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Influence of a stochastic parametrization on regional climate model results

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Regional climate models (RCMs) are often used as a tool for impact studies to provide information on the local scale. But often the RCM results suffer from significant biases. The origin of these biases can be found in the driving data as well as in the RCM itself. Even if we only consider so called perfect boundary conditions by using re-analysis data RCMs can show large biases. A big part of this RCM bias comes from the model's parametrization. Traditionally, parametrizations describe the evolution of grid-mean quantities that can not be described by fundamental physical laws. These parametrizations do not take into account higher moments of such variables, or the effect of energy backscatter from unresolved scales to larger scales. Stochastic parametrizations try to consider these aspects and have been shown to give more realistic results in climate model simulations. We present a novel stochastic parametrization implemented in a regional climate model based on the concept of Markov random fields. Several stochastic 10 year simulations (1979-1988) over a European domain using the regional climate model REMO were run. All simulations were carried out with a horizontal resolution of 0.5° ($\sim$ 55km) and a domain size of 81x91 grid boxes on 20 vertical levels. As perfect boundary conditions we used ERA-40 re-analysis data. First results suggest that stochastic physics can improve model results if compared with observations. However, a careful analysis and interpretation of the involved physical mechanisms is important.