

Ryan et al., (2025), Submitted to ACP:

Measurement report: Aerosol vertical profiling over the Southern Great Barrier Reef using lidar and MAX-DOAS measurements

Responses to the Editor, following addressing Reviewer Comments.

Editor comments in black text - *Author responses in italic blue text*

We thank the reviewer for their support of our manuscript, pending fixing the minor revisions requested. We have addressed the comments, with the exception of struggling to know how to address the formatting issues related to parentheses alignment. Will it be possible to submit the manuscript as a Word document for copy editing, rather than as a PDF? The equations, subscripts and parentheses alignment look good in Word.

- 1) Please remove the period from the title. - *fixed*
- 2) Abstract: RAPSODI is not defined. - *fixed*
- 3) Line 85: the time of experiments is January to March, 2023. In the abstract the time is from February to April, 2023. Please clarify. - *Clarified in the methods at lines 85-86*
- 4) Last paragraph of the introduction: Please reformulate the paragraph in a form that provides the aim of this paper. At least the first sentence needs to be rephrased. - *paper aims reformulated in lines 75-79.*
- 5) Line 98: please check the observation period to be consistent. - *observation periods fixed*
- 6) Line 131: GPS is not defined. - *fixed*
- 7) Equation 3-6, please correct the alignment of the parenthesis in general and around (r) as well as throughout the text. - *thanks for pointing this out; the alignment of the parentheses are correct in my Microsoft Word version, however I can see that the alignment is wrong when converted to PDF format. My understanding is that in the final submitted paper, copy editing of equations will be updated by copy edit staff – I am not sure what else I can do at this stage because it is fine in Word.*
- 8) Line 192, please define One Tree Island (OTI) in the text. - *fixed*
- 9) Line 218, please define QDOAS algorithm. - *Differential optical absorption spectroscopy is already defined, and QDOAS is just the name of the algorithm rather than a further acronym. I have addressed this comment by putting quote marks around QDOAS the first time it appears.*
- 10) Equation 8 and text around it. Please correct the alignment of the parenthesis. - *see response to point 7 above.*
- 11) Please use proper subscript for O₄ instead of just smaller font. - *I have done this throughout already. Once again I think this is an issue with the conversion from Microsoft Word to PDF, or perhaps my choice of Times New Roman font.*
- 12) Line 234 and elsewhere (figures etc), please use a consistently a fixed format for the dates. - *fixed*
- 13) Equation 9 and related discussion in the text, please fix alignment of the

parenthesis. – *see response to point 7 above.*

14) Line 249, please define VLIDORT algorithm. - *fixed*

15) Line 273, please rename the section to Results and Discussion. Please consider splitting the section into at least 2 separate sub-sections. - *fixed*

16) Line 278, please indicate, where the full data set is available. – *the full data set is available as indicated in the Data Availability section at the end of the manuscript.*

17) Line 286, please remove the period before the unit. - *fixed*

18) Line 296, please indicate the mean depolarization rate and the standard deviation in the cloud-free conditions as well. – *this information has been added at line 287.*

19) Line 305, The highest... - *fixed*

20) Paragraph starting from line 305, please use consistent way to express the date and include the year. - *fixed*

21) Line 332, the greatest - *fixed*

22) Line 395, why do you need to present the equation here? – it is important to mention the Angstrom exponent equation for reproducibility – *anybody else wanting to analyse or compare AOD at different wavelengths using different techniques will find this useful.*

23) Line 433, please remind the reader, what is the value of AOD based on your results. - *fixed*

24) Line 439, is there a way to remove the cloud impact? – *as described in the Methods, we go to some considerable extent to filter out clouds. The point made at line 439 is that despite this, the variability in raw MPL-derived AOD is still high. My hypothesis is that high level cloud is being missed and misinterpreted as AOD. I have rephrased this section to the following “The raw MPL AOD has much larger variability than the other techniques. This variability, caused by frequent occurrence of high extinction values, may indicate that the cloud-filtering algorithm is missing some optically thin cloud above the boundary layer. This could be tested with cloud filters based on different cloud detection methods, for example different LiDAR types not employed at One Tree Island. Inappropriately flagged cloud would result in misinterpreted aerosol information both due to enhanced lidar return and because the extinction-to-scatter ratio calculated for aerosols, RA , would be inappropriate for thin cloud.”*

25) Line 447, please change the section name to Conclusions and have the discussion in the section “Results and Discussion” concentrating on the Conclusions here. – *fixed, especially by shifting the last part of the previous ‘Discussion and conclusions’ section into the end of the updated ‘Results and Discussion’ section.*

26) Line 494, please rephrase AOD source. There are sources that increase aerosol concentrations that influence AOD. - *fixed*

27) Line 500, CAMS - *fixed*

28) Figure 2. Please be consistent with the date format. - *fixed*

29) Figure 3. DOFS is not defined. – *fixed in the caption*

30) Figure 4. Please be consistent with the date format. - *fixed*

31) Figure 5. Please be consistent with the date format and please include the year. - *fixed*