

## Report on Extreme Weather Events during January-May 2022

### 1. Introduction

As per the definition 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) originating in the Mediterranean Sea region passing 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. The passage of WDs under favorable 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 gives 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 a thunderstorm, dust storms, squalls and dust-raising winds. Some days, temperatures can shoot up under favorable conditions and can give rise to heat waves and hot day conditions, especially along the northern plains and central parts of the country, the frequency of which is maximum in the month of April and May. This season is also characterized by the formation of low-pressure systems 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 2022.

### 2. Cyclonic Systems

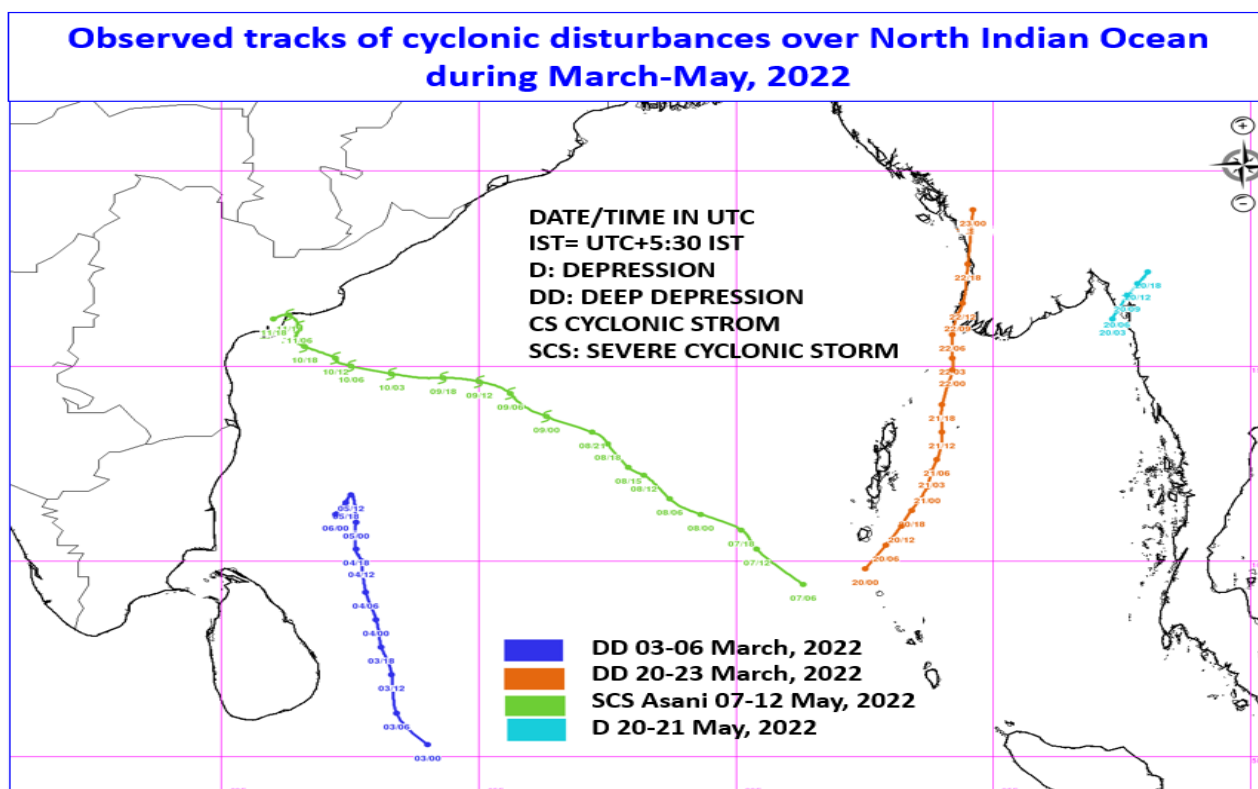
During the winter season from January to February 2022, no intense system formed over the Indian

Seas. However, during the pre-monsoon season from March to May, one Depression, 2 Deep Depressions (DDs) and one Severe Cyclonic Storm (SCS) formed over the Bay of Bengal (BoB) as per the details given below.

- (i) DD over BoB during 3-6 March, 2022.
- (ii) DD over North Andaman Sea during 20-23 March, 2022.
- (iii) SCS named Asani over BoB during 07-12 May, 2022.
- (iv) Depression over BoB during 20-21 May, 2022.

