

The Contributions of Shear and Turbulence to Cloud Overlap for Cumulus Clouds

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Vertical cloud overlap, the ratio of cloud fraction by area and by volume, for cumulus clouds are studied using large-eddy simulations (LES) due to the inefficient, wide-range values of cloud overlap. We can obtain information about the cloud cover of a cloud field by inspecting the individual clouds in that cloud field. We start with the maximum-random assumption and adjust this assumption for individual clouds. From this there is an underprediction which leads to the conclusion that something can be added. We extend this by considering physical factors of cloud overlap: area variability, vertical wind shear, and turbulence. We use numerical schemes to calculate the effect of each contributor based on cloud height. The resulting model shows good accuracy in modeling the cloud overlap.