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The Diurnal Cycle of Precipitation Over Tropical Oceans and the Weak Temperature Gradient Approximation LEAH LINDSEY, SHARON SESSIONS, New Mexico Tech — Convection and circulation processes in the tropics have a significant impact on global climate. Understanding the mechanisms that force convection in the tropics will help to improve global circulation models. An important process that is still not fully understood is the diurnal rainfall variability. Here, we use the weak temperature gradient (WTG) approximation to determine the extent to which diurnal variability in precipitation is controlled by the thermodynamic environment. The basis for the WTG approximation is that the virtual temperature is nearly horizontally uniform and thus has a constant vertical profile in the tropics. Any change in the vertical temperature profile as a result of surface fluxes, latent heat release, or radiation is counteracted by gravity waves. In the model, a vertical velocity is generated to counteract diabatic heating. Using a cloud resolving model, we impose observed diurnal variations in the reference profiles of potential temperature and moisture. The perturbations are taken from the EPIC field program (East Pacific Investigation of Climate Processes in the Coupled Ocean-Atmosphere System, September – October 2001), and the reference profiles represent the convective environment. We compare simulated diurnal cycles in precipitation to observations and find good agreement in timing of precipitation maximum. This suggests that thermodynamic control of diurnal rainfall is important.

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