Forcing the SCAM with aquaplanet conditions

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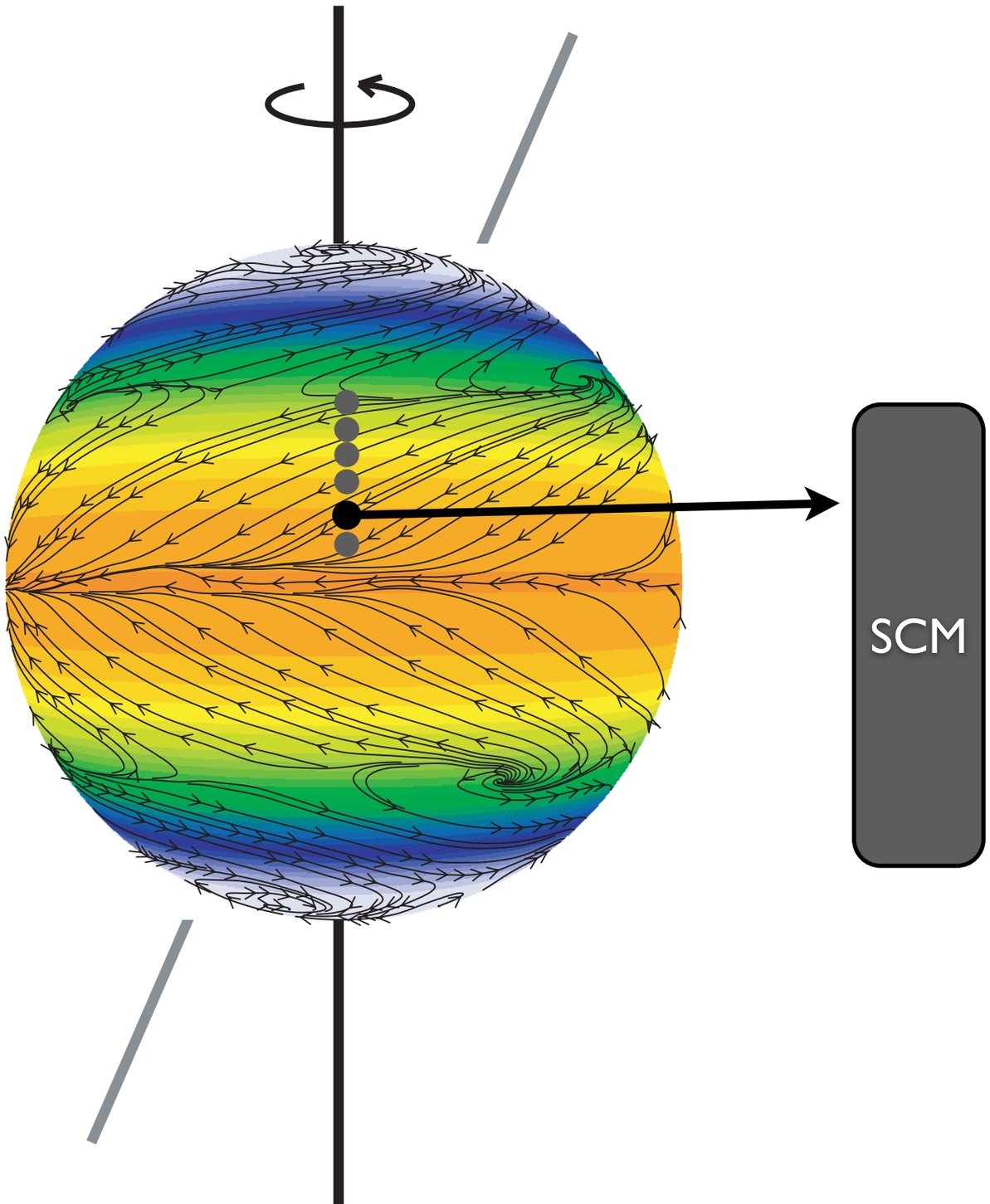
The idea



Use aquaplanet to drive SCM.

Can SCM capture the cloud response from GCM?

