

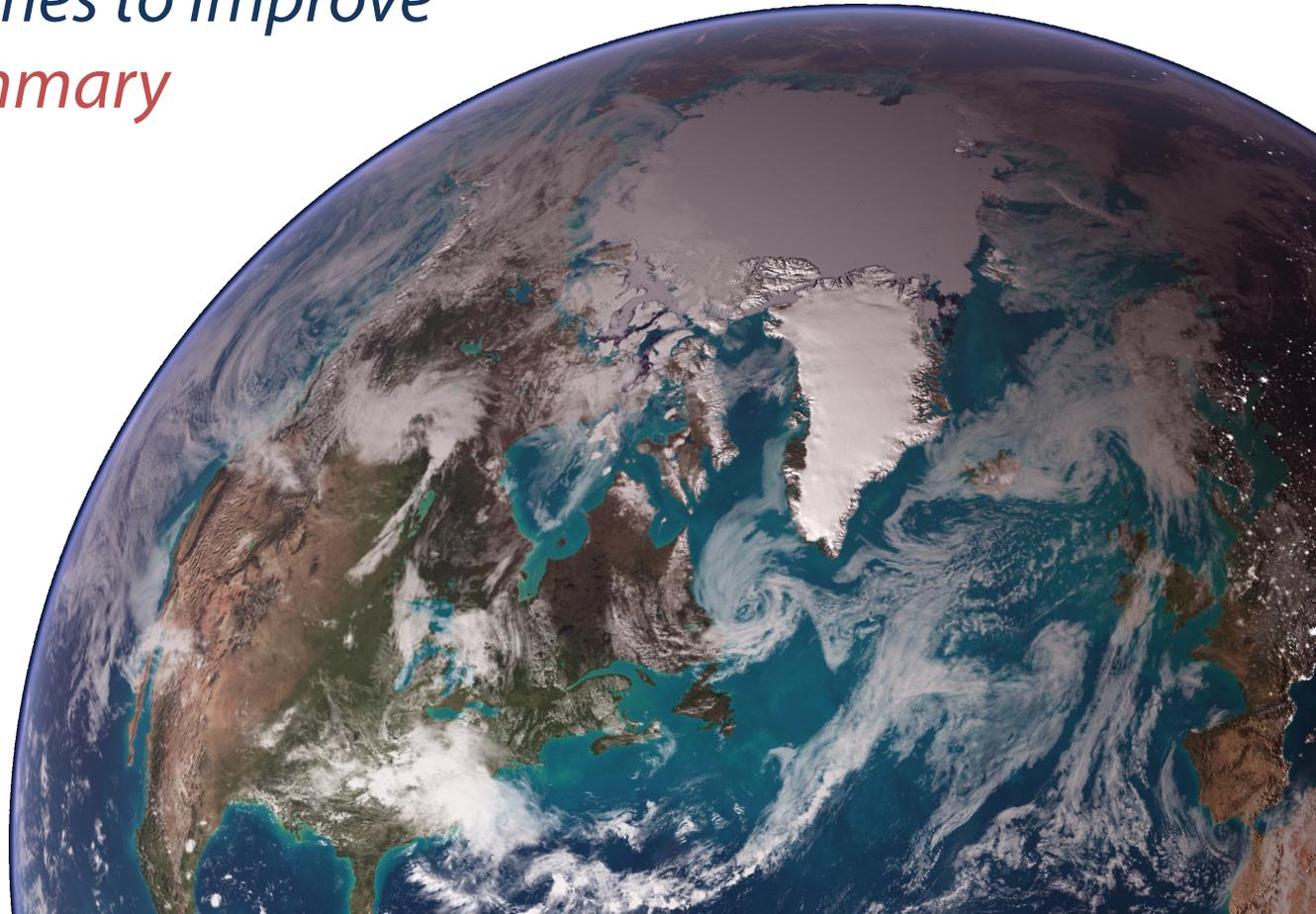


Theme 2: Understanding the Physical System

*Explaining Extremes to Improve
Predictions - **Summary***

Joseph Barsugli

Science Review
12-14 May 2015
Boulder, Colorado



Science Questions Addressed

- What are the causes of climate variability and change on regional scales?
- How does climate affect extreme events?
- What is the role of local and regional factors in making an event “extreme”?

Notable Successes

- Improved understanding of SST-forced and other boundary-forced components of regional trends and extreme events
- Contributed to a multi-faceted understanding of the factors that determine the flooding impact of atmospheric rivers
- Produced and contributed to assessments of the causes and predictability of many high-impact events
- Peer-reviewed articles; stakeholder meetings; webinars
- Inform operational forecasts and outlooks through regular participation in Climate Prediction Center (NOAA/CPC) and Famine Early Warning System (FEWSNET) calls

- Developing large atmosphere, coupled, and hydrologic model ensembles to address these questions
- Developing FACTS website to share data and enable analysis (Poster by Don Murray)

FACTS
Facility for Climate Assessments

[PSD Climate Data Repository](#) | [Search](#)

Climate Model Comparison

Plot monthly maps from different climate model datasets as well as differences between datasets.

Collection: **Monthly Climate Model Runs**

Select Data To Plot
Make Plot

Dataset 1	Dataset 2 (Optional)
Model: CAM4	Model: ECHAM5
Experiment: AMIP with Observed Radiative Forcing	Experiment: AMIP with Observed Radiative Forcing
Ensemble Member: Member 4	Ensemble Member: Member 4
Variable: Large Scale Precipitation	

Update Data Selection

Area Statistics

Variable: Large Scale Precipitation

Statistic: Average Anomaly

Months: Start: January End: January

Years: First Dataset: Start: 1979 End: 1988
or List: (comma separated)

Years: Second Dataset: Start: 1979 End: 1988
or List: (comma separated)

Region: Continental U.S.

Plot Options

Plot As: Difference Separate Plots

Plot Type: Map (Image) Google Earth

Override Contour Interval:

Defaults: Range: Low High

CAM4 amip_obs_rf ens04 Jan 1979-1988

Large Scale Precipitation mm/day

ECHAM5 amip_clim_o3 ens04 Jan 1979-1988

Large Scale Precipitation mm/day

Download image
Files used for plots:
CAM4 amip_obs_rf ens04 Jan 1979-1988
ECHAM5 amip_clim_o3 ens04 Jan 1979-1988
(Download All Files)

U.S. Department of Commerce | National Oceanic and Atmospheric Administration
 Earth System Research Laboratory | Physical Sciences Division
 NOAA/ESRL/PSD Climate Data Repository

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Future Directions

- Assess high-impact weather and climate events
- Explore future scenarios of extremes in more detail
- Refine event attribution approaches
- Address seasonal risks of extremes
- Connect climate and local/regional land surface processes and weather scale dynamics
- Enhance ensembles and web-based tools (e.g. FACTS)
- Explore effective communication strategies to explain causes of events

Future Directions

PSD Strategic Goal 2015-2020

- Develop new knowledge and capabilities to explain observed weather and climate extremes, trends and their impacts to inform risk management and adaptation decisions
- Work across teams in PSD to integrate event and trend analysis with fundamental predictability studies, fine-scale hydrologic modeling and analysis
- Work with partners to better incorporate predictive physical understanding in impact modeling and assessments, adaptation, and preparedness