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Earth Surface Dynamics Discussions

# *Interactive comment on* "Geomorphic signatures of the transient fluvial response to tilting" *by* Helen W. Beeson and Scott W. McCoy

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I thank the authors for their response to my comments, and it is encouraging that we have found common ground on the issue of the antiquity of the canyons. However, the key point that I was trying to convey regarding the age of the canyons has to do with the authors' incision analysis and its underlying assumption. Fortunately, the authors have offered their analysis of the South Fork American River, which will be helpful to clarify my point. On the first figure, I show the mapped location of Eocene-Oligocene gravels within the canyon of the South Fork American River (I've visited this site to confirm their presence). These gravels are ∼250 m below the volcanic rocks that the authors are using to calculate recent bedrock incision depths. I've plotted, on their figure, the approximate position of this deposit. The assumption underlying the analysis shown in



the inset plot is that the difference in elevation between the lowest volcanic rocks and the modern river bed is a measure of recent incision. However, the presence of the Eocene-Oligocene gravels below the volcanic rocks refutes this assumption. Indeed, the fact that these ancient gravels underlie the volcanic deposits was well known by miners during the Gold Rush; they tunneled down through the volcanic deposits to get at the gold in the underlying Eocene-Oligocene gravels. I've included a map showing the gravels (Ng) below the andesitic volcanic deposits (Na) near Placerville (this is from a 1:125000 map; these small deposits are not shown on the 1:250000 map). This map shows that there are Eocene-Oligocene gravels below the volcanic deposits at the location where the authors have added a black arrow on their profile of the river. Thus, in order for their S Fk American River figure to depict the actual distribution of the Cenozoic deposits, they would need to include the Eocene-Oligocene gravels that underlie the volcanic deposits. Because these older and deeper deposits are not shown, this figure is missing critical information.

The present distribution of the remnant volcanic deposits is simply due to the fact that volcanic deposits that were once in the valley and along the steep valley walls have been eroded away; the last figure shows some small remnants of these volcanic rocks along the valley wall near Riverton on the South Fork. So, my point is that the distribution of the volcanic rocks does not define a pre-incision paleosurface and, therefore, cannot provide information on incision depths. The present distribution of the volcanic rocks is an artefact of hillslope erosion (ie. deposits on steep valley walls were eroded away). Finally, please note that the information about the Eocene-Oligocene deposits is presented in my 'in review' paper and, therefore, is embargoed and cannot be used elsewhere.

Finally, my GSAB paper showing that lithology has a first order control on channel steepness is now in press. I've attached the proofs as a supplement.

Please also note the supplement to this comment:

https://www.earth-surf-dynam-discuss.net/esurf-2019-24/esurf-2019-24-SC4-supplement.pdf

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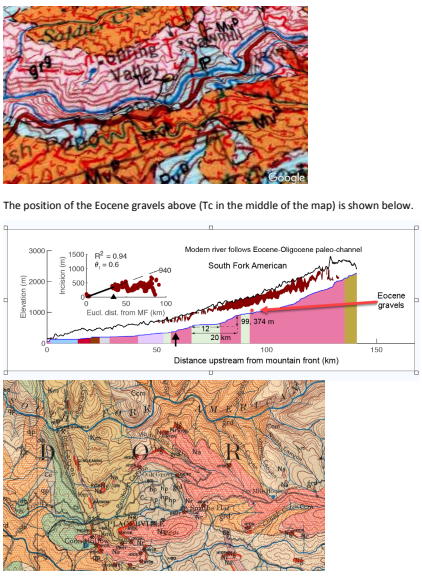


**Fig. 1.** S Fk AR 1

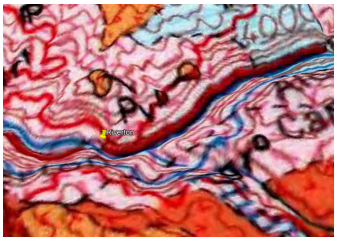

**Fig. 2.** S Fk AR 2