Winter Forecast for 2013–2014 with CFSv2 and NMME

Hui Wang
NOAA/NWS/NCEP/Climate Prediction Center

Acknowledgments: Arun Kumar, Wanqiu Wang, Qin Zhang
Emily Becker, and Huug van den Dool

Fifth Session of North Eurasian Climate Outlook Forum (NEACOF-5)
October 28 – November 1, 2013, Moscow
NCEP Climate Forecast System (CFS)

- Fully coupled ocean-atmosphere-land model
- CFSv1: implemented for operational seasonal forecast at NCEP in 2004 and terminated in November 2012
- CFSv2: operational at NCEP in March 2011
- 10-month forecasts, 4 runs each day
- 40-member ensemble forecast from initial conditions of the latest 10 days, updated on a daily basis

Available online at
U.S. National Multi-Model Ensemble (NMME)

- Experimental multi-model seasonal forecasting system
- Coupled models from NCEP, GFDL, NCAR, NASA, and Canada's CMC1 and CMC2
- Extremely effective at quantifying prediction uncertainty
- Better prediction skill than any single model ensemble
- Monthly updates with lead times from 0 to 6 months

Available online at
http://www.cpc.ncep.noaa.gov/products/NMME/
## Hindcasts

<table>
<thead>
<tr>
<th>Model</th>
<th>Hindcast Period</th>
<th>Ensemble Size</th>
<th>Lead Times</th>
</tr>
</thead>
<tbody>
<tr>
<td>NCEP CFSv2</td>
<td>1982–2009</td>
<td>24</td>
<td>0–9 mon</td>
</tr>
<tr>
<td>GFDL-CM2.2</td>
<td>1982–2010</td>
<td>10</td>
<td>0–11 mon</td>
</tr>
<tr>
<td>NCAR CCSM3.0</td>
<td>1982–2010</td>
<td>6</td>
<td>0–11 mon</td>
</tr>
<tr>
<td>NASA GEOS5</td>
<td>1981–2010</td>
<td>6</td>
<td>0–9 mon</td>
</tr>
<tr>
<td>CMC1</td>
<td>1981–2010</td>
<td>10</td>
<td>0–11 mon</td>
</tr>
<tr>
<td>CMC2</td>
<td>1981–2010</td>
<td>10</td>
<td>0–11 mon</td>
</tr>
</tbody>
</table>

Hindcasts are used to evaluate forecast quality based on models’ past performance.
2013–2014 Winter Forecast

- Forecasts of Dec, Jan, and Feb (DJF) seasonal mean anomalies with October initial conditions (IC)
- ENSO forecast
- Precipitation and surface air temperature ($T_{2m}$)
- Probability forecasts
- Comparison between CFSv2 and NMME
Forecast Skill for DJF SST: Anomaly Correlation (AC)

Based on hindcasts   ICs: Oct

**NMME**: better skill for ENSO forecast
CFSv2: warmer SST anomalies
NMME Seasonal Forecast  IC: Oct 2013
Niño 3.4 SST Plumes (K)

NMME: ENSO-neutral condition

Nino 3.4 SST: GFSv2 > NMME
NMME Probability Forecast  IC: Oct 2013

DJF 2013/2014 SST

ENSO: neutral
Negative PDO

Warmer SST: WP warm pool, N. Atlantic, Arctic Ocean, and S. Oceans
Forecast Skill for DJF Prcp: Anomaly Correlation (AC)

Based on hindcasts   ICs: Oct

CFSv2

NMME

NMME: better skill for tropical precipitation forecast
Seasonal Forecast  IC: Oct 2013
DJF 2013/2014 Prec Anomaly (mm/day)
NMME Probability Forecast  IC: Oct 2013

DJF 2013/2014 Prcp

Above  Below  Neutral
40%  50  60  70  40%  50  60  70  40%  50  60  70
Forecast Skill for DJF $T_{2m}$: Anomaly Correlation (AC)

Based on hindcasts  ICs: Oct

**CFSv2**  CFSv2 Forecast of T2m Skill (AC)  IC=10 for fsea

**NMME**  NMME Forecast of T2m Skill (AC)  IC=10 for fsea
Warming over most of global land
NMME Probability Forecast  IC: Oct 2013

DJF 2013/2014 T2m
CFSv2 Updates

DJF 2013/2014

ICs: 10–19 Oct 2013

Latest Forecast

ICs: 19–28 Oct 2013
CFSv2 Updates
DJF 2013/2014

ICs: 10–19 Oct 2013

Latest Forecast
ICs: 19–28 Oct 2013
Summary

To some degree, the CFSv2 and NMME seasonal forecasts are consistent with each other.