Characterization of aerosol mixture components on the basis of multiwavelength lidar measurements

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Atmospheric aerosol provides significant impact on the Earth system and this impact still remains highly uncertain. Multiwavelength Raman lidars based on tripled Nd:YAG lasers are widely used nowadays for remote characterization of the aerosol physical properties. Such lidars provide aerosol backscattering, extinction coefficients and depolarization ratios at multiple wavelengths and these observations can be inverted to the particle microphysical properties [1]. However, the aerosol normally contains particles in both the fine and the coarse fractions, as well the aerosol complex refractive index can be size and wavelength dependent. Hence the number of lidar input observations is insufficient for complete aerosol characterization and corresponding inverse problem is underdetermined. Alternative approach can be based on using several main aerosol types with known physical properties, thus number of unknowns becomes equal to the number of the aerosol types considered.

In our presentation we analyze the results of lidar observations performed during SHADOW and DAO field campaigns. The observed aerosol mixture is separated to the components (for example: dust, maritime, biomass burning, urban, urban polluted) using aerosol types from MERRA-2 model or from the model based on AERONET observations. For inversion the GRASP [2] and newly developed algorithm are considered.

References

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