Improving the water balance simulation of a mediterranean catchment using TOPBAL, a modified version of TOPMODEL.

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TOPBAL has been developed within the semi-distributed structure of TOPMODEL to simulate the response of catchments with high climatic seasonality and diverse vegetation types. The model explicitly considers rainfall interception by vegetation, the control of local soil water balance by evapotranspiration, and the two-way exchanges between the root-unsaturated store and the phreatic store, which is equal for all the catchment as in TOPMODEL.

TOPBAL was compared with the classical TOPMODEL using the GLUE methodology in the Can Vila small catchment (Vallcebre research area, NE Spain). Results indicate that for an overall similar efficiency, TOPBAL improved the simulation of the first events after a dry episode, recession curves and provided a better simulation of water balance along the studied period than TOPMODEL. But, as a consequence of the two-way exchanges between soil and phreatic stores, TOPBAL parameters showed a large interdependence when constrained only on discharge. Discrete observations on semi-distributed soil moisture and depth to the water table, as well as evapotranspiration fluxes were used to evaluate this interdependence.