Abstract Submitted
for the 4CF12 Meeting of
The American Physical Society

The sensitivity of multiple equilibria in a cloud resolving model to sea surface temperature changes in weak temperature gradient simulations STIPO SENTIC, SHARON SESSIONS, New Mexico Institute of Mining and Technology — In the tropics, gravity waves quickly redistribute buoyancy anomalies, which leads to approximately weak temperature gradients (WTG) in the horizontal. In our cloud resolving model (CRM), the WTG approximation is enforced by relaxing potential temperature perturbations to a reference profile which represents the mean state of the atmosphere. To obtain reference profiles, the model is run in a non-WTG mode until radiative convective equilibrium (RCE). RCE vertical profiles of temperature and moisture are then used as reference profiles for WTG simulations. Continuing the work of Sessions et al (2010), we investigate the sensitivity of multiple equilibria in a CRM to changes in sea surface temperatures (SST). Multiple equilibria refers to a precipitating or non-precipitating steady state under identical forcing conditions. Specifically, we run RCE simulations for different SSTs to generate reference profiles representing different large scale environments for WTG simulations. We then perform WTG experiments for each SST with varying surface wind speeds. The model domain is initialized either with a completely dry troposphere, or with a RCE moisture profile. We find that the range of wind speeds maintaining both a dry and a precipitating steady state is strongly dependent on SST.

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Date submitted: 25 Sep 2012 Electronic form version 1.4