AIRBORNE LASER RADAR FOR MAPPING TWO-DIMENSIONAL CONTOURS OF AEROSOL CONCENTRATION

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ABSTRACT

The prototype compact dye-laser radar developed by Grams and Wyman (1972) has been installed on NCAR's Electra aircraft for detection and measurement of atmospheric aerosols and cirrus clouds. The system differs somewhat from the earlier version. It incorporates several improvements to increase the overall efficiency of the organic-dye laser used in the transmitter, providing approximately 1/2-J pulses with a more uniform beam illumination and narrower line width than had been obtained with the original system. The receiver optical system, incorporating an 8-inch (20-cm) Cassegrain telescope, is designed with narrow field-of-view and stray-light baffles to allow daylight operation. The transmit/receive optics are arranged in a coaxial configuration. An externally mounted mirror system on the aircraft directs the field-of-view of the coaxial transmit/receive unit either upward or downward so that two-dimensional contours of aerosol concentration can be mapped out either above or below the aircraft.

The aircraft instrumentation also includes a single-particle optical counter and a particle impaction device (Blifford and Ringer, 1969; Grams et al. 1972) for size distribution measurements along with an airborne polar

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nephelometer (Grams, 1973). As a combined measurement system, these devices will allow particle size distributions and polar scattering diagrams to be measured by flying through an aerosol layer to aid in the interpretation of backscattering profiles of the layer measured by the laser radar.

References

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