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Retrieval of aerosol size and microphysical properties from multi-wavelength Raman lidar measurements: inter-comparison with in situ sensors onboard the ATR 42 in the HyMeX-SOP1

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Reported measurements were carried out in the frame of the Hydrological Cycle in the Mediterranean Experiment – Special Observation Period 1 (HyMeX-SOP1), which took place in the period September–November 2012 over the North-Western Mediterranean Sea and its surrounding coastal regions in France, Italy and Spain. In the frame of HyMeX-SOP1, the University of BASILicata ground-based Raman Lidar system (BASIL) was deployed in the Cévennes-Vivarais site (Candillargues, Southern France, Lat: 43°37' N, Long: 4° 4' E, Elev: 1 m). This effort benefits from the dedicated flights in the frame of the EUFAR Project "WaLiTemp" of the French research aircraft ATR42, equipped with a variety of in situ sensors for turbulence and aerosol/cloud microphysical measurements. It in possible to compare aerosol size and microphysical properties retrieve from multi-wavelength Raman lidar measurements with simultaneous and co-located in-situ measurements.We focus our attention on 2 October 2012. The lidar raman BASIL use an Nd:YAG laser source, supplied with second and third harmonic generation crystals, is used by BASIL. Pulses at 1064, 532 and 355 nm are simultaneously transmitted in the atmosphere along the zenith. BASIL is capable to perform high-resolution and accurate measurements of atmospheric water vapour and temperature, both in daytime and nightime, based on the application of the vibrational and rotational Raman lidar techniques, respectively, in the UV.Besides water vapour and temperature, BASIL, in its HyMeX configuration, also provides measurements of particle backscatter at 355 and 532 nm and 1064, particle extinction at 355 nm and 532 and particle depolarization at 355 nm.
Results by Veselovskii demonstrate that an input data set consisting of the particle backscattering coefficient at 355, 532 and 1064 nm, the particle extinction coefficient at 355 and 532 and the particle depolarization ratio at one wavelength is sufficient to retrieve particle microphysical parameters, such as number, surface, volume density, effective radius and complex refractive index.
The agreement between the different comparisons is excellent and it will be shown in the conference.