



## **TRENT2D WG: a smart web infrastructure for debris-flow modelling and hazard assessment**

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Mountain regions are naturally exposed to geomorphic flows, which involve large amounts of sediments and induce significant morphological modifications. The physical complexity of this class of phenomena represents a challenging issue for modelling, leading to elaborate theoretical frameworks and sophisticated numerical techniques.

In general, geomorphic-flows models proved to be valid tools in hazard assessment and management. However, model complexity seems to represent one of the main obstacles to the diffusion of advanced modelling tools between practitioners and stakeholders, although the UE Flood Directive (2007/60/EC) requires risk management and assessment to be based on “best practices and best available technologies”. Furthermore, several cutting-edge models are not particularly user-friendly and multiple stand-alone software are needed to pre- and post-process modelling data. For all these reasons, users often resort to quicker and rougher approaches, leading possibly to unreliable results. Therefore, some effort seems to be necessary to overcome these drawbacks, with the purpose of supporting and encouraging a widespread diffusion of the most reliable, although sophisticated, modelling tools. With this aim, this work presents TRENT2D WG, a new smart modelling solution for the state-of-the-art model TRENT2D (Armanini et al., 2009, Rosatti and Begnudelli, 2013), which simulates debris flows and hyperconcentrated flows adopting a two-phase description over a mobile bed. TRENT2D WG is a web infrastructure joining advantages offered by the software-delivering model SaaS (Software as a Service) and by WebGIS technology and hosting a complete and user-friendly working environment for modelling. In order to develop TRENT2D WG, the model TRENT2D was converted into a service and exposed on a cloud server, transferring computational burdens from the user hardware to a high-performing server and reducing computational time. Then, the system was equipped with an interface supporting Web-based GIS functionalities, making the model accessible through the World Wide Web. Furthermore, WebGIS technology allows georeferenced model input data and simulation results to be produced, managed, displayed and processed in a unique and intuitive working environment. Thanks to its large flexibility, TRENT2D WG was equipped also with a BUWAL-type procedure (Heinimann et al., 1998) to assess and map debris-flow hazard. In this way, model results can be used straightforwardly as input data of the hazard-mapping procedure, avoiding work fragmentation and taking wide advantage of the functionalities offered by WebGIS technology.

TRENT2D WG is intended to become a reliable tool for researchers, practitioners and stakeholders, supporting modelling and hazard mapping effectively and encouraging connections between the research field and professional needs at a working scale.