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Uncertainty in prediction of deep moist convective processes: turbulent parameterizations, microphysics and grid-scale effects

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A line of development of numerical meteorological forecast, common to many European and American Meteorological Organizations, schedules a drastic reduction of the space scale for the realization of limited-area predictions.
The scientific community has been discussing such an issue, whether this approach can be of real advantage for the solution of the problems of the uncertainty of the decision-maker. The extraordinary enhancement of the computer power could indeed, just because "nowadays it is possible", promote this drastic reduction of the modeling horizontal resolution. However this "brute-force" approach to the question of the solution of the problem of nowcasting does not guarantee a priori success in the solution of the problem.
In this framework, deep moist convective processes in simplified atmospheric scenarios (e.g. supercell) are studied in this paper by means of high resolution numerical simulations with Cosmo Model.
Particular attention is paid to determine if and at which extent the convection-resolving solutions, in the range of grid-spacing between 1 km and 100 m, statistically converge from a turbulence perspective with respect to flow field structure, transport properties and precipitation forecast. Different turbulent closures, microphysics settings and gridspacings are combined and their joint impact on the spatial-temporal properties of storm processes is discussed.