



State of Pakistan Climate in 2024

IN THIS ISSUE

1. Pakistan Climate highlights in 2024	2
2. Significant Climate Events in 2024	2
3. Synoptic Features of 2024.....	3
4. Above average annual rainfall	5
4.1 Seasonal (Jan-Mar, JFM) Rainfall.....	6
4.2 Pre-Monsoon (Apr-Jun, AMJ) Rainfall	7
4.3 Monsoon (Jul-Sep, JAS) Rainfall	8
4.4 Post-Monsoon (Oct-Dec, OND) Rainfall	9
5. Another warm year of Pakistan.....	9
5.1 Annual Mean Temperature	9
5.2 Annual Mean Maximum	9
5.3 Annual Mean Minimum	10
5.4 Seasonal (Jan-Mar, JFM) Mean Temperatures	11
5.5 Seasonal (Apr-Jun, AMJ) Mean Temperatures	11
5.6 Seasonal Summer/Monsoon (Jul-Sep, JAS) Mean Temperatures	13
5.7 Seasonal Post-monsoon (Oct-Dec, OND) Mean Temperatures	14
6. Cyclonic Storm ASNA, اسنى	16
7. Extreme and record breaks	17
8. Strong winds events of 2024	22

LIST OF FIGURES

1. Significant Climate Events during the year	2
2. Number of Fog days in January-2024.....	3
3. Number of Fog days in November-2024.....	5
4. Monthly mean rainfall in 2024 VS Avg.....	5
5. Spatial rainfall distribution/departure in 2024	6
6. Pakistan daily AWR & Avg in 2024	8
7. Pakistan Avg AW rainfall 1961-2024.....	9
8. Monthly Mean Temperature in 2024 Vs Avg.....	10
9. Spatial mean temp distribution in 2024	12
10. Spatial mean Max temp distribution in 2024	15
11. Spatial mean Min temp distribution in 2024.....	15
12. Pakistan's AA Mean temperature 1961-2024.....	16
13. Observed Track of CS ASNA.....	16
14. PMD Radar Image of CS ASNA.....	16

LIST OF TABLES

1. Annual AW Rainfall of Pakistan and regions	6
2. Annual AA temperatures Pakistan & regions ...	10
3. Records of Heaviest one day Rainfall in 2024	17
4. Records of wettest Rainfall in 2024	18
5. Records of Hottest day Temperature in 2024...18	
6. Records of Coldest day Temperature in 2024...19	
7. Records of hottest night Temperature in 2024 20	
8. Records of coldest night Temperature in 2024.21	
9. Strong Wind Speed reported in 2024	22

1. Pakistan Climate highlights in 2024

- The Cyclonic Storm “Asna” originated in the Northeast Arabian Sea was a rare phenomenon in the month of August 2024.
- The year 2024 happened to be a wetter-than-average with annual rainfall being +31% of average and ranked as the 7th wettest year during the past 64 years.
- Annual rainfall was excessively above average over Sindh (+94%) and Balochistan (+82%), slightly above average over Punjab (+18), near average over KP (+04%), while below average over AJK (-13%) and GB (-12%).
- The country witnessed the 7th wettest (+48%) Apr-Jun (AMJ) 2024 seasonal rainfall and 8th wettest (+51%) Jul-Sep (JAS) seasonal rainfall since 1961.
- National winter (JFM) rainfall was near average, while post-monsoon (OND) seasonal rain been well below average.
- National **annual mean temperature**, for Pakistan as a whole, was **0.71 °C** above average and ranked as the 9th highest.
- The **annual mean maximum temperature** at country-level was **0.68 °C** warmer than average.
- The **annual mean minimum temperature** was **1.29 °C** warmer than the country-average and ranked as the 2nd warmest on record (the record is 16.63 °C in 2022).
- Punjab experienced the lowest maximum temperature of 14.26 °C in January with large negative anomaly of **-5.79 °C** (record was 16.66°C in 1964) due to persistent foggy conditions.
- Record-breaking warm seasonal temperatures observed in monsoon (JAS) and post-monsoon (OND) 2024. The details are given in the relevant discussion section.

2. Significant Climate Events in 2024

The significant climate events over the year across the country are depicted in Fig. 1.



Figure 1. Significant Climate Events during the year

3. Synoptic Features of 2024

January 2024

Due to persistent high-pressure and dry continental airflow across the country, a severe cold wave affected most parts of the country during the month. Only two western disturbances (WDs), first a week one on 18-21 Jan and second a good one on 27-31 Jan approached the country which produced the season's first good rains and snow. On the other hand, a frequent dense fog prevailed over Punjab, south Khyber Pakhtunkhwa (KP) and upper Sindh during the month (Fig. 2), which blocked the sunlight for many days to weeks. Apart from reducing the visibility virtually to zero meters, it badly disrupted the aviation, road and rail traffic movement for many days resulting in considerable economic losses to the transport sector and caused health issues due to extreme cold conditions in Punjab. The prolonged foggy weather rendered the daytime maximum temperatures across Punjab to well-below zero (-5.79°C) which happened to be the ever lowest mean maximum temperature in the month and so was the case in Sindh (-1.74°C) which observed the 5th lowest mean maximum temperature.

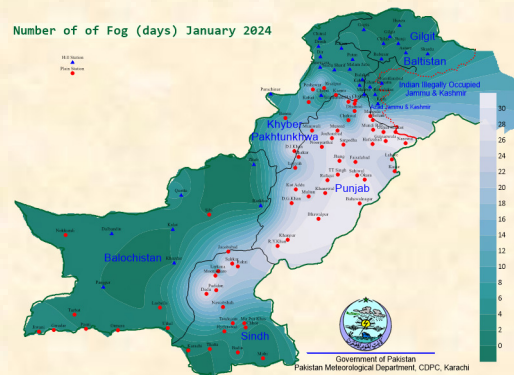


Fig-2. Number of Fog days in January-2024

February 2024

February 2024 has brought 3/4 WDs across Pakistan from 1-6 Feb, 11-13 Feb, 16-21 Feb and 25-29 Feb that caused heavy/ very heavy rain-thunderstorms (with some record-breaking events in southwest Balochistan - Gwadar district) and snowfall over hills in KP, Gilgit-Baltistan (GB), Azad Jammu & Kashmir (AJK), Punjab, Balochistan and some parts of Sindh.

