



Dendrogeomorphological studies for natural hazards research in the Iberian Peninsula (Spain and Andorra)

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For a time span of more than 15 years, several scientists have been carrying out research on the application of dendrogeomorphological techniques to the study of natural hazards in Spain and Andorra. The studied natural hazards cover a broad spectrum of geomorphic processes, being more prominent those of slope movements (rock-falls, rock avalanches, slides, debris flows...), soil erosion by running water (sheet and gully erosion) and snow avalanches. Wildfire is another specific subject that has been studied, and torrential flash floods are beginning to be analyzed. Areas under study are concentrated in two Iberian mountain ranges and their surroundings: Catalanian, Andorran and Aragonese Pyrenees and the Spanish Central System. Conifer trees and forests, mainly, are the common research material. Among them, pines (*Pinus sylvestris*, *Pinus uncinata* and *Pinus nigra*) and fir (*Abies alba*) are the most usual. Occasionally, broad leaf species such as oaks, holm oaks, birches and beeches are included. Stems and branches are the most habitual elements under analysis, although exposed tree roots have been studied too. Research techniques are the standardized methods of dendrocronology: systematic sampling, ring measuring using automatic systems, events dating by cross-dating synchronization, anatomical analysis and statistical procedures. The obtained results are diverse - event chronologies (even including seasonal details), frequency of occurrence, rates of activity, maps of spatial distribution of events, hazard maps and threshold values of triggering conditions.