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On the added value of regional climate modeling

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One of the most important issues for regional climate models (RCMs), when used as dynamical downscaling tools of Global Climate Model (GCM) information, is that of added value. In other words, the question needs to be asked: What added information does a RCM provide compared to the driving GCM? This issue is not obvious, as the added value can be found in many different aspects of the simulations, such as for example the effects of fine scale topography and coastlines, the simulation of regional circulations or the improvement in the representation of extreme events. Often it is expected that the RCM should improve all aspects of the simulation, which is not necessarily the case, especially when looking at regional averages. It is indeed not the role of RCMs to improve large scale climatic patterns, although this might happen in some contexts. In this paper we will discuss the issue of the added value of RCMs through a series of illustrative example drawn from the completion of a recent set of CORDEX experiments over multiple domains. In particular, we will make the point that the added value should not be seeked in regional spatial and temporal averaged quantities (e.g. regional biases) but in higher order spatial and temporal climate statistics and regionally relevant circulations.