

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

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It appears, then, that the plots of incision are really plots of landscape relief.

Yes, our measure of incision is similar to that of relief, only our measure is closer to the relief of steep tributaries draining canyon walls in that it is measured in a 15 km wide swath centered along the mainstem river.

It should be reasonable to expect that relief increases gradually as one goes from the Central Valley into the range but that, because of rock strength limitations, relief reaches a maximum and then remains constant. Therefore, the pattern seen in the incision plots can be explained on the basis of how relief changes in a mountain range and there is no need to appeal to tilting.

We agree that, in a steady-state landscape or one that is strength limited, relief is likely to increase moving inward of the mountain front and be relatively uniform within the range. However, nowhere in the Sierra is relief uniform. In contrast, relief is variable both within and among basins. For example, in the American River, the South Fork reaches a maximum relief of 700 m in its upper reaches about 70 km from the mountain front, the Middle Fork reaches 700 m of relief not far from the outlet at about 40 km from the mountain front, and the North Fork reaches 1,100 m of relief again at 70 km from the mountain front. If one looks to southern Sierra the same rock types support relief of up to 2000 m. Furthermore, in steady-state landscapes, relief should be greater in more resistant rock. In contrast to this, some of the least incised reaches in the Sierra are those that flow through granodiorite, as illustrated in all forks of the American.

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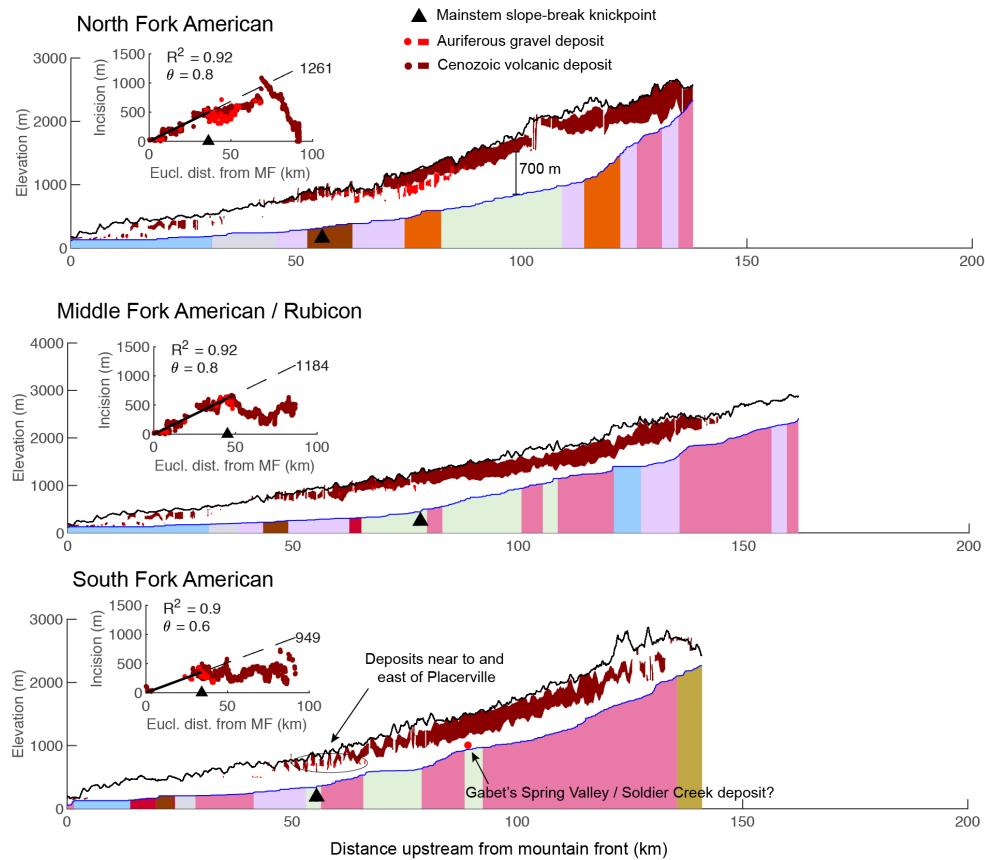


Fig. 1. American River longitudinal profiles with surface geology, Cenozoic volcanics and Eocene auriferous gravels. Insets show depth of canyon in basement below volcanics and gravels.

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