

Atmospheric processes accompanying extreme Warm and Cold-Temperature events under pronounced Polar Amplification conditions: Insights from a large-scale ensemble model dataset



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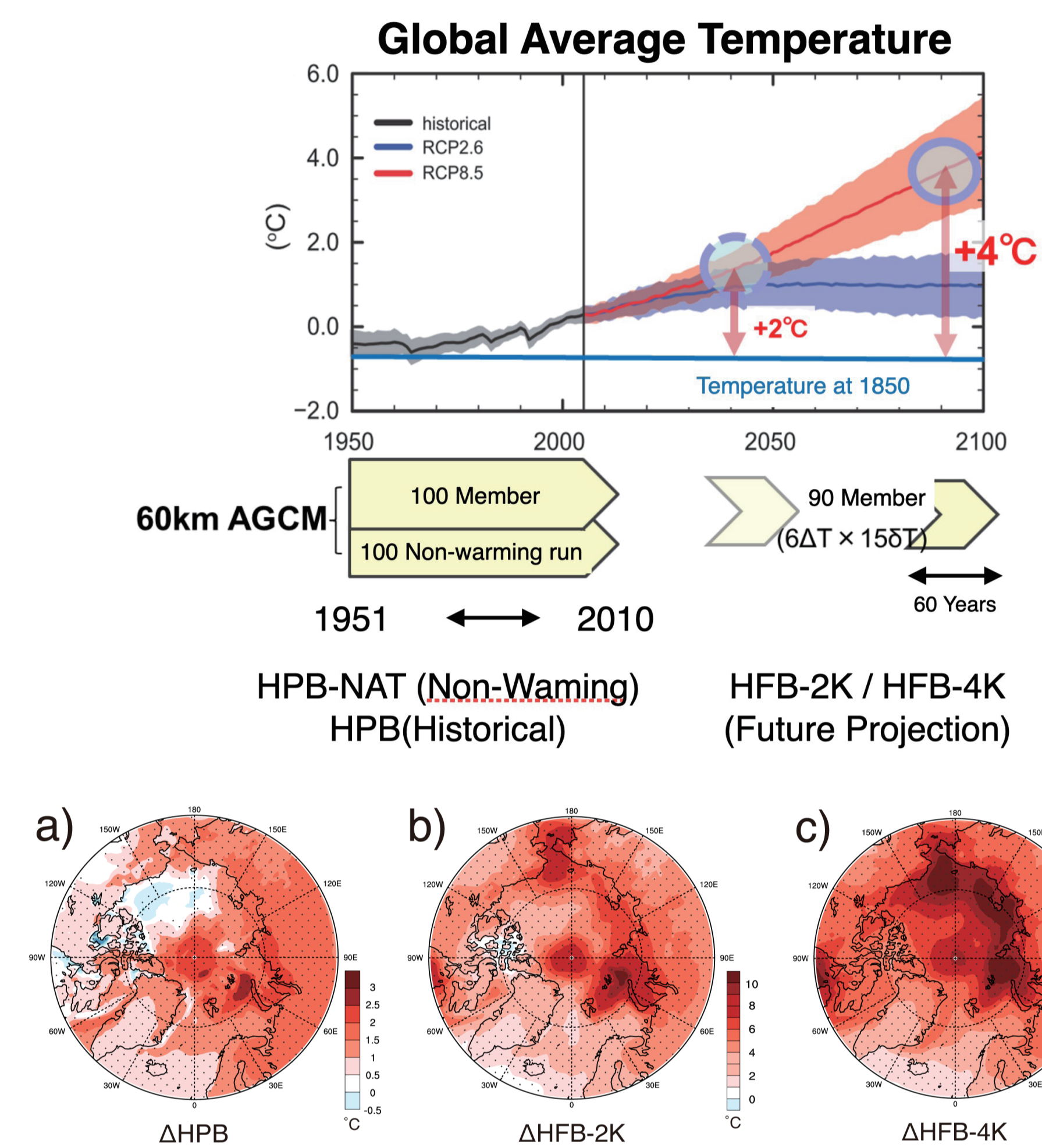
1. Objective

Objective of the Study

Using a large-ensemble model experiment dataset (d4PDF) with varying level of Arctic Warming, we investigate the change in transient atmospheric processes contributing to extreme temperature events.

