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Recalibration of CFS seasonal precipitation forecasts using statistical techniques for bias correction

Jan Bliefernicht (1), Patrick Laux (2), Jonatan Siegmund (1), Harald Kunstmann (1,2)

(1) Chair for Regional Climate and Hydrology, University of Augsburg, Germany, (2) Institute of Meteorology and Climate Research, Karlsruhe Institute of Technology, Germany

The development and application of statistical techniques with a special focus on a recalibration of meteorological or hydrological forecasts to eliminate the bias between forecasts and observations has received a great deal of attention in recent years. One reason is that retrospective forecasts are nowadays available which allows for a proper training and validation of this kind of techniques. The objective of this presentation is to propose several statistical techniques with different degree of complexity and to evaluate and compare their performance for a recalibration of seasonal ensemble forecasts of monthly precipitation. The techniques selected in this study range from straightforward normal score and quantile-quantile transformation, local scaling, to more sophisticated and novel statistical techniques such as Copula-based methodology recently proposed by Laux et al. (2011). The seasonal forecasts are derived from the Climate Forecast System Version 2. This version is the current coupled ocean-atmosphere general circulation model of the U.S. National Centers for Environmental Prediction used to provide forecasts up to nine months. The CFS precipitation forecasts are compared to monthly precipitation observations from the Global Precipitation Climatology Centre. The statistical techniques are tested for semi-arid regions in West Africa and the Indian subcontinent focusing on large-scale river basins such as the Ganges and the Volta basin. In both regions seasonal precipitation forecasts are a crucial source of information for the prediction of hydro-meteorological extremes, in particular for droughts. The evaluation is done using retrospective CFS ensemble forecast from 1982 to 2009. The training of the statistical techniques is done in a cross-validation mode. The outcome of this investigation illustrates large systematic differences between forecasts and observations, in particular for the Volta basin in West Africa. The selection of straightforward correction techniques such as a quantile-quantile transformation can clearly decrease the bias and can moderately improve the accuracy of the CFS precipitation forecast for warning situations.