Interactive comment on "Friagem Event in Central Amazon and its Influence on Micrometeorological Variables and Atmospheric Chemistry" by Guilherme F. Camarinha-Neto et al.

Editor Decision: Publish subject to minor revisions (review by editor) (09 Nov 2020) by Gilberto Fisch

Comments to the Author:

The authors did most of the points raised by the 2 reviewers. However, as the reviewer B point out, the question of the drop of air temperature was not clearly addressed. Moreover, I would like to see if the specific humidity (or better the equivalent potential temperature) will show a difference along the days...This is to exclude the possibility of wind direction/O3 enrich by convection (General Comments (1) and Major Comments (1) and (5)). There are negative values of Heat Fluxes that can be useful for your analysis, explore Fisch (1996) his PhD Thesis. I also recommend to read/incorporate 2 previous study about Friagem in Amazonia, Viana and Herdies (2018) DOI http://dx.doi.org/10.1590/0102-7786331014 and Ricarte et al. (2014) https://doi.org/10.1002/met.1458.

We would like to thank the Editor for his comments/suggestions. We incorporated the references (Fisch, 1996; Ricarte et al., 2014; Viana and Herdies, 2018) cited by the Editor in the new version of the manuscript (in blue). We believe that these works bring important contributions to a better understanding of the role of Friagem phenomena in the thermodynamics of the atmosphere.

We will start by showing the values of the sensible heat flux (*H*) obtained with experimental data before and during the arrival of the Friagem at the ATTO site (Figure 1). We emphasize that it was on July 11, 2014 that Friagem arrived in the central region of the Amazon. It is noted that the *H* values did not show strong decreases during the arrival of the Friagem compared to the *H* values in the days before the Friagem. It is also observed that in some times the values of *H* decrease sharply (in some cases these values become negative even in daytime conditions). These falls occurred during the presence of deep convection above the region (Figure 2).

Figure 3a shows the values of air temperature and equivalent potential temperature (θ_e) and Figure 3b shows the values of specific humidity (q) measured at the ATTO experimental site. There is a slight drop in air temperature with the arrival of Friagem, as mentioned in the Manuscript (L190). The values of q during the Friagem practically did not vary compared to the values observed in the previous days. Sharp drops in the values of q and θ_e are observed, probably much more associated with the presence of downdrafts from convective clouds (Betts et al., 2002; Gerken et al., 2016; Dias-Junior et al., 2017), than with the arrival of the Friagem.

The works indicated by the Editor (Fisch, 1996; Ricarte et al., 2014; Viana and Herdies, 2018) and others (Marengo et al., 1997; Silva-Dias et al., 2004) show that the arrival of Friagem in the South region of Amazônia produced striking changes in the ABL thermodynamic variables. For example, Fisch (1996) showed that the values of *H* are considerably lower during the presence of Friagens (page 140, Fig. A4-a). Ricarte et al. (2014) showed that both maximum and minimum temperatures suffer strong reductions with the arrival of Friagem. Viana and Herdies (2018) also noticed sharp drops in temperature and specific air humidity in the South of the Amazon region. However, they noted that in the central Amazon region (Manaus) these reductions were quite weak, similar to the results shown in the manuscript and here. According to Marengo et al. (1997) and Silva-Dias et al (2004) one of the main effects of Friagem in the central region of the Amazon is the induction of strong cloudiness. We believe that the presence of these clouds reduces the solar radiation that reaches the surface and plays an important role in the surface concentration of O3, as mentioned in the manuscript (L181-184; L329-335).

