

Report on Extreme Weather Events during January-May 2018

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 during its eastward movement cause weather activity over eastern and northeastern states also. Passage of WDs under favourable conditions, give rise to the occurrence of hailstorms over these regions. In addition to these, the season is also characterized by fog, cold days and cold waves etc., 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 details and impact of the extreme weather phenomena during the winter and pre-monsoon seasons of 2018.

2. Low Pressure Systems

On the whole there had been four low pressure systems which attained the intensity of Depression or above during the period; three of them formed over Arabian Sea and one over Bay of Bengal. The low pressure area which formed over Equatorial Indian Ocean and adjoining Southwest Bay of Bengal (BoB) and south Sri Lanka coast on 10th March attained the intensity of Depression over Southeast Arabian Sea and adjoining Equatorial Indian Ocean on 13th March 2018. Moving in a nearly northwestwards direction, it weakened into a Well Marked Low pressure area over Lakshadweep and adjoining Southeast Arabian Sea on 15th early morning and into a low pressure area over the same region on 16th and became less marked on 17th. This low pressure system caused heavy to very heavy rainfall at isolated places over south Tamil Nadu and Kerala on 14th, heavy rainfall at isolated places over Kerala and Lakshadweep on 16th and over Tamilnadu and interior Karnataka on 17th. Observed track of this depression is given in Figure 1.

The second low pressure system which attained the intensity of a cyclonic storm originated from a low pressure area which formed over South-West Arabian Sea in the morning of 14th May 2018. Under favourable environmental conditions, this Low pressure area concentrated into a Depression over Gulf of Aden in the evening of 16th May. Moving west-northwestwards, it intensified into a Deep Depression in the early morning and further into a cyclonic storm "Sagar" in the morning of 17th May 2018 over Gulf of Aden. Moving west-southwestwards it crossed Somalia coast between 1330 and 1430 IST of 19th May near latitude 10.65°N and longitude 44.0 °E with wind speed of 70-80 kmph gusting to 90 kmph. While moving further west-southwestwards, it maintained its cyclone intensity for about 9 hours and weakened into a Deep Depression around the mid night of 19th and into a Depression in the early morning of 20th. It further weakened into a Well Marked Low pressure area over

