Abstract

PRODEF is embedded in the BMBF Research Programme “Mittelfristige Klimaprognosen” (MiKlip). Within the MiKlip cooperation, it contributes to MiKlip Module C (regionalization of decadal predictions) and has links to Module E (evaluation and validation).

Dynamical downscaling (DD) using atmospheric regional climate models (RCMs) often supports regional interpretation of global climate model (GCM) projections. Because DD is computationally very expensive, the question arises whether simpler methods of statistical or probabilistic downscaling can be used to achieve similar results. To attain resilient conclusions, the applied statistical techniques have to comprise more than relationships between large-scale climate indicators and local observations. Statistical-dynamical downscaling (SDD) combines both the added value of high resolution meteorological modelling (DD) and statistical and/or probabilistic refinement of GCM output.

The intention of PRODEF is to improve and further develop SDD methods with focus on decadal predictions. SDD will provide a computationally cost efficient tool to produce large numbers of ensembles of probabilistic projections for three different climate-related focal points: i) windstorms ii) wind potential for energy supply and iii) severe rainfall leading to floods. SDD presupposes statistical interpretation of large scale forcing factors and, therefore, implies an evaluation of GCM results with respect to problems of uncertainty and model bias. A second step is the application of DD in ensemble mode, using existing simulations and those to be accomplished within MiKlip for decadal forecasts. The recombination step develops methods to assess the statistical uncertainty and parameters for probabilistic modelling.

SDD methods are an alternative approach to purely DD approaches and have advantage of being comparatively computationally cheap. PRODEF processes large ensembles of GCM data to produce a larger ensemble of downscaled predictions, being therefore an important and valuable contribution for the joint efforts of regional downscaling in Module C.