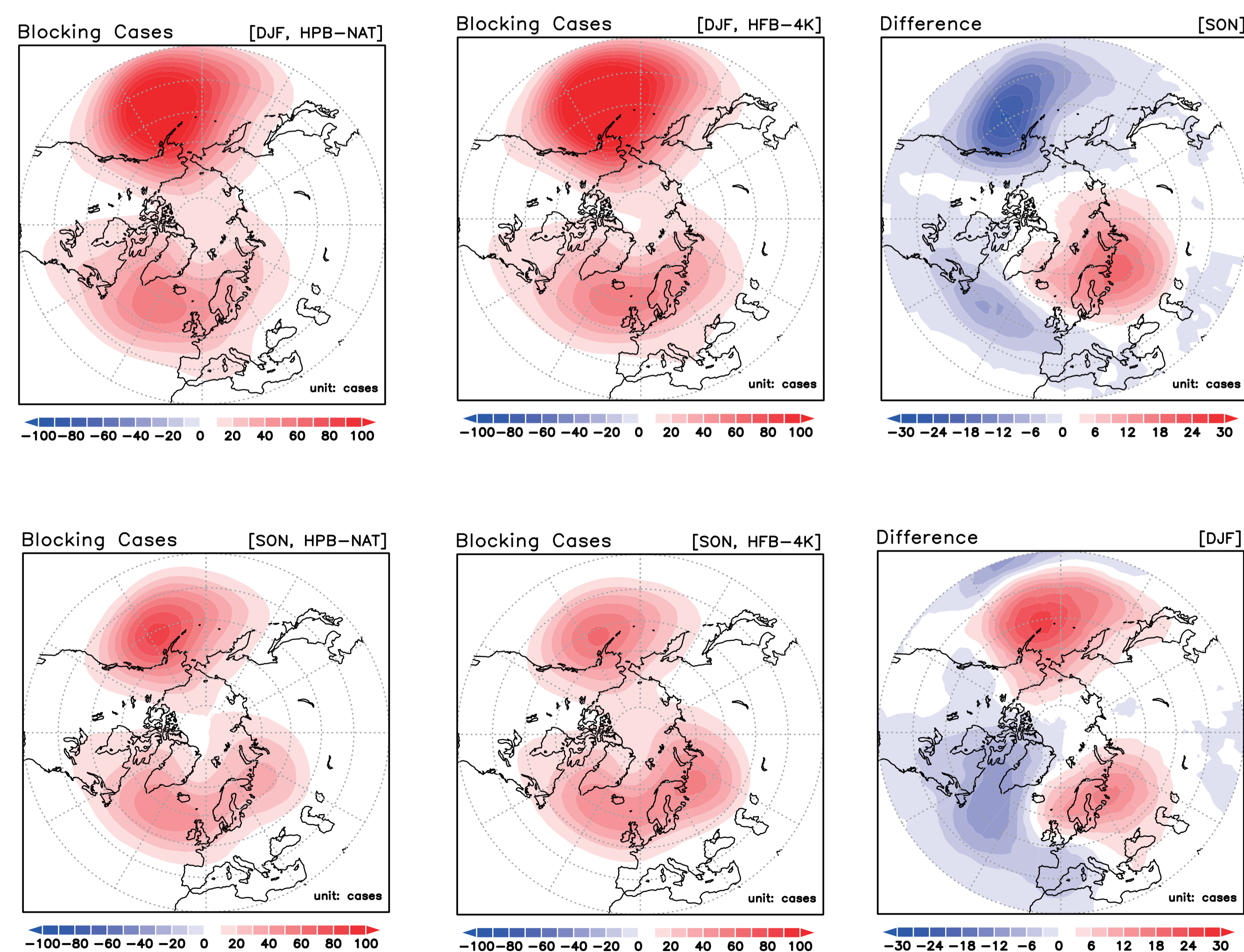
Dataset Used

Database for Policy Decision-Making for Future Climate Change (d4PDF) which is a AGCM based large ensemble model dataset with non-warming experiment (HPB-NAT) with 100 members, and 4K warming experiment (HFB-4K) with 15 ensembles for 6 CGCM SST boundaries (90member).



