

# **Investigation of aerosol optical characteristics variation at Varanasi during Diwali festival and its impact on radiation**

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Investigation of aerosols and radiation changes for a festival of extensive crackers burning and fireworks is reported for a north Indian station, Varanasi (25.3N, 83.0E, 76 masl) - situated at bank of Ganges River in the Indo-Gangetic Plains. The ground-based measurements were done around Diwali festival in a campaign mode. Satellite-borne data is also analysed for this study. Reported results correspond to the Diwali day and 3 days before and after the festival. Diwali was celebrated on November 1 in the year 2005, when extensive fireworks and crackers were burnt. Reported study was aimed to assess the impact of fireworks and crackers burning on the ambiance. Measurements during campaign were done by ground based, pre-calibrated, Microtops-II Sunphotometers working at central wavelengths of 340, 500, 870, 936 and 1020 nm (FWHM:  $\pm 2-10$  nm). The total radiation fluxes were measured by pyranometers in the wavelength range of 290-3000 nm. Results are compared with satellite-borne observations, which show an increase in AOD for each wavelength and column water vapour content on Diwali day. The highest increase in AOD is seen at 870 nm, followed by 936, 340, 500 and 1020 nms. A gradual decrease in AOD and water vapour is noticed after the festival. Angstrom exponent ( $\alpha$ ), computed following Angstrom Law using ground based measurements, is found to decrease subsequently from  $\sim 2.0$  on October 29, 2005 to  $\sim 0.5$  around Diwali. Global radiation for Diwali day was found lower than the October 30 data, but diffused radiation was found higher due to increase in firework generated aerosols. Comparing the average of rest of the day to that of Diwali, a decrease in global radiation by about  $\sim 13\%$  and an increase in its diffused component by  $\sim 5\%$  is noticed.