

Climate Summary for the month of November 2021

1. Monthly Rainfall Scenario (1 to 30 November 2021)

Rainfall over the country as a whole for the month of November 2021 shows that it has recorded 56.5 mm, which is 86% more than its Long Period Average (LPA) of 30.4 mm. Rainfall over South Peninsular India (232.7mm) during the month of November was highest since 1901. The monthly rainfall for November 2021 is given in the table below:

Regions	Actual Rainfall (mm)	Normal Rainfall (mm)	% Departure from LPA
Country as a whole	56.5	30.4	86
Northwest India	5.2	11.9	-56.08
Central India	21.9	15.8	38.7
South Peninsula	232.7	89.2	160.8
East & northeast India	11.4	24.6	-53.6
Northeast Monsoon Region	316.2	117.4	169.2

During this month, 14 sub-divisions received large excess, 2 excess, 2 normal, 3 deficient, 14 large deficient rainfall and one subdivision received no rain. The NE Monsoon rainfall for November was highest (169.2% departure from LPA) since 1901. The rainfall received for November 2021 over Kerala (157.2% departure from LPA), South Interior Karnataka (318.9% departure from LPA), Tamilnadu, Puducherry & Karaikal (136.8% departure from LPA), Rayalaseema (330.2% departure from LPA) was highest since 1901.

The time series of November rainfall (percentage departure from normal for the period 1961-2010) over NE Monsoon Region, Rayalaseema, Tamilnadu, South Interior Karnataka and Kerala for the month of November (1901 to 2021) are given in Fig.1.

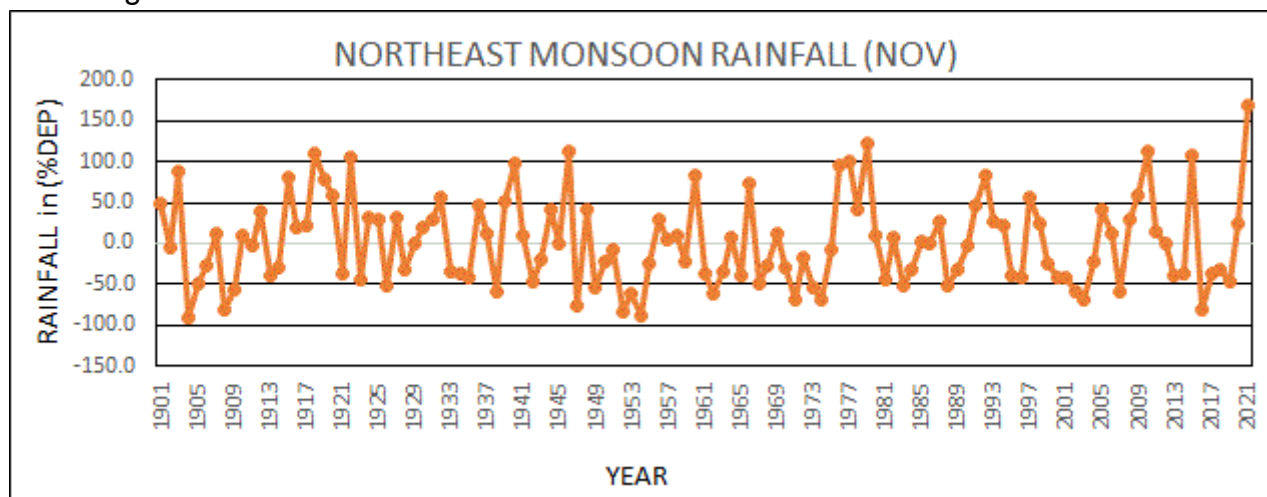


Fig 1(a): The November month rainfall (percentage departure) over NE Monsoon Region during 1901 to 2021.

