Session: C25 Poster: W76A

On the relative roles of circumnavigating waves and extratropics on the Madden-Julian Oscillation (MJO)

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A unique global climate model (GCM)-based framework is introduced to diagnose the relative roles of the circumnavigating waves and the extratropics on the Madden-Julian Oscillation (MJO). Apart from a standard GCM simulation ('control'), two sensitivity tests are conducted for 20 years. In the first (second), model prognostic variables are relaxed in the tropical Atlantic region (200-300 latitude zones) toward the 'controlled' climatological annual cycle to remove the influences from the circumnavigating waves (extratropics). The results suggest that the circumnavigating waves do not play any major role on the MJO, however, the MJO variance was substantially reduced in the absence of extratropical influences. We believe that this is the first study to quantitatively demonstrate the relative roles of the two processes on the MJO statistics. Implications of the results will be discussed in the meeting.