

National Multi-Model Ensemble (NMME)

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(with help from NMME Project Team)

Climate Prediction Center

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Why Multi-Model Ensemble?

- **MME is a practical approach to quantify forecast uncertainties due to model errors**
- **Allows for a larger ensemble to sample the PDF of seasonal means. Larger ensembles also lead to better skill**
- **Is an economical way to pool computing and developmental resources at various institutions**
- **Builds up a data set can research community can tap into to advance understanding of climate variability**

NMME

- **Time line (Phase-1)**
 - **NCEP/Climate Test-Bed (CTB) workshops on NMME on February 18 & April 18, 2011**
 - **Workshops established protocols for experimental real-time NNME (e.g., hindcast period; forecast submission date; variables)**
 - **Hindcast and real-time forecasts submitted to Climate Prediction Center and are also distributed via IRI data library**
 - **NMME became real-time in August 2011, and data submission adheres to CPC's operational schedule**

NMME Partners

- **University of Miami/RSMAS** (Ben Kirtman is the project lead)
- **NCAR**
- **COLA**
- **IRI**
- **University of Colorado – CIRES**
- **NASA – GMAO**
- **NOAA/NWS/NCEP – EMC & CPC**
- **NOAA/OAR – GFDL**
- **Canadian Meteorological Center**

Data Availability

- **Monthly means of total precipitation; sea surface temperature; T2M**
 - <http://iridl.ldeo.columbia.edu/SOURCES/.Models/.NMME/>
- **Hindcast Verifications (e.g., anomaly correlation; RPSS; Reliability...)**
 - <http://iri.columbia.edu/~tippett/NMME/>

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NMME Forecasts of Monthly Climate Anomalies for

August 2012 to February 2013

[NMME Forecasts of Monthly Climate Anomalies Home](#)

[View Forecasts by Model](#)

Three-month mean spatial anomalies

	Season 1	Season 2	Season 3	Season 4	Season 5
Global SST	●	●	●	●	●
Global prate	●	●	●	●	●
Global tmp2m	●	●	●	●	●
US prate	●	●	●	●	●
US tmp2m	●	●	●	●	●

Skill maps for 3-month means

	Season 1	Season 2	Season 3	Season 4	Season 5
Global SST	●	●	●	●	●
Global prate	●	●	●	●	●
Global tmp2m	●	●	●	●	●
US prate	●	●	●	●	●
US tmp2m	●	●	●	●	●

Anomalies with Skill Masks Applied

<http://www.cpc.ncep.noaa.gov/products/NMME/seasanom.shtml>



The National Multimodel Ensemble

There is ample evidence of the need for a US national multi-model seasonal-to-interannual prediction system. It is in the Nation's interest to have a multi-model seasonal-to-interannual prediction capability independent of information that may be available from outside sources. The advantage of a MME prediction system is that it, in addition to providing additional forecast information for the surface air temperature and precipitation outlooks that are currently products of the Climate Prediction Center (CPC), the MME can also provide information about fields and phenomena that the US has specific interest in predicting: ENSO cycle, monsoons, intraseasonal variability and the Madden-Julian Oscillation. (Ben P. Kirtman and Dughong Min)

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Verification

Precipitation

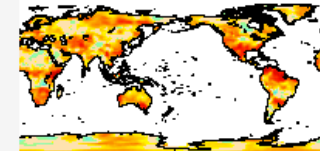
Near-surface temperature

SST

Precipitation

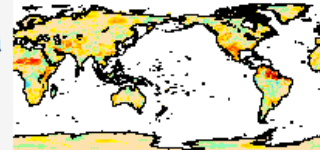
Anomaly correlation

This map shows the anomaly correlation between NMME forecast precipitation and observations as a function of start and lead.



