## Enhanced workflows and algorithms for rock mass characterization: the Passo della Morte test site

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The main goal of the ATLAS IR (Advanced Technologies for Landslides Research Infrastructure), developed within the ITINERIS project, is to implement workflows, algorithms and a data management platform capable of integrating multiple heterogeneous datasets to support operations during emergency situations related to geo-hazards. Among the various types of landslide phenomena, this study focuses on recent activities related to rock mass characterization. To enhance ATLAS IR’s capabilities in assessing and monitoring potential rockfall events, all instruments acquired during the ITINERIS project were tested at the Passo della Morte test site (Udine). Several datasets, including displacement maps, point clouds, images and meteorological data, were collected using both passive and active sensors. These datasets have been integrated and visualized within the ATLAS platform. In terms of rock mass characterization, we implemented methodologies to generate three-dimensional models of the studied area, from outdoor slopes to indoor spaces, by merging ground-based and mobile mapping data. These models serve as a foundation for more advanced analyses typical of engineering geological studies. Furthermore, we are developing algorithms to extract geometric properties of the rock mass, with a focus on fracture trace detection and characterization of open fractures. These include measurements of discontinuity aperture such as area, perimeter and width, which are automatically extracted from two-dimensional images and subsequently draped onto the previously created three-dimensional models.

**Keywords: Rock mass characterization, geomatic survey, 2D image processing**