

ENSO modulation of MJO teleconnection to the North Atlantic & Europe and implications for subseasonal predictability

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The Madden-Julian Oscillation (MJO), an organized eastward propagating source of enhanced convection, acts as a Rossby wave source and as a global tropical driver of subseasonal predictability. An example pathway leads this source of predictability out of the tropics to the North Atlantic / European (NAE) region, known as a teleconnection, via the jet stream and stratosphere. Through this teleconnection the MJO can influence regimes of large-scale weather patterns, including the North Atlantic Oscillation (NAO). The aim of this study is to investigate the dependence of the MJO – NAE teleconnections on the interannual variations in the background state associated with the El Niño Southern Oscillation (ENSO).

We use the Cassou (2008) framework to show that these teleconnections from the MJO to the NAE weather and jet regimes are strongly dependent on the phase of ENSO. For example, during El Niño years the MJO to NAO+ teleconnection is strongly enhanced and persists throughout more MJO phases, dominating the climatological mean picture, whilst during La Niña this teleconnection to the NAO+ is weak and short-lived. Further NAE regime transitions and in situ development also become clearer via this perspective separated by ENSO background state. We also discuss the seasonal mean response to ENSO in the NAE region through rectification of these subseasonal teleconnections onto the seasonal mean.

The dependence on the background state has strong implications for subseasonal predictability, including implications for interannual variations in subseasonal predictive skill and also the need for models to get the background state correct in order to correctly represent these teleconnections.

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Key words: MJO, teleconnections, NAO, ENSO, Eddy-driven jet

References

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