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Aerosol impacts in continental shallow cumuli using bin and bulk microphysical schemes

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Much attention has been given to the impacts of aerosol on maritime cumulus clouds, which are often in a state of near equilibrium with the environment. However, less work has been done to confirm that the results of these maritime studies hold in continental cumuli where the diurnal cycle of the boundary layer is much more pronounced and where aerosol concentrations can reach much higher levels. A second issue is that differences in cloud and rain properties that arise due to the choice of microphysical scheme can be greater than differences that arise through changes in the aerosol number concentration. The sensitivity to the choice of scheme contributes uncertainty to the aerosol results. In the current study continental cumulus clouds have been simulated at high resolution (50m horizontal spacing, 25m vertical spacing) using both the Hebrew University bin scheme and the standard bulk microphysics scheme in RAMS under clean and polluted conditions. The influence of aerosol on cloud morphology and microphysical characteristics will be presented for each microphysical scheme and the results compared to those from previous studies of maritime cumuli. Individual microphysical process rates from each scheme will also be compared to understand differences in the response to aerosol. Comparing the process rates in this way will allow for a better understanding of the causes of spread between microphysical schemes.