The track of the above four systems can be seen in Figure 1. As shown in Figure 1, DD over southwest BoB and the adjoining Equatorial Indian Ocean during 3-6 March, 2022, initially formed as a cyclonic circulation formed over the south Andaman Sea & adjoining Equatorial Indian Ocean (EIO) concentrated into a low-pressure area over southeast BOB and adjoining areas at 1200 UTC of 28 February 2022. At 0300 UTC 2nd March, 2022 it became well marked, concentrated into a Depression and lay centered at 0000 UTC (0530 hrs IST) of 3rd March 2022, over southwest BoB and adjoining equatorial Indian Ocean. It then moved northwestwards and subsequently north northwestwards and intensified into a deep depression over southwest BoB at 1200 UTC (1730 hrs IST) of 4th March 2022. It moved nearly northwards till 5th morning and then nearly southwestwards, weakened into a Depression and lay centered at 1800 UTC of 4th (2330 hrs IST of 5th March). Continuing to move southwestwards, it weakened into a depression over southwest BoB at 0000 UTC (0530 hrs IST) of 6th March 2022. It further weakened into a well-marked low-pressure area (LPA) at 0300 UTC (0830 IST) of 6th March over the same region.

The second system during the month was a DD over BoB (20th-23rd March, 2022). Initially, a LPA formed over EIO and adjoining southwest BOB by 1200 UTC (1730 IST) of 15th March, 2022 and became a well-marked low-pressure area at 0000 UTC (0530 IST) of 19th March. The well-marked



**Figure 1: Tracks of Cyclonic Disturbances (3 Deep Depressions and 1 Severe Cyclonic Storm ‘Asani’ ) over the Bay of Bengal during March to May 2022.**

low-pressure area concentrated into a depression at 0000 UTC (0530 IST) of 20th March, over southeast BoB and adjoining south Andaman Sea. The depression then moved nearly northwards and intensified into a deep depression around 0000 UTC (0530 IST) of 21st March over north Andaman Sea and adjoining southeast BoB. The DD further moved northwards and crossed Myanmar coast during 0800-0900 UTC (1330-1430 IST) of 22nd March near lat. 16°N and long. 94.20°E with maximum sustained wind speed (MSW) of 30 knots (kt) gusting to 40 kt. Finally, it gradually decreased its intensity and became less marked at 0000 UTC (0530 IST) of 24th March 2022 over the same region.

The third DD of the season was formed over the BoB during 20th-21st May, 2022. Initially, a cyclonic circulation formed over Gulf of Martaban and adjoining Myanmar in the morning at 0300 UTC (0830 IST) of 19th May, 2022. Under its influence, a LPA formed over the same region in the evening at 1200 UTC (1730 IST) of 19th May. It became a well marked low pressure area at 0000 UTC (0530 IST) of 20th May. Favorable

environmental conditions ensued and it concentrated into a depression over the same region at 0300 UTC (0830 IST) of 20th May. It moved north-northeastwards and crossed south Myanmar coast close to Mawlamyine near latitude 16.53°N and longitude 97.46°E during 0800 & 0900 UTC (1330 & 1430 IST) of 20th May. Continuing to move north-northeastwards, it weakened into a well marked low pressure area over northwest Thailand and adjoining Myanmar at 0000 UTC (0530 IST) of 21st May.

The only cyclonic storm of the season in the form of SCS named Asani initially formed as a low-pressure area formed over the South Andaman Sea and adjoining Southeast BoB in the morning (0830 hrs IST) of 6th May, 2022. The observed track of the system is presented in Figure 1. It lay as a well-marked LPA over the Southeast Bay of Bengal and adjoining south Andaman Sea in the early morning (0530 hours IST) of 7th May. Under favorable environmental conditions, it concentrated into a depression over the same region around noon (1130 hrs IST) of same day, the 7th May, 2022. It moved northwestwards and intensified into a deep

