A probabilistic climate change scenario for Switzerland

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The study of regional effects of future climate change not only requires quantitative regional climate forecasts but also measures of uncertainty in these predictions. The availability of comprehensive multi-model ensemble simulations enables the generation of scenarios where uncertainty can be quantified in a probabilistic framework. Here we present an early approach to generating a probabilistic regional scenario for the 21st century in Switzerland, and discuss its utility/limitations for climate change impact studies.

The scenario is based on an ensemble of climate change simulations conducted with regional climate models during the PRUDENCE project. Altogether 16 different model chains were considered. Due to the limited number of global models represented in the model chains, the uncertainty of global climate sensitivity was factored in from a probabilistic scenario for global mean temperature.

The resulting scenario for mean seasonal temperature and precipitation exhibits considerable uncertainty. For example the mean temperature trends around the mid 21st century vary by a factor of about four between the lower and upper bounds of the 95% confidence interval. It is also found that the uncertainties in the scenarios are clearly larger than the currently expected regional variations of the scenario across the country. This suggests that it is not of utmost priority to develop scenarios at detailed spatial resolution - at least for Switzerland, and that a coarse regionalization may be sufficient to users at this stage.

We will illustrate the use of the scenario for several examples of climate change impact analyses and we will also discuss our experience with communicating the probabilistic concepts to the scenario users.