Development of a Physically-based Hydrologic Model: "Watershed Environmental Hydrology (WEHY)" Model ～Application to flood forecasting for a dam reservoir～

This is a joint research project between the University of California at Davis and Public Works Research Institute of Japan.

The WEHY Model is based on spatially-averaged hydrologic-process eqations which are the integrals of non-linear stochastic partial differential equations. These kinds of equations incorporate the subgrid-scale variance or the hetrogeneity of hydrogeologic constants and variables in a river catchment.

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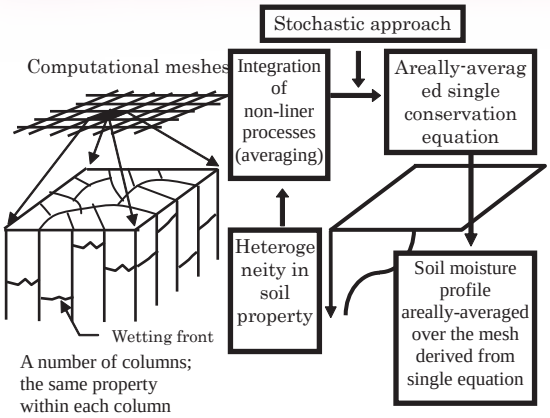
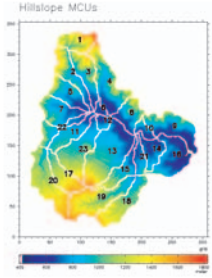
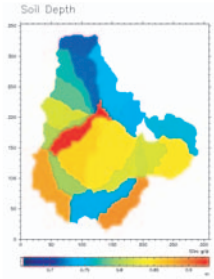


Concept of spatial averaging (ex. soil water profile)

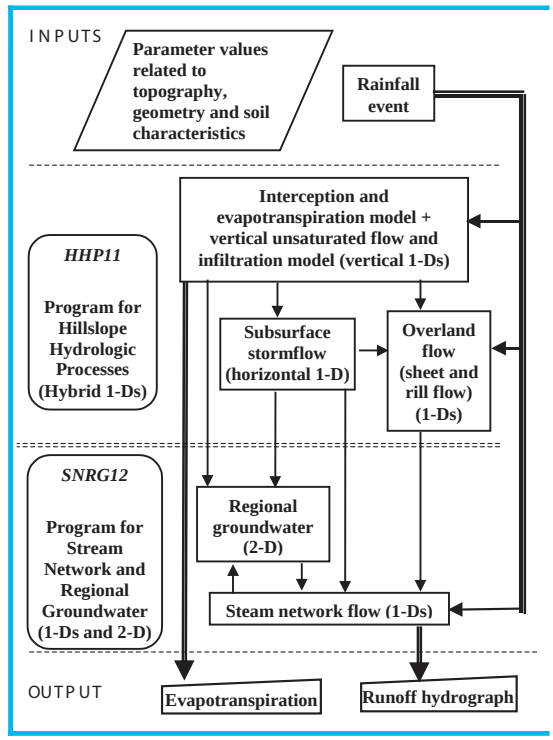
Study Area (A=100km2)



Model coputational units (MCUs)=hillslopes



Soil depth distribution for each MCU



Structure of WEHY Model

Study Storm Events

Event	Starting Date Ending Date	Peak Discharge (m^3/s)	Peak Time	Max. Rain (mm/hr)	Time Lag (hours)
1	5/21/97 5/28/97	82.81	5/25 4:00	16	2
2	6/16/97 6/23/97	322.61	6/20 17:00	39	2
**	8/23/98 9/4/98	1660.55	8/27 21:00	72	0
3	9/12/98 9/21/98	1089.27	9/16 7:00	73	1
4	10/14/98 10/20/98	101.41	10/18 8:00	28	2

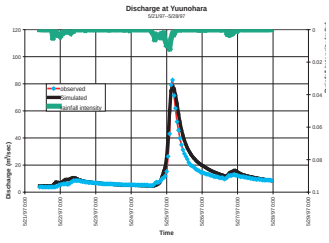


Figure 1- Comparison of the observed and simulated hydrographs at Yuunohara for the rainfall – runoff event during 5/21/1997 to 5/28/1997

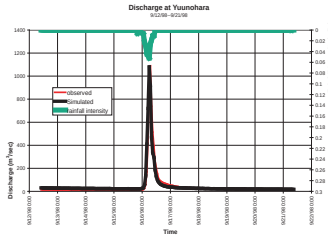


Figure 1 - Comparison of the observed and simulated hydrographs at Yuunohara for the rainfall – runoff event during 9/12/1998 to 9/21/1998.

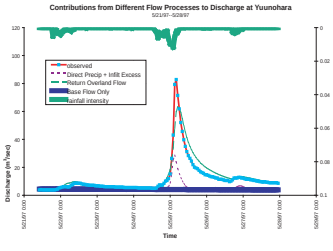
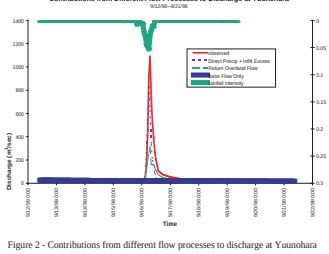


Figure 2 - Contributions from different flow processes to discharge at Yuunohara



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Performance of WEHY Model

WEHY Model can simulate well...

- *a wide range of flood peak discharge magnitudes (82 - 1089 cms), although most of the model parameters were estimated apriori to the rainfall-runoff events, directly from the GIS database of the watershed.*
- *the contributions of different runoff processes*