ROSSBY WAVE BREAKING THROUGH THE 21ST CENTURY IN A GLOBAL CLIMATE MODEL

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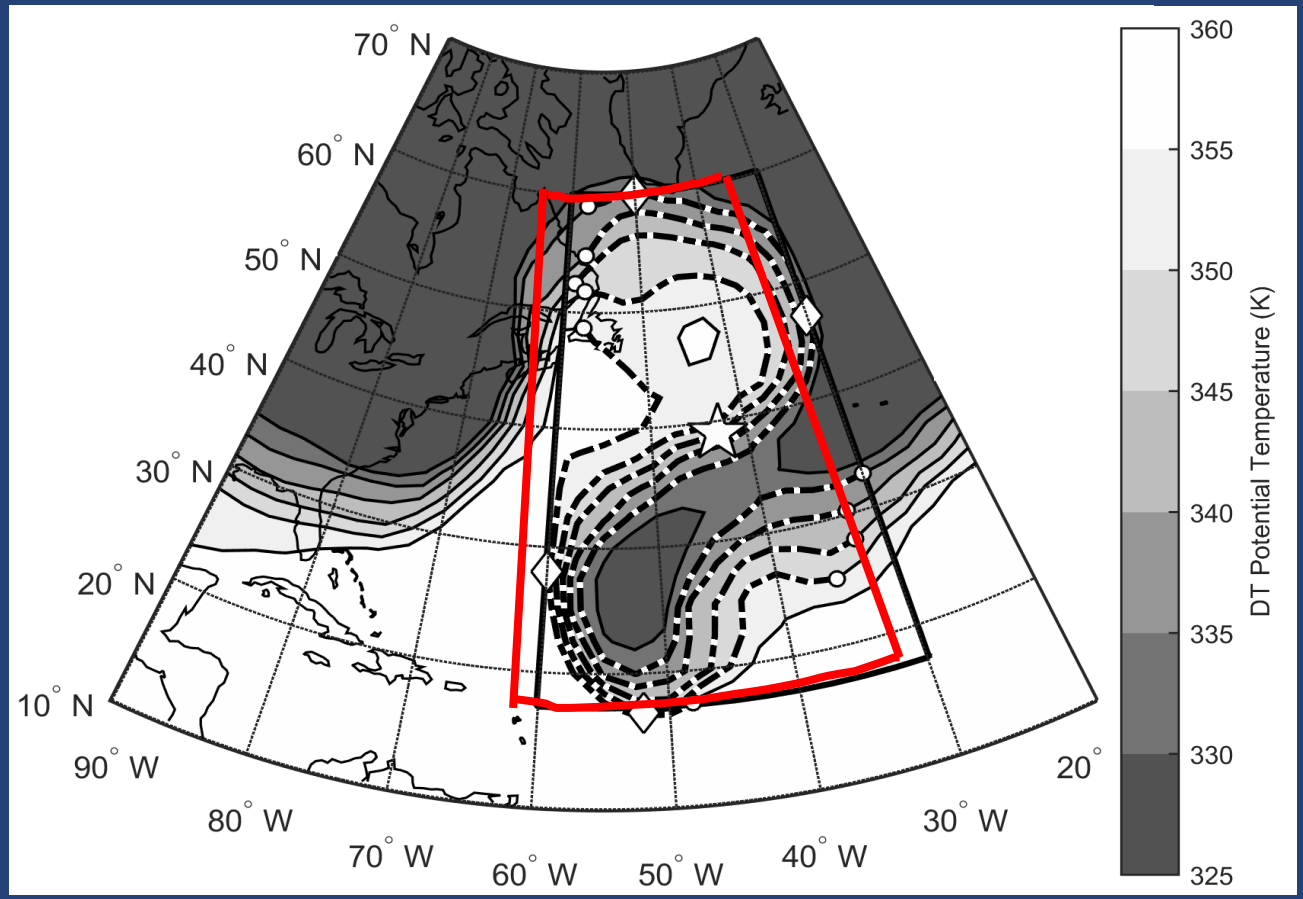
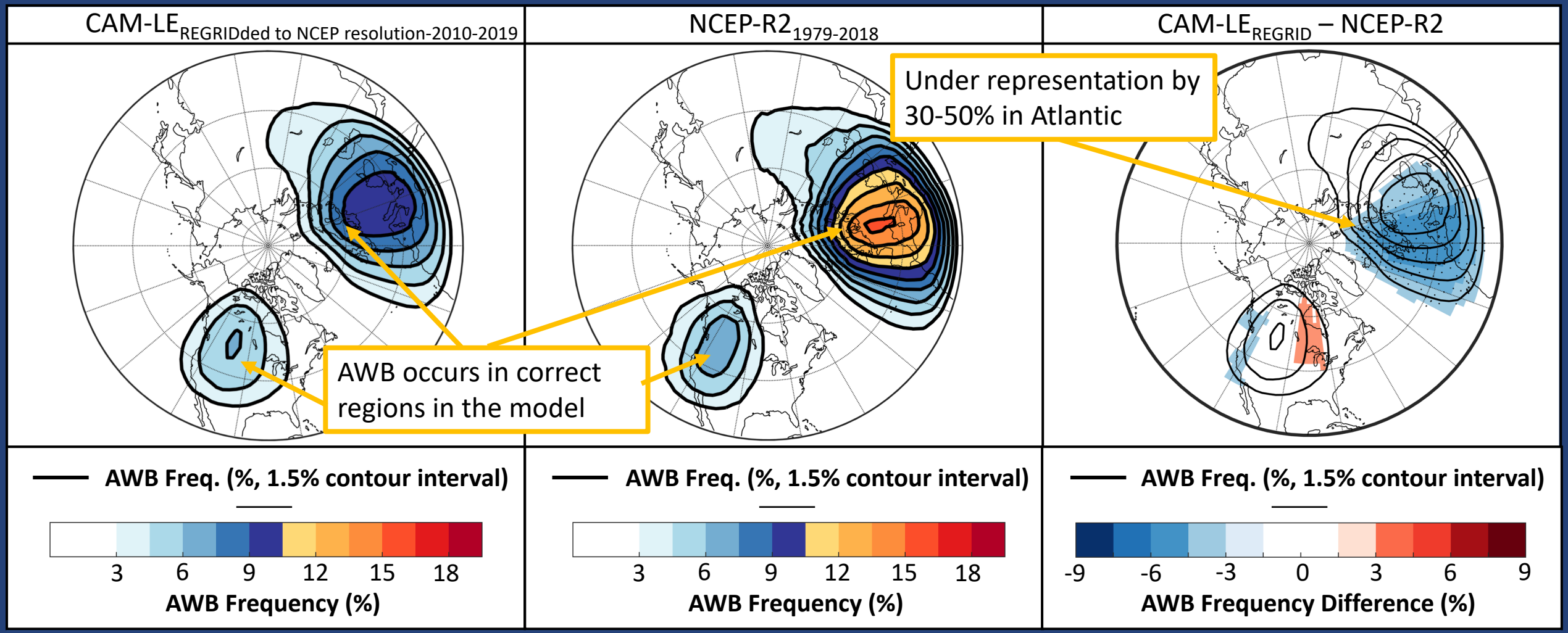
Rossby Wave Breaking Identification

