



**Government of India**  
**Earth System Science Organization**  
**Ministry of Earth Sciences**  
**India Meteorological Department**

**Press: Dated: 2 April 2022**

**Subject: Monthly Weather and Climate Summary for the month of March 2022**

**Salient features of month of March 2022**

- (a) **Absence of active WDs in the month over north India and absence of any major system in easterly over south India caused sub-due rainfall and very less thunderstorm activities in the month over most parts of India:** Five number of Western Disturbances(WD) moved across north in the month of March 2022(1-8 March, 5-8 March, 8-15 March, 18-23 March and 23-26 March 27, 2022), but most were dry, having no lower level supports for any moisture incursion either from Arabian Sea or Bay of Bengal, except the 1<sup>st</sup> one which moved in the 1<sup>st</sup> week and caused isolated rainfall over parts of northwest and central India for 1-2 days. Similarly, absence of lower level southwesterly or southerly wind convergence to northeast India from Bay of Bengal in most dates of the month at lower levels also caused sub-due rainfall over these areas in the month.
- (b) **Northwest and Central parts of India including Gujarat, Maharashtra and Delhi and lower ridges of Western Himalayan region experienced early spells of heat wave to severe heat wave with 1<sup>st</sup> spell during 11-19 March and then 2<sup>nd</sup> spell during 27-31 March (refer Table 1 for details of Frequencies and Characteristics of these two spells of Heat Wave/Severe Heat wave of March 2022 observed over various meteorological Sub-division of India).**
- (c) **Formation of 2 low pressure system over Bay of Bengal and both intensified into Deep Depression, but none of them made any landfall over India (Refer Fig. 1 for tracks of March 2022 over north Indian ocean).**
- i) A Deep Depression moved from Southwest Bay of Bengal and adjoining Equatorial Indian Ocean to Southwest Bay of Bengal during 3-6 March 2022 and then its remnant to north Tamil Nadu coast till 7<sup>th</sup> March 2022. Since this system had been away from the coast, it had not caused any adverse weather over Peninsular India (refer Fig.1 for track)
  - ii) **Deep Depression over southeast Bay of Bengal(20-23 March 2022) which crossed Myanmar coast (2<sup>nd</sup> Deep Depression over the Bay of Bengal in this March 2022):** A Low pressure area lay over Southeast Bay of Bengal and adjoining east Equatorial Indian Ocean on 17

March. It moved east-northeastwards and became a Well Marked Low pressure area over Southeast Bay of Bengal and adjoining south Andaman Sea on 19<sup>th</sup> March. It concentrated into a Depression over the same Areas on morning of 20<sup>th</sup> March. It moved nearly northwards and intensified into a deep depression over north Andaman Sea and adjoining southeast Bay of Bengal, on morning of 21<sup>st</sup> March. It continued to move nearly northwards along & off Andaman & Nicobar Islands crossed Myanmar coast near latitude 16.0° N & longitude, 94.2°E as a deep depression between 1330 hours IST and 1430 hours IST and lay over Coastal Myanmar as a Deep depression. Then, it moved nearly north-northeastwards and weakened into a depression over Myanmar in the night of 22<sup>nd</sup> and further into a well marked low pressure on morning 23<sup>rd</sup> March and into a low pressure are over the same area in the evening of 23<sup>rd</sup> March. It became less marked in the morning of 24<sup>th</sup> March. **(Refer Fig 1 for track of the system)**. The above system had moved along and off Andaman & Nicobar Islands and caused fairly widespread to widespread rainfall/thunderstorm activity with isolated heavy to very heavy rainfall during 19-22 March.

➤ Climatologically, during the period 1891-2020, there has been 8 cyclonic disturbances over the north Indian Ocean with 7 over Bay of Bengal and 1 over Arabian Sea in the month of March. Out of these, 1 crossed TamilNadu coast as a cyclonic storm in the year 1925 and another crossed Sri Lanka coast as a severe cyclonic storm in 1907 **(Refer Fig.2)**. **So March 2022 is unique month in last 132 years when for the 1<sup>st</sup> time in the month of the March, 2 systems of intensity of depression and above formed over north India Ocean.**

**Table 1: Characteristics of Heat Wave/Severe Heat wave in March 2022**

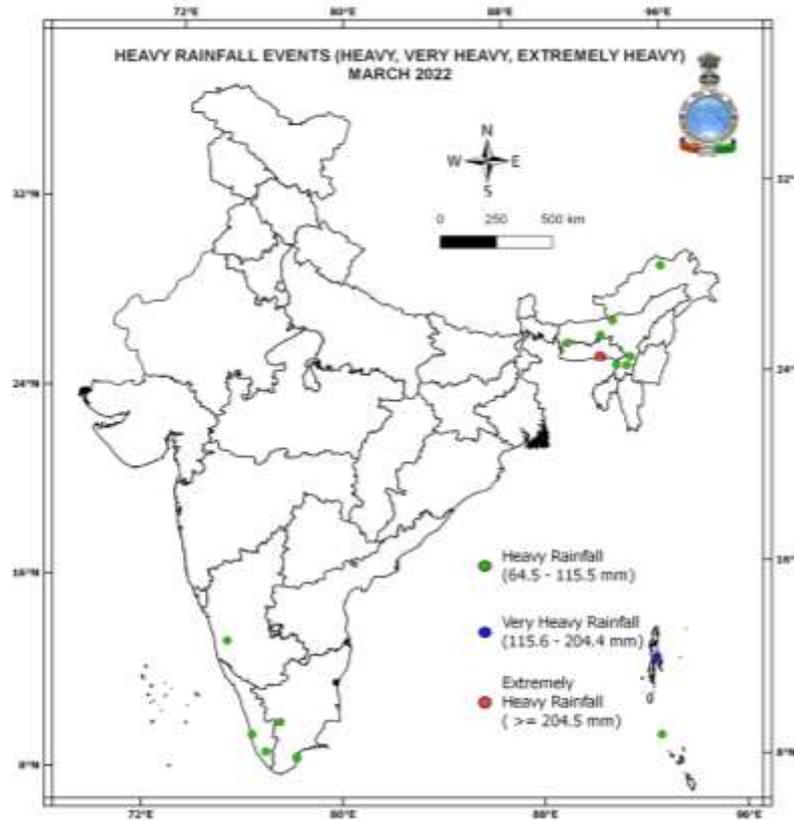
| <b>Met sub- divisions affected</b>  | <b>Spell Periods</b> | <b>Maximum Temp range and Dep</b> |
|---|----------------------|-----------------------------------|
| <b>1<sup>st</sup> spell of the season-11-21 March 2022</b>                                |                      |                                   |
| Saurashtra and Kutch  | 11-18 March          | 40-43degC with +5 to +9degC       |
| Gujarat Region  | 14-18 March          | -do-                              |
| Konkan-Goa  | 11-13 March          | -do-                              |
| West Madhya Pradesh   | 16-22 March          | -do-                              |
| Vidarbha  | 17 - 18 March        | -do-                              |
| Lower ridges of western Himalayan region - Jammu Division, Himachal Pradesh & Uttarakhand | 16-21                | 32-37degC with +8-11 Deg C        |

