File Revision Date:
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Data Set Description:

PI: PAL, S. R.
Centre for Research in Earth and Space Technology
Instrument: Ozone DIAL (4-channel @ 308,353,332,385 nm.)
Site(s): TORONTO, Ontario, CANADA
Measurement Quantities: Ozone, Aerosol, Temperature

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Reference Articles:

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Instrument Description:

[UVB: Include list of instrument spec's that are or are not met. See UVB instrument validation appendix for list of instrument spec's.]

RAMAN OZONE DIAL

Transmitter:

Laser	Lumonics EXCIMER-600 (unstable resonator optics)
Wavelengths	308 nm (generated by laser)
	353 nm (Raman 1st Stokes vibrational in H2)
Pulse Energy	100 mJ (@308nm), 10mJ (@353nm)
Pulse length	13 ns.
Spectral Width	0.7 nm.
Repetition Rate	300 Hz.
Final Beam Div.	0.2 mrad. (66% of energy)

Receiver:

Telescope	1 meter, f 2.5 Newtonian
Field of View	0.5 - 1 mrad.
Optical BW	2.5 nm FWHM
4-channel	308,353,332,385 nm.
Data Acq.	Photon Counting
Range Res.	Usually 300 m.

Detectors and Signal Processing:

Photomultiplier	Hamamatsu H5783P-03
Amplifier	10 x Phillips 770
Discriminator	Phillips 704
Counters	Optech PC plug-in boards (700 MHz.)

Algorithm Description:

[LIDAR: Include information on unit conversion if pressure or mixing ratios appear in the data file.]

The DIAL technique used with 308 and 353nm. Signals from three altitude ranges are merged producing a single profile and from that the ozone profile is calculated. The derivative is found by the least square fit to the slope of ln(353/308). The error of this fit is the error of the derivative or d_(dS/dr) ie. the slope. The width of the window generally increases with height in order to keep the estimated error within a given percentage below a given altitude.

Relative density profile from the lidar 353 signal and reference density at 35-40 km give absolute density profile accurate above 35 km where there are no aerosols. The absolute density profile with pressure reference at 80 km give a pressure profile by integrating downward. The pressure profile then gives the temperature profile.

The aerosol scattering ratio R is calculated using the 353 signal and an iterative scheme based on an assumed alpha/beta (extinction/backscatter) ratio.

Expected Precision/Accuracy of Instrument:

- Listed in data files.

Instrument History:

(dates and description of significant changes in instrument or algorithm)

1990 - system installed and operated (308,353 nm.)
1991 -
1992 -
1993 -
1994 -
1995 - raman ozone channels added (332, 385nm)
1996 -
1997 -
1998 - water vapor channel (405.6 nm.) tested
1999 -
2000 -