INTRODUCTION/OBJECTIVES

Atmospheric blocking in the North Atlantic alters normal climates across Europe and Russia by shifting storm tracks. Typically associated with an anticyclone, the normal zonal wind pattern known as the jet stream deviates and its westerly winds reroute north and south of the anticyclone (as shown on the right). This results in anomalous temperature and precipitation events. Factors that may amplify or weaken the frequency of blocking are still being investigated. One such potential factor is sea surface temperature. Häkkinen et al. (2011) speculate that the Atlantic Multidecadal Oscillation (AMO), which characterizes the natural variability of SST in the North Atlantic, may play a role in variability of blocking. In this work, we investigate this relationship.

Objectives:
1. Investigate the relationship between blocking and AMO on decadal time scales.
2. Assess a climate model observation in simulating the blocking and AMO.

DATA AND METHODS

20th Century Reanalysis (20CR): 2300 (1871-2005)
Hadley Global Sea Ice and Sea Surface Temperature (HADISST): 1871-2005
Community Earth System Model Large Ensemble (CESM1LE): 1920-2005

- 3D simulations with the same radiative forcing (e.g. CO2) but slightly different atmospheric initial conditions in each simulation.
- Number of Blocking Days (20CR vs. CESM1LE):
  - Criterion: inverted meridional geopotential height at 500hPa
  - 5 consecutive days of inversion to be considered a “block”
- AMO Index (HADISST vs. CESM1LE):
  - Yearly weighted area-average SST over the North Atlantic
  - Calculated with and without global mean SST included

SPATIAL PATTERN OF BLOCKING

20CR DJFM Climatological Mean Number of Blocking Days in DJFM (1920-2005)

20CR # Blocking Days

# of Simulations

# of Blocking Days

HADISST AMO Index

CESM1LE AMO Index

0-60N, 60W-10E

HADISST and CESM1LE Standard Deviations

HADISST

CESM1LE

20CR

CESM1LE Linear Trend from 1920-2005

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REFERENCES