|  |             |                             |
|--|-------------|-----------------------------|
| <b>2<sup>nd</sup> spell of the season 26-31 March 2022</b>                 |             |                             |
| Saurashtra and Kutch   | 26-29 March | 40-43degC with +5 to +9degC |
| South Haryana and Delhi  | 29-31 March | do                          |
| Rajasthan  | 27-31 March | do                          |
| Madhya Pradesh   | 27-31 March | -do-                        |
| Southwest UP and East Uttar Pradesh  | 29-31 March | -do-                        |
| Lower ridges of western Himalayan region -Jammu Division, HP & Uttarakhand | 27-31 March | 33-37degC with +6-9 Deg C   |



**(d) Frequency of Heavy Rainfall events over India in March 2022**

The March 2022 witnessed extremely heavy rainfall, very heavy rainfall and heavy rainfall events mainly over East and Northeast India. The location of occurrences of extremely heavy rainfall, very heavy rainfall and heavy rainfall events is shown in the Figure 3. Out of total 17 stations, 2 stations reported extremely heavy rainfall ( $\geq 204.5$  mm), 1 station reported very heavy rainfall (115.6 to 204.4 mm) and 14 stations reported heavy rainfall (64.5 to 115.5 mm of rainfall) during this month.



**Fig 3: The location of occurrences of heavy rainfall events in the month of March 2022.**

Some stations received record rainfall (24 hour) during March 2022. The table below shows stations received 24-hour record rainfall and its previous record.

| STATION   | 24 HOUR RECORD RAINFALL IN MARCH 2022(mm)* | DATE | PREVIOUS RAINFALL RECORD(mm) | DD-MM-YYYY |
|-----------|--|------|------------------------------|------------|
| MAJBAT    | 77.5                                       | 26   | 57.2                         | 08-03-1976 |
| MAWSYNRAM | 397.8                                      | 26   | 270.8                        | 06-03-1973 |

**e) Monthly Rainfall Scenario (01 to 31 March, 2022) over India**

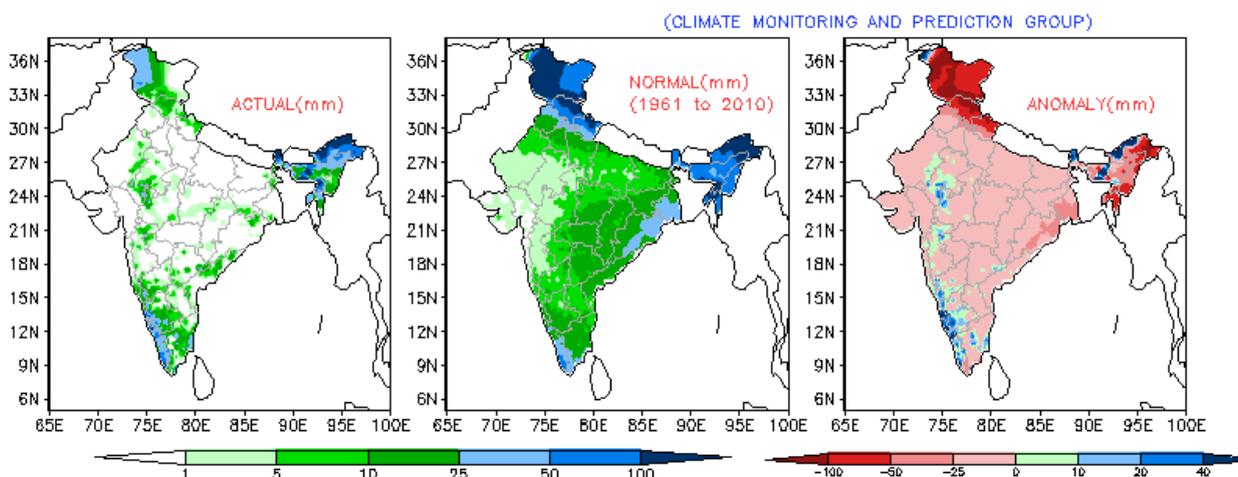
Rainfall over the country as a whole for the month of March 2022 shows that it has recorded 8.9 mm, which is 71% less than its Long Period Average (LPA) of 30.4 mm. Rainfall over All India (8.9 mm) was 3<sup>rd</sup> lowest since 1901 after the years 1909 (7.2 mm) and 1908 (8.7 mm).

The monthly rainfall for March 2022 is given in the table below:

| Regions                | Actual Rainfall (mm) | Normal Rainfall (mm) | % Departure from LPA |
|------------------------|----------------------|----------------------|----------------------|
| Country as a whole     | 8.9                  | 30.4                 | -71                  |
| Northwest India        | 5.2                  | 47.5                 | -89                  |
| Central India          | 1.1                  | 8.4                  | -87                  |
| South Peninsula        | 12.4                 | 14.4                 | -14                  |
| East & northeast India | 28.2                 | 63.5                 | -56                  |

During this month, 3 sub-divisions received large excess, 2 excess, 4 normal, 6 deficient rainfall, 19 large deficient and 2 sub-divisions not received rainfall. The observed spatial rainfall, normal rainfall (Averaged over 1961 to 2010) and its departures from normal for the month of March 2022 is given in Figure 4.