2. Future Change in Blocking Occurrences

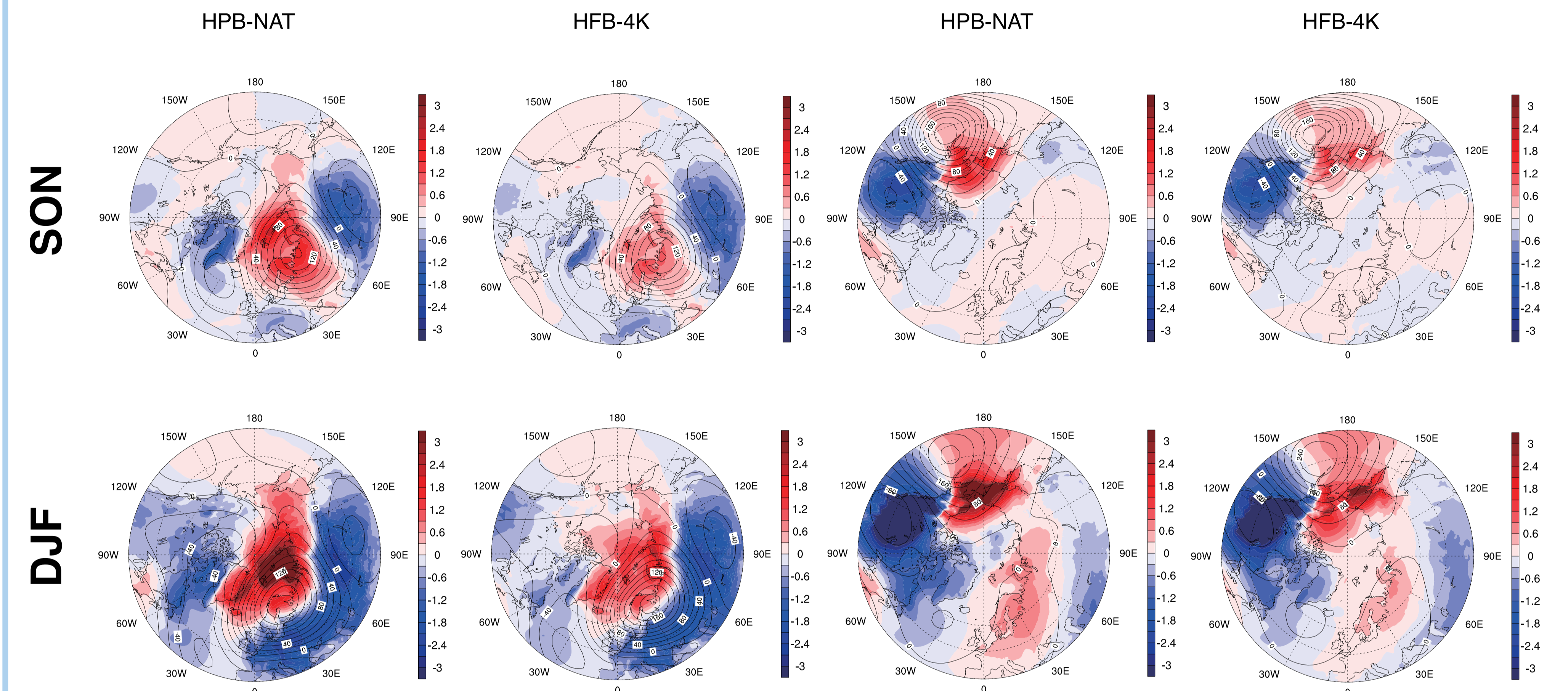
Anomaly method based on Dunn-Sigouin and Son (2013) is used to detect blockings based on 500hPa geopotential height anomalies. Difference in blocking occurrence between HFB-4K and HPB-NAT experiment shows a stronger Ural blocking and a seasonal dependence of weakening and strengthening in the Pacific Blocking during the cold season.



3. Composite of Circulation and Surface Temperature

Ural Blocking

Pacific Blocking



Composite of 500hPa geopotential height anomaly and surface temperature anomaly is made based on blocking days in Ural Blocking region (50-80°N, 30-90°E) and Pacific Blocking region (35-65°N, 180-240°E). Region of temperature anomaly for Ural blocking is confined to the sea-ice boundary during HPB-NAT whereas in HFB-4K extends towards the central Arctic. Influence of Pacific Blocking extends northward for DJF under HFB-4K.

4. Extreme Temperature within d4PDF

Comparison with 95% / 5% percentile surface temperature change reveals changes in Ural Blocking occurrence during SON is concurrent with the change in sea ice distribution in the Arctic region and influences both warm and cold temperature extremes. Warm temperature extreme is more influenced by Pacific Blocking during DJF whereas its influence is milder in the early winter.

