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A stochastic parametrization for deep convection and its scale adaptivity

RJ Keane (1,2), GC Craig (1), G Zaengl (2), and C Keil (1)
(1) LMU Munich, Germany (richard.keane@lmu.de), (2) Deutscher Wetterdienst, Offenbach, Germany

The development of NWP models operating at more than one resolution has lead to a requirement that the physical parametrizations are scale adaptive; this means that extra variability should be added at finer resolutions, in accordance with the extra information available, but that the parametrization should not be fundamentally dependent on the grid spacing. Conventional (i.e. non-stochastic) convection schemes are unable to do this by design, since they assume a fixed response to a given grid-scale forcing. This is important when the grid spacing is of the order of tens of kilometers, where deep convection is not resolved explicitly, but where the grid boxes are not large enough that an ensemble-mean convective response to a given resolved forcing can be assumed.

This presentation will outline a stochastic parametrization for deep convection, and show how its inclusion in an NWP system (here the ICON GCM) enhances the scale adaptivity of precipitation modelling, in comparison with conventional parametrizations. A brief overview of its interaction with the dynamical core, in terms of how its stabilizing effects feed back on precipitation produced at later time steps, will also be given.