Extended-range/Monthly Predictions

WGSIP, Trieste
Sub-seasonal to Seasonal Prediction: Met Office, Exeter (1 to 3 December 2010)

• Purpose

- Review of the current capabilities in sub seasonal to seasonal prediction and the identification of high-priority problems which if addressed successfully would lead to improvements in predictions
Sub-seasonal to Seasonal Prediction: Met Office, Exeter (1 to 3 December 2010)

- Recommendations

  - Sponsorship of a few international research activities
  - The establishment of collaboration and co-ordination between operational centres undertaking sub-seasonal prediction
  - Facilitating the wide-spread research use of the data collected for the CHFP (and its associate projects), TIGGE and YOTC for research
  - The establishment of a series of regular Workshops on sub-seasonal prediction
• Operational centers making extended-range/monthly forecasts
  – ECMWF
  – JMA
  – NCEP
  – Environment Canada
  – Bureau of Meteorology (Australia)
  – UKMET (?)
Operational Prediction Systems

• Medium-range weather predictions (~10-15 days)

• Monthly or extended-range predictions (~30-45 days)

• Seasonal predictions (~12 months)

• Decadal predictions (~10-15 years)
Weather vs. Monthly/Seasonal Predictions

• For monthly/seasonal prediction biases could be as large as the signal one seeks to predict, and hence, anomalies cannot be computed from the observed climatology

• And therefore, one needs to have a set of **hindcasts** to calibrate real-time predictions

• Need for hindcasts creates some difficult practical issues (e.g., consistency of initial conditions; standardization across centers; data exchange; etc.)

• For weather predictions atmospheric initial conditions are very important, but we don’t quite know the same for long-range predictions (and importance of initial conditions for various components, e.g., land, ocean, atmosphere,..., may also differ. Implications!)
Status of Forecast System
Standardization

- **Weather predictions**
  - Good standardization across different operational centers
  - Forecasts run at a fix cycle (00Z; 06Z;...18Z)
  - Data exchange procedures are in place
  - Coordinated efforts (e.g., TIGGE; GIFS)
Status of Forecast System
Standardization

• **Seasonal predictions**

  - *Not adequate standardization across different operational centers*
  
  - *Seasonal forecast systems are run on a daily, weekly, or a monthly basis*
  
  - *Out of ten GPCs for LRF, currently it is a mix of 1-tier and 2-tier prediction systems (but all have hindcasts)*
  
  - *Some data exchange (mostly real-time forecast anomalies) are in place via the efforts of the WMO LC-LRFMME*
  
  - *Some coordination via LC-LRFMME, CHFP etc.*
Status of Forecast System
Standardization

- **Monthly predictions**
  - *Probably not adequate level of standardization across different operational centers*
  - *Monthly forecasts run on a daily or weekly basis*
  - *Mix of coupled, or atmospheric alone, prediction systems*
  - *No data exchange efforts (?)*
  - *So...how to organize this???

Arun Kumar           Climate Prediction Center         13 September, 2011
Global Producing Centers (GPCs) and Extended-Range Forecasts
Global Producing Centers for Long-Range Forecasts (LRF)

- Global Producing Centers (GPCs) for LRF are
  - *WMO recognized centers (for LRF)*
  - *Recognition is mandated based on meeting a minimum set of functional requirements (listed in the GDPFS manual)*
    - Have fixed production cycles and time of issuance;
    - Provide a limited set of mandatory products;
    - Provide verifications as per the WMO SVSLRF;
    - Provide up-to-date information on methodology used by the GPC;
    - Make products accessible through the GPC website and/or disseminated through the GTS and/or the Internet
<table>
<thead>
<tr>
<th>GPC name</th>
<th>Centre</th>
<th>System Configuration (ensemble size of forecast)</th>
<th>Resolution (atmosphere)</th>
<th>Hindcast period used</th>
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<tbody>
<tr>
<td>Beijing</td>
<td>Beijing Climate Centre</td>
<td>Coupled (48)</td>
<td>T63/L16</td>
<td>1983-2004</td>
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<td>CPTEC</td>
<td>Centre for Weather Forecasts and Climate Studies</td>
<td>2-tier (15)</td>
<td>T62/L28</td>
<td>1979-2001</td>
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<td>ECMWF</td>
<td>European Centre for Medium Range Weather Forecasts</td>
<td>Coupled (41)</td>
<td>T159/L62</td>
<td>1981-2005</td>
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<td>Exeter</td>
<td>Met Office Hadley Centre</td>
<td>Coupled (42)</td>
<td>1.25° x1.85° /L38</td>
<td>1989-2002</td>
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<td>Melbourne</td>
<td>Australian Bureau of Meteorology</td>
<td>Coupled (30)</td>
<td>T47/L17</td>
<td>1980-2006</td>
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<tr>
<td>Montreal</td>
<td>Meteorological Service of Canada</td>
<td>2-tier (40)</td>
<td>T32/T63/T95/2.0° x2.0° (4-model combination)</td>
<td>1969-2004</td>
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<td>Tokyo</td>
<td>Japan Meteorological Agency</td>
<td>Coupled (51)</td>
<td>T95/L40</td>
<td>1979-2008</td>
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<td>Toulouse</td>
<td>Météo-France</td>
<td>Coupled (41)</td>
<td>T63/L91</td>
<td>1979-2007</td>
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<td>Washington</td>
<td>National Centres for Environmental Prediction</td>
<td>Coupled (40)</td>
<td>T62/L64</td>
<td>1981-2004</td>
</tr>
<tr>
<td>Moscow</td>
<td>Hydromet Centre of Russia</td>
<td>2-tier (10)</td>
<td>1.1° x1.4° /L28</td>
<td>1979-2003</td>
</tr>
</tbody>
</table>

The 12 WMO-designated GPCs
Long-range forecasting and the Global Framework for Climate Services

R. J. Graham\textsuperscript{1,*}, W.-T. Yun\textsuperscript{2}, J. Kim\textsuperscript{2}, A. Kumar\textsuperscript{3}, D. Jones\textsuperscript{4}, L. Bettio\textsuperscript{4}, N. Gagnon\textsuperscript{5}, R. K. Kolli\textsuperscript{6}, D. Smith\textsuperscript{1}

\textsuperscript{1}Met Office Hadley Centre, FitzRoy Road, Exeter EX1 3PB, UK
\textsuperscript{2}Korea Meteorological Administration, 460-18 Sindaebang-dong Dongjak-qu, Seoul 156-726, Republic of Korea
\textsuperscript{3}Climate Prediction Center, National Centers for Environmental Prediction, World Weather Building, Room 800, 5200 Auth Road, Camp Springs, Maryland 20746-4304, USA
\textsuperscript{4}Australian Bureau of Meteorology, GPO Box 1289, 3001 Melbourne, Victoria, Australia
\textsuperscript{5}Meteorological Service of Canada, 2121 Trans-Canada Highway, Dorval, Québec H9P 1J3, Canada
\textsuperscript{6}Climate Prediction & Adaptation Branch, Climate and Water Department, World Meteorological Organization, 7 bis Avenue de la Paix, CP 2300, 1211 Geneva 2, Switzerland
• Global Seasonal Climate Update (GSCU)
  – Similar to WMO El Nino/La Nina update
  – Seasonal outlook guidance for surface temperature & precipitation
  – Use data from GPCs collected at the KMA

• SI Predictions/Predictability
  – Connections between CHFP and Operational predictions (GPCs, LRFMME)