Grokking cloud response, à la Zhang & Bretherton

Technical challenges... but progress

Temperature, height v. time

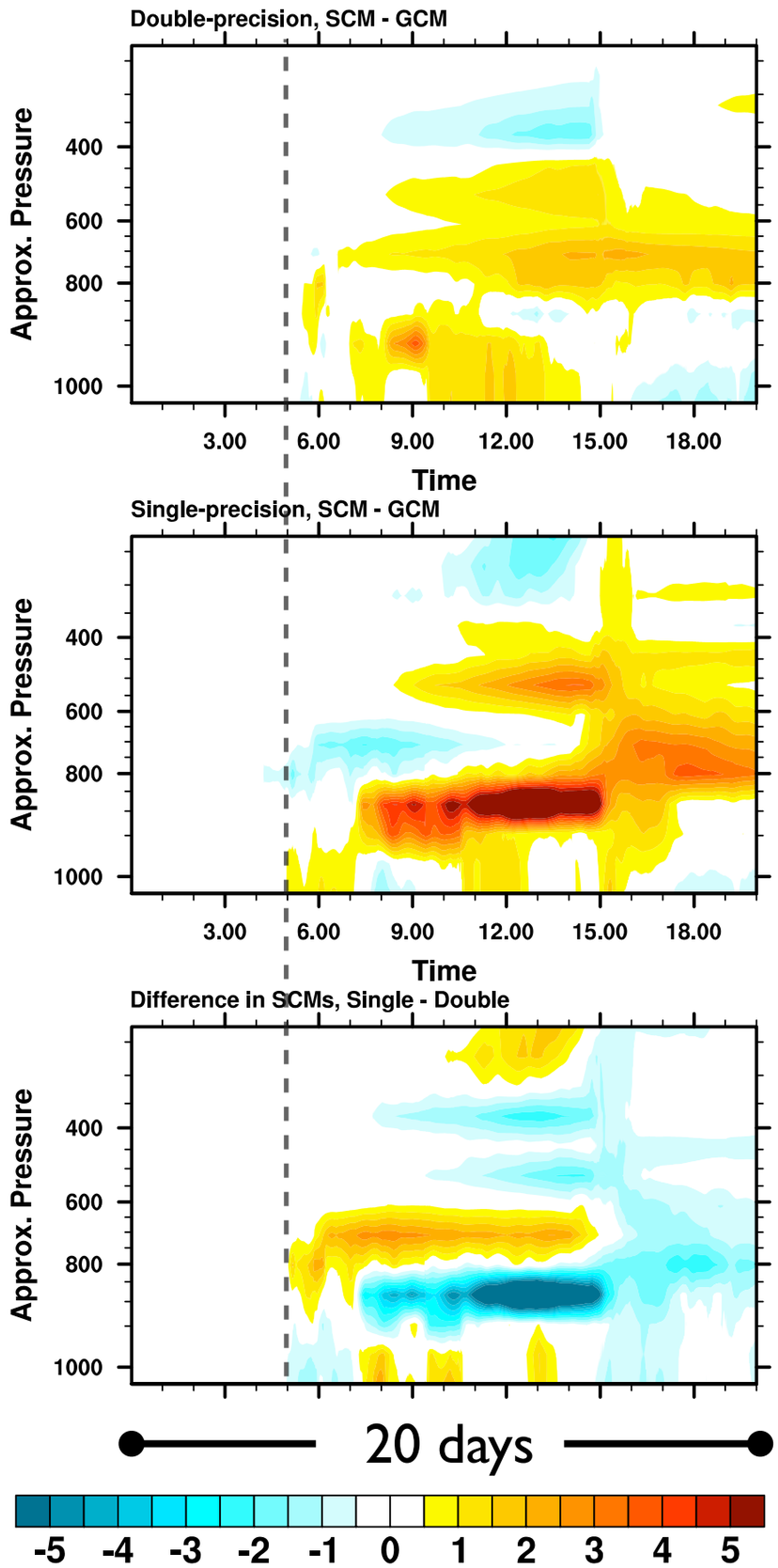
Double precision forcing

SCM - GCM