RAINFALL OVER THE COUNTRY FOR MARCH 2022

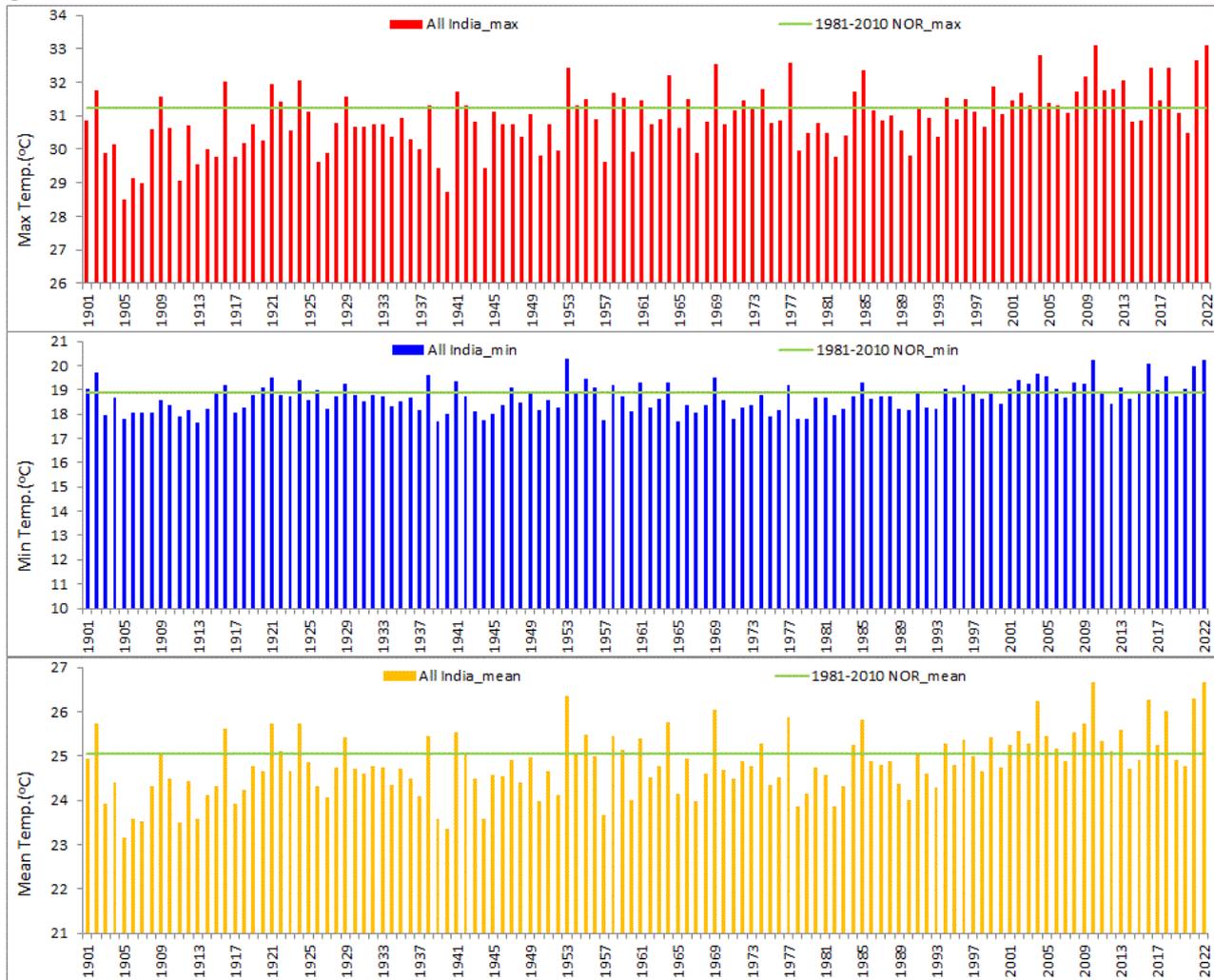


**Fig 4: Observed spatial Rainfall pattern for the month of March 2022 over India and their departure from normal (1961 to 2010 period)**

**(f) Characteristics of Average maximum, minimum and mean temperature for the country as a whole and over four homogenous region during March 2022 and its comparison since 1901**

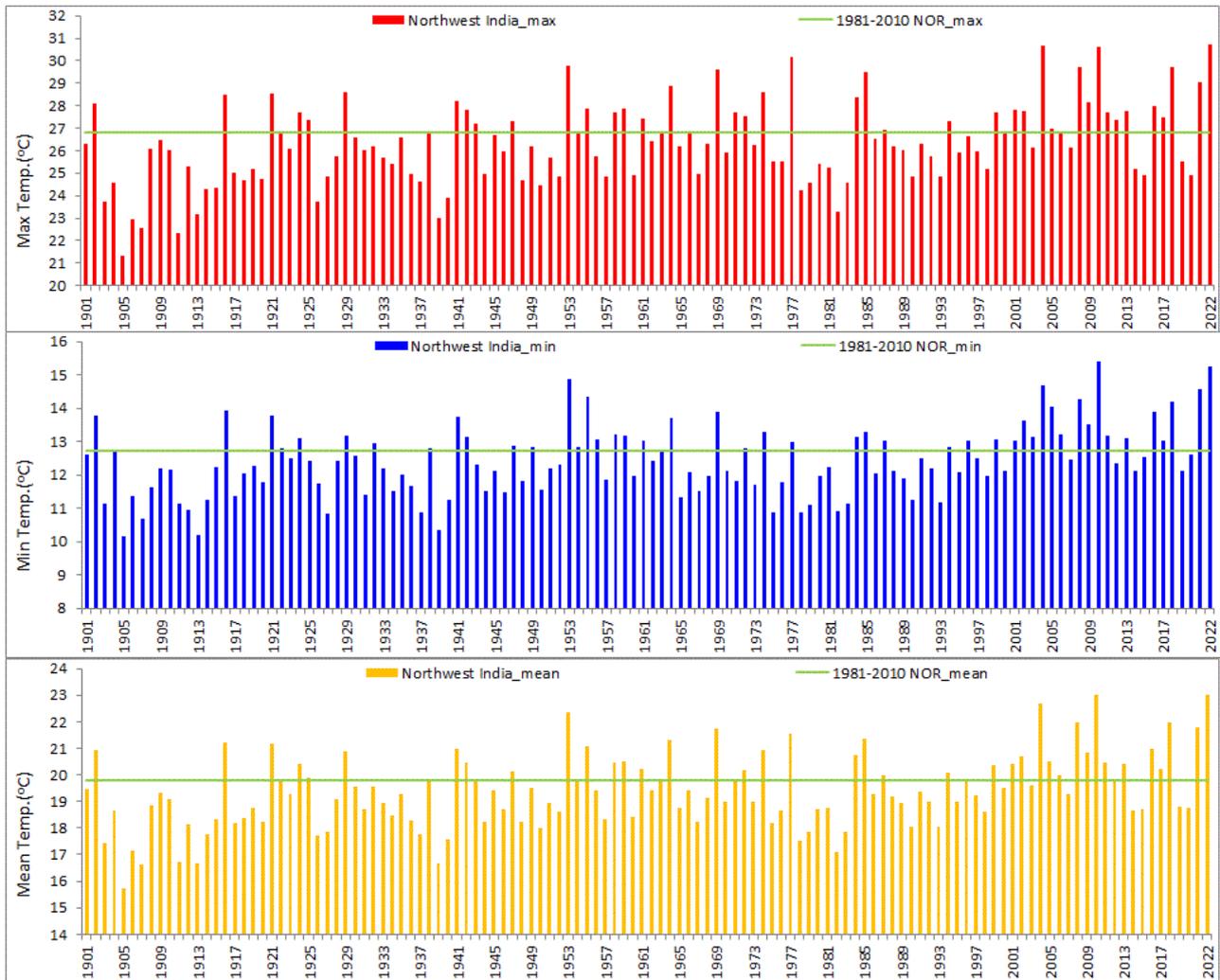
The observed average maximum, minimum and mean temperature for the country as a whole during March 2022 are 33.10°C, 20.24°C and 26.67°C respectively, against the normal of 31.24°C, 18.87°C and 25.06°C based on period 1981-2010. Thus, the average maximum, average minimum temperature and mean temperature are above normal by 1.86°C, 1.37°C, 1.61°C respectively for the country as a whole. The climatological data based on the period of 1981 to 2010 are used to calculate the normal and hence the anomaly (Actual average temperature in 2022 - normal temperature based on data of 1981-2010). Figure 5 shows time series of monthly average maximum, average minimum and mean temperature over all India for the month of March during 1901-2022. It shows over the country as a whole, the average maximum temperature recorded in March 2022 is the ever highest with 33.10 °C in last 122 years for the period 1901-2022 and it broken the earlier ever highest of 33.09 °C which was in 2010 for the month of the March for the same period. The country averaged monthly mean temperatures of 26.67°C is the second warmest since 1901 (The warmest years on record was 2010 (26.671 °C)). The average minimum temperature was third highest with 20.24°C (previous

