

## Report on Extreme Weather Events during January-May 2020

### 1. Introduction

As per the classification of the seasons used by IMD, January and February (JF) 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) originated in the Mediterranean Sea region 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. While moving eastward, the WDs 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 (MAM) 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 2020.

### 2. Low Pressure Systems

During the winter season from January to February 2020, no intense system formed over the Indian Seas. However, during this season, two intense low pressure systems formed in the month of May: A Super Cyclonic Storm (SuCS, AMPHAN, 16-21 May) over the Bay of Bengal and a Depression (29-31 May) over the Arabian Sea. Besides these two systems, a low pressure area formed over the south Andaman Sea and adjoining Southeast Bay of Bengal on 1st May and became less marked on 6th May (Figure 1). The cyclonic circulation associated with the above low pressure area, persisted over the same region from 6-12 May. Under the influence of this cyclonic circulation, a low pressure area formed over southeast Bay of Bengal and adjoining south Andaman Sea on 13th May and became well marked over southeast Bay of Bengal & neighbourhood on 14th May. It concentrated into a Depression over southeast Bay of Bengal and lay centred 0000 UTC of 16th May 2020 near Lat. 10.4°N/ Long 87.0°E. The system Crossed West Bengal-Bangladesh coasts as VSCS across Sundarbans, near Lat.21.65°N/Long. 88.3°E during 1000-1200 UTC on 20 May. The Satellite, Radar and Scatterometer wind (SCAT SAT) during AMPHAN is shown in Figure 2.

The above system caused heavy to very heavy rainfall with isolated extremely heavy rainfall over Gangetic West Bengal. Under the influence of a cyclonic circulation over west-central and adjoining southwest Arabian Sea, a low pressure area formed over west-central Arabian Sea on 28th May and became Well Marked Low Pressure Area over the same region on 29th May. It concentrated into a Depression over south coastal Oman and adjoining Yemen at 0900 hrs IST 29th May 2020 near Lat.17.5°N/Long.54.0°E.

### 3. Western Disturbances

A total of 15 WDs (including 8 upper air cyclonic circulations, 4 troughs in westerlies and 3 induced

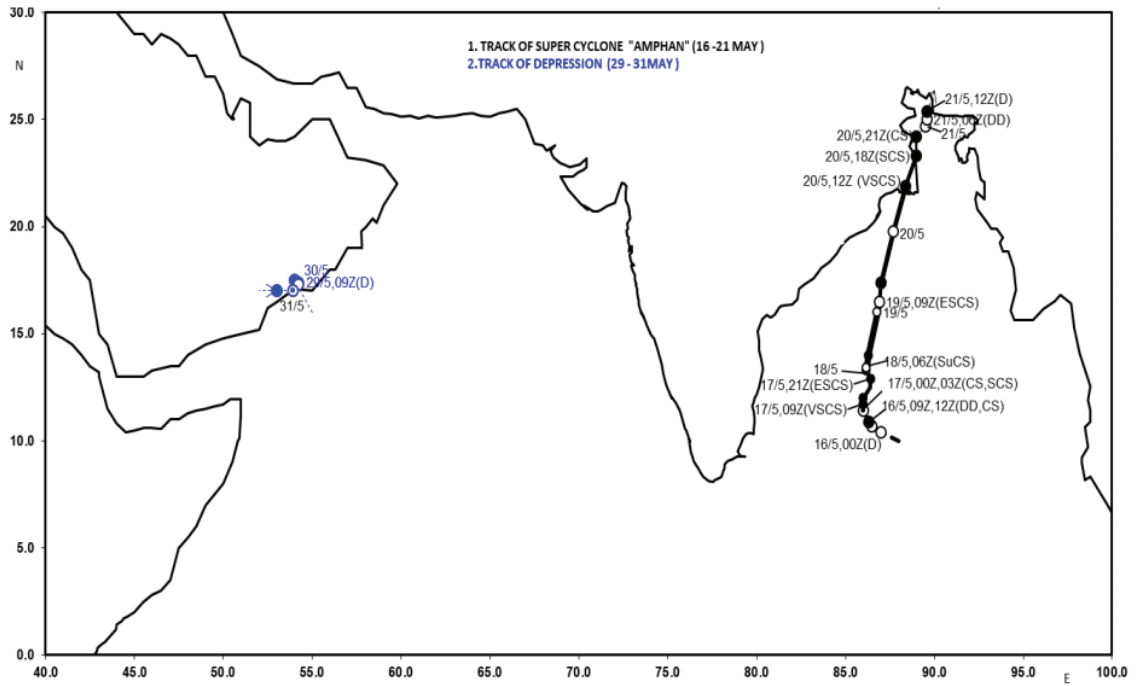


Figure 1: Track of Super Cyclone AMPHAN over the Bay of Bengal during 15-21 May, 2020 and a Depression over the Arabian Sea during 28-29 May 2020.

