

Report on Extreme Weather Events during January-May 2019

1. Introduction

As per the classification of the seasons, January and February constitute the winter season whereas March, April and May constitute the summer or pre-monsoon season. The winter season is associated with the passage of Western Disturbances (WDs) through the northern parts of the country causing weather phenomena like rainfall/snowfall over the Western Himalayan Region and rain/thundershower activity over the adjoining plains. The WDs in course of their eastward movement cause weather activities over eastern and northeastern states. Passage of WDs under favourable conditions gives rise to the occurrence of hailstorms over these regions. In addition, the season is also characterized by fog, cold days, cold waves and similar other weather events, the spatial coverage and intensity of these being regulated by the frequency, intensity and latitudinal extent of the passing WDs. During this season, the extreme south peninsula also gets rainfall/thundershower activity associated with the passage of easterly waves. The interaction between the westerly systems and the high amplitude easterly waves occasionally give rise to the occurrence of severe weather over the central parts of the country. The pre-monsoon season from March to May is mainly associated with convective weather phenomena like thunderstorm, dust storm, squalls and dust raising winds. The day temperatures can shoot up under favourable conditions and can give rise to heat wave and hot day conditions especially along the northern plains and central parts of the country, the frequency of which are maximum in the month of April and May. This season is also characterized by the formation of low pressure system over the north Indian Ocean and their intensification into cyclones. In this report, an attempt is made to bring out the details of the extreme weather phenomena and their impact during the winter and pre-monsoon seasons of 2019.

2. Low Pressure Systems

During the winter season from January to February, one cyclonic storm PABUK formed in January 2019. It originated as a low pressure area (LPA) over South China Sea on 28 December 2018 and concentrated into a tropical depression on 31 December. At around 0600 UTC of 1 January 2019, it further intensified into a tropical storm PABUK. It weakened into deep depression on 6 Jan at 0600 UTC. The system crossed Andaman Islands as a deep depression close to south of Port Blair between 1300 UTC and 1500 UTC on 6 Jan. Figure 1 shows track of the Cyclonic Storm PABUK. Besides this cyclonic storm, one low pressure area formed in January and 3 short lived low pressure areas formed in February.

During the pre-monsoon season from March to May, an Extremely Severe Cyclonic Storm (ESCS, FANI, 26 April - 4 May 2019) formed over Bay of Bengal. Track of the system is given in Figure 2. Besides this ESCS, one short lived low pressure area formed on 30 May 2019 over southwest Arabian sea off Somalia coast which dissipated on 31 May.

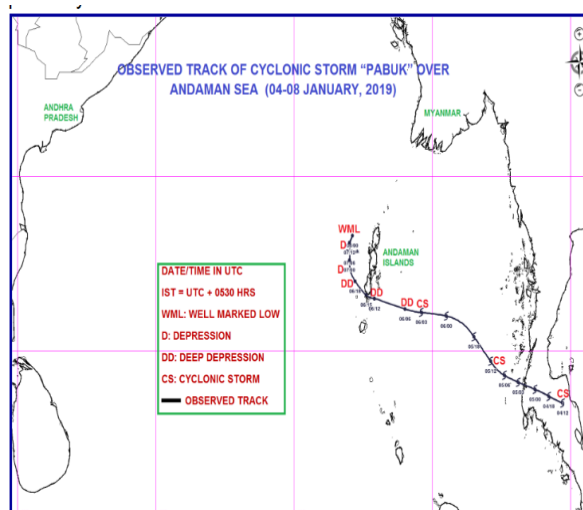


Figure 1: Observed track of Cyclonic Storm “PABUK” over Andaman Sea (04-08 Jan 2019).

places over Punjab on 1st and then nearer the month's end from 29th to 31st in Gangetic west Bengal, Telangana, Central India sub-divisions of Madhya Pradesh, Chattisgarh, Odisha and Vidarbha. The minimum temperatures were normal to below normal over most days of the month of January and the month's lowest minimum temperature over the plains of the country was -1.1° C recorded at Churu (West Rajasthan) on 29th January.

The minimum temperatures were mostly normal over south Peninsular region, normal or below normal over East and Northeast India except towards the month's end of February. A drop in temperature over northwest and central India was observed in coincidence with precipitation/hailstorms. The lowest minimum temperature recorded during the month over the plains was 1.4° C at Churu (West Rajasthan) on 9th February 2019.

6. Hailstorms

The Hailstorm activity was not much during winter and pre-monsoon seasons of 2019. Due to hailstorm, around 1,102 birds got killed in Madhya Pradesh in March. (The Hindu 3 March). As per the available data, a total of 85 hailstorm events were recorded over the country during the Storm Period-2019 i.e. period from 1 March to 30 June, 2019 (Based on STORM report IMD, 2019). On region wise distribution it was observed that during Storm Period-2019, Northwest India recorded highest number {51(60%)} of hailstorm events followed by East India and Central India with 23(27%) and 6(7%) hailstorms respectively i.e. these three regions accounted for about 94% of the total hailstorm over the country during entire STORM period. South Peninsular and Northeast India recorded only 3 and 2 hailstorms respectively during the entire FDP STORM period. As per the data available, no hailstorm was reported over West India.