record values were of 1<sup>st</sup> highest 20.26°C (1953) and 2<sup>nd</sup> highest as 20.25°C (2010). The Temperatures during March 2022 for all India and homogeneous regions with its ranks since 1901 is given in table 2 and the five extremes for temperature along with year occurrence is given in table 3.



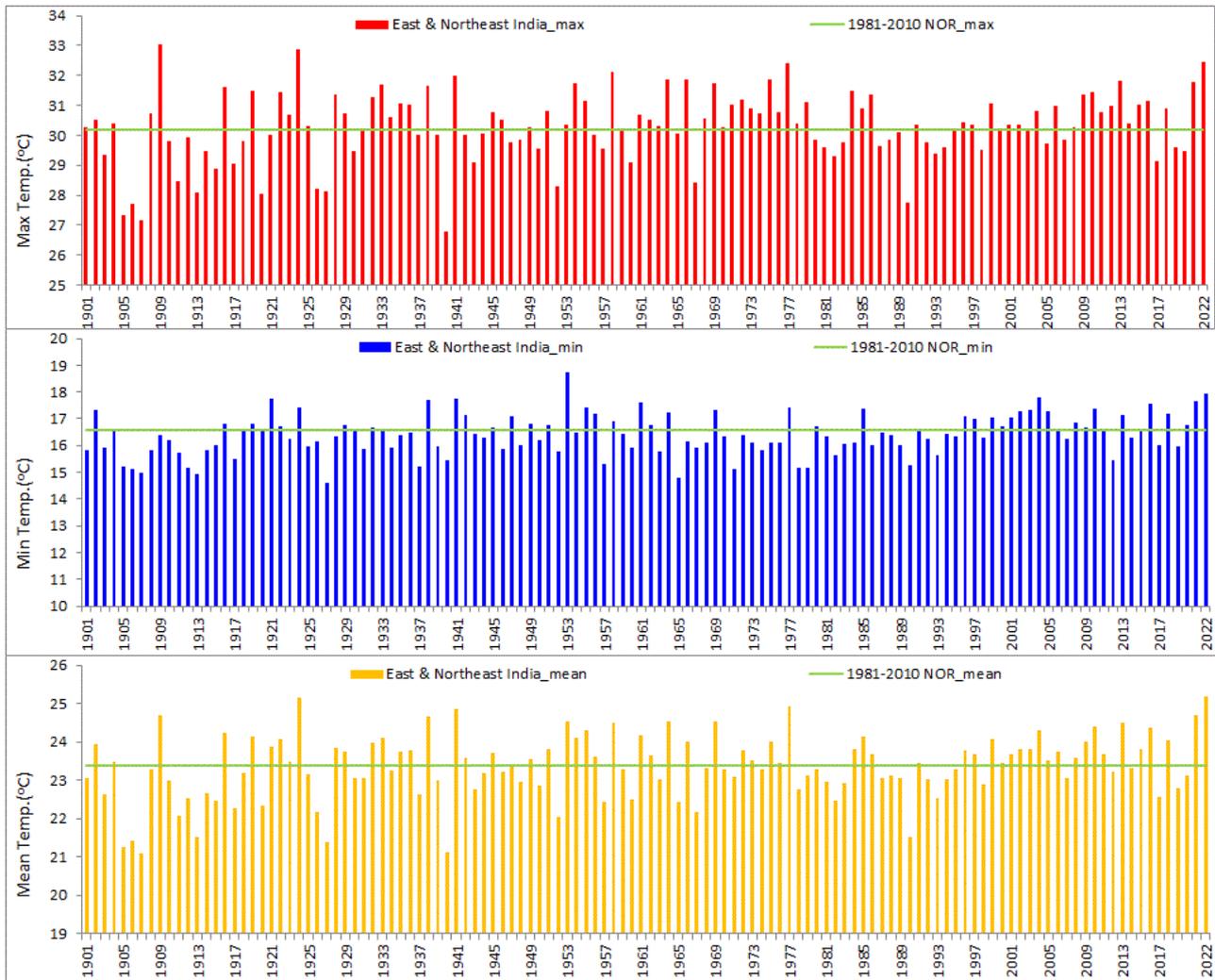
**Fig 5: Time series of monthly average maximum, average minimum and mean temperature over all India for the month of March during 1901-2022.**

Figure 6 shows time series of monthly average maximum, average minimum and mean temperature over Northwest India for the month of March during 1901-2022. Over Northwest India, during March 2022, the average maximum temperature is highest with 30.73 °C in last 122 years(earlier highest was in 2004 with value of 30.67 °C), average minimum temperature is second highest with 15.26 °C (the highest is of 15.4 °C in 2010) and mean temperature is second highest with 22.99 °C (the highest in last 122 years is 23.01 °C in 2010).



