

Forecast skill of the Madden–Julian Oscillation in two Canadian GCMs

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The output of two global atmospheric general circulation models (GCMs) participating in the second phase of the Canadian Historical Forecasting Project (HFP2) is utilized to assess the forecast skill of the Madden–Julian Oscillation (MJO). Space–time spectral analysis of the daily precipitation in near–equilibrium integrations reveals that the two models behave differently in simulating the convectively coupled equatorial waves that include the MJO, Kelvin, equatorial Rossby (ER) and mixed Rossby–gravity (MRG) waves. An objective of this study is to examine how the MJO forecast skill is influenced by the model's ability in representing the convectively coupled equatorial waves.

The results show that the model with a better representation of the tropical convectively coupled waves produces a significantly better forecast skill for the MJO. The difference is larger in winter than in summer, when the correlation skill score drops below 0.50 at a lead time of 10 days for one model whereas at 6 days for the other. There are some features that are common for the two models. The forecast skill is better in winter than in summer. Forecasts initialized with a large amplitude of the MJO are found to be more skillful than those with a weak MJO signal in the initial condition. The forecast skill is dependent on the phase of MJO at the initial condition. Forecasts initialized with an MJO that has an active convection in tropical Africa and Indian ocean sector have a better forecast skill than those initialized with a different phase of the MJO.