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AIR POLLUTION AT DIBRUGARH AIRPORT

With rapid industrialization the level of air pollution is increasing menacingly day-by-day of late, all countries of the world have become conscious about the gravity of the problem since it is badly affecting the ecological balance and causing climatic changes in the long run. Thus an intimate knowledge of the present status of pollution of an area is very essential to take effective measures to check further pollution.

Out of measurement of various parameters suggested for quantification of atmospheric pollution, the most widely used one is the measurement of pH of the precipitation sample. It is a measure of the acidity of the sample and is expressed as

$$\text{pH} = -\log_{10} \frac{1}{(\text{H}^+)}$$

where (H⁺) is the hydrogen ion concentration of a sample solution in moles per litre. Of course it has to be kept in mind that pH is regarded more as an indicator of whether the sample has excess of alkali or acid, since measurement of pH of a very dilute solution are subject to many inaccuracies and one-to-one correspondence between pH and chemical constituents of the precipitation sample is not expected. In the present paper, we have studied the pH values of precipitation samples collected at Dibrugarh AP (Mohanbari) with particular emphasis upon wind direction, pollution sources and topography of the region.

A number of workers have worked on the subject. Measurement of pH values of precipitation samples

TABLE 1

Details of pollution sources

Nomenclature	Type	Direction/Distance
Dibrugarh	Urban-Industrial	West/09 km
Tinsukia	Do.	East/40 km
Duliajan	Oil field	Southeast/40 km
Moran	Do.	South/35 km
Naharkatia	Do.	Southeast/40 km
Namrup	Fertilizer plant	Southeast/41 km
Digboi	Oil refinery	East/66 km
Sibsagar	Oil and natural gas installation	South/49 km

in Europe and USA (Barret and Brodin 1955, Likens *et al.* 1979) show values close to the theoretically computed value of 5.65 at 20 deg. C. Mukherjee (1957) observed pH values of rainwater close to the neutral value 7.0 at Calcutta. Mukherjee (1981) gave physical reasoning of such high values of pH. Krishnanand (1984) made a detail study about the prospects of acid rain over India.

2. *Data and topography of the region* — Dibrugarh AP (Mohanbari) is one of the ten Background Air Pollution Monitoring Network (BAPMoN) stations in India. The pH values of precipitation samples collected at the station during July 1980 to December 1983 have been studied in this paper. Wind roses have been prepared (not shown). Conditional wind roses (Munn 1968) have also been prepared during precipitation (Fig. 2). Topography of the region with major pollution sources have been shown in Fig. 1 and nature of the pollution sources have been given in the Table 1

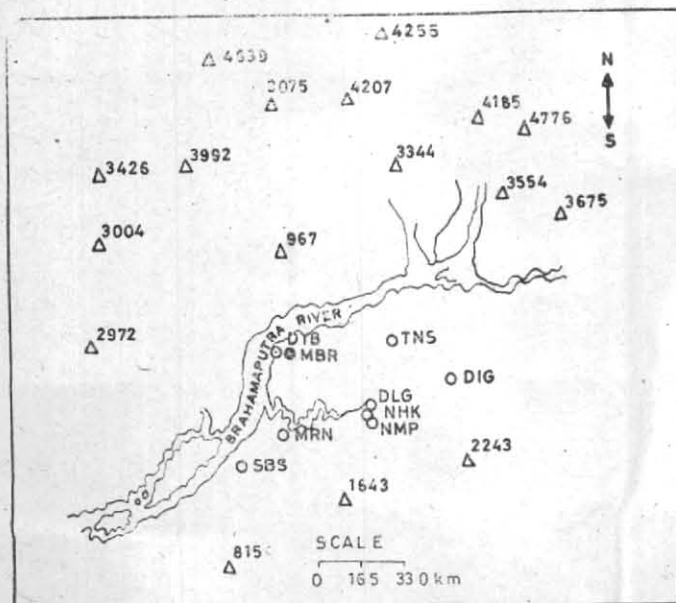


Fig. 1. Location map of pollution sources

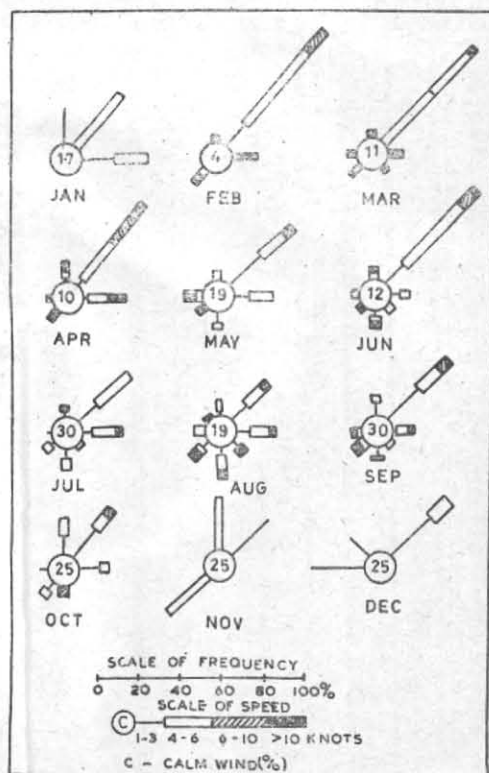


Fig. 2. Conditional wind roses during precipitation

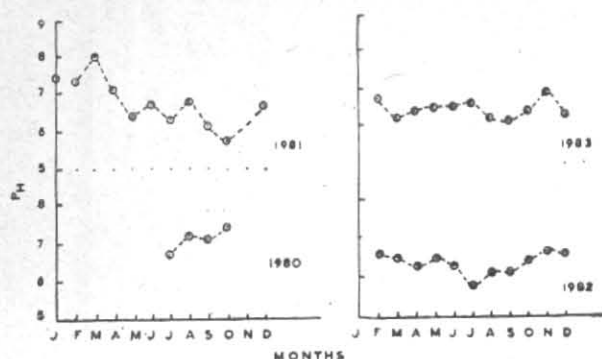


Fig. 3. monthly mean values of pH

Dibrugarh is situated on the Brahmaputra valley almost surrounded by high hills on the three sides. The hills are about 33 km away towards northwest, 140 km towards northeast and 45 km towards southeast. This particular feature of the region has been found to be important in the study.

3. *Discussion and result* — Day-to-day variations of pH values of precipitation samples (not shown) as well as monthly mean values (Fig. 3) were plotted. Conditional wind roses (Fig. 2) during precipitation for each month were prepared to see the predominance of wind from a particular sector and to see the seasonal variation. Wind roses at fixed hours over the station shows the predominance of northeasterly wind during day time and calm wind during night time. That the local sources have got good influence at the station is supported by the high concentration of nitrate and sulphat in the rainwater samples. Mean maximum monthly deposition of nitrate of 500 mg/m² occurs in July and that of sulphate of 1530 mg/m² in June (Krishnanand *et al.* 1979).

It has been observed that monthly mean values of pH for Dibrugarh are mainly varying between 6.0 and 7.0 during this period. Of course with data for such

a short period it cannot be inferred that the rate of pollution has become increasing.

Contrary to normal expectation, pH values have either remained same or slightly decreased throughout the rainy season. The reason may be attributed to the fact that during this season southerly components of wind are more pronounced compared to other seasons (Fig. 2) and the major pollution sources are located to the southern sector. pH values, during the period November to February are slightly higher compared to the rest of the year since surface wind is predominantly northeasterly (56%) or calm (22%) and there is no major pollution source to the northeast sector. The topography of the region plays a major role in dispersal of air pollution.

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