Highlights from 40 Years of Satellite UV Measurements

Pawan K. Bhartia
NASA Goddard Space Flight Center, Greenbelt, MD, 20771, USA
Email: pawan.bhartia@nasa.gov

This year we are celebrating the 40th anniversary of the launch of the Backscatter Ultraviolet (BUV) instrument on NASA's Nimbus-4 satellite. The purpose of this instrument was to demonstrate the capability to measure total column ozone and its vertical distribution from space. The success of this instrument led to about a dozen instruments of this type on various NASA and NOAA satellites. These instruments used a single photomultiplier tube (PMT) that restricted the measurements to 6-12 discrete wavelengths in the 250-380 nm range. With the availability of solid-state detector arrays in the past decade it has been possible to make similar measurements but with hyperspectral (contiguous in wavelength) sampling and enhanced spectral resolution. This has allowed global mapping of several weakly-absorbing trace gases including SO_2, NO_2, BrO, HCHO, and CHOCHO. Since these measurements are affected by clouds and aerosols, a great deal of effort has gone into understanding their effect on ultraviolet radiation- both upwelling and downwelling. The downwelling UV radiation is chemically and biologically active and has both negative (genetic damage, air pollution) and positive (production of vitamin D and OH radical) environmental effects. I will discuss how the interaction of Rayleigh-scattered UV radiation with clouds and aerosols produce a variety of interesting effects that are leading to new methods of remote sensing of their properties. The UV measurements can greatly enhance the information that one derives from more traditional methods that use infrared and visible part of the solar spectrum.