## M.S.115. Babu, C.A.–Studies on air pollution Meteorology with special reference to Madras City–1989–Dr. D. Viswanadam and Dr. H.S. Ram Mohan

Once a gas emitted into the atmosphere, its dispersion and the subsequent concentration are solely governed by the prevailing meteorological conditions of the region. A knowledge of atmospheric dispersal capacity is essential for developmental activities to keep the pollution level within the tolerable limit.

The main objective of the study is to provide a comprehensive picture of the atmospheric potential for the dispersal of pollutants over Madras City and neighbourhood. This includes spatial distribution of sulphur dioxide concentration due to industrial sources in additon to the establishment of climatology of atmospheric dispersal capacity. The spatial distribution of sulphur dioxide can be determined by means of theoretical models, provided the emission inventory is known in addition to the meteorology of the area.

For this study, hourly temperature and wind data at the surface, three-hourly cloud data, upper air temperature data, wind speed and wind direction fluctuation data for every 15 minutes and air pollution data were analysed. The review of literature reveals that for any urban area the study of inversions, isothermals, lapse conditions, mixing heights, ventilation coefficients, wind roses and atmospheric stability is vital. It also reveals that despite the presence of various mathematical models, Gausian plume model is the widely used on because of its encouraging results and easy adaptability. Keeping this in view fast developing metropolis, Madras situated on the east coast of India, is chose for a comprehensive study of the atmospheric dispersal capacity and the spatial distributioon of sulphur dioxide by means of Gaussian model.

The percent freqeuncy of occcurence of lapse conditions is extremely high in all the months. The hourly values of mixing heights show a clear cut diurnal variation. The diurnal march of mixing height closely follows the diurnal temperature march. The ventilation coefficient also shows a diurnal variation with highest values occurring in the afternoon hours. The most predominant Pasquill's stability class is F. Highly stable conditions during night-time and neutral to unstable conditions during daytime are the important features. The study of wind roses reveals two prominent wind directions in the entire year namely southwesterlies and northeasterlies. In most of the months calm wind prevails during night. The diurnal variation of the wind direction fluctuation range ($\sigma_\theta$:) show near-normal

distribution with the maximum around noon. A clear-cut diurnal variation of wind speed fluctuation range ($\sigma_{\theta s}$) is observed in all the months $\sigma_{\theta D}$ is found to be good measure of surface turbulence. The interrelationships among the parameters show a reasonable representation of $\sigma_{\theta D}$ for various Pasquill's classes. The mixing height can be computed even in the absence of vertical temperature structure with the knowledge of $\sigma_{\theta D}$ with a fair degree of accuracy.

The spatial distribution of sulphur dioxide concentrations shows different pattern in different months according to the meteorological conditions. In most of the cases the western and southern parts of Madras metropolitan area appear to be relatively free from pollution and the northeastern sector is almost always polluted. It is suggested that a 25% reduction in the emission will bring down the concentrations within the permissible limit. It is felt that instead of reducing the emission, the stack height could be raised by 20% which could reduce the concentrations by 50% within the first few kilometres. The extreme southwestern part would be the first choice followed by southeastern and extreme western parts, for further industrial development.