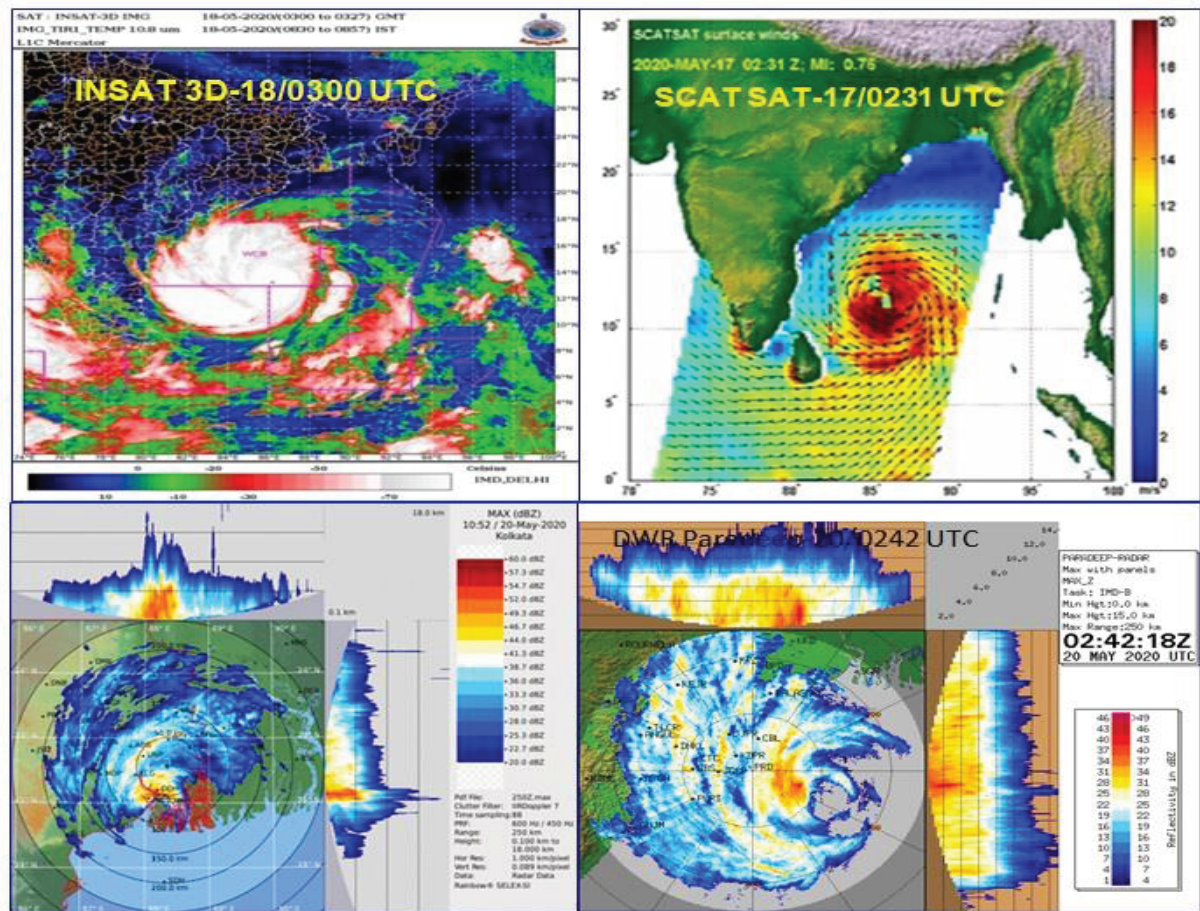


Figure 2: The Satellite, Radar and Scatterometer wind (SCAT SAT) during the Super Cyclone AMPHAN.

cyclonic circulations), 21 upper air cyclonic circulations, 1 trough in easterlies and 8 other troughs formed which affected the weather over the country during the month of January, 2020. During the month of February, a total of 14 WDs (including 7 upper air cyclonic circulations, 5 troughs in westerlies and 2 induced systems), 27 upper air cyclonic circulations and 4 troughs in the easterlies and 7 other troughs/wind discontinuities formed which affected the weather over the country during the month of February.

