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# A comparison of SRM and HBV models for real time runoff forecasting in the Upper Euphrates Basin, Turkey

A.A. Sorman, A. Sensoy, E. Yamankurt, and E. Gozel
Anadolu University, Eskisehir, Turkey (asorman@anadolu.edu.tr)

Predicting snowmelt runoff in the mountainous eastern part of Turkey at a daily time step is important in water resource management as it constitutes nearly 2/3 in volume of the total yearly runoff during spring and early summer months. Keeping track of snow dynamics as well as forecasting the amount and timing of snowmelt runoff in the headwaters of the trans-boundary Euphrates River, where large dams are located, is a crucial and challenging task concerning the practical importance and great demand for real time forecasting of melt water.

In mountainous regions, data limitations prevent detailed understanding of the variability of snow cover and melt. In situ snowpack measurements are sparsely distributed relative to snowpack heterogeneity therefore, to supplement ground measurement networks, remotely sensed images of snow covered area (SCA) provide useful information for runoff prediction during the snowmelt season. SCA has been used as a direct input to hydrological models such as Snowmelt Runoff Model (SRM) or as a means of assimilating hydrologic model snowpack and checking the internal validity as in the case of HBV model.

Alternative ways of handling melt water modeling using satellite derived SCA is discussed, with emphasis on the contrasting treatments in two widely used hydrologic models, SRM and HBV. The greatest similarity between the two models is that each uses a temperature index method to predict melt rate whereas the greatest difference lies in the way snow cover is handled. Moderate Resolution Imaging Spectroradiometer (MODIS) daily snow cover products with 500 m spatial resolution are used to derive SCA data in this study. Since the cloud obscuring problem degrades the use of satellites with optical sensors, a special combination and filtering methodology is utilized to reduce cloud coverage of the product. Both models are used to simulate runoff for the years 2001-2010 with model efficiency above 0.86 and volume difference less than 2.5%. Finally, operational snowmelt runoff forecasting is carried out for 2011 ablation season using numerical weather prediction (Mesoscale Model 5) data as forcing input variables. Discussion of results are supervised to reflect the general debates in hydrologic modeling in terms of parameters and calibration, internal validation, the value and limitations of using satellite derived and numerical weather prediction data.

Key words: snow, SRM, HBV, forecasting, Upper Euphrates Basin