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Magnetic susceptibility as a proxy of soil redistribution affected by land use change and slope gradient in hilly regions of Lordegan, Western Iran.

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The magnetic susceptibility of soils results mainly from their magnetite and maghemite contents, although pyrrhotite and greigite could be important in some instances. Magnetic susceptibility (χlf) could be affected by transportation processes due to redistribution of soils within the landscape. Major parts of Oaks forests in western Iran have been gradually degraded and were improperly operated for rainfed cultivation. Therefore, this study was conducted to study the land use change and slope effects on the magnetic susceptibility as a measure of soil degradation. Three land uses included natural Oak forest (NF), degraded forest (DF) and clear cutting forest under cultivated rainfed (CR) were chosen in the hilly regions of Lordeagn region, located at western Iran. The parent material of the all land uses consisted of Quaternary deposits. In each selected land uses three slope classes were chosen to evaluate of slope gradient on soil redistribution included 0-10%, 20- 40% and more the 40 %. The soil samples were collected in a randomly factorial design, with land uses and slope classes as factors with eleven soils samples at each category as iterations from the 0-10cm surface soils. Soil samples were air-dried and passed through the 2 mm sieve. For the analyses of the magnetic susceptibility 25g subsample were slightly compressed to avoid the movement particles and placed into 25 mL containers. A Barrington suscptimeter with MS2B probe was used to measure the magnetic susceptibility in 99 soil samples at low and high frequencies. The effects of land use change and slope gradient were assessed using the least square method and an ANOVA to evaluate the significance of the main factors. The results of ANOVA indicated that slope gradients and land uses had significant ($p<0.01$) effects on distribution of magnetic susceptibility. The mean comparison of χlf among three land uses showed that they had significant differences, as the highest values($85\times$10-8 m3 kg-1) and the least values($24\times$10-8 m3 kg-1) contributed to NF and CL land uses, respectively. The DF land use showed a moderate values ($55\times$10-8 m3 kg-1), but was significant different from two other land uses. Slope gradients had significant effects on the χlf within the hilly regions and steep slopes showed the least values and lower slopes showed higher magnetic susceptibility induced by deposition of ferromagnetic minerals accompanying with fine particles deposited through deposition processes. This is probably attributed to fine particle redistribution within the landscape because of soil erosion and deposition. Therefore, magnetic susceptibility could be used as a proxy of land degradation by land use changes in different slopes with similar parent materials.