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## Preliminary statistical analysis of the Ticino landslide inventory

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The canton Ticino, Switzerland, with an alpine setting and humid climate, is exposed to a great number of natural events, among which are gravitational movements. The StorMe inventory, which is compiled by the Forestry Section from the Republic and Canton of Ticino, contains all the relevant information regarding recorded natural events during the last 20 years, including rockfalls, debris flows, floods, landslides and avalanches (Galfetti et al., 2019).

Annually, millions of Swiss francs are invested for risk management for natural events (Galfetti et al., 2019): base studies, precautionary measures (such as mitigation works, and the protection and maintenance of woods) and monitoring. Considering landslide inventories are important sources of information for hazard and risk assessment, it is crucial to exploit the existing data in order to gain a better understanding of the specificities of the processes present at a regional scale.

The most significant statistical properties of landslides derive from geometrical parameters such as landslide area or volume; which can be used to calculate the size, frequency and potential distribution of future landslides as well as the contribution of sediment yield to erosion.

Here, a statistical analysis was carried out using the StorMe inventory and additional data, in order to better understand the spatial and temporal distribution of events in the study area, their geometric characteristics (distance and angle of propagation, volume) and their relation to the soil/rock type, land use, and climate. The inventory consists of both spatial attributes (points and polygons) and linked attributes. Additional input data included topographical, geological, land cover and previously created hazard maps; both in raster and vector formats.

Preprocessing of the available data included the calculation of derived attributes (slope, curvature, elevation, area, perimeter, among others...) and the joining of spatial and textual data. Bivariate and multivariate statistical analyses were carried out first on the whole inventory (including time series, spatial distribution, volume distribution, frequency–area distribution and inventory quality) and then analyses on controlling factors (mainly elevation, slope, lithology and land cover) for each different type of process was carried out.

Preliminary analysis results show a few general trends regarding chiefly the distribution of landslide types, volumes, propagation distance, and reach angle (Farböschung); as well as some local anomalies. More in-depth analysis using machine learning will be carried out in the future in

order to determine main controlling factors for each movement type in the study area.

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Galfetti, M.; Bottinelli, L.; Salvetti, A.; Re, L. and Coratelli, S. (2019). Pericoli naturali in Ticino: storia, cifre e strumenti di prevenzione. EXTRA DATI - Supplemento online della rivista Dati dell'Ufficio di statistica. Anno XIX – N.02