Title: Planetary boundary layer evolution over the Amazon rain forest in episodes of deep moist convection at ATTO.

Manuscript Number: acp-2019-373

Authors: Maurício I. Oliveira, Otávio C. Acevedo, Matthias Sörgel, Ernani L. Nascimento, Antonio O. Manzi, Pablo E. S. Oliveira, Daiane V. Brondani, Anywhere Tsokankunku, and Meinrat O. Andreae

Manuscript type: Article

Recommendation from the reviewer: Publish

Reply to Reviewer #2:

General remarks

Reviewer says: *This manuscript analyzes turbulence data measured at several levels at an 80-m high tower at the ATTO site in the Amazon. The data are analyzed around the occurence of deep moisture convection (DMC) and strong downdrafts of cold air from above associated with the passage of storms by the tower, as identified by meteorological radar.*

The manuscript is well written and easy to understand. It is also basically an observational study. It consists of the description of the evolution in time of the response in atmospheric variables measured by the tower to the passage of the pool of cold air from the storm downdrafts.

As such, the manuscript does not contain new quantitative theories, nor does it describe any new phenomena, with the possible exception of the detailed attention to the temporal behavior of the sensible and latent heat fluxes, and the turbulence kinetic energy, measured at several levels at the tower during those episodes. It is however useful as a good example of the application of high-quality research data to the understanding of influence of storm downdrafts on the planetary boundary layer. As such, I think it deserves publication.

Because it is well written and documented, and of its descriptive nature, there are very few remarks that I can make on the manuscript. They are listed in the specific comments below.

Reply: The authors would like to thank the reviewer for positive remarks.

Specific comments

Reviewer says: *p. 2, l. 19–20 "This stage initiates in the wake of the storms and **it** may take 7-10 h for the ML to re-establish undisturbed conditions."*

Reply: The sentence has been changed.

Reviewer says: *p.2, l. 32–33 "They found latent and sensible heat flux enhancements reaching peak values of 60 W m^{-2} and 250 W m^{-2} for large, organized Mesoscale Convective Systems (MCSs)."*

In general LE $\gg$ H over the ocean, but here you are saying ΔLE =60 Wm^{-2} , ΔH = 250 Wm^{-2} . Please confirm that the enhancements are much larger for H.

Reply: The reviewer is correct. We rephrase the sentence to "*They found sensible and latent heat flux enhancements reaching peak values of 60 W m^{-2} and 250 W m^{-2} for large, organized Mesoscale Convective Systems (MCSs)."*

Reviewer says: *p.4, l 10–11 "Computation of turbulent quantities from tower data such as mean flow, heat fluxes and turbulent kinetic energy were accomplished by employing Reynolds averaging at 1-min time intervals."*

Strictly speaking, "Reynolds averaging" is ensemble averaging, for which the so-called Reynolds postulates apply. Here, you should say "time averages over 1-min. intervals".

Reply: It is a valid point. The sentence has been changed.

Reviewer says: *p.4, l 31 "gust (not gusts) fronts."*

Reply: The sentence has been changed.