# Comparing GFDL GCM Model Output with ARM CMBE Dataset: *A First Look*

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### What is CMBE?

- *CMBE (Climate Modeling Best Estimate) is a new ARM dataset specifically designed to evaluate climate models against ARM observations.*

- *CMBE contains best estimates of selected ARM measurements: cloud fraction, surface radiation fluxes, total cloud cover, liquid water path, precipitable water vapor.*

- *For more information on CMBE: http://science.arm.gov/wg/cpm/scm/best_estimate.html*

### GFDL GCM models used in this comparison

- *AM2.1: current version of the atmospheric model (GFDL Global Atmosphere Model Development Team, J. Climate, **17**, 4641-4673, 2004)*

- *AM3 prototype: development version of the next atmospheric model.*
  *Highlights for AM3:*
  - *New cubed-sphere dynamical core.*
  - *New deep and shallow convection parameterizations.*
  - *Prediction of aerosols (direct effect).*
  - *Treatment of CCN (cloud condensation nuclei) activation (indirect effect).*

- *Monthly climatology is computed from all available CMBE data and compared with model output climatology interpolated to ARM site location.*

- *Model versions:*
  *AM2.1 (m45_am2p14_1990); AM3 prototype (c48_am3p4_ss4_13b).*

### Future goals

- *Additional sites (Tropical Western Pacific).*

- *Model versus observed vertical profile of cloud fraction.*

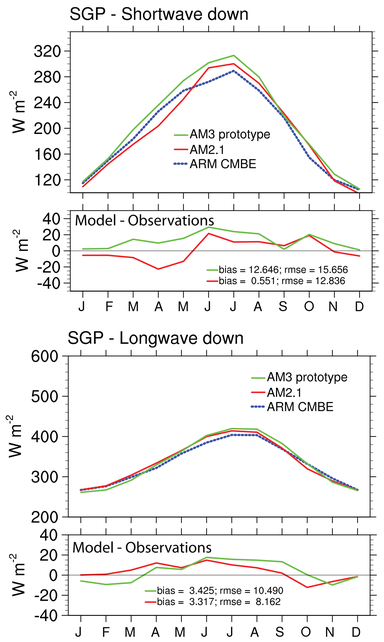
- *Diurnal variation.*

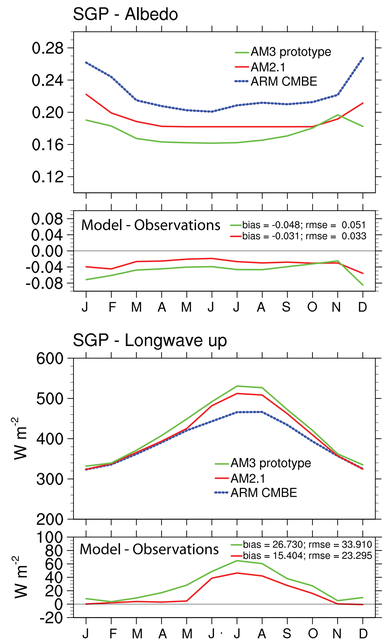
- *Integrate ARM CMBE comparisons to the automated GFDL model diagnostics suite to make comparisons available to anyone running the GFDL atmospheric model.*

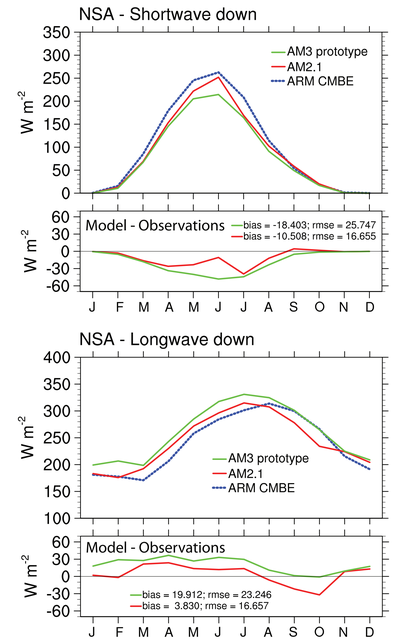
## *Southern Great Plains (SGP)*

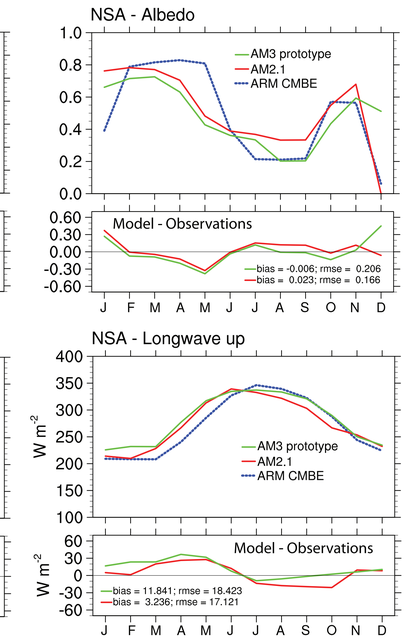
## *North Slope Alaska (NSA)*

### Surface Radiation







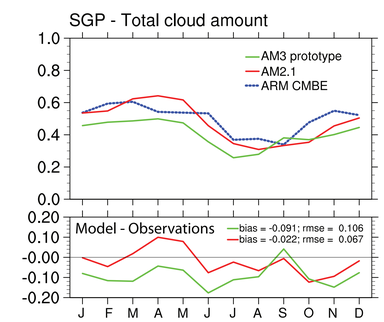


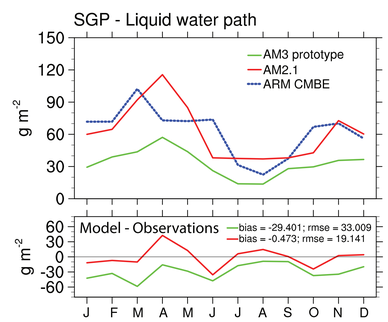


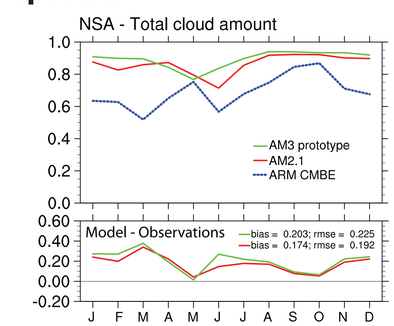


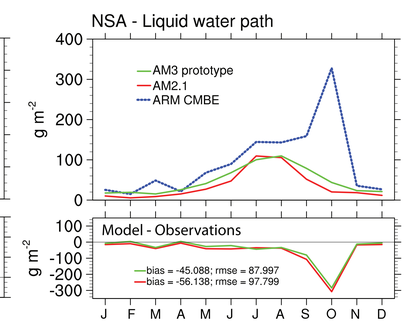



### Cloud Properties




### Comments

**** Southern Great Plains (SGP)***

- *Low albedo bias, more exaggerated in AM3.*
- *Longwave up is too high in model, related to a high surface temperature bias.*
- *Liquid water path is much lower in AM3 than AM2 and observations.*


**** North Slope Alaska (NSA)***

- *Cloud related issues:*
  - *Model total cloud cover is too large during all seasons.*
  - *Negative bias in incoming shortwave and positive bias in longwave down.*
- *Model albedo falls off too fast in the spring time.*

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