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Reply on RC2

Valeria V. Martinez and Laura F. Serpa

Author comment on "Introduction to teaching science with three-dimensional images of dinosaur footprints from Cristo Rey, New Mexico" by Valeria V. Martinez and Laura F. Serpa, Geosci. Commun. Discuss., <https://doi.org/10.5194/gc-2021-15-AC2>, 2021

The referee correctly points out our motive in the paper is to point out the merits of using 3-D digital representations of geological features, in our case—dinosaur foot tracks—in k-12 and lower level university classes. We also point out that the 3-D digital data can be used to preserve non-renewal fossil information. We acknowledge that our data were not collected or processed in the most appropriate manner but that is one of the points that we are trying to make. It does not require much training to collect and process 3-D data for many applications. In fact, we are hoping we made the point that this is accessible to untrained school teachers and students at relatively early grade levels. That is one of the major strengths of the approach we are promoting. Students and teachers can explore the process independent of formal training and develop their own techniques to build interest in both the geologic topic and the methodology.

As a beginning graduate student in geology, Ms. Martinez went out and collected nearly 10,000 high resolution photographs after learning it was possible to make a 3-D representation of the site but with no other training in photogrammetry or data collection techniques. She taught herself how to process the data and this resulted in her identifying a fairly large number of new footprints that well-educated paleontologists had missed. She subsequently experimented with a few methods to enhance the data and has learned more about photogrammetry since that time. This is the sort of educational experience we want students to have when they take their first geology class. We would encourage the use of inexpensive smart phone, cameras, and drones to collect data and free or inexpensive software for processing in those beginning classes rather than expensive options that are based on more advanced understanding of the structure for motion photogrammetry methods because it is the **geology** we want students to learn at that point, not the methodology. We do recognize the methodology may also interest students in STEM careers outside of geology and we would be happy with that outcome but it is not the intent of this paper.

The reviewer recognizes the need for careful data collection and processing with the best available technology when the goal is to provide accurate information. We are using Cristo Rey as a test site for several projects and have collected lidar data and completed at least two drone flights over the area in addition to the data discussed in this paper. Those additional data will be discussed in a subsequent paper. It should be recognized that the original photos do provide the only record of the fossil site at the time they were

collected and they provide very high-quality information that will be preserved for future studies despite flaws in the processing and data collection. Our paper is intended to make the point that 3-D models of geology can improve interest, knowledge, and further educational pursuit of geologic studies through exploration of 3-D images from a number of different sources.