March 2024

During March, three strong WDs entered the country from 1-7 Mar, 9-14 Mar & 21-31 Mar which produce heavy/very heavy rain-wind/thunderstorm accompanied with hailstorms and snowfall over the hills in KP, GB, AJK, Punjab, Balochistan. The unusual prolonged wet spells dropped the temperatures to new lowest records at several places in Balochistan & Sindh. On the other hand, a short-lived heat-low developed over northwest Balochistan and eastern Sindh on 15-17 March which raised the day temperatures in Sindh during the period.

April 2024

In April, three back-to-back WDs entered the country from 2-7, 10-15 & 18-30 April which yielded widespread dust-thunder-hail storms/rains and snowfall over hills of KP, GB, AJK, Balochistan and Punjab. These systems triggered flash floods in Balochistan & upper KP associated with riverine flood in Kabul River.

May 2024

Four shallow WDs approached the country during the 2-6, 10-12, 16-21, and 24-25 May that caused moderate/ rather heavy dust-thunderstorm in KP, GB, AJK, Punjab & North Balochistan. From mid-May the seasonal (heat) low developed over Northwest Balochistan. A severe heatwave struck the plains of Punjab, Sindh and northeast & south Balochistan from 23 May and persisted

till end May with daytime maximum temperatures shot up to 50-52.5 °C in upper Sindh and south Punjab on 26 May.

June 2024

The WDs continued to affect northern parts of the country with seasonal (heat) low persisted over North-Northwest Balochistan through the month. Another low-pressure area developed over Northeast Arabian Sea and adjoining Indian Gujarat region on 23 June, persisted until 30 June and caused heatwave in Karachi, Thatta and suburbs and resultantly produced first pre-monsoon dust-thundershowers in southeast Sindh and Karachi. Apart from this, a severe heatwave also struck the plain areas of Punjab and upper Sindh from 1-3 June & 24-27 June when daytime maximum temperatures shot up to 46-48 °C.

July 2024

Usually, monsoon sets on in the country from start of July; however, 2024 saw its onset two days earlier (29 June) with WDs kept approaching KP, GB and AJK. The seasonal/heat low prevailed over Northwest-West Balochistan with elongated trough over southeast Sindh from 9 -12, 15 -17, 19 -24, and 29 -31 July which pulled moisture from the Arabian Sea and resulted in widespread heavy to very heavy rainfall over KP, GB, AJK, Punjab, Balochistan and Sindh during.

August 2024

During Aug, the monsoon currents' penetration from the Arabian Sea & Bay of Bengal over the country remained a dominant feature with occasional WD also entered in upper parts of the country. Meanwhile, seasonal (Heat) low oriented mostly over Northwest Balochistan. Another prominent and a rare feature of the month was a development of Cyclonic Storm, CS (ASNA) on 30th August over the Northeast Arabian Sea off Sindh coast which lasted till 2nd Sep and ultimately moved westward towards Oman coast. The CS (ASNA) proved to be the only 4th CS in the recorded history (during 1893-2023) of the North Indian Ocean during Aug, the previous ones being in 1944, 1966 and 1976.

September 2024

Monsoon currents continued penetrating in upper and central parts of the country during first and last week of the month with a westerly wave also approached during 27-29 Sept, which produced few heavy to extremely heavy rainfall over KP, Punjab, GB and AJK. Monsoon-2024 withdrew from the country in last week of Sep. Seasonal (Heat) low, remained located over Northwest-west Balochistan during most of the month.

October 2024

With withdrawal of monsoon, the dry continental air gripped the country from 1-4 Oct followed by a westerly wave approached the northern parts of the country from 5-14 Oct. Meanwhile, heat low-pressure area persisted over Northwest Balochistan and Upper Sindh from 7-10 and 23-26 October. Another significant feature was a formation of a Depression over the Central Arabian Sea during 13-15 Oct 2024 which tracked northwest-ward and crossed the Oman coast near Duqm on 15th Oct night. Another low-pressure area formed over the Central Arabian Sea and moved west towards the Yemen coast. Blocking the sea breeze, these features raised the daytime temperatures in lower Sindh.

November-2024

The first week of the month remained under the dry continental air across the entire country followed by 3 westerly waves on 11-12, 15-16, 28-30 November which resulted some moderate to heavy rain in KP & Balochistan and light/moderate rains in Punjab, GB, and AJK. On the other hand, central and south Punjab remained in grip of severe smog/fog lowering air quality to dangerously worst levels during most of the month (Fig-3).

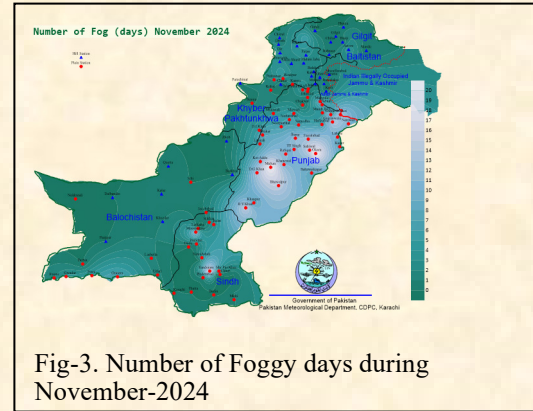


Fig-3. Number of Foggy days during November-2024

December 2024

The dry continental air with dense foggy conditions remained a predominant feature of the month across most parts of the country. In all, three weak westerly waves entered northern parts of the county during 1-3, 8 -12 & 26-28. These waves caused some light-intensity rainfall in Northern areas of Punjab, KP, GB, AJK and west Balochistan.

4. Rainfall: Above-average annual rainfall

The national total rainfall (390.0 mm) for the year 2024 was 31% above the long-period average of 1961-2010 (average is 297.6 mm) and ranked as the 7th highest during past 64 years (record is 526.9 mm in 2022). It was excessively above average over Balochistan with 290.7 mm (+82%) ranking as the 4th wettest (record is 409.4 mm in 2022), Sindh with 334.3 mm (+94%) ranking as the 9th wettest (record is 741.6 mm in 2022). Whereas, it remained slightly above average (+18%) over Punjab with 454.8mm, slightly below normal (-13 %) over AJK with 816.7 mm & GB (-12%) with 170.6 mm and near normal (+4%) over KP (Table-1). The temporal (monthly) rainfall distribution is given in (Fig-4) and spatial distribution is given in Fig-5 [actual (left) & departure (right)].

