Cascading processes of the Vaia storm in the Italian Rio Cordon mountain catchment

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Mountain basins can be affected by Large Infrequent Disturbances (LIDs) that have the power of changing their forest cover and morphological settings, and supplying high amounts of sediments to river networks. The resulting cascading processes are often underestimated although their understanding would improve river management strategies. The recent improvements in the field of sediment transport monitoring and analysis allow to gather a deeper understanding of these long-lasting and complex chains of processes, especially in mountain streams. This contribution aims at investigating the suspended sediment transport exhibited by two recent (summer-autumn 2020) over-bankfull (> 2.3 m³/s) flood events occurred in the Rio Cordon, an alpine basin (5 km²) strongly altered by the Vaia storm (October 2018). This LID blew down 139 trees along the main active channel that were removed by local forest operations after the event, leaving exposed banks and increasing the availability of fine sediment. Two water quality sondes were placed upstream and downstream the windthrow affected area (WAA) to monitor the Suspended Sediment Load (SSL) and quantify the contribution of the WAA in supplying sediments. Water discharge and suspended sediment transport were continuously measured by the two instrumentations, while water samples and direct discharge measurements (salt dilution method) were taken to derive rating curves and calibrate the turbidity meters. Results show that the early September 2020 event (Qₘₐₓ=2.67 m³/s) produced a SSL = 39.27 t and a SSL increase of +5% between the downstream and upstream cross-section. To this, it was also registered a +44% variation of SS maximum concentration (SSC g/l) which can be ascribed to the contribution of the WWA. The event of October 2020 (Qₘₐₓ=3.05 m³/s) instead, registered a SSL of 179.22 t and a SSL variation of +334% and +81%, respectively. The preliminary results suggest that the SS is not related to the water discharge but for this reason, further analysis and data collection will be made, also considering rainfall data. However, the ongoing monitoring of this area represents a suitable and promising approach for understanding the cascading processes on the SS dynamics in a mountain basin affected by a LID.