LONGDOM PUBLISHING

Nighttime vertical profiles of ozone concentration collected by an unmanned aerial vehicle and the mixing of the nighttime boundary layer in an urban region of central Amazonia

Patricia Guimaraes [1,2]
Jianhuai Ye [3]
Carla Batista [1,2]
Rafael Barbosa [1,2,]
Igor Ribeiro [1,2,]
Adan Medeiros [2,]
Rodrigo Souza [2,*]
Scot Martin [3,4,*]

[1] *Post-graduate Program in Climate and Environment, National Institute of Amazonian Research and Amazonas State University, Manaus, Amazonas, 69060-001, Brazil;*

[2] *School of Technology, Amazonas State University, Manaus, Amazonas, 69065-020, Brazil;*

[3] *School of Engineering and Applied Sciences, Harvard University, Cambridge, Massachusetts, 02138, USA;*

[4] *Departments of Earth and Planetary Sciences, Harvard University, Cambridge, Massachusetts, 02138, USA;*

Abstract

The nighttime boundary layer was studied in an urban area surrounded by tropical forest by use of a copter-type unmanned aerial vehicle (UAV) in central Amazonia in the wet and the wet-to-dry transition seasons. Fifty-seven vertical profiles of ozone concentration, potential temperature, and specific humidity were collected from surface to 500 m at high vertical and temporal resolutions by use of embedded sensors on the UAV. Abrupt changes in ozone concentration with altitude served as a proxy of nighttime boundary layer (NBL) height for the case of a normal, undisturbed, stratified nighttime atmosphere, corresponding to 40% of the profiles. The median height of the boundary layer was 350 m. A turbulently mixing nighttime boundary layer constituted 28% of the profiles while, and the median height of the boundary layer was 310 m. The remaining 32% of profiles corresponded to complex atmospheres without clear boundary layer heights. The occurrence of the three different cases correlated well with relative cloud cover. The results show that the standard nighttime model widely implemented in chemical transport models holds just 40% of the time, suggesting new challenges in modeling of regional nighttime chemistry. The boundary layer heights were also somewhat higher than observed previously over forested and pasture areas in Amazonia, indicating the important effect of the urban heat island.

Biography:

Patricia Guimaraes is current President of the Regional Center of Meteorology of Amazonas (NRMAM) linked to the Brazilian Society of Meteorology (SBMET). Graduated in Meteorology from the State University of Amazonas (UEA), Master in Climate and Environment from the National Institute of Amazonian Research (INPA). She is currently PhD student in Climate and Environment and Co-oriented Student in partnership with INPA / UEA and HARVARD.

Speaker Publications:

1. Vertical Profiles of Ozone Concentration Collected by an Unmanned Aerial Vehicle and the Mixing of the Nighttime Boundary Layer over an Amazonian Urban Area

2. Impact of fires on atmospheric methane variability over South America: 10 years of spatial observations of the AIRS sensor

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