Suspended sediment concentration (SSC) is generally a function of water discharge and slope, frequently expressed by “rating curve” equations. Scatter around the equation line represents hysteresis effect, connected with sediment supply and depletion.

Data on measured water discharge and average cross-section SSC for 27 gauges on 19 large and medium rivers of Russian Arctic was used to evaluate the hysteresis effect and its geographical features.

During the spring freshet, clockwise hysteretic curves prevail on most of the studied cross-sections. Sediment supply from the above channel reaches is limited by within-channel permafrost, catchment washout activity is also low. Counter-clockwise relations are observed on rivers of Verkhoyansk-Kolyma Mountains, primarily because of rain floods overlapping late freshet.

During summer floods, hysteretic curve type is determined by the dominant sediment delivery process. Clockwise curves are typical for Western Siberia and Verkhoyansk-Kolyma Mountains, where surface washout dominates. Mass bank failure and distant source activation form counterclockwise curves on Arctic Plain rivers.

Role of channel pattern in formation of hysteretic curve type is preliminary estimated. During autumn low-flow, low relative depth of braided channel patterns is auspicious for accumulation of fine sediments. Abrupt SSC rise on the rising limb of the hydrograph and rapid depletion cause the formation of clockwise hysteretic curve. In turn, meandering patterns have extensive length of bank failure line and active mass movement, thus forming counterclockwise curves.

Research results are also used to reestimate calculated sediment fluxes, using different rating curves for rising and falling limb of the hysteretic curve.