Table 1: Annual area-weighted rainfall-2024 of Pakistan and sub-regions

Region	Rank (of 63)	Normal (mm)	Average (mm)	Departure (percent)	Comment
Pakistan	58	297.6	390.0	31	07th highest (record 526.9 mm in 2022)
Azad Jammu & Kashmir	14	939.4	816.7	-13	14th driest (record 698.7 mm in 2007)
Balochistan	61	159.9	290.7	82	04th highest (record 409.4 mm in 2022)
Gilgit Baltistan	27	193.6	170.6	-12	27th driest (record 77.5 mm in 1971)
Khyber Pakhtunkhwa	37	684.2	711.7	4	28th highest (record 995.9 mm in 2015)
Punjab	43	387.0	454.8	18	22nd highest (record 642.3 mm in 2015)
Sindh	56	171.9	334.3	94	09th highest (record 741.6 mm in 2022)

Rank ranges from 1 (lowest) to 64 (highest).

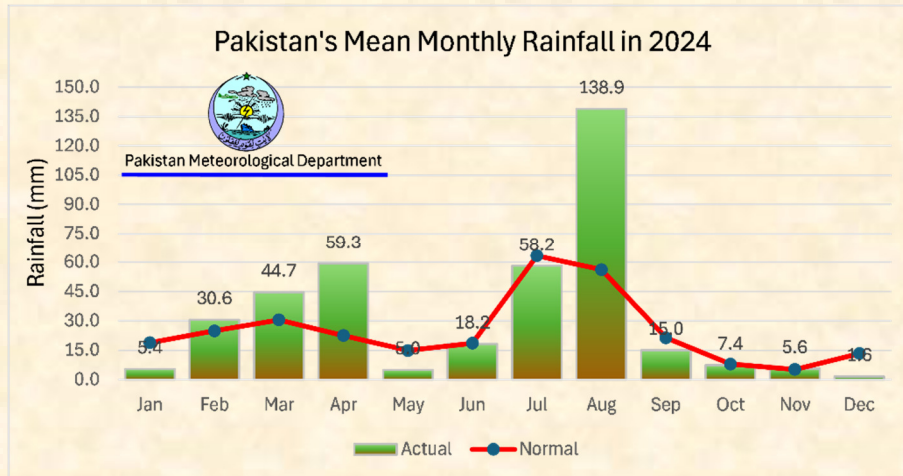


Figure 4: Monthly mean rainfall in 2024 verses corresponding averages.

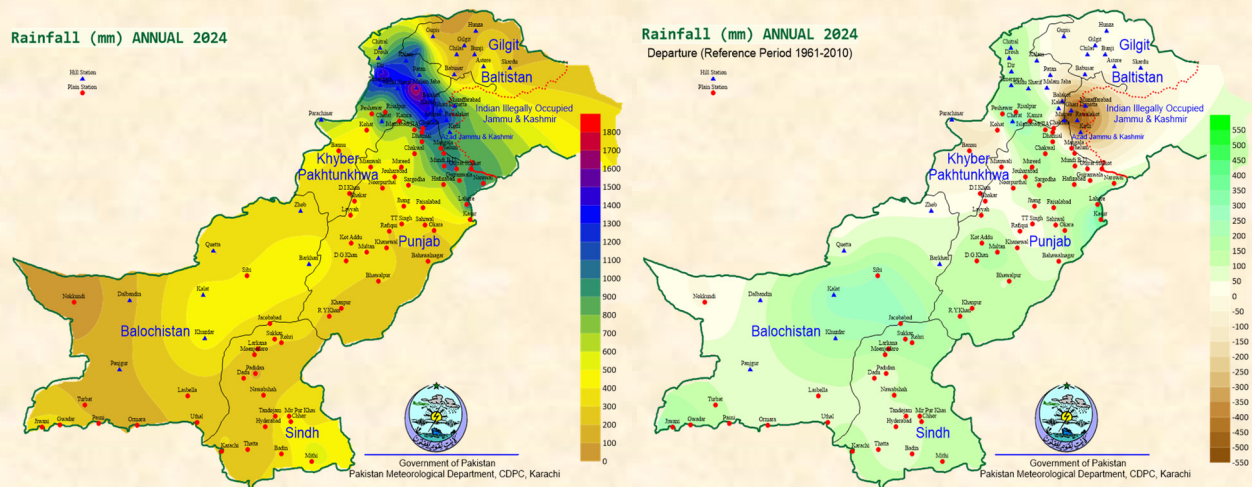


Figure 5: Pakistan spatial distribution of 2024 annual rainfall, actual (left) and departure (right)

The year 2024 started with an excessively below-average rainfall (-72% anomaly) in **January 2024** with only 5.4 mm against the 18.9 mm average rainfall with a similar large deficiency observed in the regions too. However, the situation became better in the following two months, i.e. in **February 2024**, National area-weighted rainfall (30.6 mm) was 23% above average with Sindh & Balochistan having recorded excessively above average rainfall with 14.4 mm (+174%) 39.2 mm (+108%) respectively and stood as the 8th wettest February in the region, while, Punjab and GB observed deficient rain. In **March 2024**, national area-weighted rainfall of 30.6 mm was 47% above average. On regional scale, Balochistan with 39.0 mm (+91%), GB with 43.9mm (+68%) and Sindh with 7.6mm (+64%) all recorded excessively above average rains, whereas AJK with 141.4mm (+40%) and KP with 128.3mm (+39%) both recorded well above-average rains in the month.

4.1. Seasonal (Jan-Mar, JFM) Rainfall

This made the national quarterly (*Jan-Mar, JFM 2024*) total rain 80.8 mm (+9%) near average. On regional scale, Sindh with 22.6mm (+78%) & Balochistan with 86.3mm (+51%) experienced largely above average rainfall, whereas, Punjab (with -38%) & GB (with -10%) recorded below average rains. It was so in AJK and KP but with lesser extent, -4% & -1% respectively.

April 2024, with national area-weighted rainfall of 59.30 mm (+164%), happened to be the wettest April since 1961 (previous record being 55.8 mm in 1983). On regional scale, Balochistan with 58.1 mm (+437%), KP with 174.9 mm (+137%) and AJK with 168.9 mm (+102%) recorded excessively above average & record-breaking rainfall and hence ranked as the wettest April, whereas, Punjab with 35.5 mm too recorded excessively above average (+73%) rainfall in the month. In sharp contrast to the preceding month, **May 2024** with only 5.0 mm rainfall was excessively deficient-rain month (-66%) for Pakistan and ranked as the 2nd driest May (the driest ever is 3.6 mm in 1988). On regional scale: AJK with 14.2 mm (-76%) observed the 2nd driest May (the first one being in 1988 with 10.8 mm), Sindh with 0.0 mm (14th time during past 64 years), KP with 17.6 mm (-59%) experienced 4th driest, Punjab with 4.8 mm (-69%) saw 7th driest and GB with 5.5mm (-80%) saw the 9th driest and Balochistan with 6.0 mm (-52%). **June 2024** with 18.2 mm (+2%) rainfall was near average for Pakistan. The situation was diverse on regional scale, i.e. Sindh with 23.9 mm (+134%) observed excessively above average rainfall ranking as the 10th highest in past 64 years, GB with 14.2 mm (+32%) too recorded above average rainfall and so was Balochistan with 10.3 mm (+14%). Whereas, in AJK, Punjab and KP it remained below average.

