Enhancing the Climate Model Diagnostic Analyzer (CMDA)

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Objective

Enable the capability to diagnose model biases in contemporary climate models:

- Reduce the impact of model biases via the identification of relevant physical processes

Advance current capability of CMDA:

- Improve diagnostic analysis methodology

- Enable web services to permit machine-to-machine interconnection of services

- Extend cloud computing environment technology to eliminate the need for local installation and to achieve scalability

- Add provenance service to track and describe history
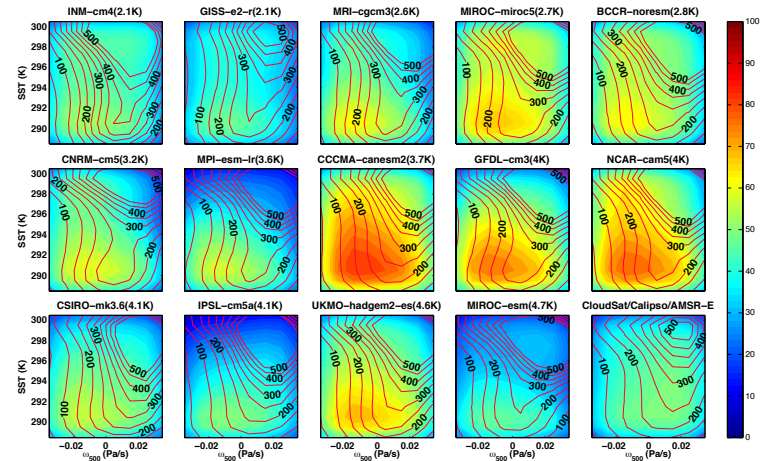
Evaluating model representation of low-cloud simulations using the developed diagnostic methodology and analysis tool

Accomplishments

- Demonstrated value and use of CMDA diagnosis in the following ways:
  - Radiation budget: how model biases are attributed to lack of key drivers like atmospheric large ice particles in GCMs.
  - Low-cloud bias: how many GCMs under-simulate low clouds in five primary subtropical low cloud regions
  - Climate sensitivity: how cloud radiative feedback accounts for most of the inter-model spread of climate sensitivity.
  - Demonstrated educational use of CMDA with JPL Center for Climate Sciences Summer School in 2015, 2016, and 2017.
- Enhanced the diagnostic analysis and provenance service system of CMDA with advanced diagnostic analysis algorithms, better user interfaces, provenance-based search, recommendation, reanalysis, and reproducibility.
- Infused CMDA capabilities to PO.DAAC datasets enabling analysis-driven data exploration and data customization.

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$TRL_{in} = 3$ $TRL_{out} = 5$

Earth Science Technology Office