On the mountain boundary layer: Diurnal valley winds and exchange processes over complex terrain

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Abstract:

Thermally induced wind systems, such as the diurnal slope and valley winds, are an important component of the boundary layer over mountainous regions with a large influence on mountain weather and climate. These wind systems are not only important for the local climate in a mountain valley, but also for the formation and development of clouds and thunderstorms and for the interaction of the mountain with the large-scale circulation. In current numerical weather prediction models these winds are often poorly resolved, also their role in land-atmosphere exchange over complex terrain is unclear. A recent evaluation of the representation of the valley winds in the Alpine region in the COSMO NWP model will be discussed, as well as an investigation of heat exchange processes over complex terrain by means of large-eddy simulation in order to bring light into the current debate on the valley heating mechanisms.