Statewise, Uttarakhand recorded maximum 15 hailstorms followed by Himachal Pradesh & Sikkim with 13 hailstorms each and Jammu & Kashmir 12 hailstorms i.e. these four states accounted for about 62% of the total hailstorms over the country. As per the data received, no

hailstorm was recorded over the states Andhra Pradesh, Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Delhi, Goa, Gujarat, Kerala, Lakshadweep, Maharashtra, Manipur, Mizoram, Tamilnadu, Telangana, Tripura, and Vidarbha. Gangtok and Shimla received highest number (10 each) of hailstorms followed by Mukteshwar (8) and Batote (5).

Monthwise study of hailstorm data revealed that around 32% hailstorms occurred in April followed by March and May (26% each). Comparatively lesser hailstorms (16%) were observed in June. As observed, although cloud organization and associated thunder squall surface winds are highest over east and northeast India during the pre-monsoon season, the hailstorm frequency is highest over East India and Northwest India especially so over the mountainous terrain along the Himalayas, where the freezing level is lowest. Their frequency is also highest in early pre-monsoon season - March, April and early May when the atmosphere freezing level is generally low.

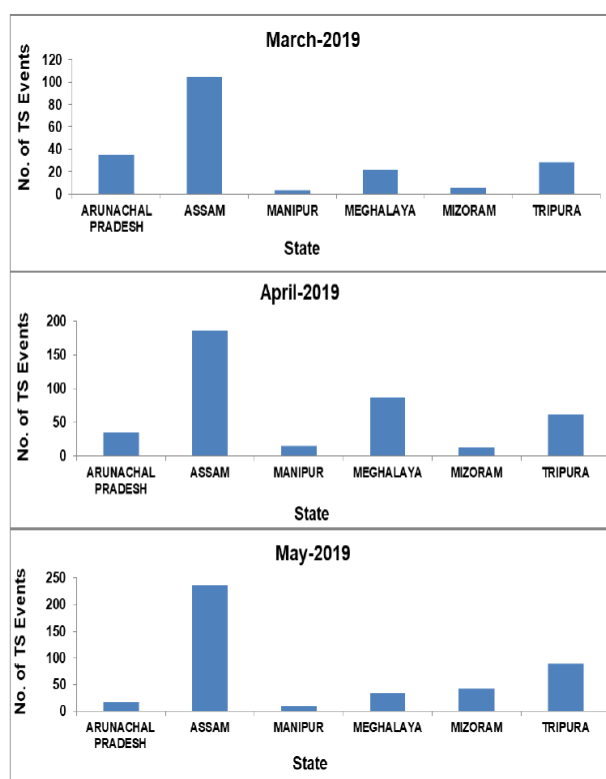


Figure 3: State wise distribution of thunderstorm events in different months of pre-monsoon season during Mar-May 2019 (Source: STORM Period 2019).

7. Thunderstorm Activity of the Pre-Monsoon Season

The convective activity during the pre-monsoon season was very significant during the year 2019. State wise distribution of thunderstorm events in different months of pre-monsoon season during Mar-May 2019 over Northeast India is shown in Figure 3. State wise, Assam recorded the highest number of thunderstorm events in all the four months i.e. March (53%), April (40%), May (55%) and June (48%) as compared to other states followed by Arunachal Pradesh in March, Meghalaya in April and Tripura in May (Fig 3). On a single day, the highest number of stations getting thunderstorm events in the region were 14 on 31 March, 15 on 2 April and 12 each on 13 & 23 May 2019.

A severe thunderstorm activity was observed over Central India during 15-17 April, 2019. The period of 15-17 April was marked by a spell of frequent thunderstorms over the central Indian region. Thunderstorm activity over the region decreased after 17 April. This spell of weather included squall reports over Nagpur on 15 and 16 April and hailstorm reports over Guna and Sagar on 17 April. The lightning observations valid for 0715 to 1015 UTC of 17 April depicting the thunderstorm activities during these periods are shown in Figure 4 (a, b & c).

