[1.3] Referee comment: P7, section 2.4: ATTO tower is 325 m tall. What is the uncertainty we expect from the BT analysis start height of 1000 m?

Author Response: We have conducted a sensitivity test and found that backward trajectory start heights at 200 m and 1000 m gave similar results. A corresponding statement can be found in Sect. 2.3:

> "A sensitivity test confirmed that starting heights of the BTs at 200 and 1000 m AGL gave similar results. Accordingly, the chosen start height at 1000 m appears to be a good representation of the origin of the boundary layer air masses at ATTO."

Details on the backward trajectory analysis can be found in C. Pöhlker et al. (2018), which has been submitted to ACP. This reference is cited several times throughout the text to clarify aspects of backward trajectory patterns and land use in the ATTO footprint region.

Editor comment: I have an additional doubt about the point below. Could you explain how winds at 200 and 1000 m showed the same pattern?! Which wind field are you using for these backtrajectories?!

Author Response: The HYSPLIT backward trajectories (BT) analysis has been based on meteorological input data from the global data assimilation system (GDAS1) as outlined in Sect. 2.3 in the present study. The GDAS1 data on a 1° by 1° grid is comparatively coarse. However, it sufficiently resolves the direction of air mass advection towards ATTO. The aerosol and CCN population at ATTO that is analyzed in detail in this work originates from regional and well long-range transport influences. In terms of regional influences, a study by Lammel et al. (2003) reported characteristic formation times of secondary aerosols of about 48-72 h as well as the fact that coarse mode particles "were derived from emissions < 36 h back". Accordingly, 3-day HYSPLIT BTs represent an appropriate choice to map the spatiotemporal variability of the effectively overpassed regions and its land cover with the potential aerosol sources.

Figure R1 shows BT ensembles for the starting heights of 200 vs. 1000 m. Note that the direction of advection of the BTs is almost exclusively directed towards easterly directions. Moreover, the BT ensembles of both starting heights shows similar spatiotemporal patterns and, thus, cover rather similar 'footprint regions'. In the present study, we have used BTs to characterize the overall directions of air mass advection. For this analysis, BTs at starting heights of 1000 m were used. Figure R1 underlines that for this purpose the choice of 200 vs. 1000 m as starting height makes no substantial difference.

References

Lammel, G., Bruggermann, E., Gnauk, T., Müller, K., Neususs, C., and Rohrl, A.: A new method to study aerosol source contributions along the tracks of air parcels and its application to the near-ground level aerosol chemical composition in central Europe, Journal of Aerosol Science, 34, 1-25, 10.1016/s0021-8502(02)00134-9, 2003.

Pöhlker, C., Walter, D., Paulsen, H., Könemann, T., Rodríguez-Caballero, E., Moran-Zuloaga, D., Brito, J., Carbone, S., Degrendele, C., Després, V. R., Ditas, F., Holanda, B. A., Kaiser, J. W., Lammel, G., Lavrič, J. V., Jing, M., Pickersgill, D., Pöhlker, M. L., Praß, M., Ruckteschler, N., Saturno, J., Sörgel, M., Wang, Q., Weber, B., Wolff, S., Artaxo, P., Pöschl, U., and Andreae, M. O.: Land cover and its transformation in the backward trajectory footprint region of the Amazon Tall Tower Observatory, Atmos. Chem. Phys. Diss, submitted, 2018.

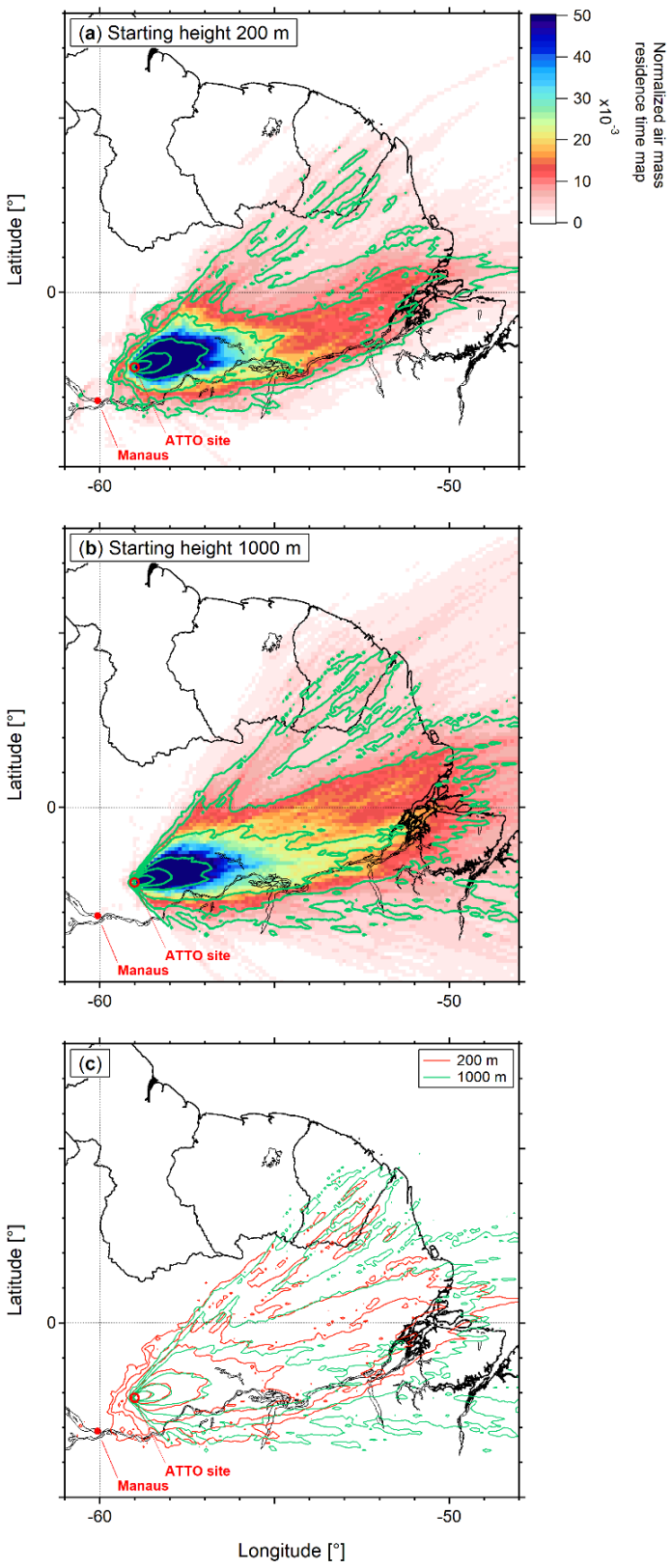

Figure R1. HYSPLIT backward trajectory (BT) ensembles representing ATTO-relevant air mass residence time maps (**a** and **b**). The BT ensembles comprise all 8760 individual 3-day BTs, spanning the time period relevant for the present study (i.e., hourly BTs from 01 Mar 2014 until 28 Feb 2015). The BT analysis was conducted for the starting heights 200 m and 1000 m above ground level. Contour lines (in green) were added to the image plots in **a** and **b**. These contour lines representing the 200 and 1000 m cases were combined in **c** for direct comparison.