Geophysical Research Abstracts
Vol. 19, EGU2017-11695, 2017
EGU General Assembly 2017

Time scale for degradation and erosion of archaeological terraces in the Judea Mountains, Israel

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The fate of mountain bench terraces which have been abandoned in ancient times is puzzling. On the one hand recently abandoned terraces undergo rapid degradation by walls crumbling, leading to soil being washed by rain water out of breaches in the walls, suggesting that within a short time all soil would be washed down-slope. On the other hand slopes with degraded terraces appear to still retain much soil even though only faint remains of the terraces exist. Moreover, if soil is rapidly eroded down-slope when terraces are no longer maintained, where do subsequent terrace builders find the soil to fill behind the stone walls?

These questions were addressed as part of a larger study on the chronology of terraces in the Judea Mountains, Israel. Previous OSL dating of terrace soils in the region showed that the majority of the maintained terraces were constructed during the past 700 years, and only occasionally older ages were obtained for the soil at the very base of these terraces. Concerns were raised that soil erosion caused earlier events of terrace construction to disappear.

To check if terraces and soils indeed erode entirely and how long this might take, we selected a relatively smooth hill slope showing small patches of limestone bedrock as well as remains of highly degraded sets of terraces. Three pits were excavated in soils within three different terrace remains down to bedrock, some to a depth of 2 m, and samples for OSL dating were collected from the exposed soil sections. In all three pits the lowermost samples gave ages of 3000-4500 years before the present, possibly the natural soils before any human intervention. However samples from a depth of 35-45 cm gave ages of 350-200 years, providing the last time the soil at that depth was exposed to sunlight. This suggests that the terraces were abandoned in the past 200 years or so and since then degraded. However the thick soil present on most of the slope suggests that after the first stage of rapid degradation the slope reaches equilibrium, probably due to coverage by native shrubs that reduce direct soil erosion, and most of the soil is retained on the slope.