AROME and Meso-NH performance to retrieve fine scale low level wind under stable conditions during two recent mountain field experiments.

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Over the past years, METEO-FRANCE experimental and instrumental meteorology research group (CNRM/GMEI) has been involved in several mountain meteorology field experiments. These projects are carried out in close collaboration with several partners, among them the University of the Balearic Islands and Laboratoire d'Aérologie.
The field experiments took place in the three main mountain range systems of Metropolitan France: the Alps, the Pyrenees and the Massif Central.
Our research focuses in particular on fine scale flows over complex terrain and their impacts under stable conditions. One objective is to contribute to improve their representation in fine scale numerical weather prediction models. This paper will give an overview of an on-going work concerning fine scale wind verification for two field experiments.
The first one (Passy-2015) took place in a narrow alpine valley of the French Alps, which is known to be one of the worst place in France regarding air quality. The analyses of flows within the valley from observations and high resolution numerical simulations highlight their role in the observed wintertime pollution events and reveal the mechanisms at play. Fine scale temporal evolution of temperature and wind profiles at the valley center as well as cross-valley wind structure will be compared to the same fields retrieved from a 100 m horizontal resolution numerical simulation using the non-hydrostatic mesoscale atmospheric model Meso-NH.
The second field experiment took place during summer and fall 2018 in a narrow valley of the central Pyrenees (Vallée d'Aure). It emerged from a recent 400 m horizontal resolution numerical study done with Meso-NH by Jiménez et al. (2019). This study suggests that under clear-sky conditions a jet forms in the valley and can be observed several kilometers away from the valley exit. A first attempt to analyze performance of the fine scale numerical prediction model AROME operational at METEO-FRANCE to retrieve the jet, its structure and its connection with along valley temperature gradient will be presented.
A few planned projects will be mentioned to conclude.

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