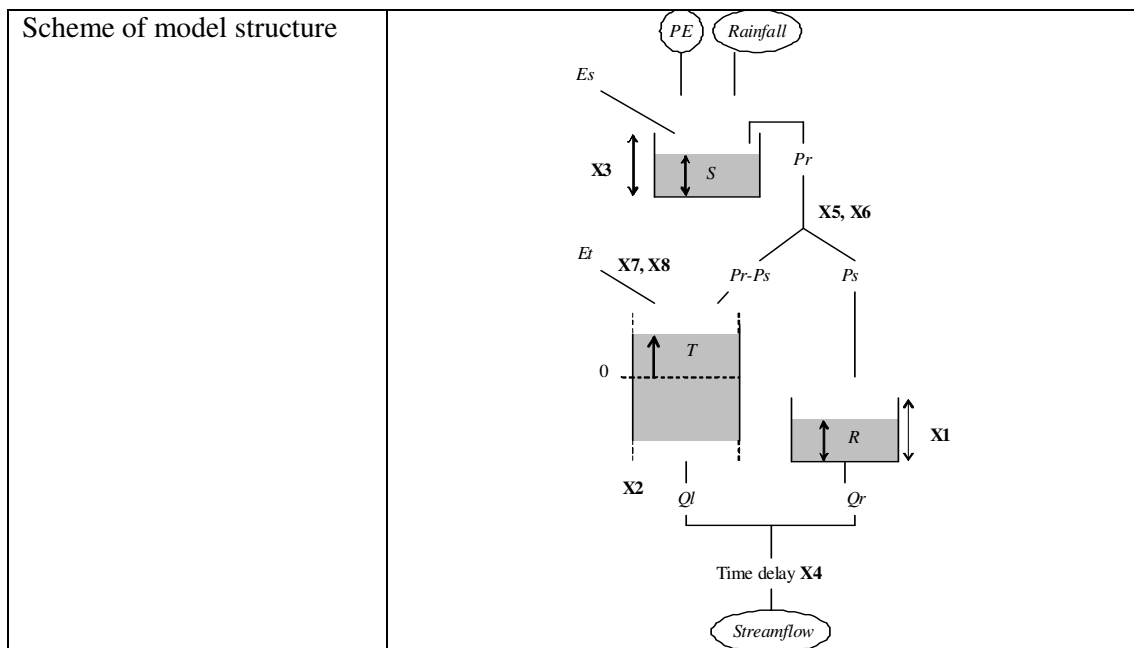


# Fact-sheet TOPM

In: Görgen, K., Beermsa, J., Brahmer, G., Buiteveld, H., Carambia, M., de Keizer, O., Krahe, P., Nilson, E., Lammersen, R., Perron, C. & D. Volken (2010): Assessment of climate change impacts on discharge in the Rhine River Basin: Results of the RheinBlick2050 Project. CHR Report No. I-23. pp. 175-177.  
 Download: [http://www.chr-khr.org/files/CHR\\_I-23.pdf](http://www.chr-khr.org/files/CHR_I-23.pdf).

<b>1. General Information</b>	
Model name	TOPM (modified version of the TOPMODEL model proposed by Beven and Kirkby, 1996)
Version	Proposed by Cemagref (see Michel et al., 2003)
Author(s) / First publication	Michel et al. (2003)
Contact person (name, email)	Charles Perrin charles.perrin@cemagref.fr
Institute	Cemagref
Web site	<a href="http://www.cemagref.fr/webgr">www.cemagref.fr/webgr</a>
General modelling objectives	flow simulation
Domain of applicability (catchment types and climate conditions)	Model version widely tested on French catchments
<b>2. Model description</b>	
Model type (empirical, conceptual, physically-based, others)	Conceptual model
Continuous or event-based	Continuous
Possible running time steps	Daily
Spatial discretization (lumped, semi-distributed, distributed)	Lumped
Short description of model structure detailing main function (evaporation, soil moisture accounting, groundwater, routing, snowmelt, etc.)	<p>The model structure can be divided into a production module and a transfer module.</p> <p>The production module consists of:</p> <ul style="list-style-type: none"> <li>- an interception store</li> <li>- a non linear soil moisture store used to split net rainfall into two components through a logistic function representing the distribution of the topographic index in the original model</li> <li>- a function to determine the actual evapotranspiration from the soil moisture store;</li> <li>-</li> </ul> <p>The transfer module consists of:</p> <ul style="list-style-type: none"> <li>- two flow components, one routed through a quadratic store, the other routed by an exponential store</li> <li>- a pure time delay.</li> </ul> <p>A degree-day snowmelt module is used for application in catchments influenced by snow.</p>



### 3. Model parameters

Distribution of model parameters (yes/no)	No
Number of free parameters	8 free parameters
Procedure of model parameter estimation (measurement, manual or automatic algorithm, etc.)	Automatic calibration

### 4. Model inputs / Model outputs

List and characteristics of input variables (type, time step, spatial resolution, etc.)	Daily series of potential evapotranspiration and catchment areal rainfall Daily series of temperature for snowmelt
List and characteristics of output variables (type, time step, spatial resolution, etc.)	Daily streamflow

### 5. Examples of previous model applications

Catchments, objectives, etc.	Application on French catchments
Results of existing comparisons with other models	Perrin et al. (2001), Andréassian et al. (2001), Mathevet (2005), Le Moine (2008)

### 6. List of 5 selected references

Andréassian, V., Perrin, C. and Chel, C., 2004. Impact of imperfect potential evapotranspiration knowledge on the efficiency and parameters of watershed models. *Journal of Hydrology* 286(1-4), 19-35.

Mathevet, T., 2005. Quels modèles pluie-débit globaux pour le pas de temps horaire ? Développement empirique et comparaison de modèles sur un large échantillon de bassins versants. Thèse de Doctorat, ENGREF (Paris), Cemagref (Antony), France, 463 pp.

Le Moine, N., 2008. Le bassin versant de surface vu par le souterrain : une voie d'amélioration des performances et du réalisme des modèles pluie-débit ? Thèse de Doctorat, Université Pierre et Marie Curie, Paris, 324 pp.

Michel, C., Perrin, C. et Andréassian, V., 2003. The exponential store: a correct formulation for rainfall-runoff modelling. *Hydrological Sciences Journal* 48(1), 109-124.

Perrin, C., Michel, C. and Andréassian, V., 2001. Does a large number of parameters enhance model performance? Comparative assessment of common catchment model structures on 429 catchments. *Journal of Hydrology* 242(3-4), 275-301.