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Implementation of the Plant-Craig stochastic parameterization of deep moist convection in a numerical atmospheric model

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We report on our efforts to implement a stochastic scheme for deep moist convection into the COSMO (Consortium for Small-scale Modeling) atmospheric model, and use the scheme in simulations with 7 km grid-spacing.

A parameterization scheme of deep moist convection aims to represent the net effect of convection occurring on sub-grid scales, i.e. that which a model cannot resolve explicitly. Given properties of the resolved flow, it produces a feedback to that resolved scale flow. A stochastic parameterization, like the Plant-Craig (PC) scheme, takes into account the fact that the unresolved convection is not merely determined by resolved-scale parameters, but also by unresolved physics. To this aim, the PC-scheme, being based on equilibrium statistics, uses convective plumes that are randomly drawn from a probability density function that describe the chance of launching a plume with a certain mass flux.

Preliminary results show a more realistic distribution of convective precipitation than that produced by non-stochastic schemes. Statistical properties of the scheme's convective precipitation are compared with those observed by radar and those of non-stochastic schemes.