MPI-M Perspectives

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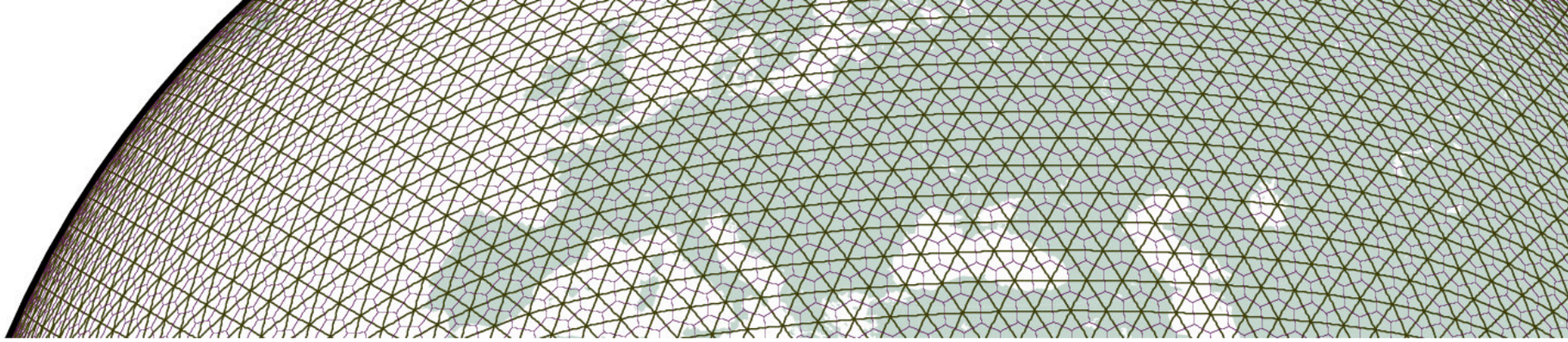
MPI-ESM



- MPI-ESM 1.1 is being finalized and will be released next year.
  - new treatment of radiation (PSRad); major bug fixes to clouds and convection; energy conservation.
  - five-layer soil hydrology; nitrogen cycle
  - last MPI-ESM with ECHAM/MPI-OM Core
  - ECHAM development to stop this year
  - Will be default model for CMIP6

- MPI-ESM 2.0 is in development
  - joint development with DWD (dynamical core), DKRZ (computational layers), ETH (Chemistry & Aerosol)
  - Fully compressible equations solved on a semi-structured icosohedral (triangles) grid
  - Weak scaling on 65,000 processors, targeting a million cores
  - Atmosphere, Ocean and Land share a common infrastructure (time-control, grid, IO, etc)
  - Pre-operational with DWD physics
  - AMIP and OMIP simulations in early 2014
  - Cloud-resolving model – 100 m simulations over Germany planned for 2015.

