PP-02

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Recent Pre-Monsoon Thunderstorms Scenario over Bangladesh

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Abstract

Study is done to understand the frequency of Thunderstorms (TSs) which are locally known as Nor'westers or Kal-baishakhis, took place over Bangladesh during the pre-monsoon season (March-May) in the last 10 years (2012-2021). The data are collected from Bangladesh Meteorological Department (BMD), Agargaon, Dhaka, Bangladesh. It is found that, most of the severe TSs with wind speed 121-149 km/h which are embedded within squall lines and accompanied by lightning, thunder, hailstorms and heavy rains took place in the month of May whereas most of the moderate and light TSs took place in the month of April. The highest incidence of TSs occurred over Chattogram region, second highest occurred over Dhaka region and a good number of TSs occurred over Sylhet, Rangpur, Mymensing, Bagura and Cumilla region.

Introduction

Geographic location of Bangladesh is an indicated zone of natural disaster like storm, drought, flood etc. Bangladesh is facing a long term climate change (In last 25 years average temperature of Bangladesh increased by 1.5°C). Most of the weather events occurring over Bangladesh and its neighborhood are mesoscale or regional scale phenomena. These mesoscale phenomena are called Thunderstorms, locally known as Nor'westers or Kal-baishakhis, that occur especially during the pre-monsoon season (March to May). According to the Encyclopedia Britannica Bangladesh lies in the high rate of recurrence zone having an estimate of 60–100 TS days per year. Recently, thunderstorm with lighting has increased to such a great extent over Bangladesh that the government has declared lighting strikes as a natural disaster in August, 2015. In this study the frequency and intensity of thunderstorms that occurred over Bangladesh during pre-monsoon (March-May) season in the last ten years (2012-2021) was observed to identify the probable time of occurrence of the thunderstorms and also identify the vulnerable areas for thunderstorms so that the Govt. as well as the mass people may aware and take necessary preparation to reduce the loses of lives and properties.

Thunderstorms are developed mainly due to merging of mid-tropospheric cold dry northwesterly winds and low level southerly warm moist winds from the Bay of Bengal. A thunderstorm is basically a storm, characterized by lightning and thunder. Thunderstorm is defined as one or more sudden electrical discharges, manifested by a flash of light (lightning) (Fig.1) and a sharp or rumbling sound (thunder). Nor'westers are meso-scale severe thunderstorms that occur in Bangladesh during the pre-monsoon season (March-May). These are local severe storms. Sometimes tornado cells are embedded in mother thunderstorm cloud. Two transition periods between southwest and northeast monsoons over the India-Bangladesh-Pakistan subcontinent are characterized by local severe storms. In Bangladesh, these transition periods are known as pre-monsoon (March-May) and post-monsoon (October-November) seasons. Of these, it is the pre-monsoon season when most of the local severe storms occur over different parts of Bangladesh with frequent intervals. These storms are popularly known as Nor'westers or Kalbaishakhis (Fig.2) in Bangladesh, West Bengal and Assam of India. In this study, thunderstorms which are the local severe storms have been classified as shown in table 1.

Table 1: Classification of TSs based on wind speed

Thunderstorms	Wind speed (km/h)
Thunderstorms with gusty winds	31-40
Thunderstorms with squally winds	41-60
Light nor'westers	61-90
Moderate nor'westers	91-120
Severe nor'westers	121-149
Tornado	≥150

(Source: Bangladesh Meteorological Department)

Figure 1: Lightning in a thunderstorm

Figure 2: Nor'westers or Kalbaishakhis

Objectives of the Proposed Research

- To observe the recent scenario of thunderstorms occurred over Bangladesh during pre-monsoon season (March-May) .
- To understand the frequency and intensity of thunderstorms that occurred over different areas of Bangladesh during last ten years (2012-2021).
- To identify the probable time of occurrence of the thunderstorms.
- To identify the vulnerable areas for occurring thunderstorms so that the Govt. as well as the mass people may aware and take necessary preparation to reduce the loses of lives and properties.

