Representation of the Scandinavia-Greenland Pattern and its Relationship with the Polar Vortex in S2S Forecast Models

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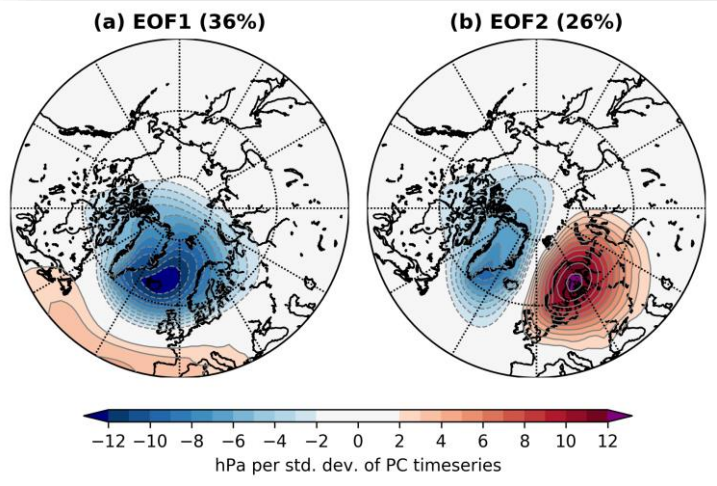
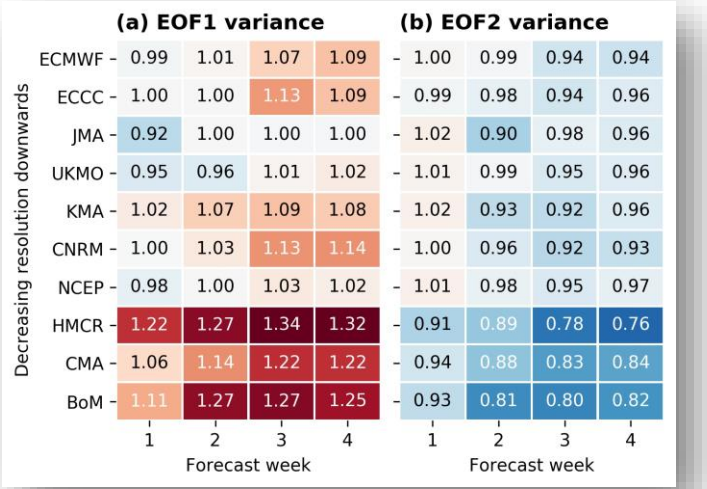
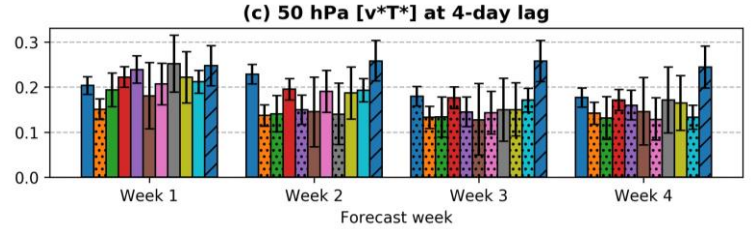


- Blocking & anticyclonic wave breaking in northeast Atlantic a known precursor to stratospheric vortex weakening
- *Related work:* "S-G dipole" preceding 2018 SSW (Lee et al. 2019 JGR)
- EOF analysis of MSLP in region 60-85°N, 60°W-50°E: 1st EOF NAO-like "zonal pattern", 2nd EOF "S-G pattern"

➢ **How well do current S2S models capture these modes of variability & the impact of SG pattern on stratosphere?**



- **Variability bias:** S2S models have broadly too much variance in leading EOF & less in 2nd EOF (S-G pattern), especially weeks 3-4.
- Three models (HMCR, CMA, BoM) have large (>20%) biases: resolution dependence?
- **Predictability:** deterministic correlation skill 5-10 days, ROC skill of SG pattern minimal beyond week 2 & lower than zonal pattern



- Relationship between SG pattern & enhanced stratospheric eddy heat flux decays with lead-time in most S2S models

- Combination of variability biases, poor extended-range predictability, and biases in the associated vertically-propagating wave activity likely **limit sub-seasonal skill in predicting vortex weakening**
- Impact of these biases propagates beyond their own timescale through stratospheric vortex

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