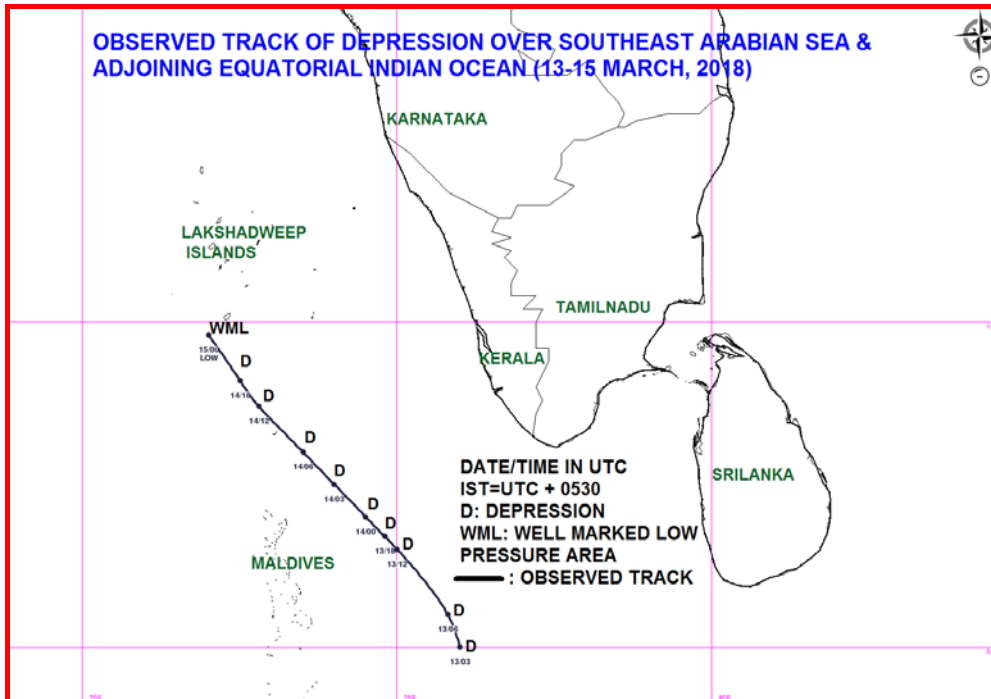


Figure 1: Observed track of Depression over Southeast Arabian Sea and adjoining Equatorial Indian Ocean

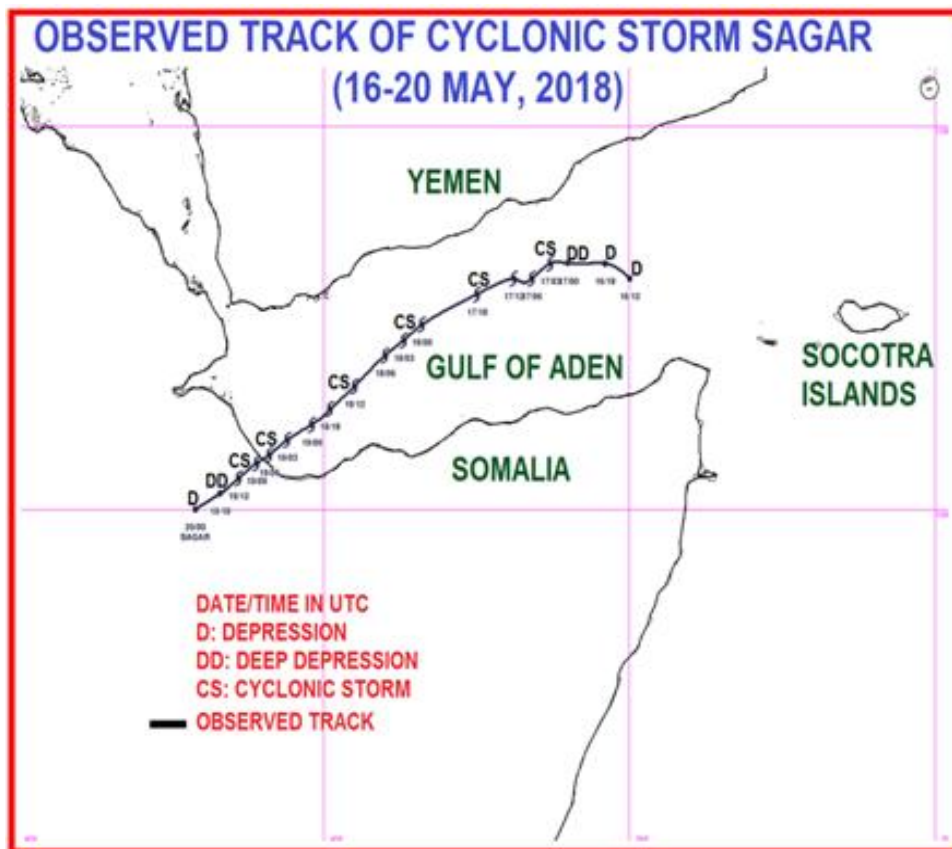


Figure 2: Observed track of CS Sagar (16- 20 May, 2018) over Arabian Sea

Ethiopia and adjoining Somalia in the morning of 20th.

Since this system had been far away in the Southwest Arabian Sea from its genesis stage itself, it has not caused any adverse weather over the mainland. Observed track of Cyclonic Storm “Sagar” is given in Figure 2.

