

Texas A & M University and U.S. Bureau of Reclamation
Hydrologic Modeling Inventory
Model Description Form
July 17, 2007

Name of Model: ArcEGMO

Model Type: deterministic 3D-catchment model, conceptual, multilayer

Model Objective(s):

Runoff and stream flow modeling (prediction) from precipitation, Simulation of water balance (budget), nitrogen and carbon budget, if desired, on regional scale (hydrotape based, hydrotapes behave hydrologically uniform and unique), Vegetation modeling (crop rotation, yields, forest development with/without disturbances and/or harvest), Climate change impact studies, land-use change impact studies,

Agency and Office: Bureau of Applied Hydrology, Germany

Technical Contact and Address:

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Model Structure or Mathematical Basis:

Tool box with modular structure, deterministic, physically based
Multilayer modeling considering as many vegetation and soil layers as required

Model Parameters:

Depend on the activated sub-models and layers

Spatial Scale Employed in the Model:

- hydrotapes (polygon or grid) for the simulation of the “vertical domain” (vertically directed) processes (1 m² - 5 km² areal units behaving hydrologically unique and uniform, in dependence on the input data basis and the modeling aim)
- different larger areal units for the simulation of the lateral flows domain (subbasin, basin, runoff cascades, river reaches)

Temporal Scale Employed in the Model: 5 min up to 1 day

Input Data Requirements:

- digital maps for describing the spatial characteristics of the research area (elevation, aspect, slope, soil, land use/land cover, groundwater depth)
- time series of precipitation, air temperature, air humidity, global radiation or sun duration, wind velocity ($\Delta t \leq 1d$)

Please see the HMI web page: <http://www.usbr.gov/hmi>
Forms are available in Text file, HTML, MS Word and WordPerfect formats
This effort is being conducted by River Systems & Meteorology Group: <http://www.usbr.gov/rsmg>

Computer Requirements: WINDOWS-PC

Model Output:

Time series (stream flow (discharge), water budget components, carbon and nitrogen budget components, vegetation variables, results of the climate regionalization, etc.); imported easily into GIS (e.g. ArcView, ArcGIS) or into table calculation programs (EXCEL, ACCESS etc.)

Parameter Estimation / Model Calibration:

Calibration only necessary for some parameters of the lateral flows domain (subsurface storage and flow etc.)

Many parameters are predetermined in relation to the above mentioned spatial characteristics

Model Testing and Verification:

- comparison of simulated and observed discharges and groundwater levels
- validation of the sub-models of the vertical domain by using measured data from lysimeters and intensive monitoring plots

Model Sensitivity:

depend on the chosen sub-models,

very sensitive against precipitation, global radiation and air temperature but also against the site characteristics (e.g. vegetation parameter)

Model Reliability:

very good (depends on the chosen sub-models)

Model Application / Case Studies:

Catchments from 0.7 km² up to 100 000 km² in Germany, Austria and Italy

Documentation: www.arcegmo.de

Other Comments:

Interfaces exist for coupling the ArcEGMO tool box with external models (groundwater flow models, vegetation models, atmosphere models)

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