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R-HyMOD: an R-package for the hydrological model HyMOD

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A software code for the implementation of the HyMOD hydrological model [1] is presented. HyMOD is a conceptual lumped rainfall-runoff model that is based on the probability-distributed soil storage capacity principle introduced by R. J. Moore 1985 [2]. The general idea behind this model is to describe the spatial variability of some process parameters as, for instance, the soil structure or the water storage capacities, through probability distribution functions.

In HyMOD, the rainfall-runoff process is represented through a nonlinear tank connected with three identical linear tanks in parallel representing the surface flow and a slow-flow tank representing groundwater flow. The model requires the optimization of five parameters: C_{max} (the maximum storage capacity within the watershed), β (the degree of spatial variability of the soil moisture capacity within the watershed), α (a factor for partitioning the flow between two series of tanks) and the two residence time parameters of quick-flow and slow-flow tanks, k_{quick} and k_{slow} respectively. Given its relatively simplicity but robustness, the model is widely used in the literature. The input data consist of precipitation and potential evapotranspiration at the given time scale.

The R-HyMOD package is composed by a "canonical" R-function of HyMOD and a fast FORTRAN implementation. The first one can be easily modified and can be used, for instance, for educational purposes; the second part combines the R user friendly interface with a fast processing unit.

[1] Boyle D.P. (2000), Multicriteria calibration of hydrological models, Ph.D. dissertation, Dep. of Hydrol. and Water Resour., Univ of Arizona, Tucson.
[2] Moore, R.J., (1985), The probability-distributed principle and runoff production at point and basin scale, Hydrol. Sci. J., 30(2), 273-297.