Dataset description

The dataset consists of 392 slope failures occurred in the Italian Alps between 2000 and 2020 at high-elevation (above 1500 m a.s.l. Figure 1). It has been conceived as a data repository for the following processes: landslides, blockfalls, rockfalls, soil slips, rock avalanches and complex landslides. This dataset is partly an update and implementation of that published by Paranunzio et al. (2019), which also includes debris/mudflows and glacial hazards, but ends in 2016 and does not contain all fields in this dataset.
The repository includes relevant information for localizing, describing and interpreting slope failures, based on the following fields: spatial and temporal accuracy of the localization, region, data source, name of the event, elevation (meters a.s.l.), date (yyyy-mm-dd), coordinates (WGS84, decimal degrees), type of process, volume (m^3), lithology and specific lithology of the niche of detachment, aspect of the failed slope (degrees), slope gradient (degrees) and permafrost probability of occurrence (B = blue = permafrost in nearly all conditions; P = purple = permafrost mostly in cold condition; Y = yellow = permafrost in very favourable conditions; N = lack of permafrost). In case of lack of information, fields of the dataset include the initials n.a. (not available). In the dataset, landslides are listed in chronological order of occurrence (from the most recent to the oldest) and, subsequently, in alphabetical order based on the name of the event.
The case studies have been mapped as single points using a Geographical Information System (GIS) and Google Earth TH: as a rule, the point corresponds to the tip of the failure (highest point of the detachment zone). Lithology has been derived from the Italian National Geoportal (Geoportale Nazionale, 2020) based on the spatial resolution of a geological map 1:500000 in scale. The permafrost status has been derived from the *Alpine Permafrost Index Map* (APIM, 2020), a 2018 thematic map showing the likelihood of finding permafrost in the European Alps. Aspect and slope of the detachment zones have been calculated with GIS tools from a DEM of the Italian territory developed by the National Institute of Geophysics and Volcanology (INGV, 2020): the DEM has a resolution of 10x10 m.

The information sources that we considered are the followings: i) datasets of the Italian regional agencies, namely *Banca Dati Eventi del Piemonte* (cited as BDEP_ARPAP in the database) and *Sistema informativo frane in Piemonte (SiFraP) - ARPA Piemonte* (SIFRAP_ARPAP); *Regione Lombardia*, *Ispettorato Regionale delle Foreste Milano* (Regione Lombardia - IRFM) and *ARPA Lombardia* (ARPA); *Regione Veneto*; *Catasto Dissesti Regionale della Regione Autonoma Valle d'Aosta* (CD_RAVA); *ED30 - Regione Autonoma di Bolzano* (GEOIFFI-Trento and GEOIFFI-Bolzano); and case studies derived from the *IdroGEO* platform, which has been realized by ISPRA with the aim of bringing together in a single portal all the information produced by the Italian Landslide Inventory project; ii) Civil Protection Departments, namely *Protezione Civile Trento - Provincia Autonoma di Trento* (PC Trento); iii) information stored in the archives of CNR-IRPI Torino, including data derived from local/national newspapers, technical reports, personal communications and surveys, Google Alerts, hikers' and glaciological operators' alerts and reports; iv) scientific papers (citations are reported in the "References" section at the end of this document and in the database).

In order to verify the correctness and accuracy of the information provided, all collected data have undertaken a quality check (particularly from a temporal and spatial point of view). Specifically, as mentioned above, data come from different sources: this may entail a certain degree of inhomogeneity for accuracy and level of detail. Codes ranging from "1" to "3" referring to decreasing spatial and temporal accuracies were assigned to each case study. In terms of spatial accuracy, "1" was assigned when the tip of slope instability (of any type we considered) is identified with a good accuracy (i.e., the detachment point is known). When uncertainty was of the order of a few hundred meters, even of altitude, code "2" was assigned. Code "3" refers to a lower level of spatial accuracy, i.e. information on the approximate elevation and failure zone are available, but not on the exact detachment point. With reference to temporal accuracy, we assigned code "1" when the date of occurrence is known with a daily accuracy (sometimes also the hour of

detachment was known), whereas codes “2” and “3” were attributed to a lower level of temporal accuracy i.e., “2” when only the week of occurrence (or a few days’ period is known) and “3” only the month (or 30 days of range) are known, respectively.

