

A brief update on Benchmarking Simulated Precipitation in Earth System Models WGNE36

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- Motivation, US DOE July 2019 Precipitation Metrics Workshop
- Progress on Benchmarking Simulated Precipitation
- Exploratory Metrics
- Possible connections with WGNE

Benchmarking Simulated Precipitation in Earth System Models

WORKSHOP REPORT



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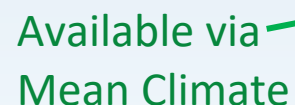
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Baseline and exploratory metrics

- A limited set of routine or baseline metrics are being advanced for repeat use benchmarking via development of a quasi-operational capability
- Exploratory metrics are being investigated for a variety of characteristics lacking well-established performance tests (e.g., ARs, TCs)

https://climatemodeling.science.energy.gov/sites/default/files/RGMA_Precip_Metrics_workshop_0.pdf



Workflow to run all or partly: Underway

Baseline metrics

Current status and priorities



- Implemented in python with interactive demos (Jupyter notebooks) and includes a variety of observational datasets
- Emphasis on provenance and reproducibility for lasting benchmarking
- Results for all generations of CMIP and AMIP being made available
- A complete version expected within the coming year
- Could serve as a guide to *challenge and assist* modelers in improving simulated precipitation – a potential discussion for WGNE37?

Exploratory metrics: Overview

- Purpose: To identify and develop benchmarks of increasingly diverse aspects of precipitation to meet the needs of different user communities (model developers, earth system scientists, impact researchers and stakeholders)
- A framework is being advanced to help loosely integrate tools independently developed by different teams: Coordinated Model Evaluation Capabilities (CMEC)
- CMEC could be stitch together independent exploratory analysis tools to enable modelers to more directly benefit from ongoing community efforts

Exploratory Metrics		
Process-oriented Metrics	Regime-oriented Metrics	Use-inspired Metrics
Diurnal cycle of precipitation	Frontal precipitation	Fraction of wet days
Character of the distribution of precipitation rates	Extratropical + tropical cyclones	Average length of consecutive wet periods
Emergent constraints on precipitation	Mesoscale convective systems	Decorrelation time of precipitation
Orographic precipitation	Monsoonal precipitation	Intensity-duration-frequency curves
Teleconnections	Weather states	Correlated extremes

Coordinated Model Evaluation Capabilities

<https://cmec.llnl.gov/>



Goals

1. Develop robust **standards** for framing metrics and diagnostics packages.
2. Develop accompanying tools for **coordinated execution** of metric packages, and **visualization of / interaction with** metrics and diagnostics package output.
3. Build **connections across projects and agencies** related to model evaluation activities.
Fostering interactions with multiple research groups and individual PIs.

Notably: CMEC is targeted towards outsourcing development activities to the evaluation developers, rather than taking ownership in-house