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Space-time variability of precipitation in a montainous catchment of the Spanish Central System

V. Ruiz-Villanueva (1), J.M. Bodoque (2), A. Díez-Herrero (3), and J.A. Ballesteros (4)

(1) Instituto Geológico y Minero de España, Área de Investigación en Peligrosidad y Riesgos Geológicos Madrid, Spain (v.ruiz@igme.es), (2) Universidad de Castilla-La Mancha, Departamento de Ingeniería Geológica y Minera, Toledo, Spain (josemaria.bodoque@uclm.es), (3) Instituto Geológico y Minero de España, Área de Investigación en Peligrosidad y Riesgos Geológicos, Madrid, Spain (andres.diez@igme.es), (4) Instituto Geológico y Minero de España, Área de Investigación en Peligrosidad y Riesgos Geológicos, Madrid, Spain (ja.ballesteros@igme.es)

The catchment of the Cabrera Stream (15.5 km2) is on the northern slope of the Gredos Mountain Range in the Spanish Central System. The catchment altitude ranges in between 1923 and 735 masl and the mean slope of the watershed is 20 percent. There are six raingauges installed (one station per 2.6 km2) since 2004 in order to analyze the spatial and temporal characteristics of rainfall as an input of the calibrated distributed hydrometeorological models. They were also installed to record extreme rain events that could trigger sediment-laden flows like the hyperconcentrated one which took place on December 1997, which generated numerous infrastructure damages.
The design of an instrumental network is very important in this kind of basins because of the high spatial-temporal rainfall variability. The accuracy of the registered values depends on the number and the location of the raingauges. For this reason, Multicriteria Evaluation was applied in a geographic information system in order to define the optimal position of the raingauges using factors such as topography, slope, aspect, curvature, geology, land uses, vegetation and accessibility.
Eight heavy rainfall events, which took place from March 2005 to October 2008 in different seasons, have been considered to analyze the spatial and temporal rainfall variability during intense precipitations.
The maximum intensity value of each event during different timespans was calculated (I24h, I12h, I1h, I30´, I10´) and different interpolations techniques (ordinary krigging, krigging with external drift, splines, IDW) were used in order to obtain areal rainfall estimations.
These findings were calibrated with the data obtained from one of the stations (the one not used in interpolation) in order to analyze the best interpolation method.
Then, the estimated values were compared with the observed values and a success rate was calculated.
The results show the spatial and temporal characteristics of the rainfall dataset generated by the high density rainfall network and have improved the data quality of our hydrometeorological model inputs.