

# **A comparative study of atmospheric aerosol effect on UV-B erythemal dosage at Delhi and Port Blair site, India.**

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The effect of solar ultraviolet radiation on human skin is a matter of human concern and wide interest in scientific community during last few decades. National Physical Laboratory (NPL, New Delhi, India) initiated the solar UV-B radiation (280- 320nm) intensities studies all over the Indian mainland and over Antarctica since 1980s. For Delhi site, continuous measurement of the UV-B has been done for the last 20 years along with sporadic field campaigns at various mainland, islands and oceanic sites. The atmospheric aerosol optical depth in visible and near infrared regions has also been done along with UV-B observations for many locations. One such campaign has been done at Port Blair Port Blair (Andaman Islands, 11.67 N, 92.72 E, 78m amsl) during March 2002. The present work emphasizes the results of this field campaign as a relatively cleaner site and its comparison with urban polluted location – Delhi (28.4 N, 77.1 E, 216m amsl). The observations at both sites were taken under clear sky conditions and the column atmospheric ozone values were almost similar. The UV-B measurements were carried out by Erythemal Probe (International Light Inc., USA) having interference filter of wavelength band 290-301 nm (maximum sensitivity/transmission at 297.5 nm). The aerosol optical depth (AOD) was derived from the solar radiation intensity measurements by grating based, solid-state spectroradiometer operating in the wavelength range 350-1100 nm, (International Light Inc., USA). Satellite based measurements were also seen for AOD. Results show an average global radiation intensity for the campaign period as  $\sim 5.5 \times 10^{-6}$  W/cm<sup>2</sup>,  $\sim 9.0 \times 10^{-6}$  W/cm<sup>2</sup>,  $\sim 1.25 \times 10^{-6}$  W/cm<sup>2</sup> and  $\sim 1.5 \times 10^{-5}$  W/cm<sup>-2</sup> at  $\chi = 60, 50, 40$  and  $30^\circ$ , respectively, while these intensities were found to be  $\sim 3.0 \times 10^{-6}$  W/cm<sup>2</sup>,  $\sim 5.0 \times 10^{-6}$  W/cm<sup>2</sup>,  $\sim 9.0 \times 10^{-6}$  W/cm<sup>2</sup> and  $\sim 1.0 \times 10^{-5}$  W/cm<sup>-2</sup> at Delhi. The observed AOD at these sites during campaign periods were found to be  $\sim 0.3-0.4$  at Port Blair and  $\sim 0.5-0.6$  at Delhi at 500 nm wavelength on an average. The ratio global/direct radiation varied  $\sim 2.0-3.5$  at Port Blair for  $\chi = 30^\circ$ , and between 2.0-4.0 at Delhi, however, at  $\chi = 60^\circ$ , these values were  $\sim 2.5-7.0$  at Port Blair and  $\sim 4.5-19.5$  at Delhi. On an average, the global UV-B radiation intensities were found to be  $\sim 65\%$  less at Delhi than at Port Blair. It is clearly found that the increase in UV-B radiation forcing is influenced by increase in AOD.