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Wind Lidar measurements of sub-grid scale variability in complex terrain

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Up-slope and down-slope mountain flows were measured between the months of July and August 2011 in a field campaign in the heart of the Swiss Alps. A priori, the average behavior of mountain and valley flows is well known, with drainage flow over nighttime periods, and upslope flow over daytime periods of convective instability. The cycle closes with two transitioning events at sunrise and sunset, where flows become transitionally quiescent, for later changing their respective sign (Nadeau et al. 2011).

By means of three wind Lidars, a 10 meter tower equipped with 5 sonic anemometers and a fully equipped meteorological station with 2 additional sonic anemometers the up-slope/down-slope valley winds were studied in detail. Important sub-grid scale variability was captured in both dominant flows by the wind Lidars. Because of their long range of measurement and their fine scale resolution combined with its high frequency data acquisition, wind Lidars are an excellent tool for capturing the complex behavior of mountain flows. Preliminary results showing the existence of counter-sense a priori unknown sub-grid scale flow properties will be presented.