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Dynamically and statistically downscaled outputs of AO-GCMs for mesoscale hydrological impact assessment

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This study aims at comparing outcomes from Regional Climate Models (RCMs) and Statistical Downscaling (SD) with a view to the assessment of greenhouse-gas induced climate change impacts on a pluvio-evaporal hydrological regime at the end of the 21st century. Daily time series of rainfall and air temperature related to dynamical downscaling were provided by the coupled AOGCMs-RCMs modelling experiment performed in the framework of the EU PRUDENCE (Prediction of Regional Scenarios and Uncertainties for Defining EuropeaN Climate change risks and Effects) project (2002-2005). Seasonal "delta change" predicted by the PRUDENCE AOGCM-RCMs between 1961-1990 and 2071-2100 has been proportionaly applied to observed air temperatures. For rainfall, the seasonal "delta change" on five key-rainfall variables representative of the spectrum of possible changes in the temporal structure and intensity of rainfall series (seasonal total, frequency of wet days, mean rainfall intensity, maximum rainfall intensity, maximum duration of a rainfall event) has been applied to observed daily rainfall series. The Statistical Downscaling Model (SDSM), a hybrid of the stochastic weather generator and regression-based downscaling method was used to i) calibrate statistical transfer functions between point-scale rainfall as well as air temperature series and HadCM3 GCM's atmospheric indices, ii) and to generate ensemble of rainfall and air temperature series for present and future climate conditions.