4.2. Pre-Monsoon (Apr-Jun, AMJ) Rainfall

Hence, the *Pre-Monsoon (April-June, AMJ 2024)* rainfall came up 48% above average and ranked as the 7th wettest season (the record is 111.1 mm in 2007). Similarly, Balochistan with 71.3 mm (+176%) recording the 3rd highest, for KP with 222.6 mm (+45%) recording 5th highest and Sindh with 29.0 mm (+79%) all exhibited excessively above average pre-monsoon rain, while, AJK and Punjab received near average rainfall, and GB experienced slightly below normal rain during the season.

July 2024, the first monsoon month of the year, brought 57.5 mm of rainfall, which was near to average (-9%). However, the situation varied on regional scale with four of the provinces/regions recording below-average rainfall, i.e. AJK with 94.7 mm (-46%), ranking 3rd driest July, GB with only 4.6 mm (-65%) and Sindh with 33.8 mm (-44%) and KP with 84.0 mm (-21%) all observed below average rainfall during past 64 years. Whereas, Punjab with 112.4 mm (+8%) and Balochistan with 34.3 mm (+16%) were the only two regions to have observed slightly above average rainfall. **August 2024**, with 138.9 mm (+147%), proved to be the 2nd wettest August for Pakistan (record being 193.2 mm in 2022) during past 64 years. On regional scale, Sindh with 234.0 mm (+337%) & Balochistan with 82.2 mm (+266%) both recorded the 3rd wettest August (record being 443.6 mm & 154.9 mm respectively in Aug 2022), Punjab with 200.7 mm (+115%) observed 4th wettest August (record being 282.6 mm in 1973) and GB with 30.9 mm (+85%) the 6th wettest August (record being 89.1 mm in 1997). KP with 133.6 mm (+29%) and AJK with 170.5 mm (+13%) both exhibited above average rainfall. Another significant and rare event of the month was formation of Cyclonic Storm ASNA (اسنى) in the North Arabian Sea. The details of the TC event are given in the subject discussion. The third Monsoon month of **September 2024** was well below average (-30%) with National area-weighted rainfall of 15.0 mm. On regional scale, GB with 4.2 mm (-56%), Sindh with 10.6 mm (-47%), KP with 26.3mm (-43%), experiencing

the 8th driest September, AJK with 41.4 mm (-36%), Balochistan with 4.4 mm (-29%) and Punjab with 30.9 mm (-11%) all exhibited well below average rainfall in the month.

4.3. Monsoon (Jul-Sep, JAS) Rainfall

The 3-months (**Jul-Sep, JAS 2024**) aggregate rainfall therefore proved to be excessively above average (+51%) with national total 212.1 mm and ranked as the 8th wettest monsoon (the record is 387.8 mm in 2022). It was so in Balochistan with 122.9 mm (+111 %), ranking as the 4th wettest, and Sindh with 278.4 mm (+108%) ranking as the 10th wettest monsoon. Punjab with 344.0 mm (+48%) also exhibited above average rainfall, while, GB with 40.5 mm (+2%) and KP with 242.7 mm (-5%) saw near average seasonal rain and it remained below normal in AJK (-21%).

October 2024 (with 7.4 mm) rainfall with a little negative anomaly of -8% was near average for Pakistan. However, diverse situation was observed on regional scale, i.e. Balochistan with 1.0 mm (-66%) recorded excessively below average rainfall, Punjab with 4.8mm (-40%) and Sindh with 3.8mm (-12%) recorded below average rains. KP with 29.7 mm (+19%) and AJK with 35.6 mm (+15%) recorded slightly above average rainfall. GB with 12.8 mm (+64%) was the only region to exhibit excessively above average rainfall. Inconsistent to previous month, **November 2024** rainfall with 5.6 mm was near average with a positive anomaly of (+8%) for the country. However, a diverse situation has been observed on a regional scale i.e. Balochistan with 7.6 mm (+193%) was the only region to have recorded excessively above average rainfall and ranked 8th wettest November (the record is 25.8 mm in 2019). In contrast to Balochistan all other regions exhibited below to excessively below average rain. **December 2024** rainfall with only 1.6 mm was excessively below average with an anomaly of -88% for Pakistan and ranked as 10th driest December during past 64 years. A similar situation has been observed on a regional scale, i.e. KP with 0.7 mm (-98%) recorded excessively below-average rainfall and ranked as the 4th driest. Similarly, Sindh with only 0.1 mm (-98%), Balochistan with 1.7 mm (-87%), Punjab with 1.6 mm (-894%), AJK with 6.9 mm (-83%) and GB with 4.1 mm (-62%) all experienced excessively below-average rains in the month.

4.4. Post-Monsoon (Oct-Dec, OND) Rainfall

Therefore, the post-monsoon season (October to November, **OND 2024**) aggregate rainfall with 14.6 mm (-45%) was well below average across Pakistan. A similar situation existed across the regions during the season.

Round the year 2024 all-months rainfall time series plot is shown in Fig. 6.