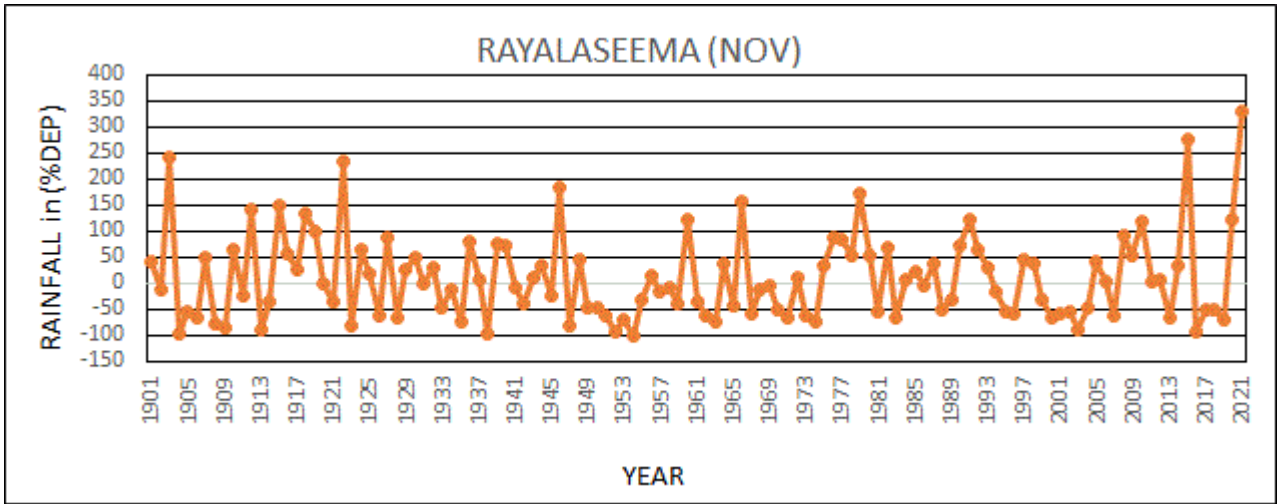


Fig 1(b): The rainfall (percentage departure) received over November 2021 over Rayalaseema during 1901 to 2021.

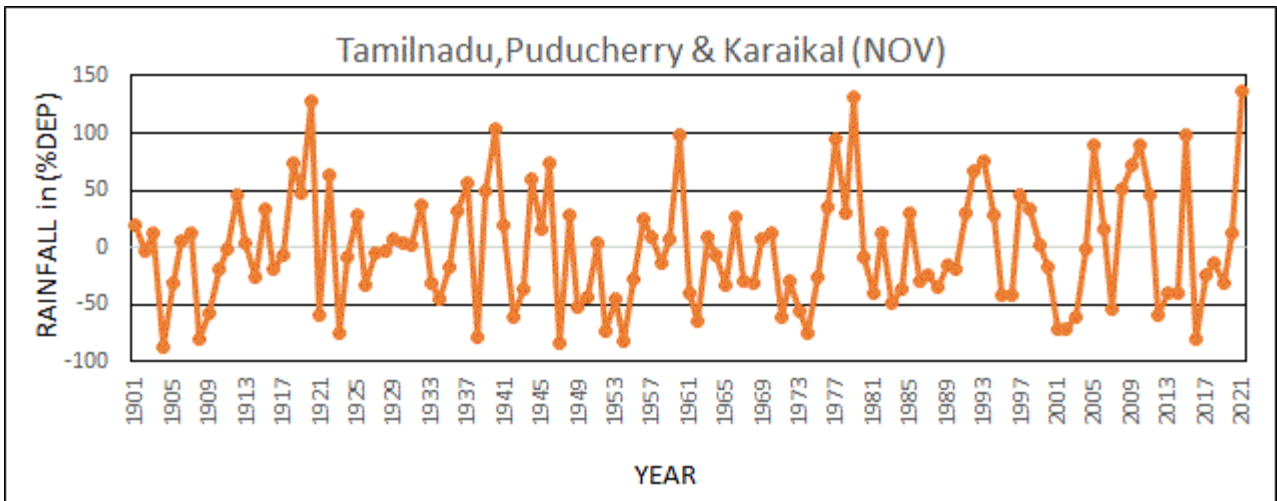


Fig 1(c): The rainfall (percentage departure) received over November 2021 over Tamilnadu, Puducherry, Karaikal during 1901 to 2021.

