COMPLEMENTARY INFORMATION BETWEEN UV AND IR FOR REMOTE SENSING OF TOTAL OZONE

Prabhakara Cuddapah
NASA/Goddard Space Flight Center

Ultraviolet and infrared satellite techniques have demonstrated their ability to measure total ozone in the atmosphere. However, as the physical principles involved in the two techniques differ considerably, they can convey independent information. The UV method depends on the O_3 absorption and molecular scattering, while the IR method hinges on pressure dependent thermal emission and absorption.

Possible causes for errors in the UV method are clouds in the troposphere, aerosols and UV absorbing gases such as SO_2 in the stratosphere. On the other hand, errors in the IR arise from variations in thermal stratification in the stratosphere, and the tropospheric clouds. When both the IR and UV measurements are available simultaneously with the same field of view, it is possible to minimize some of the errors in measuring the total ozone.

Addition of the IR technique to TOMS type of operation can aid in getting measurements of ozone in the nighttime and during polar night. A radiometer with a channel in the window region around 11 μm, a channel in the 9-6 μm O_3 band, and 3 channels in the 15 μm CO_2 band should be adequate to retrieve total ozone. Such a radiometer could be designed to do cross track scanning. This combination of UV and IR instruments could be flown on a geostationary or polar orbiting satellite.