



Determining erosion and sedimentation chronology on semi-arid catchments using radioisotopes.

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Semi-arid environment is defined by high magnitude, low frequency rainfalls that produce highly variable soil erosion rates. This study attempted to establish erosion dynamic of past 70 years on three small semi-arid catchments with history of grazing and vegetation change. Activity of Cs-137 and excess Pb-210 from 18 cores collected from sedimentation ponds were measured using gamma spectrometer. The sediment was dated using constant initial concentration (CIC) and constant rate of supply (CRS) models. These estimates were compared with direct measurement of aggradation from historic topographic surveys. Sedimentation in the ponds ranged between 3.1 and 5.4 cm/year and the long term average erosion rates on catchments varied between 0.8 and 1.4 t/ha/year. The distribution of excess Pb-210 in the cores was better described by CRS model. Estimated erosion rates were in agreement with those established by other methods for similar catchments in the region. Past variation in sedimentation rates were identified and correlated with recorded history of grazing, vegetation management, and anthropogenic disturbance. Cs-137 and Pb-210 methods are suitable for use in arid environment and can complement each other to increase reliability of sedimentation rate estimates under highly variable hydrologic regimes.