

Recent Track Climatology of Cyclonic Disturbances over the Bay of Bengal

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Abstract

Compared to global perspective the Bay of Bengal (BoB) is an import frequently tropical cyclone forming basin. Track climatology of Cyclonic Disturbances (CDs) is imperative to minimize casualties and damages. An attempt has been made to construct the seasonal distribution of cyclones over the BoB during 1891-2020 using Bangladesh Meteorological Department (BMD) and India Meteorological Department (IMD) e-Atlas data. The most devastating cyclones' tracks of 1991, 1994, 2007, 2008, 2009 and 2020 are also drawn over the BoB. The number and frequency of cyclone over the BoB varies year to year. The analysis represents that the category of cyclonic stage are 35, 123, 97 and 28 in pre-monsoon, monsoon, post-monsoon, winter seasons respectively whereas correspondingly severe cyclonic storms are 58, 33, 103 and 26 over the BoB during 1891-2020. Initially, the cyclone of all intensity over the BoB follows Westward/Northwestwards tracks, some of them re-curved and follows North/Northeastwards tracks. Sometimes looping track is also found over the BoB. It is also found that some cyclones have completed their course of journey in the BoB without making any landfall. This variation of cyclone makes the BoB basin more vulnerable and more challenging for track forecasting.

Keywords: BoB, e-Atlas, track, cyclone and frequency.

1. Introduction

A tropical cyclone is a disturbance and it is a rapidly rotating storm system characterized by a low-pressure center, a closed low-level atmospheric circulation, strong winds, and a spiral arrangement of thunderstorms that produce heavy rain or squalls. Atmosphere and ocean are replete with inertial waves and intra-seasonal oscillations, which play a very important role in transferring energy and momentum [12]. TC forms frequently over 5° to 30° latitude from the equator [2]. A TC may path 300-400 miles on average per day and may pass up to 3000-miles before its death [net &11]. Precondition of Tropical Cyclone genesis are - (i) >60% Humidity at lower level (ii) SST> 27°C (iii) Lower level vorticity (iv) Co-riolise force effect at >5° lat. and wind speed at least 62-88 km/hr. A series of low-pressure systems form over Bay of Bengal and move to W, NW, N, and NE direction across India, Bangladesh & Myanmar more [1, 5, 7, 8]. Bangladesh is a playground of different natural disasters of meteorological region [6]. Complex funneling shape of Bangladesh coast have made the weather system complicated here [3, 4, 9]. The landfall of the TCs brings a lot of devastating impact on the coastal regions

especially in the eastern coast of India because of its shallow bathymetry, funnel shaped architecture of coast line, low-lying delta areas associated with large number of river basins and highly dense population along the coast [10, 13, 14]. So, It is important to know the long term variation of their frequencies and trend [14]. Most of the TC being formed in the southern Bay near Andaman Island during the month of April and May of pre-monsoon season and October to November of Post-monsoon season [3]. Total Cyclonic Disturbance is decreasing but increasing its intensity. Dissipated of cyclone is less at monsoon, pre-monsoon, & post-monsoon respectively.

2. Objectives

Due to Geographical location, BOB form frequently Cyclonic disturbance. Bangladesh is situated on the bank of head Bay and that's why the coastal people of Bangladesh suffered more. The objectives of this paper are – a. To observe the Tropical Disturbance(TD) over Bay Of Bengal(BOB) during 1891-2020, b. To find out the intensity of Cyclone after its landfall, c. To observe the cyclone track over BOB and d. To find out the seasonal variation of Tropical Disturbance.

3. Methodology

All of the data from 1891 to 2020 have been taken from BMD and RSMC in New Delhi. Cyclonic disturbance(CD), Depression(D), Cyclone(CS), Severe Cyclone (SCS) etc. events are counted. BMD has no earlier cyclone records. At this stage, few data from IMD have been included with BMD data for drawing graph & tracks Cyclones which recently (1990-2020) made landfall in Bangladesh Coast are counted for drawing track. For measuring intensity after landfall, there is no regular data in BMD, but a few data are available at achieves in RSMC. Available data of excel and ArcGIS has been used for analysis.

