The authors appreciate the detailed insights and suggestions by Dr. Dozier. We have considered all comments and have responded below.

Jeff Dozier, reviewer #1

The manuscript describes customized instruments for experimentally depositing BC, BrC, and mineral dust on snow. The manuscript includes some cursory analysis of the results, based on measurements of the spectral HCRF (hemispherical-conical reflectance factor). However, given the wealth of the data gathered, this analysis could be more robust and help the reader appreciate the importance of the work.

Specifically:

The y-axes of Figures 4-7 are labeled "directional reflectance." The caption should include the geometry, solar zenith angle, observation angle and azimuth with respect to the sun.

- The figures have been updated to reflect this information. Additionally, azimuth has been added to the table of information for each measurement (Table 1). The observation angle of the field spectrometer is nadir-looking for each measurement. This information has been added to the manuscript (p. 4, l. 33).

Although the "H" in HCRF designates "hemispherical," most of the illumination when skies are clear is in the direction from the sun. The reflectance measurements (in the Supplement) should be sufficient to estimate the imaginary part of the refractive index. Skiles et al. (2016) have published a method to retrieve the imaginary part of the complex index of refraction from measurements of reflectance. It would be interesting to apply their method to these data. Moreover, Skiles' method could be compared to the published measurements for hematite (Scanza et al., 2015).

- While the authors agree that methods outlined in Skiles et al. (2016) are useful, they are outside of the scope of this manuscript, which describes a deposition apparatus and method. However, it is a great example of a potential application of the apparatus described here and we therefore mention it in our manuscript as such (p. 6, l. 35-37).

Knowledge of the bulk optical properties of the absorbing particulates would be needed to model snow reflectance. Also important would be the size distribution, or at least the effective spherical radius, along with the particulate concentration in the upper snowpack. The shape of the spectral reflectance between the blue and red wavelengths depends partly on the size of the contaminating particles.

- We have updated the manuscript to include the particle size distributions for the three aerosols used in this particular study by placing this information in the supplemental data section. However, these size distribution data have been produced in laboratory settings and not in situ. For BrC and BC, the size distributions in the updated manuscript represent measurements made under nearly identical combustion conditions in laboratory settings during previous, related studies. For the hematite used in this study, we used a pure, artificially manufactured powder, for which a size distribution was measured by the manufacturer. For each of the three number size distributions presented, we supply the fractional lognormal distribution and the corresponding geometric mean diameter and geometric standard deviation.

- Future versions of the apparatus described in this manuscript could add ancillary characterization (e.g., size distribution) of the aerosols during deposition, and we have included this information in the updated manuscript (p. 6, l. 7-10).

For the historical context on the experimental approach, the manuscript should address the work of Conway et al. (1996). Specifically, they examined the fate of deposited black carbon and volcanic ash, either remaining near the surface or washed downward during melt depending on size and composition. Sterle et al. (2013) also examined the fate of deposited BC, an important consideration in assessing the effect of absorbing aerosols on hydrology and climate.

- The work presented in the manuscript represents depositions of aerosol that are in the topmost layer(s) of snow; an investigation to whether the aerosol migrate further into the snowpack is not included here. For each of the three aerosols used in the study, a new study site was chosen upwind of the last, as to not contaminate reflection measurements. Aerosols found in the topmost layer, as pointed out by the reviewer, may represent 1) aerosols that have been very recently deposited, such as a recent dust storm, or 2) aerosols that remain in the uppermost layer of snow during the ablation season when water soluble species are washed out with snowmelt. We thank the reviewer for pointing out yet another application of this apparatus and have added this to our section on potential applications in our manuscript (p. 6, l. 20-27).

A few nits:

- **"Dozier" not "Dozer" page 1, line 23.**
    - Fixed. Our apologies, Dr. Dozier.
- **"Sierra Nevada" means snowy mountain range, so eliminate "Mountains" on page 2, line 43.**
    - Fixed.
- **How about "Inside the" instead of "Inside of the" on page 3, line 9?**
    - Fixed.
- **In the Acknowledgments, you should include Ned Bair, who helped you a lot.**
    - Acknowledged.