Geophysical Research Abstracts
Vol. 17, EGU2015-557-1, 2015
EGU General Assembly 2015

Incidence of mass movement processes after an historical episode of heavy snowfall in the Asturian Massif (Northern Spain)

Cristina Garcia-Hernandez, Jesús Ruiz-Fernández, and David Gallinar
Department of Geography, University of Oviedo, Spain (cristingar@hotmail.com)

This research examines a mass movement event caused in the context of the Great Blizzard of 1888, one of the most severe recorded blizzards in the history of Europe, whose implications go far beyond. In the Asturian Massif the episode consisted in four linked and consecutive snowstorms that took place between the 14th of February 1888 and the 8th of April 1888, creating snow covers with a depth ranging between 5 and 7 m, snow avalanches and flooding, causing dozens of deaths and large material damage.
The Asturian Massif belongs to the Atlantic-climate area and is composed mainly by sedimentary and metamorphic paleozoic rocks. Many sectors of the Massif are between 1.000 and 2.000 m a.s.l., and its topography is characterized by a great height difference and steep slopes. Because of the lack of deep soils suitable for farming, the main traditional activity has been livestock keeping, and goods traffic.
We have devised a method that enables the reconstruction of this event on the basis of nivo-meteorogical conditions, geographical location and socio-economic impact. The mass movement episode has been studied through the issues of 6 newspapers published in Asturias between the 20th of January and 30th of May 1888, the ancient meteorological station data of the University of Oviedo, and field work. A logical database structure has been designed with the aim to store and cross the information for statistical analysis.
Thirty six mass movement worthy of consideration were documented, 28 of them causing material damage (six homes destroyed and at least 22 interruptions with the traffic flow on roads, highways and railways). Ten high- and mid-elevation mountain municipalities were affected by mass movement. We must consider that only the most important events, or those that happened in crowded places, have been considered by the newspapers, so the total number of mass movements should be considered as a minimum figure. We have got to identify and classify 27 of them; 16 as landslides, 5 as rockfalls, 4 as mixed typology of rockfalls with a big amount of mud, and 2 as debris flow. One person died as a consecuence of a rockfall. Thirty out of thirty six events anthropic intervention is proved. It acted as a prior conditioning where the previous topography has been modified (in 29 cases), either as a direct triggering mechanism at least in one landslide episode.
The sequence analysis of the events shows that their number and frequency increases with episodes of snow melting during the snowstorm breaks, announcing the highest instabilities on 10th and 11th of March, coinciding with a rainfall peak. However the connection with the rainfall episode seems weak compared with the one than can be settled with the rise of temperatures and the resulting melting intensification. It caused the progressive water saturation of surface formations, that reached a maximum during the second break, triggering 20 events during the 11th of March 1888.