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Mapping groundwater recharge with associated uncertainty at the regional scale

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ABSTRACT

Assessing the groundwater recharge can represent a challenge due to the generally limited knowledge about infiltration processes, interaction with surface water or between aquifers, available data and pumping impact on it. Using different methods to estimate recharge is recommended in order to integrate uncertainties. Nonetheless, only some of the existing recharge estimation methods allow mapping groundwater recharge at the regional scale and providing a spatial resolution in accordance with water management decision scale.

A gridded water budget approach has been developed to compute at the daily time step, the groundwater recharge by precipitation at the regional scale of the south of France. Independent water budget approaches are compared between them and with the SURFEX land surface modelling results to assess the uncertainty associated to the effective rainfall parameterization method. A distributed parameter (IDPR) related to the drainage density and which accounts for hydrological connectivity have been calibrated to provide the gridded effective rainfall infiltration coefficient necessary for recharge estimation. Independent recharge evaluations at the catchment/aquifer scale are included in the analysis to assess the part of the total recharge taken by the infiltrated precipitation.