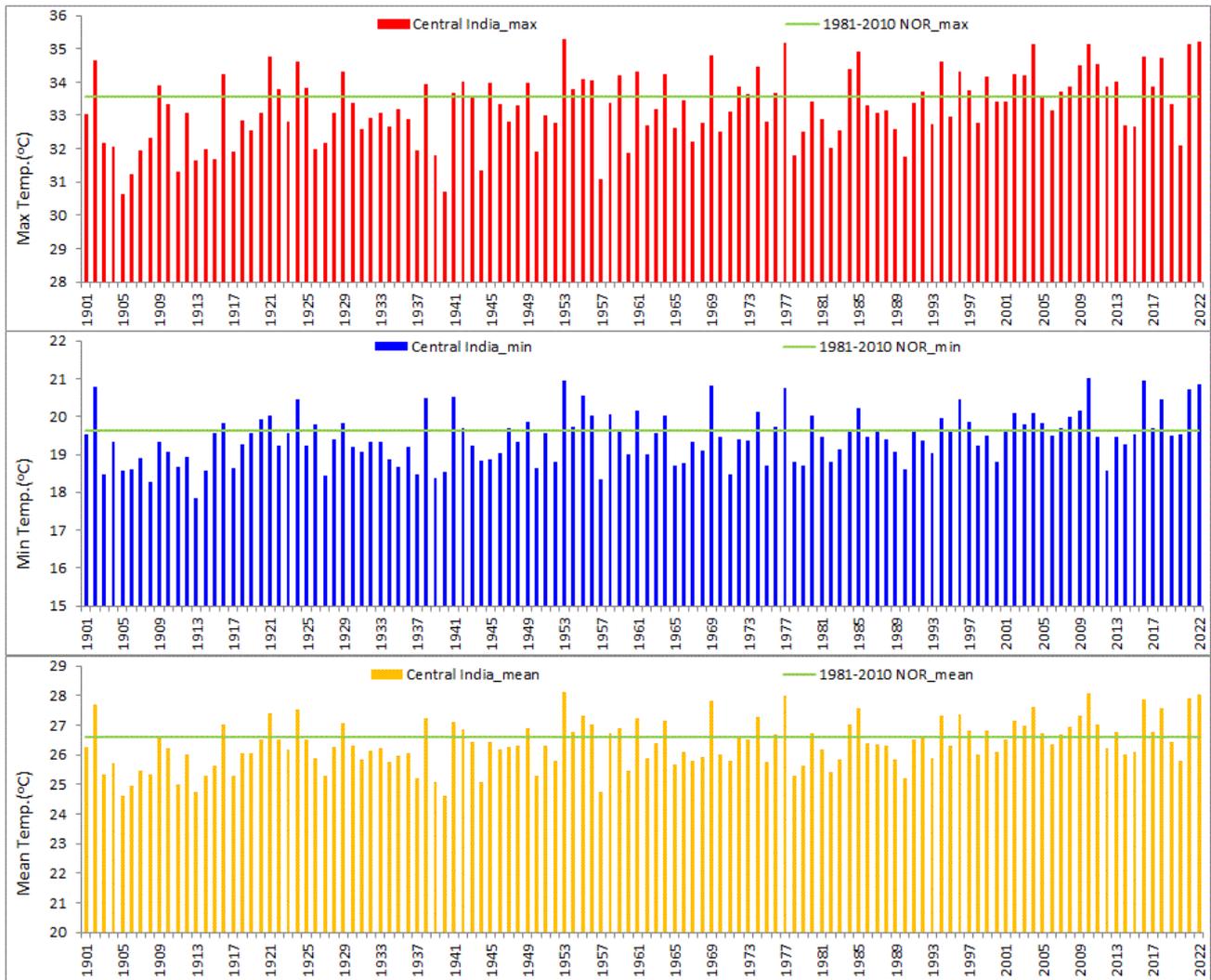
**Fig 6: Time series of monthly average maximum, average minimum and mean temperature over Northwest India for the month of March during 1901-2022.**

Figure 7 shows time series of monthly average maximum, average minimum and mean temperature over East & Northeast India for the month of March during 1901-2022. Over East & Northeast India during March the average maximum temperature is third highest with 32.45°C, average minimum temperature is second highest with 17.94°C and mean temperature is highest with 25.20°C since 1901. (For ranks pls see the table 3)



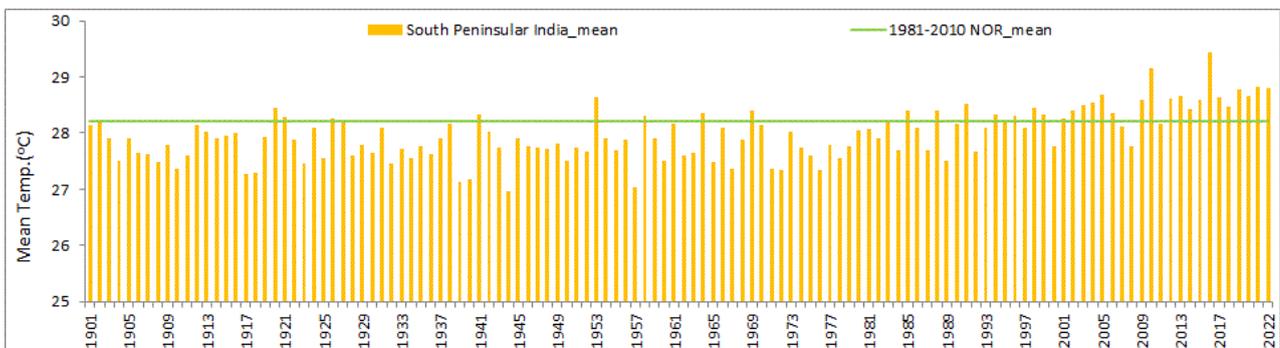
**Fig 7: Time series of monthly average maximum, average minimum and mean temperature over East & Northeast India for the month of March during 1901-2022.**

