



Intensities of deep convection in general circulation models and satellite observations

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Extreme precipitation events, often associated with deep convection, are of great societal and scientific interest. Intensity distributions of deep convection in atmospheric general circulation models (GCMs) have not been widely analyzed, despite their importance and possible change in association with trends in greenhouse gases and aerosols. In this study, convective intensities are examined in the Geophysical Fluid Dynamics Laboratory atmospheric GCM (AM2) and compared with intensity distributions inferred from TRMM and SSM/I satellite observations. It is possible to generate both AM2 distributions of precipitation intensities dominated excessively by weak events and distributions with more strong events than observed, by varying the closure, convective triggers, and spectrum of convective cells and mesoscale clouds used in the cumulus parameterization. Changes in the frequency of heavy rain events associated with changing these components of the cumulus parameterization are larger than those associated with 2 K increases in sea surface temperature in AM2.