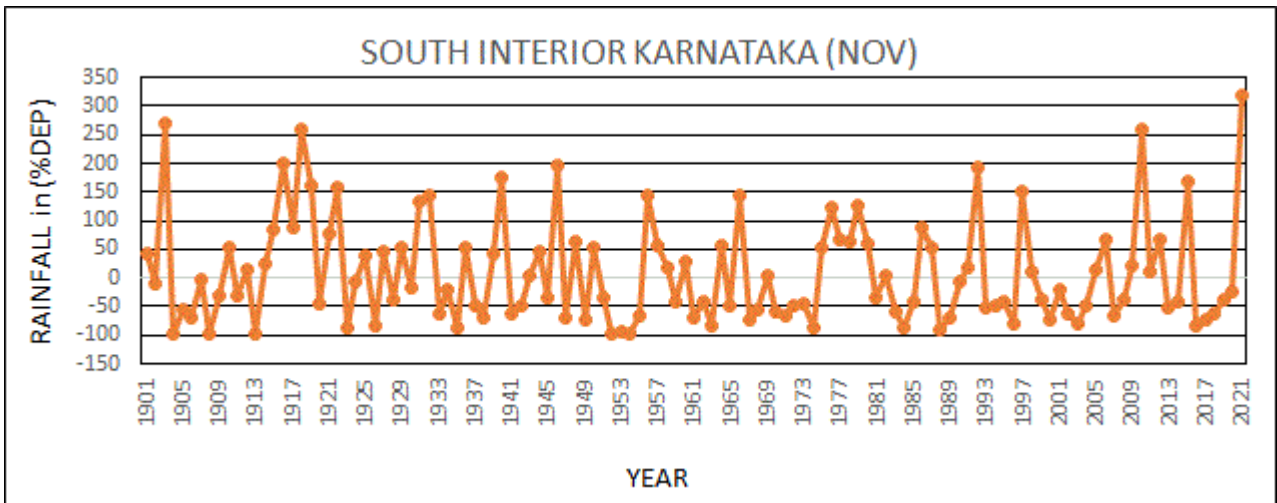


Fig 1(d): The rainfall (percentage departure) received over November 2021 over South Interior Karnataka during 1901 to 2021.

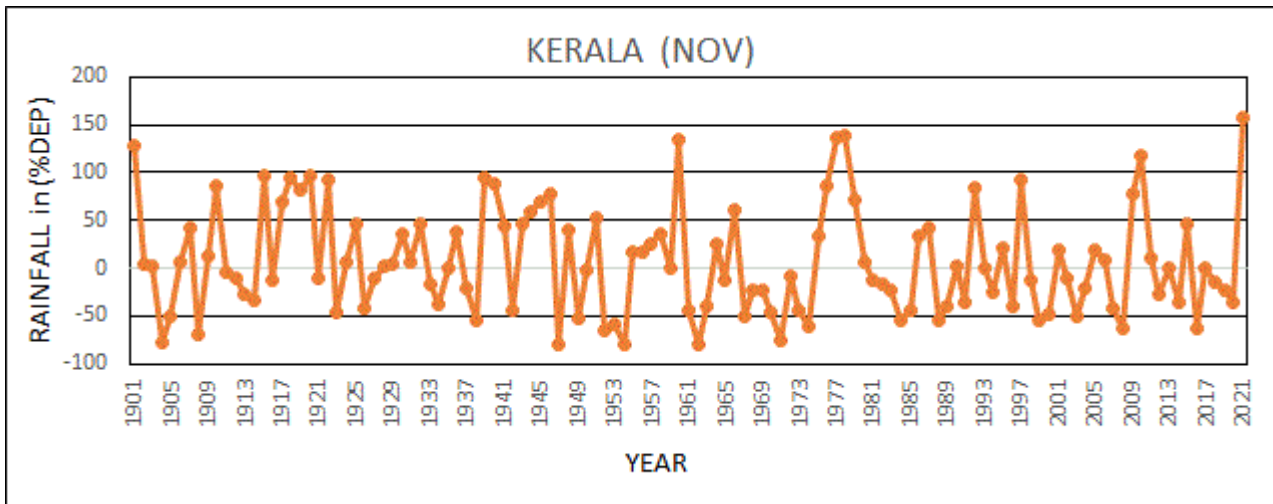


Fig 1(e): The rainfall (percentage departure) received over November 2021 over Kerala during 1901 to 2021.

The five highest rainfall records and corresponding ranks since 1901 for NE Monsoon Region, Rayalaseema, Tamilnadu, South Interior Karnataka and Kerala are given in the table below;

NEM RF NOV (mm)				RAYALASEEMA RF NOV (mm)				TN,Pudu.,&Karaikal RF NOV (mm)			
Normal		117.5		Normal		70.2		Normal		179.6	
YEAR	RF(Act)	%DEP	Rank	YEAR	RF(Act)	%DEP	Rank	YEAR	RF(Act)	%DEP	Rank
2021	316.2	169.2	1	2021	302.0	330.2	1	2021	425.2	136.8	1
1979	259.9	121.3	2	2015	264.0	276.1	2	1979	416.4	131.8	2
1946	250.3	113.1	3	1903	241.1	243.4	3	1920	409.2	127.8	3
2010	249.4	112.3	4	1922	235.0	234.8	4	1940	366.4	104.0	4
1918	245.8	109.2	5	1946	200.2	185.2	5	1960	357.0	98.8	5
S I K RF NOV (mm)				KERALA RF NOV (mm)							
Normal		50.6		Normal		153.4					
YEAR	RF(Act)	%DEP	Rank	YEAR	RF(Act)	%DEP	Rank				
2021	212.0	318.9	1	2021	394.5	157.2	1				
1903	186.8	269.2	2	1978	365.6	138.3	2				
1918	182.5	260.7	3	1977	362.1	136.0	3				
2010	182.4	260.5	4	1960	358.0	133.4	4				
1916	151.2	198.8	5	1901	350.8	128.7	5				

The observed actual rainfall, climatology normal rainfall for the period 1961 to 2010 and its departures from normal for November 2021 is given in Figure 2.