Figure 8 shows time series of monthly average maximum, average minimum and mean temperature over Central India for the month of March during 1901-2022. Over Central India during March 2022 the average maximum temperature is second highest with 35.20°C, average minimum temperature is fourth highest with 20.84°C and mean temperature is third highest with 28.02°C since 1901.(For ranks pls see the table 3)



**Fig 8: Time series of monthly average maximum, average minimum and mean temperature over Central India for the month of March during 1901-2022.**

Figure 9 shows time series of monthly mean temperature over South Peninsular India for the month of March during 1901-2022. Over South Peninsular India during March 2022, mean temperature is fourth highest with value of 28.80°C since 1901 (for 1<sup>st</sup> highest to 3<sup>rd</sup> highest pls refer table 3).



**Fig 9: Time series of monthly mean temperature over South Peninsular India for the month of March during 1901-2022.**

**Table 2. The Temperatures during March 2022 for all India and homogeneous regions with its ranks since 1901;**

| <b>MAR 2022</b>                   |                 | <b>Max Temp<br/>(°C)</b> | <b>Min Temp<br/>(°C)</b> | <b>Mean Temp<br/>(°C)</b> |
|-----------------------------------|-----------------|--------------------------|--------------------------|---------------------------|
| <b>ALL INDIA</b>                  | <b>ACTUAL</b>   | <b>33.10</b>             | <b>20.24</b>             | <b>26.67</b>              |
|                                   | NORMAL          | 31.24                    | 18.87                    | 25.06                     |
|                                   | ANOMALY         | 1.86                     | 1.37                     | 1.61                      |
|                                   | <b>TOP RANK</b> | <b>1</b>                 | <b>3</b>                 | <b>2</b>                  |
| <b>NORTHWEST INDIA</b>            | <b>ACTUAL</b>   | <b>30.73</b>             | <b>15.26</b>             | <b>22.99</b>              |
|                                   | NORMAL          | 26.82                    | 12.73                    | 19.77                     |
|                                   | ANOMALY         | 3.91                     | 2.53                     | 3.22                      |
|                                   | <b>TOP RANK</b> | <b>1</b>                 | <b>2</b>                 | <b>2</b>                  |
| <b>EAST &amp; NORTHEAST INDIA</b> | <b>ACTUAL</b>   | <b>32.45</b>             | <b>17.94</b>             | <b>25.20</b>              |
|                                   | NORMAL          | 30.21                    | 16.58                    | 23.39                     |
|                                   | ANOMALY         | 2.25                     | 1.36                     | 1.80                      |
|                                   | <b>TOP RANK</b> | <b>3</b>                 | <b>2</b>                 | <b>1</b>                  |
| <b>CENTRAL INDIA</b>              | <b>ACTUAL</b>   | <b>35.20</b>             | <b>20.84</b>             | <b>28.02</b>              |
|                                   | NORMAL          | 33.58                    | 19.62                    | 26.60                     |
|                                   | ANOMALY         | 1.62                     | 1.22                     | 1.42                      |
|                                   | <b>TOP RANK</b> | <b>2</b>                 | <b>4</b>                 | <b>3</b>                  |
| <b>SOUTH PENNINSULAR INDIA</b>    | <b>ACTUAL</b>   | <b>33.56</b>             | <b>24.03</b>             | <b>28.80</b>              |
|                                   | NORMAL          | 33.08                    | 23.34                    | 28.21                     |
|                                   | ANOMALY         | 0.48                     | 0.69                     | 0.59                      |
|                                   | <b>TOP RANK</b> | <b>9</b>                 | <b>6</b>                 | <b>4</b>                  |

**Table 3 The five highest temperature records with corresponding ranks since 1901 for all India and three homogeneous regions (TMean, TMax, TMin) and for South Peninsular India (TMean) are given in the table below;**

| All India (March 2022) |        |        |         |      | Northwest India (March2022) |        |        |         |      | East & Northeast India (March 2022) |       |        |         |      |
|------------------------|--------|--------|---------|------|-----------------------------|--------|--------|---------|------|-------------------------------------|-------|--------|---------|------|
| Year                   | TMean  | Normal | Anomaly | Rank | Year                        | TMean  | Normal | Anomaly | Rank | Year                                | TMean | Normal | Anomaly | Rank |
| 2010                   | 26.672 | 25.06  | 1.612   | 1    | 2010                        | 23.016 | 19.77  | 3.25    | 1    | 2022                                | 25.20 | 23.39  | 1.81    | 1    |
| 2022                   | 26.669 | 25.06  | 1.609   | 2    | 2022                        | 22.994 | 19.77  | 3.22    | 2    | 1924                                | 25.15 | 23.39  | 1.76    | 2    |
| 1953                   | 26.344 | 25.06  | 1.284   | 3    | 2004                        | 22.685 | 19.77  | 2.92    | 3    | 1977                                | 24.92 | 23.39  | 1.53    | 3    |
| 2021                   | 26.300 | 25.06  | 1.240   | 4    | 1953                        | 22.331 | 19.77  | 2.56    | 4    | 1941                                | 24.86 | 23.39  | 1.47    | 4    |
| 2016                   | 26.256 | 25.06  | 1.196   | 5    | 2008                        | 21.990 | 19.77  | 2.22    | 5    | 2021                                | 24.71 | 23.39  | 1.32    | 5    |

