Response to Reviewer 1

The authors would first like to thank the reviewer for their comments and suggestions.

1. **The authors propose the "Minimum bounding sphere" fitting model (Section 2.2.4). Why the results of the fitting model are not proposed in Figure 13?**

The minimum bounding sphere approach was not included in Figure 13 as it would result in every block plotting at the top of the ternary diagram (see Figure below). In addition, every single block would be classified as cubic. In the minimum bounding sphere approach, all of the calculated dimensions are equal (i.e. A = B = C). However, for completeness, the plot could be included, if required.

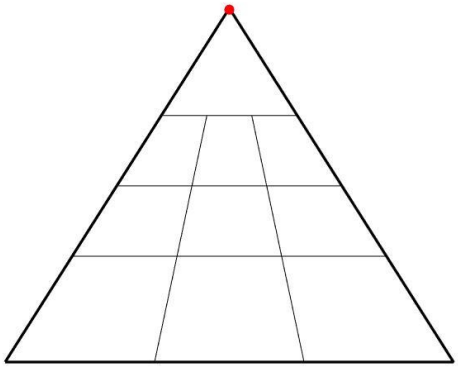

Figure 1 – Sneed and Folk diagram presenting the results of the minimum bounding sphere approach for the 50 rockfall objects.

2. **RFSHAPZ is one of the novel fitting methods. What does "RFSHAPZ" means? Is the method derived from other approaches? Why Fourier series, Gaussian and sum of sines fits? It there a particular reason? Which is the size of the point cloud the authors refer to?**

The name RFSHAPZ is used to reflect rockfall (RF) and the derived shapes (SHAPZ). To the authors' current knowledge, the method is not derived from other approaches. Any curve fitting method can be easily implemented in the code which we have developed. For this study, we chose to implement the Fourier, Gaussian and Sum of Sines approaches, to examine the effect of the variation in curve fitting approach each provides. Both the Sum of Sines and Fourier approaches try to fit a curve to a periodic signal. The main difference is that the Sum of Sines equation includes the phase constant and does not include a constant (intercept) term as in the Fourier approach. The Gaussian approach attempts to fit peaks in the data series. The text can be modified to add further clarification.

The authors are not entirely sure what is meant by "…the size of the point cloud the authors refer to?". All of the synthetic blocks were based on sculpting a 1 m^3 cubic mesh into the shapes presented in the Sneed and Folk diagram.

3. **RFCYLIN is the other novel fitting method. Similarly, what does "RFCYLIN" means?**

The name is to reflect rockfall (RF) and the use of cylinders (CYLIN) in calculating the dimensions of the rockfall objects. The text will be modified to reflect this description.

4. **What differs manual methods 1 and 2?**

Manual 1 and 2 reflects two different people who manually measured the orientation and dimension of the mutually orthogonal dimensions of the dataset of 50 rockfall blocks from the White Canyon. In Line 30 on Page 12, we state that two sets of independent manual measurements were made. The authors will add further clarification to outline what was measured.

5. **The authors should compare the results of automatized methods to the data obtained through a non-automatized method, say, the manual approach which is considered as "true". This will help in defining the best approach.**

The authors are not sure which cases the reviewer is referring to. In the comparison with the synthetic block dataset, all dimensions calculated with each fitting method were compared to manual measurements of each of the blocks. This comparison formed the basis of the error analysis which was conducted.

In the case of the 50 rockfall blocks from the White Canyon, given the variation in the both sets of manual measurements (Figure 13), the authors were hesitant to define one of the measurements as “true” to compare against. This is further illustrated with the example of the single block in Figure 14. Five different independent manual measurements of the dimensions were conducted for the rockfall object. All of the manual measurements indicated that the rockfall object is being classified as very bladed. The adjusted bounding box, least-squares ellipsoid, RFSHAPZ fits and the RFCYLIN approach all resulted in the rockfall object being classified as very elongate. The bounding box classified the rockfall object as either compact-platy to platy. The spherical fit, as always, classified the rockfall object as compact. This is a direct result of the fact that all calculated dimensions are equal when using the spherical fit. This example hopefully illustrates that automated methods should not be blindly used and the method used should consider the expected block shape given the rockmass structure.

The second reviewer addressed that an addition to the discussion on the methods regarding computation and accuracy should be added. The authors will add and provide recommendations on implementing the different methods.