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Weather times and erosion in a Mediterranean Mountain area (Central Spanish Pyrenees)

Estela Nadal Romero, Nicola Cortesi, and José Carlos Gonzalez Hidalgo
University of Zaragoza, Geography and Land Management, Zaragoza, Spain (estelanr@unizar.es)

Flood generation and soil erosion are associated with specific weather conditions that can be described by Weather Types (WTs) approaches. Previous researches in the Iberian Peninsula (IP) have analyzed the relationship between precipitations and specific WTs, being the most prevalent to produce precipitation the Westerly, South-Westerly and Cyclonic WTs.
In this study, we analyze the synoptic weather conditions (WTs) during which floods, storm-flow and suspended sediments are generated in a Mediterranean mountain area of the Iberian Peninsula (Pyrenees range). The results show that the three wettest WTs were NW, C and W, which accounted for 30% of rainy days and 46% of rainfall, but comprised only 13% of total daily records. Generally, extreme floods are commonly associated with westerly airflows (SW and W), whereas cyclonic circulations produce moderate ranking floods. Suspended sediment transport is mainly related to SW, NW and W types. Moreover, seasonal differences in sediment yield exist in WTs, remarking the predominance of SW flow in autumn and of the N and W flows in summer.
The results also show that the highest rainy events did not occur during the most frequent WTs, and some infrequent WTs produced the highest mean values of rainfall as a consequence of infrequent storms.
Finally, future scenarios indicate changes in WT dynamics and its seasonal distribution. Consequently, soil erosion and sediment yield, storm-flow and rainfall dynamics could change, and efforts against erosion and flooding should be perhaps re-evaluated.