Methodology

In this study recent scenario of thunderstorm events occurred in the months of March-May over Bangladesh during 2012 to 2021 have been studied. The secondary data have been collected from Bangladesh Meteorological Department, Agargaon, Dhaka. The data are analyzed by Excel program. Data are analyzed according to the wind speed, place (region) and time (month) of occurrence of the thunderstorms over Bangladesh.

Results and discussion

It is found that most of the severe TSs with wind speed 121-149 km/h took place in the month of May whereas most of the moderate and light TSs took place in the month of April. According to the data analysis the No. of severe TSs took place in the last 10 years in the month of March, April and May are 0, 4 and 17 whereas No. of moderate TSs are 4, 18, 17 and the No. of light TSs are 29, 112 and 84 respectively (shown in fig.3).

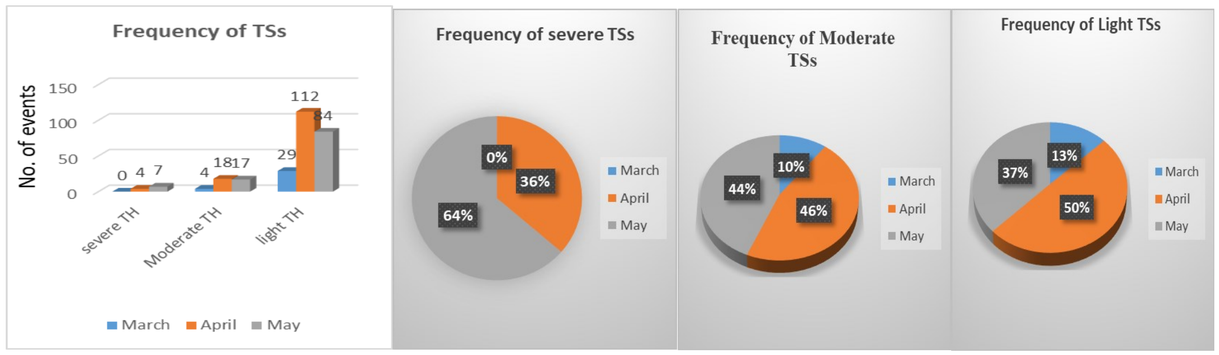

Figure 3: Frequency of severe thunderstorms during pre-monsoon season (March, April, May) of 2012-2021.

During the study period (2012-2021) there were about 06 severe TS events took place over Chattogram out of 11 events of the whole country. But the highest speedy TS (148km/h) took place over Badalgachi, Naogaon on 24.4.2015. Fig.4 shows the the frequency and wind speed of the severe thunderstorms during the study period.

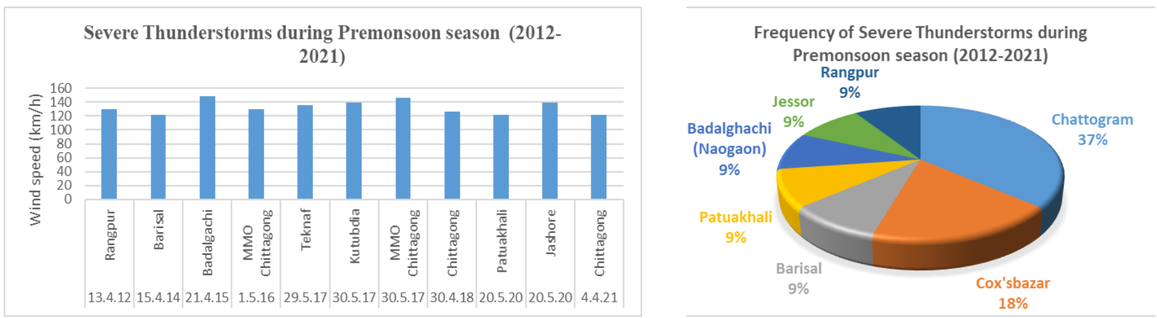

Figure 4: Wind speed and frequency of severe thunderstorms over different area of the country.

