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Probabilistic Decadal Forecast for Central and Western Europe (PRODEF)

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Dynamical downscaling (DD), using atmospheric regional climate models (RCMs), often supports regional interpretation of coupled atmosphere-ocean global climate model (AOGCM) projections. Because DD is computationally very expensive, methods of statistical or probabilistic downscaling can be used as alternative. To attain resilient conclusions, such methods must comprise more than the relationships between large-scale climate indicators and local observations. We proposed a statistical-dynamical downscaling (SDD) method which combines both the added value of high resolution meteorological modelling (DD) and statistical and/or probabilistic refinement of AOGCM output.
Within the MIKLIP consortium, PRODEF focuses on the development of a combined SDD and probabilistic forecast tool for decadal predictions. Three different climate-related focal points are considered: i) windstorms ii) wind potential for energy supply and iii) severe rainfall leading to floods. SDD consists of three steps: The identification of relevant weather clusters in larger scale forcing data, the DD for representative episodes for weather clusters, and a construction of climate parameter distributions by "recombining" DD episodes. The tool pre-supposes the statistical interpretation of large scale forcing factors and, therefore, implies an evaluation of AOGCM results with respect to problems of uncertainty and model bias. This technique provides a computationally cost efficient tool to produce large numbers of ensembles of probabilistic projections, as required for an operational decadal prediction system. Preliminary results are presented focussing on the ECHAM6 hindcasts for the decade 2001-2010. Further research will focus on the previous decades and an evaluation of SDD projections compared to DD and statistical methods for decadal prediction.