

Texas A & M University and U.S. Bureau of Reclamation
Hydrologic Modeling Inventory
Model Description Form
July 18, 2007

[Please update as appropriate and fill in missing information]

Name of Model:

SVAT&HYCY

Model Type:

One-dimensional numerical model

Model Objective(s):

To understand the heat and water regimes in a river basin scale through hydrological modeling

Agency and Office:

Frontier Research Center for Global Change, Japan Agency for Marine-Earth Science and Technology

Technical Contact and Address:

Dr. Xieyao Ma

Frontier Research Center for Global Chang

3173-25 Showa-machi, Kanazawa-ku, Yokohama city, Kanagawa 236-0001, Japan

Phone: +81-45-778-5546

Fax: +81-45-778-5706

E-mail: xyma@jamstec.go.jp

Model Structure and Mathematical Basis:

This is a combined model consists of four submodels: a simple SVAT (Soil-Vegetation-Atmosphere Transfer) model, runoff model, river ice model and river routing model to explain snowmelt, evapotranspiration, break-up, thawing and freezing of permafrost and river flow

Model Parameters:

Index of vegetation condition, parameters in runoff formation model, water flow velocity in the river

Spatial Scale Employed in the Model:

The maximum is 1-grid in the SVAT model and 0.1-grid in the river routing model

Temporal Scale Employed in the Model:

Hourly

Please see the Hydrologic Modeling Inventory Website: <http://hydrologicmodels.tamu.edu/>
The inventory is being maintained by Texas A&M University and the Bureau of Reclamation.

Input Data Requirements:

Daily routine meteorological data

Computer Requirements:

Personal computer or super computer

Model Output:

Evapotranspiration, runoff in a grid level and discharge for a watershed scale

Parameter Estimation / Model Calibration:

Necessary

Model Testing and Verification:

Necessary

Model Sensitivity:

The local vegetation condition is very sensitive to the estimation of evapotranspiration.

Model Reliability:

High

Model Application / Case Studies:

Small mountainous watershed of Japan, Selenge River basin of Mongolia, Lena River basin of Siberia, Yellow River basin of China

Documentation:

1. X. Ma, T. Hiyama, Y. Fukushima and T. Hashimoto, 1998: A numerical model of the heat transfer for permafrost regions. *J. Japan Soc. Hydrol. & Water Resour.*, **11**, pp. 346-359.
2. X. Ma, Y. Fukushima, T. Hashimoto, T. Hiyama and T. Nakashima, 1999: Application of a simple SVAT model in a mountain catchment under temperate humid climate. *J. Japan Soc. Hydrol. & Water Resour.*, **12**, pp. 285-294.
3. X. Ma, Y. Fukushima, T. Hiyama, T. Hashimoto and T. Ohata, 2000: A macro-scale hydrological analysis of the Lena River basin. *Hydrol. Process.*, **14**, pp. 639-651.
4. X. Ma, T. Yasunari, T. Ohata, L. Natsagdorj, G. Davaa and D. Oyunbaatar, 2003: Hydrological regime of the Selenge River basin, Mongolia. *Hydrol. Process.*, **17**, pp. 2929-2945.
5. X. Ma, T. Yasunari, T. Ohata, and Y. Fukushima, 2005: The influence of river ice on spring runoff in the Lena River, Siberia. *Annals of Glaciology*, **40**, pp. 123-127.
6. Y. Sato, X. Ma, J. Xu, M. Matsuoka, H. Zheng, C. Liu and Y. Fukushima, 2008: Analysis of long-term water balance in the source area of the Yellow River basin. *Hydrol. Process.*, **22**, pp. 1618-1629

Please see the Hydrologic Modeling Inventory Website: <http://hydrologicmodels.tamu.edu/>
The inventory is being maintained by Texas A&M University and the Bureau of Reclamation.

Other Comments:

Please see the Hydrologic Modeling Inventory Website: <http://hydrologicmodels.tamu.edu/>
The inventory is being maintained by Texas A&M University and the Bureau of Reclamation.