Atmospheric Measurement Techniques Discussions

Atmos. Meas. Tech. Discuss., referee comment RC1
https://doi.org/10.5194/amt-2022-69-RC1, 2022

Comment on amt-2022-69

Anonymous Referee #1

Referee comment on "Performance evaluation of an A band differential absorption LIDAR model for the ocean surface pressure from low-Earth orbit" by Guanglie Hong et al., Atmos. Meas. Tech. Discuss., https://doi.org/10.5194/amt-2022-69-RC1, 2022

It is my believe, that while this work represents a nontrivial amount of effort, it seems to be primarily a reexamination of existing methods for know oxygen A band wavelengths. It follows a very traditional error analysis and arrives at similar over all conclusions. Changes in topography over land and surface reflectance over the ocean are primary drivers in LIDAR measurements of surface pressure. While this is true, what is also most likely true is that the surface pressure over the spatial scales required to obtain the measurement also also plays a predominate role in the error analysis, and the longer one averages samples the more dominate this term becomes. These changes are at the crux of the problem. While this work address some of the requirement needs it does not provide a constraint on others, and seems to set a scale length to meet the design, instead of developing a design that meets the requirements. Currently, production NWP model cell sizes, on global scales, are consistently on the order of 15km, This work seems to have backed into a 44km measurement size purely based the need to beat down the measure noise, and not based on model or observational needs. This indirectly assuming that pressure is in some way shape or form stable/static over the defined extent. The examples provided as rational for such measurements, clearly have very dynamic behavior on these scales.

A more pertinent question, might be what is the appropriate path length for these type of measurements, and how many samples over land, for a typical/prescribed LEO orbit, fall in the category of having less than a 2 meter change in height over any 44km or other path length. how does one introduce this constraint into an error analysis of this type, how many sample might be expected and where?

While this work seems adopt a rigorous approach to compute atmospheric absorptions values, these could most likely be achieved using some high fidelity community RT model that may better address the interplay between/contamination of other species e.g. H20.

Finally, I find the summary/conclusions lacking.

Please also note the supplement to this comment:
https://amt.copernicus.org/preprints/amt-2022-69/amt-2022-69-RC1-supplement.pdf