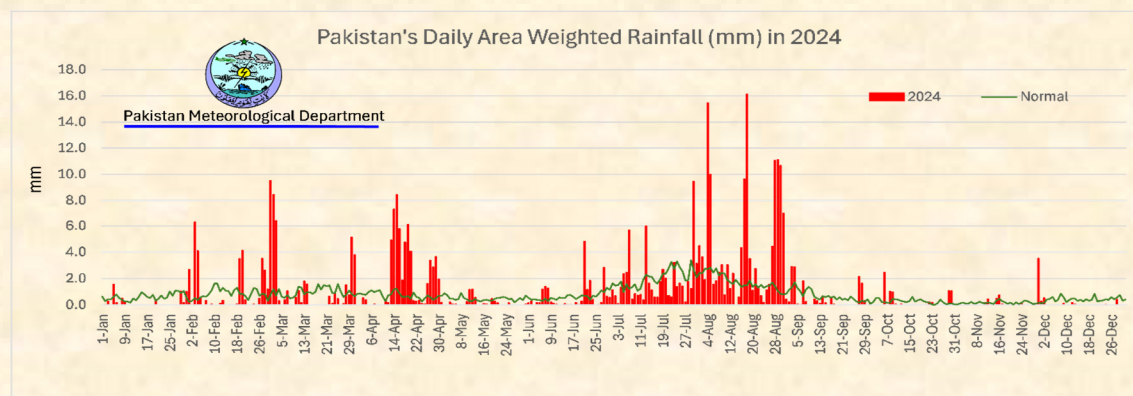
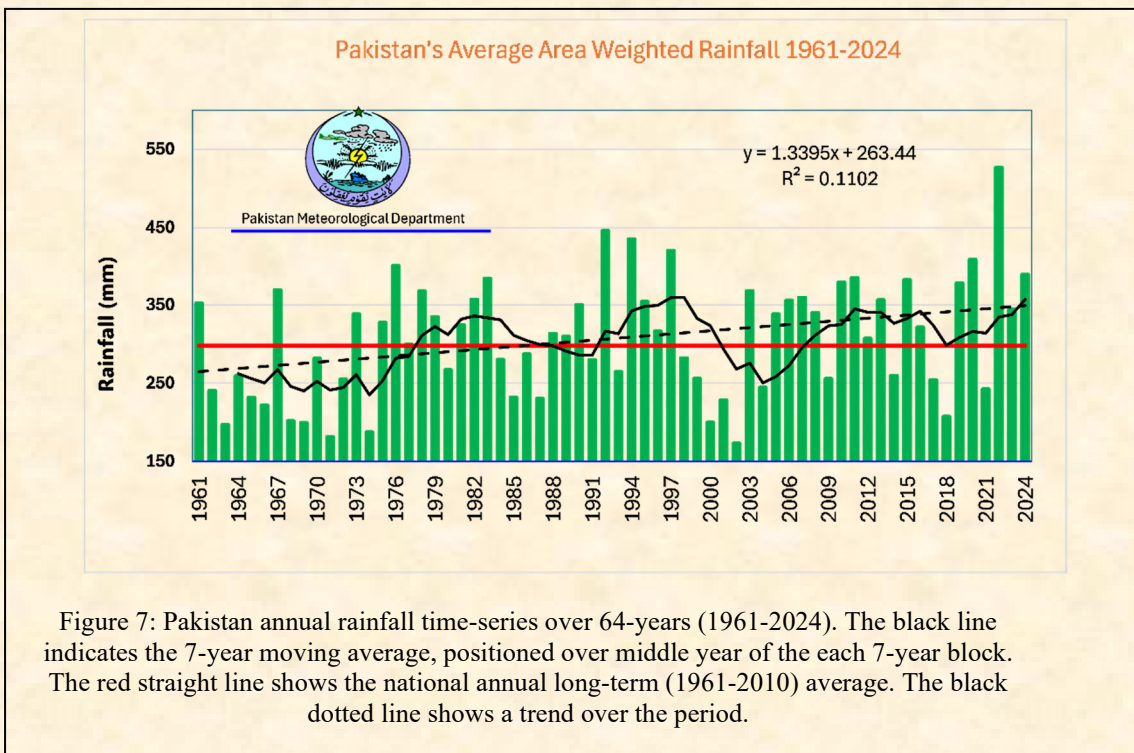


Figure 6: Pakistan daily area-weighted observed & normal rainfall during 2024

Moreover, to have a glance of all 64-year annual rainfall trend a time series plot is shown in Fig. 7, which depicts three episodes of deficient, drier-than-average (1961- 1972, 1984- 1987, 1998- 2002 & 2017- 2018, with some mixed trends within) and surplus, wetter-than-average (1975- 1983, 1988- 1997, 2003 & 2005 onwards with 2009, 2014, & 2021 being deficient) rains each. Apart from these distinct trends, there is some noticeable interannual rainfall variability over the analysed period. The dotted black line shows a rising trend (about 1.4 mm/year but with lesser R² value) especially after the year 2003.



5. Temperature: Another warm year of Pakistan

5.1. Annual Mean Temperature

Pakistan national annual 2024 mean temperature of 23.52 °C, was **0.71 °C** above average of 22.80 °C (baseline period 1961–1990), ranked as the 9th warmest year on record during past sixty-four years (Table 2) (the record is 23.95 °C in 2002). A similar situation prevailed across all the sub-regions: for Sindh with 27.62 °C (+1.04 °C) & AJK with 17.22 °C (+1.00 °C) it ranked as 4th highest annual mean temperature (records are 27.89 °C in 2018 & 17.43 °C in 2001 respectively) (Table-2, Fig. 9).

5.2. Annual Mean Maximum Temperature

The annual mean maximum temperature at country-level was 30.37 °C being **0.68 °C** warmer than average of 29.69 °C and was so with anomalies ranging 0.21 °C to 1.40 °C in all the sub-regions except Punjab where it was -0.13 °C. Over AJK with 23.84 °C (+1.40 °C) it ranked as 3rd highest (record is 24.1°C in 2001), whereas over GB with 22000°C (+1.25 °C) ranked as 7th

highest of past 64 years (record is 22.96°C in 2001). The spatial distribution of annual mean maximum temperature across Pakistan is given in Fig. 10.

5.3. Annual Mean Minimum Temperature

The annual mean minimum temperature was 16.63 °C, being 1.29 °C warmer than the country-average of 15.34 °C, which proved to be the 2nd warmest on record (the record is 16.63 °C in 2022). A similar trend prevailed across all the sub-regions except GB where it was bit cooler (-0.08 °C) than average. For Sindh (+1.87 °C), it ranked 1st highest (previous record being 20.5 °C in 2023), for Punjab (+1.70 °C) the 3rd highest (record is 18.8 °C in 2022), Balochistan (+1.23 °C) the 4th highest (record is 16.81 °C in 1999), KP (+0.55 °C) the 5th highest (record is 13.89°C in 1970) and AJK (+0.62 °C) ranked the 8th warmest year in past 64 years (Table-2). The spatial distribution of annual mean minimum temperature across Pakistan is depicted in Fig. 11.

