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Dependence of a large scale blending heights on local surface fields from BOREAS observations.

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Modeling and observational studies examining the interaction between the land surface and the atmosphere above heterogeneous terrain have shown that the air properties above different surface patches retain their individual character up to a blending height and then become horizontally homogeneous. Observational studies demonstrate the existence of blending heights for scales on the order of km, and include the speculation that the concept is valid for larger scales. GCM studies simulate a blending height for larger scales placed at approximately one third of the height of the planetary boundary layer (PBL). In order to determine the existence of a larger scale blending height using observations, and the consistency between this model behavior and observations, radiosonde data from the BOREAS experiment were analyzed. The data used in this analysis were from temporally concurrent measurements (daytime or afternoon), taken over a wide enough range of surface types and on scales comparable to a GCM grid size. An algorithm similar in nature to that used in the observational and GCM studies was used to compute the blending heights. Blending heights were defined over more than 50% of the vertical soundings from seven locations that were analyzed.

Seasonal averages of the daily maximum height of the blending height from spring and summer seasons show that the ratio between PBL height and blending heights varied between spring and summer seasons, due to the increase in PBL heights in spring without a corresponding increase in blending heights. Blending heights are generally higher on clear days than on cloudy days, following the behavior of the PBL height. The relationships between blending height and surface ground temperature, air temperature and soil moisture will also be presented.