- **Research Question:**
  - How well are Rossby wave breaks represented in GCMs, and will the frequency of Rossby wave breaking change in the future climate
- **Method:**
  - Wave breaking event region (red box) identified on dynamic tropopause following technique of Bowley et al. 2019a
  - Events identified in:
    - NCEP Reanalysis 2 dataset (Kanamitsu et al. 2002)
    - CAM-LE Community Earth System Model Simulations (25 member ensemble)
      - "Atmosphere-only" configuration with prescribed sea ice and SST
      - Sea ice and SST boundary conditions from the CESM large ensemble (Kay et al. 2015)



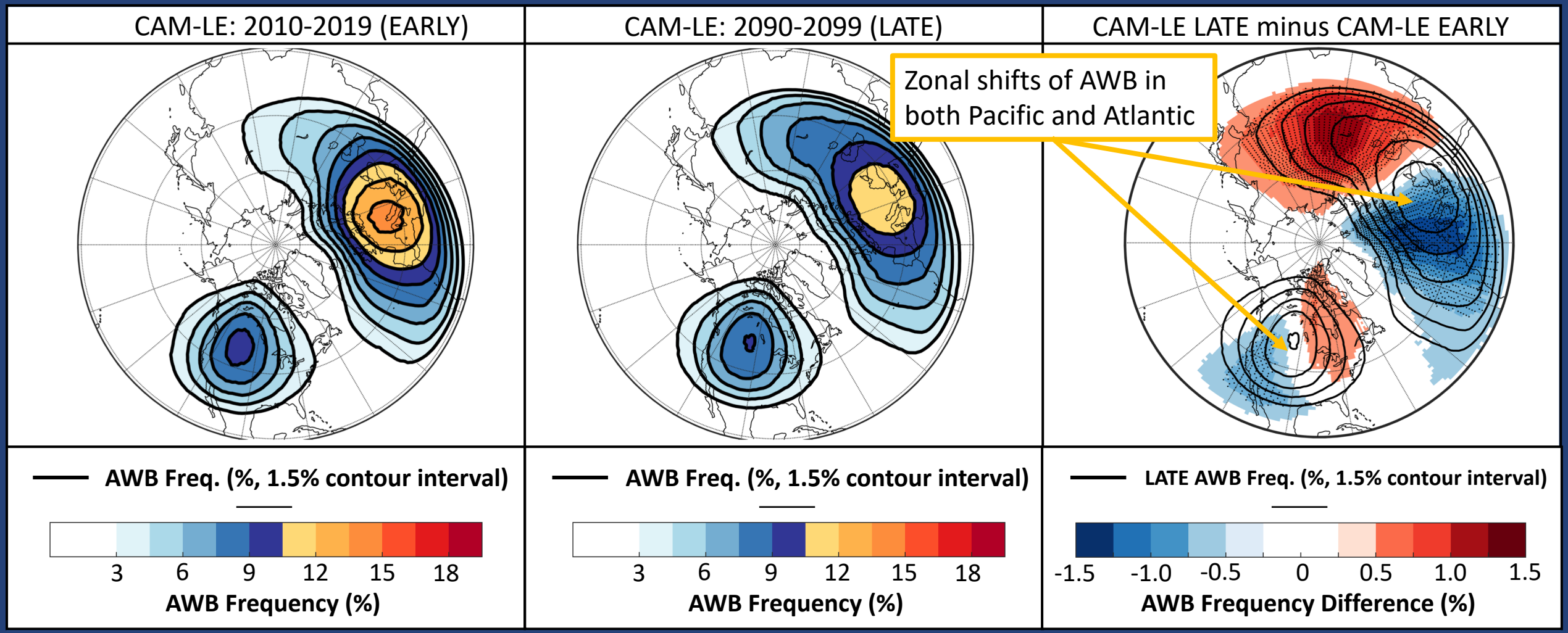
Bowley et al., 2019a

AWB on the Dynamic Tropopause



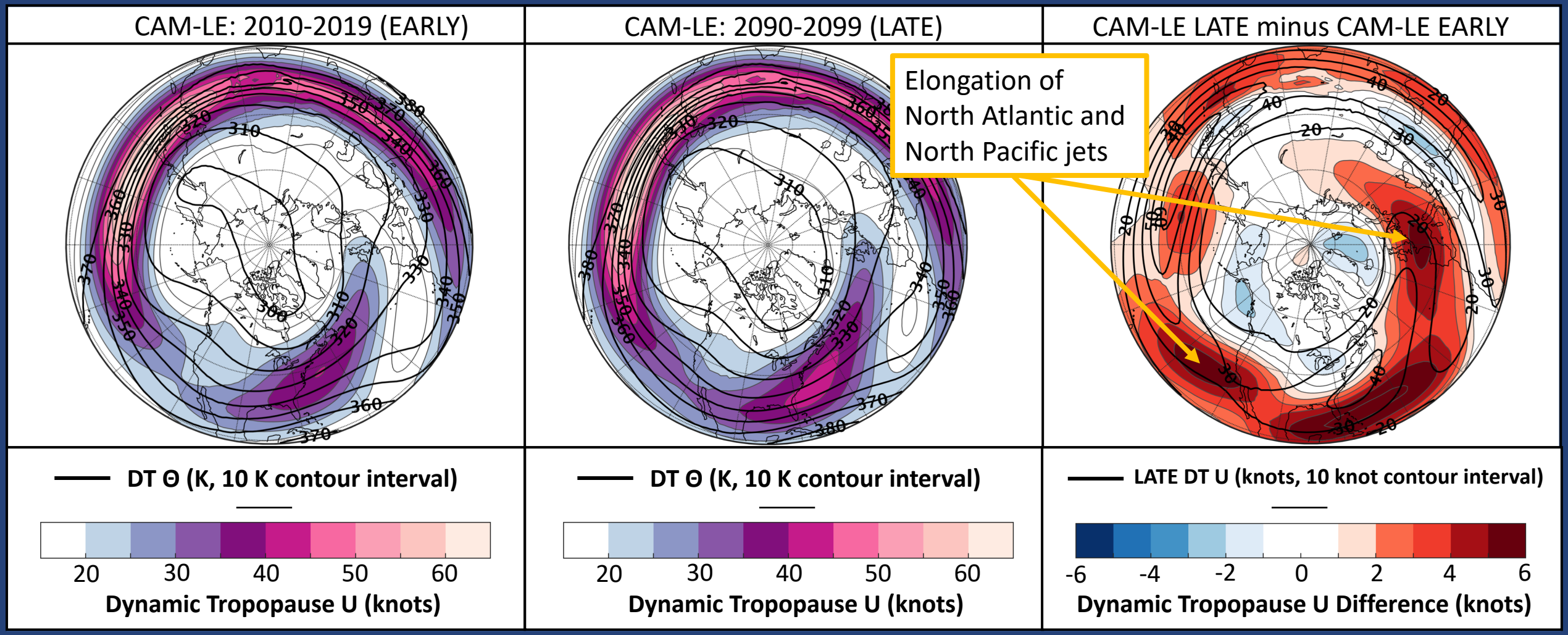
CAM-LE Projections: DJF

AWB on the Dynamic Tropopause



CAM-LE Projections: DJF

Zonal wind on the Dynamic Tropopause



CAM-LE Projections: DJF

Rossby wave breaking through the 21st century in a global climate model

- CAM-LE experiments show **downstream shift in AWB**
- North Pacific shift associated with elongation of subtropical jet in the Pacific likely attributable to tropical upper-tropospheric warming - eg. Shaw et al. 2016
- North Atlantic shift associated with elongation of the North Atlantic eddy-driven jet. Gervais et al. 2019 demonstrated the important role of the North Atlantic Warming hole in producing this elongation.
- These impacts would not be seen in zonal mean metrics highlighting the need to examine spatial patterns in future changes in Rossby wave breaking

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