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Interactive comment on "Patterns of landscape form in the upper Rhône basin, Central Swiss Alps, predominantly show lithologic controls despite multiple glaciations and variations in rock uplift rates" *by* L. A. Stutenbecker et al.

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The manuscript "Patterns of landscape form in the upper Rhone Basin..." by Stutenbecker et al. uses the clear lithologic variability of the central Swiss Alps to investigate the extent to which lithology, rather than tectonics or climate, governs landscape form. The authors have certainly identified an issue which has received comparatively little attention, and the manuscript reveals notable differences in landscape morphology between the various zones of the central Swiss Alps. Unfortunately the overriding sense is that the manuscript does not yet make a compelling case: the presentation

of the methods is uneven, the results aren't presented in sufficient detail to convince the reader, the statistics aren't analysed robustly, and there seem to be a number of instances where the authors could have approached the problem differently for similar or better effect.

Some detailed comments:

- Section 2.1. Given the range of variables in play across the study area (e.g., the range in base level for each of the catchments, set by the Rhone), could the authors make more of directly comparing drainage basins entering the Rhone from opposite sides at similar points along the river?

- Section 3.1. The authors make frequent reference to the "annual 90% of total daily precipitation", yet I never felt confident that I understood what this statistic meant (and how it related to the more familiar 90th percentile). Please could the authors explain with greater clarity?

- Section 3.2. The section on river longitudinal profile methods is very brief. Yes, numerous authors have used similar methods, but the authors should still give a clear account of the methods they're applied here (which links to the comment below, where alternative methods have been selected rather than longitudinal profile analysis, and to comments about the results section).

- Section 3.3. The account of the hypsometric curve could be clearer, and also doesn't tell the whole story of how hypsometry might be influenced by glacial modification. River-bed hypsometry is given the briefest of mentions. Is this a technique that has been used widely elsewhere? To me it seems likely to tell a story similar to stream gradient, yet with significantly less resolution, so why introduce this new hypsometry approach? It seems confusing to be using hypsometry for both drainage basins overall, and just along the thalweg of the stream, and also to eschew established longitudinal profile analysis here

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- Section 3.4. I found it unclear what tests the authors were proposing to undertake based on the hillslope gradients.

- Section 3.5. How robust are measurements of Vfw? Is there any subjectivity here?

- Section 4.1. Rather confusing comment that spatial precipitation gradients are low, yet precipitation varies from <500 mm/yr to >2,500 mm/yr. See comment above on "annual 90%".

- Section 4.2. "Oversteepened head scarps" are one of the features omitted from the longitudinal profile methods (see above). Please outline in the methods the basis of this approach. Also, I couldn't find a clear illustration of the three groups of river channels; Figure 7 is not presented using this framework, so doesn't match the text here. If the authors are going to argue that each of their three geologic domains corresponds more or less uniquely to a different longitudinal profile form, this case needs to be much more compelling. If Figure 7 is filled out with more longitudinal profiles, will they really disperse into three distinct groups?

- Section 4.3. Given the broad overall range of hypsometric integrals, is there really a statistically significant distinction between the three litho-tectonic units?

- Section 4.5. What is meant by "have usually"?

- Figure 5. Vfw as labelled doesn't appear to be a specific, readily repeatable measure. How do you know exactly where this is? (See comment above)

- Figure 7. Information about relief/elevation and gradient has been lost when longitudinal profiles are plotted normalised like this. Is this a problem? Also, no mention of groups 1, 2 and 3 here (see comment above).

- Figure 8. As discussed above, more detail on the hypsometry along the river bed would be good. Given the impressive resolution of the topographic data, is the river bed always 1 pixel wide? What's the upstream end of the river bed? What differences separate this analysis from longitudinal profile analysis (and to what extent is this an

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improvement)?

- Figure 9. Raises the question of how good the topographic data are in this challenging terrain...

- Figure 14. Is the mean HI the mean of the HI values from the individual basins, or the HI of all of the topography within a litho-tectonic unit? Also the torrential catchments labelled are only considered very briefly in the text – how important are they?

- Figure 16. More detail and justification on the locations of the cross sections, please.

There is no doubt that there is much to be gained with a careful topographic analysis of the central Swiss Alps. As such, I hope these comments help to improve a potentially interesting manuscript.

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Interactive comment on Earth Surf. Dynam. Discuss., 3, 1061, 2015.