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The benefit of using additional hydrological information from earth observations and reanalysis data on water allocation decisions in irrigation districts

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Hydrological information on water availability and demand is vital for sound water allocation decisions in irrigation districts, particularly in times of water scarcity. However, sub-optimal water allocation decisions are often taken with incomplete hydrological information, which may lead to agricultural production loss. In this study we evaluate the benefit of additional hydrological information from earth observations and reanalysis data in supporting decisions in irrigation districts. Current water allocation decisions were emulated through heuristic operational rules for water scarce and water abundant conditions in the selected irrigation districts. The Dynamic Water Balance Model based on the Budyko framework was forced with precipitation datasets from interpolated ground measurements, remote sensing and reanalysis data, to determine the water availability for irrigation. Irrigation demands were estimated based on estimates of potential evapotranspiration and coefficient for crops grown, adjusted with the interpolated precipitation data. Decisions made using both current and additional hydrological information were evaluated through the rate at which sub-optimal decisions were made. The decisions made using an amended set of decision rules that benefit from additional information on demand in the districts were also evaluated. Results show that sub-optimal decisions can be reduced in the planning phase through improved estimates of water availability. Where there are reliable observations of water availability through gauging stations, the benefit of the improved precipitation data is found in the improved estimates of demand, equally leading to a reduction of sub-optimal decisions.