depression over the southeast Bay of Bengal in the same evening (1730 hrs IST) of 7th May. Continuing to move northwestwards, it intensified into the cyclonic storm ASANI in the early morning (0530 hrs IST) of 8th May and into a SCS in the same evening (1730 hrs IST) over the southeast Bay of Bengal. Continuing to move northwestwards, it reached peak intensity of 55 knots (100-110 kmph gusting to 120 kmph) on 9th early morning (0530 hrs IST). It maintained its peak intensity till 10th noon (1130 hrs IST), thus for 30 hrs. From 10th evening, it started gradually moving north-northwestwards and weakened into a cyclonic storm over west-central BoB about 60 km south-southeast of Machilipatnam in the early hours (0230 hrs IST) of 11th May. Thereafter, it started moving nearly northwards with a very slow speed and weakened into a deep depression over west-central BoB close to the Andhra Pradesh coast in the evening (1730 hrs IST) of 11th May. It crossed Andhra Pradesh coast near latitude 16.3°N and longitude 81.3°E between Machilipatnam and Narsapur during 1730-1930 hours IST of 11th May, 2022 as a deep depression with a maximum sustained wind speed of 55-65 kmph gusting to 75 kmph. It then moved slowly west-southwestwards and weakened into a depression in the early morning (0530 hrs IST) and further into a well-marked low-pressure area in the morning (0830 hrs IST) of 12th May over coastal Andhra Pradesh.

The SCS Asani exhibited multiple re-curvatures in its track/path. Most of the models suggested a change in direction of movement of the system from northwest to northeast near the coast. IMD maintained round-the-clock watch over the north Indian Ocean and the cyclone was monitored since 28th April, about 8 days prior to the formation of a low-pressure area over the south Andaman Sea on 6th May and 9 days prior to the formation of a depression over the southeast BoB. The cyclone was monitored with the help of available satellite observations from INSAT 3D and 3DR, polar-orbiting satellites, and available ships & buoy observations in the region. The system was also monitored by Doppler Weather RADAR (DWR) Machilipatnam from the 10<sup>th</sup> of May morning. Typical imagery from INSAT 3D (R) and DWR Machilipatnam is presented in Figure 2.

### 3. Significant Weather Events

The significant weather events that occurred during the winter and pre-monsoon season of 2022 as obtained from the Climate Diagnostic Bulletin, published by IMD Pune is shown in Figure 3a & 3b respectively.

#### 3.1. Winter Season (Jan-Feb)

Figure 3a shows significant weather events during the season (based on real-time media reports). From 1st January to 28th February, a total of 12 persons were reportedly claimed dead, 7 persons injured & 58 livestock perished. The details of casualties are given below, which are based on real-time media reports.

**Lightning:** A total of 4 persons were reportedly claimed dead & 8 livestock perished, from 1st January to 28th February, because of Lightning. Out of 4, 3 persons lost their life in Hoshangabad, Morena, Tikamgarh (Madhya Pradesh) and 1 person from Nagpur.

**Snowfall:** A total of 7 persons reportedly claimed dead, from 1st January to 28th February, because of Snowfall in the state of Arunachal Pradesh.

**Floods & Heavy Rains:** A total of 1 person reportedly claimed dead, 1 injured & 50 livestock perished from 1st January to 28th February, because of Floods & Heavy Rains in the Union Territory-Jammu & Kashmir.

**Thunderstorm:** A total of 6 persons were injured from 1st January to 28th February, because of the Thunderstorm in the state of Jharkhand.

#### 3.2 Pre-monsoon Season (Mar-May)

Figure 3b shows significant weather events during the season (based on real-time media reports). From 1st March to 31st May, a total of 231 persons were reportedly dead, 105 persons injured, 11 persons missing & 1234 livestock perished. The details of casualties are given below, which are based on real-time media reports.

**Floods, Heavy Rains & Landslides:** In total, 81 persons were reportedly dead, 15 persons injured, 11 persons missing & 1151 livestock perished, from

