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Impact of the MJO on the wind resource in the ISO regions in the US

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The Madden-Julian Oscillation (MJO) is the dominant mode of variability in the tropical region. It has been shown that through interaction with Rossby waves, MJO impacts the midlatitude weather. Studies have shown that the MJO impacts the mean structure of the wind power density (WPD) and the frequency and magnitude of high and low WPD events in the US with robust statistical significance. Since ISO regions are the logical areas of aggregation of wind power, we look at the impact of the MJO on the mean aggregated WPD and the high and low WPD events. We consider the robustly estimated WPD data from (Gunturu and Schlosser, 2012) and the MJO activity data in terms of the real time multivariate indices RMM1 and RMM2 (Wheeler and Hendon, 2004) and analyze the phase plots of MJO activity and the WPD events. The changes in frequency and magnitude of the lows and highs, and also the changes in the mean WPD with the activity of the MJO convection are tested for statistical significance. The statistically significant results are discussed. The most important significance of this study is that diagnostically, the changes in the resource and extreme events can be predicted based on the location of the MJO activity and the location of the deep convection associated with the MJO. Further, with the successful monitoring and prediction of the MJO activity and location of the deep convection, subseasonal prediction of the wind resource is possible.