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Interactive comment on "Coupling slope-area analysis, integral approach and statistic tests to steady state bedrock river profile analysis" *by* Yizhou Wang et al.

Anonymous Referee #2

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This contribution compares and combines two approaches for analyzing steady state bedrock channels, the slope-area and integral methods. It uses a well-studied set of streams in tectonically active northern California as its test case. The main finding is that the integral approach yields better-constrained values of channel concavity and steepness parameters. The slope-area method is useful to identify scaling breaks, which are then used as limits over which to apply the integral method. Given the popularity of longitudinal profile analysis in tectonic geomorphology, this kind of methods comparison has value. I have several suggestions for improving the manuscript.

1. The MTJ site is well studied, but has the disadvantage of including only short (<10 km long; <20 km2 area) streams. Choosing a site with longer, larger rivers (and there-

fore more robust scaling between slope or chi and area) would have some merit, given the statistical focus of the study. Longer streams would likely also show clearer downstream transitions between colluvial, bedrock and alluvial conditions. Some of the limitations of the MTJ study area for slope-area analysis where discussed by Wobus et al. (2006), but this study does not make much reference to those findings.

2. The authors use 1 arc-second SRTM DEM, which has a very coarse resolution compared with the 1/3 arc-second DEM available from the USGS (Wobus et al., 2006). Why was the coarse dataset used? Also, how were the profile smoothing parameters chosen (e.g., Figure 3 caption)?

3. In the slope-area method of the uncertainty in steepness partially comes from the uncertainty in concavity. Different concavities result in very different steepnesses; this is the reason that researchers use a reference concavity when comparing channels. The authors do not present an uncertainty on the concavity values found via the integral approach; this may explain the extremely low uncertainties on the steepness values.

4. As others have done in past studies, the authors choose the part of the stream in which to conduct the analysis (the bedrock channels) based on scaling breaks in the slope-area data (Figures 3a and 4a). In the ideal case, these transitions would be mapped in the field, although in practice they are likely gradual and difficult to identify on the ground. Why do the authors believe that the scaling breaks identified in slope-area data are more geomorphically meaningful than those seen in the integral analysis (e.g., Figure 4 analysis; p. 4-5)? I suspect that the authors are assigning too much geomorphic meaning to fairly subtle scaling breaks seen in the slope-area data.

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