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Outer scale and Monin-Obukhov flux relationships of atmospheric turbulence under dry convective conditions

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In this study we will investigate the assumption that in the atmospheric surface layer the outer scale (L_0) is proportional to the height above the surface, under dry convective conditions. For this purpose we analyzed raw sonic anemometers data collected at 3.5 m and at 9 m in a field campaign at the Santa Cruz Flats ($32^0$40.3190'N, $111^0$32.641'W, 526 m of elevation) near Eloy, Arizona. For simplicity, we define the L_0 as that separation distance at which the spatial correlation coefficient of air temperature at two points in the surface layer is 0.5. Then, according to the 2/3-Kolmogorov scaling law in the inertial sub-range, L_0 is determined by the variance and the structure parameter of T. It is found that L_0 does not scale with height. Possible reasons for this negative result will be discussed, by considering the methodology to determine structure parameters, Taylor's frozen turbulence hypothesis, effects of intermittency and Monin-Obukhov flux relationships for variance and structure parameter for T. The question is asked whether the concept of *surface constant flux layer* still holds under strong convective condition.