Structure and Evolution of Tropical Cloud Population: From Field Observations to Global Cloud Permitting Models

PIs

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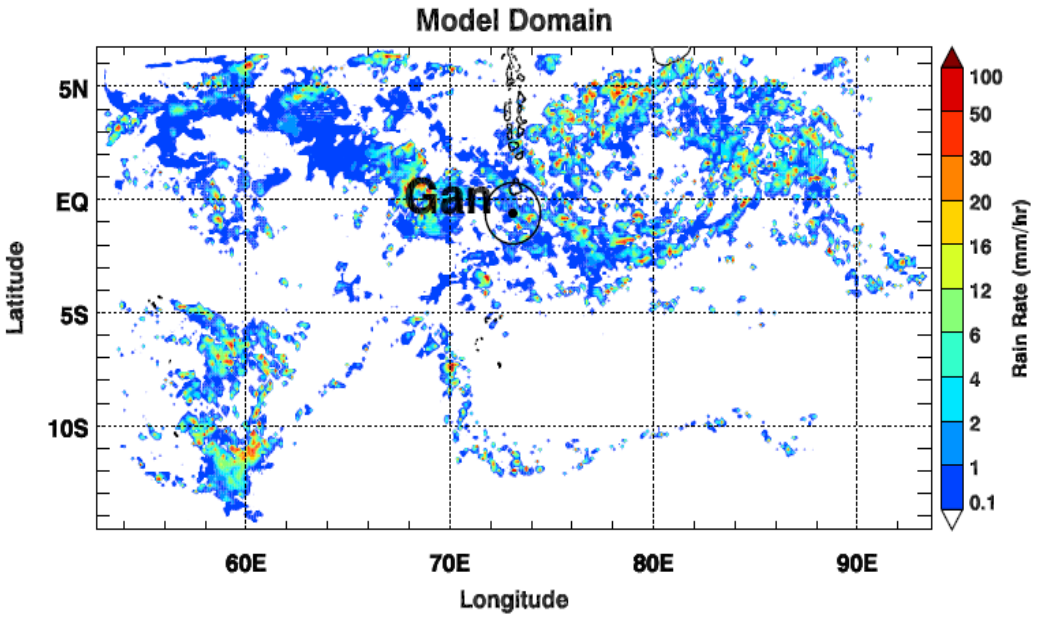
Objectives

- To apply the AMIE/DYNAMO field observations to the development of global CPMs by
  - Combining measurements from various AMIE/DYNAMO instruments to build observed cloud statistics.
  - validate simulations by global and regional CPMs under different large-scale conditions associated with various stages of the MJO.
  - Use a hierarchy of CPMs with different domains, cloud microphysics, and forcing to help isolate main sources of cloud and precipitation biases in global CPM simulations and to reduce these biases.

Models and Domain

- Global CPMs
  - MPAS, GEOS5
- Regional CPM
  - WRF
- CRM
  - GCE, SAM



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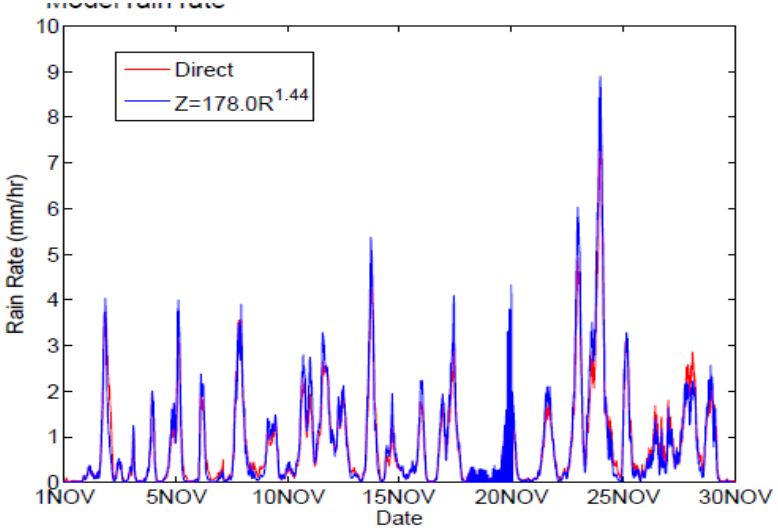
Some points for discussion

- For a fair evaluation, the model simulation design and analysis area has to match the radar domain.
  - A radar simulator is critical bridge between the model and radar worlds.
- How do we know if a radar simulator is working correctly?
  - The derived model rain-rate should be close to the direct model output.



