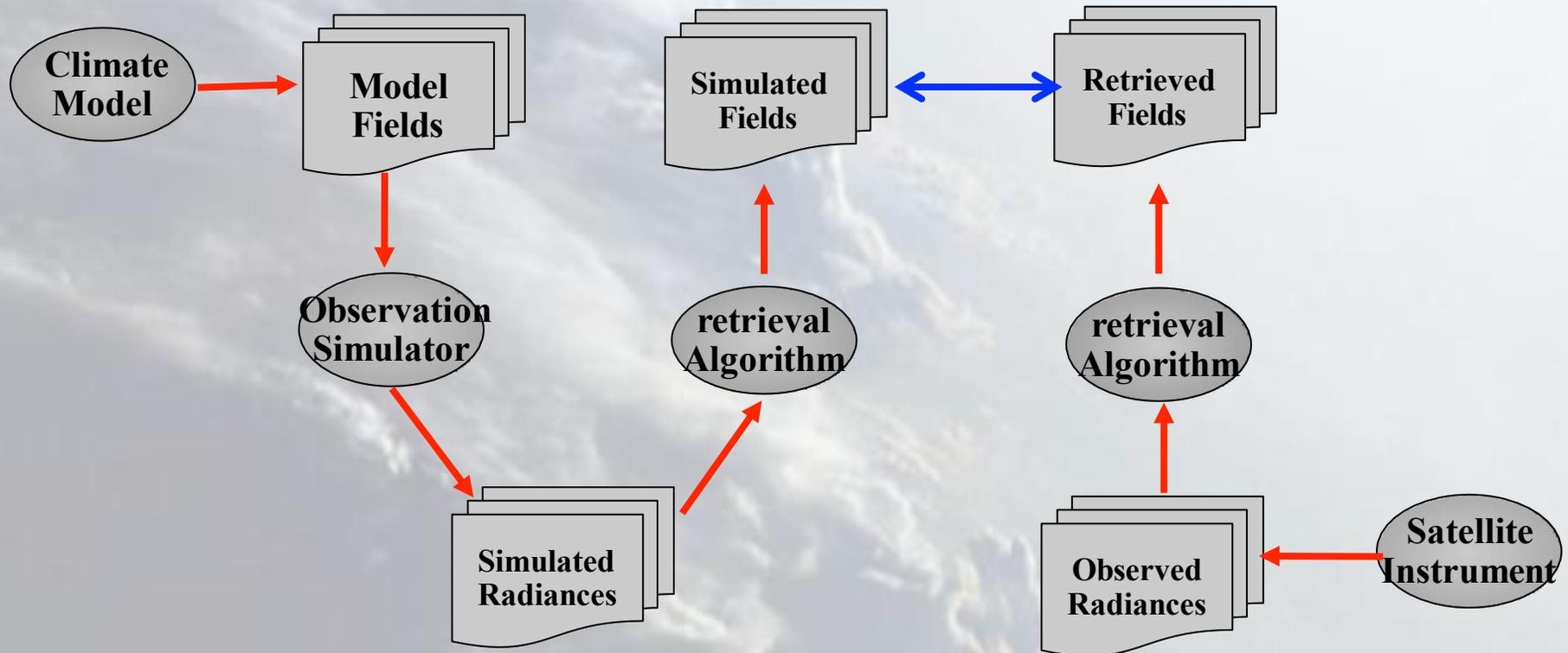




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Climate Models versus Satellite Observations: Stage 4



In stage 4: retrieval issues are taken into account and models/
observations are compared in geophysical variables



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Summary

- How to provide observations to *CMIP*?
Effort is underway to provide access to observations for *CMIP5*
- How to compare models and satellite observations?
Satellite simulators and beyond ...
- New observations and satellite missions - Model evaluation/development
can play key role in designing future missions



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Satellite Observations for CMIP5 Simulations

ESG-JPL Gateway : Side by Side Archive



ESG Gateway hosted by the Program for Climate Model Diagnosis and Intercomparison

Search: for:

To conduct a search, select a category from the pull down menu and/or enter free text into the text box.

- Search Categories**
- Project
 - > CMIP5
 - > TAMIP2
 - > gfdl_test
 - > obs4MIPS
 - + Institute
 - + Model
 - + Experiment
 - + Frequency
 - + Product
 - + Realm
 - + Variable
 - + Ensemble

Welcome to PCMDI



The Program for Climate Model Diagnosis and Intercomparison (PCMDI) was established in 1989 at the Lawrence Livermore National Laboratory located in the San Francisco Bay Area. Our staff includes research scientists, computer scientists, and data management personnel.

