

Partitioning Between Historic Water and Wind Induced Soil Redistribution Rates Using Direct Measurements and Anthropogenic Radioisotopes.

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Redistribution of soil and sediment by the forces of water and wind is a natural process that shapes landscapes. Tillage of soil results in reduced surface protection and in increased rates of soil redistribution. Six conservation bench terraces (CBT) of Pullman clay loam at the USDA-ARS Conservation and Production Research Laboratory in Bushland, Texas were established in a wheat-sorghum-fallow rotation with stubble mulch tillage in 1949. Flumes were installed on three CBT in 1958 and sediment samplers added in 1978. In 1981, alternate CBT were placed in a no-till cropping system and additional flumes with sediment samplers were added. We collected eight cores to 60 cm from the top, middle, and bottom of each CBT. An adjacent undisturbed native rangeland that had been in grazing exclosure for most of the last 60 years was similarly cored for a reference area. ¹³⁷Cs activities were determined in a gamma spec using soil samples in 500 ml Marinelli beakers for a period of 48 hours. Radioisotopic-based estimates of soil loss rates ranged from negligible to nearly 8 t/ha/yr for the no-till CBT and from 6 to greater than 15 t/ha/yr for the stubble mulch CBT. Soil loss estimates based on measured runoff and sediment load were 1.31 and 2.09 t/ha/yr for the no-till and stubble mulched CBT, respectively. We conclude that the balance of soil loss was caused by wind, an erosive force that was visually confirmed during the course of the study.