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Hotel Laforet Shuzenji

ICCP-GSRA Workshop 2023, jointly with The 2nd EarthCARE Modeling Workshop

Wrap-up: GCMs

Rapporteurs: Tsuyoshi Koshiro, Takuro Michibata

Summary

Ming Zhao (GFDL)

An analysis of cloud radiative effects based on daily precipitation regimes

- Climatological LW and SW cloud radiative effects attributed various daily precipitation regimes: observations and GFDL's model simulations
- The analysis reveals error compensation and identifies key weather regimes for model improvement

Andrew Gettelman (PNNL)

Confronting global models with observations and the promise and pitfalls of improved prediction

- Improving weather/climate predictions requires synergistic use of observations and models: recent ESM advancements and new methods for Model-Data Fusion
- Key cloud microphysics problems: cloud phase, aerosol-cloud interactions, and precipitation

Richard Forbes (ECMWF)

Will EarthCARE lead to better weather forecasts?

- The answer is yes — improvement of initial state / improvement of the forecast model
- Need to improve the representation of microphysics

Summary (cont.)

Takuro Michibata (Okayama Univ.)

Process representations of cloud and precipitation in MIROC6 with prognostic precipitation: Evaluation against A-Train observations

- Prognostic modeling of precipitation in MIROC6: one of the desirable solutions, but not perfect
- Synergistic use of CloudSat/CALIPSO/MODIS with their satellite simulators is useful for process evaluation and improvement

Hideaki Kawai (MRI)

Importance of minor-looking treatments in GCMs —Can satellite observation reduce uncertainty in such treatments?—

- Minor-looking treatments (e.g., upper and lower limits, thresholds for enabling processes, and numerical methods) crucially determine the performance of GCMs
- They should be shared and discussed more in the climate community

Discussion for next step

- How can we improve model biases by EarthCARE observations with the satellite simulator?
- EarthCARE doppler CPR simulator (COSP2) by Yuhi Nakamura@AORI
- Consistency of model physics and retrieval processes is important
- Intercomparison between advanced GCMs and GCRMs is useful
- New approach: machine learning
- EarthCARE can help assimilation of cloud information for weather forecasts and model evaluation
- Key places to make progress with EarthCARE: vertical motions, reflectivity, cloud phase, hydrometeor species
- Can EarthCARE constrain the minor-looking treatments in GCMs to reduce their uncertainty?