

First measurements of water vapor mixing ratio in Sao Paulo metropolitan area using a six channels Raman LIDAR

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Abstract: The determination of the water vapor amount in the atmosphere using LIDAR systems is being demonstrated to be very useful, as LIDARs can operate in a continuously. The Raman LIDARs have the ability of determining the water vapor mixing ratio (WVMR) by calculating the ratio between the signal backscattered by water molecules and nitrogen molecules. In São Paulo, the IPEN Lidar Group is running a Raman LIDAR with six channels since June 2013, providing information of the water vapor mixing ratio in two different wavelengths: 532nm, and the corresponding Raman wavelengths 607nm (nitrogen) and 660nm (water); and 355nm, and the corresponding Raman wavelengths 387nm (nitrogen) and 408nm (water). The first measurements were performed during a winter campaign held in July 2013 and the first results are presented here. The comparisons of the WVMR provided by the IPEN Raman LIDAR, using 532nm and 355nm showed good agreement with each other. We also obtained the WVMR ratio from radiosoundings, and the comparisons with the LIDAR derived WVMR also showed good agreement. In the future we plan to conduct a summer field campaign during January to March 2014 because the water vapor is more abundant in the metropolitan region during this time.

References

- [1] MacKinnon, D., *The Effect of Hygroscopic Particles on the Backscattered Power from a Laser Beam*, Journal of the Atmospheric Sciences **26**, 500–510 (1968).
- [2] Feingold, G., Morley, B., *Aerosol hygroscopic properties as measured by LIDAR and comparison with in situ measurements*, Journal of Geophysical Research **108**, 4327 (2003).

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