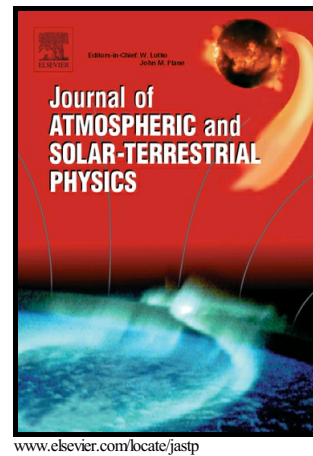


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## Characterization of aerosol events based on the column integrated optical aerosol properties and polarimetric measurements

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### Abstract

Aerosol optical properties are very useful tools for analyzing their radiative effects, which are directly or indirectly related to the global radiation budget. Investigation of column-integrated aerosol optical properties is a worldwide and well-accepted method. The introduction of new methodologies, like those of operation with polarimetric measurements, represent a new challenge to interpret the measurement data and give more detailed information about the aerosol events and their characteristics. Aerosol optical properties during the period June – August 2015 in AERONET Strzyzow station in Poland were analyzed. The aerosol properties like aerosol optical depth, Ångström exponent, fine mode fraction, fine mode contribution on AOD, asymmetry parameter, single scattering angle are analyzed synergistically with the polarimetric measurements of the degree of polarization in different solar zenith and zenith viewing angles at several wavelengths. The overall results show that aerosol events in Strzyzow were characterized mostly by fine mode aerosols. Backward-trajectories suggest that the majority of air masses come from the west. The principal component of the aerosol load was urban/industrial contamination, especially from the inner part of the continent. Additionally, the maximal values of the degree of linear polarization were found to be dependent on the solar zenith and zenith viewing angles and aerosol optical properties like aerosol optical depth and Ångström exponent. These dependencies were further analyzed in a specific case with very high mean values of  $AOD_{500}$  (0.59) and  $AE_{440-870}$  (1.91). The diurnal variations of aerosol optical properties investigated during this special case, suggest that biomass burning products are the main cause of that aerosol load over the stations.

### Keywords

AERONET Strzyzow station, aerosol events, aerosol optical parameters, degree of linear polarization, CIMEL 318 sun-photometer

### 1. Introduction

Atmospheric aerosols play a key role in the earth's climate budget. They affect this energy budget directly by scattering and absorbing solar and terrestrial radiation, and indirectly affecting

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