The seasonal outlook for East Asian winter 2018-2019 from dynamical models, APCC MME, WMO LC LRFMME

APEC Climate Center

Yoojin Kim
APEC Climate Center Multi Model Ensemble (APCC MME)

- 3M-lead seasonal-rolling forecast since 2005
- 3M-lead monthly-rolling forecast since 2008
- 6M-lead monthly-rolling forecast since September, 2013
- At present, 17 leading climate forecasting centers and institutes in 11 countries are participating.

APCC MME Participation Agencies

- Data collection from the 17 centers and institutes in the world
- Producing seasonal forecast & verification data by MME
APCC webpage: http://apcc21.org

- CLIK: Climate Information Tool Kit
- ADSS: APEC Climate Center Data Service System

Download APCC MME, individual models, etc.
Lead Centre for Long Range Forecast Multi-Model Ensemble

- Data collection from the GPC’s in the world
- Producing seasonal forecast & verification data by MME
A benefit: diversity of model set, an important condition to improve the MME’s forecast skill
ENSO Prediction
ENSO Prediction

- East tropical Pacific SST warming
- Around +1°C SSTA predicted for upcoming 6 months in NINO 3.4 region
**ENSO Prediction**

- **Probabilistic ENSO prediction (APCC MME)**
- **DJF Weak El Nino**

![Probabilistic ENSO Forecast for DJF 2018](image1)

![Probabilistic ENSO Forecast for 2018 NDJFMA](image2)

* ENSO Intensity based on 3M Mean Niño3.4 SST Anomaly (Category Boundaries: +/-1.5, 1.0, 0.5°C)

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Global Winter Prediction
- Northern Hemisphere T2m warming, East Asia
- El Nino response warming in East Asia
- El Nino-like precipitation pattern, but not strong
- Dry western Pacific, wet-neutral eastern Pacific
- Arctic warming, circulation brings cold waves from high-latitudes
APCC MME DJF MEAN Prediction

- El Nino like SLP pattern
- Tropical western Pacific High, eastern Pacific Low
- Anti-cyclonic circulation over western Pacific (weak El Nino response)
Northern Hemisphere warming
Sub-tropical western Pacific cooling
Weak El Nino like precipitation, SLP pattern
Sub-tropical western Pacific dry, High pressure
Similar with APCC MME, generally
East Asia Winter Prediction & Verification
APCC MME 2m temperature

- Warming over East Asia (more than 40% models)
- Mongolia, eastern China, Korea, Japan warming, except the west southern part of China
- Warmer FEB, roughly
Heidke Skill Score (HSS)

- **Skill** = \( \frac{\text{score value} - \text{score for the standard forecast}}{\text{perfect score} - \text{score for the standard forecast}} \)

For the HSS, the "score" is the number correct or the proportion correct. The "standard forecast" is usually the number correct by chance or the proportion correct by chance. Thus using the proportion correct,

\[
HSS = \left\{ \frac{(a+d)/n - [(a+b)(a+c)+(b+d)(c+d)]/n^2}{1 - [(a+b)(a+c) + (b+d)(c+d)]/n^2} \right\}
\]

This can be simplified into,

\[
HSS = \frac{ad - bc}{((a+c)(c+d) + (a+b)(b+d))/2}
\]

- \(-\infty < HSS \leq 1\), \(HSS \leq 0\) **no skill**
- \(HSS > 0\) **skillful**
APCC MME 2m temperature

Forecast skill (HSS)

Best skill Tropics, Ocean
No skill China land in DEC, but skillful in FEB
DEC Arctic contribution to EA is not predictable

Temperature at 2m for DEC 2018
Temperature at 2m for JAN 2019
Temperature at 2m for FEB 2019
WMO LC 2m temperature

- Similar with those from APCC MME
- Warm East Asia
- Cold sub-tropical western Pacific
- Warmer FEB, roughly
APCC MME Precipitation

- Dry over sub-tropical western Pacific
- Anti-cyclonic circulation in western Pacific, El Nino
- Wet in some part of western China, North Korea, north eastern China
- Wetter Dec, Drier Feb
APCC MME Precipitation

**Forecast skill (HSS)**

- Prec HSS DEC
- Prec HSS JAN
- Prec HSS FEB

**Poor than temperature**
- Best skill Tropics/Sub-tropics, Ocean
- No skill China land in JAN but good in DEC, FEB

**Precipitation for DEC 2018**

**Precipitation for JAN 2019**

**Precipitation for FEB 2019**
Similar with those from APCC MME
- Dry over sub-tropical western Pacific
- El Nino like circulation pattern in western Pacific
- Wet in some part of western China, Korea, eastern China
- DEC wetter, FEB drier
Summary

- **ENSO**
  - DJF weak El Nino
  - Dry sub-tropical western Pacific, Neutral-wet tropical eastern Pacific

- **T2m**
  - East Asia warming (Mongolia, China except west southern part, Korea, Japan)
  - El Nino response
  - Consistent warming DJF, slight warmer February
  - Be careful the Arctic warming

- **Precipitation**
  - Dry sub-tropical western Pacific, Wet some part of western China, North Korea, north eastern China
  - El Nino response
  - Consistent dry in sub-tropical western Pacific; slight drier FEB
Thank You