

COMPARISON OF DIGITAL FILTER HYDROGRAPH SEPARATION WITH GEOCHEMICAL SEPARATION

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Abstract. Aquatic Stormflow is defined as flow resulting directly from a storm event, while baseflow is thought to be groundwater flow that continuously occurs, most predominantly during non-storm periods. While conceptually these concepts are convenient, it is difficult to ascertain the actual flow paths of each component. In this paper we will compare common digital filters used to estimate baseflow with a geochemically derived baseflow separation.

A Dynamic End Member Mixing Analysis (DEMMA) on Panola Mountain, Georgia was used by Cary (2011) to separate four stream flow components using naturally occurring chemical tracers for 22 storm events. DEMMA relies on intensive runoff and chemical sampling, and uses the flow and chemistry hysteresis to separate the hydrograph. Several digital filters were compared to the DEMMA hydrographs. While parameterized differently, each was a recursive procedure that acts as a low pass filter.

In general the digital filters over estimate true baseflow for Panola (that is, true groundwater flow), and more closely resemble contributions from subsurface flow (that is soil) pathways.

The one parameter filters are insensitive to calibration, although simple to use because the parameter is usually not modified. The two parameter filter (Eckhardt, 2005) was more robust in its range, but sensitive to calibration. This research provides some insight into the flow paths the digital filters may be approximating.