

Interactive comment on “Detection of seasonal erosion processes at the scale of an elementary black marl gully from time series of Hi-Resolution DEMs” by J. Bechet et al.

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Interactive comment on “Detection of seasonal erosion processes at the scale of an elementary black marl gully from time series of Hi-Resolution DEMs”

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Anonymous Referee #1

Author’s response: First we thank the reviewer for his very pertinent review that will improve the paper.

Interactive comment on Earth Surf. Dynam. Discuss., 3, 1555, 2015.

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Comments from Referees: This paper deals the erosion processes measured from multi temporal lidar data in a small catchment located in the South East of France. The approach developed by the authors is interesting for their purpose. I am surprised that no mention of slope is made in the paper. Are there some relationships between erosion amount and slope value?

Author’s response: We fully agree with this we were too much concentrated on the surface slope changes and the volume transfer, and not enough by the other parameters (that we have already). We will provide an erosion rate versus slope angle diagram and adding discussion. In page 1562 at the end of 2.4 we indicate that the slope changes are limited where there is no slope mass movements. The erosion is mainly promoted by runoff with rates quite homogeneous over the catchment in these zones. These observations will be detailed and illustrated.

Comments from Referees: I think that this paper could easily concern a broader audience if the discussion part was more developed. I list also some minor points:

Author’s response: yes we agree.

Comments from Referees: Abstract: the results are not described in the abstract. Please remove sentences such as “Comparisons of the TLS sediment budget map with the in situ sediment monitoring (limnigraph and sedigraph) in the stream are discussed” by sentences with more content.

Author’s response: again we focused too much about the changes detection and description, and not enough about the results. Nevertheless, part of the results are presented, but in a too general ways, we will reformulate the abstract.

Comments from Referees: Page 1559 Line 8: I don’t think that your model conceptual explains but it describes.

Author’s response: Yes this is a description, but behind the description of the model we can extract some explanations. We will take attention about this issue. But in some

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acceptation of the terms “conceptual model”, it includes explanations... we will clarify or changes the wording.

Comments from Referees: P1559 I19: What is IRSTEA ?

Author's response: sorry we completely forgot to as the meaning of IRSTEA which is: Institut national de recherche en sciences et technologies pour l'environnement et l'agriculture

Comments from Referees: P1560 I9: Is there a relationship between erosion intensity and the deep of sedimentary layers?

Author's response: yes there is an impact but in our study we were not able to make the difference, in the discussion we will add some references (Mathys, 2005; catena; PhD Mathys). When the slope is perpendicular to the bedding the weathering is more important.

Comments from Referees: P1560 I10: Pinus nigra instead of Pina Negra:

Author's response: Sorry this is a really stupid mistake we will correct it!

Comments from Referees: P1561: Are the hyper concentrated flows trapped in the sediment trap ? If not how do you take them into account in your measure of sediment export?

Author's response: Hyperconcentrated flows observed on these catchments are hyperconcentrated in fine sediments. So most of them are not trapped. But fine sediment concentration is measured continuously at the catchment outlet, even during hyperconcentrated events, which allows estimating the total amount of sediment exported as suspension. It represents on average 20% of the total yearly sediment export, as explained in the text. So we corrected the sediment budget by 20%, which accounts for all suspension transport, including hyperconcentrated flows. This aspect will be clarified. On page 1565 the choices we made are explained.

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Comments from Referees: P1563 L1: replace as by has.

Author's response: ok!

Comments from Referees: P1164: the discussion concerning the accuracy is not clear for me. Could you develop? You discuss only the vertical accuracy. What about the horizontal one? In such high relief environment, a horizontal error will produce high errors in topographic balances.

Author's response: the high density of points allows to reduce the noise by averaging, we will clarify that point. For the lateral errors we will add a comment. But as we analyse error on grid comparison, all the error is transferred to the vertical component.

Comments from Referees: P1564 L21: the images are small and difficult to analyse.

Author's response: One of the solutions is to propose a large version in supplementary materials.

Comments from Referees: P1565: Did you try to evaluate the accuracy on flat area on which erosion or deposit is negligible?

Author's response: such test has been performed in other paper such in Abellan et al. (2009). This provides simply the accuracy we are giving above in the text.

Comments from Referees: P1565L13: I don't see any mention of density in table 2 or I don't understand what you mean. (Perhaps it concerns volume variation).

Author's response: this sentence will be removed because it remains from a previous manuscript. It simply reproduced a value of the table, so there is no use for it.

Comments from Referees: P1565L21: Do you mean that 40% of the sediment are not trapped?

Author's response: No, this is the maximum ratio measured by Mathys (2006) at the scale of one specific event, the average is 20%. This is the value we used.

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Comments from Referees: P1566L13: Could you explain why interpolation reduces measurement errors? Generally interpolation propagates errors.

Author's response: in that case the interpolation reduced the number of points by averaging locally, this means that the elevation error was reduced, but the size of pixels increased.

Comments from Referees: P1568: I think that you could be clearer concerning the relationship between rainfall and erosion. What is finally the main parameter? The instantaneous amount of rain? The history of rainfall in the few days before the erosion occurs? Is the soil saturation an important parameter for erosion?

Author's response: The answer is not straightforward. The erosion rate depends first on the material available, and second on the rainfall intensity. But low intensity rainfalls are participating to the cycle of erosion by implying drying and wetting plus micro-slope movements, which weather the regolith more and transfer mass locally.

Comments from Referees: P1169L27: June?

Author's response: yes right we will add 14 of June.

Comments from Referees: P1571L11: event

Author's response: yes right we will correct.

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