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Inhomogeneity of atmospheric boundary layers in complex terrain

MW Rotach
University of Innsbruck, Institute for Meteorology and Geophysics, Innsbruck, Austria (mathias.rotach@uibk.ac.at)

In complex terrain the atmospheric boundary layer is inhomogeneous by definition –radiative forcing on the one hand and dynamic modification of the flow on the other hand are inherently variable over length scales comparable to those of the PBL. Thus our current theoretical understanding that also enters parameterizations in numerical models cannot readily be applied. In this contribution therefore the problem is first outlined on the example of available evidence from experimental campaigns and numerical modelling. It is shown that horizontal inhomogeneity is serious (i.e., dominant) for spatial scales of a typical topographic feature (a valley system, say). Unfortunately these are the scales that are often not (or poorly) resolved (e.g., in numerical models). Possible approaches on how to systematically address the problem will be presented and ongoing initiatives are discussed that are likely to contribute to further progress.