Anticyclonic and cyclonic Rossby wave breaks (RWBs) play an important role in shaping regional climate patterns. Their impacts range from generating extreme precipitation and temperature anomalies to developing and sustaining longer duration patterns such as blocking. Rossby wave breaking also has been shown to be well-correlated to some notable Northern Hemisphere teleconnections such as the North-Atlantic oscillation (NAO) and Pacific North American (PNA) patterns. However, regional variability in RWB occurrence under different teleconnection phases has been less explored, in particular on daily time scale. In this work, winter season (December-February) Northern Hemisphere anticyclonic and cyclonic wave breaks were detected between 1980 and 2014 using an instantaneous Rossby Wave Break identification method applied to the ECMWF reanalysis v5 (ERA5) dataset. Daily NAO and PNA indices from Climate Prediction Center (CPC) were normalized and used to identify positive (> 1 σ, or standard deviation), neutral (< 1 σ and > -1 σ), or negative (< -1 σ) phases for each index. Frequency maps of RWB activity were generated to identify where wave break activity was most common during specific phases of the NAO and PNA. Significant changes in wave breaking frequency were found for all phases of teleconnections. Cyclonic wave breaking was found to be most frequent in the North Atlantic and Bering Sea, while anticyclonic wave breaking activity occurred primarily in the Mediterranean Sea and Western North America, matching prior climatologies. During the negative phase of the NAO, cyclonic wave break activity occurred between 10-20% more frequently in the North Atlantic surf zone, which was the largest anomaly of any teleconnection. This increase in cyclonic RWB activity is attributed to an equatorward-shifted jet stream, matching prior theory on the jet position and RWBs. For the positive phase of the PNA, anomalously high anticyclonic wave break activity was found over the Western United States due to the notable eastern extension of the Pacific jet exit region. Variations in precipitation are also shown to be associated with this variability in RWBs and the jet stream. Continuing to understand the linkage between teleconnections and RWB activity is a crucial step in helping develop better climate forecasts and improve modeling to better prepare for extreme weather and future climate impacts.

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