

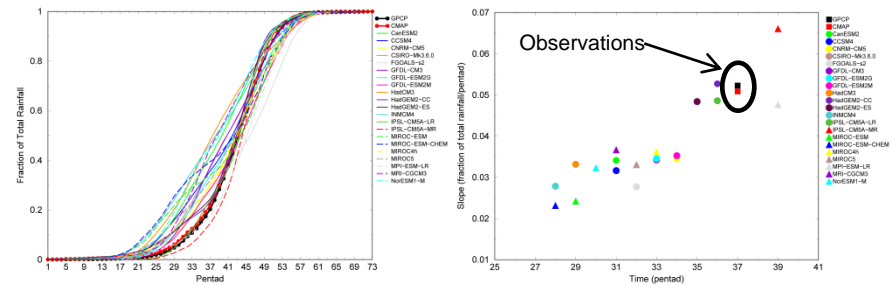
The Use of Fractional Accumulated Precipitation for the Evaluation of the Annual Cycle of Monsoons

Objectives

- Develop a new diagnostic approach and skill metrics for analyzing the annual cycle of monsoon rainfall
- Circumvent the issues that arise from using threshold-based approaches that preclude the analysis of climate models with dry biases

Approach/Results

- Use pentad rainfall to calculate the fractional accumulation during the annual cycle
- Benchmark how well the CMIP5 models represent the fractional accumulation during the peak monsoon season
- Assess how well the model represent the time of monsoon onset, and the accumulation rate during summer
- For the Sahel, the models overestimate the fractional accumulation prior to and through most of the summer monsoon (left figure)



- In terms of skill, nearly all CMIP5 models are biased toward early Sahel monsoon onset, and most do not accumulate rainfall as quickly as observations (right figure)
- Monsoon onset is also early for the North American Monsoon, and late for India, the Gulf of Guinea, and the South American Monsoons (not shown)

Impact

- The CMIP5 models are not responding properly to the annual cycle of solar radiation, which is an important driving mechanism for the development of monsoons
- Regional processes studies are needed to uncover the sources of the disparate errors in the ocean-atmosphere-land-cryosphere system