Geophysical Research Abstracts
Vol. 21, EGU2019-2208, 2019
EGU General Assembly 2019

North Atlantic Summertime Anticyclonic Rossby Wave Breaking: Climatology, Impacts, and Connections to the Pacific Decadal Oscillation

Breanna Zavadoff and Ben Kirtman

University of Miami, Rosenstiel School of Marine and Atmospheric Science, Miami, United States
(bzavadoff@rsmas.miami.edu)

Anticyclonic Rossby wave breaking (RWB) is characterized by the rapid and irreversible deformation of potential vorticity (PV) contours on isentropic surfaces, manifesting as a pair of meridionally elongated high and low-PV tongues that transport extratropical stratospheric air equatorward and tropical tropospheric air poleward, respectively. Previous studies have noted connections between different types of RWB and the modulation of localized atmospheric phenomena such as the North Atlantic Oscillation (NAO) and tropical cyclogenesis. Despite being the season in which anticyclonic RWB events are most prevalent, no work has focused solely on the frequency, genesis, or variability of the synoptic environment surrounding the equatorward branch of anticyclonic RWB events during the North Atlantic summertime, providing motivation for this study.

Using 58 years (1960-2017) of NCEP-NCAR Reanalysis data, a comprehensive spatio-temporal climatology of North Atlantic equatorward anticyclonic RWB identified on the 350 K isentropic surface is developed and the synoptic environment surrounding these events from time and high-PV tongue centroid-relative perspectives is investigated. Consistent with previous studies, composites suggest that high-PV tongues associated with equatorward anticyclonic RWB introduce anomalously dry, stable extratropical air into the tropical environment, subsequently inhibiting convection there. Additionally, a connection between atmospheric responses to Pacific Decadal Oscillation (PDO) sea surface temperature (SST) anomalies and the intra-basin frequency of anticyclonic RWB events is uncovered and explored. Results from this study may provide aid in short to medium range forecasting of North Atlantic tropical convection, with applications extending into the field of tropical cyclogenesis forecasting.