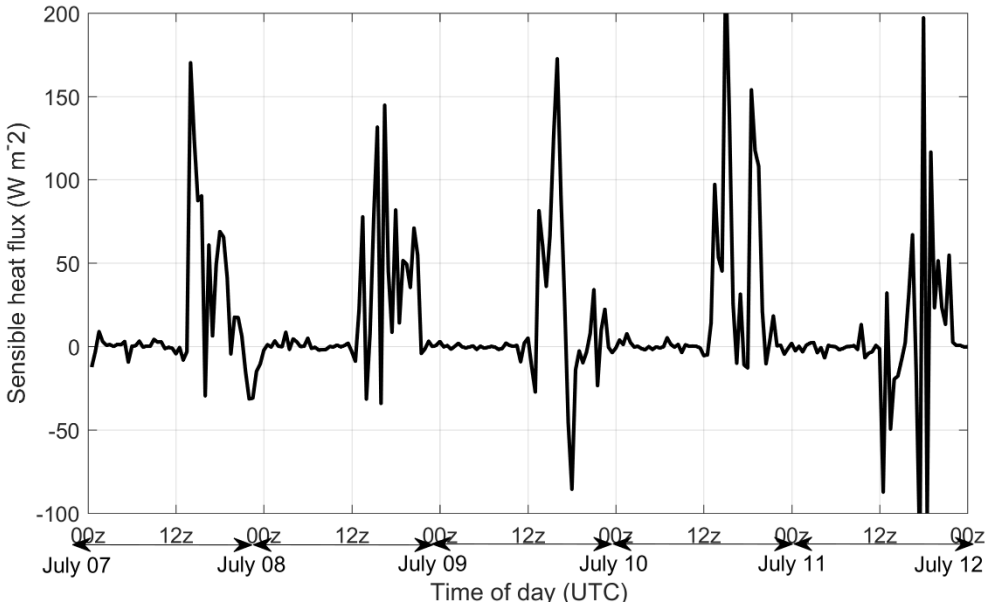

Figure1: Sensible heat flux on July 07-11th 2014, measured at 81 m, at ATTO site.

