LOWER ATMOSPHERIC TEMPERATURE PROFILE MEASUREMENTS USING A RAMAN LIDAR

S.H. Melfi and D. Whiteman
Laboratory for Oceans
NASA Goddard Space Flight Center
Greenbelt, Maryland, U.S.A.

A Raman lidar system has been used to measure the temperature profile of the upper troposphere and lower stratosphere.

The system consists of a tripled Nd-YAG laser (0.354 μm) and a 1.5 meter diameter telescope. Two photomultipliers are used at the output of the telescope to allow for measurements at both the laser wavelength and at the Raman shifted wavelength due to atmospheric nitrogen. The signal from the photomultipliers is recorded as photon counts in 1 μsec bins. The results of a number of laser shots are summed together to provide atmospheric returns which have acceptable signal-to-noise characteristics.

Measurements of the Raman nitrogen return have been acquired up to an altitude in excess of 20 km. Temperature profiles have been retrieved from the attenuation corrected Raman nitrogen return assuming the atmosphere to be in hydrostatic equilibrium and using the ideal gas law. Retrieved temperature profiles will be shown compared with independent temperature measurements. The agreement is very good in the upper troposphere and lower stratosphere. In the lower troposphere, attentuation due to aerosols results in poorer agreement.