Polarimetric Remote Sensing of atmospheric aerosols: First results from the SPEXone instrument on the PACE mission

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On February 8, 2024 the NASA Plankton, Aerosol, Cloud & ocean Ecosystem (PACE) mission has been launched with onboard the SPEXone Multi-Angle Polarimeter [1]. SPEXone is designed to deliver unprecedented information on aerosol properties, such as composition, size, absorption (SSA), amount (AOD, number column), and aerosol layer height. After a commissioning phase of about two months, the PACE data are open to the public since April 11. The launch of PACE brings an end to a 10 year gap in the availability of space-based multi-angle polarimeter data, which are essential to understand and quantify the role of aerosols and clouds in climate change. SPEXone provides hyperspectral radiance and polarization measurements at high accuracy in the spectral range 385-770 nm observing each ground pixel under 5 viewing angles. In this contribution, we give an overview of the performance of SPEXone during the first months of the operational phase. We present the first results of aerosol retrievals from SPEXone and a validation with ground-based measurements. Already now, less than three months after launch, SPEXone is able to provide aerosol data with high accuracy and we expect further improvements in the calibration and processing algorithms in the coming months. We will present a global view on aerosol composition and aerosol absorption derived from SPEXone. Finally, we provide an outlook on the scientific use of SPEXone data for thequantification of radiative forcing due to aerosol-radiation and aerosol-cloud interactions.

References

[1] Hasekamp, O. P., Fu, G., Rusli, S. P., Wu, L., Di Noia, A., aan de Brugh, J., Landgraf, J., Smit, J. M., Rietjens, J., and van Amerongen, A.: Aerosol measurements by SPEXone on the NASA PACE mission: expected retrieval capabilities, J. Quant. Spectrosc. Ra., 227, 170–184, https://doi.org/10.1016/j.jqsrt.2019.02.006, 2019.

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