

ABSTRACT

Water Balance Simulation Modell (WaSiM-ETH)

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The seminar will give an overview over the model structure, the model components and the various ways to use it in practice. <http://www.wasim.ch>

The development of WaSiM-ETH model started in 1994. The primary goal was to have a tool for estimating climate change impacts for pre-alpine and alpine regions on a physical basis in high temporal and spatial resolution. This also included shifts in extreme flood events statistics.

The first model version (1995-1997) already established a wide range of algorithms which are still used today. However, there have been numerous major improvements since then. The original version incorporated a set of interpolators for meteorological data, a set of evaporation algorithms, several methods for snow accumulation and melt, an interception module, precipitation correction, topography driven correction of radiation and temperatures and a runoff generation module based on the Topmodel-approach.

Major improvements in the last years encompass the implementation of a layered soil model based on the Richards equation, a multi-layer groundwater model, coupling of solutes and tracer transports, layered vegetation, an irrigation module, several methods for dynamic phenology, a glacier model (accumulation of snow, melt of snow, ice and firn), an interface for online-coupling with other models (climate models, groundwater models. etc.), integration of a lake model (including interaction with groundwater), a silting-up model and a surface discharge routing model. The river (channel) routing model accounts for artificial and natural reservoirs and lakes as well as branches and artificial abstractions using time-variant rules.

The model can be used for a broad range of applications. Its rasterized model domain allows for cell sizes of virtually any dimensions (from centimeters to several km), and the time step can be chosen from 1 minute to several days. There are appropriate algorithms for different time steps including dynamic downscaling for soil water flow and surface discharge routing.

A set of graphical or command line driven tools is available for pre- and post-processing. WaSiM-ETH is available for Windows, Linux, Unix etc. in 32 and 64 bit versions. It has a parallelized structure and takes full advantage of multi processor computers. Gridded data are compatible with common GIS-packages (e.g. Arc-Info).

Today, there are around 50 institutions (universities, governmental agencies and consulting engineers) using WaSiM-ETH as tool for their projects. Using WaSiM-ETH is free of charge. (The source code, however, is not free.)