The third low pressure system also formed in the month of May in Arabian Sea and attained the intensity of an Extremely Severe Cyclonic Storm. It had its genesis from a low pressure area which formed over Southeast Arabian Sea in the morning of 20th May. Under favourable environmental conditions, this low pressure area concentrated into a Depression over Southwest Arabian Sea in the evening of 21st May. Moving west-northwestwards it intensified into a Deep Depression in the morning of 22nd May. It then moved north-northwestwards and intensified into a Cyclonic Storm “Mekunu” in the evening of same day

Severe Cyclonic Storm in the morning and into a Very Severe Cyclonic Storm in the afternoon of 23rd May. Continuing its movement north-northwestwards, it intensified into an Extremely Severe Cyclonic Storm in the morning of 25th. It crossed south Oman coast near 16.85⁰N/53.75⁰E around midnight of 25th May as an Extremely Severe Cyclonic Storm with an estimated wind speed of 170-180 kmph gusting to 200 kmph. Moving northwestwards it weakened into a Very Severe Cyclonic Storm over Oman in the early hours of 26th May. Continuing to move north-northwestwards, it further weakened into a Severe Cyclonic Storm in the early morning and into a Cyclonic Storm in the afternoon and into a Deep Depression around midnight of 26th May. It further weakened into a Depression in the early morning and into a Well Marked Low pressure area over Saudi Arabia and adjoining Oman & Yemen in the morning of 27th May. The observed track of

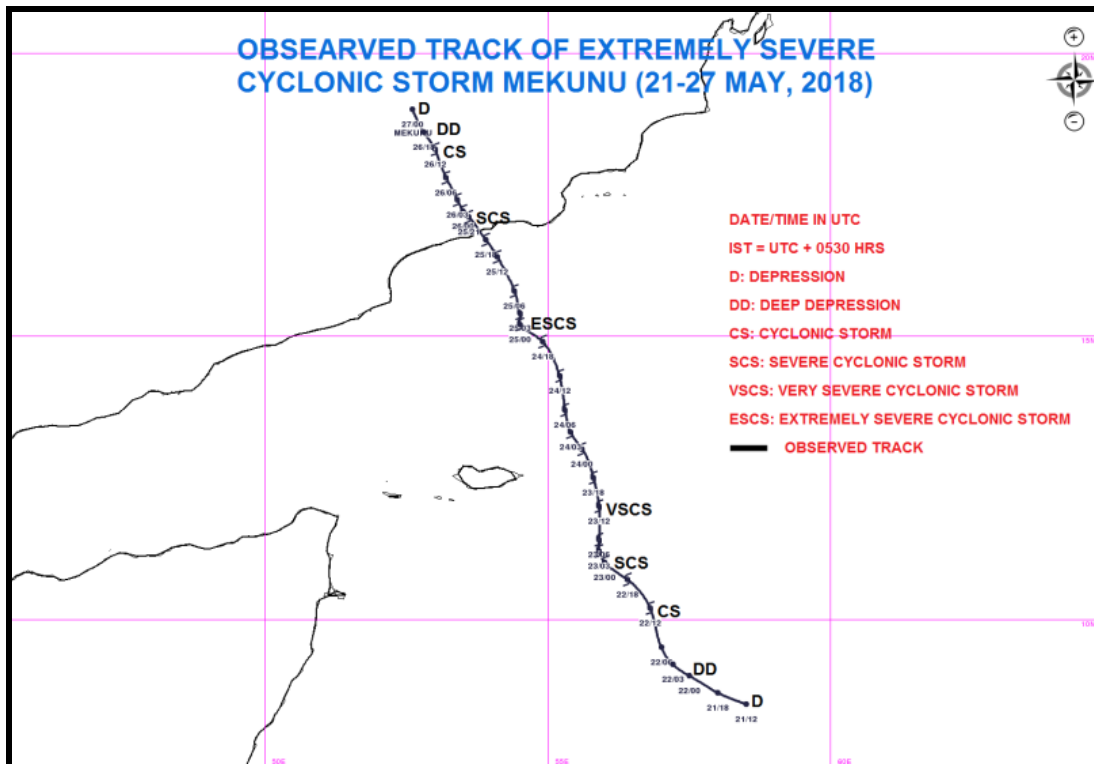


Figure 3: Observed track of ESCS Mekunu (21- 27 May, 2018) over Arabian Sea

over Southwest Arabian Sea. Moving further north-northwestwards, it intensified into a

the system is given in Figure 3.

