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Troposphere-Stratosphere Coupling In S2S Models and Its Importance for a Realistic Extratropical Response to the Madden-Julian Oscillation

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The representation of upward and downward stratosphere-troposphere coupling and its influence on the teleconnections of the Madden Julian oscillation (MJO) to the European sector is examined in five subseasonal-to-seasonal (S2S) models. We show that while the models simulate a realistic stratospheric response to transient anomalies in troposphere, they overestimate the downward coupling. The models with a better stratospheric resolution capture a more realistic stratospheric response to the MJO, particularly after the first week of the integration. However, in all models examined here the connection between the MJO and vortex variability is weaker than that observed. Finally, we focus on the MJO-SSW teleconnection in the NCEP model, and specifically initializations during the MJO phase with enhanced convection in the west/central pacific (i.e. 6 and 7) that preceded observed SSW. The integrations that simulated a SSW (as observed) can be distinguished from those that failed to simulate a SSW by the realism of the Pacific response to MJO 6/7, with only the simulations that successfully simulate a SSW capturing the North Pacific low. Furthermore, only the simulations that capture the SSW, subsequently simulate a realistic surface response over the North Atlantic and Europe.