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### 4. Significant Weather Events

The significant weather events those occurred during the winter and pre-monsoon season of 2020 as obtained from the Climate Diagnostic Bulletin, published by IMD Pune is shown in Figure 3a & 3b respectively. Snowfall (Avalanche) and Cold wave were the major weather events during the winter season, although hailstorm and heavy rainfall also caused damage to Rabi crops (Figure 3a) as discussed below.

**Snowfall (Avalanche):** Due to avalanche, 13 persons reportedly claimed dead from Bandipora, Doda, Ganderbal and Kupwara districts of Jammu & Kashmir (7, 13, 14 Jan).

**Cold wave:** Due to severe Cold wave, total 62 persons reportedly claimed dead from northern India. Of these, 45 persons reportedly claimed dead from East Champaran, Muzaffarpur, Sheohar and Sitamarhi districts of Bihar on 1 Jan. 16 persons

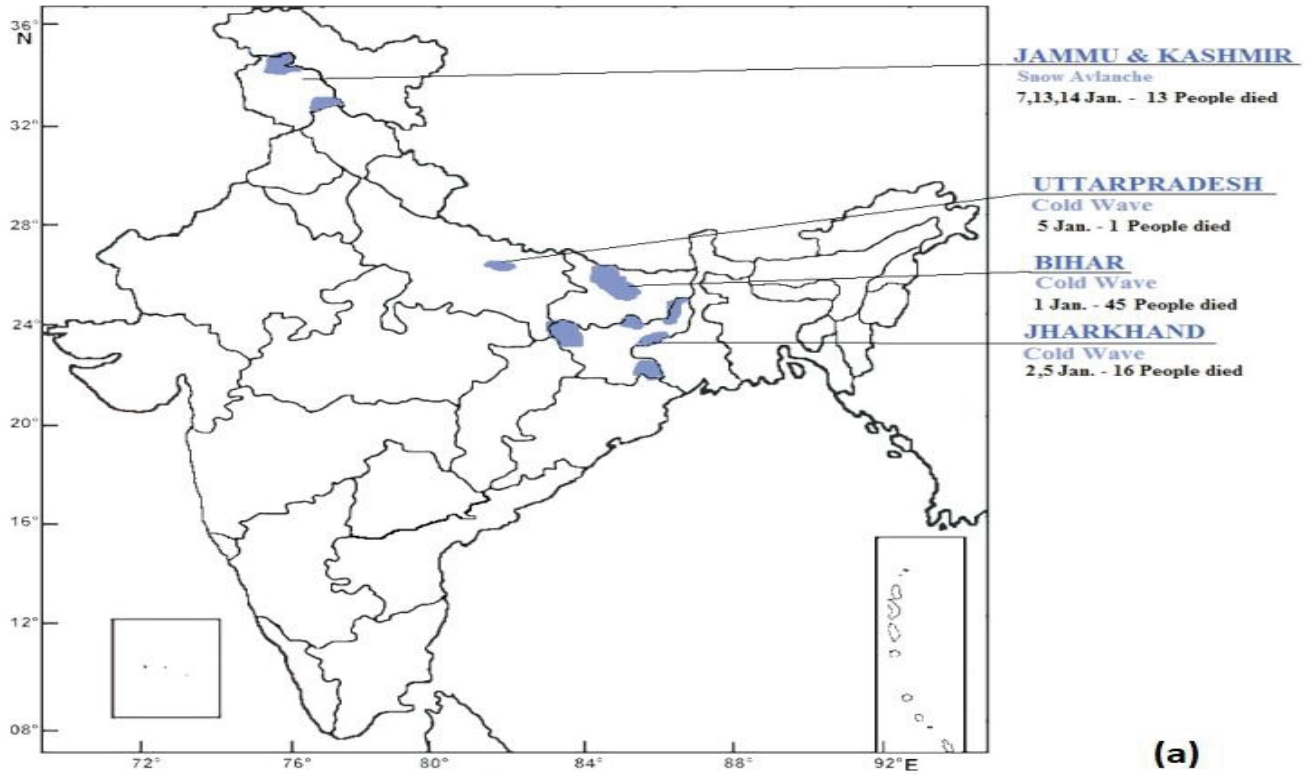
reportedly claimed dead from Bokaro, nd th Chatra, Dhanbad, East Singhbhum, Garhwa, Koderma & Ramgarh districts of Jharkhand (2 & 5<sup>th</sup> Jan.). While one person from Barabanki district of Uttar Pradesh on 5 Jan.