4. Result & Discussion

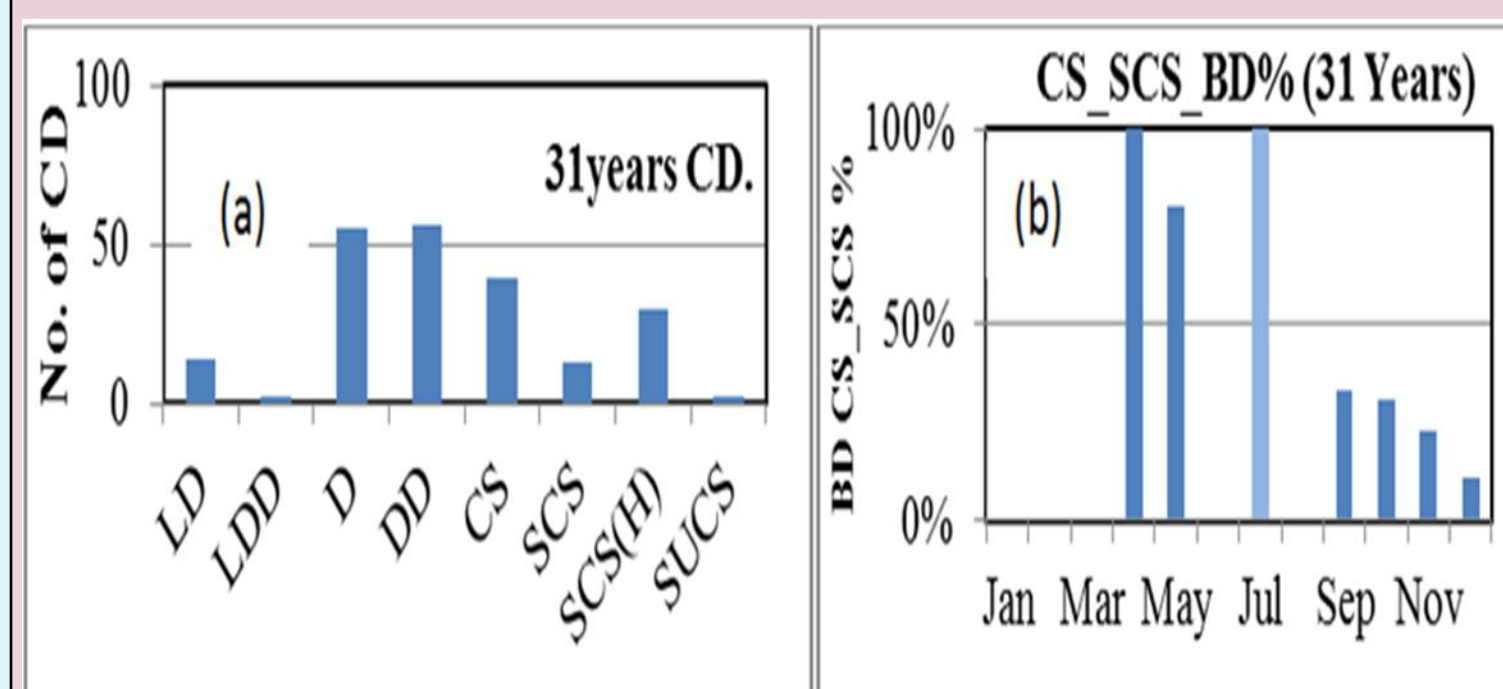


Figure 1. (a-b): No. of CD and monthly rate of landfall over BD and adj. during 1990-2020.

