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The influence of MJO initial condition on the extratropical prediction skills in subseasonal-to-seasonal prediction model

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This study examines the impacts of the Madden-Julian Oscillation (MJO) on extratropical prediction skill in the Northern Hemisphere during the extended winter, using subseasonal-to-seasonal reforecasts. All four models examined in this study showed a sensitivity of the prediction skill in the North Pacific basin to the initial MJO amplitude at lead weeks 4 and 5. In the ECMWF model, for example, pattern anomaly correlation coefficient (PACC) skill of 300-hPa geopotential height at week 4 becomes higher when the model is initialized with strong MJO than weak MJO. An improved PACC skill with strong MJO is also found in surface air temperature prediction, primarily over the United States. Although not always statistically significant, the similar results are also found in other three reforecasts. The changes in extratropical prediction skill seem to be linked with the MJO prediction skill and the amplitude of the predicted MJO in the first 3 weeks of forecast lead, both of which are higher with strong MJO at initial state than those without active MJO. In addition, the impact of the MJO initial condition on the extratropical prediction is different for each MJO phase. The prediction skill mainly changes in the region where observed teleconnection pattern is consistent across events for each phase, verifying the causality between the MJO and the extratropical prediction skills.