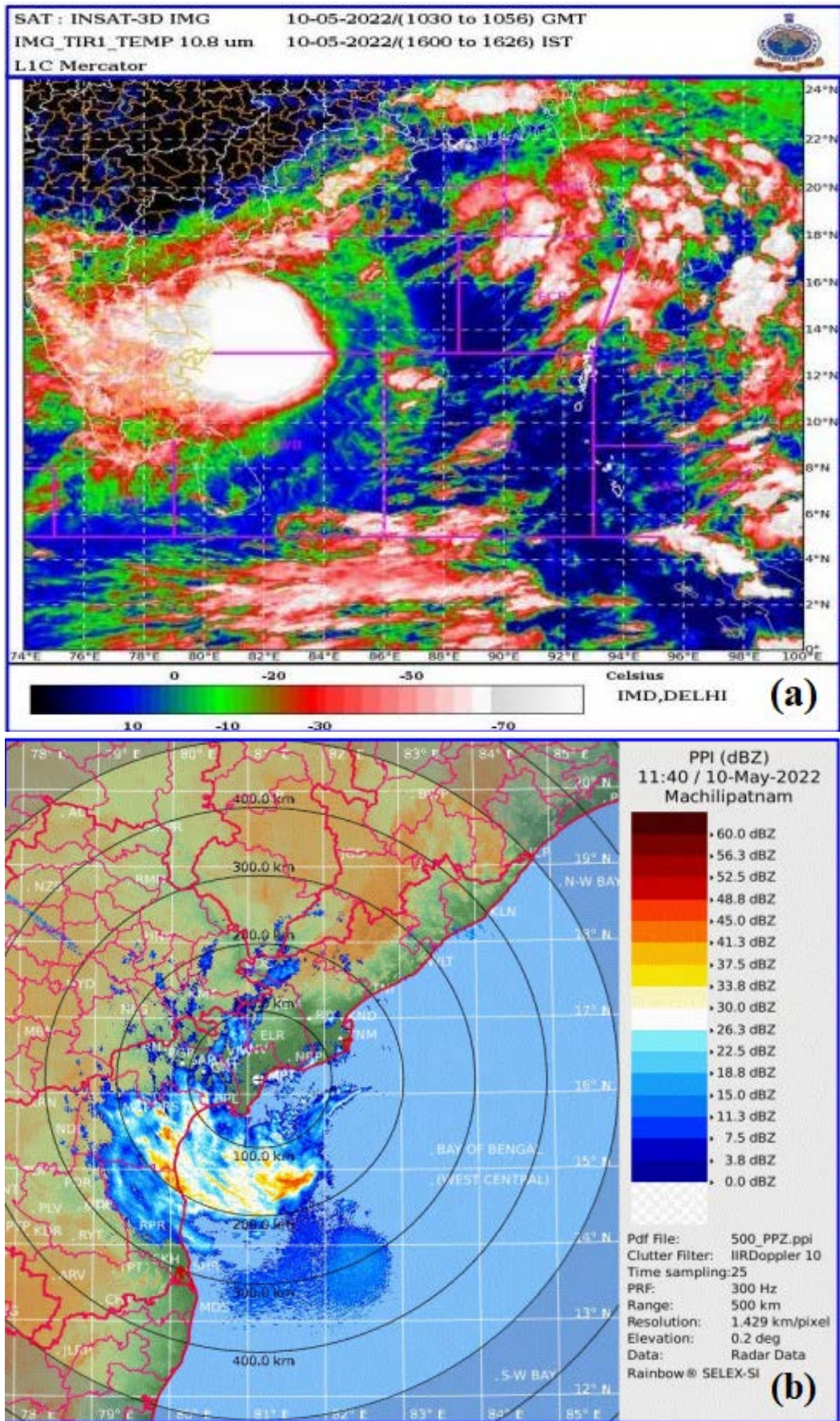


Figure 2: Typical (a) INSAT 3D (R) imagery at 1600 hrs IST and (b) DWR Machilipatnam imagery at 1720 hrs IST of 10th May of severe cyclonic storm ASANI.

