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Interactive comment

Interactive comment on "Mass balance, grade, and adjustment timescales in bedrock channels" *by* Jens Martin Turowski

Anonymous Referee #1

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In linear stability analysis, "unstable" means that the initial small bar height grows (i.e., bars can form). In Nelson and Seminara (2012), λ is the wavenumber (=2πB/L, L is the wavelength). Therefore, Fig.3 shows that long bars are unstable and can form, or short bars are stable and can not form. Fig. 2 shows that growth rate of long bars increases with decreasing sediment supply. This imply that long bars are more likely to form when the alluvial cover is low. In your assumption (eq. 23), bar wavelength decreases with decreasing alluvial cover. You also stated that "gravel bars increase their length as cover increases" in page 15 line 6. These are in contradiction to Nelson and Sminara (2012).

In numerical analysis (Inoue et al., 2016), the thickness of gravel bars decreases with decreasing the sediment supply (Figs. 5 and 11). The decrease in bar height weak-

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ens the flow meander and can increase the bar wavelength. In Figures 11 and 13 of Chatanantavet and Parker (2018), the bar width increases as the alluvial cover increases, but the wavelength does not increase (almost constant). Both results do not support your assumption.

You may be confusing the length of an individual bar patch with the length between two bar patches (i.e., wavelength shown in Fig. 2 in your paper). Although the bar patch length has a positive correlation with both the bar width and the alluvial cover, the wavelength has no positive correlation (negative in numerical analysis, constant in experiment). I think γ depends on the bar wavelength or bar height, and decreases as alluvial cover decreases.

I encourage you to reconsider your assumption and model.

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