

Use of AC Wavelength Pairs for Measuring Total Column Ozone

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The Dobson spectrophotometer is used to make Total Column Ozone (TCO) measurements, which is the amount of ozone contained in a hypothetical column of air between the Dobson and the outer edges of the atmosphere. It does this by comparing the relative intensities of two bands of ultraviolet light. The band of shorter wavelengths are highly attenuated by ozone, while those of the longer band are only mildly attenuated. There are three primary wavelength pairs named A (305.4 nm, 325.3 nm) C (311.2 nm, 332.3 nm), and D (317.5 nm, 339.9 nm). The A pair is the most sensitive to ozone and the D pair is the least sensitive. Observations are typically made using AD and CD pair combinations to improve accuracy. At mid-latitudes, the AD combination is the most common, but the 305.4nm band is nearly extinguished at high latitudes due to the sun's elongated path through the ozone layer, so a CD combination is used. The reverse is true at low latitudes. The D pair is hardly attenuated which leads to noisy measurements at $\mu = 1$ to 1.2. Here we investigate the use of AC measurements for more accurate measurements at low μ .

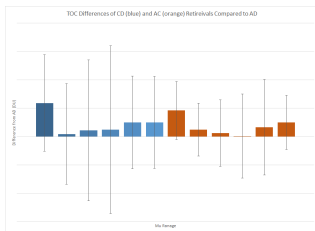


Figure 1. The difference between CD retrievals (blue) and AC retrievals (brown) compared to AD retrievals at various μ ranges: 1 - 1.5, 1.5 - 2.0, 2.0 - 2.5, 2.5 - 3.0, 3.0 - 3.5, and > 3.5