EMS Annual Meeting Abstracts
Vol. 11, EMS2014-181, 2014
14th EMS / 10th ECAC

Enhancing local climate projections for Switzerland: Possibilities and limitations of bias correction techniques

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The Swiss CH2011 scenarios provide a portfolio of climate scenarios for the region of Switzerland, specifically tailored for use in climate impact research. Although widely applied by a variety of end-users, these scenarios are subject to several limitations related to the underlying delta change methodology. Examples are difficulties to appropriately account for changes in the spatio-temporal variability of meteorological fields and for changes in extreme events. The recently launched ELAPSE project (*Enhancing local and regional climate change projections for Switzerland*) is connected to the EU COST Action VALUE (www.value-cost.eu) and aims at complementing CH2011 by further scenario products, including a bias-corrected version of daily scenarios at the site scale. For this purpose the well-established empirical quantile mapping (QM) methodology is employed. Here, daily 2 m temperature and precipitation output of 14 GCM-RCM model chains of the ENSEMBLES project is downscaled and bias-corrected to match observations at weather stations in Switzerland.

The performance of QM is evaluated in a cross-validation framework. Special emphasis is placed on investigating the effect of bias correction on the mutual dependency between temperature and precipitation. Critical sites and seasons are highlighted and discussed. Also changes of the inter-parameter relation between the control and scenario period are assessed. The QM scenarios are compared against the delta change-based CH2011 scenarios in terms of mean seasonal climate change signals and distribution-based metrics of the future climate. Furthermore, the stability of the QM transfer functions on decadal-to-centennial time scales is assessed in a pseudo-reality framework. For modelling precipitation extremes a parametric extension of QM is considered.

This contribution will present selected aspects of the above mentioned analyses and will advise on possibilities and on limitations of the related scenario products for use in climate impact research in the alpine environment of Switzerland.