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Plain Language Summary: The Madden-Julian Oscillation (MJO) significantly influences the global and local climate and its simulation largely attributed to the convection scheme in Atmospheric General Circulation Models (AGCMs). By incorporating the Stochastic Multicloud Model into the ECHAM6.3 atmosphere model, the simulated eastward propagation of the MJO is improved through adjusting the shallow-deep convective trigger.

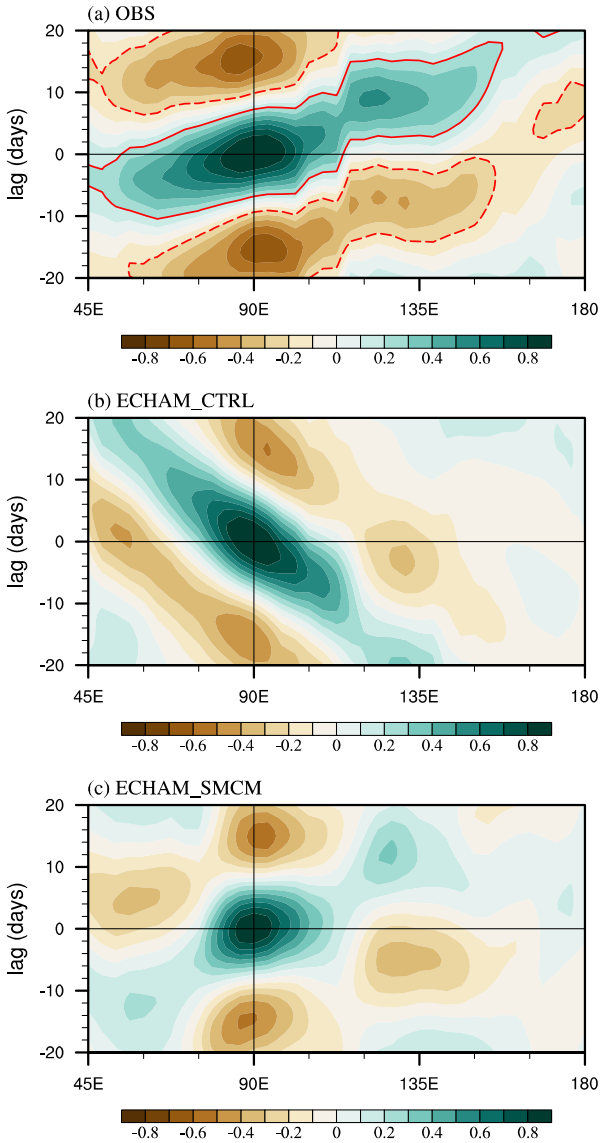

Fig. 1 Eastward propagation of the MJO precipitation as indicated by the lead-lag correlation of 20-70 day filtered precipitation averaged over 10°S-10°N with reference to the precipitation at the equatorial eastern Indian Ocean (10°S-10°N, 80°E-100°E) during boreal winter (NDJFMA): (a) observation, (b) ECHAM_CTRL, and (c) ECHAM_SMCM (Stochastic Multicloud Model). The red contour in (a) represents correlation coefficient (CC) of ±0.2.

- The simulation of the MJO eastward propagation is improved by coupling the SMCM to the ECHAM6.3 atmosphere model.
- The improvement in the MJO eastward propagation is mainly attributed to the improved dynamical processes including the boundary layer moisture convergences, low-level circulation, vertical structures of diabatic heating and equivalent potential temperature.
- The findings in this study may be of interest to GCM developers and users.