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AEROSOL-CLOUD INTERACTIONS OBSERVED DURING GOAMAZON

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GOAmazon (Green Ocean Amazon) campaign, which was conducted in the environs of Manaus, (Brazil) from 2014 to 2015, was conceived to explain how human activities affect the climate in the Amazon Basin, particularly, the susceptibility to cloud aerosol precipitation interactions. It is well-known that aerosol particles may act as cloud condensation nuclei. When aerosol lading is relatively low, increases in aerosol lead to an increase in droplet concentration and a reduction in cloud effective radius. However, when aerosol optical depth is high, the droplet concentration usually saturates as aerosol loading increases. Moreover, if the aerosol is absorbing, there might be a reduction of droplet concentration. (IPCC, 2013).

One of the aims of this work is to assess the impact of two different aerosol types on the low-clouds base height (CBH): urban pollution from Manaus city and biomass burning particles. CBH under presence of high aerosol loads is evaluated and compared to when only background aerosol is present.

A 1 min-resolution database has been created. CBH is obtained from a ceilometer and a micro pulse lidar. In-situ data has been used to classify air masses in three possible scenarios, based on Thalman *et al.* (2017): background aerosol, Manaus plume and biomass burning. Only periods in which CBH temporal frequency were similar for two scenarios have been studied. These periods are January-May for Manaus plume and August-December for biomass burning (both with data of 2014-2015), CBH values were averaged each month.

Both aerosol type scenarios showed an increase in CBH (Fig. 1). This effect could be due to an excess of cloud condensation nuclei in low levels, which could lead to an extreme competition between them for water vapour. Other explanation could be based on the absorption nature of the aerosol, cooling the surface and heating the atmosphere. Finally, maybe air masses carrying these aerosols have other external properties which lead to this effect.

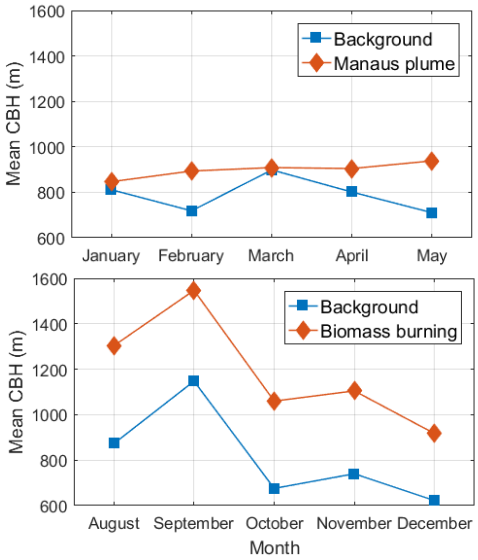

Fig. 1. CBH differences: (upper panel) Manaus plume vs background, (bottom panel) biomass burning vs background.

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Thalman, R., , et al. (2017): CCN activity and organic hygroscopicity of aerosols downwind of an urban region in central Amazonia: seasonal and diel variations and impact of anthropogenic emissions, *Atmos. Chem. Phys.*, 17, 11779-11801, https://doi.org/10.5194/acp-17-11779-2017.