

Influence of the QBO on MJO prediction skill in the S2S models

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Recent studies have shown that the Madden-Julian Oscillation (MJO) is significantly modulated by the stratospheric Quasi-Biennial Oscillation (QBO). In general, boreal-winter MJOs become stronger during the easterly phase of the QBO (EQBO) than during the westerly phase (WQBO). In this study, such finding is applied to state-of-the-art operational models, which participated in the WCRP/WWRP Subseasonal-to-Seasonal (S2S) prediction project, to examine the influence of the QBO on MJO prediction skill. All models show higher MJO prediction skill during EQBO winters than during WQBO winters. Based on a bivariate anomaly correlation coefficient of 0.5, the enhancement of MJO prediction skill during EQBO winters is up to 10 days. This enhancement is largely insensitive to the initial MJO amplitude indicating that improved skill during EQBO years is not simply a result of stronger MJOs. Rather, it is argued that QBO-dependent upper-tropospheric circulation anomalies play a key role in determining such an enhancement. This result indicates that MJO prediction skill is sensitive to the stratospheric mean state, highlighting the importance of the stratospheric processes and its related upper-tropospheric circulations in the operational S2S prediction.

Key words: MJO prediction skill, Quasi-Biennial Oscillation, Madden-Julian Oscillation