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The more hydrologic info the less uncertainties in monthly runoff prediction: The case study of a semi-arid Mediterranean island

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Since the Gravity Recovery and Climate Experiment (GRACE) launch in 2002, a global dataset of Earth's total water storage (TWS) measures is available, providing additional and useful information for global and regional hydrologic models. In this study we demonstrate how this data can be easily integrated with a simple two-parameter regional water balance model also at the small scale (i.e. area < 50'000 km²). In particular, we show how the inclusion of additional information reduces the predictive uncertainty of the hydrologic model. As test case, the island of Sardinia (Italy) located in the Mediterranean Sea, with an area of about 24000 Km², is chosen. The water balance model simulates at monthly scale surface and subsurface runoff, actual evapotranspiration fluxes, and terrestrial (surface and ground) water storage of the island during the period 2002–2017. The results show that GRACE data constitutes a reliable dataset for the hydrologic modeling also at the small scale and their integration into the proposed regional water balance model reduces the uncertainties in reconstructing long-term variations of the TWS.