Oceanic forcings of the interdecadal variability in East Asian summer rainfall

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Data

**SST** : HadISST, 1871-2011;

**Rainfall** : Combined instrumental measurements and historical record from China, 1880-2011 (Wang et al. 2002);

**Geopotential Height, Wind** : NOAA 20th-century reanalysis (V2), 1871-2011.
Motivation

Trenberth and Shea, 2006
The leading two EOF modes of decadal-filtered summer (JJA) rainfall in East China for 1880-2011.

In-phase mode

Dipole mode
The relationship between the PC1, PC2 and PDO, AMO
850hPa circulation regressed on PDO

1960-2011

1880-1959

Vector: wind; Shading: divergence

SST regressed on PDO

1880-1959

1960-2011

1. Weaker Walker Cell
2. Pacific-East Asian teleconnection
   (Wang and Zhang, 2002)
HGT regressed on AMO

Atlantic-Northern Hemisphere teleconnection

850hPa circulation regressed on AMO

Baroclinic structure; slightly westward with height.
Atlantic-Northern Hemisphere teleconnection simulated by historical CMIP5 run

CanESM2  
CCSM4  
GFDL-CM3  
GFDL-ESM2M  
HadGEM2-AO  
MIROC5  
MPI-ESM-LR
Influence of AMO on PDO

Z500 regressed on AMO
1960-2011
1880-1959

SST regressed on AMO
1960-2011
1880-1959

Influence of AMO on PDO

Z500 regressed on AMO
1880-1959
1960-2011

SST regressed on AMO
1880-1959
1960-2011
Summary

1. The AMO teleconnects its influence to the East Asian region, and beyond, through a circumglobal stationary baroclinic wave train extending from the Atlantic Ocean, through the Eurasian continent, and extending to North America.

2. The AMO also altered the nature of the PDO through this atmospheric teleconnection, resulting in the occurrence of different PDO pattern (“Pseudo-PDO”) between 1960s and 2010s.

3. The Pseudo-PDO causes a distinct atmospheric response in East Asia leading to an opposite relationship with the PC1 compared to the conventional PDO, thus leading to a change in the direction of the influence of the PDO on PC1 between 1880s-1950s and 1960s-2010s.
Thank you!