This system did not cause any adverse weather scenario over the country, since it was far away from the mainland. However it is to be mentioned that, IMD received appreciation from WMO for the round the clock monitoring and the issue of warnings and advisories to WMO as well as to the affected countries like Oman, Yemen and Somalia, with reference to this system.

The fourth system formed over the Bay of Bengal and attained the intensity of a Deep Depression. It originated as a Low pressure area over East central Bay of Bengal and concentrated into a Depression over East central and adjoining Northeast Bay of Bengal around noon of 29th May. Moving northeastwards, it intensified into Deep Depression in the same evening and crossed Myanmar coast to the north of Kyakpyu in the night between 1700 & 1800 UTC. Continuing to move northeastwards, it weakened gradually into a Depression in the early morning of 30th May over Myanmar and then into a Well Marled Low pressure area over Myanmar around noon of the same day. Observed track of the system is given in Figure 4.

In general, none of these systems had made landfall over the Indian coast.

3. Western Disturbances (WDs)

There had been intense WD activity and the monthly frequency of the same had been about eight to nine during the period. These have caused intense rainfall/snow fall activity over Western Himalayan region during winter months and intense rainfall/thunderstorm activity during the pre-monsoon months. Among the WDs in the month of January, one caused fairly widespread to widespread rainfall and thunderstorm activity over the plains during 22nd-23rd January 2018 with peak activity on 23rd January. During the passage of the system, hailstorms were also reported over the plains. The interaction of the WDs and their induced circulation with the low level easterlies have given rise to intense thunderstorm activity accompanied with hailstorm over Central India during the winter season.

Among the WDs which have moved across northern parts of India during the pre-monsoon months, 50% have caused isolated to scattered precipitation in the northern plains also, in addition to giving fairly widespread to

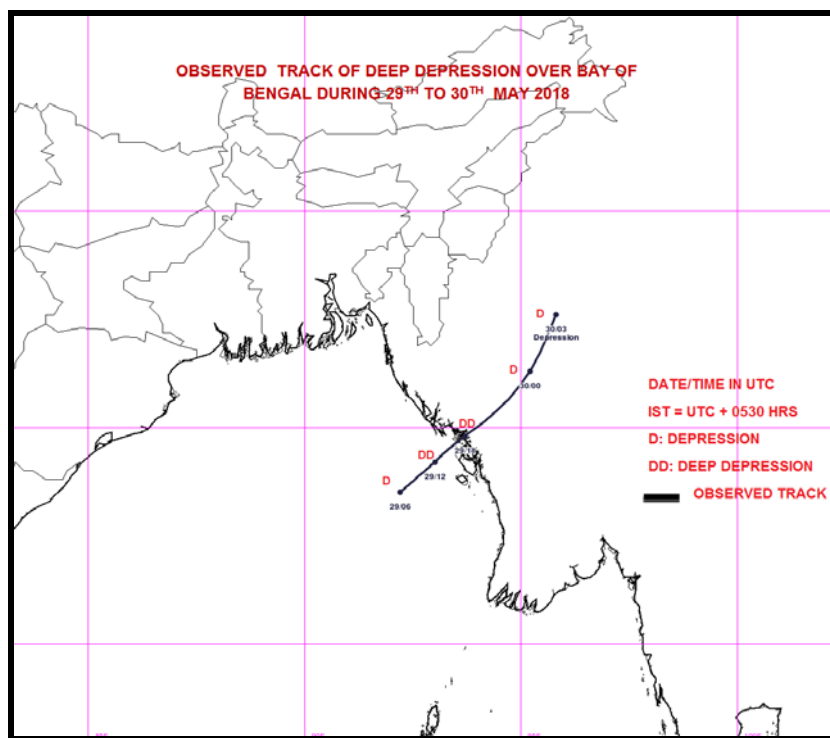


Figure 4: Observed track of deep depression (29-30 May)

widespread precipitation over Western Himalyan Region.

