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The Winter North Pacific Teleconnection in Response to ENSO and the MJO in Operational Subseasonal Forecasting Models Is Too Weak

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Teleconnection patterns associated with the Madden–Julian oscillation (MJO) and El Niño–Southern Oscillation (ENSO) impact weather and climate phenomena in the Pacific–North American region and beyond, and therefore accurately simulating these teleconnections is of importance for seasonal and subseasonal forecasts. Systematic biases in boreal midwinter ENSO and MJO teleconnections are found in eight subseasonal to seasonal (S2S) forecast models over the Pacific–North America region. All models simulate an anomalous 500-hPa geopotential height response that is too weak. This overly weak response is associated with overly weak subtropical upper-level convergence and a too-weak Rossby wave source in most models, and in several models there is also a biased subtropical Pacific jet, which affects the propagation of Rossby waves. In addition to this overly weak response, all models also simulate ENSO teleconnections that reach too far poleward toward Alaska and northeastern Russia. The net effect is that these models likely underestimate the impacts associated with the MJO and ENSO over western North America, and suffer from a reduction in skill from what could be achieved.