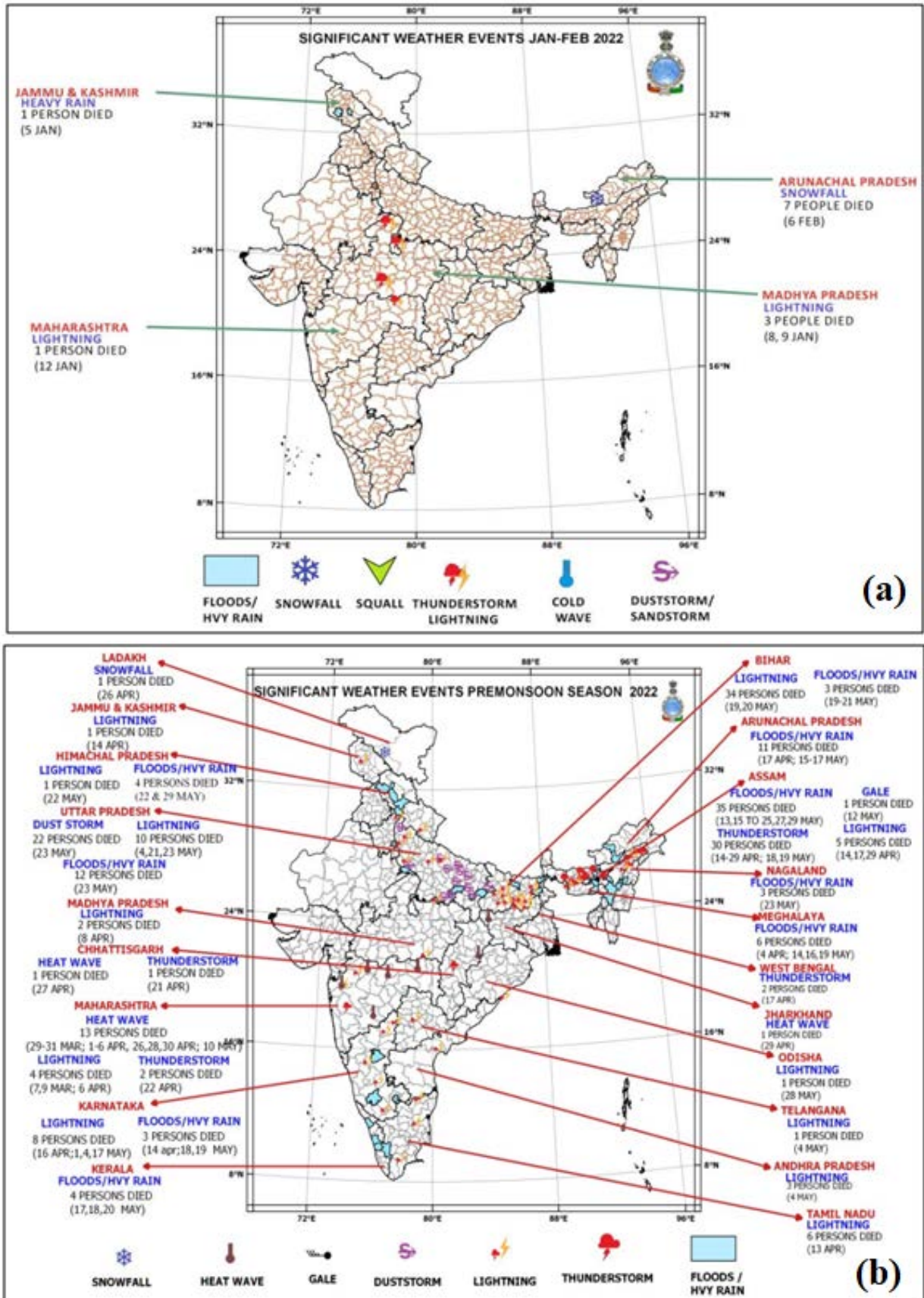


Figure 3: Significant weather events during (a) Winter and (b) Pre-monsoon seasons, 2022.

1st March to 31st May, because of Floods, Heavy Rains & landslides. The areas affected by the events are over the states of Assam, Arunachal Pradesh, Meghalaya, Uttar Pradesh, Kerala, Meghalaya, Bihar, Himachal Pradesh, Karnataka and Nagaland.

**Lightning:** In total, 76 persons reportedly claimed dead, 36 persons were injured & 77 livestock perished, from 1st March to 31st May, because of Lightning. The areas affected by the events are over the states of Bihar, Uttar Pradesh, Karnataka, Tamil Nadu, Assam, Maharashtra, Madhya Pradesh, Union Territory-Jammu & Kashmir, Telangana, Himachal Pradesh, and Odisha.

**Thunderstorm:** A total of 35 persons were reportedly claimed dead, 54 people injured & 6 livestock perished, from 1st March to 31st May, because of the Thunderstorm. Most of the death (30) were in the state of Assam and the remaining 5 deaths were in Pune (Maharashtra), Cooch Behar (West Bengal) and Durg (Chhattisgarh).

**Dust Storm:** A total of 22 persons were reportedly claimed dead due to dust storms on 23<sup>rd</sup> May over Uttar Pradesh.

**Heat Wave:** A total of 15 people reportedly claimed dead, from 1st March to 31st May, because of Heat Wave. Most of the death (13) were in the state of Maharashtra and 1 death each in Raigarh (Chhattisgarh) and Palamu (Jharkhand) during the season.

**Gale:** One person reportedly claimed dead in Assam during the season from 1st March to 31st May, because of Gale.

**Snowfall:** One person reportedly claimed dead in Kargil (Union Territory-Ladakh) during the season from 1<sup>st</sup> March to 31<sup>st</sup> May, because of Snowfall.

#### **Acknowledgments**

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.