

Study of Total Ozone Column Amount and its Impacts on Solar Ultraviolet Radiation Dose Rate Over Pokhara Valley, Nepal

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Abstract

Solar ultraviolet radiation (UVR) reaching the Earth's surface is strongly modulated by the total ozone column (TOC) and plays a crucial role in human health and environmental processes. Since the 1980s, extensive observational and satellite-based studies have been conducted worldwide to monitor variations in TOC and surface UVR. Pokhara Valley, Nepal (850 m above sea level), characterized by complex mountainous terrain and unique topography, provides an important natural setting for examining ozone–UV interactions and their potential impacts on local populations. This study investigates the variability of the total ozone column and its influence on solar ultraviolet radiation dose rate and UV index over Pokhara Valley using Ozone Monitoring Instrument (OMI) data from the Aura satellite. The analysis reveals a mean TOC value of 267 Dobson Units (DU). The corresponding mean solar UV radiation dose rates are found to be 4.03 ± 1.34 and 10.71 ± 3.38 , respectively. A clear inverse relationship between TOC and solar UV radiation dose rate is observed, consistent with established atmospheric physics and previous studies. These findings contribute to a better understanding of ozone–UV dynamics in mountainous regions of the Himalayas and highlight the importance of continuous monitoring for assessing UV exposure risks in Nepal.

Keywords

Solar Ultraviolet Radiation, Total Ozone Column, Aura satellite, OMI.