Table 2: The 2024 annual area-averaged temperatures and anomalies across Pakistan and sub-regions

Annual Area-Averaged Temperatures (°C) in 2024 and anomalies from normal 1961-1990						
Regions	Maximum Temperature		Minimum Temperature		Mean Temperature	
	Actual	Anomaly	Actual	Anomaly	Actual	Anomaly
Pakistan	30.37	+0.68	16.63 ^{2nd}	+1.29	23.52 ^{9th}	+0.71
Azad Jammu & Kashmir	23.84 ^{3rd}	+1.40	10.55 ^{8th}	+0.62	17.22 ^{4th}	+1.00
Balochistan	31.05	+1.01	16.53 ^{4th}	+1.23	23.81	+0.70
Gilgit-Baltistan	22.00 ^{7th}	+1.25	7.57	-0.08	14.81	+0.59
Khyber Pakhtunkhwa	26.98	+0.72	13.55 ^{5th}	+0.55	20.28	+0.69
Punjab	31.37	-0.13	18.65 ^{3rd}	+1.70	25.03	+0.48
Sindh	34.26	+0.21	20.93 ^{1st}	+1.87	27.62 ^{4th}	+1.04

January 2024 with national mean monthly temperature of 11.81°C was 0.58 °C warmer than average at country-level. So was the case in most of the sub-regions: GB (+2.48 °C) and Balochistan (+2.45 °C) both recorded the 4th warmest mean January temperature and AJK (+1.54 °C) it ranked as the 7th warmest. On the other hand, in a sharp contrast, Punjab with 9.90 °C (-2.75 °C)

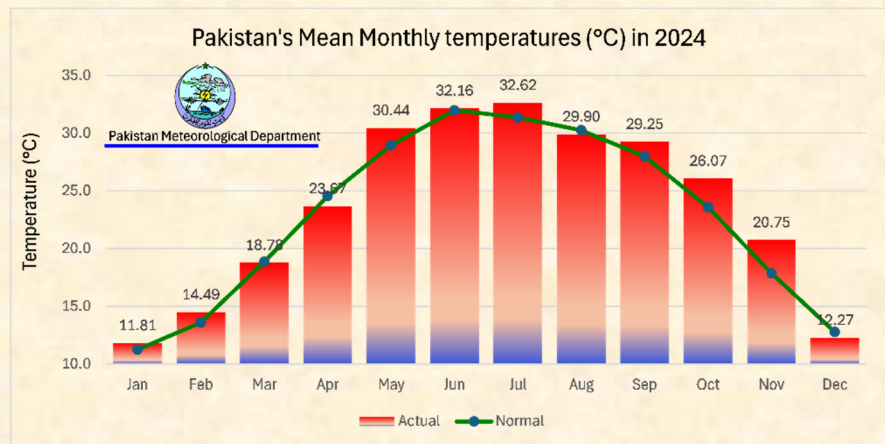


Figure 8: Monthly mean Temperature 2024 verses corresponding averages.

observed the coldest mean temperature of the month during the past 64 years (record was 10.5°C in 1964) primarily due to prolonged persistent foggy conditions (Fig-2). The maximum (daytime) temperature (18.49 °C) recorded at country-level was slightly warmer (+0.15 °C) than average of 18.34 °C. However, a record-breaking contrast seen over the regions as GB (+5.07 °C) stands with highest monthly mean maximum temperature. For Balochistan with 21.64 °C (+3.07 °C) and AJK with 13.02 °C (+2.43 °C) it ranked as 4th & 5th highest maximum temperature respectively. In contrast, Punjab with 14.26°C (-5.79 °C) experienced the lowest maximum temperature (record was 16.66°C in 1964) and Sindh (-1.74 °C) also recorded the 5th lowest maximum temperature. Whereas the country-level minimum (nighttime) temperature of 5.08 °C was warmer (+1.39 °C)

than average of 3.69 °C and stood as the 8th warmest night-time (minimum) temperature. **February 2024** mean temperatures at country-level and across the sub-regions remained warmer than average by 0.17-1.17°C. Similarly, the daytime maximum temperatures were also warmer than average. However, the minimum (nighttime) temperature in GB was -1.19 °C cooler than average and ranked as the 10th lowest of the month. **March 2024** mean temperature at country-level was slight negatively anomalous by -0.08 °C. Across the sub-regions it remained warmer than average with anomalies range 0.27 °C to 0.93 °C, except Balochistan where it was -0.79 °C cooler than average. A similar trend prevailed for the month's maximum (daytime) and minimum (nighttime) temperatures during the month.

5.4. Seasonal (Jan-Mar, JFM) Mean Temperature

The Mean temperatures of the **season JFM** in Pakistan and the sub-regions remained +0.43 to +1.06°C warmer than average. However, because of the impact of Fog/Smog in the month of January Punjab was the only region to have observed cooler than average temperatures with -0.63° negative anomaly in the season.

The **April 2024** mean temperature in Pakistan and in the regions remained cooler than average with a negative anomaly range -0.43 °C to -1.7 °C except GB & Sindh where these were positively anomalous by 0.12 °C & 0.40 °C. Whereas, the maximum (daytime) temperatures remained below average by -0.53 °C to -1.75 °C at country-level and across sub-regions except GB where it was positively anomalous by 0.34 °C. The minimum (nighttime) temperatures also remained cooler than average with anomalies range of -0.10 °C to -0.76 °C with Sindh and Punjab having recorded warmer than average by +1.48 °C & +0.62 °C respectively. **May 2024** mean temperatures in all three indices remained warmer than average with anomalies range +0.84 °C to +3.42 °C. Over Sindh (+1.51 °C) it was 5th highest and over AJK (+2.19 °C) & GB (+2.27 °C) the 10th highest. The maximum (daytime) temperatures over Sindh (+1.71 °C) it stood 4th highest, AJK (+3.20 °C) the 7th highest, Punjab (+2.46 °C) the 9th and GB (+3.42 °C) the 10th highest mean maximum temperatures. The month's mean-minimum (nighttime) temperatures remained warmer than average at country-level and the sub-regions AJK, Balochistan, Sindh & Punjab with anomalies from 0.14°C to +0.83°C with GB and KP exhibiting a negative anomaly. **June 2024** mean temperatures remained warmer than average with anomalies range from +0.18 °C to +0.56 °C across Pakistan and sub-regions except GB & KP, where it remained negatively anomalous by -1.04 °C & -0.10 °C respectively. So were the maximum (daytime) temperature with range of 0.01 °C to 0.96 °C across Pakistan and sub-regions, with AJK being warmer by +0.96 °C and ranking as 7th highest, except GB where it was negatively anomalous by -0.97 °C. The minimum (nighttime) temperatures remained slightly warmer than average with anomalies range from +0.14 °C to 0.83 °C except GB and KP where these were negatively anomalous by -1.12 °C & -0.21 °C respectively.

