Second review of:
"**Land cover and its transformation in the backward trajectory footprint region of the Amazon Tall Tower Observatory**",
by Pöhlker and *twenty-seven* additional authors.

Reviewed by: David Fitzjarrald, ASRC, University at Albany, SUNY

General comments to the Editor and the Authors.

I do not understand how this journal operates, what with the paper disappearing and reappearing, but so be it! It warms my hard reviewer's heart to see that some of my recommendations were adopted, and, to me, the paper is in much better shape. Once the Editor is satisfied with the authors' response to the limited issue I raise here, it should be approved.

A key improvement is the good-faith effort to refine the trajectory estimates to allow for the diurnally-intermittent mixing occurring during the convective part of the day. This will be the period when the air 'parcel' is most influenced by the surface conditions. In some detail, both in the body of the text and in the Supplementary materials, the authors lay out a their approach, using the information available in the HYSPLIT package, to identify convective conditions. I think all involved realize that this trajectory approach is likely compromised in the rainy season because of the deep cloud updrafts, but that the situation during the dry season is more amenable to the approach. I appreciate the new comments that own up to limitations of this type of analysis.

A key question I have is how relevant that Amazon land cover details are. (I don't see how the identification of Saharan dust in the Amazon validates this part of the study.)

One thing that puzzles me is that their revised 'footprints' have no indication of how the transient areal influences contribute to what the parcel carries when arriving at the ATTO. All that is demonstrated is that the upwind 'footprint' is not much changed by including this effect. Just how does work?

When I wrote (not too precisely): "That will turn out to precess over the course of the day for parcels tracked back from different arrival hours at the ATTO site, and would look like to a 'dashed line' of activity as the trajectory crosses into the continent.", I meant for the authors to comment on this intermittent representativeness issue. Did I miss something? What about this? Only with this can one visually identify the regions that get "special attention" when measurements at the tower are examined. I realize that there is likely appreciable horizontal diffusion, but the authors have gone this far with the most elementary way to use HYSPLIT to address this issue, why not a take the small additional step to explain the effort more clearly?

I made a rough cartoon to illustrate what I mean. The trajectory of the flow inland from the coast can be thought of as a 'characteristic', in the sense one uses to solve certain kinds of differential equations. Based on analysis of cloud base wind speed from the Santarém soundings that I did for a recent paper (Kivalov and Fitzjarrald, 2018), ≈ 8 m/s is a fair estimate. A rough estimate of the distance from the coast to ATTO is about 1200 km, and this gives a travel time of about 40 hours. I would think that the time of day for the boundary layer to be 'coupled' to cloud base to be roughly a third of the day, 8 LT – 16 LT—look at the cloud reports on the ceilometer graph in the original review. Anyway, the intersections of the characteristic curve with these time of day bands leads to corresponding bands of longitude, indicating the regions that are more properly linked to the air mass. The band along the coast is surely compromised by breeze effects, but that is just one price of the simplification in using the HYSPLIT approach. Could you not mention and show what these bands are? Could you not note to what degree of

specificity one must know the land use categories to comment, as the authors do, on the upwind surface conditions? In particular, in view of this situation, can you comment on whether or not the presence of mining upwind is likely to be detectec at ATTO?

Kivalov, S.N. and Fitzjarrald, D.R., 2018. Quantifying and modelling the effect of cloud shadows on the surface irradiance at tropical and midlatitude forests. *Boundary-Layer Meteorology*, *166*(2), pp.165-198.