Anonymous Referee #1 Comments:

The manuscript has improved a lot since the first submission.
There are still three points to consider:
1.) A HWP used to calibrate or to correct for alpha works only, if the depolarization measurement is performed at a single wavelength. A HWP for 532 would be a quarter wave plate for 1064 and introduce circular (or elliptical) polarization. Dual-wavelength polarization lidars need a HWP for each wavelength to perform a calibration.
2.) The change from 0 (zero) to O like Optics has been done everywhere except of Equation (17). Please change it.
3.) p16, l26-27 You mix particle and volume linear depolarization ratio. The first part of the sentence describes the particle linear depolarization ratio (which is around 0.22, see Fig. 9), whereas the second part of the sentence describes the volume depolarization ratio, which is close to the molecular depolarization ratio.

First of all I would like to thank Anonymous Referee #1 for time dedicated to provide the comments and suggestions for the manuscript. We followed all recommendations and we hope that the updated version is satisfactory for publication.

Comment 1: A HWP used to calibrate or to correct for alpha works only, if the depolarization measurement is performed at a single wavelength. A HWP for 532 would be a quarter wave plate for 1064 and introduce circular (or elliptical) polarization. Dual-wavelength polarization lidars need a HWP for each wavelength to perform a calibration.

Answer: The text was updated according to the suggestions.

3.2.1 $\Delta 90^{\circ}$ mechanical rotation calibrator and HWP calibrator

The same type of calibrator can be also implemented by using a stepping motor rotation mount or a HWP mount which is placed in a holder with fixed and accurate positions at 0 and p/m 45 (or multiple positions) (Fig 3.b). Dual-wavelength polarization lidars need a HWP for each wavelength to perform the calibration (a HWP for 532 would be a quarter wave plate for 1064 and introduce circular or elliptical polarization).

3.4.2 Correction for the α parameter

The experimental correction of (Y) can be performed either by rotating the PBS in the WSU (without or together with the receiving optics) or by rotating the plane of polarization of the collected light using a HWP placed in front of the PBS or in front of the receiving optics (in the case of one wavelength lidar instruments or systems with separate optics for the depolarization channels since a HWP used to correct for alpha works only if the depolarization measurement is performed at a single wavelength).

Comment 2: The change from 0 (zero) to O like Optics has been done everywhere except of Equation (17). Please change it.

Answer: The equation was updated. Thank you for pointing this error.

Comment 3: You mix particle and volume linear depolarization ratio. The first part of the sentence describes the particle linear depolarization ratio (which is around 0.22, see Fig. 9), whereas the second part of the sentence describes the volume depolarization ratio, which is close to the molecular depolarization ratio.

Answer: Thank you for pointing this mistake. We had updated the text accordingly:

Updated text:

Measurements performed using the Granada lidar system (Mulhacen) in July 2012 show the presence of a distinct layer between 2.5 and 5 km (Fig 9.a-c). The volume linear depolarization ratio shows high values in the aerosol layer (0.18) and levels close to the molecular depolarization in the low aerosol height ranges. The particle depolarization ratio shows values reaching 0.22 in the layer. The back trajectories model indicates that the corresponding air mass originates in Northern Sahara