Electronic Supplementary Material (ESI) for Environmental Science: Advances.

Supplemental material for the manuscript: VA-ART-12-2022-000327.

Figure 1 provides the turbidity hysteresis for a hypothetical storm event in which the turbidity on the rising limb of the hydrograph is higher than the turbidity on the falling limb for the same flow rate. The hysteresis index would be calculated for each of the three flow rates indicated by the dotted lines in this plot, and the results would all yield positive index values since the TU_{RL} is greater than the TU_{FL}. If the storm trajectory had been opposite to this hypothetical, the turbidity on the rising limb would be less than the turbidity on the falling limb, and the index value would be negative. The sign of the turbidity hysteresis index can help in determining the characteristics of sediment transport timing during storm events, which can be used to determine likely sediment sources in a watershed. Positive index values point to a first flush effect or a local source, where all of the deposited sediment in the watershed is washed off early in the storm and sediment sources become exhausted, causing higher turbidity early on and lower turbidity in the later part of the storm (Lawler, 2006). A negative hysteresis index might point to remote sediment sources, which contribute to turbidity levels at a station only later in the storm event. An alternative explanation for a negative hysteresis value would be in-stream erosion; after streamflow has reached a threshold velocity or stage, erosion in the stream may increase, causing higher sediment loads on the falling limb of the hydrograph rather than on the rising limb. Negative hysteresis values can also characterize large undeveloped watersheds, where the movement of sediment downstream progresses more slowly than the movement of a hydrograph (Lawler, 2006).

Figure:

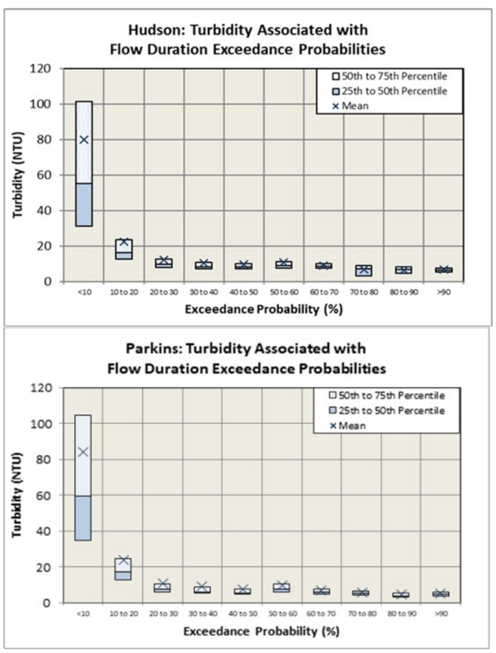

Figure 8: Flow-based turbidity for the year 2014-2015: Hudson (top) and Parkins (bottom). The graph is included as supplemental materials for Figure 8 of the original manuscript.