Even the hailstorm and heavy rain also caused damaged to crop. During the season, Rabi crops including Wheat & Tur as well as fruits & vegetable crops damaged due to hailstorm in Akola, Amravati, Buldana, Gondia, Hingoli, Nagpur, Nanded, Wardha, Washim & Yavatmal districts of Maharashtra on 1, 2, 8 Jan. & 24 Feb. Similarly due to heavy Rain Rabi crops including Gram, Tur, Wheat, Jawar, fruits & vegetables damaged in Beed, Hingoli, Nanded, Parbhani districts of Maharashtra on 3rd Feb.

During the pre-monsoon season, 234 persons reportedly claimed dead & more than 40,000 livestock perished due to the different weather events as discussed below (Figure 3b).

**Cyclonic Storm:** Due to the Super Cyclonic Storm AMPHAN, in total 90 persons reportedly claimed dead. Out of this number, at least 86 belonged to East Midnapur, North 24 Parganas, South 24 Parganas, Kolkata, Hooghly and Howrah districts of West Bengal. Further, 4 persons and nearly 4000 livestock reportedly died from Odisha. Damage also occurred to about 88,000 hectares of paddies and 2,00,000 hectares of vegetable and sesame crops. Thousands of mud houses were damaged. Several trees and electric poles uprooted.

**Thunderstorms:** Due to thunderstorms, 68 persons reportedly claimed dead from north eastern & central parts of the country. Of which, 52 persons were from Arwal, Aurangabad, Bhojpur, Bhagalpur, Banka, Darbhanga, Gaya, Jamui, Jehanabad, Kaimur, Katihar, Nalanda, Nawada, Patna, Purnea, Rohtas, Saharsa, Saran, Sheikhpura, Samastipur, Siwan, Sitamarhi districts of Bihar on 13th March, 26th April & 5th, 7th, 19th & 30th May. While more than 900 livestock perished from Aurangabad district of Bihar on 14th March. 14 persons reportedly claimed dead from Chatra, Dhanbad, Deoghar, Giridih, Gumla, Hazaribag, Lohardaga, Palamu, Ranchi, Ranghar districts of



