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Sensitivity of precipitation forecasts to uncertainties in model physical parametrisation

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During the last 15 years, ensemble weather forecasting has made substantial progress and has proved its skill in forecasting the probabilities of relevant weather events. More recently, the development and growing use of highresolution, convection-permitting models has significantly increased the potential of atmospheric modelling. However, this opens new questions regarding the representation of the initial state, boundary conditions, and model uncertainties. In particular, the relative weight of each contribution remains to be investigated.
This talk focuses on model uncertainties (and especially those related with the cloud and precipitation representation) which, so far, have been much less studied than initial state uncertainties. The sensitivity of the precipitation forecasts to the details of cloud physics parametrization is assessed i) by varying the tunable parameters of the model microphysical scheme within their range of admitted values and ii) by introducing random perturbations on the time tendencies that govern hydrometeor evolution. Here, this methodology is applied to past cases of heavy precipitation over southeastern France. It is found that the second set of perturbations induces a wider spread of the results and that low-skill forecasts show much higher sensitivity to the microphysical scheme perturbations than high-skill forecasts. Furthermore, the spread amplitude is found to be quite comparable to the one obtained with initial state perturbations. These results indicate that the model uncertainties associated with cloud physics parametrisation should be taken into consideration in convective scale ensemble prediction systems.