5.5. Seasonal (Apr-Jun, AMJ) Mean Temperatures

The mean temperatures in the pre-monsoon season **AMJ 2024** remained slightly warmer than average by +0.11 °C to +0.80 °C at country- and sub-regions -level except Balochistan which exhibited slightly cooler (-0.27 °C) than average temperature. The maximum (daytime) temperatures too remained warmer than average across Pakistan and the sub-regions with anomalies range +0.06 °C to +1.22 °C. So were the minimum (nighttime) temperatures across

Pakistan and sub-regions with anomalies of $+0.21\text{ }^{\circ}\text{C}$ to $+1.22\text{ }^{\circ}\text{C}$ except GB & KP where these remained near average with anomalies $0.00\text{ }^{\circ}\text{C}$ & $-0.04\text{ }^{\circ}\text{C}$ respectively.

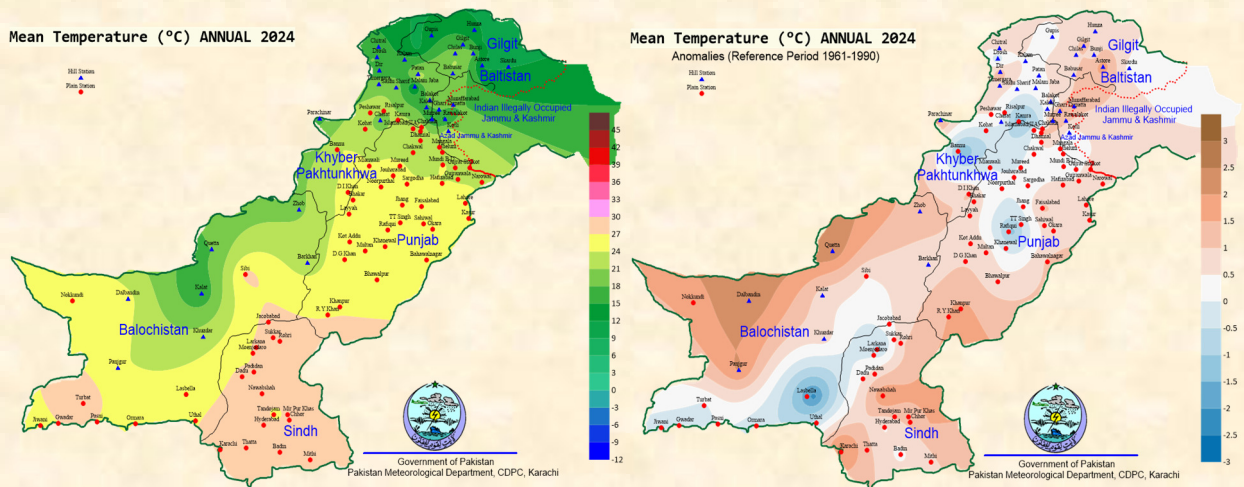


Figure 9: Pakistan spatial distribution of 2024 annual mean temperature, actual (left) and anomaly (right)

July 2024 temperatures in all three indices were record breaking for Pakistan as well as sub-regions during the 64 years period. The month's national mean temperature of $32.62\text{ }^{\circ}\text{C}$ was $+1.26\text{ }^{\circ}\text{C}$ warmer than the country-average of $31.36\text{ }^{\circ}\text{C}$ and ranked as 2nd warmest mean temperature during past 64 years (the record being $+32.63\text{ }^{\circ}\text{C}$ in 1969). A similar trend prevailed across the sub-regions: AJK with $27.16\text{ }^{\circ}\text{C}$ ($+1.55\text{ }^{\circ}\text{C}$) and Balochistan with $33.38\text{ }^{\circ}\text{C}$ ($+1.52\text{ }^{\circ}\text{C}$) both experienced the warmest mean monthly temperatures (records were $26.98\text{ }^{\circ}\text{C}$ in 1976 & $33.35\text{ }^{\circ}\text{C}$ in 1969 respectively) with Sindh with $34.27\text{ }^{\circ}\text{C}$ ($+1.65\text{ }^{\circ}\text{C}$) observing the 2nd warmest mean temperature (record is $34.33\text{ }^{\circ}\text{C}$ in 2020), KP ($+0.76\text{ }^{\circ}\text{C}$) and Punjab ($+1.10\text{ }^{\circ}\text{C}$) falling amongst first ten highest mean temperatures. while, GB was the only region having near average anomaly ($-0.04\text{ }^{\circ}\text{C}$). The month's mean-maximum (daytime) temperature of $38.58\text{ }^{\circ}\text{C}$ recorded at country-level with a positive anomaly of $+1.39\text{ }^{\circ}\text{C}$ than the country average of $37.19\text{ }^{\circ}\text{C}$ and ranked as 3rd highest mean maximum temperature (the record is $38.68\text{ }^{\circ}\text{C}$ in 1969) during the past 64 years. The AJK with $33.34\text{ }^{\circ}\text{C}$ ($+1.98\text{ }^{\circ}\text{C}$) recorded the highest mean maximum temperature in July (record was $33.18\text{ }^{\circ}\text{C}$ in 2012). Daytime mean maximum temperatures in all other regions except GB & KP also remained in the first-ten warmest range. The mean-minimum (nighttime) temperature of $26.63\text{ }^{\circ}\text{C}$ ($+1.36\text{ }^{\circ}\text{C}$) was also warmer than average of $24.27\text{ }^{\circ}\text{C}$ and stands as warmest nighttime temperature in July (the record was $26.12\text{ }^{\circ}\text{C}$ in 1979). Sindh with $29.25\text{ }^{\circ}\text{C}$ ($+1.88\text{ }^{\circ}\text{C}$), Punjab with $28.63\text{ }^{\circ}\text{C}$ ($+1.57\text{ }^{\circ}\text{C}$) and Balochistan with $26.77\text{ }^{\circ}\text{C}$ ($+1.43\text{ }^{\circ}\text{C}$) all exhibited highest minimum temperature in July (record were $28.85\text{ }^{\circ}\text{C}$ in 2020, $28.25\text{ }^{\circ}\text{C}$ in 1991 & $26.5\text{ }^{\circ}\text{C}$ in 1979 respectively). Mean minimum (nighttime) temperature in all other regions except GB also remained in the first ten warmest range. The **August 2024** national mean temperatures remained slightly cooler than average for Pakistan, over Punjab, Balochistan and Sindh with anomalies $-0.36\text{ }^{\circ}\text{C}$ to $-0.74\text{ }^{\circ}\text{C}$. In contrast, the AJK ($+0.73\text{ }^{\circ}\text{C}$), observed the 9th warmest mean temperature, GB and KP experienced warmer than average with anomalies $+0.25\text{ }^{\circ}\text{C}$ & $+0.05\text{ }^{\circ}\text{C}$ respectively. The month's mean-maximum (daytime) temperature for Pakistan, over Punjab, Balochistan and Sindh remained cooler than average with anomalies range $-0.96\text{ }^{\circ}\text{C}$ to $-1.46\text{ }^{\circ}\text{C}$ and ranked at 5th to 7th lowest. The AJK was the only region to have exhibited warmer than average temperature by $+0.42\text{ }^{\circ}\text{C}$. In contrast, the mean-minimum (nighttime) temperatures for Pakistan and all the sub-regions remained warmer than average with anomalies range $+0.31\text{ }^{\circ}\text{C}$ to

