SubX Multi-Model Predictability and Prediction Experiment
Who is the SubX Team?

CORE TEAM
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Hai Lin

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Stan Benjamin
Ben Green

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Hai Lin
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SubX ≠ NMME

- NMME Sub-Seasonal Experiment
  - High Frequency NMME Output
- NMME Sub-Seasonal Forecast System Exploratory Workshop
  - Recommendations/Experimental Protocol
- SubX Protocol – Real-Time July 7, 2017
  - Re-Forecast and Forecast Data Available Mid-August 2017
  - Re-Forecast Deterministic Assessment
SubX Protocol

• Prediction System Details up to Provider
• Real-time and Retrospective Systems Identical
  – Ensemble Generation Issues
• Reforecast Forecast Period: 1999-2017
• At Least 3 Ensemble Members
• Minimum Length 32 Days
• Real-time Forecast Made Available to CPC Through NCO Every Wednesday by 5pm of Every week
• Data on Uniform 1x1 Grid
### Current Data Holdings (Last updated: Feb 14, 2018)

<table>
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<tr>
<th>Model</th>
<th>Ens Members</th>
<th>Init Interval</th>
<th>P1</th>
<th>P2</th>
<th>Climo</th>
<th>Years</th>
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<th>Feb</th>
<th>Mar</th>
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- ECCC-GEM produces re-forecasts “on the fly”
- Some groups have provided both P1 & P2 data, others only P1
- Database constantly updated as new data comes available
SubX Week 3 Anomaly Correlation 2m Temperature [ NDJ 1999-2014]

RSMAS-CCSM4(0.18)

ESRL-FIN(0.22)

NRL-NESM(0.15)

GMAO-GEOS(0.22)

EMC-GEFS(0.27)

ECCC-GEM(0.15)

NCEP-CFSv2(0.27)

MME(0.31)
SubX Week 3-4 2m Temperature Anomalies (°C): Valid 2 weeks ending MAR 16

ESRL-FIMr1p1 (IC: 02/14 ; 4 Ens)

RSMAS-CCSM4 (IC: 02/11 ; 9 Ens)

EMC-GEFS (IC: 02/14 ; 21 Ens)

GMAO-GEOS_V2p1 (IC: 02/10 ; 4 Ens)

NRL-NESM (IC: 02/10-02/13 ; 4 Ens)

ECCC-GEM (IC: 02/15 ; 21 Ens)

MME (63 Ensemble Members)

Temperature Anomaly Range: -4 to 4 °C
SubX Week 3-4 Total Precipitation Anomalies (mm): Valid 2 weeks ending MAR 16

ESRL-FIMr1p1 (IC: 02/14 ; 4 Ens)
RSMAS-CCSM4 (IC: 02/11 ; 9 Ens)
EMC-GEFS (IC: 02/14 ; 21 Ens)

GMAO-GEOS_V2p1 (IC: 02/10 ; 4 Ens)
NRL-NESM (IC: 02/10-02/13 ; 4 Ens)
ECCC-GEM (IC: 02/15 ; 21 Ens)

MME (63 Ensemble Members)

-100 -50 -25 -10 -5 -2 2 5 10 25 50 100
SubX BY THE NUMBERS

7 Global Models

1 Year of *Real-time* Forecasts

17 Years of *Retrospective* Forecasts

3-4 week guidance for Climate Prediction Center Outlooks
Can Resolved Ocean Eddies Improve Forecast Skill?
Improving the Week 3-4 Forecast
High Spatial Resolution (0.5x0.5 Atmos, 0.1x0.1 Ocean) Forecasts
Jan 15-31 2014 Forecast and Observational Estimates

Map a: MERRA2 PREC
Map b: HR PREC
Map c: LR PREC
Map d: TRMM PREC

Rainfall rate (mm h⁻¹)
Improving S2S Forecasts