

# Climate Model Evaluation: Where we are now, and the next frontier..

Current status and future opportunities

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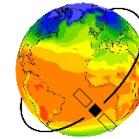
*WCRP Workshop on Future Climate Modelling*



# CMIPx engaged and enabled a global community

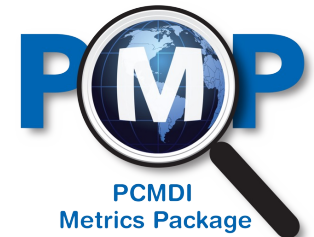
## Where we are now?

- Coordinated model analysis
  - Number of “packages” steadily growing
  - Limited project coordination – often requires extensive intervention for reuse
  - Duplication of efforts, data
- Leveraging community insights
  - PCMDI Metrics Package (US)
  - ESMValTool (EU)
  - ILAMB (US)
  - CliMAF (France)
  - CVDP (US)
  - and others ...
- Connecting through frameworks
  - Coordinated Model Evaluation Capabilities (CMEC, US)
  - NOAA Model Diagnostics Task Force (MDTF, MAPP, US)



**ESMValTool**

Earth System Model Evaluation Tool



**MAPP**

Modeling, Analysis,  
Predictions, and Projections



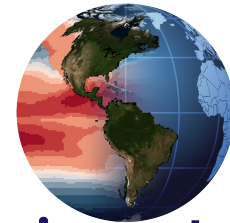
**CMEC**

Coordinated Model Evaluation Capabilities

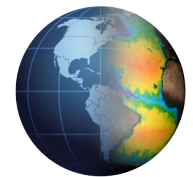
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## Opportunities for continued science discovery?

- Moving from global -> regional
  - Global climate change is an answered question
  - Quantifying impacts – next science need
  - Evaluating fitness-for-purpose regional applications
- Process-based evaluation
  - Understanding why a result, or why a bias
  - Seamless weather (days) -> climate (centuries) analyses
  - Fitness-for-purpose for future prediction (historical extremes simulated?)
- Leveraging across agencies
  - NOAA MDTF (US) and DoE CMEC (US) are interoperable
- Provenance and reproducibility
  - CMIP “standards” allow systematic evaluation
  - ESGF a global repository for “planet-sized” experimentation
  - Bring observations to models – obs4MIPs (NASA, NOAA, ESA, ECMWF, ...)
  - Focus on quantifying known uncertainties – input4MIPs






input4MIPs



obs4MIPs  
Observations for Model Intercomparisons Project

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## Opportunities for continued science discovery?

- Do reproducible science
- Make data available (including derived quantities!)
- Make code available (stop duplicating effort!)
- Ensure data providers are recognized (citation, usage stats, ...)
  - Recognition is important for funding
- Dataset provenance (versions, source, raw inputs)
  - Analysis methods/code provenance (Github, zenodo, figshare, ...)
- Build data and code around existing standards
  - Extend standards enabling reuse and comparison
  - Develop tools around community standards
  - Build connections across projects (and agencies)
- Build science connections across silos (climate  health  ...)
  - WG1 ↔ WG2 ↔ WG3 ↔ WG1 



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