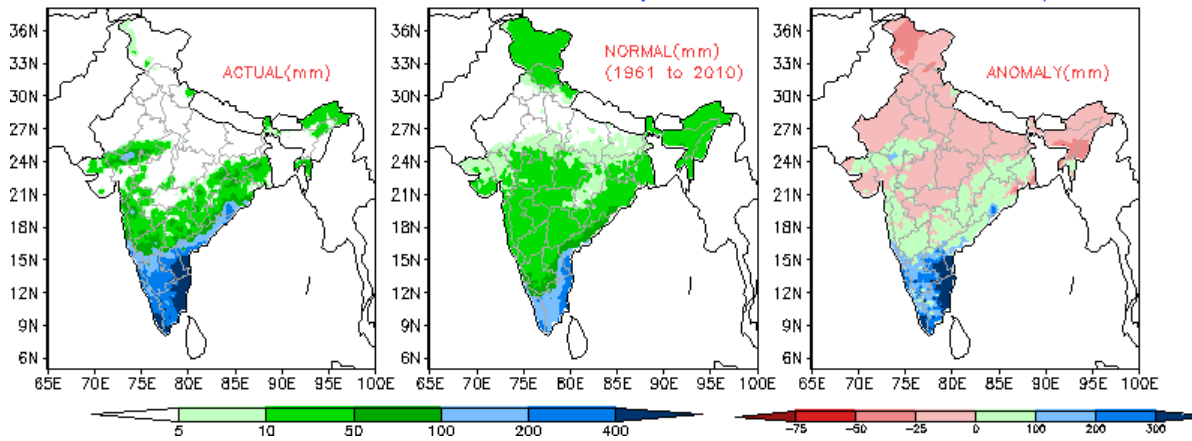


Fig 2: Observed spatial Rainfall pattern for the month of November 2021 over India and their departure from normal (1961 to 2010 period).

Frequency of Heavy Rainfall events

The November 2021 witnessed heavy, very heavy and extremely heavy rainfall events over many stations of south peninsular India, East Rajasthan and Odisha. The location of occurrences of rainfall extremely heavy, very heavy events and heavy rainfall events is shown in the Figure 3. There were 11 stations reporting extremely heavy rainfall (>204.5mm), 168 stations reporting very heavy rainfall (115.6 to 204.4 mm), 662 stations reporting heavy rainfall (64.5 to 115.5 mm of rainfall),

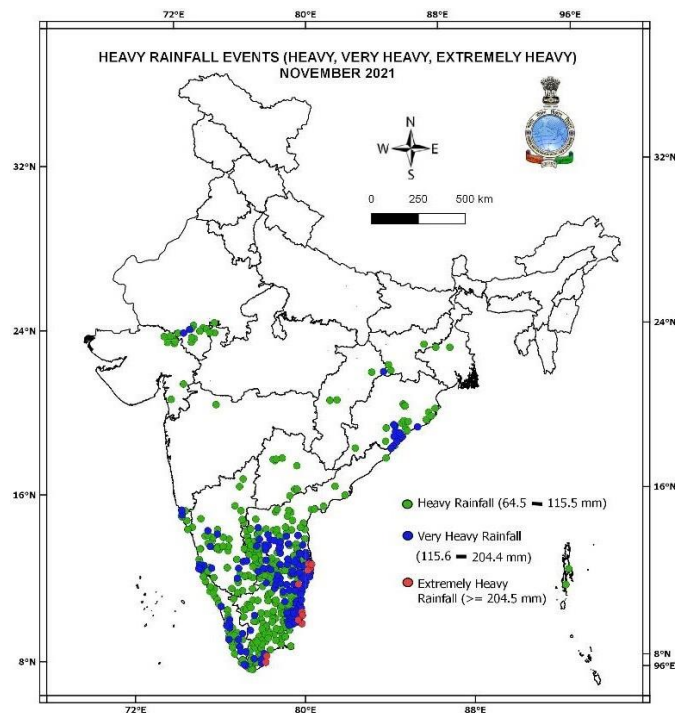


Fig 3: The location of occurrences of extremely heavy, very heavy events and extremely heavy rainfall events in the month of November 2021.

