

# On the order of atmospheric scattering, its polarization and computation efficiency

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Polarization becomes more and more important in current and future remote sensing of earth's atmosphere and astronomical observations, as it could provide more information than that of intensity-only measurements. While forward simulation of polarization of light during its transfer in the earth-atmosphere system is still a burden especially for the full polarized radiative transfer with heavy aerosol loading. Based on previously established model-SOSVRT, a full polarized radiative transfer model with successive order of scattering method, the polarization of atmospheric scattering under different aerosol loadings are simulated, the lights for each scattering order, its polarization and the errors introduced by ignoring the polarization are analyzed. We are trying to answer how many orders are necessary in polarization simulations. Finally, a new method to speed up the modelling of polarized radiative transfer is proposed.

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