



## **SMART-SED: A sustainable management of sediment transport in response to climate change conditions**

Davide Brambilla, Luca Bonaventura, Vladislav Ivanov, Laura Longoni, Alessio Radice, and Monica Papini  
Politecnico de Milano, Italy

Hydrogeological instability is and has always been a major concern for inhabited areas due to its negative consequences in terms of natural hazard for people and infrastructures. In recent years, all the processes typically included in this broad definition are receiving increasing attention in light of the growing occurrence of calamitous events that is frequently explained including in the picture a changing-climate context. Mitigation of hydrogeological instability may be pursued by local interventions or by management strategies appropriately designed and applied. The urgent need for a territorial policy that takes into account sediment transport has been discussed for decades (Sear et al, 1995, Hartmann et Driessen, 2013). As part of broader project of risk mitigation, funded by Lecco Municipality and Cariplo Foundation (an Italian philanthropic organization) we are developing a comprehensive software tool able to model the hydraulic and hydro-geological processes over the entire catchment by a coherent approach and with efficient numerical solvers.

The final objective was to create a tool that is able to predict erosion in a basin, along with hydraulic processes in the rivers, exploiting pre-existing regional and national databases and avoiding the needs for expensive and extensive on field data acquisition. This choice imposes some trade-off on the accuracy of results, but we believe that useful scenarios for risk mitigation can be assessed with the needed precision using the SMART-SED model. Along with the model principles, an extensive database of sediment transport data was compiled for tuning and validation purposes. A mixed Eulerian\ Lagrangian approach was adopted for monitoring sediment movements in rivers. The Eulerian is two folded. First approach exploits painted patches of the bed river to assess critical diameter for each rainfall event. Second approach implies bathymetry surveys in two sedimentation pools along the river. Lagrangian approach is based on more than 500 RIFD (Radio-Frequency Identification) equipped tracers which were sought after every rain event to build an extensive, high-resolution database of movements; monitoring started in July 2016 and still going on nowadays.