Earth **Surface**
Dynamics

Discussions

EGU

Interactive comment on "Spatial and temporal patterns of sediment storage and erosion following a wildfire and extreme flood" *by* Daniel J. Brogan et al.

Anonymous Referee #2

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General: This manuscript reports on quantitative changes in erosion & deposition along 50 –meter length channel sections of two stream networks that experienced wildfire and flooding in a mountainous region of Colorado. Using DEMs of difference calculations from 4 time intervals spanning a total of ∼3 years, they show that significant volume changes in the 50-meter valley segments from erosion or deposition were correlated to contributing area, channel width, burn severity, channel slope, and rainfall intensity. The value of the manuscript is two-fold, because they develop thoughtful methods for analyzing the spatial and temporal pattern of sediment storage from repeat DEM data (including a canopy interference correction), and their conclusions about the landscape and meteorological controls on valley response can be used to predict

downstream risks in fire-prone landscapes. This is a very powerful paper with a nice dataset and is pretty close to being ready for publication.

While the authors were transparent in how they approached the study, there are some aspects that could be clarified simply to help the reader follow the rich dataset and somewhat involved analytical approach. Here are some suggestions that may help the presentation of the work:

-How did the authors land on 50-meter channel sections? Clearly this is a balance of resolving power and obtaining analytical units with meaningful change, but a few lines explaining the rationale of this length scale would be helpful

-Skin Gulch and Hill Gulch received significantly different volumes and intensities of precipitation over the study period: the magnitude of this difference should be generalized perhaps in a table (a row or two could be tacked on to Table 1) with maximum 30-minute rainfall rates measured over the time period or something that generalizes the total rainfall or intensity difference that the watersheds had. I appreciate the images in Figure 3 that show precipitation data in grids but I'm still left unclear on the magnitude of differences between the watersheds with regards to precipitation.

-I'm interested in the relationship between fire intensity and erosion/deposition measured in the channel sections. Fire intensity appeared to be one of the more significant predictors of net volume change in the channel, yet I'm unclear as to how and over what scale Burn Severity was calculated.

Brogan et al. find here that %burned at moderate to high intensity may be a good predictor of erosion/deposition measured in the channel; these results are consistent with the recent findings of Abrahams et al. 2018 (DOI: 10.1002/esp.4348) showing that burn severity was the biggest predictor of hillslope erosion in Fourmile Canyon, central Colorado.

Minor Comments:

The paragraph structure in several parts of the paper is weak, especially on pages 10-14: lots of small (2-4 sentence) paragraphs starting with the same word or phrase. Combine some of these short paragraph fragments into larger paragraphs that flow into one another.

On Figures 8 and 9, the general shape of the canyons is given in the upper pane (A. longitudinal profile, slope, valley width, etc.)- which DEM sources was used for these initial data? Because so many DEMS are used here, just be clear about which one is used for various visuals.

Figure 12: the x-axis title should be "channel slope".