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A case study for natural cascading hazard: the Great Blizzard of 1888 in the Asturian Massif (Northern Spain)

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In this paper we study the events triggered by the Great Blizzard of 1888 in the Asturian Massif as a case study that shows how one hazard can be the main cause of another hazard occurring. The reconstruction of the chain of hazards triggered by the episode has been done on the basis of nivo-meteorogical conditions, event geographical location, and socio-economic impact. The episode has been studied through the analysis of the issues published in six different newspapers between the 20th of January and 30th of May 1888. We have collected the data of the ancient meteorological station of the University of Oviedo, and those contained in parish documents. Field work consisted in visual inspection and interviews to the contemporary residents. The information has been stored and crossed for statistical analysis using a logical database structure that has been designed with this purpose.
The snowfall episode consisted in four consecutive snowstorms that occurred between the 14th of February 1888 and the 8th of April 1888, creating snow covers with an average depth ranging between 5 and 7 m. The snow accumulations were the main cause of material damage, affecting 27 high- and mid-elevation mountain municipalities. However, we have to consider that the newspapers only reflected those events affecting densely populated areas along with those which affected vital economic spaces (railway lines, roads in mountain passes, etc.). There were more than 200 interruptions with the traffic flow and communication outages, hampering economic activities. Snow built up on the roofs added extra weight to the structure of the buildings so more than 900 constructions collapsed, killing three persons and causing the loss of more than 19.000 head of cattle. Moreover, these snow accumulations were the basis of an episode of sixty-four snow avalanches that, undoubtedly, meant the main personal damage with a number of dead and wounded that reached 29 and 23 respectively.
During the snowfall breaks, snow-melting processes became important: the river rising affected all the main hydrological basins, 29 news related to material damage were documented and three people died drowned. In addition, snow avalanches caused fast damming followed of violent river risings in at least two cases, causing even worse damages because of the surprise effect. Finally, we have to consider the connection that can be made between the melting process and thirty-six mass movements that were documented, destroying six buildings, causing the death of one person and dozens of interruptions in communications: the increase in such events is clearly associated with the temperature rising and, at the same time, its decline can be observed with the temperature dropping. These events took place mainly during the second snowfall break, so we must take into account the cumulative effect on the water saturation of the surface formations.