The table below shows stations received 24-hour record rainfall and its previous record in November 2021.

STATION	24 HOUR RECORD RAINFALL IN NOVEMBER 2021(mm)*	DATE	PREVIOUS RAINFALL RECORD (mm)	DD-MM-YYYY
ASANSOL	78	14	0.7	01-11-1960
RANCHI AERO	55.8	14	49.4	30-11-1979
TBIA IMD PART TIME	50	22	10	02-11-2019
PANJIM - IMD OBSY	121.3	21	109	06-11-1922
DURG	70.2	22	59.6	26-11-1972
ANANTPUR	101.1	19	99.3	05-11-1948
CUDDAPAH	112.8	19	104.6	22-11-1943
MAHABALIPURAM	181.1	27	71.2	02-11-1979
BENGALURU KIAL OBSY	90.6	19	57	03-11-2015
CHAMARAJANAGAR	67.2	5	65.2	10-11-2015
MANGALURU	161.2	20	112.1	23-11-1958
KOLAR PWD	149.4	19	112.6	01-11-1975
CHIKKANAHALLI AWS	97	19	86.6	01-11-2012
TUMAKURU	148.8	19	73	24-11-1997
KOCHI C.I.A.L.	189.8	14	145.8	05-11-2015

*Based on real time available data

Formation of Low-Pressure Systems over North Indian Ocean during November 2021

During November, total three low-pressure systems (Depressions) formed (one over Arabian Sea and two over Bay of Bengal). The tracks of low-pressure systems formed during November 2021 are given in Fig.4.

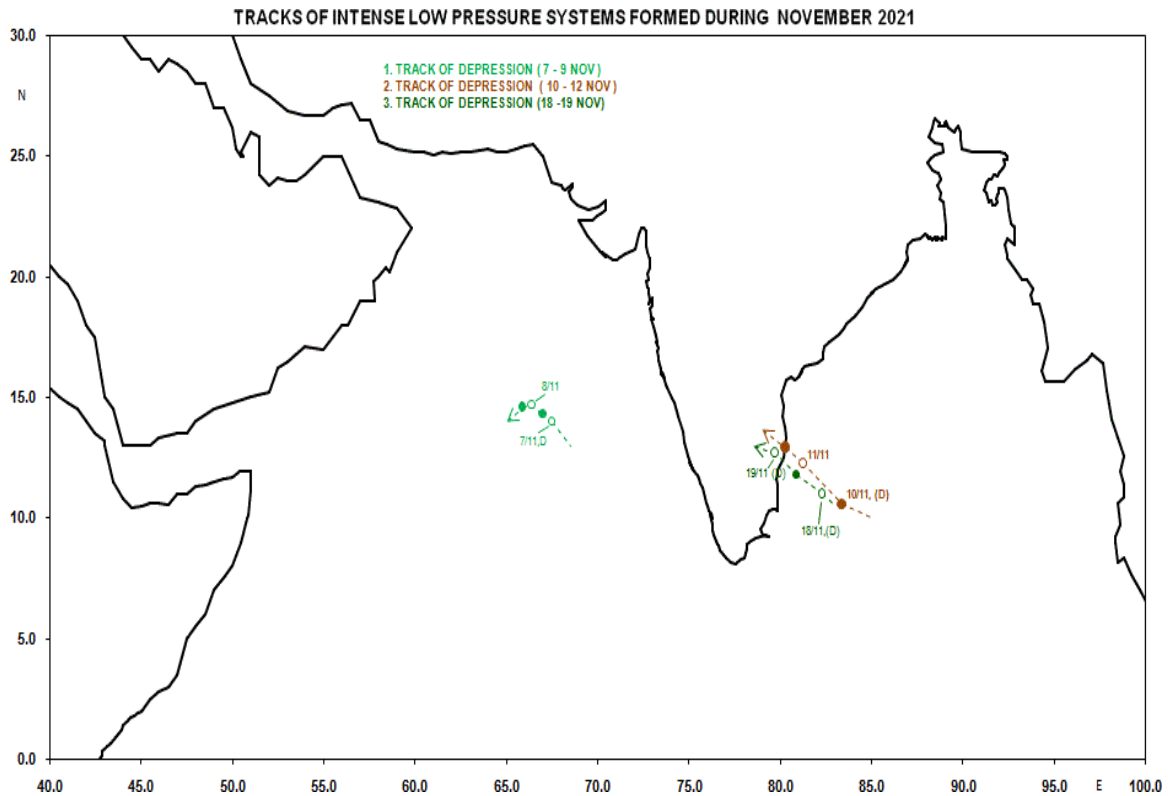


Figure. 4. Tracks of Low-Pressure Systems formed during November 2021.

