



Inter-seasonal and inter-variable dependencies in multi-model projections: lessons learnt from the CH2011 climate change scenarios

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The new climate change scenarios “CH2011” provide a consistent assessment of how precipitation and temperature may change in Switzerland during the 21st century. Digital data were made available at different spatial and temporal aggregation levels. Here we revisit one product of CH2011, the climate scenarios of seasonal means, with the aim to enhance its practicalities for impact studies. These scenarios are based on the joint analysis of several regional climate models (RCMs) from the ENSEMBLES project that were all run according to the A1B emission scenario. Combined multi-model projections using a sophisticated Bayesian algorithm are provided for three different Swiss regions, four seasons and three projection periods in the 21st century. Uncertainty, arising from model-to-model projection and from internal decadal variability, is expressed with three estimates following an expert judgement: a lower, medium and upper estimate.

In CH2011, the three uncertainty estimates are derived and provided in an univariate way separately for each lead-time, region and season without providing information on combined changes and uncertainties. Yet, for impact applications often several climatological variables must be considered together and across all four seasons. Here, we elucidate further on the inter-seasonal and inter-variable dependencies by inspecting correlations in the underlying climate model data of CH2011.

The analysis shows that a firm conclusion on the correlation structure is highly challenged by the uncertainty of the different model projections, by the limited set of independent models and, possibly, the complex climate regime Switzerland is located in. Regarding the inter-variable relationship toward the end of the 21st century, confidence is still too low to make firm conclusions, although in summer a tendency for a negative relation can be inferred from the limited model set. Similar to the inter-variable relation, no recommendation can be given on how to combine the lower, medium and upper precipitation estimates from one season to the next, but the correlation analysis confirms a positive inter-seasonal dependency in case of temperature changes. In the presentation, we will further elaborate on the inherent complexities and implications of univariately derived multi-model projections.