551.521.1 (545.5)

URBAN-RURAL RADIATION DIFFERENCES AT DELHI

One of the consequences of urbanization are reduction of solar radiation in an urban complex compared to rural areas (Peterson 1969). Mateer (1961) and Padmanabhamurty (1977) have shown decrease of solar radiation on holidays compared to working days. This is considered as the effect of increased pollutants in urban areas. Again for a given amount of pollutants solar radiation is reduced during winter, as the path of radiation through the particulates is long. Solar radiation during its journey to earth is absorbed by the layers of pollution resulting in elevated inversions which in turn inhibit dispersal of pollutants in the vertical (Atwater 1971). Therefore, a study of urban-rural radiation difference enables us to understand the dispersive capacities and the imbalances in the pollution potential. Most of the studies are based on data of extra tropical countries but studies in tropical latitudes are sparse or non-existent. Urban-rural radiation difference over Delhi during a winter period have been examined and presented here.

2. Bi-hourly total radiation data at Lodi Road, (urban) and Indian Agricultural Research Institute (IARI, rural) for the period 1 November '77 to 31 March '78 is utilised. Scatter diagrams were prepared between urban and rural radiations monthwise as the entire population of data showed wide scatter. Coefficients of correlation were computed and linear regression equations were fitted. March of the urban-rural differences over the entire period also was plotted.

3. The scatter diagrams of total radiation between IARI and Lodi Road for all the months, *viz.*, Nov, Dec 1977, Jan, Feb and Mar 1978 showed close relationship and correlation coefficients correspondingly came out to be 0.999, 0.984, 0.988, 0.996 and 0.989. These show that radiation at Lodi Road is linearly related to that at IARI.

Daily radiation differences (IARI-Lodi Road) are mostly positive suggesting that urban radiation is less than rural radiation which could be attributed to comparatively higher pollution levels in urban Delhi over rural Delhi. Occasions were there when the urban-rural difference became positive. This may be due to the change in the wind direction resulting in transport of pollutants from the urban complex to rural locations.

4. The study points out that urban Delhi receives less radiation than rural Delhi in winter time and less radiation at urban Delhi than rural areas in winter assists in the formation of stable layer and stagnates the pollutants for a longer period.

Meteorological Office, New Delhi
27 September 1981

B. PADMANABHAMURTY
B. B. MANDAL

References

Marshall, A., 1971, "Radiation Budget for polluted layer of the Urban Environment", *J. appl. Met.*, **10**, 2, Apr 1971, pp. 205-214.

Mateer, C. L., 1961, "Note on the effect of the weekly Air Pollution on Solar Radiation at Toranto", *Int. J. Air Water Poll.*, **4**, pp. 52-54.

Padmanabhamurty, B., 1976, "Pollution cycles and some Environmental Parameters", *Vayu Mandal*, **6**, No. 4, Oct-Dec. 1976.

Peterson, J. T., 1969, "The climate of cities"—A survey of Recent Literature.