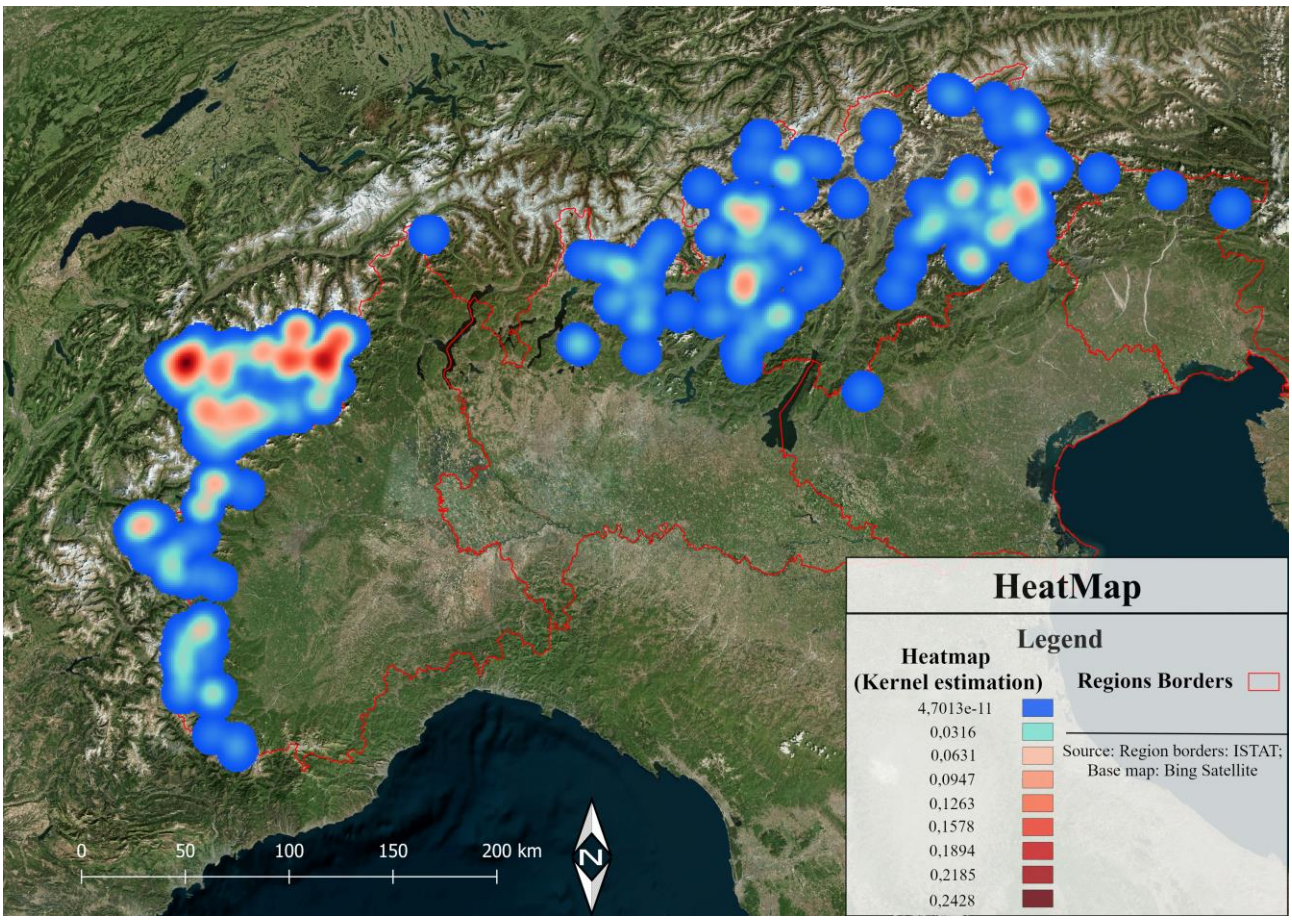

Figure 1 - Concentration of slope failures listed in the dataset in the different regions of the Italian Alps (from Guerini M., 2020)

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