



Decadal variability of weather regimes and teleconnections in reanalyses and century long hindcasts

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Atmospheric intraseasonal variability, especially in the extratropics during the cold season, is characterized by preferred large-scale quasi-stationary flow patterns that have non-Gaussian characteristics. They are known as weather regimes and can be associated with significant temperature and precipitation anomalies. Several observation-based and model studies have shown that El Niño-Southern Oscillation (ENSO), Atlantic Multi-decadal Variability (AMV) and Madden and Julian Oscillation (MJO) forcing affects the relative frequency of occurrence of circulation regimes. The ENSO forcing is particularly important for the Pacific North-American (PNA) region, whose intraseasonal variability is directly linked to tropical Pacific SST anomalies. The AMV forcing seems to affect the frequency of occurrence of the North Atlantic Oscillation (NAO) and the Euro-Atlantic blocking on a decadal time scale. The MJO forcing affects the occurrence (and sub-seasonal predictability) of the North Atlantic Oscillation (NAO) and, to a lesser extent, the Euro-Atlantic Blocking.

On the other hand, several recent studies have shown that wintertime large scale extratropical circulation over both the Pacific North American and the Euro-Atlantic sectors exhibits a non-negligible interdecadal variability, which seems to be related to a decadal modulation of the tropical-extratropical teleconnections and can strongly impact on seasonal predictability (see for example Weisheimer et al. 2016, O'Reilly et al. 2017, O'Reilly 2017).

In this study we use century reanalysis datasets and a range of coupled and atmospheric-only ensemble seasonal hindcasts together with climate simulations to investigate the inter decadal variability of wintertime extratropical weather regimes and their associated tropical and extratropical teleconnections.

The implications of the results of this study for S2D predictability and the evaluation of S2D forecasting systems is discussed.