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Application of earth observation products for hydrological modeling of the Oum Er Rbia river basin

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The increasing water demand over recent decades together with the climate change impacts on water resources lead to a growing shortage of water availability. Investigating and developing novel strategies to assess and manage water resources have turned into a key issue, leading to increasing efforts to enhance and improve hydrological models and datasets. Despite campaigns to increase the quality and the temporal and spatial availability of ground-based hydro-meteorological data, many river basins around the world still have a limited number of in-situ observations. This in turn limits the application of hydrological models. Recently developed global earth observation products may unlock a greater capability of basin scale hydrological modeling for advanced water management.

This study aims to evaluate the applicability of earth observation products for hydrological model simulation in comparison with in-situ data for water resources management and water allocation of the Moroccan Oum Er Rbia river basin. Two different hydrological models (SWAT and PCR-GLOBWB) were applied to inter-compare various combinations of in-situ and global earth observation data. Global earth observation products were obtained from various sources including meteorological data from the WATCH Forcing Data methodology applied to ERA-Interim reanalysis data, remotely sensed ESA CCI surface soil moisture Soil Water Index combined product and evapotranspiration data from the FLUXNET global monitoring network. The daily data were provided for the time period from 1979 to 2012. Due to the insufficient in-situ discharge observations available in the basin, local calibration of both hydrological models was based on global evapotranspiration and soil moisture data, covering additional aspects of the hydrological cycle to further reduce modeling uncertainty.

Preliminary results indicate that even though significant differences in model estimates were found between SWAT and PCR-GLOBWB, the remotely sensed soil moisture and evapotranspiration data can be used for model calibration of both hydrological models. However, in-situ discharge data should be also included to obtain full calibration. The diverse combinations of in-situ and globally available datasets successfully explore the possibility of predicting the observed dynamics of different parts of the models with acceptable accuracy, exploiting the strengths of each observation type and showing the great potential of earth observation products to provide critical information for improved water management at a basin scale.