

OBSERVATIONS OF STRATOSPHERIC AEROSOLS ASSOCIATED
WITH THE EL CHICHON ERUPTION

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Lidar observations of aerosols have been carried out at Aberystwyth ($52^{\circ} 25' N$, $4^{\circ} 04' N$) between November 1982 and December 1985 using a frequency doubled and frequency tripled Nd/Yag laser and a receiver incorporating a 1 m diameter in a Newtonian telescope configuration. Studies of the data obtained have been concerned both with different features of the aerosol distribution over the three-year period and the detailed changes which occurred in late winter and spring months in 1983.

In the analyses of the experimental data attention is paid to the magnitude of the coefficient relating extinction and backscatter, the choice being related to the possible presence of aerosols in the upper troposphere and the atmospheric densities employed in the normalisation procedure. The aerosol loading showed marked day to day changes in early months and an overall decay was apparent only after April 1983, this decay being consistent with an e^{-1} time of about 7 months. The general decay was accompanied by a lowering of the layer but layers of aerosols were shown intermittently at heights above the main layer in winter months. The height variations of photon counts corrected for range, or of aerosol backscatter ratio ($R-1$), showed clear signatures of the tropopause. A strong correlation was found between the heights of the tropopause identified from the lidar measurements and from radiosonde-borne temperature measurements. The month of February 1983 corresponded to a period of intense blocking activity in the vicinity of the UK. An examination of synoptic charts indicated that the measurements in this month refer to air that had been transported from a more northerly latitude. One notable feature of the observations is the appearance of very sharp height gradients of backscatter ratio which seem to be produced by differential advection. Statistical studies of the data recorded in February and April have shown an increase in the degree of variability with height, especially above 16 km, with the horizontal coherence length being greater above this height than below.