



Latent heating controls by convection scheme parameters

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We explore the tropical latent heating (LH) of experiments performed with two versions of the atmospheric component of the Max Planck Institute Earth System Model (MPI-ESM1.2), which only differ w.r.t. parameters of the convection scheme, namely in experiment EC-En we increased the entrainment rate for penetrative convection. For evaluation, the satellite retrieved TRMM PR Spectral Latent Heating is used.

EC-En reveals a worse mean state, a better MJO, and a more realistic top-heavy heating profile than the control experiment. The experiments also differ in their LH amounts, and the partitioning between convective and stratiform heating. We found a control change of LH by large-scale circulation, as represented by the vertical velocity in 500 hPa (w500). This change favors the more top-heavy profile in EC-En. Furthermore, a shift from moderate to strong vertical motions in EC-En enhances the impact of the changed control of LH by w500. This additionally contributes to a more top-heavy profile. However, the change of the large-scale circulation further increases its bias that is already evident in the control experiment. Thus, the improved mean LH profile in EC-En is achieved at the cost of a realistic large-scale circulation.