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Observed triggering of tropical convection by a cold surge: Implications for MJO initiation

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The extratropical influence is an important mechanism in the initiation of the Madden-Julian Oscillation (MJO). Based on analyses of several datasets, this study demonstrates that the MJO case initiated in late January 2008 was strengthened by a preceding cold surge over West Asia when the MJO was at its initiation phase. The cold surge-related northerlies propagated southward along the east coast of African continent. The associated convergence on its edge enhanced ascending motion in the tropical western Indian Ocean and led to the onset of deep convection to the north of Madagascar. This process helped to amplify the MJO convection rapidly as shown in the development of the moist static energy anomalies. In this way, the cold surge affected the behavior of the MJO and modified the timing of its initiation to some extent. These results support previous studies that the extratropical factors are important for the initiation of the MJO, and imply that the subtropical cold surges are more likely to strengthen and accelerate the buildup of deep MJO convection rather than to initiate it.