4. Fog

Fairly widespread to widespread dense to very dense fog had been observed over East Uttar Pradesh and Bihar on most of the days during the month of January 2018 leading to prolonged cold day to severe cold day conditions over these areas. The lowest maximum temperature of 10.2° C was recorded at Shahjahanpur (West Uttar Pradesh) on 12th January 2018 during the month. Dense to very dense fog had been observed at a few places over Punjab, Haryana, Chandigarh & Delhi and West Uttar Pradesh also on most days in this month. The fog scenario had been reduced in the month of February however, Dense to very dense fog had been observed at a few places over Haryana, Chandigarh & Delhi and Uttar Pradesh and at isolated places over Uttarakhand, north Rajasthan, Madhya Pradesh, Odisha, Bihar, Sub-Himalayan West Bengal, Assam & Meghalaya and Tripura, on one or two days during the month.

5. Cold Wave

Cold wave to severe cold wave conditions had been observed at a few places over Punjab, Haryana, north Rajasthan, Uttar Pradesh and Bihar and at isolated places over Madhya Pradesh, Vidarbha, Telangana, Jharkhand, Gangetic West Bengal and Odisha on a few days and the lowest minimum temperature of 0.0° C recorded at Sikar (East Rajasthan) on 3rd and 16th during the month of January 2018.. In the month of February, the severity as well as the spatial distribution of the cold wave has reduced however, cold wave conditions prevailed at isolated places over Punjab, Haryana and north Rajasthan on one or two days of the month. The lowest minimum temperature of 2.4°C was recorded at Churu (Rajasthan) in the plains of the country on 7th of the month.

6. Hailstorm

Hailstorm was reported from different parts of the country during both winter as well as pre monsoon season of the year 2018 however the hailstorm activity observed during the month

of February 2018 over the central parts of the country was very significant.

Severe Thunderstorms accompanied with hailstorms were reported from different parts of the country during 11-13 February 2018 and the impact of this weather phenomena was very severe in the state of Maharashtra where it caused wide spread damage to agriculture as well as loss of life. More than 1.25 lakh hectare of crops were damaged by the unseasonal hailstorm and heavy shower that hit the central parts of Maharashtra, Marathwada, and parts of Vidarbha. The severe hailstorm also damaged the standing Rabi crops of wheat, jowar, onion, chickpea, grapes, and also the banana plantations, and vegetables. Vidarbha bore the maximum brunt, as seven of the 11 weather stations of the subdivision reporting widespread rainfall on 11th February 2018 although of light intensity.

This severe weather activity was in association with a Western Disturbance, which lay as a cyclonic circulation at 3.1 km above sea level over eastern parts of Iran and adjoining Afghanistan with a trough aloft with its axis at 5.8 km above sea level roughly along 55 °E to the north of Latitude 32°N on 8th February 2018. As the system progressed eastwards, the amplitude of the trough associated with the Western Disturbance went on increasing and on 11th and 12th February it reached up to about 22°N giving rise to the interaction of this system with the low level easterlies originating from an anticyclone situated over the eastern parts of the country.

This system caused intense to very intense weather activity over north west, central as well as east and north eastern parts of the country with Widespread rainfall/snowfall over Jammu & Kashmir, Himachal Pradesh and Uttarakhand on 12th and 13th February with isolated heavy falls over Jammu & Kashmir on 13th. Fairly widespread to widespread rainfall activity has been observed over Punjab, Haryana, Chandigarh and Delhi, West Uttar Pradesh, Madhya Pradesh, Chattisgarh during 11th to 12th and scattered to fairly widespread rainfall activity has been observed over East Uttar Pradesh and Jharkhand on 13th and 14th February.