CMIP5 Survey

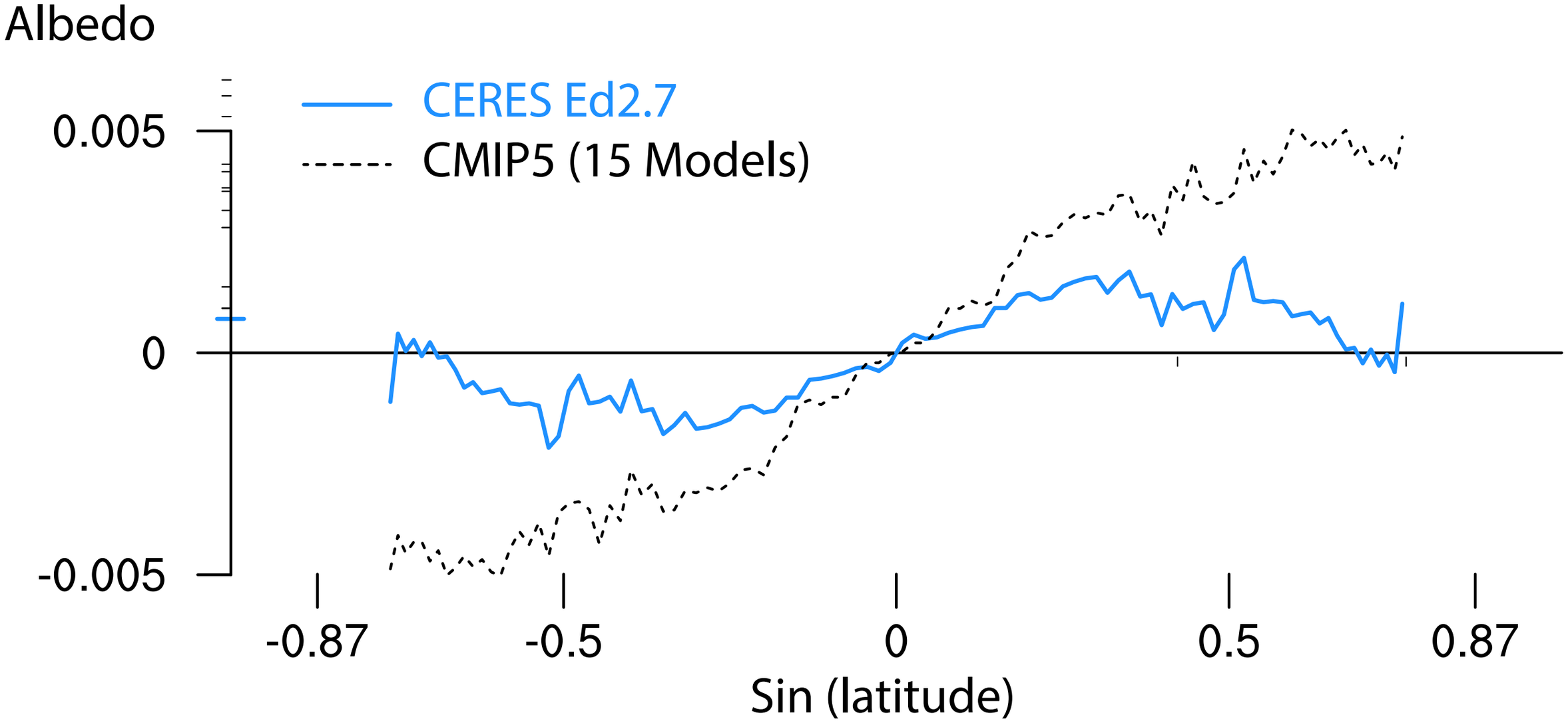
- The RCP scenario choice and underlying story-line was not very transparent, and non-CO_2 forcings were not well treated (land cover, aerosol)

- Scenarios and projections should be de-emphasized in future CMIPs (just another MIP) and focus should be directed toward conceptual issues.

- Some other MIPS could be fine-tuned (assimilation for decadal prediction; merging of Past/Future forcing; station data and COSP output for CFMIP)

