

Response to Anonymous Referee #1

The referee's comments are in italics, our responses in plain font.

While not explicitly stated in the manuscript (except indirectly in the title), it appears to me that this paper is an introduction article to the ATTO special issue rather than a regular research article. At such, the paper is very well written and easy to read. I do not find any errors in the paper, so my comments are mainly related to structural and technical issues. Once the authors have addressed the comments given, I recommend accepting this paper for publication in ACP.

We thank the referee for his/her constructive comments. We have added a paragraph at the end of the introduction that makes it clear that this paper is intended as introduction and overview for a special issue.

General issues

The objectives, given in the end of section 1, remain a bit unclear when reading the paper for the first time. What are these objectives representing? Objectives of the whole research being done in ATTO, or even more generally in the Amazon basin? Objective of the research planned to be published in this special issues, or something else? Please define this clearly in the text. The current list of objectives ranges from aiming to solve purely scientific questions to mainly technical issues (carrying out various kinds of measurement). The whole paper would definitely be more appealing to readers if the authors could somehow divide the list of objective into 2-3 separate categories (e.g. "scientific aims", "technical goals" etc.).

We have now made it clear that these are the scientific objectives of the ATTO project. We have reorganized and tightened up the description of the objectives, reducing their number to seven. At this point, there are no objectives of a purely technical nature, so that a division of the list, as proposed by the reviewer, is not practical.

The type of this paper should be reflected in the section titles. Therefore, I do not think that the titles of sections 4 and 5 are appropriate. For example, some of the subsections in section 4 do not contain results at all (e.g. 4.1.2) but rather describe what is being done in practice. I suggest renaming the title of section 4 something like "4. Ongoing research and preliminary results". Likewise, the conclusions made from the ongoing measurements are preliminary rather than end products of this project. I would be more comfortable with the title "5. Summary and future outlook".

We have adopted the headings proposed by the reviewer.

While I am in favor of keeping section 3 as brief as possible, some addition information might be useful for the readers. Section 3.4: what is the accuracy of trace gas measurements, especially in terms of the detection limit for concentrations? Sections 3.6.1 and 3.6.2: Are the instruments measuring aerosol number size distributions, optical properties and CCN under regular quality control and have any of these instruments been in instrument inter-comparison experiments?

Section 3.4: Information on the precision and detection limits has been added.

Sections 3.6.1 and 3.6.2: We are conducting regular quality checks with all aerosol sizing instruments and CPCs, including flow checks, zero tests, and intercomparisons with ambient aerosol and monodisperse PSL cells. Exemplary plots are already included in the manuscript (Fig. 26). In general, all instruments are calibrated frequently as part of the maintenance routines, e.g., the CCNC with size selected monodisperse ammonium sulfate particles and the nephelometer with CO₂ as reference gas. The MAAP and aethalometer are subject to frequent intercomparisons with the other optical instruments. For example, two aethalometers and the MAAP were operated side-by-side during an intensive campaign in Nov/Dec 2014. The BC concentrations from the individual instruments agreed well. The SP2 instrument was carefully intercalibrated with another SP2 during the GoAmazon-2014 campaign. This information has been added to the text.

Technical issues

Page 11634 and Figs. 8-11: What does SD function mean? Please define.

SD means standard deviation. We had that spelled out in the manuscript, but ACP changed it to SD without telling us!

Pages 11637 and 11638: The authors use terms “intermittent events” and “GW events” and sometimes simply events (line 14 on page 11638). What is the difference? Is one of those subset of the other, or are they totally different phenomena.

Oscillatory behavior in the nocturnal boundary layer (Van de Wiel et al., 2002) can be generated by intermittent turbulence, for example due to downward bursts from turbulence created aloft (Mahrt, 1999), or by the action of gravity waves upon the turbulent flow (Zeri and Sá, 2011). The first case is discussed in section 4.2.4, where the term “intermittent events” is used (or sometimes just “events”, where the context is clear). The second case, the effect of gravity waves on the stable boundary layer, is discussed in section 4.2.5, where the term “gravity wave events” is used. These two sections have been reorganized to make this distinction clear and definitions have been added.

In principle, the figure captions should be understandable by themselves. Therefore, I recommend spelling out SD, TKE and GW in the captions of fFigs. 8-11, 13 and 14.

Done

There is a very large number of figures. Are all of them necessary and could some of them combined together (for example, Figs. 17-19 could form 3 panels of one figure).

We combined Figs. 8-10 and Figs. 17-19 into one Figure each.