

Improved parametrization of the boundary layer in Harmonie-Arome with a focus on low clouds

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The turbulence, convection and cloud scheme form the core of the HARMONIE-AROME boundary layer parametrization. These schemes are tightly coupled. Hence, an integral approach is needed to develop and optimize these parametrizations together. Substantial modifications are based on a wide variety of argumentations ranging from theoretical considerations, in-depth comparison of 1D model results with LES, and optimizations of uncertain parameters by evaluation of 3D model results.

Several results are shown with the updated set of parameterizations. Most striking is the improvement on the most important deficiency of the current Harmonie-Arome model, namely the underestimation of low stratus clouds and the overestimation of the cloud base height. Other improvements concern the triggering of rain and the representation of the stable boundary layer. As illustrated, most improvements can be related to a better preservation of atmospheric inversions.