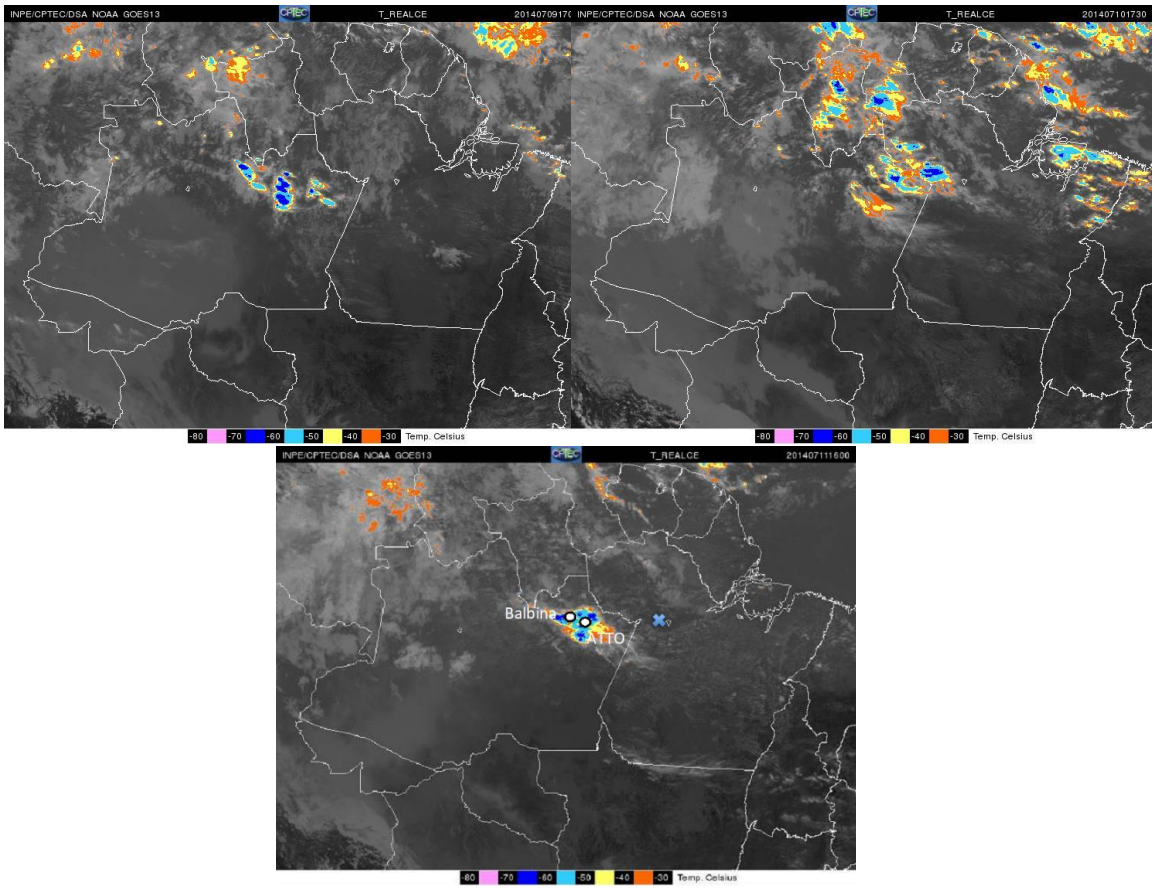

Figure 2: Enhanced images of the GOES 13 satellite in the infrared channel on: (a) July 09th at 17:00 UTC, (b) July 10th at: 17:30 UTC and (c) July 11th at: 16:00 UTC.

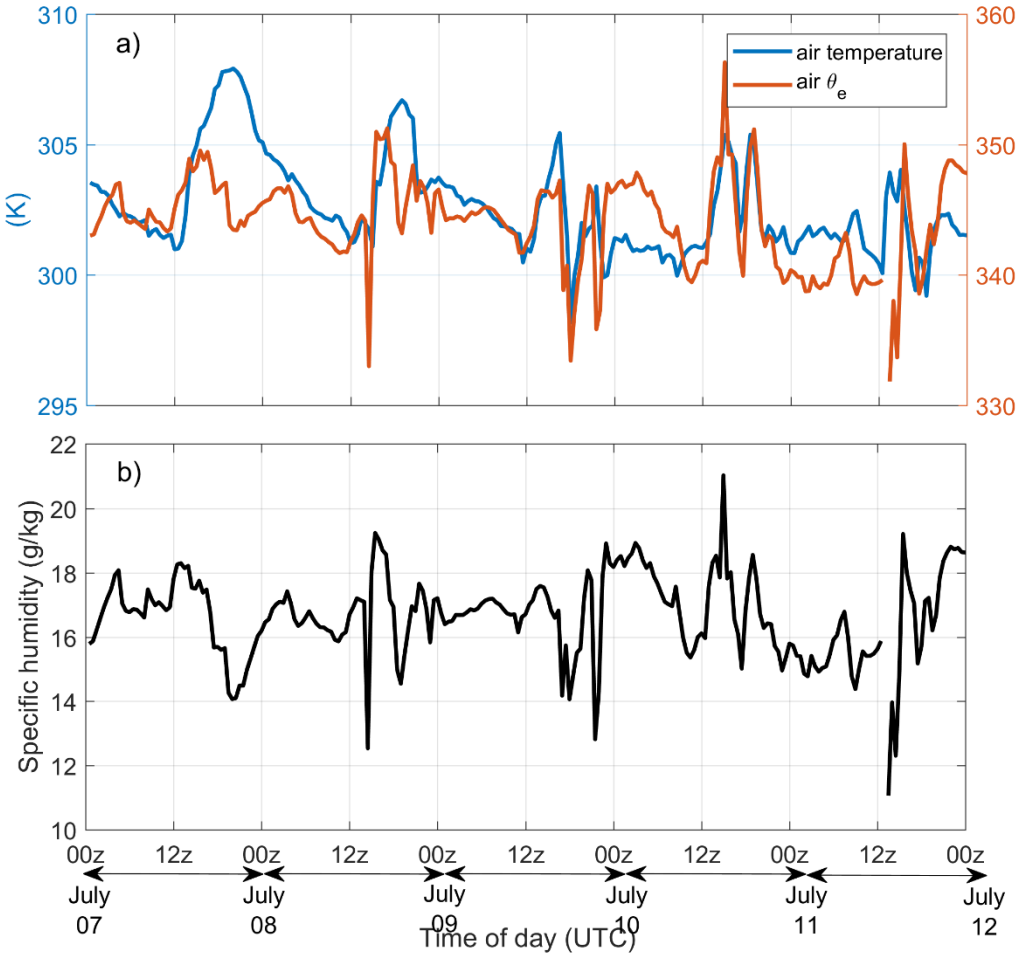

Figure3: (a) Air temperature and equivalent potential temperature (θ_e). (b) Specific humidity on July 07-11th 2014, measured at 81 m, at ATTO site.

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