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Developing a coupled hydrological model for UK chalk catchments

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Chalk forms one of the most important aquifers in the UK. Extending over large parts in the south-west, chalk aquifers account for more than half of the groundwater used for drinking in England and Wales. Groundwater held in these aquifers supports flows in chalk rivers. Hence, chalk aquifers play an important role in sustaining the riverine ecosystem. It is, therefore, important to assess and manage freshwater resources in these catchments. Here we develop and evaluate a distributed numerical model for simulating coupled subsurface and land surface hydrological processes including soil moisture variability, flow, and groundwater dynamics in chalk catchments. The parsimony and computational efficiency of this model make it possible to perform numerous simulations within a reasonable time. This allows for sensitivity analysis, calibration, and multiple scenario analysis that are useful in management decision making.