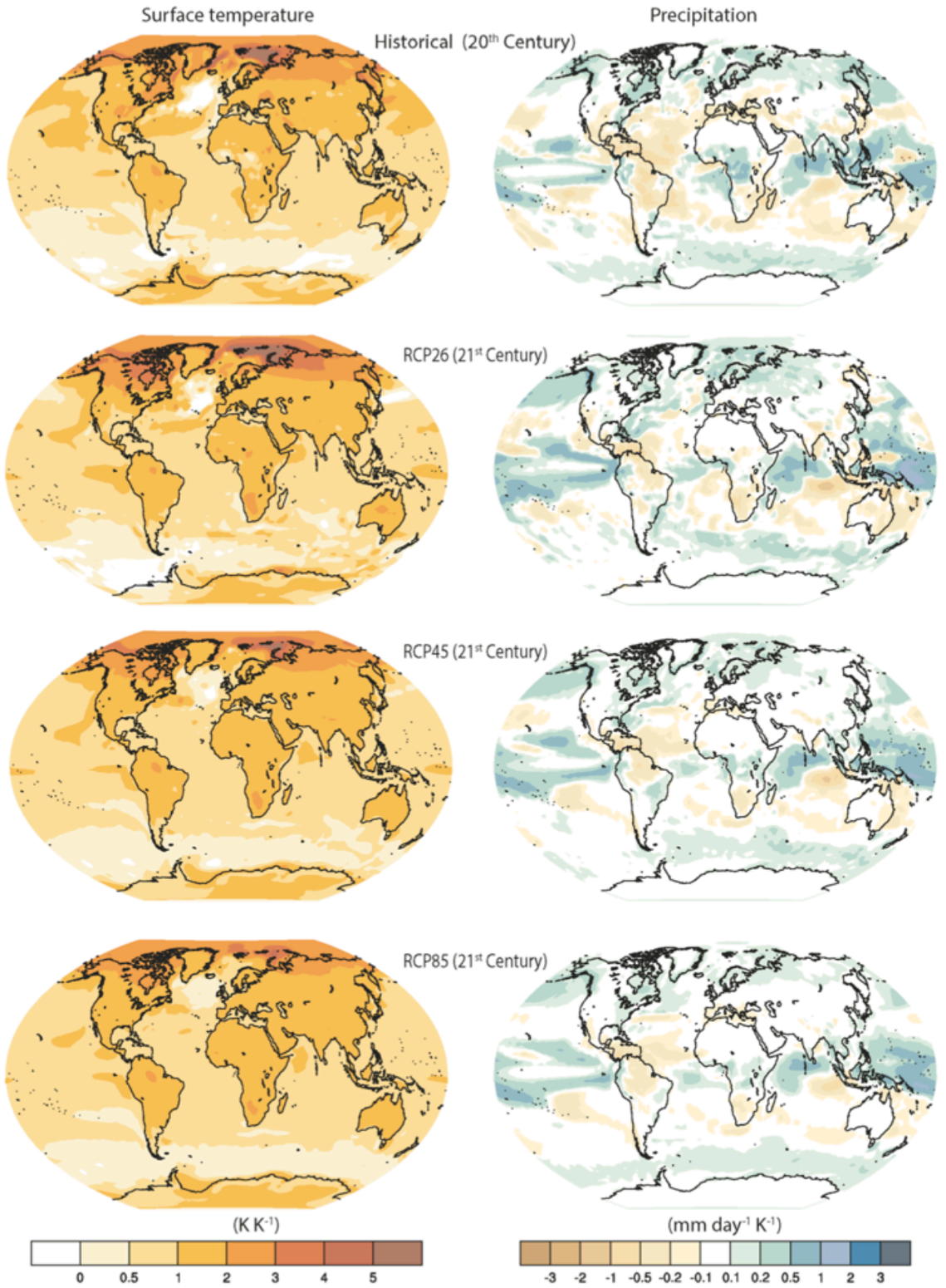
- Room for improvement in documentation of models (METAFOR was well motivated but too cumbersome), structuring of data (number of years in a file, sgs information), and data delivery (well known issues).

