



OAR Climate Program Office Modeling, Analysis, Predictions, and Projections (MAPP) Program:

Overview & Interest in Earth System Data Assimilation

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Program scope

MAPP's Mission:

To enhance the Nation's capability to understand and predict natural variability and changes in Earth's climate system.



- We support research, transition work, and engagement activities that focus on the development, integration, and application of Earth system models and analyses
- We partner with programs/labs/centers within NOAA and with other agencies through USGCRP, US-CLIVAR, and National ESPC Program
- We engage with external research community via CPO's annual Federal Funding Opportunity to extend NOAA's research capabilities; we facilitate internal research interactions and coordination



MAPP priority areas

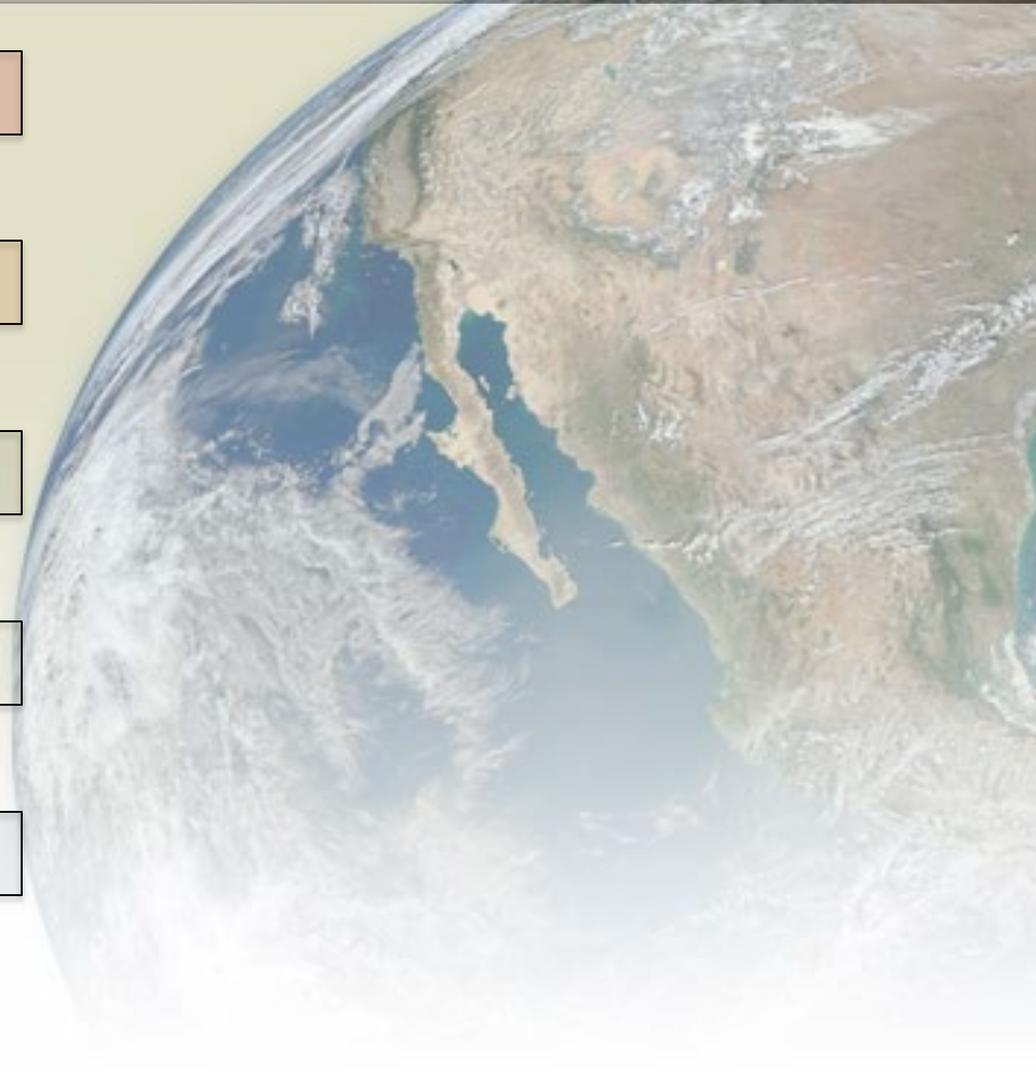
Prediction -- Weeks to Decades

Climate Reanalysis and DA

Climate and Earth System Modeling

Drought and Other Applications

Climate Projections





MAPP priority areas & task forces

Prediction -- Weeks to Decades

Subseasonal to Seasonal Prediction TF

Climate Reanalysis and DA

"Climate Reanalysis TF (ended)

