



## **Probabilistic assessment of regional climate change in Southwest Germany**

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Since single-integration climate models only provide one possible realisation of climate variability, ensembles are a promising way to estimate the uncertainty in climate modelling. A statistical model is presented that combines information from an ensemble of regional and global climate models to estimate probability distributions of future temperature change in Southwest Germany in the following two decades. The method used here is related to kernel dressing which has been extended to a multivariate approach in order to estimate the temporal autocovariance in the ensemble system. It has been applied to annual and seasonal mean temperatures given by ensembles of the coupled general circulation model ECHAM5/MPI-OM as well as the regional climate simulations using the COSMO-CLM model.

The results are interpreted in terms of the bivariate probability density of mean and trend within the period 2011–2030 with respect to 1961–1990. Throughout the study region one can observe an average increase in annual mean temperature of approximately +0.6K in and a corresponding trend of +0.15K/20 a. While the increase in 20-years mean temperature is virtually certain, the 20-years trend still shows a 20% chance for negative values. This indicates that the natural variability of the climate system, as far as it is reflected by the ensemble system, can produce negative trends even in the presence of longer-term warming. Winter temperatures are clearly more affected and for both quantities we observe a north-to-south pattern where the increase in the very southern part is less intense.