A COMPARATIVE STUDY OF THE URBAN BOUNDARY LAYER HEIGHT ESTIMATED FROM ELASTIC LIDAR DATA AND WRF MODEL IN THE METROPOLITAN REGION OF SÃO PAULO DURING THE 2023 CAMPAIGN OF THE BIOMASP+ PROJECT

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Abstract

The BIOgenic emissions, chemistry and impacts in the MetropolitAn Region of São Paulo (BIOMASP+) is a Brazil-France scientific collaboration project, coordinated by the Instituto de Astronomia, Geofísica e Ciências Atmosféricas (IAG) of University of São Paulo (USP) and the Laboratoire de Météorologie Physique (LaMP) of the Observatoire de Physique du Globe de Clermont-Ferrand (OPGC), with the main objective of characterizing urban emissions of biogenic volatile organic compounds (B-VOC) in the Metropolitan Region of São Paulo (RMSP). Knowledge of the properties of the urban boundary layer (UBL) is essential to describe the vertical distribution and dispersion mechanisms of B-VOCs in the atmosphere. This work presents two UBL height comparisons. Firstly, it was performed a comparison between the UBL height provided by two different methodologies: elastic lidar data and the Weather Research and Forecasting (WRF) model (Solar-WRF, 4 nested grids, of 27, 9, 3 and 1 km), which was centered at lidar location (23.560° S; 46.752° W). Then, the UBL height provided by the elastic lidar was compared with WRF results centered a Cotia (23. 391° S; 46.589° W), a semi-rural region, in order to evaluate the horizontal UBL height variation in the RMSP. 34 cases (days) (between April 11 and July 11, 2023) were analyzed, so that in the absence of significant meteorological disturbances, there is a significative level of agreement between the values estimated through lidar data and WRF in both regions. Such a results demonstrates as WRF can provided reliable UBL height, and in addition they reinforce the hypothesis that, in the most urbanized fraction of the RMSP, there is little spatial variability in UBL height during the convective period..

Keywords: Urban Boundary Layer Heigth; Elastic Lidar; WRF.

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