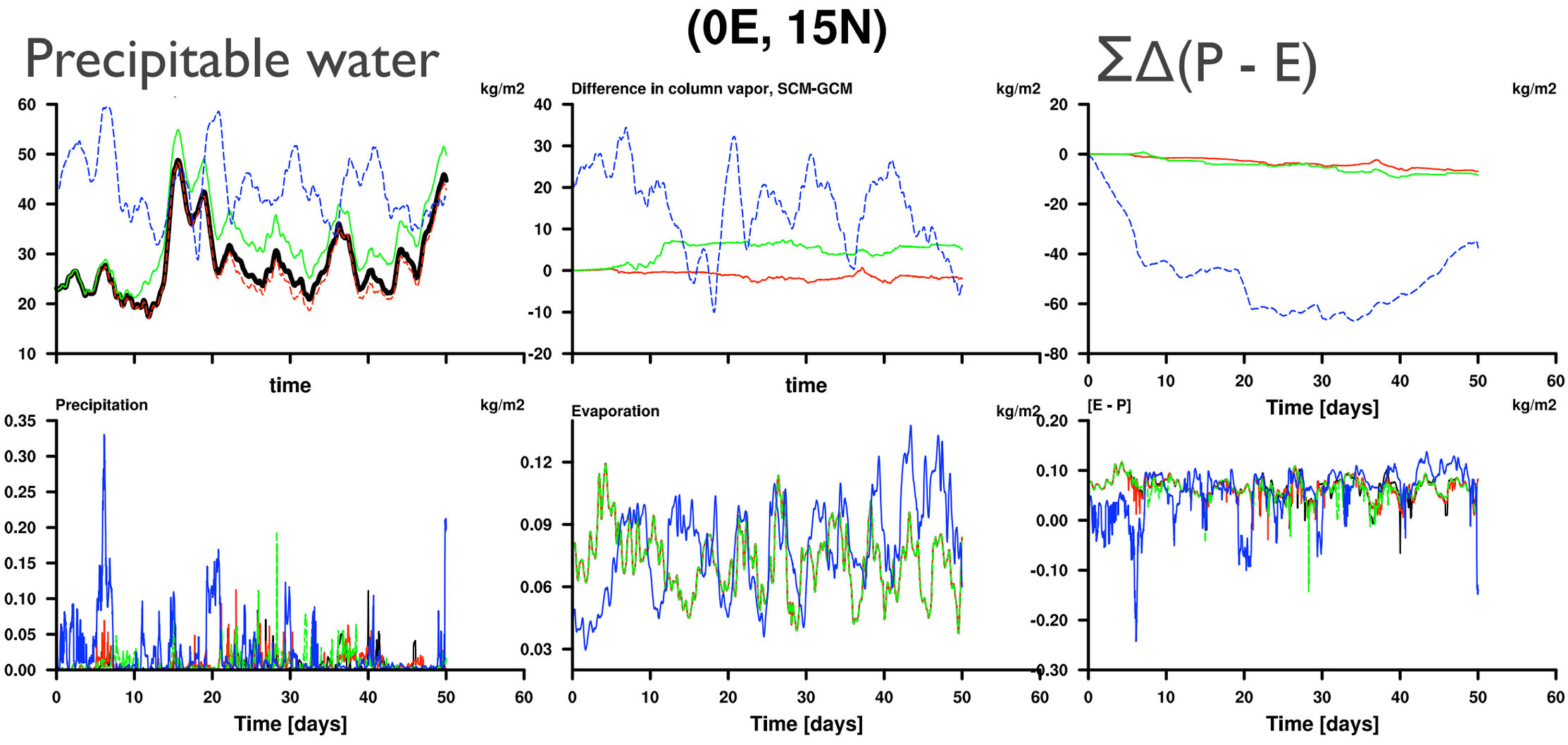
Single precision forcing

SCM - GCM

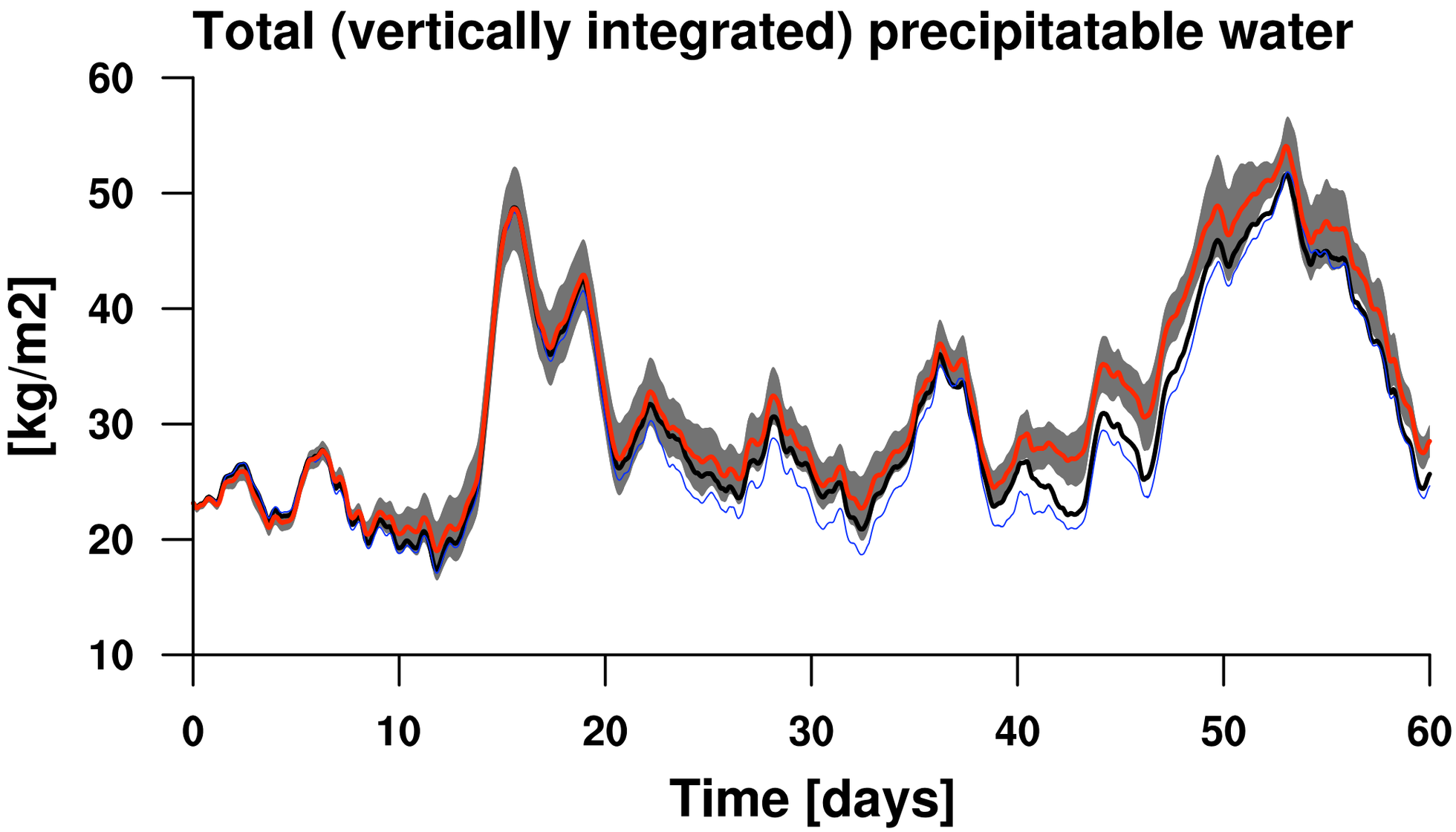