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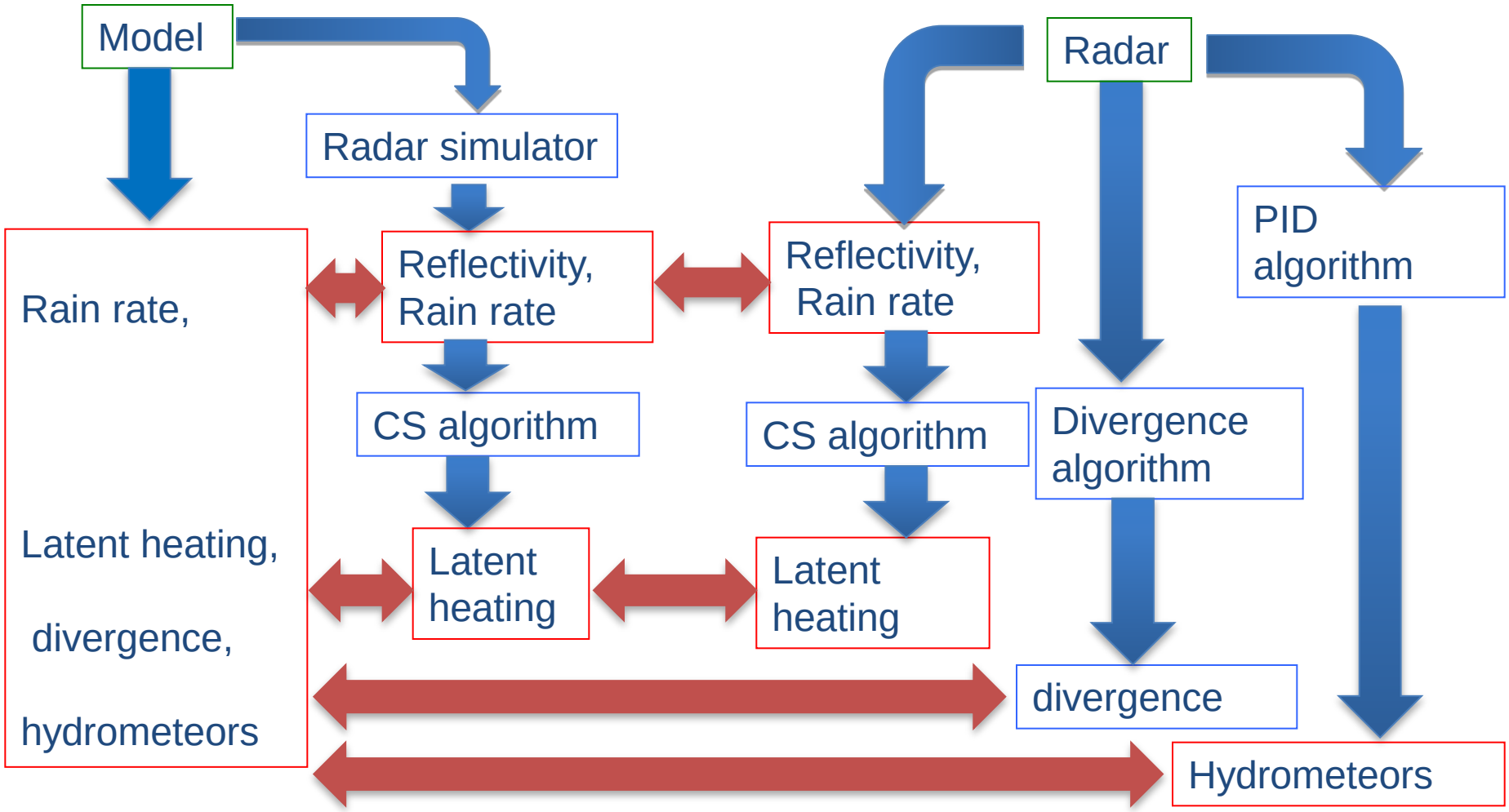
- What would a comprehensive model-radar comparison look like?



