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Hydrology and Earth System Sciences Discussions

Interactive comment on "Soil erosion and sediment delivery in a mountain catchment under land use change: using point fallout ^{137}Cs for calibrating a spatially distributed numerical model" *by* L. C. Alatorre et al.

Anonymous Referee #2

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The authors calibrate a spatially distributed catchment erosion model using internal soil erosion data (from 137Cs measurements) and validate it using independent sediment yield data for the catchment outlet. It is frequently stated that spatially distributed models should be tested against internal data and not solely the outlet response. Testing solely against outlet data indicates the ability of a model to reproduce the integrated catchment response but does not guarantee that the model is representing internal conditions correctly; e.g. it might be possible to simulate an apparently correct outlet

response on the basis of compensating errors in the internal simulation. Too frequently, though, internal data are not available for model tests. Thus the authors' study is highly commendable and is a rare example of the ideal approach to testing a catchment scale erosion model. The paper should be published, subject to minor corrections as follows:

1) Page 11141, line 10. It would be useful to have at least a summary of how the RUSLE parameters were evaluated for the Arnas catchment.

2) Page 11141, line 5. Should there be a reference to Table 2 somewhere here?

3) Page 11141, line 11. Should there be a reference to Fig. 2 somewhere here?

4) Page 11141, line 16. Where was the reference 137Cs inventory taken? On a flat area not affected by erosion or deposition?

5) Page 11142, line 7. Just to be clear, were the point 137Cs estimates compared with the model simulations for the 5-m x 5-m model grid square corresponding to the location of the 137Cs measurement? This should be stated. Given that the model grid square is unlikely to be an exact topographic representation of the catchment at that point, would it be more appropriate to use the average model simulation over a larger number of grid squares?

6) Page 11142, line 8. The Nash-Sutcliffe method is more commonly used to show the fit of simulated time series rather than point events. It would be better to use a more appropriate test such as the mean standard error.

7) Page 11143, line 6. The comparison in Fig. 5 could be read as suggesting an independent test of the model. The sentence should therefore be revised to note that the Figure shows the results of the calibration and therefore it is to be expected that there is a strong relation, but it is not an independent test.

8) Page 11143, lines 8 and 22. Figure 4 is referenced after Fig. 5, which is incorrect. The figures should therefore be reversed.

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9) Page 11143, line 24. The failure of the alternative calibration, based on outlet data, demonstrates the importance of using internal data. The authors could emphasize this point some more.

10) Page 11143, line 18. Which seven years were used for this calibration (give the dates)?

11) Page 11144, line 10. It should be acknowledged that, according to Fig. 6, the model underestimates high sediment yields and overestimates low sediment yields. The implications of this for the scenario simulations should be discussed in subsequent sections.

12) Page 11146, line 6. Are these sediment yields plausible? Have similar values been measured for heavily cultivated catchments elsewhere in the general area?

13) Figure 3. The contour values are almost too small to read. They should be in a larger font.

14) Figure 5. The caption should explain the dashed line.

15) The paper is fully understandable but there are nevertheless a number of English errors. It would therefore benefit from editing by a native English speaker.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 8, 11131, 2011.