THE GSFC GROUND-BASED LIDAR FOR THE MEASUREMENT OF STRATOSPHERIC OZONE

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Concern has risen over the last decade or so concerning the release of gases into the atmosphere which when photolyzed in the stratosphere can catalyze the destruction of ozone. Although the expected change in ozone column content is not that large (on the order of 5%), significant changes in the vertical profile are anticipated. Predictions at 40 km run as high as a 60% change in the next 50-100 years. Because of the importance of ozone in the thermal budget of the atmosphere, such a change will have a direct impact on the earth's climate. Long-term monitoring of stratospheric ozone is required to validate the predictions and Differential Absorption Lidar is particularly well suited to this measurement. GSFC is currently constructing a mobile lidar system based on a high-powered XeCl excimer laser. The system is expected to be operating by early Fall '86 and a campaign to compare the lidar results with a series of ROCOZ flights is planned.

The XeCl excimer laser will deliver either 0.5 J or 1 J pulses operating at a rep rate of 30 Hz or 80 Hz depending on linewidth. The free running system is expected to deliver 1 J @ 80 Hz, while a line narrowed injection-locked laser is spaced 500 mJ and 30 Hz. Simulations to be discussed indicate that with the 15 W laser and a 30" receiver scope a 4.5% measurement of ozone at 40 km can be made with the lidar stationed at sea level assuming a 2.5 km range cell. The same simulations show that moving the station to an elevation of 2 km reduces the estimated error to 3%. These errors are compatible with the quality of measurements required to make a determination of a long-term trend in ozone at 40 km.