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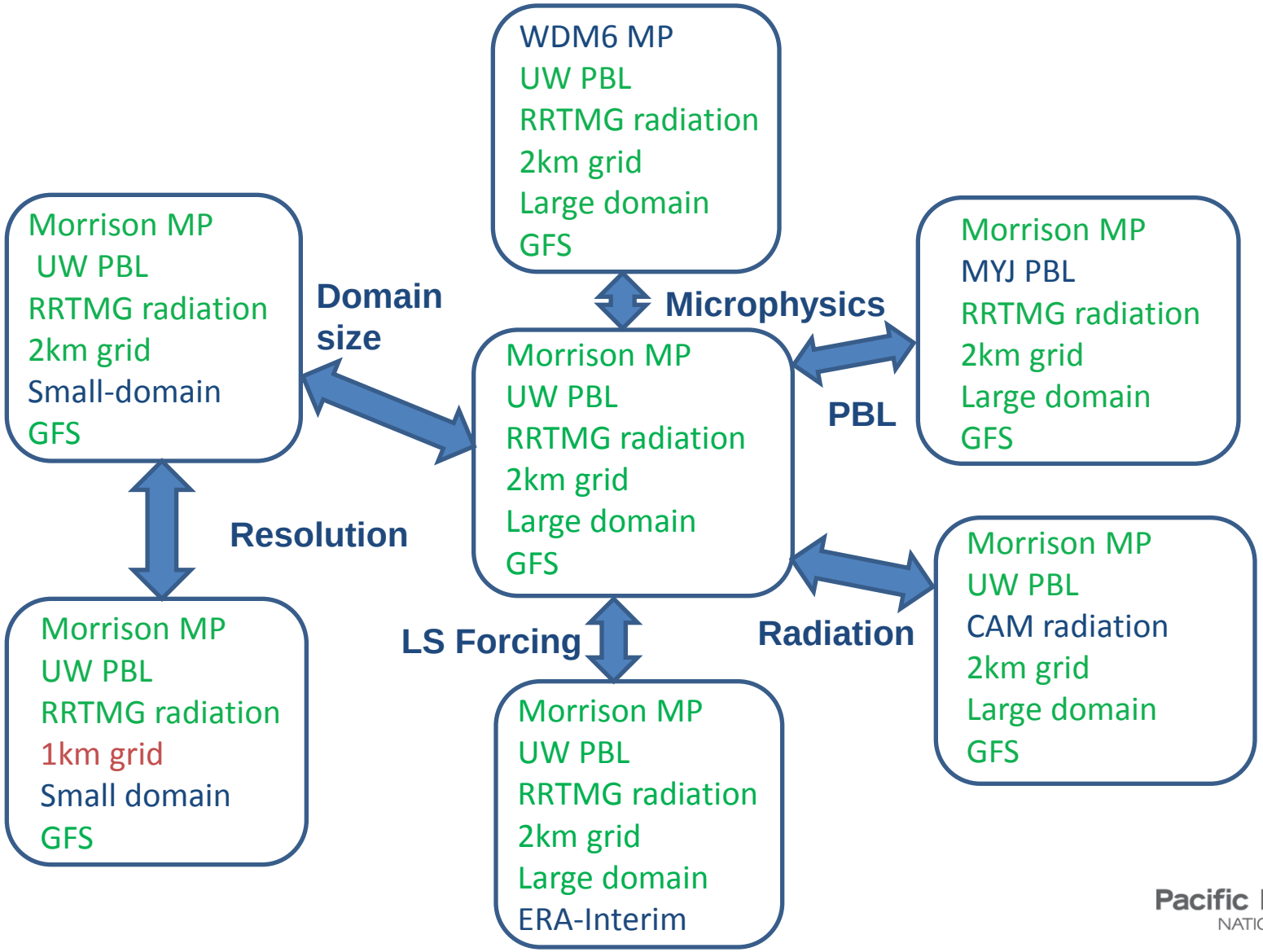
How do we do attribution of RCPM biases?