2. Characteristics of Temperatures for November 2021

The observed average maximum, average minimum and mean temperature for the country as a whole during November 2021 are 28.80°C, 18.13°C and 23.47°C respectively, against the normal of 29.03°C, 17.40°C and 23.22°C based on period 1981-2010. Thus, the average maximum and mean temperature for the country as a whole are near normal by -0.23°C and 0.25°C respectively except average minimum temperature, which is above normal by 0.73°C. 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 2021- 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 November during 1901-2021.

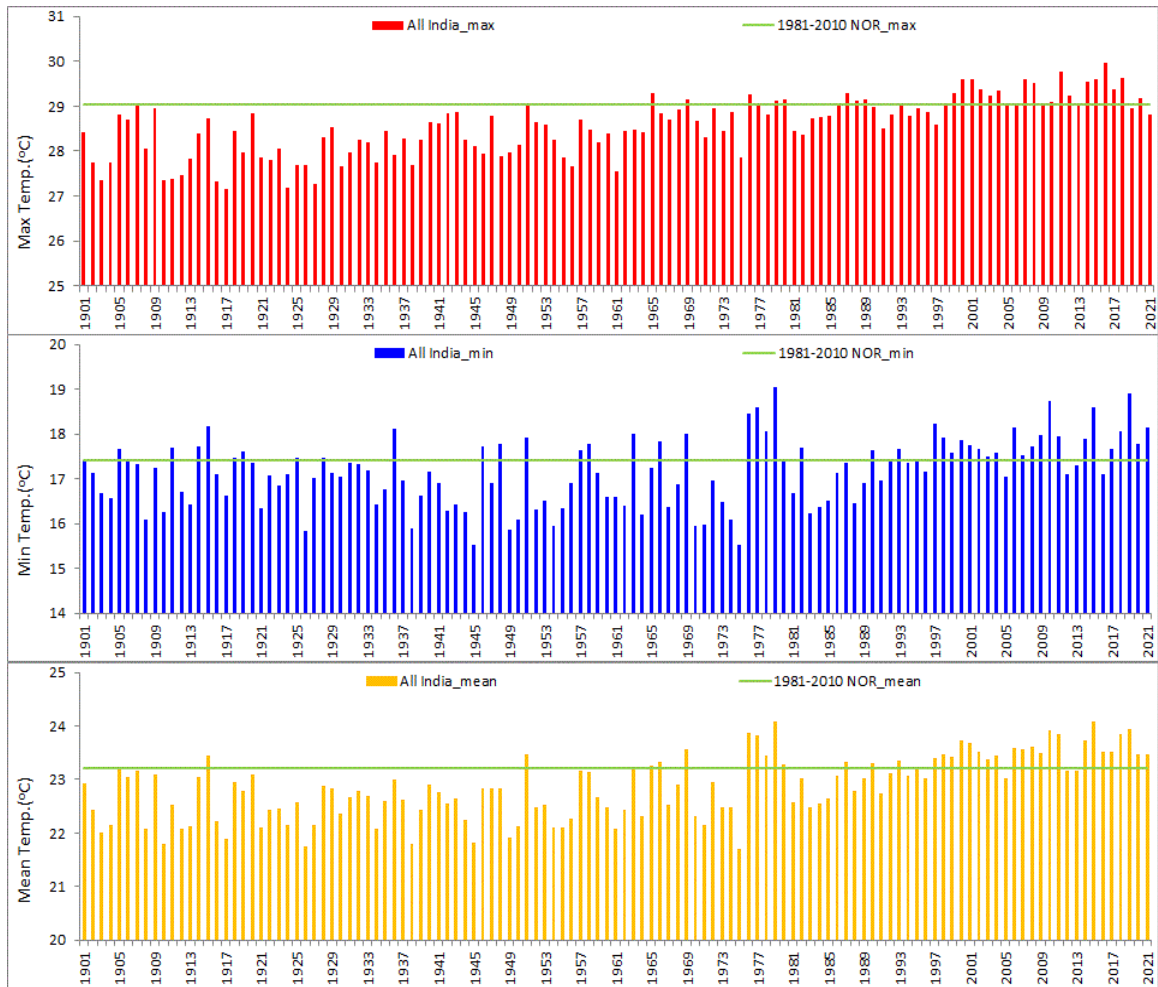


Fig 5: Time series of monthly average maximum, average minimum and mean temperature over all India for the month of November during 1901-2021.

