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Assimilation of aprioristic information for uncertainty reduction in water balance models: application to Mediterranean environments

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The issue of prediction uncertainty in water balance modeling is commonly recognized to be related to the degree of knowledge of the catchment features and the effective representation of physical processes within it. Following a previous modeling exercise, in which water balance signatures and vegetation response measures were obtained under different land-cover and soil attributes, we have explored the degrees of suitability and adaptability of each vegetation type to the relevant soil attributes in the study region. In fact, the model results allow for the interpretation of observed spatial patterns of vegetation in a wide Mediterranean region (Puglia region, Italy) covering 15.000 km^2 in which an extensive collection of samples is available concerning soil water storage and depth. The existence of soil-vegetation patterns across landscapes is then used as a sort of constraint for water balance processes at the catchment scale. In order to evaluate the effectiveness of soil hydrologic information for the reduction of both modeling and parametric error we have studied a medium sized basin in Southern Italy with intermittent regime. Particularly in the Mediterranean environment in which adequate hydrologic information is often unavailable, we found that a proper assimilation of the available information into physically consistent and measurable model parameters is a feasible approach for the reduction of prediction uncertainty.