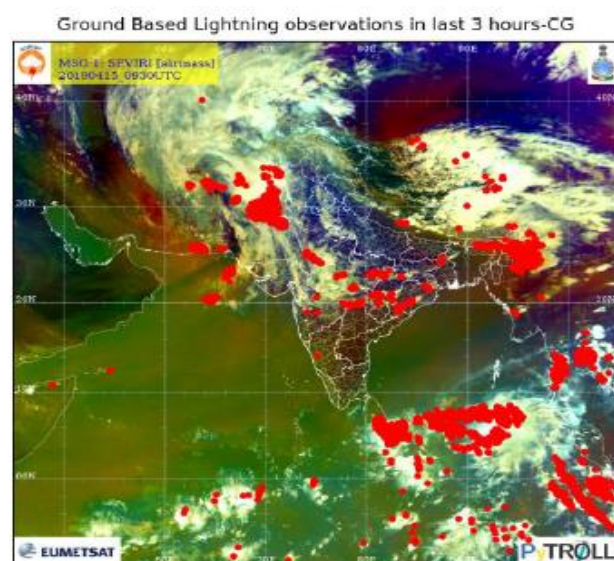


Figure 4 (a): Lightning observations valid for 0630 to 0930 UTC of 15 April 2019.

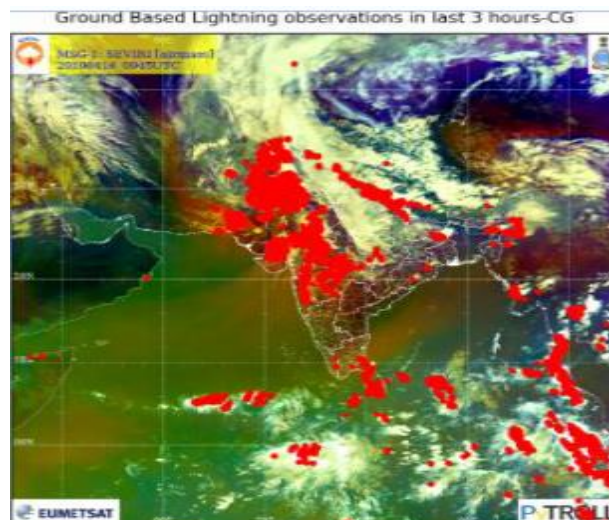


Figure 4 (b): Lightning observations valid for 0645 to 0945 UTC of 16 April 2019.

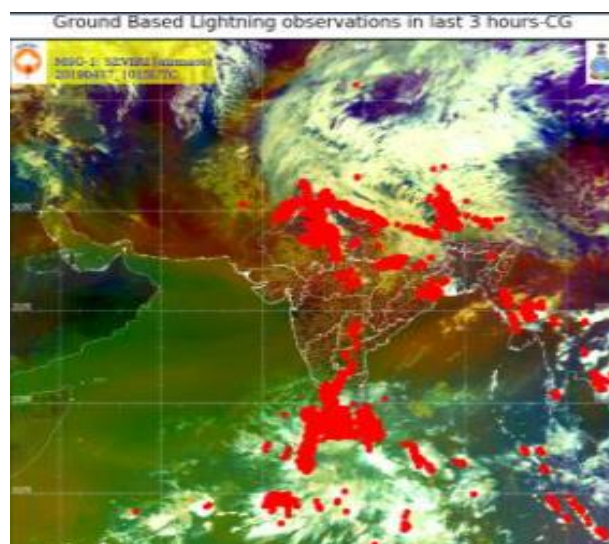


Figure 4 (c): Lightning observations valid for 0715 to 1015 UTC of 17 April 2019.

At least 60 people were reported dead across northern and western India. 50 people were reported dead in Rajasthan, Madhya Pradesh, Gujarat and Maharashtra. 4 people from Maharashtra and 3 from Manipur died during the month of April and 8 persons were reported dead in Uttar Pradesh during the first week of May.

8. Heat Wave

During the pre-monsoon season, heat wave/severe heat wave conditions were observed in all the three months. In the month of March and April, heat wave conditions were observed during 26-31 March, 1-16 April and 26-30 April at a few places

in some parts of central and northwest India. Heat wave conditions again re-emerged in the last week of the month of April over some parts of central India and Maharashtra. During the month of May, the spatial extent of heat wave conditions increased as it was observed on few days in isolated parts of the entire country except over northeast, extreme north & west coast of India. Vidarbha experienced heat to severe heat wave conditions throughout the month of May 2019. One person was reported dead during the first week of April in Aurangabad district of Maharashtra and two persons were dead during the first week of May in East Godavari district of Andhra Pradesh. One person was reported dead during the first week of April in

Aurangabad district of Maharashtra and in addition, two persons were reported dead during the first week of May in East Godavari district of Andhra Pradesh.

As per media reports, three suspected sunstroke deaths were also reported in Kerala in March due to Heat Wave.

Acknowledgements

This report is prepared by referring to the inputs from IMD Pune and NWFC. The tracks of the low pressure systems have been taken from the reports of RSMC, New Delhi on tropical cyclones. This report has been compiled by D. R. Pattanaik, Numerical Weather Prediction Division, IMD, New Delhi.