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Shear and buoyancy effects in the spatial organization of Stratocumulus clouds[1] MONICA ZAMORA ZAPATA, JAN KLEISSL, University of California, San Diego — The convective nature of Stratocumulus (Sc) clouds involves the motion of updrafts and downdrafts, driven by cloud-top radiative cooling and surface heat fluxes. Spatially, updrafts reach thicker cloud regions, while downdrafts are found at the thinner or cloud free regions. The balance of surface shear and buoyancy changes the coherent structures (Moeng and Sullivan, 1997). Surface rolls appear with stronger shear, and cells appear when buoyancy dominates. While stronger surface shear increases the cloud fraction of Cumulus clouds (Park et al., 2016), the shear effect on Sc clouds is unknown. Moreover, shear can also occur at the cloud top, where it erodes the Sc cloud from the top (Wang et al., 2012), but the effect on the horizontal spatial properties (aspect and cloud fraction) is unclear. In this work, we study the spatial organization of Sc clouds as a function of shear and buoyancy. We vary the heat flux and wind speed in Large Eddy Simulations (UCLA-LES) of the DYCOMS II RF01 reference case. Cells and rolls are observed at the surface depending on the heat flux and wind speed conditions, with clouds aligning in the direction of the wind for strong surface rolls. On average, the cloud base is more flat and cloud fraction is larger for stronger surface buoyancy.

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