Observed impact of the large-scale flow on the lee-side boundary layer over the mountainous island Corsica

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Over complex terrain, various convective, thermally and dynamically driven processes occur simultaneously and impact the conditions in the boundary layer. As part of the HyMeX field campaign in the western Mediterranean Sea 2012 the mobile observation platform KITcube was installed on the mountainous island Corsica. One of the main measurement sites was located in a valley in the lee of the major mountain ridge (Corte) and allowed to study the impact of the large-scale flow on the boundary layer in a lee-side valley.

Two case studies revealed that a warm and dry air mass with westerly momentum from the free atmosphere was transported downwards into the lee-side valley during daytime. The intrusion lasted from one to several hours. Different mechanisms were proposed to explain the downward transport, including turbulent transport, large-amplitude lee waves or downslope windstorms. The intrusion locally interrupted or inhibited the evolution of a boundary layer, which typically resulted from convective and thermally driven processes. Between the intruding air mass and a cool and moist upvalley wind layer with south-easterly momentum, horizontal convergence resulted. The conditions at the measurement site depended on the location of the convergence zone: it billowed around the site producing upward motion on one day, while it was found further down the valley on the other day resulting in strong downward motions at the sites.