7. Thunderstorm Activity of the Pre-Monsoon Season

The convective activity during the pre monsoon season was very significant during the year 2018.

During the month of March, northeast India reported the maximum number of thunderstorm days viz. 21 days. Among these, the severe thunderstorm activity was accompanied by hailstorm and squall on four to five days each. East India, South peninsular India and northwest India, also reported about 15 thunderstorm days whereas Central India reported about ten days of thunderstorm during the month. Among these, east India reported thunderstorm accompanied by hail or squall on about three to four days each. Central India reported severe thunderstorm activity accompanied by occurrence of hailstorm during one occasion and northwest India reported similar activity on two occasions. No thundersquall was reported from northwest and central India during the month. South peninsular India reported hailstorm as well as thundersquall on one day each during the month. The thunderstorm activity of the northwest India was mainly associated with the passage of Western Disturbances.

In the month of April, there was widespread thunderstorm activity over the country. Northeast and South peninsular India reported maximum thunderstorm days of 29 and 28 respectively whereas east and northwest India had 27 and 26 days each of thunderstorm activity. The central parts of the India also reported about 23 days of thunderstorm activity. While no squall was reported from northwest and central India during the month, East India reported the maximum number of thundersquall of 17 during the month, most of them occurring over West Bengal and Sikkim. Northeast India also reported about seven thundersqualls mainly reported from Assam and Tripura. South peninsular region also had three occurrences of thundersqualls, reported from South Interior Karnataka. Northwest India reported the maximum number of seven hailstorms during the month over Western Himalyan Region. Hailstorm at one or two

occasions had been reported from Telengana and interior Karnataka also.

During the month of May also widespread thunderstorm activity was reported from various parts of the country. South Peninsula reported the maximum number of 29 thunderstorm days with no squall or hailstorm reported from the region. East and northeast India reported 28 days of thunderstorm activity during the month. Among that, east had 15 days of thundersquall, maximum getting reported from Gangetic West Bengal where as northeast had about 6 days of thundersquall, most of them reported from Tripura. Central India also had thundersquall reported on three days from Chattisgarh and Vidarbha while the total number of thunderstorm days for Central India was about 24. During the month of May, northwest India experienced one of the most severe thunderstorm and dust storm activity which have caused widespread damages and losses including causalities. There had been about 26 days of thunderstorm activity for northwest India and about three thunder squalls during the month has caused havoc over the National Capital Region also. Western disturbances passing across northwest India and induced cyclonic circulation associated with them, presence of low level easterlies in the northern plains, enhanced moisture incursion to the region and intense heating of the northern plains altogether have contributed towards this severe convective activity over northwest India during the month.

8. Heat Wave

Heat waves are another severe weather phenomena experienced during the pre monsoon season.

Heat waves to severe heat wave conditions were reported from West Rajasthan Saurashtra & Kutch, Jammu & Kashmir and Himachal Pradesh during the last week of March. In the month of April, the severity as well as the intensity of heat wave was less however, heat wave conditions were observed at isolated places over Gujarat, Rajasthan, Konkan, Himachal Pradesh and Vidarbha on a few days and over Jammu & Kashmir, Madhya Pradesh, Madhya Maharashtra, Marathwada and Odisha on one or two days.

In the month of May, Heat wave to severe heat wave scenario at many places had been observed on many days over East and West Rajasthan where as West Madhya Pradesh and Vidarbha observed the scenario on a few days.

Heat wave at isolated places was also observed over East Madhya Pradesh and Madhya Maharashtra on a few days and over Himachal Pradesh, Haryana, Chandigarh & Delhi, Uttar Pradesh and Saurashtra & Kutch on one or two days during the month.

Acknowledgements

This report is prepared by referring to the daily as well as weekly weather reports issued from NWFC. The track of the low pressure systems has been taken from the RSMC, New Delhi reports on tropical cyclones.

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