Geophysical Research Abstracts
Vol. 19, EGU2017-7223, 2017
EGU General Assembly 2017

Shifting agriculture: the main cause of landscape degradation in the Central Spanish Pyrenees

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Cereal agriculture occupied large areas in the Spanish Pyrenees to feed the population in a socio-economic system of limited exchanges with the outside. In the Western valleys, shifting agriculture constitutes the dominant field pattern, representing almost three-quarters of the traditional agricultural space (Lasanta et al., in press). These were cultivated at times of heavy population growth, necessitating steep and stony hillsides with poor soil to be tilled, or the ones that were far away from the village. The fields were created by clearing the vegetation from a slope, then burning it to use the ash as a fertilizer. Cereal was grown for 3-4 years, after which they were abandoned for 20-30 years to recover fertility, and the cycle was repeated. Almost all the fields (99%) using shifting agriculture had been abandoned by the 1950s.
This study analyzes the role of the shifting agriculture in soil erosion and landscape degradation. For this purpose, (i) experimental plots, which reproduce the traditional agriculture in the Pyrenees and the abandonment processes, and (ii) the cartography made from the SIOSE (2009), which shows the present land cover 50 years after cropland abandonment, were used.
The results show that shifting agriculture caused higher soil losses than other agricultural uses (1.36 kg m-2 yr-1): fallow land (0.87 kg m-2 yr-1), chemically fertilized cereal (0.86 kg m-2 yr-1) and meadow (0.14 kg m-2 yr-1). Also, after land abandonment, soil losses are higher in shifting agriculture (0.78 kg m-2 yr-1) than cereal lands (0.73 kg m-2 yr-1). The burning of the shrub cover and the use of ashes as fertilizer did not contribute to improve the soil quality, which explains both the higher soil losses during the cultivated period and after the abandonment, since slower plant succession occurs.
The results obtained from the SIOSE confirm that the change from meadows to shrubland is relatively fast, as a consequence of the low relationship with livestock (minimum disturbances), but the plant succession is slower than in the other agricultural uses. Undoubtedly, the use of marginal areas from agriculture and high soil losses during cultivation justify the presence of highly degraded soils that delay the forest succession. This explains the high stone cover in many slopes and a landscape characterized by shrublands, after more than 60 years of land abandonment.

Acknowledgement
This research was supported by the DESEMON and ESPAS projects (CGL2014-52135-C3-3-R and CGL2015-65569-R, funded by the MINECO-FEDER). The “Geomorphology and Global Change” and the “Climate, water, global change and natural systems” research groups were financed by the Aragón Government and the European Social Fund (ESF-FSE). Estela Nadal-Romero was the recipient of a “Ramón y Cajal” postdoctoral contract (Spanish Ministry of Economy and Competitiveness).

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