**Review of de Guélis et al.: Link between the Outgoing Longwave Radiation and the altitude where the space-borne lidar beam is fully attenuated**

In this paper, which appears to be a follow-on from Guzman et al., 2017, the authors develop a simple approximation that allows them to estimate outgoing longwave radiation (OLR) using three parameters that are readily obtained from space-based lidar measurements: cloud top, cloud base (or, for opaque layers, apparent base) and cloud optical depths. Cloud altitudes are converted to temperatures using model data. The optical depths are used to compute emissivities. Since the current generation of space-based lidars cannot measure the optical depth of opaque layers, the emissivities for these clouds are assumed to be 1. For opaque clouds, OLR is approximated as a simple linear function of mid-layer temperature. The approximation for transparent clouds also uses mid-layer temperature, but is not as straightforward, as it also requires estimates of cloud emissivity and the OLR in clear sky conditions. Collocated CERES measurements are used to characterize the accuracy of both approximations.

The material presented in this paper is appropriate for AMT, and, after a few modifications are made, I believe the manuscript should eventually be published. The English language usage is, at times, somewhat (and occasionally very) awkward; however, the paper is well-organized, the figures are well-done and informative, the authors' derivation of their technique was clear and the steps taken to verify its performance were appropriate and straightforward. While the most interesting (and potentially useful) part of the manuscript was section 6, where the authors describe the limitations of their method, there are still a couple of issues that I believe deserve further investigation.

1. I had hoped to find a clear and convincing explanation for the rotation of the thin cloud data from the one-to-one line that is so evident in Figure 6b. In particular,
   (a) I'd like to know if this rotation is diminished in the "single-cloud-layer situations (not shown)", for which R increases from 0.89 to 0.92 (I suggest including the "not shown" plots in a future revision);
   (b) I'm intrigued by the differences in the sampling distributions for the opaque clouds vs. the thin clouds. For opaque layers, there is a noticeable skew in the distribution caused by (per line 518) "occurrences far from and over the identity line in Fig. 6a". But for the thin clouds in Fig. 6b the sampling distribution appears to be normally distributed about a single straight line). Do the authors have any thoughts or speculations about the root cause(s) for this difference in behavior?
2. How sensitive is the thin cloud OLR to emissivity errors introduced by aerosol contamination of "clear air" beneath the clouds detected by GOCCP?

Minor issues:

Line 17 : how much does the "atmosphere opacity altitude" depend on the (a) capabilities of the lidar used to measure the cloud, (b) the ambient lighting conditions, and (c) the algorithms used to retrieve apparent cloud base?

Lines 126–175 : nothing in this description makes it clear that columns containing multiple layers are actually included in the analyses. The fact that all columns are partitioned into one of the three categories (i.e., clear, thin cloud, and opaque cloud) should be made clear from the very beginning, and not postponed until lines 176–179.

Line 171 : in the vast majority of CALIPSO literature (including Garnier et al., 2015, which is cited here), the symbol for optical depth is τ. δ is used for depolarization ratios.

Lines 378–383 : here and elsewhere, I find the authors' notation to be very complex and cumbersome, which makes the text difficult to read and hard to understand.

Lines 530–531 : to my eye, the midlatitude emissivities are not "mostly centered around 0.25"

Line 554 : according to my (admittedly limited) understanding of the way the GOCCP cloud detection scheme works, a more realistic assessment would have been obtained by using on bin lower rather than one bin higher.

Lines 641–642 : the suggestion that "the laser beam is not able go through the entire cloud if its vertical geometrical thickness is greater than 5 km" is demonstrably false. For example, see

https://www-calipso.larc.nasa.gov/products/lidar/browse_images/show_detail.php?s=production&v=V4-10&browse_date=2010-01-01&orbit_time=12-47-14&page=3&granule_name=CAL_LID_L1-Standard-V4-10.2010-01-01T12-47-14ZN.hdf

The region between ~1.6° S and ~5.4° S contains numerous examples of transparent cirrus that are more than 6 km thick.