Relative humidity fields in the Annecy Alpine valley observed by Ro-Vibrational Raman lidar in the framework of L-WAIVE

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In June 2019, the Lacustrine-Water vApor Isotope inVentory Experiment (L-WAIVE) has been performed in the southern part of the Annecy lake (45°47’ N, 6°12’ E). The field campaign motivation is to bring a better comprehension on the evaporation processes above Alpine lakes influencing, along with orography, the complex atmospheric structuration. In particular, this two-week field campaign has involved the meteorological Raman lidar WALI (Weather and Aerosol LIdar). An ultra-light aircraft carrying a meteorological probe and a particle sizer performed several vertical profiles above the ground-based Raman lidar with a vertical resolution between 50 and 100 m for flights operated from the ground level (~0.5 km above the mean sea level (AMSL)) and ~4 km AMSL.

This setup is an opportunity to experimentally assess the instrumental errors on both the temperature and the water vapour mixing ratio profiles derived from the ground-based lidar. The methodology used to calculate the error budget will be presented. It will take into account the different types of statistical noises associated with the lidar measurement. In particular, the importance of the spectral filtration in the accuracy of the results will be discussed. The uncertainties associated with the lidar calibration procedure will be quantified. Following this detailed study, the first results of relative humidity will be presented, taking into account the associated error bars.