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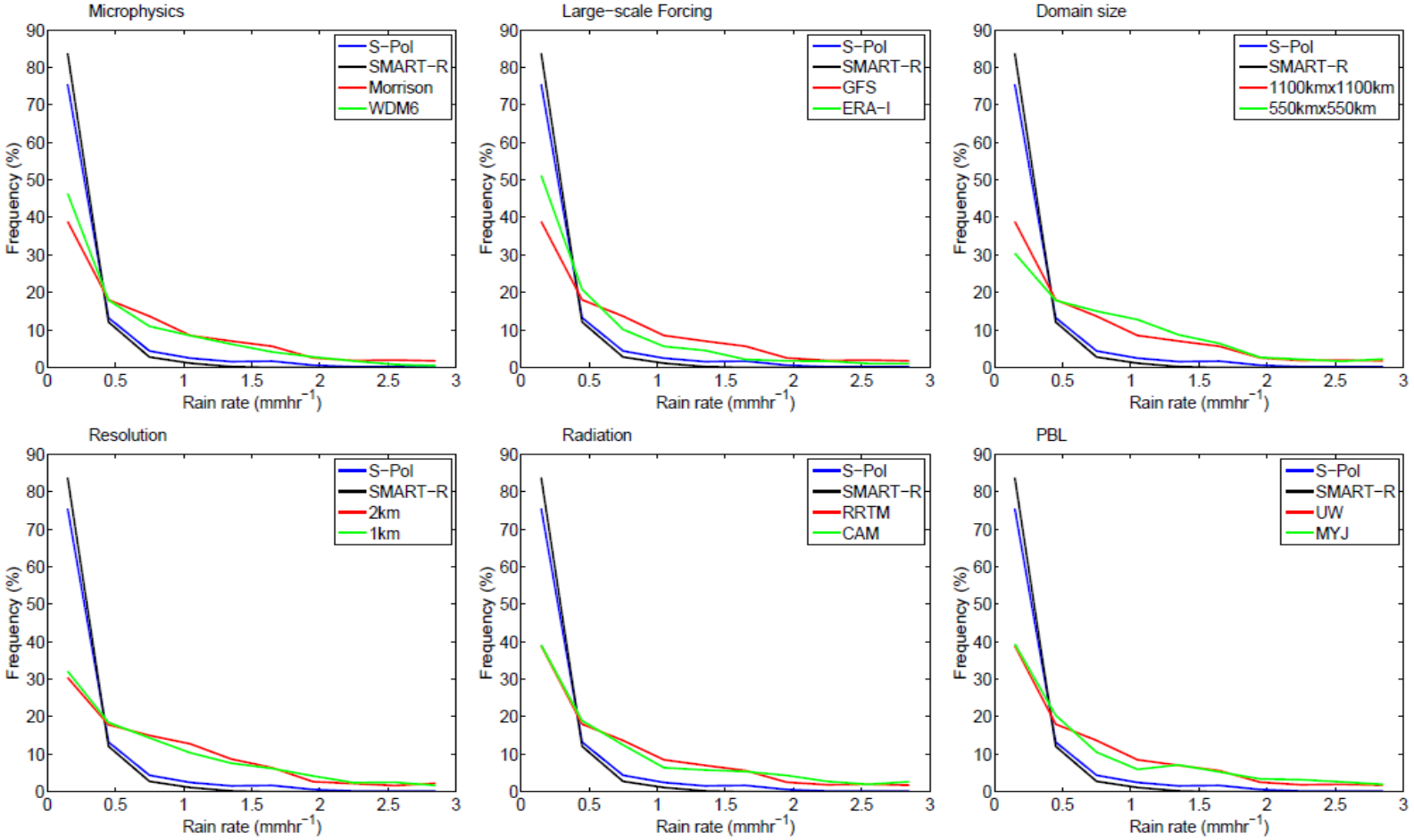
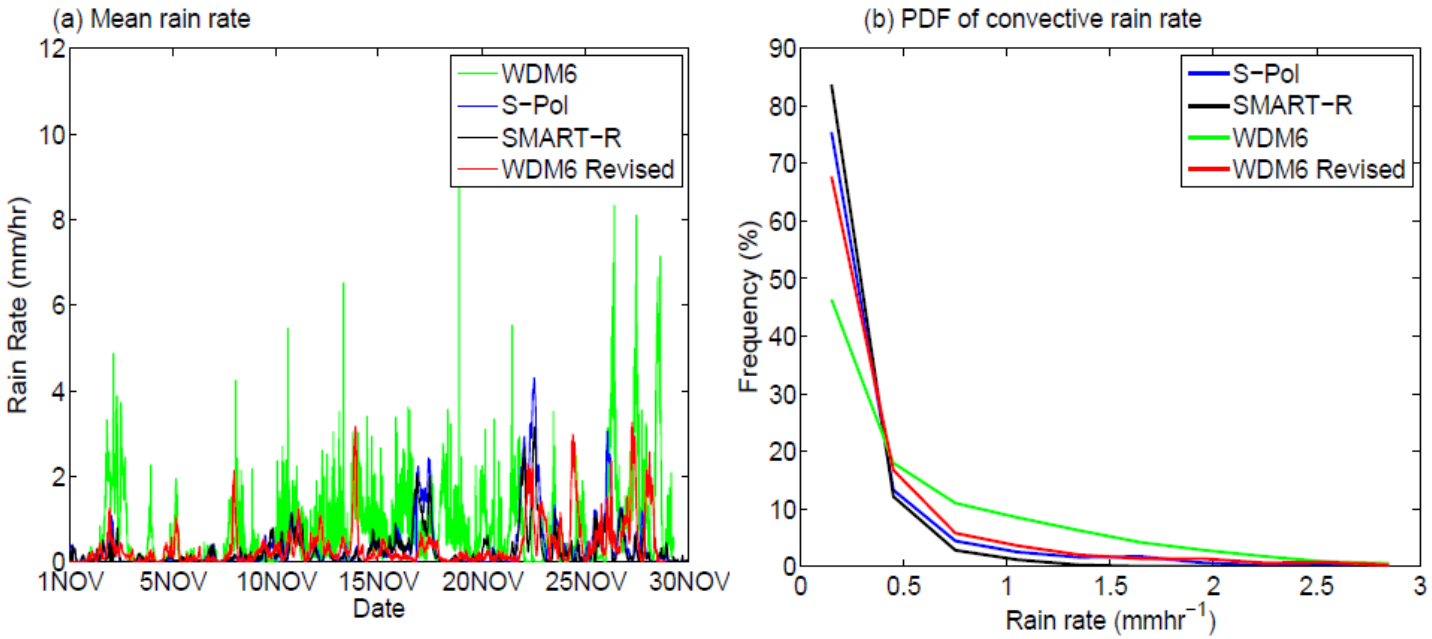


- Convective precipitation statistics is found to be most sensitive to the choice of microphysics, large-scale forcing and domain size.
- Less sensitive to resolution, radiation and PBL schemes.

- How do we go about reducing biases?
  - Work with microphysics scheme developers.



  - When WDM6 is modified to include limits for the maximum and minimum values of slope parameters for rain and cloud water based on other observations, the total and convective rain rates are dramatically improved.

We are open to collaboration with

- Microphysics scheme developers interested in evaluating and improving their schemes for application to GCPMs and RCPMs.
- Modelers interested in running different with different dycore and/physics in GCPM and RCPM mode.
- Anyone interested in analyzing our model output for process studies and/or cumulus parameterization development.

Thank you

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