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Plain Language Summary:

Better dynamical understanding of interactions between the troposphere and the stratosphere, potentially will lead to improved weather predictability. This study explores the dynamical association between three preferred latitudinal positions of the North Atlantic eddy-driven jet and the stratospheric polar vortex dynamics. It has been shown that there exists significant relationship between the central mode of the North Atlantic jet and upward wave propagation.

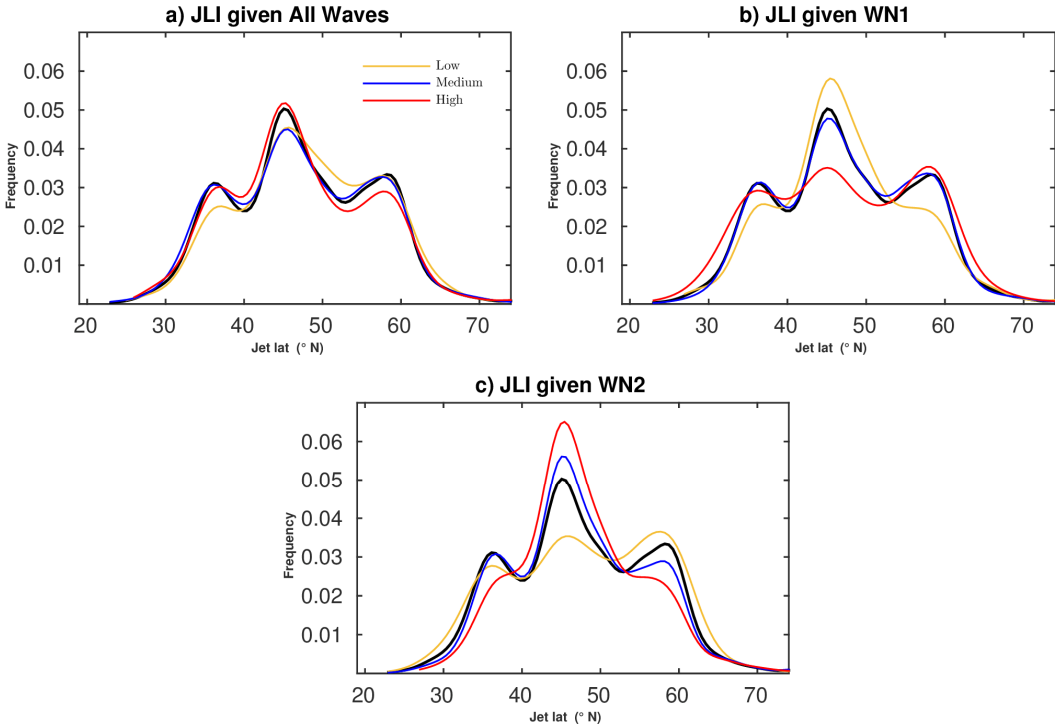

Figure 1. Kernel estimation to the Probability Distribution Function (PDF) of daily Jet Latitude Index (JLI) (in ˚N) time series for low, medium and high values of EPFZ100 computed for all Waves (a), WN1 (b), and WN2 (c). The black line in each panel represents the kernel estimation to full time series (i.e., DJF). The classification of low, medium and high EPFZ100 is based on percentiles (i.e., Low: EPFZ100≤P25, Medium: P25 <EPFZ100≤ P75 and High: EPFZ100>P75)

- The JRA-55 reanalysis diagnostics for latitudinal positions of the North Atlantic eddy-driven jet are consistent with other re-analysis data sets.
- There is a lead time of about 17 to 20 days for the North Atlantic eddy-driven jet to be equatorward of its climatological position, prior to onset of a major sudden stratospheric warming event.
- The central mode of the North Atlantic eddy-driven jet has significantly higher upward wave activity associated to WN2.