

## **Hydrologic Terrain Analysis in ArcGIS**

David G Tarboton, Utah Water Research Laboratory, Utah State University (dtarb@cc.usu.edu, <http://www.engineering.usu.edu/dtarb>)

Topography is at the heart of many hydrologic models at a very basic level, since it serves to define watersheds, the most basic hydrologic model element. This presentation will review Terrain Analysis as it is used to derive information from topography for hydrologic modeling. Using a grid digital elevation model as a starting point, surface fields, represented as grids, can be derived that collectively define a terrain flow data model for the representation of hydrologic flow processes at or near the earth surface. This then provides the basis for digital elevation model based mapping of channels and watersheds as base model elements in distributed modeling. Hillslope and channel processes are different so it is important to correctly represent the drainage density in hydrologic models. I will describe some of the options available for the delineation of flow networks that can accommodate spatially variable drainage density and procedures for objectively determining the appropriate threshold to map channel networks consistent with physical processes. The spatial flow field determined from a DEM can also serve as a basis for routing overland and subsurface flows used in water quality, erosion and terrain stability modeling. DEM derived quantities, such as downslope influence, upslope dependence, decayed accumulation and transport limited accumulation will be illustrated as special cases of a more general flow algebra that has the potential to model a rich variety of flow embedded spatial processes.