

We gratefully thank the reviewers for the constructive comments and suggestions to improve the manuscript. Below are the detailed responses to their comments. The reviewers' comments are listed black in italics and our responses and changes in the manuscript are shown in blue. The changes in the revised manuscript are also highlighted.

## Referee #1 Report

### *General comment:*

*The manuscript investigates with, ground based and satellite measurements, the effects on the air composition over the Montevideo region during a long range transport due to a biomass burning event. Investigations of air quality and the consequent effects a wildfire can cause on the environment are very important to properly address. Detecting these events and following their trajectories are the initial steps in building a scientific understanding of these processes. The authors showed good results in demonstrating the gases/particles contributions from the wildfire event. My major concern is with the following investigation the authors could have done with the elements showed in the paper. For example, the vegetation damage aspects or the fire aging plume characteristics and its chemical/physic composition and interaction with the radiation could have been explored.*

**We understand the potential for a broader investigation than the one we present, including other aspects that Referee #1 highlighted through the General and Specific comments. However, the scope and objectives of our research focus on detection using mainly DOAS and aerosol measurements (especially the comparison between ground-based and satellite measurements). While such combination of measurements is common on the northern hemisphere, they are rare in South America. This type of events could affect the atmosphere over Uruguay and its surroundings and there is almost no information about it. We are presenting, to the best of our knowledge, a first case of detection over South America with these methods, emphasizing the understanding of the trajectory of the wildfire plume and its detection over Montevideo.**

### *Specific comments:*

*The authors should improve the investigation by analyzing the amount of O<sub>3</sub> produced due to the fire event and how it might cause damage to the atmosphere and environment, for example vegetation damage.*

*Another aspect that could be further explored is the spatial distribution of the fire plume effect. Depending on the fire plume age, what are the secondary organic aerosol, Black carbon, AOD, CO, O<sub>3</sub>, NO<sub>x</sub>, HCHO values? And how are they impacted by the solar radiation for example, in the formation processes of O<sub>3</sub> and SOA?*

*It is important to know during a fire event, how strong is the correspondence between atmospheric oxidants, such as, characterized O<sub>3</sub> and NO<sub>2</sub> and the SOA concentration.*

**The purpose of our work is to show the potential of terrestrial remote sensing that allows us to quantify some atmospheric constituents associated with the burning of biomass in large areas that affect Montevideo and its surroundings. Although the relationship between the characteristics of the fire and the dynamics of the emitted substances is a very important and interesting topic, we consider it to be outside the objectives of this study. A closer look at these aspects would have to rely heavily on chemical modelling which is best done in an independent work.**

*The authors could be using the Hysplit model to define forward trajectories by calculating it starting from a cluster of points at varying heights above sea level. For example, defining a cylinder of initial starting points with a radius of ~5km centered on the fire plume's initial location, the average gas and aerosol concentrations could be calculated within the volume defined in latitude and longitude by the points as they are time evolved by HYSPLIT, rather than just examine point values. The authors could also define an altitude range to track the fire plume.*

*It is important to have a numerical experiment with an atmospheric model with a gas-phase chemistry, and aerosol model to better understand the plume trajectory. Specifically when no ground or satellite data are available.*

**We understand that an exhaustive study that includes the trajectories and chemical modelling of the composition of the products generated during the emissions and transport could be an interesting contribution. However, this is beyond the scope of this work.**

**In this study, HYSPLIT is used as a complementary tool to confirm the origin of the burning sources, since satellite imagery has a lower temporal resolution than our ground-based instruments in Montevideo.**

*I recommend the authors to better emphasize the main scientific question approached in the paper. The contribution in this paper needs to be solid and be part of the knowledge's support used for future science.*

**We hope that the improvements made in the new version of the manuscript will make the main scientific questions become clearer, please see the new version.**