SCM_{single}- SCM_{double}



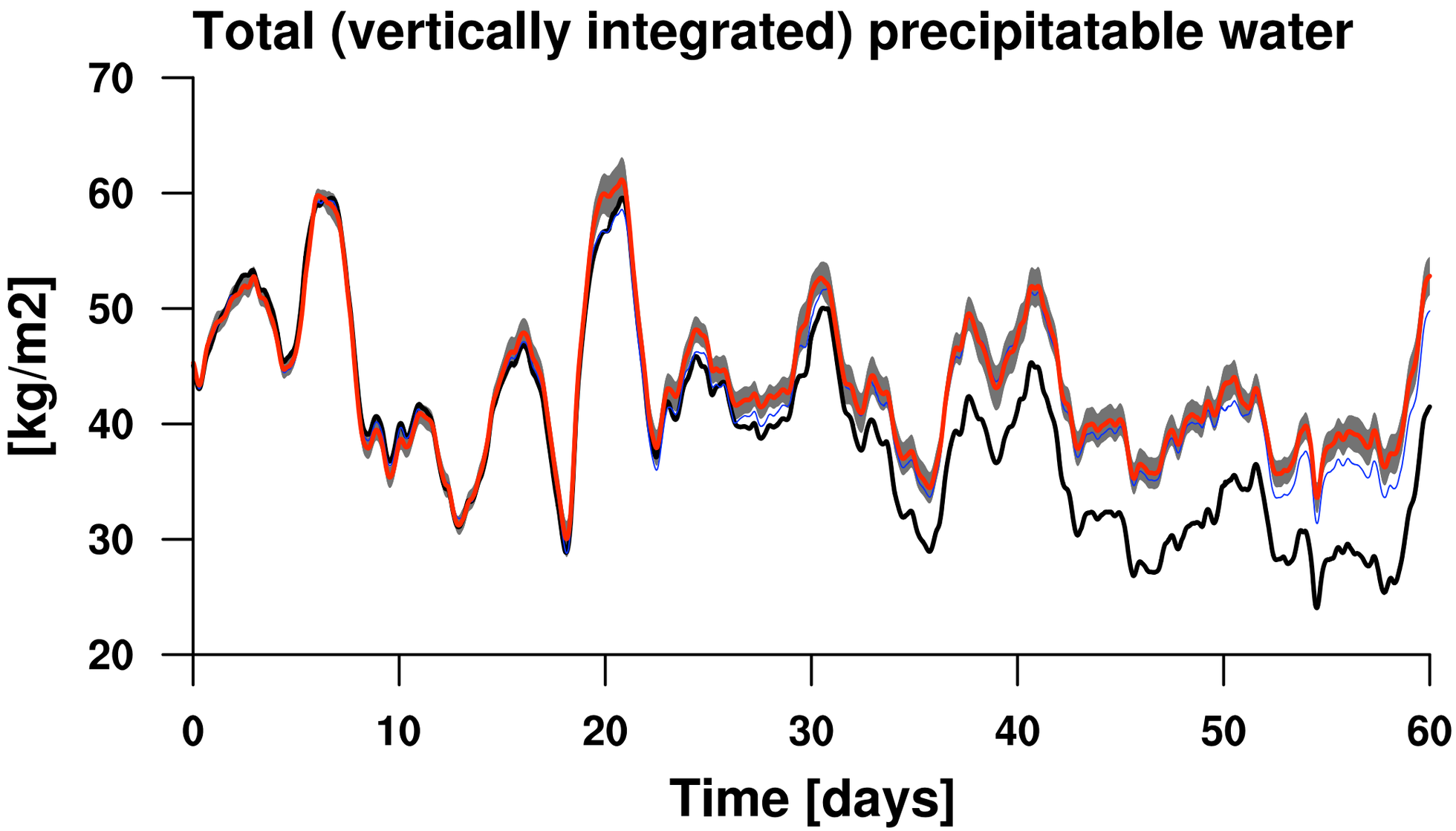
Technical challenges... but progress?



