551.576.2 (549.3)

CLIMATOLOGICAL STUDY OF CLEAR, CLOUDY AND HEAVY CLOUDY DAYS IN BANGLADESH

1. By using climatological data on the total cloud amounts for 0000, 0300 and 1200 UTC of 16 stations in Bangladesh for a period of 27 years (1951-1977), the number of clear, cloudy and heavy cloudy days, dates of commencement and cessation of these days and their duration have been studied. Annual variation charts for each station have been prepared using available mean monthly cloud amounts for these stations. The following criteria are adopted in classifying the different types of situations in terms of cloud coverage :

(*i*) Clear period : When the total cloud amount varies from 0–3.0 tenth (0–30 %)

(*ii*) Cloudy period : When the total cloud amount varies from 3.0–7.0 tenth (30–70 %)

(*iii*) Heavy cloudy : When the total cloud amount exceeds 70 %.

Using the above criteria, the commencement and cessation of these periods together with their durations have been calculated (Alisov 1947, Kobisheba and Narovlianskii, 1978). The results are then subjected to cartographic analysis to establish spatial variations.

2. From the observed characteristics of the annual variation of the total cloud amounts, four distinct periods for Bangladesh are obtained. These are : (*i*) clear period, (*ii*) first cloudy period, (*iii*) heavy cloudy period, and (*iv*) second cloudy period.

3. Dates of commencement of clear period at different stations are plotted and analysed (Fig. 1). It may be seen that the clear periods do not begin simultaneously throughout the country. The clear period begins first in the northern and coastal areas of Bangladesh during first 10 days in October. In the central parts and western half of the country, it begins after 10–20 days. On the other hand, in Chittagong and Chittagong hill tracks, it begins as late as in the first week of January. Thus, the clear period commences in the whole deltaic region by October itself, whereas the commencement of this period over the Chittagong hilly districts takes places almost after two months. In general, distinct "clear period" begins after the withdrawal of southwest monsoon (Kendrew 1957 and Mobassher 1981). Climatologically, the southwest monsoon withdraws from Bangladesh by October. This shows that except over the Chittagong areas, the commencement of clear periods over the whole deltaic areas of the country takes place with the withdrawal of the southwest monsoon. With the withdrawal of southwest monsoon, normally the periphery of the Asiatic anticyclone spawns over Bangladesh and its neighbourhood, thus, inhibiting cloud formation in this area. This kind of synoptic situation normally prevails during November to February. The reason for delayed commencement of the clear period in Chittagong area, however, cannot be explained by this synoptic situation. This may be due to the local orographic effect.

The maximum duration of the clear period up to 164 days is observed over the extreme northern parts of Bangladesh (Fig. 2). An area with secondary maximum values (up to 155 days) is located in the southern parts of the country. In the central districts of Bangladesh, the duration of the clear period ranges from 110 to 130 days. The zone with maximum duration (up to 52 days) is located in the Chittagong hilly areas.

4. The first cloudy period normally begins first in the central and the southwestern parts of Bangladesh sometimes in February. Over eastern half of the country it begins 10–20 days later and in the northeastern parts almost after one month. The first cloudy period may be associated with the increased activity of the western disturbances over the region (Mobassher 1981). The area with maximum duration of this cloudy period (up to 201 days) is limited to a small zone in the northern parts of the country (Fig.3). In the remaining parts of the country, the duration of this period is more or less uniform (from 60 to 90 days). The duration sharply decreases towards south (80 days).

5. The heavy cloudy period begins first in the northeastern parts of Bangladesh sometimes at the end of April (Fig. 4). It is mostly absent in the extreme northern parts of the country. In most of the remaining parts of Bangladesh, this period begins during 10–25 May. The southwest monsoon advances into Bangladesh sometimes in the last week of May or in the first week of June (Mobassher 1981). The synoptic systems such as monsoon depression, monsoon trough etc. which normally prevail over this region during southwest monsoon period produce heavy clouding. The normal duration of heavy cloudy period is shown in Fig. 5. It may be seen from this figure that the duration of this period in the northwestern parts of Bangladesh is nearly zero. The duration is maximum (up to 139 days) in the northeastern parts of the country and sharply decreases towards the central region. In the Sunderban region the number of heavy cloudy days is only 42. In the remaining parts of the country the duration of the heavy cloudy period ranges from 90 to 115 days. It may be mentioned that the total monsoon period in Bangladesh is nearly 150 days, whereas mean duration of the heavy cloudy period is roughly 90 to 120 days. This is mainly because of the fact that intensity, formation and location of the synoptic systems giving rise to heavy clouding vary in time and space.

6. The second cloudy period begins first in the southwestern parts of Bangladesh sometime in the middle of July. In most of the remaining parts of the country, it begins in the first week of September. The duration of this cloudy period is maximum (up to 155 days) in the southwestern parts of Bangladesh. In the remaining parts of the country, the period continues for nearly two months. The cessation of heavy cloudy period and the beginning of second cloudy period seem to have close linkage with the weakening of the monsoonal circulation. However, it is interesting to note that neither commencement nor cessation of these period occurs simultaneously

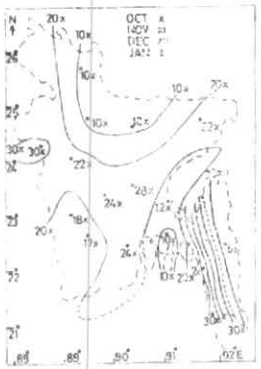

Fig. 1. Dates of onset of the 'clear period' in Bangladesh

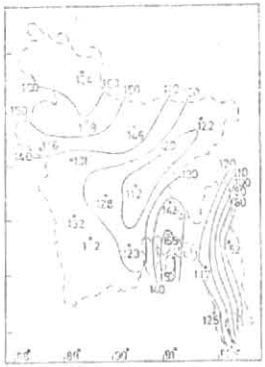

Fig. 2. Duration (in days) of 'clear period' in Bangladesh

Fig. 3. Duration (in days) of 'first cloudy period' in Bangladesh

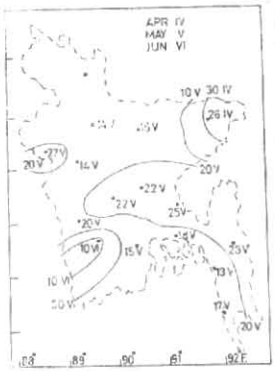

Fig. 4. Dates of onset of the 'heavy cloudy period' in Bangladesh

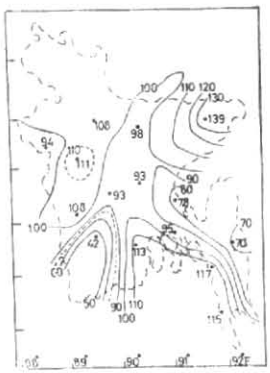

Fig. 5. Duration (in days) of the 'heavy cloudy period' in Bangladesh

at all the stations. Also, local orography and convective developments play important role in modulating the commencement/cessation and duration of these periods.

7. The study of the period presented here may be of great use for planning of solar energy conversion projects and in the evaluation of forest coverage, flooded areas fish resources etc if used in conjunction with the satellite and other remote sensing data. The climatology of cloud coverage and its temporal and spatial variations provides valuable information to understand about the synoptic systems effecting the region.

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