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High-resolution futuristic climate forcing over semi-arid catchments. Case of the Tensift (Morocco)

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In the south Mediterranean catchments, most of the available water resources are used to produce hydro-electric energy, for drinking water as well as for irrigated agriculture located downstream in the surrounding plains. This water Tower role is today threatened by the increase in water needs relative to the growth of the population and its standard of living, by the intensification of irrigated agriculture and by climate change. The south Mediterranean region is now well known as a “hot-spot” for the latter and there is reasonable evidence showing that mountainous region should face enhanced warming compared to the surrounding plains in the future. In this context, the development of a high-resolution futuristic climate forcing on the Tensift catchments. Based on the high-resolution SAFRAN reanalysis developed in the study presented above. is very important for the study of the climate, with a trend for the 2041-2060 horizon. For this purpose, we used future climate scenarios provided by the Euro-CORDEX program evaluated over the region. To achieve this objective, two RCP runs at 12 km resolution are downscaled using the quantile-quantile approach based on temperature and precipitation acquired at the Marrakech station in the plain and at the Oukaimeden station located at an altitude of 2687m in the High Atlas. It is shown that higher warming is expected on the mountainous region than in the plain station (2.8°C versus 2.3°C for the maximum temperature and 2.8° versus 2° for the minimum temperature; scenario RCP8.5 for 2041-2060). The higher warming on the minimum temperature may drastically impact the snow/rain partition in the high Atlas. Based on these disaggregated climate scenarios, future spatialized forcing are built from the correction functions obtained at the two above-mentioned plain and mountain stations and the SAFRAN re-analysis. The mountainous area is expected to face a higher increase of air temperature than in the plain, reaching +2.5°C for RCP8.5 and +1.71°C for RCP4.5 over 2041-2060. This warming will be accompanied by a marked decrease in precipitation (-16% for RCP8.5). this future spatialized data set is to be used within impact studies, in particular concerning water resources.