

Interactive comment on “Impact of grain size and rock composition on simulated rock weathering” by Yoni Israeli and Simon Emmanuel

Yoni Israeli and Simon Emmanuel

swemmanuel@gmail.com

Received and published: 11 March 2018

SC 1.1: The model that the authors present predicts that "as grain size increases, the weathering rate initially decreases" seems to contradict some of my observations in the Sierra Nevada (CA). The Sierras are a patchwork of different plutonic rocks and, oftentimes, the differential erosion between the fine-grained rocks and adjacent coarse-grained rocks is striking, with the latter seeming to resist weathering and erosion much better than the former. To be fair, these observations have not controlled for mineralogy.

AC 1.1: Thank you for your feedback. As you pointed out the coarse-grained plutonic rocks at the Sierra Nevada resist weathering and erosion much better than the fine-grained rocks. This is in fact what our simulations predict for part of the size range

Printer-friendly version

Discussion paper



that we explored (In the revised manuscript page 4 lines 22-32). In addition, our model shows that the impact of mineralogy on weathering rate is much larger than the impact of grain size (see figure 3a). It might be interesting to carry out a more quantitative comparison of the rocks mentioned in the Sierra Nevada.

SC 1.2: Have the authors found field examples that support their model's results? If not, what aspect of weathering might the model be missing?

AR 1.2: We have found some evidence for the dependence of weathering rate on grain size and this is discussed in the revised manuscript on page 5 lines 13-24. We entirely agree that future experiments and field-based work on a wider range of grain sizes are necessary (page 7 lines 26-27). We also discuss the limitations of our model on page 7 lines 20-25.

Interactive comment on Earth Surf. Dynam. Discuss., <https://doi.org/10.5194/esurf-2018-1>, 2018.

Printer-friendly version

Discussion paper

