Stream flow hydrograph separation using end-member mixing analysis and analytical techniques

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Abstract. Hydrograph separation is the process of separating stream flow into two components: baseflow and runoff. Baseflow is considered to be groundwater contribution to stream flow, and runoff includes overland flow and interflow contributions. Hydrograph separation can be performed using chemical end-member mixing or analytical methods (e.g., HYSEP). This research uses the stream conductivity mass balance method (CMB) which assumes stream flow consists of two distinct flow components, each having a unique specific conductance, which can yield an approximate ratio of groundwater to surface water contributions. Analytical methods use moving time window algorithms described by Pettyjohn and Henning (1979) based on the duration of runoff *N* described by Linsley *et al.* (1982) to find successive discharge minima on a hydrograph; these include fixed interval, sliding interval, and local minima methods. Each method uses a calculated *2N* value as the length of time window used to select discharge minima from a hydrograph, and uses a *2N** value (the nearest odd integer between 3 and 11 closest to *2N*; Pettyjohn and Henning, 1979) for a moving time window. Two-component hydrograph separation of 29 US streams using the CMB method and analytical methods was conducted to determine baseflow. Comparison of CMB baseflow values to those derived by analytical methods will yield the most appropriate analytical method for determining baseflow and *2N** value for a given stream. Presented here are results from three of the streams analyzed thus far. Results will yield new information about runoff cessation times, resulting in more accurate determination of baseflow contributions to stream flow and ultimately leading to examination of duration of runoff equation proposed by Linsley *et al.* (1982). Such work has implications in increasing accuracy of water balances, estimations of groundwater recharge, and water resource management.