The PCMDI mission is to develop improved methods and tools for the diagnosis and intercomparison of general circulation models (GCMs) that simulate the global climate. The need for innovative analysis and diagnostic tools for climate simulations is apparent, as increasingly more complex models are being developed, while the discrepancies among these simulations are increasing. PCMDI and its partners are working to improve our understanding of climate system processes and to provide the climate modeling community with the tools and data needed to improve GCMs for simulation and prediction.

Status of the CMIP5 Archive

6/3/2011: CNRM-CERFACS decadal hindcast/forecast datasets are available for all realms but sea-ice (10 members already available for all realms ocean, only 3 so far for realms land/atmos/landIce).

6/25/2011: PCMDI CMIP5 data server is back online. The INM datasets are available.

7/7/2011: NCC datasets are now available to all users.

7/19/2011: PCMDI data server will be down for maintenance on 7/20 17:00 PST. It is expected back online 7/20 17:00 PST.

7/20/2011: PCMDI data server is back online.

7/20/2011: Because of a processing fault affecting the MOHC rcp85 data from 2080 onwards, this data has been withdrawn. We expect to provide us with corrected data in a format at which time a new version of these datasets will be published.

9/7/2011 - 9/9/2011: The BADC ESGF system will be unavailable on September 7th and 8th. As a precaution you should consider "At Risk" on Friday September 9th.

obs4MIPS Project



ESG Gateway hosted at the NASA Jet Propulsion Laboratory

Search: for:

To conduct a search, select a category from the pull down menu and/or enter free text into the text box.

Please note that the NASA datasets accessible through this gateway are provided as part of an experimental activity to increase the usability of NASA satellite observational data for the model and model analysis communities. These are not standard NASA satellite instrument products. They may have been reprocessed, reformatted, or created solely for comparisons with the CMIP5 models. Community feedback to improve and validate the dataset for modeling usage is appreciated.

- Search Categories**
- Project
 - > CMIP5
 - > obs4MIPS
 - + Institute
 - + Model
 - + Experiment
 - + Frequency
 - + Product
 - + Realm
 - + Variable

AIRS (Atmospheric Infrared Sounder)



[AIRS Data Catalog at ESG](#)
 Documentation: [Air Temperature](#)
 Documentation: [Specific Humidity](#)
[AIRS Home at NASA/JPL](#)

AMSR-E (Advanced Microwave Scanning Radiometer - EOS)



[AMSR-E Data Catalog at ESG](#)
 Documentation
[AMSR-E Home at NSIDC](#)

AVISO



[AVISO Data Catalog at ESG](#)
 Documentation: [Sea Surface Height \(SSH\)](#)
[AVISO Home](#)

MLS (Microwave Limb Sounder)



[MLS Data Catalog at ESG](#)
 Documentation: [Specific Humidity](#)
 Documentation: [Air Temperature](#)
[MLS Home at NASA/JPL](#)

MODIS (Moderate Resolution Imaging Spectroradiometer)



[MODIS Data Catalog at ESG](#)
 Documentation
[MODIS Home](#)

TES (Tropospheric Emission Spectrometer)



[TES Data Catalog at ESG](#)
 Documentation: [Ozone](#)
[TES Home at NASA/JPL](#)

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- ESG Federation**
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This afternoon's session

Session 3: Climate Model Evaluation & Invited Climate Modeling Presentations (Chair: Joao Teixeira)

Joao Teixeira	JPL	Satellite Observations for CMIP5/IPCC	1:30 PM
Jerry Potter	GSFC	A perspective on CMIP5: from the simple beginning of model intercomparison to an international effort	1:50 PM
Brian Medeiros	NCAR	Evaluating CAM's clouds with satellite simulators	2:20 PM
Claire Radley	GFDL	Comparison of GFDL's atmospheric models with observations during El Nino events	2:50 PM
Hui Su	JPL	Process oriented quantitative assessment of IPCC AR5 model simulations of clouds and water vapor using A-Train observations	3:20 PM
<i>BREAK (Afternoon Light Refreshments)</i>			<i>3:40 PM</i>
Baijun Tian	JPL	Evaluating CMIP5 models using AIRS temperature and water vapor profiles	4:00 PM
Amy Braverman	JPL	Likelihood-based evaluation of CMIP5 decadal experiment runs and AIRS water vapor data	4:20 PM