Climate and Earth System Modeling

"Climate Model Development TF

Drought and Other Applications

Drought TF

Climate Projections

Model Diagnostics TF

- Task Forces: coordinated PI-driven research efforts focused on the topic of a particular grant competition





Support for advances in NOAA models and prediction

MAPP goal: support improvements of NWS Climate Forecast System and GFDL models for monitoring and prediction across timescales

- **Advance coupled Earth system data assimilation for monitoring and prediction**
- Assess benefits of high-resolution modeling
- Test new physical representations in models via Climate Process Teams
- Process level diagnostics for model improvement (Model Diagnostics Task Force)
- Modeling software infrastructure and CFS data access





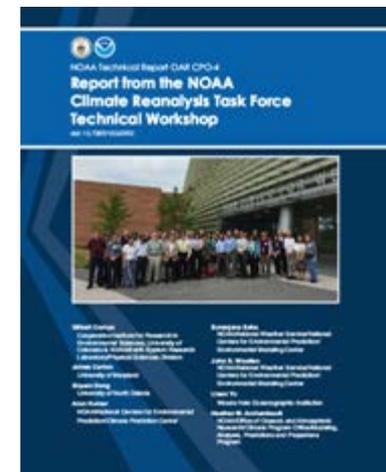
MAPP Climate Reanalysis Task Force Activities

In FY13, MAPP funded seven 3-yr projects to evaluate & improve aspects of NOAA's reanalysis for climate monitoring and prediction:

- Work on next generation of NOAA climate reanalyses (PI: A. Kumar, CPC)
- Stratospheric processes (PI: C. Long, CPC)
- Advanced ocean DA (PI: J. Carton, UMD)
- Air-sea fluxes (PI: L. Yu, WHOI)
- Land surface (PI: M. Ek, EMC)
- Polar clouds, precip., radiation w/ combined surface-satellite obs (PI: X. Dong)
- Stratospheric ozone (PI: G. Compo, UC/CIRES & ESRL)

Task force held a technical workshop in May 2015 to

- Increase awareness of complementary reanalysis efforts at national and international institutions
- Identify challenges, possible solutions to competing uses of reanalysis datasets within NWS and other operational centers





MAPP's FY16 data assimilation projects (two-year grants)

“Upgrading the CPC operational ocean monitoring to an eddy-permitting global ocean analysis using the Hybrid Global Ocean Data Assimilation System as a replacement for GODAS” (NESDIS & NWS/STI support)

Steve Penny (UMD), Jim Carton (UMD), Yan Xue (CPC), David Behringer (EMC), Laury Miller (EMC)

“Development toward NCEP’s fully-coupled global forecast and data assimilation system: A coupled wave–ocean system” (NWS/STI support)

Stephen Griffies (GFDL), Robert Hallberg (GFDL), Alistair Adcroft (GFDL & Princeton), Arun Chawla (EMC), Suranjana Saha (EMC), Steve Penny (UMD/NCEP)

“Operational Transition of Soil Moisture and Snow Data Assimilation in the North American Land Data Assimilation System (NLDAS)” (NWS/STI support)

Christa Peters-Lidard (NASA Goddard), Michael Ek (EMC), David Mocko (Goddard), Sujay Kumar (Goddard), Youlong Xia (EMC), Jiarui Dong (EMC)

“Development of ensemble-based sea ice analysis and forecasting in the Climate Forecast System”

Jim Carton (UMD), Steve Penny (UMD/NCEP), Robert Grumbine (EMC), Suru Saha (EMC)





Potential data assimilation research & transition needs

- Research on new data assimilation approaches for Earth system monitoring and prediction
- Systematic exploration of benefits of weakly vs. strongly coupled data assimilation for the Earth system
- Incorporation of new observational datasets in NOAA operational data assimilation systems



Questions to frame today's discussions

- What Earth system monitoring and prediction capabilities is EMC hoping to develop in the next 5–10 years? Which new or improved services is NWS hoping to provide? What are the capabilities gap that require R&D?
- What new research/science can be enabled by coupled DA? What is the status of NOAA research Earth system that can enable advanced DA?
- What new climate-quality Earth system data from JPSS is becoming available for DA that could enable new NOAA services?