

Interactive comment on “Ozone profiles by DIAL at Maïdo Observatory (Reunion Island) Part 1. Tropospheric ozone lidar: system description, performances evaluation and comparison with ancillary data” by Valentin Duflot et al.

Anonymous Referee #1

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The paper describes one of the instruments now making regular measurements of tropospheric ozone at a high-altitude, sub-tropical Southern Hemisphere observatory on Reunion Island in the Southern Indian Ocean. The location of the observatory is in a region of the globe that is under-represented in regular atmospheric observations. The paper is written to demonstrate the quality of the measurements and, as such, there importance in adding to the understanding of global ozone concentrations. The paper provides a chronology of measurements on the island and describes the advantages of the mountain site over the previous sea level site. It is well written and deserving of publication.

Page 2. Several sites are discussed here, Gillot, near the coast, where sondes are launched; the Université de la Réunion, where a lidar was first installed, and the Maido site. It would be helpful to have a small Table here with the Lat., Lon., Altitude and distances between the sites. It puts the information in a single location. In the related Figure 1, the color scheme makes some of the print difficult to read – this may be exacerbated in the printing process.

Pages 3 and 5. In the discussion of the Raman cell it is not clear if the laser beam is focused into the cell or not. My reading of this (and Figure 5) would lead me to believe that it is not, but this should be stated if it is the case. Also some information as to why such a choice was made. What is the efficiency of the conversion into each of the Stokes lines? D2 pressure in the cell? Here too, a small table with the input and output parameters of the Raman cells for each of the two systems is helpful in understanding any differences noted in the measurements.

Page 4, Line 27: “decrease” should be “decreases”

Page 5, Line 14: It states that a Hamamatsu 9980-110 PMT is used. I could not find a datasheet for a -110 variant of the R9980. Should this be an R9880-110? The quantum efficiency of the R9980 is quite low below 300 nm, whereas the R9880 is significantly higher. If this is a 9880-110 is it used at the 289 wavelength? This tube is susceptible to signal induced noise in the UV. The R7400 has much better characteristics than the 9880-110 at these wavelengths, but it has less gain.

Page 6, Line 26: should this end “with an uncertainty of 5%.”?

Page 7, Line 19: Mount should be Observatory

Page 7, Line 23: Delete “Laser and Raman Cell”, insert “at the transmitted wavelengths,”

Figures 6,7 – Is the fact that there are increasing vertical resolutions as the integration time increases (Figure 6), responsible for the higher uncertainty for the one hour

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integration, compared with the 20 minute integration? How are the vertical resolutions determined? Is a maximum desired uncertainty used to select the vertical resolution?

Figure 8: There is a discontinuity seen at 14 km in both panels. Is this also due to some measurements not reaching beyond this altitude? Was this sonde or lidar related? Figure 9 shows remnants of the same discontinuity.

Page 8, Lines 24 – 28: Was there a reason for using the non-standard solutions in the sondes at Gillot? If so this should be stated.

Page 9, Line 5: Insert “The” before “valid range”.

Page 9, Line 7: delete “until”, insert “near”

Page 9, 14-19. If a Morgane campaign curtain plot of the lidar retrieved aerosol scattering ratio is available, this would be a good place to insert that to go along with the discussion of the volcanic plume. At what altitude were the stratospheric intrusions located. Is this enhanced aerosol visible in the daily ASR plots? This should show up in the figure mentioned here.

Page 10, Line 19: “co-located” should be changed to “compared”

Page 10, Line 23: “set a comparable” should be “set of comparable”

Page 12, Line 9: delete “to a NDACC labellisation” insert “for inclusion within NDACC”

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