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Interactive comment on "The fate of seeds in the soil: a review of the influence of overland flow on seed removal and its consequences for the vegetation of arid and semiarid patchy ecosystems" *by* E. Bochet

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Answer to Referee 4

First of all, I would like to thank you for your interest in the revision of my manuscript and for your helpful comments and suggestions that will serve to improve it. Hereafter, you will find a point-by-point reply to your comments that will be included in the next version of the manuscript.

Point-by-point reply to minor comments

- Page 594, line 6. Delete the space between "afore" and "mentioned".

OK, I will correct it.

- Page 594, lines 25-26: "these authors observed an increasing seed density in the downslope direction from the top to the bottom part of the slope that supports the hypothesis of seed redistribution along the slope...". Please, add ",at least in part," just after "supports". Vegetation density usually increases dowslope, which can also have an important role on explaining the concentration of seeds at the base of hillslopes.

I completely agree with your comment, I will nuance the sentence adding “at least in part” after “supports”.

- Page 595, line 5. Change "afore-mentioned" to "aforementioned".

Ok, I will correct it.

- Page 595, line 12. Please, delete "slope or".

It is confusing and not necessary, I will delete it.

- Page 597, line 24: "was also correlated with soil properties related to runoff generation". Change "related to" to "associated with".

I will change it as requested.

- Page 597, line 26. Please change “plants” to “species”.

I’ll change “plants” to species not only in line 26, but also in the following lines of the same paragraph (lines 27, page 597 and line 3, page 598).

- Page 598, line 1: “. . .than the water. . .”. Please, delete “the”

OK.

- Pages 601-602, lines 27-2: “A possible outcome that has been inferred from these

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observations by many authors, that remains a controversial topic today, is that the vegetation patterning migrates progressively upslope (Thiéry et al., 1995; Montaña et al., 2001). In a recent model, Saco et al. (2007) related the migrating or stationary condition of bands to the dispersal of seeds by overland flow". Vegetation bands in some particular environments migrate upslope (tiger bush landscapes in Africa) while in other areas (e.g. Mulga bands in central Australia) they are stationary. A good review of the mechanisms that induce these differences can be found in Deblauwe et al. 2012: Determinants and dynamics of banded vegetation pattern migration in arid climates, Ecological Monographs, 82: 3-21.

Thank you for this interesting review (Deblauwe et al. 2012) which has to be cited in this manuscript indeed, because it is an important contribution to the debate about migrating or static bands that is still open today. The following small text (hereafter in bold) will be added in the section between p.601, line 22 and p.602, line 5 in order to include some relevant results and ideas from the review of Deblauwe et al. (2012):

"In banded landscapes, seeds trapped by the vegetation are present throughout the bands, but the better water availability at the upslope edge of bands, and the smaller runoff volume passing through to the downslope edge, leads to the colonization of the upslope edge by pioneer species and to the progressive death of plants at the downslope edge (Seguieri et al., 1997; Valentin et al., 1999). A possible outcome that has been inferred from these observations by many authors, that remains a controversial topic today, is that the vegetation patterning migrates progressively upslope (Thiéry et al. 1995; Montaña et al. 2001; Deblauwe et al. 2012). Nevertheless, the use of new technologies in the study of slow ecosystem dynamics (e.g. high resolution satellite images and airborne photographic surveys) provided recently unequivocal photographic evidence of marked upslope migration for different dryland areas exhibiting banded patterns worldwide (e.g. northeastern Chihuahan desert, Somalian Haud and Mediterranean steppes of eastern Morocco, Deblauwe et al. 2012). In the same study, however, Deblauwe et al. (2012) stated that this dynamics which proved to be widely

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influenced by weather regime cannot be considered as systematic because migration was undetectable at the available image resolution in other banded systems they investigated (e.g. central Australia, western New South Wales). The reasons causing some banded patterns to move fast and others to be static are still elusive. Deblauwe et al. (2012) provide a review of some possible mechanisms that may induce these differences, including seed translocation by overland flow. In a recent model, Saco et al. (2007) related the migrating or stationary condition of bands to the dispersal of seeds by overland flow. They found that the anisotropic redistribution of seeds by surface flow downslope might prevent the bands from traveling upstream, whereas isotropic seed dispersal mechanisms might be responsible for upslope band migration. However, empirical studies investigating seed fluxes are needed to validate this model and the possible migration-impeding role of seed redistribution".

- Page 604, lines 22-24: "because future scenarios of climate change predict changes in vegetation (type, cover and spatial distribution) and in rainfall distribution (higher intensive rainstorms), leading both to more intense erosion events". Please, add a citation for this statement.

The following two citations will be added for this statement: "Specht RL and Specht A. 1995. Global Warming: predicted effects on structure and species richness of Mediterranean ecosystems in southern Australia. In: Time scales of Biological Responses to Water Constraints (eds Roy J, Aronson J, Di Castri F), pp. 215–237. SPB Academic Publishing, Amsterdam" that refers to the predicted changes in vegetation, and "Nearing MA, Pruski FF, O'Neal MR. 2004. Expected climate change impacts on soil erosion rates: a review. Journal of Soil and Water Conservation, 59, 43–50" that refers to the predicted changes in the rainfall intensity.

- Page 605, line 14: "mine spoils, burnt areas, ...)". Please, delete the comma and the space between "burnt areas" and ". . .".

The ellipsis used here at the end of a list of terms means "et cetera". That is the reason

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why a comma was added before the ellipsis (such as in p. 588, line 21, line 23; p.590, line 18, line 19, line 21; p.591, line 13).

- Page 605, line 28. Change "afore-mentioned" to "aforementioned".

OK, I will correct it.

- Figure 2. Line patterns in this figure are not very helpful for identifying data type. Adding colour to this graph will substantially improve the identification of the different lines/ vectors.

This is an excellent idea. I have just consulted with the Editorial Support Service and there is no problem to edit a Figure in color.

- Figure 5. Why plants in the slope toe are labelled to be more competitive than plants in the slope? Plant species adapted to growth in sloped environments can be as competitive (or even more) for the use of water as plants adapted to growth in flat areas. However, the type of microsite can make a big difference in the use of resources: slope toes are generally very densely vegetated which subject these areas to a very high competition for resources (this point is correctly described in the text: page 598, lines 23-26).

I agree with your comment. As suggested by another referee, I will remove the terms “Low competitive” and “High competitive” from Figure 5A, because the concept of competitiveness is not an essential topic in my manuscript.

Interactive comment on SOIL Discuss., 1, 585, 2014.