Hydrosystems Engineering Seminar Series

Modeling Watershed Runoff: Is There a Fundamental Scale?

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Friday, February 21st
12:15* -1:15 pm, 202 Hammond Building

Spatial heterogeneity in rainfall and land surface characteristics occurs at multiple scales. A fundamental question is at what scale hydrologic models should be formulated. This study explores the use of natural hillslopes as the elemental units in formulating a distributed watershed model. Hillslopes are more meaningful than rectangular grids of arbitrary size. First, they are defined by topography, a dominant control of flow on steep to moderate terrain. Second, they are self-contained; they do not drain into one another but only to the streams, thus simplifying the treatment of boundary flux. Third, they are at the scales of field observations and measurements of runoff, which renders the model testable at the elemental scale. Here it is shown that a watershed may be partitioned into three hillslope types: divergent, convergent, and uniform. Using soil moisture storage as the state variable, the 3-D problem can be reduced to a 1-D problem that can be solved analytically and semi-analystically. Finally, it is emphasized that the scales of hydrologic conceptualization should not be arbitrary. Instead of imposing an arbitrary geometry and scale, such as a rectangular grid, onto a watershed, we should search for natural shapes and scales relevant to the hydrologic processes.

* Note that this is a 'brown bag' seminar series. 202 Hammond will be open at 12:00pm and you are encouraged to bring a lunch, show up early, and socialize with your colleagues.

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