Figure 6 shows time series of monthly average minimum temperature over South Peninsular India for the month of November during 1901-2021. The average minimum temperature over South Peninsular India during November 2021 is highest (23.66°C) since 1901.

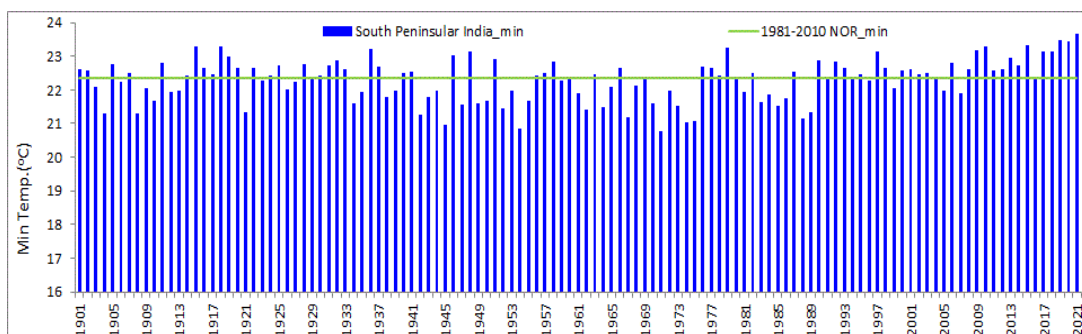


Fig 6: Time series of monthly minimum temperature over South Peninsular India for the month of November during 1901-2021.

The Temperatures during November 2021 for all India and homogeneous regions with its rank since 1901 are given in the table below;

NOV 2021		Max Temp (°C)	Min Temp (°C)	Mean Temp (°C)
ALL INDIA	ACTUAL	28.80	18.13	23.47
	NORMAL	29.03	17.40	23.22
	ANOMALY	-0.23	0.73	0.25
	TOP RANK	51	10	23
NORTHWEST INDIA	ACTUAL	25.28	10.84	18.04
	NORMAL	25.74	10.75	18.24
	ANOMALY	-0.46	0.09	-0.20
	TOP RANK	65	34	47
EAST & NORTHEAST INDIA	ACTUAL	28.19	15.30	21.70
	NORMAL	27.79	15.58	21.68
	ANOMALY	0.40	-0.29	0.02
	TOP RANK	17	61	37
CENTRAL INDIA	ACTUAL	31.06	18.91	24.95
	NORMAL	31.14	17.60	24.37
	ANOMALY	-0.08	1.31	0.58
	TOP RANK	39	13	15
SOUTH PENNINSULAR INDIA	ACTUAL	29.87	23.66	26.74
	NORMAL	30.37	22.34	26.36
	ANOMALY	-0.50	1.32	0.39
	TOP RANK	63	1	16

The five highest minimum temperature (TMin) records and corresponding ranks since 1901 for South Peninsular India are given in the table below;

South Peninsular India (Nov 2021)				
Year	TMin	Normal	Anomaly	Rank
2021	23.66	22.34	1.32	1
2019	23.47	22.34	1.13	2
2020	23.45	22.34	1.11	3
2015	23.35	22.34	1.01	4
1918	23.28	22.34	0.94	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 November 2021 is given in Figure 7.