Vignette: Systematic biases in aerosol forcing



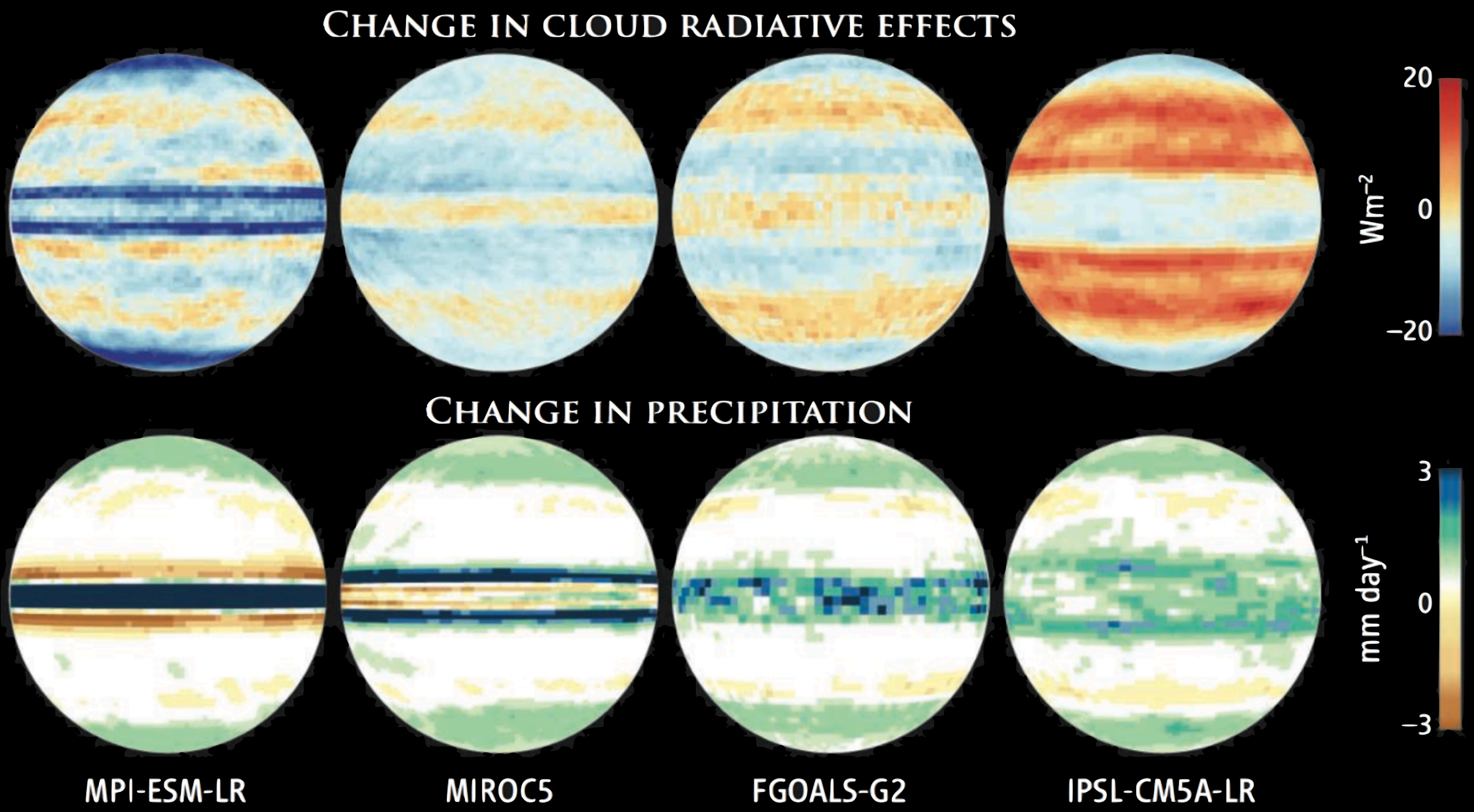
Vignette: Scenario similarity

Shown on right are different scenario runs with the MPI-ESM-LR. Left shows temperature change scaled by global average change. Right shows precipitation scaled by surface temperature change. Text



Giorgetta et al., *JAMES* (2013)

Vignette: Model Biases



Stevens and Bony, *Science* (2013)

Perspectives and Recommendations

- Our center would benefit from an ability to distinguish between science and operational activities (e.g., scenarios, which in our case could be taken over by DKRZ – they would like this). This is why we have been advocating for and support a scenario MIP.

- We should work to ensure that CMIP is strongly identified with scientific questions (i.e., Grand Challenges) we need to be more proactive here.

- Climates of the recent and distant past are where scenarios and science overlap, and can be better emphasized in CMIP.

- Worried that modeling (and computational/data) centers risk being de-emphasized, need to think of a ways (high-profile CMIP paper with center involvement) to continue to bring their contributions to the forefront.