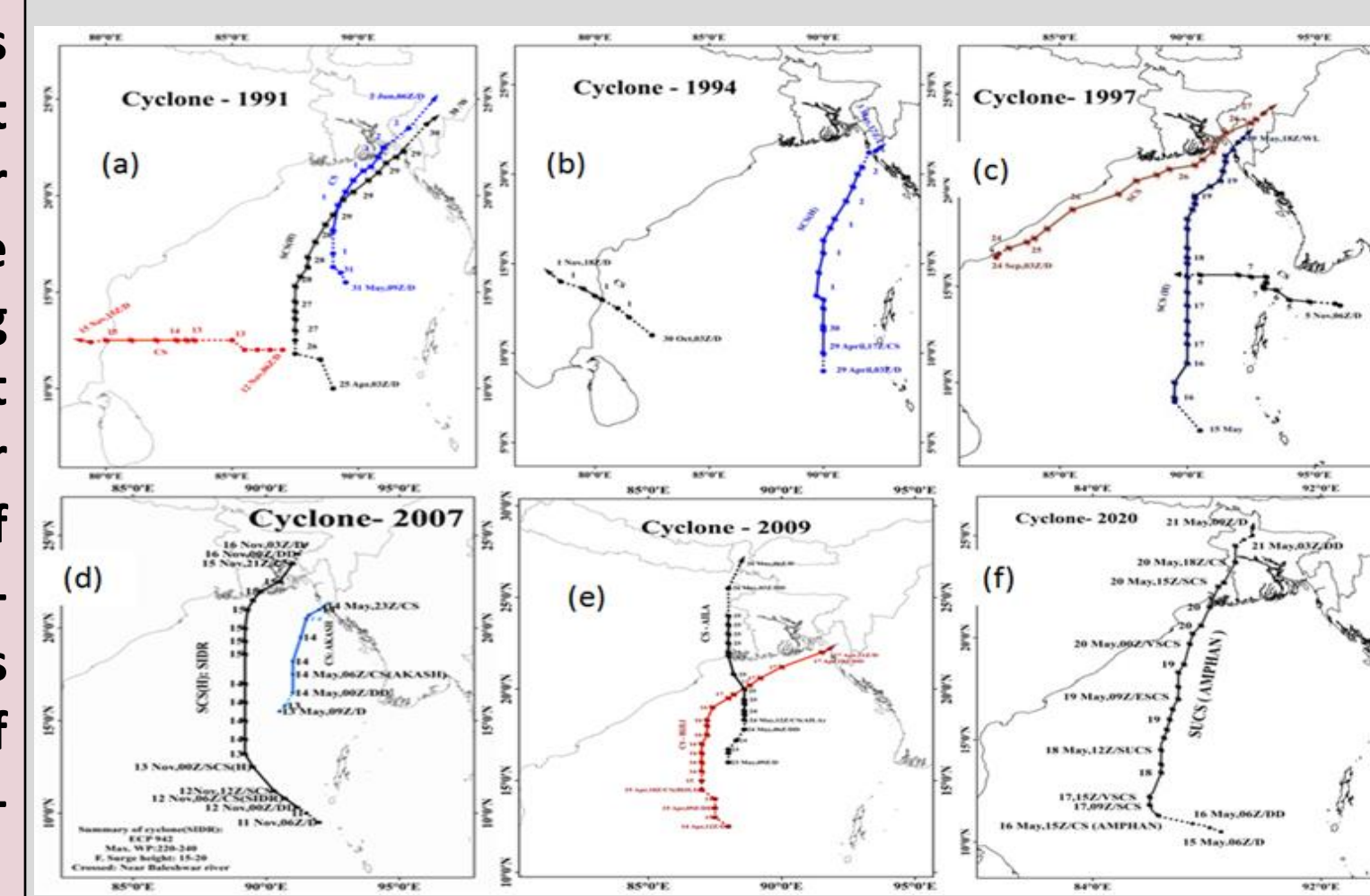


Figure 2. (a-f): Track of Recently devastating 6 cyclones of Bangladesh.

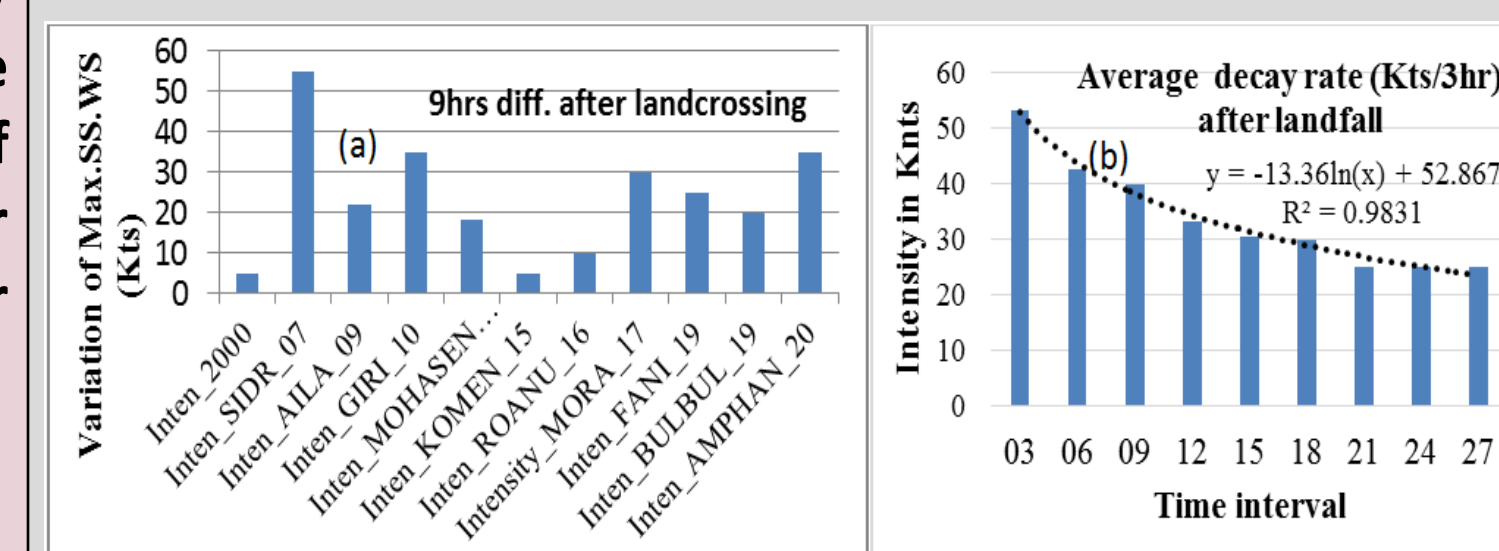


Figure 3. (a-b): Decay feature of 11 cyclones after landfall of Bangladesh & adjoining area.

