Uncertainties in predicting climate distributions: A Bayesian ensemble method

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Combining climate predictions of different Regional Climate Models (RCMs) requires a weighting method for the ensembles of RCMs. The weights should be based on the quality of the individual prediction of each model. Correlations due to the use of the same GCMs or AOGCMs have also to be taken into account. We propose a Bayesian method to combine the different model predictions into one statistical model. In the end we obtain a probabilistic forecast for the future climate that is more reliable than each single model prediction. We consider the control and the scenario runs of 6 RCMs and the CRU observations for the control period. Individual model bias corrections are included and their a posteriori distributions are estimated as well as the a posteriori distributions of the parameters that describe the climatic change. The individual model predictions are weighted according to the biases of the corresponding RCM for the control period. The bias corrections are not kept fixed for the future climate, but we allow a possible small bias change. Results are shown for the Alpine region.