# VERTICAL DISTRIBUTION OF THE MANAUS POLLUTION PLUME DURING GOAMAZON IOP1

**Amanda V. dos Santos, Henrique M. J. Barbosa and Diego A. Gouveia**

Institute of Physics – University of São Paulo

amanda.vieira.santos@usp.br

## Objective

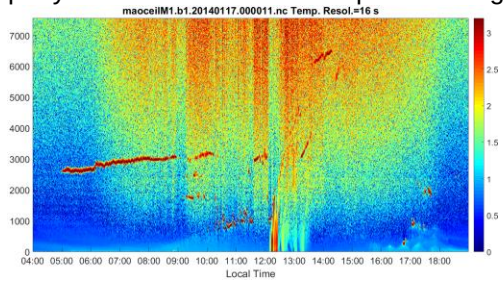
Aerosols are important agents of the global climate system for being able to significantly alter Earth's energy balance, affecting the atmospheric system in time scales ranging from minutes to climate change. In this sense, it is important to understand how pollution emission may alter the natural distribution of aerosols. In this study, our main goal is to study the vertical distribution of aerosols in the central Amazon region, where emissions from anthropogenic pollutants are affecting the natural environment.

## Materials and Methods

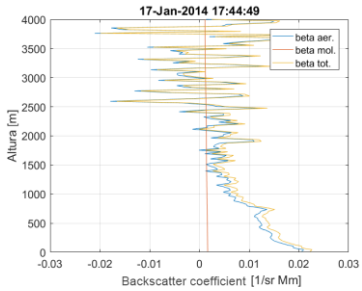
Data from a ceilometer (a simple laser-based radar, i.e. lidar) operated at the experimental site T3-Manacapuru will be used, during the IOP1 period (Feb-Mar 2014) of the GoAmazon2014/15 experiment, when there was no contribution from biomass burning. The detection of the aerosols will be made by applying the Klett method (Klett, 1981) to the elastic backscatter signal measured by the ceilometer, in order to obtain the vertical distribution of the aerosol backscatter coefficient. Only profiles without clouds will be included in the analysis. The profiles that contain clouds are removed by an automatic algorithm developed in a previous Scientific Initiation project.

## Results

Once we remove the profiles that contain clouds, we can apply the Klett method. In Pictures 1 and 2 we see examples of the aerosol vertical distribution. Picture 1 shows the time evolution of the ceilometer signal, where we can readily identify clouds and aerosol layers. Picture 2 shows 30-min average profiles for the aerosol, molecular and total backscatter coefficient ($sr^{-1}$ $Mm^{-1}$), where clouds were properly removed before the temporal average.




Picture 1: Time evolution of the ceilometer signal for Jan. 17, 2014, from 04h00 a.m. until 07h00 p.m.




Picture 2: Vertical profiles for Jan. 17, 2014, at around 05h45 p.m.

## Conclusions

We demonstrated that it is possible to obtain the aerosol backscatter coefficient from 30-min averaged data of a ceilometer if the necessary corrections are applied and if the profiles are correctly cloud screened.

## References

Klett, J. D., Stable analytical inversion solution for processing lidar returns, Appl. Opt. 20, 211-220, 1981.