

Abstract Submitted
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Vertical concentration profiles of dust particles in the atmospheric surface layer¹ LIVIA SOUZA FREIRE GRION, MARCELO CHAMECKI, Pennsylvania State University — The study of the emission of dust particles from soil surfaces into the atmospheric boundary layer (ABL) has important applications to different environmental problems, from local air quality to large-scale aerosol transport and its interaction with climate. Due to the difficulty of measuring surface dust flux, a model relating it to the vertical profile of mean concentration is needed. In this study, we use Large-Eddy Simulation of the ABL to evaluate the effects of particle size and turbulence on the relationship between dust flux and concentration profiles. Results show that for very small particles (less than 5 micrometers) the settling velocity is usually negligible and the mean concentration displays a logarithmic profile. For large particles (more than 30 micrometers), there is an approximate balance between vertical turbulent diffusion and gravitational settling, so that Prandtl's power-law solution holds. However, a more general solution including non-zero net fluxes and gravitational settling exists, and it is in agreement with LES results for all particle sizes. Effects of atmospheric stability are also investigated.

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