TEMPERATURE FOR THE MONTH NOV 2021 & ITS ANOMALY

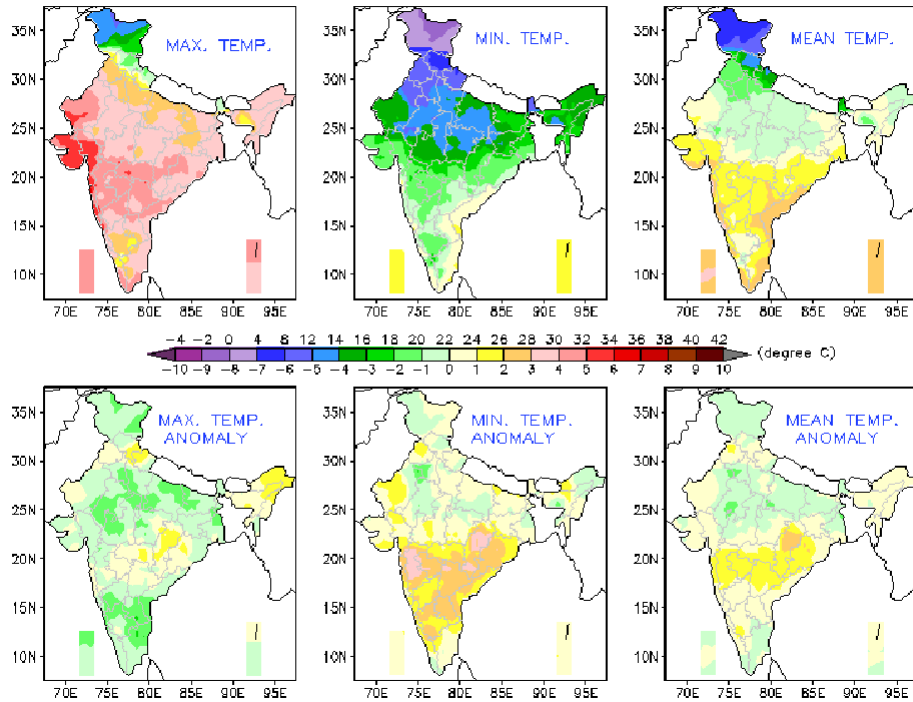


Fig 7: Observed spatial temperature pattern of monthly average maximum, average minimum, and mean temperature over India (top three from left to right) and their departure from normal (1981 to 2010 period) for November 2021 (lower three from left to right).

3. Significant Weather Events for the month of November 2021:

The figure 9 shows significant weather events during the month. (based on real time media reports.).

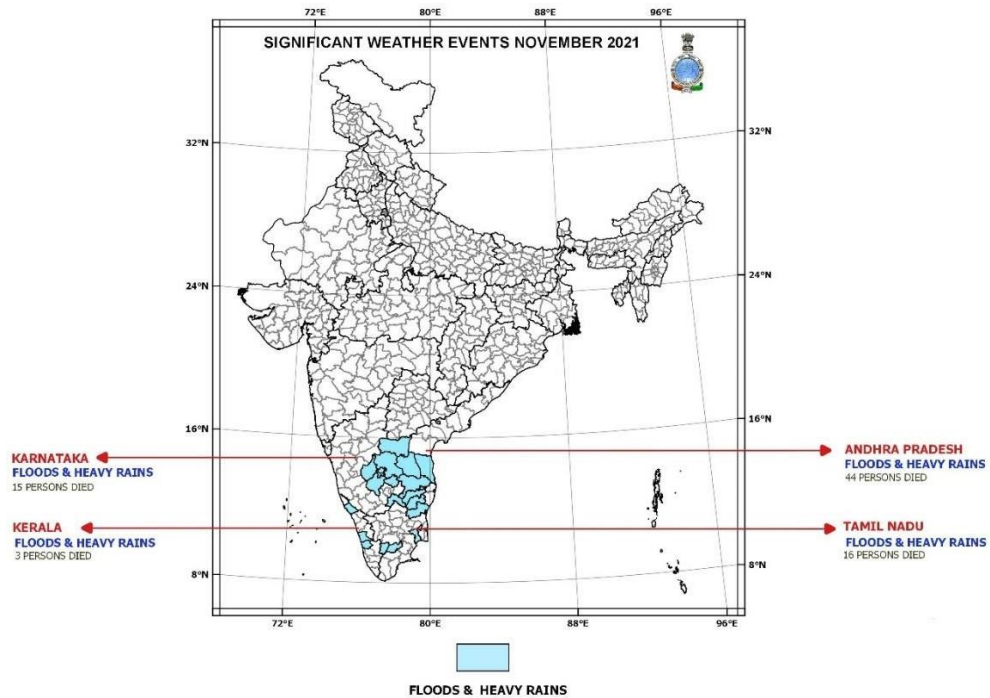


Fig 9: Significant weather events during November 2021 (Based on real-time media report)

During November, total 78 persons reportedly claimed dead, 9 persons injured, 17 persons missing & more than 2500 livestock perished. Deaths and damages observed due to Floods & Heavy Rains. The details of casualties given below, which are based on real time media reports.

DATE	DEATH	INJURED	MISSING	LIVESTOCK	DISTRICT (STATE) AFFECTED
8 to 21 Nov.	44		17	2400	Anantpur, Chittoor, Cuddapah, Kurnool, Nellore & Parts of Andhra Pradesh
6 to 21 Nov.	16	9		157	Chennai, Kallakurichi, Krishnagiri, Madurai, Thanjavur, Teni, Tiruvannamalai, Thiruvavarur, Vellore, Villupuram (Tamil Nadu)
15 to 20 Nov.	15				Chitradurga, Chikkaballapura, Tumkur & parts of Karnataka
15 Nov.	3				Ernakulam, Kannur, Thrissur (Kerala)