At same period 12 No. of moderate TSs with wind speed 91-120 km/h took place over Chattogram region where as 06, 05 and 05 events took place over Dhaka, Sylhet, Barishal and Patuakhali regions. Out of 304 light TSs with wind speed 61-90 km/h, 95 events took place over Chittagong region, 47 events over Dhaka region, 37 events over Sylhet region, 27 events over Rangpur region and 09 events over Mymensingh region (shown in Fig.5)

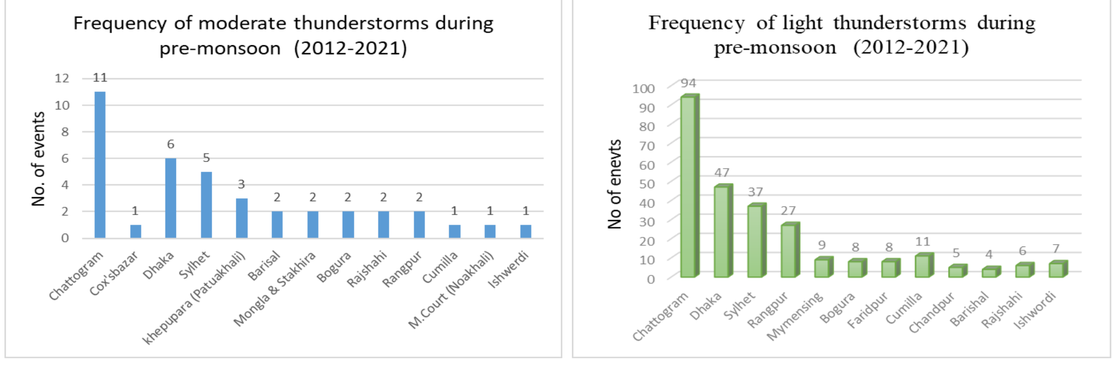

Figure 5:Frequency of moderate and light thunderstorms over different areas of the country.

It is found that the mean TS days increases significantly from March to May and the mean monthly thunderstorm events are 5,13 and 15 respectively for the months of March, April and May during 2012-2021. For the same period the mean pre-monsoon (March-May) seasonal thunderstorm is 33. Fig. 6 shows month-wise thunderstorm events including gusty, squally and nor'westers occurred over Bangladesh during the study period.

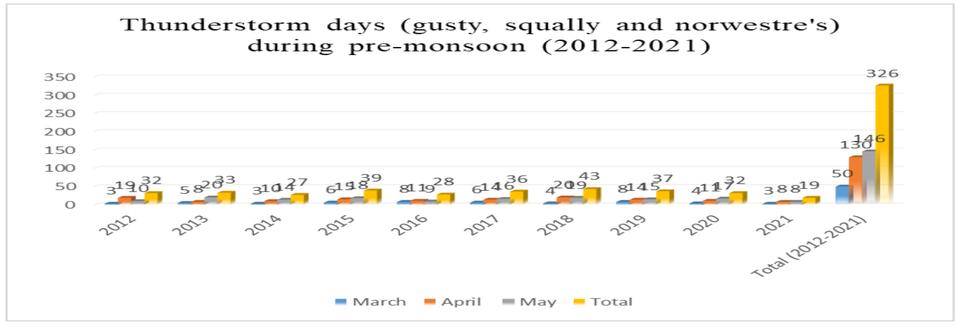

Figure 6: Month-wise thunderstorm events during the study period.

Conclusions

It is found that the mean TS days increase significantly from March to May and most of the severe thunderstorms took place in the month of May whereas most of the moderate and light TSs took place in the month of April having highest incidence of TSs occurred over Chattogram region, second highest occurred over Dhaka region and a good number of TSs occurred over Rangpur region. Most of the severe TSs occurred in Chattogram region. These violent, short-lived weather disturbance associated with lightning, thunder, dense clouds, heavy rain or hail, and strong gusty winds. Apart from local TS, some of them move towards Bangladesh from Choto Nagpur, West Bengal and north-eastern states of India.