

5.6 LOWER STRATOSPHERIC AEROSOLS AT A TROPICAL LATITUDE STATION

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A pulsed ruby lidar has been in regular operation at the tropical station Trivandrum ($8^{\circ} 33' \text{ N}$, $76^{\circ} 57' \text{ E}$) since October 1986. The lidar data have been analyzed to obtain monthly mean aerosol extinction at lower stratospheric altitudes. The monthly mean variation of aerosol extinction shows a peak in March-April with a trough in the winter months. This behavior is compared with that of temperature at the same altitude, obtained from balloonsonde measurements at the same station. It is found that there is a negative correlation between the two with high extinction values corresponding to low temperature values and vice versa. This is attributed to the stratospheric aerosol microphysical processes. The association of stratospheric aerosol extinction with the tropopause altitude and temperature has been studied also and the implications of these results are discussed.

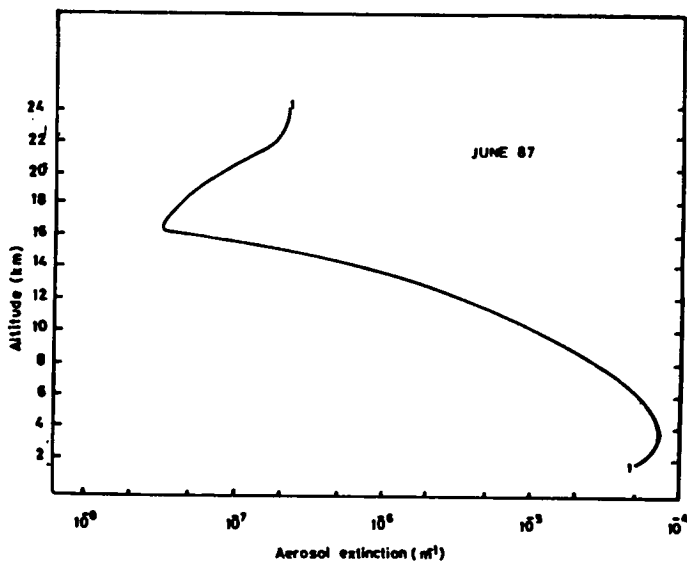


Figure 1. Monthly mean altitude profile of aerosol extinction for June 1987 at the tropical station Trivandrum ($8^{\circ} 33' \text{ N}$, $76^{\circ} 57' \text{ E}$). the profile is obtained using ruby lidar backscatter observations.

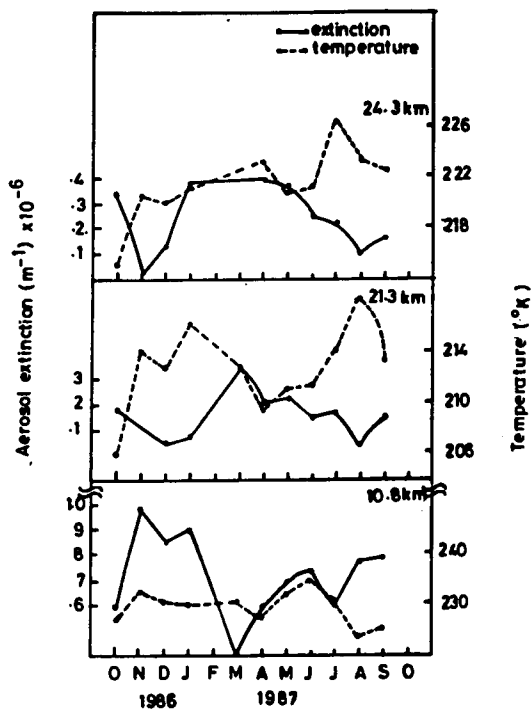


Figure 2. Variation of monthly mean aerosol extinction and temperature at 21.3 km and 24.3 km in the lower stratosphere and at 10.8 km in the troposphere. Aerosol extinction shows a negative correlation with temperature in the stratosphere whereas no such association is seen at 10.8 km. The negative correlation in the stratosphere is attributed to the *in situ* aerosol (sulfate) production processes of heterogeneous heteromolecular and homogeneous heteromolecular nucleation which are more efficient at lower temperatures.

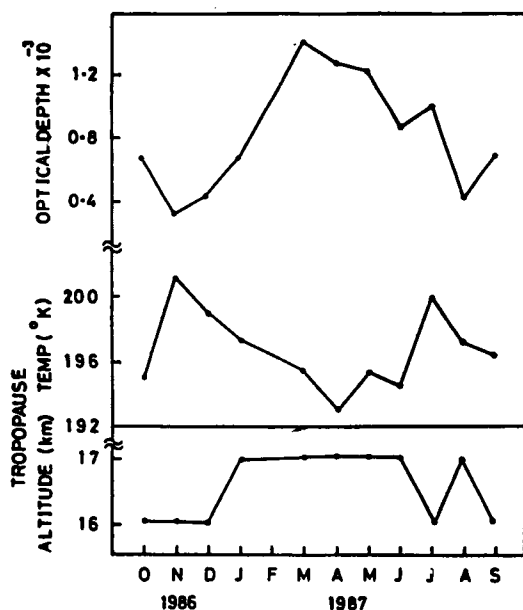


Figure 3. Variations of monthly mean stratospheric aerosol optical depth (from 18 km to 24 km) and tropopause altitude and temperature. The tropopause altitude is high during months of large optical depth. High tropopause altitude indicates increased convective activity. This would lead to an increase of convective transport of precursor gases (OCS and SO_2) from the troposphere into the stratosphere for *in situ* aerosol production.