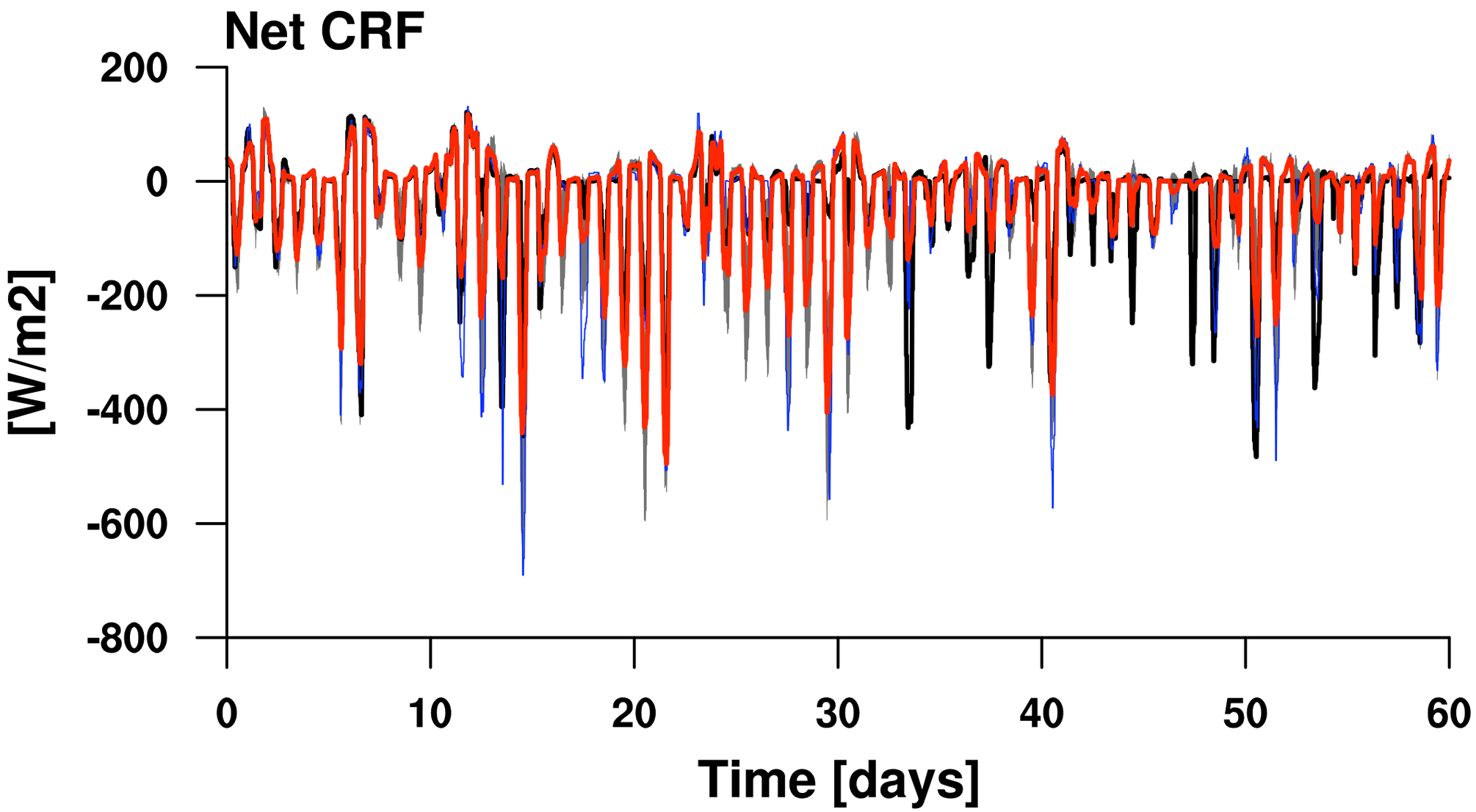
Buoyed by progress, run an ensemble



Same point from a SST+2 experiment



Preliminary result: ΔCRF



	ΔCRF
GCM	-14
SCM	-9
Ensemble	-9.6*

Compare with tropical average ~ -2W/m^2

AND ~ -8.5 W/m^2 at 15° latitude

What now?

Do SCM and GCM agree as well as expected?

Run SCM with forcing from more grid points (span subsidence regimes)

Mechanisms involved in cloud response

Comparison with LES/CRM ?

Low Clouds - discussion (1 of 2)

How we got here (14:05 - 14:20)

Discussion Points (14:20 - 15:00) - PART 1

- Can we say something about the characteristics of the changing forcing (steady vs. transient)?
- Do we have a framework for understanding how the models are responding to such changes?
  - (from large-scale models, to scm's, to LES/CRMs at various resolution).
- Are we at a point where we can begin thinking about synthesizing some of the things we are learning as a group?
- What are we missing?

Low Clouds - discussion (2 of 2)

Discussion Points (14:20 - 15:00) - PART 2

- Can we think of observational tests for our ideas, or possible observational constraints for advancing our modeling?
- Can we make better use of the prototype MMF? (i.e., how can we make an identifiable contribution in the context of CMMAP?)
- Suitability of SAM for low-cloud LES
  - Are microphysics, SGS and transport algorithms good enough?
  - If so, which of the available choices seems most appropriate?
  - What resolution is adequate for use of SAM to study low cloud and aerosol processes; would an adaptive vertical grid help?
  - For all of these questions, how do we know or what do we do to find out?
- Mini-LES. Is CMMAP ready for this now, or is it better just to continue with proto-MMF runs; who is to be involved?