SNOW AVLANCHE / COLD WAVE

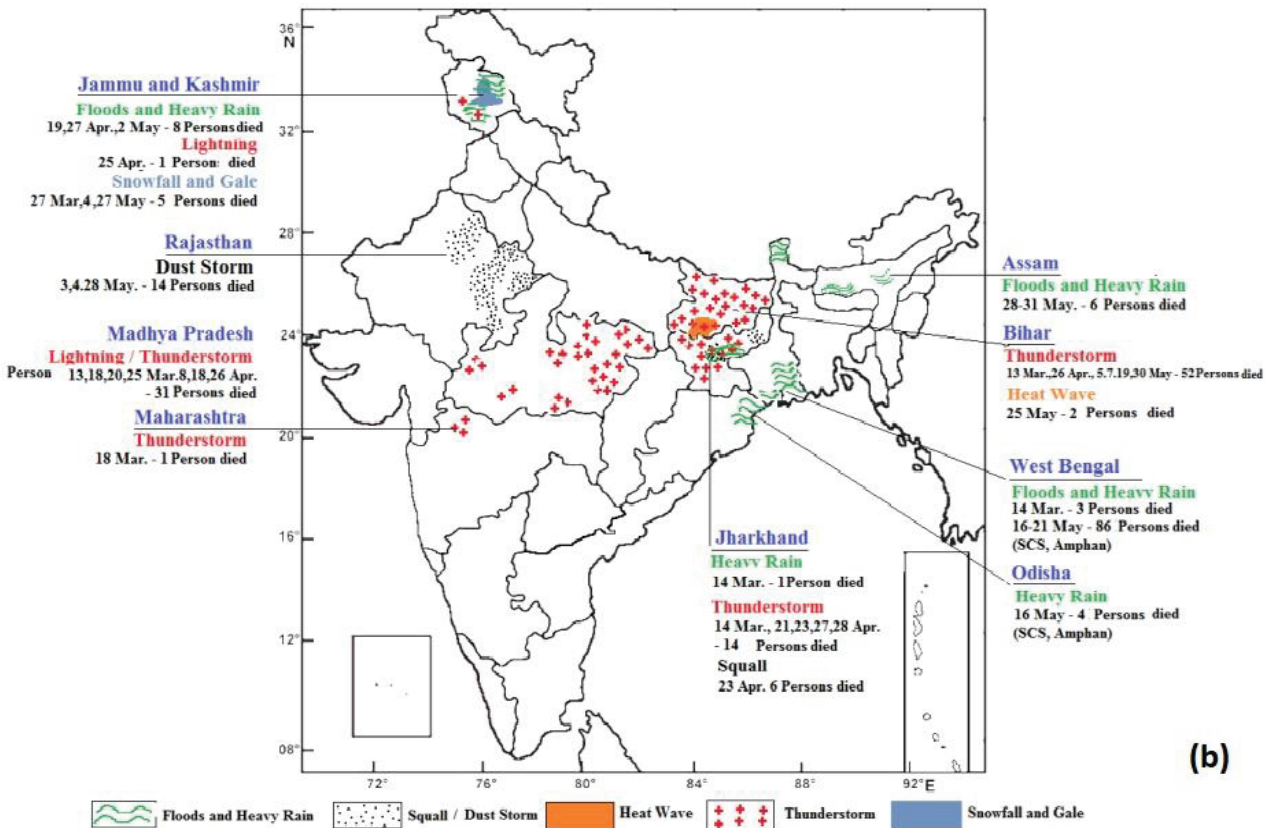


Figure 3: Significant weather events during (a) Winter and (b) Pre-monsoon seasons, 2020.

Jharkhand on 14th March & 21st, 23rd, 27th, 28th April. Also, one person each reportedly claimed dead from Dhule district of Maharashtra (18th March) & Damoh district of Madhya Pradesh (18th April).

**Lightning:** Due to Lightning, 31 persons reportedly claimed dead from Madhya Pradesh & Jammu & Kashmir. Of which, 30 persons were from Chhindwada, Damoh, Dewas, Dindori, Mandla, Panna, Ratlam, Rewa, Sagar, Satna, Shahdol, Sidhi, Singrouli & Umaria districts of Madhya Pradesh on 13th, 18th, 20th, 25th March & 8th, 18th, 26th April. While one person reportedly claimed dead from the forest area of Rajouri district of Jammu & Kashmir on 25th April.

**Dust Storm:** Due to Dust Storms, 14 persons reportedly claimed dead from Alwar, Churu, Dhaulpur, Jaipur, Karauli, Kota & Tonk districts of Rajasthan on 3rd, 4th & 28th May.

**Squalls:** Due to Squalls, 6 persons reportedly claimed dead from Dumka and Ramghard districts of Jharkhand on 23rd April. Damage to property and agriculture was reported from Hazaribagh and Ranchi districts on 27th and 29th April.

**Gale:** Due to Gale, 3 persons reportedly claimed dead from Anantnag & Shopian districts of Jammu & Kashmir on 27th May.

**Heat Wave:** Due to Heat Wave, 2 persons reportedly claimed dead from Gaya districts of Bihar on 25th May.

**Heavy Rain:** Total 18 persons reportedly claimed dead due to the events caused by heavy rains during the season from different parts of the country. Of these, 8 persons reportedly claimed dead from Budgam, Kishtwar, Rajouri & Shopian districts of Jammu & Kashmir on 19th, 27th April & 2nd May.

While, 6 persons reportedly claimed dead & 35000 livestock perished from Goalpara, Hojai & Nagaon districts of Assam during the period 25th to 31st May. Landslide due to heavy rain claimed lives of 3 persons from Darjeeling, West Bengal on 14th March. One person reportedly claimed dead from Bokaro district of Jharkhand on 14th March. Damage to crops, roads & houses also reported from different parts of the country.

**Hailstorm:** Extensive damage to crops, fruits, vegetables as well as houses reported from Annapur, Balaghat, Betul, Bhind, Chhattarpur, Dindori, Hoshangabd, Jabalpur, Katni, Khandwa, Mandla, Morena, Narsingpur, Panna, Raisen, Sagar, Sahadul, Satna, Sheopur, Seoni, Shahdol, Sidhi, Tikamgarh, Uamaria, Vidisha districts of Madhya Pradesh on 2nd, 4th, 6th, 13th, 18th, 19th, March & 25th, 26th April. Damage to crops, vegetables & fruits reported from Ahmednagar, Amravati, Aurangabad, Bhandara, Chandrapur, Dhule, Gondia, Hingoli, Jalana, Jalgaon, Nashik, Nagpur, Nanded, Nandurbar, Osmanabad, Parabhani, Satara, Solapur, Wardha, Washim districts of Maharashtra on 1st & 18th March and from Anantnag, Baramulla, Budgam, Kupwara, Pulwama, Shopian districts of Jammu & Kashmir on 27th April, 2nd, 5th, 17th and 29th of May.

**Snowfall (Avalanche):** Due to avalanche, 2 persons reportedly claimed dead from Ganderbal district of Jammu & Kashmir on 27th March & 4th May.

#### **Acknowledgements:**

This report has been prepared by Dr. D. R. Pattanaik based on inputs from IMD Pune and RSMC New Delhi after compilation with other available information.