



Aspects of boundary layers in complex terrain and the interaction to the free troposphere

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Numerical weather and climate prediction models generally apply turbulence schemes based on similarity relations from ideal terrain in their subgrid-scale parameterisations, and this may have a major effect on the accuracy and performance of these models. However, while we know that applying ‘ideal parameterisations’ in complex terrain may be dangerous, for many types of non-ideal terrain we do not even know what the characteristics of the turbulence structure actually look like. In other words we even lack the knowledge concerning what a better exchange parameterisation should reproduce. In this contribution an attempt is made to summarize the present state of knowledge with respect to turbulence in complex terrain and what recent developments have contributed. A focus will thereby be laid on the question of the applicability of similarity relations in these environments, i.e. those potentially relevant in boundary layer parameterisations of numerical models. On the basis of an example concerning moisture exchange in a narrow alpine valley and using LES it is finally shown that indeed the traditional (ideal) boundary layer parameterisations may not always be up to their basic task: to correctly account for the transport of heat, mass and momentum from and to the ‘surface’.