

## Dynamical Simulation of Shallow Stratocumulus Convection

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### ABSTRACT

The stratocumulus covers a vast region over the ocean. They are important for the air-sea interaction. We have employed Kuo and Schubert's (1988) twodimensional convection model to simulate the cloud-topped marine boundary layer. In addition to the evaporative cooling in Kuo and Schubert (1988), the effect of radiative cooling, sea surface evaporation and large scale subsidence are considered in the model. In particular, we explore the impact of large scale subsidence, sea surface temperature on the cloud-topped marine boundary layer.

Our experiments indicate that the stratocumulus is likely to breakup under the conditions of high sea surface temperature and large scale subsidence. Whether the background soundings satisfies the entrainment instability criteria or not, the stratocumulus will not breakup under low sea surface temperature and climate value of subsidence. Our results also indicates that high sea surface temperature plus the entrainment unstable sounding may be the reason that stratocumulus breakup into trade cumulus in the Hadley circulation.

Key words: entrainment instability, boundary layer, radiative cooling, large scale subsidence, spectral method.

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