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Cold-air pooling in the Cerdanya valley (Pyrenees)

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The Cerdanya valley in Catalonia, a graben 35 km long and 15 km wide, is the largest of the Pyrenees and one of the widest in Europe. Its distinct NE-SW orientation stands out among the rest of the valleys, generally oriented in the N-S direction. Its topographical configuration, composed by the main axis of the Pyrenees to the north (peaks above 2900 m above sea level -asl-), the Cadí mountain range to the south (maximum high 2648 m asl) and the valley floor at 1000 m asl, is prone for the development of intense cold-air pooling.

This work documents such cold-air accumulation using different sources of information: i) a four-year long period (1/9/2010- 31/8/2014) of data from several meteorological stations operating around the area at different elevations, which is filtered to isolate the cases when local circulations prevail in order to provide a statistical description of the phenomena; ii) a high-resolution mesoscale simulation of a selected case (1-4 October 2011) that, combined with meteorological data and satellite information, allows to deeply investigate the relevant processes in the cold-air pooling formation; and iii) an experimental campaign that was carried out in October 2015 with the objective of finding experimental evidence of the processes indicated by the simulations.

The statistical analysis shows evidence of recurrent cold air pooling in the valley and hints of the processes of formation and dissipation, especially those linked with flow from the tributary valleys and topographic blocking downvalley. These features appear well defined in the simulation outputs. The campaign results, that make use of data from tethered balloon, a multicopter drone, a surface energy budget station and a WindRASS, provide preliminary evidence confirming the previous statements, and a more detailed analysis will be presented at the conference.