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High resolution LES study of the nocturnal low level jet

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Katabatic winds are buoyantly driven flows arising along cooled sloping surfaces which play a crucial role in driving the local weather, redistributing scalars such as temperature and moisture in the atmosphere. These winds are established following sunset under strong radiational cooling and rapidly stop after dawn with the formation of the convective boundary layer. They are characterized by a peak in the along slope velocity known as nocturnal low level jet (LLJ) whose effects, on the dynamics of such systems, have been recently investigated but are still not fully understood. The current contribution proposes a Large Eddy Simulation (LES) study at high resolution of idealized katabatic flows along cooled sloping surfaces and aims at gaining a deeper understanding on those that are the dynamics of such thermodynamical systems at the LLJ height. The stably stratified atmosphere is approximated in the Boussinesq sense, rotational effects are not taken into account and the subgrid terms for momentum and buoyancy are independently parametrized adopting Lagrangian scale dependent dynamic models (Bou Zeid et al., 2005). The structure of the mean and turbulent fields obtained from our numerical setup is analysed and results are compared with recent literature and meteorological observations from a narrow alpine valley with steep slopes (Val Ferret, Switzerland). The importance of the subgrid parametrization is tested via run at various resolution.