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Evaluation of thermally driven local winds in the Swiss Alps simulated by a high-resolution NWP model

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In fair weather conditions, thermally driven local winds often dominate the wind climatology in deep Alpine valleys resulting in a unique wind climatology for any given valley. The accurate forecasting of these local wind systems is challenging, as they are the result of complex and multi-scale interactions. Even more so, if the aim is an accurate forecast of the winds from the near-surface to the free atmosphere, which can be considered a prerequisite for the accurate prediction of mountain weather. This study investigates the skill of a high-resolution numerical weather prediction (NWP) model, the most current version of the COSMO-DWD model, at 1.1 km grid spacing in simulating the thermally driven local winds in the Swiss Alps for a month-long period in September 2016. The study combines the evaluation of the surface winds in several Alpine valleys with a more detailed evaluation of the wind evolution throughout the valley depth for a particular site in the Swiss Rhone valley. The former is based on a comparison with observations from the operational measurement network of MeteoSwiss, while the latter uses data from a wind profiler stationed at Sion airport.