| All India (March 2022) |        |        |         |      | Northwest India (March2022) |        |        |         |      | East & Northeast India (March 2022) |       |        |         |      |
|------------------------|--------|--------|---------|------|-----------------------------|--------|--------|---------|------|-------------------------------------|-------|--------|---------|------|
| Year                   | TMax   | Normal | Anomaly | Rank | Year                        | TMax   | Normal | Anomaly | Rank | Year                                | TMax  | Normal | Anomaly | Rank |
| 2022                   | 33.101 | 31.24  | 1.86    | 1    | 2022                        | 30.726 | 26.82  | 3.91    | 1    | 1909                                | 33.03 | 30.21  | 2.82    | 1    |
| 2010                   | 33.095 | 31.24  | 1.85    | 2    | 2004                        | 30.678 | 26.82  | 3.86    | 2    | 1924                                | 32.88 | 30.21  | 2.67    | 2    |
| 2004                   | 32.817 | 31.24  | 1.58    | 3    | 2010                        | 30.632 | 26.82  | 3.81    | 3    | 2022                                | 32.45 | 30.21  | 2.24    | 3    |
| 2021                   | 32.648 | 31.24  | 1.41    | 4    | 1977                        | 30.136 | 26.82  | 3.32    | 4    | 1977                                | 32.43 | 30.21  | 2.22    | 4    |
| 1977                   | 32.565 | 31.24  | 1.33    | 5    | 1953                        | 29.770 | 26.82  | 2.95    | 5    | 1958                                | 32.13 | 30.21  | 1.92    | 5    |

| All India (March 2022) |        |        |         |      | Northwest India (March2022) |       |        |         |      | East & Northeast India (March 2022) |       |        |         |      |
|------------------------|--------|--------|---------|------|-----------------------------|-------|--------|---------|------|-------------------------------------|-------|--------|---------|------|
| Year                   | TMin   | Normal | Anomaly | Rank | Year                        | TMin  | Normal | Anomaly | Rank | Year                                | TMin  | Normal | Anomaly | Rank |
| 1953                   | 20.263 | 18.87  | 1.39    | 1    | 2010                        | 15.40 | 12.73  | 2.67    | 1    | 1953                                | 18.73 | 16.58  | 2.15    | 1    |
| 2010                   | 20.248 | 18.87  | 1.38    | 2    | 2022                        | 15.26 | 12.73  | 2.53    | 2    | 2022                                | 17.94 | 16.58  | 1.36    | 2    |
| 2022                   | 20.237 | 18.87  | 1.37    | 3    | 1953                        | 14.89 | 12.73  | 2.16    | 3    | 2004                                | 17.78 | 16.58  | 1.20    | 3    |
| 2016                   | 20.073 | 18.87  | 1.20    | 4    | 2004                        | 14.69 | 12.73  | 1.96    | 4    | 1941                                | 17.73 | 16.58  | 1.15    | 4    |
| 2021                   | 19.952 | 18.87  | 1.08    | 5    | 2021                        | 14.58 | 12.73  | 1.85    | 5    | 1921                                | 17.73 | 16.58  | 1.15    | 5    |

| Central India (March 2022) |       |        |         |      |
|----------------------------|-------|--------|---------|------|
| Year                       | TMean | Normal | Anomaly | Rank |
| 1953                       | 28.12 | 26.60  | 1.52    | 1    |
| 2010                       | 28.06 | 26.60  | 1.46    | 2    |
| 2022                       | 28.02 | 26.60  | 1.42    | 3    |
| 1977                       | 27.98 | 26.60  | 1.38    | 4    |
| 2021                       | 27.92 | 26.60  | 1.32    | 5    |

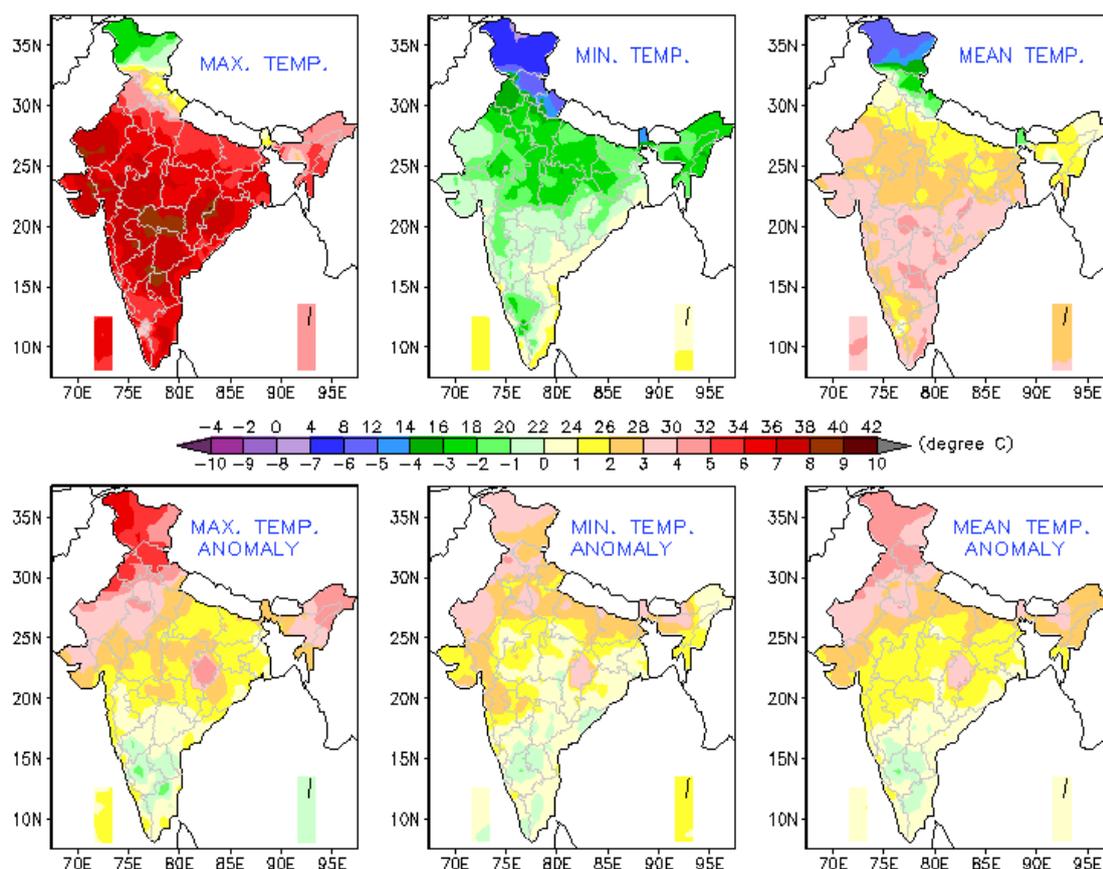
| Central India (March 2022) |       |        |         |      |
|----------------------------|-------|--------|---------|------|
| Year                       | TMax  | Normal | Anomaly | Rank |
| 1953                       | 35.30 | 33.58  | 1.72    | 1    |
| 2022                       | 35.20 | 33.58  | 1.62    | 2    |
| 1977                       | 35.19 | 33.58  | 1.61    | 3    |
| 2004                       | 35.14 | 33.58  | 1.56    | 4    |
| 2021                       | 35.13 | 33.58  | 1.55    | 5    |