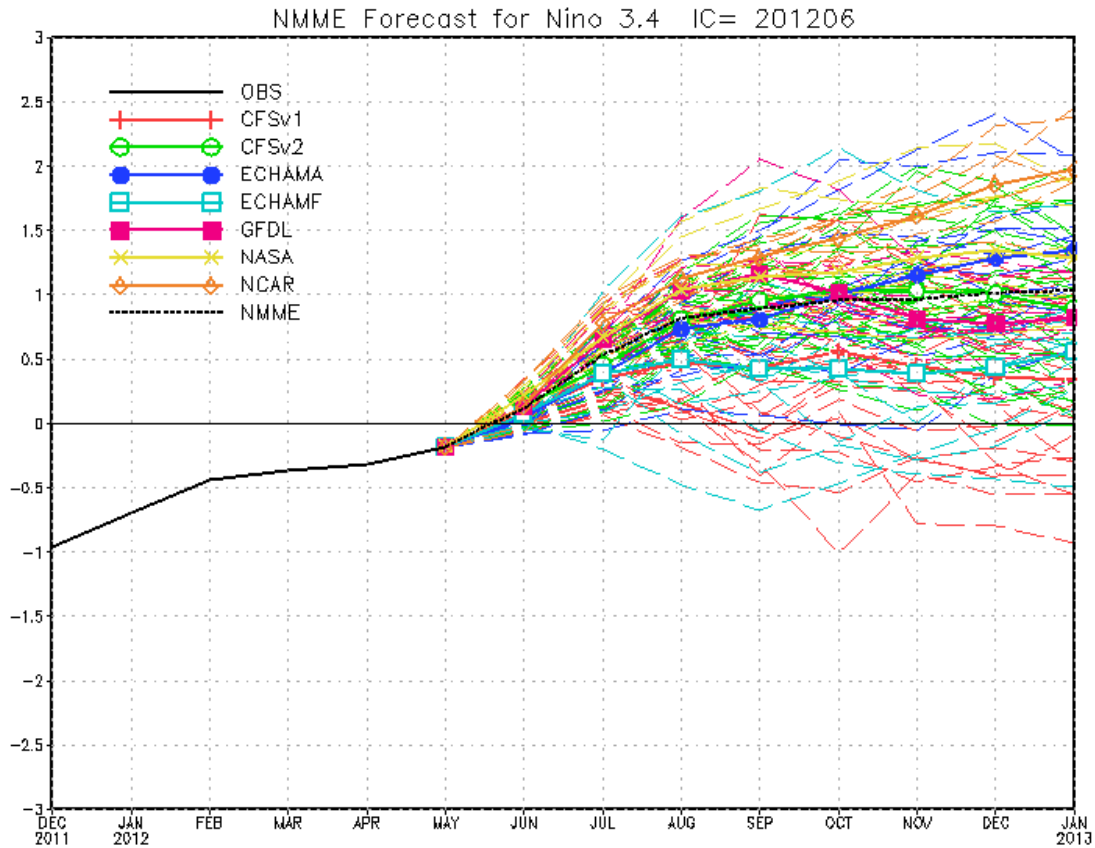
RPSS

This map shows the RPSS for NMME forecast precipitation as a function of start and lead.



<http://iri.columbia.edu/~tippett/NMME/>

ENSO Plumes



NMME – Phase-2

- **Continue Experimental Real-Time Predictions**
- **Enhancing Current NMME Capability**
- **Model Updates: GFDL-CM2.5 (20 km AGCM), IRI (T106), CCSM4, CESM1**
- **Assess Forecast Quality**
- **MME Combinations, Model Independence**
- **Drought Assessment**
- **Include: soil moisture, runoff, evaporation**
- **Sub-Seasonal Assessment**
- **Forecast Protocol**
- **Initial Condition Sensitivity Experiments**
- **Ocean, Land**
- **Improved Data Distribution**
- **NCAR To Host**

Possible USCLIVAR Links with the NMME

- **Bring involvement of multiple US funding agencies in advancing NMME?**
- **NMME hindcast datasets can enable science in understanding of predictability on seasonal time-scale**