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Applicability of Smart-SED, a new sediment erosion and transport model, to Alpine scenarios

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In recent times, the study of effective methods to deal with hydrological hazard in urban areas became more urgent in relation to the climate changes in act.

The development of tools able to predict the effects of extreme rainfall events is of great importance particularly for cities located at the downstream of mountain catchments, where exposure to floods and to the hazard related to sediment transport is relevant. Soil erosion and transport models are helpful instruments for the identification of hazardous areas and for risk management.

In this work, results gained applying an efficient simulation tool, developed by Politecnico di Milano research group and named Smart-SED, to different real case studies are presented.

The advantages of this new model over other tools already available in literature are the few input parameters required, the automatic identification of the drainage zones, the adaptive time step implied for the computations and the capability of dealing with multi-event simulations.

The proposed model was calibrated on a catchment locatedin the Southern Alps, in Northern Italy, and successfully validated, considering rainfall events of 2020 together with sediment and water discharge data collected in control points on the field. The calibrated model was then applied to another catchment in the proximity to evaluate flood risk in case of extreme rainfall events, such as catastrophic storms recently occurred in Northern Italy and climate change scenarios.