Systematic and Objective Evaluation of Earth System Models: PCMDI Metrics Package (PMP) version 3

Science Question

With the growth of data size and diversity of ESM simulations, it is important to establish a framework for systematic evaluation to respond to the following questions:

1) What are the relative strengths & weaknesses between models?

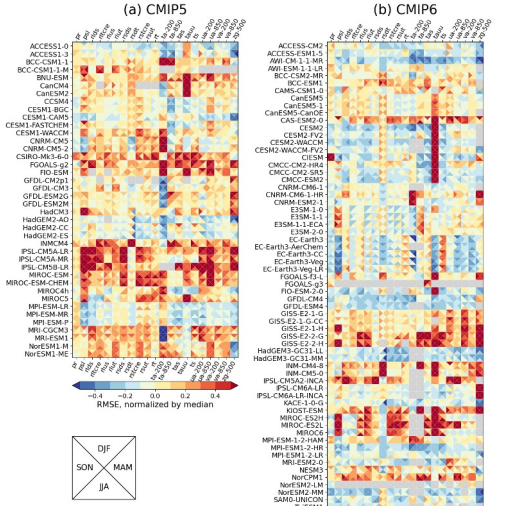
2) How are models improving with further development?

Key Accomplishments

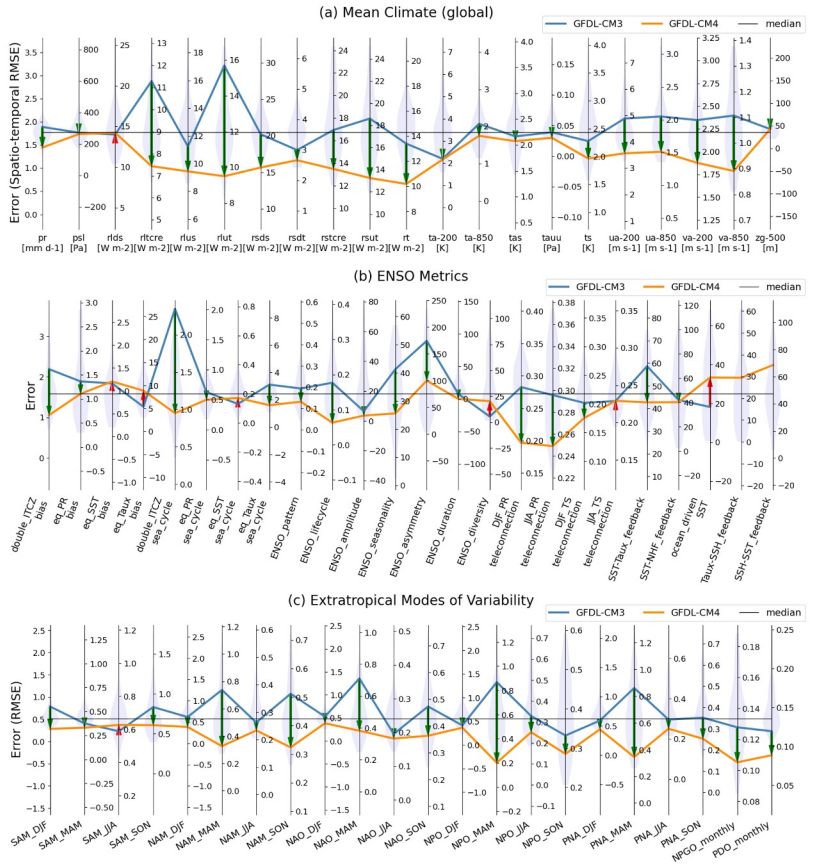
- Upgrades to PMP provide a more efficient and systematic evaluation of ESMs, with more comprehensive evaluation of their performance.
- PMP now supports a diverse suite of metrics that includes climatology, variability, and extreme in a single reusable software package.

Impact

- Together with the PMP results archive, PMP is expected to play a crucial role in benchmarking ESMs for international intercomparison projects and during the model development process.



PMP results for collective evaluation and intercomparison of ESMs. The spatial RMSE of global seasonal climatologies for (a) CMIP5 and (b) CMIP6. The interactive version of the Portrait plot is available on the PMP result pages on the PCMDI website (https://pcmdi.llnl.gov/metrics/mean_clim/).



Contrasting performance of two different versions of a model in their Historical experiment for errors from (a) mean climate, (b) ENSO, and (c) extratropical modes of variability. Improvement (degradation) in the later version of the model is highlighted as a downward green (upward red) arrow between lines.

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