Geophysical Research Abstracts
Vol. 15, EGU2013-1042, 2013
EGU General Assembly 2013


# The use of magnetic iron oxide as a tracer to determine vegetation trapping efficiency in Southern Spain at hillslope scale

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A new technique to identify and assess the vegetation trapping efficiency in hillslopes has been used in this study. Hillslope vegetation is a key parameter to reduce soil erosion as it redistributes sediments along the slope and improves soil properties. It has been shown that hillslope vegetation captures eroded soil particles from the top of the slope, increases soil porosity, water storage capacity and infiltration due to its root system, reducing the probability of laminar erosion and creating isolated fertility island along the slope. Following this soil improvement technique for reducing soil erosion rates, vegetation strips were planted between tree rows, in olive orchards in Spain. To check its actual efficiency and relevance, as well as the sediment transport efficiency, magnetic iron oxide tracer was used as it is capable of tracking sediment within the landscape.
Three plots with no morphological differences (A, B, C) of 84 m2 (6x14 m) with 15% slope were selected in southern Spain (Cordoba). Three tillage strips and three vegetation strips were located per plot. Each plot is provided with a tank at the end to measure runoff and soil losses. Rainfall simulations were carried out during the summer of 2011 and 2012 and during February and May 2012. Magnetic susceptibility of the plots was measured with a MS2D field probe meter before and after each simulation. Soil samples for laboratory magnetic susceptibility measurements were also taken for calibrating the field probe. The applied intensity was 2.8 bar in all the simulations so we could reproduce high erosive events. A mixing model, used by Guzmán et al. 2010 in order to know if the sediments were coming from the vegetation or tillage strips.
Due to the small amount of sediment collected during this experiment, we decided to divide the simulations in two parts of 1h and 30 min each, with a 30 min stop in between so the soil profile had the time to get to field capacity.
The application of the mixing model showed that 89% of the collected sediment from runoff came from the vegetated strips, in both 2011 and 2012 rainfall simulation experiments. These high values from the vegetated strips suggest that further research needs to be done in order to characterize the role of the vegetation on trapping sediments.

References

Guzmán, G., Barron, V. Gómez, J.A. 2010. Evaluation of magnetic iron oxides as sediment tracers in water erosion experiments. Catena, 82, 126-133.