## "Regional Decadal Climate Prediction for Europe (REDCLIP)"

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## Abstract:

This project is part of the BMBF funded research program "Medium term climate prediction" (MiKlip) and a contribution to Module C (Regionalisation). The aim of our project is to develop regional ensemble techniques to improve decadal climate predictions for Europe by means of dynamical downscaling and statistical post-processing and to come up with a suggestion which method should be used in an operational decadal climate prediction system. To achieve this goal the project will follow a four step strategy.

- **Development of a regional decadal prediction strategy**: In a first step, a strategy for regional decadal predictions will be developed based on existing experience with regional multi-member ensembles. Results from in house PhD studies as well as from several projects like ENSEMBLES, Clavier and Klimzug will be assessed and synthesized in a strategy for REDCLIP.
- **Downscaling of decadal predictions**: In step two, selected global baseline system decadal hindcasts will be dynamically downscaled using the regional climate model REMO (Jacob et al., 2007). At least two ensemble members of each hindcast period (defined by the global simulations with ECHAM6/MPIOM in Module D (Synthesis)) will be used and directly downscaled to 0.22° horizontal resolution. The choice of the members will be coordinated within Module C to achieve a sufficient ensemble size for the regional decadal predictions. A detailed analysis in cooperation with partners in Module C but also with Module E (Validation) of the downscaled predictions will be done to assess the predictive skill of the regional hindcasts. It is planned to carry out a workshop with several partners from Module C and E to coordinate the analysis and skill assessment.
- Generation of regional ensembles: A regional ensemble based on a stochastic physics approach and domain shifting will be set up and tested. Several regional ensembles of selected hindcast members based on the strategy developed in step one will be downscaled (preferable in 0.44° resolution to be able to run as many members as possible). The techniques used to generate these ensembles will be the stochastic physics scheme and the domain shifting technique discussed above.
- Statistical post-processing recalibration: Statistical post-processing techniques such as the climate conserving recalibration (CCR) by Weigel et al. (2009) used in seasonal forecasting will be transferred to decadal climate predictions. Hence, the downscaling of the baseline decadal predictions already performed in step two will be completed. This is to get a more confident statistical basis available for the application of the statistical post-processing. This method will then be applied to the regional and global baseline hindcasts. A comparison of the skill between recalibrated regional and global hindcasts for Europe will be evaluated.