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Interactive comment on "Characterization of long-range transported Saharan dust at the Caribbean by dual-wavelength depolarization Raman lidar measurements" *by* S. Groß et al.

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The task of describing particles optical properties after long range transport is a difficult task, as already quoted in the literature. The work presented by Gross et al. intends to reproduce such work concerning Sahara dust. However such event in the SALTRACE region of the Earth has never been reported before and it is very interesting to report how the optical properties of atmospheric aerosol are changing after crossing both the African continent and the Ocean. Because the methodology used to analyze with lidar device the change in aerosol optical properties after long-range transport is not new, it will be interesting for the readers that the authors quote others methodologies

applied for such analysis as for example Sugimoto et al., AO 2006, Shimizu et al. JGR 2004 , David et al, ACP 2013. I have some concerns with this manuscript. 1. The title does not refer the paper content. Gross et al. presented an analysis of a few cases, which is not a characterization that relies on the generalization of useful and well accepted physical, chemical or geophysical characteristics. Moreover, the study only relies on aerosol optical properties and not on aerosol chemical properties. 2. Why is the individual profile of the aerosols depolarization not shown in the PBL for the volume depolarization? It will strongly help the reader to improve the comprehension on how this parameter behaves in the atmosphere. 3. In the introduction, why is Earthcare program here quoted? It has nothing to do with the proposed analysis of the field campaign. 4. What do we learn that the PLDR, presented in figure 14 remains constant within the error bars? Same question with figure 15 on the Lidar ratio? 5. My main concern is relative to figure 16 and the way to use intensive optical parameters (Lidar ratio and PLDR) to classify aerosol. It is a first tentative but it should not be considered as a general method. This because the sensitivity and the accuracy of the measurements are not high enough to realize this classification and only specific cases are shown on this 2D plot. The atmospheric content shows many examples of external mixed aerosol with the same PLDR and Lidar ratio values and different kind of particles with different microphysical properties. On this topic, can the authors discuss on what does "Pure Dust" mean and this quantitatively and not qualitatively.

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