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Assessment of landslide hazard in the province of Belluno (Veneto Region, Italy) before and after windstorm Vaia

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In the last decades, extreme meteorological events, such as wind disturbances, have increased their frequency and their strength due to the effects of the climate changes and are expected to further intensify in the future. The strong winds combined with heavy rain modify the water-soil interaction and the soil mechanics raising the landslides hazard. An example of the damages caused by this atmospheric phenomenon is windstorm Vaia, that affected the north-eastern part of Italy in October 27th-30th, 2018. In particular, the province of Belluno (Veneto Region, Italy) was hit by intense rain and violent gusts of 150 km/h stripping 12,000 hectares of forests generating bare slopes. Several landslides occurred during and after the storm. The main aim of this research is to develop a multi-temporal geodatabase that allows to analyze the effects of critical extreme events on the landslide hazard. A spatial and multi-temporal landslide inventory is a crucial task to identify areas most prone to instability and to evaluate the variation of each conditioning factor over time, leading to an effective estimation of the hazard. In this work, the morphometric (elevation, slope, curvature) and the non-morphometric conditions (lithology, land use, distance to roads, distance to rivers), as well as the triggering factors of the instabilities occurred during and two years after the event have been considered and compared to the landslide-related factors before the windstorm. The instability phenomena occurred before the windstorm Vaia have been extracted from the Inventory of Landslide Phenomena in Italy (IFFI) carried out by the Italian Institute for Environmental Protection and Research (ISPRA) and the Regions and Autonomous Provinces. The landslides occurred during and after the meteorological event have been provided by the Veneto Region. The results show the variation in time of the instability scenario and the influence of the storm on the increase of landslide hazard. These outcomes can help to assess the temporal evolution of the slope dynamics after similar extreme climate contexts. In the future, thanks to the large availability of data obtained by direct site inspections in the area, we will validate remote sensing methods finalized to rapid landslide detection and characterization.