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Coupling climate and hydrological models to evaluate the impact of climate change on run of the river hydropower schemes from UK study sites

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As climate change is expected to generate variations on the Earth's precipitation and temperature, the water cycle will also experience changes. Consequently, water users will have to be prepared for possible changes in future water availability. The main objective of this research is to evaluate the impacts of climate change on river regimes and the implications to the operation and feasibility of run of the river hydropower schemes by analyzing four UK study sites. Run of the river schemes are selected for analysis due to their higher dependence to the available river flow volumes when compared to storage hydropower schemes that can rely on previously accumulated water volumes (linked to poster in session HS5.3).
Global Climate Models (GCMs) represent the main tool to assess future climate change. In this research, Regional Climate Models (RCMs), which dynamically downscale GCM outputs providing higher resolutions, are used as starting point to evaluate climate change within the study catchments. RCM daily temperature and precipitation will be downscaled to an appropriate scale for impact studies and bias corrected using different statistical methods: linear scaling, local intensity scaling, power transformation, variance scaling and delta change correction. The downscaled variables will then be coupled to hydrological models that have been previously calibrated and validated against observed daily river flow data. The coupled hydrological and climate models will then be used to simulate historic river flows that are compared to daily observed values in order to evaluate the model accuracy. As this research will employ several different RCMs (from the EURO-CORDEX simulations), downscaling and bias correction methodologies, greenhouse emission scenarios and hydrological models, the uncertainty of each element will be estimated. According to their uncertainty magnitude, a prediction of the best downscaling approach (or approaches) is expected to be obtained. The current progress of the project will be presented along with the steps to be followed in the future.