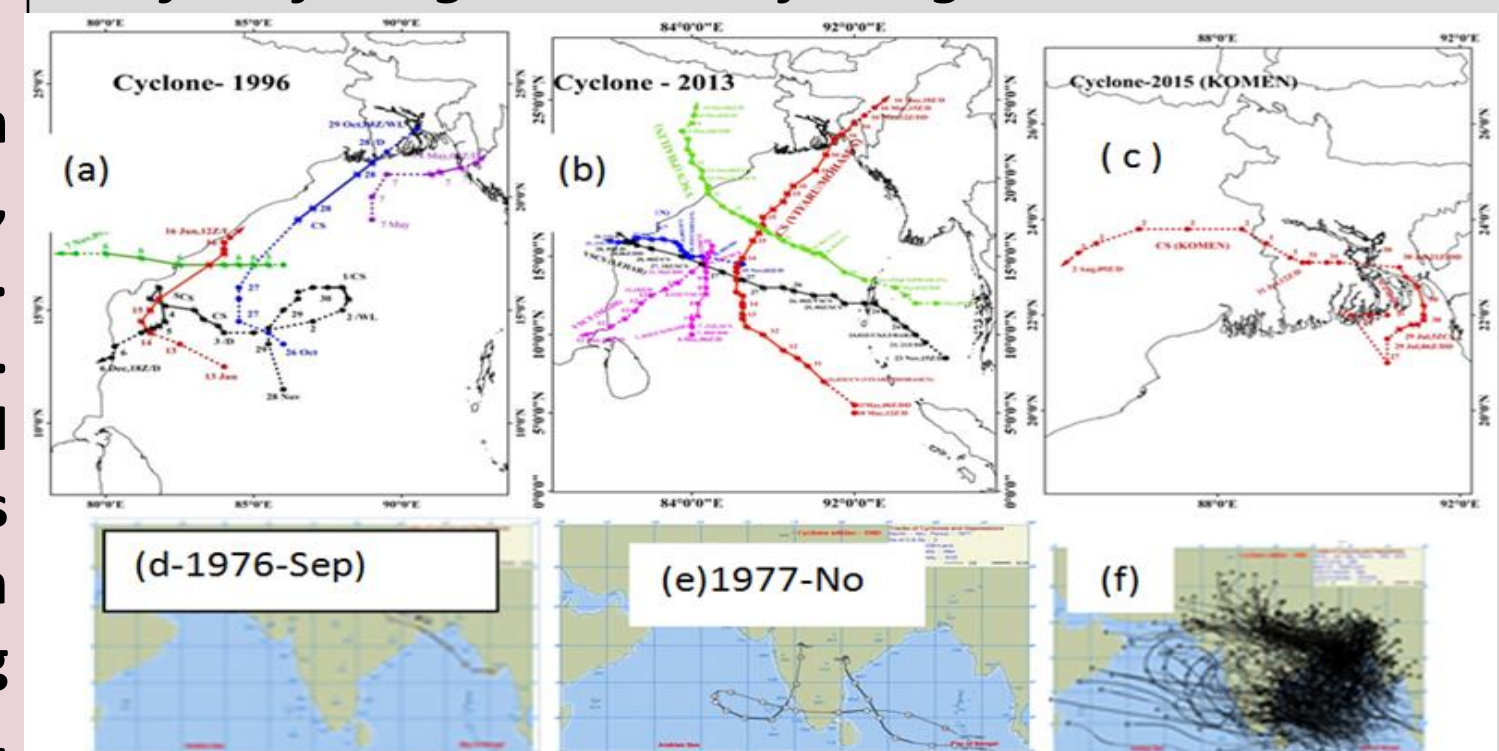


Figure 4 (a-j): Critical loop path, Tracks, and CS_SCS track during 1891-2020.

5. Conclusion

During pre-monsoon season most of the cyclone tracked N/NE wards, following landfall over Myanmar & Bangladesh coasts. During monsoon most of the cyclonic disturbances moved westwards and their tracks were long than other seasons. Sometime cyclone may show their critical track which direction detect is very difficult at previous time. Total no. of cyclonic disturbances is found to increase during 1891-1990, but it is found to decrease slightly afterwards. Dissipation rate of CDs over BOB is very less in monsoon season. The decay rate of recent CSs after landfall over Bangladesh coast is about 13.4 kts/3 hr.

References: References will be provided on request.