

Interactive comment on “Controls on slope-wash erosion rates in the Mojave Desert” by O. Crouvi et al.

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This paper seeks to estimate erosion rates for rocky hillslopes in the Mojave desert. The fundamental problem with the paper is the assumption that all differences between measured Cs137 inventories and the reference sites (2 points) must be due to erosion by water.

Specific comments 537/1 Given the discussion by Boardman, Pimental's rates may not be the most reliable benchmark 537/29 Something of an oversimplification of the finding of Abrahams & Parsons, who argued for a peak in erosion rate at c. 12° as a result of the combined impact of gradient and stone cover. 538/15-25. The distinction between arid and semi-arid is not normally based upon just precipitation but on the ratio of precip to evapotranspiration. The assertions that all arid climates have the

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same precipitation regime and rates of dust accumulation are demonstrably incorrect. 539/15 and 24. The addition of dust by aeolian activity is likely also to affect 137Cs inventories at the local scale. 5340/10 Indeed, which conflicts with the notion of the importance of high-intensity rainfall. Some climatic data would be useful here (return periods of varying intensities for example). 542/3. Accepting 2 of the reference sites simply because they conform to some expectation seems somewhat arbitrary. Surely, the issue is whether or not they could have experienced erosion/deposition or not is the key criterion. Topographically, they exhibit no better qualities than the rejected sites (from the profiles shown). Given the estimates of erosion rates hinge on the validity of these sites, this approach would seem to undermine any faith one might put in the results. Tables 1 and 2. It would be more useful to have data for individual sampling sites than just statistics for the transects. 543/22 Is a uniform bulk density justified? 545/1-3 Although you do not say, I presume your soil profiles were of the order of a few 10s of cm across so it is the gradient at this scale that is important, not the hillslope scale, if you are trying to relate erosion rate to gradient. Why could you not have measured the gradient at the same time as digging the soil profiles? 545/13-15 Although sheet erosion is due to raindrop detachment and not flow detachment. 545/21 You can't calculate a coefficient of variation with 2 points. 546/25 et seq Throughout, the assumptions are that a) deposition of 137Cs is spatially uniform, and b) differences from the reference value are due to water erosion (551/6). Neither seems particularly sound. Deposition on rocky slopes, where rock cover may exceed 50% implies that more than half the initial deposition is onto this rocky surface. Where does this 137Cs end up? Your own data suggest that wind-blown material can account for up to 100% of soil fines. No consideration is given to these issues. Likewise, no discussion is given to the significance of spatial variation in vegetation. 549 What processes do you attribute these differences in soil thickness to? 551/25-27. Yes, but they will affect your claim to have estimates of absolute erosion rates and any subsequent comparisons with other rates. 552/3 Might that not be a result of wash-off from the rock fragments – see comment on 546/25 557/29-30 The study would be more convincing if there had

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been data from ^{137}Cs on deposition in these areas, rather than simply asserting this must be the explanation.

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