

## ***Interactive comment on “Graffiti for science – Erosion painting reveals spatially variable erosivity of sediment-laden flows” by A. R. Beer et al.***

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“Graffiti for science” by Beer et al. presents an interesting proof-of-concept study that nicely illustrates the utility of using paint to indicate spatial patterns of surface erosion or sediment transport. I recommend publication with minor revisions to clarify just a few points. While I think the idea of using paint to constrain erosion patterns is fairly straightforward, the case study and field site is sufficiently novel and detailed to warrant publication. I believe this work will inspire others to use the technique.

Page 1 line 9: I appreciate that the authors do not oversell their technique, but in some ways my initial reaction to this line is that “qualitative” sells their method a little short. True that they cannot quantitatively measure erosion rates with the technique (or at

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least not with much accuracy), but using paint can quantitatively give spatial pattern of surface impacts. I can live with calling the method qualitative, but would encourage selling it as potentially a way to quantify spatial patterns. Same comment would apply to some points in the discussion.

Pg1line14: Not sure its worth separating out hydraulic shear detachment and plucking as separate processes. I could be wrong (didn't go back and check), but I don't remember any of the papers they reference for this point emphasizing hydraulic shear detachment in rock separate from plucking.

Pg1 line 24: The authors could consider referencing Johnson, Whipple, Sklar, GSA Bulletin 2010, “Contrasting bedrock incision rates from snowmelt and flash floods in the Henry Mountains, Utah”, which monitored bedrock incision in a natural channel (albeit in a modified reach), and focused on spatial patterns of incision in relation to sediment transport and accumulation as well as hydrographs.

Pg2 line 14: Maybe a little more detail on the paint. Was it housepaint? Latex based? Oil based? There are a great many types of paint with different properties that could be described as environmentally safe paint for outdoor use.

Pg3 line10: of 42 rather than 42 of?

Pg3line11: say a bit more about the data gap— which data set? Flow depths? Was it a sensor failure? Does the power company not have records of releases?

Pg3 line27: describe “vertical erosion on planar surfaces” a bit more; I don't think this is a specific enough description. Lots of surfaces oriented differently relative to flow are probably planar but don't have vertical erosion in this study.

Pg4 lines19-20: I realize references are given for erosion and erosivity, but I think it worth clarifying a bit more what is meant here. i.e., say something like the amount (length) of vertical erosion.

Pg4 line 23: Probably don't need to point out that permission could be needed to do

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graffiti. . .

Pg5 line9-17: I think briefly mention this explanation in the caption of figure2, and/or in the text where the figure is referenced, or at least say something like "relation between the change detection and painted areas is further explained in the discussion section". When I looked at figure 2 I tried to figure out what was going on with the patterns of erosion on the surface, and was perplexed until getting to this paragraph.

Pg5 lines 24-27: So do the authors think these issues—air bubbles in the paint, and painting on wet rock surfaces—affected their measurements? It's a little unclear how much these factors may have influenced their results. Is it conjecture, or based on hindsight from their results?

Pg7 lines 9-12: I'm not sure how well this would necessarily work, because how well paint adheres to a surface is generally pretty sensitive to the surface characteristics. I would think that different rock types or compositions would typically have different "paintabilities". Its kind of hard to get paint to stick well to quartz, for example. In any case this effect should be acknowledged.

Figure 2: In 2f and 2g, does "mm/2a" mean millimeters per two years? So is this not the amount of erosion measured between 4/6/2012 and 8/10/2013 (1 year and 4 months or so), but that amount of erosion, normalized up to two years? Please clarify what the 2 years means in this case.

I realize the Lidar-based change detection measurements are not the main focus of the present work, but on the figure or in the main text I think some mention of uncertainty of these measurements is needed. Both uncertainty of the individual scans themselves, and also uncertainty in the differences.

In 2e, it seems confusing to have the box and whisker plot rectangles not be centered over the time intervals that I think they're supposed to represent.

In figure 5c, I presume the dark vertical lines on either side of the white painted area is

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the rock being wet? Clarify in caption what the dark areas are. Conceivably could be intrusions or something.

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Interactive comment on Earth Surf. Dynam. Discuss., doi:10.5194/esurf-2016-27, 2016.

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