| Central India (March 2022) |       |        |         |      |
|----------------------------|-------|--------|---------|------|
| Year                       | TMin  | Normal | Anomaly | Rank |
| 2010                       | 21.00 | 19.62  | 1.38    | 1    |
| 2016                       | 20.96 | 19.62  | 1.34    | 2    |
| 1953                       | 20.94 | 19.62  | 1.32    | 3    |
| 2022                       | 20.84 | 19.62  | 1.22    | 4    |
| 1969                       | 20.81 | 19.62  | 1.19    | 5    |

| South Peninsular India (March 2022) |       |        |         |      |
|-------------------------------------|-------|--------|---------|------|
| Year                                | Tmean | Normal | Anomaly | Rank |
| 2016                                | 29.45 | 28.21  | 1.24    | 1    |
| 2010                                | 29.15 | 28.21  | 0.94    | 2    |
| 2021                                | 28.83 | 28.21  | 0.62    | 3    |
| 2022                                | 28.80 | 28.21  | 0.59    | 4    |
| 2019                                | 28.78 | 28.21  | 0.57    | 5    |

The observed spatial temperature pattern of monthly average maximum, average minimum and mean temperature over India and their departures from normal (1981 to 2010 period) for the month of March 2022 is given in Figure 10.

## TEMPERATURE & ITS ANOMOLY FOR THE MONTH MARCH 2022



**Fig 10: Observed spatial temperature pattern of monthly average maximum, average minimum, and mean temperature over India (top three from left to right) and their departure from normal (1981 to 2010 period) for March 2022 (lower three from left to right).**

### g) Weather related Impacts for the month of March 2022

During March, total 3 persons reportedly claimed dead & 4 livestock perished. The details of casualties given below, which are based on real time media reports.

**Lightning:** Total 2 persons reportedly claimed dead & 4 livestock perished, during the month due to Lightning at Dhule, Nashik (Maharashtra) during 7-9 March 2022.

**Heat Wave:** One person reportedly claimed dead on 31 March 2022 due to Heat Wave at Jalgaon district of Maharashtra. In addition, damage to crops reported during 8th & 9th March from Dhule, Jalgaon, Nandurbar, Nashik districts of Maharashtra due to Hailstorm & Heavy Rains.

Figure No.10 shows deaths due to significant weather events during the month. (Based on real time media reports).

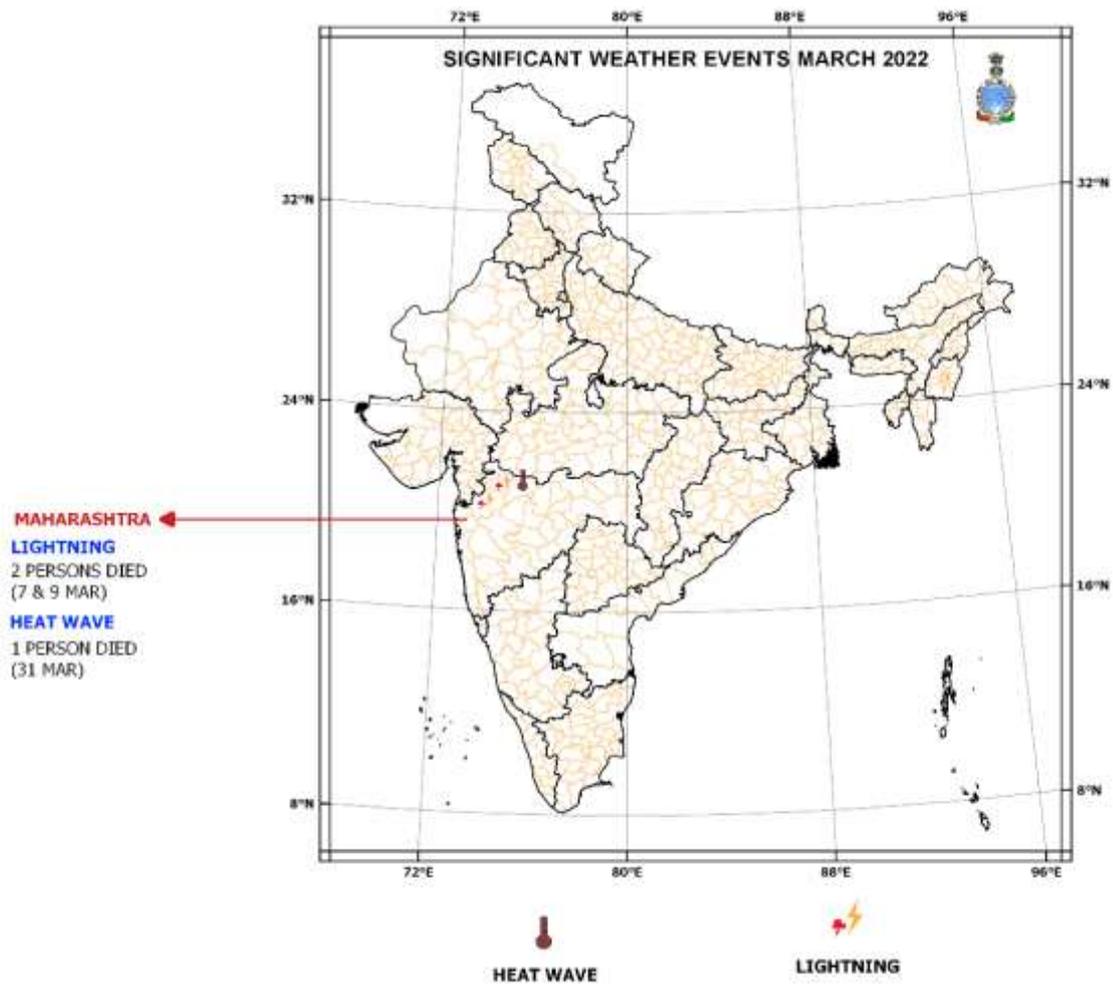


Fig 10: Significant weather events during March 2022 (Based on real-time media report)