Formal Review for:

Ozone profiles by DIAL at Maïdo Observatory (Reunion Island) Part 1. Tropospheric ozone lidar: system description, performances evaluation and comparison with ancillary data.

Scientific Summary: It's critically clear that the Maïdo Observatory is uniquely located to investigate constituent (e.g. ozone) variability at various levels within the atmosphere. A new/improved tropospheric ozone lidar is described at this site, in conjunction with a long-term data set of the previous version of the tropospheric ozone lidar. The manuscript is well written and logical and I recommend it for publication after some minor revisions suggested below.

General Comments:

It should be reiterated throughout the text which lidar system (old vs. new) is being described. Although the subscript "_UR" is used to denote the old system, I still found several instances confusing as to which lidar data was presented.

Figure 1: Recommend adding ECC, LIO3T, and LIO3t_UR to the map after site location. Also altitude site altitude would be helpful.

Figure 2: The VR and uncertainty are effectively presented in Figure 6/7 for the new instrument. The information in Figure 2 could be simply stated in the text at various altitudes or added as a component to complement figure 6/7. Or conversely, bring in the new lidar VR/Uncertainty budget here as well to simultaneously show the absolute uncertainty as well as improvement to the system.

Figure 3: It would be useful to add the occurrences (with a different color) for the new system. It is stated later in the text and elaborated in Figure 14, but may make more sense to have towards the beginning to complement the old lidar system. Conversely, you could move all of the lidar/ECC discussion to the end (where Figure 14 currently exists).

Section 2.2 and Figure 4: Does the missing data (e.g. December above 10 km) in bottom panel Figure 4 correspond to lack of lidar coverage? Or the uncertainty of the measurement was larger than a certain threshold? It would be helpful to recreate the occurrences in Figure 3 as the same layout as Figure 4 but monthly instead of yearly. Generally the ECC shows higher ozone between 10-16 kms, regardless of time of year. Is this a known issue? Relevant to sonde reprocessing? and more importantly, are these differences within the uncertainty of the lidar measurement (with a set vertical resolution/temporal averaging)? A difference plot may highlight potential differences. Is the ECC climatology only from Gillot or combination of Gillot/Maido?

Figure 6: Are the differences observed between 6-8 km geophysical or based on the algorithm/processing? Is there a sounding for this observational period to compare with? I would assume the SNR to be largest from 6-8 kms and therefore the temporal averaging would generate less obvious differences. Is it possible there is a partial overlap or saturation correction that needs to be addressed?

L25 – Remove "5The"

Figure 7: Are these uncertainties explicitly based on the retrievals performed in Figure 7 or are these average uncertainties over many nights. It seems odd that at 8 kms, there is a greater uncertainty from a 1 hr measurement than at 20 mins. Please clarify.

P8L23 – Is Witte et al., still in prep or under review?

P9L9 – Should be McGee, not MacGee

Figure 8/9: There appears to be the largest difference between the lidar and ECC below 8 kms. Is this systematic for all 8 launches? Is this also apparent in the original lidar data? Were these sondes launched from Gillot or Maido? It is useful to have a profile of the number of comparisons to make discontinuities apparent. If the potentially contaminated (e.g from aerosols) data were removed would the results improve?

Eq 6, what is reference for the 200 in the numerator? Is this based on sample size?

Figure 11: What's driving the difference in FTIR uncertainty from the beginning of the time series to the end? Is this the full uncertainty or partial uncertainty? Bottom panel y-label can just be D.

Further suggestion #1: Instead of the cross histogram in figure 15, show a complete time series of all the data in the archive used to make this plot. Showing the reader the entire data set instead of the histogram will emphasize the observed variability in O3.

Further suggestion #2: One very unique piece of information at the lidar site location is the ability to observe this enhanced O3 related to biomass burning. In the section describing the IASA comparisons, it may be helpful to show a world map of one day (or gridded month) where Maido is directly in the center of a CO transport plume, therefore highlighting the location and detection capabilities of the instruments.