+1.05 °C. September 2024 temperatures were well above average and fall in first ten highest range in all three indices. The month's mean temperature at country-level was warmer by **+1.26 °C** and ranked 4th highest, for Punjab (**+1.47 °C**) ranked 3rd highest, AJK (**+1.74 °C**) & KP (**+1.46 °C**) 4th highest, for both Balochistan (**+1.24 °C**) & Sindh (**+1.02 °C**) it ranked 7th highest. The month's mean-maximum (daytime) Temperatures of Pakistan (**+0.93 °C**) ranked 8th highest, AJK (**+1.87 °C**) & KP (**+1.25 °C**) the 4th highest and Punjab (**+0.77 °C**) it ranked 10th highest. The month's mean-minimum (nighttime) temperatures of Pakistan (**+1.99 °C**) ranked 4th highest, whereas, for Punjab (**+2.73 °C**) ranked 2nd highest, Sindh (**+1.97 °C**) & KP (**+1.63 °C**) both it ranked 4th highest, AJK (**+1.57 °C**) 5th highest and Balochistan (**+2.09 °C**) it ranked the 6th highest.

5.6. Seasonal Summer/ Monsoon (Jul-Sep, JAS) Mean Temperatures

The summer/ monsoon (JAS)-2024 seasonal temperatures (all three indices) were warmer than average and placed in first ten highest range. The season's mean temperature at country-level warmer by **+0.71°C** ranked the 4th highest. At sub-regional scale; AJK with 25.71 °C (**+1.34 °C**) ranked as the warmest (record was 25.60 °C in 1961), KP (**+0.61 °C**) 3rd highest, Sindh (**+0.77°C**) 6th highest, Balochistan (**+0.72 °C**) 7th highest and Punjab (**+0.61 °C**) ranked as the 9th highest seasonal mean temperature. The mean-maximum (daytime) temperature was warmer by **+0.48 °C** at country-level. AJK with 31.66 °C (**+1.42 °C**) recorded warmest mean maximum temperature (record was 31.44 °C in 1987) and across other sub-regions it remained warmer than average by **+0.14 °C** to **+0.62 °C**. The mean-minimum (nighttime) temperature at country-level (with 24.81 °C, **+1.27 °C**) and Punjab (with 27.22 °C, **+1.58 °C**) ranked as all-time warmest (records being 24.70 °C in 1961 and 25.05 °C in 2019 respectively). Sindh (**+1.51 °C**), Balochistan (**+1.28 °C**), KP (**+1.02 °C**) & AJK (**+1.25 °C**) all ranked as the 2nd highest seasonal mean minimum temperatures.

October 2024 temperatures in all three indices were record breaking warmer than average. The month's national mean temperature of 26.07 °C was significantly warmer, **+2.48 °C**, than the country-average of 23.59 °C and ranked as the highest mean temperature in the month (record was 25.46°C in 2013). Across all the sub-regions, except GB, October mean temperature remained the highest. Sindh with 31.02 °C (**+3.00 °C**), Balochistan with 25.98 °C (**+2.65 °C**), Punjab with 28.16 °C (**+2.56 °C**), AJK with 19.38 °C (**+1.96 °C**) and KP with 22.61 °C (**+1.91 °C**) all recorded the highest mean temperature during past 64 years (previous records were 29.87 °C in 2017, 25.62 °C in 2002, 27.45 °C in 1965, 19.11°C in 2001 and 22.48 °C in 2017 respectively). GB with 16.17 °C (**+1.25 °C**) observed the 8th highest mean temperature (record being 16.93 °C in 2013). The month's mean maximum (daytime) temperature of Pakistan being warmer by **+1.80 °C** ranked 4th highest, Punjab (**+1.59 °C**) 2nd highest, AJK (**+1.99 °C**) 4th highest, Balochistan (**+2.07 °C**) and Sindh (**+1.37 °C**) both ranked 5th highest and KP (**+1.59 °C**) ranked 6th highest. The month's night-time (minimum) temperature of Pakistan with 18.79 °C was warmer by higher extent (**+3.55 °C**) than the country average of 15.24 °C and ranked as the highest mean minimum temperature of the month since 1961 (record was 18.17 °C in 2013). A very similar trend was found across all the sub-regions except GB. Sindh with 24.46 °C (**+4.64 °C**), Punjab with 21.25 °C (**+4.15 °C**), Balochistan with 18.33 °C (**+3.75 °C**), KP with 15.30 °C (**+2.14 °C**) and AJK with 12.21 (**+1.94 °C**) all recorded significantly warmer than average and ranked as the highest mean minimum temperatures during the past 64 years (the records were 23.54°C in 2013, 20.69°C in 2013, 17.64°C in 2006, 15.25°C in 2013 and 11.79°C in 1977 respectively). GB (**+0.82 °C**) ranked as the 10th warmest. Consistent to the last month, **November 2024** temperatures were also significantly warmer than average and mostly record breaking in all three indices. The

month's mean temperature of Pakistan with 20.75°C (+2.89 °C) was significantly warmer and ranked as the highest mean temperature (previous record was 19.87 °C in 2011). A similar trend prevailed at regional scale too i.e. for Balochistan with 21.63 °C (+3.70 °C), Sindh with 26.25 °C (+3.54 °C), KP with 17.05 °C (+2.27 °C) the November now ranked as the highest mean temperatures since 1961 (previous records were 20.27°C in 1999, 25.64°C in 2011 and 16.18 in 1977 respectively). For Punjab (+1.96 °C) it ranked 2nd highest, AJK (+1.41 °C) & GB (+1.25 °C) observed 5th & 6th highest mean temperatures respectively. The month's mean maximum (daytime) temperature of Pakistan was also significantly warmer with 28.05 °C (+2.13 °C) than the country average of 25.92 °C and ranked as the 2nd highest. On sub-regional scale; Balochistan with 29.56 °C (+3.56 °C) and Sindh with 33.61 °C (+2.01 °C) ranked as the warmest mean maximum temperatures during past 64 years (records were 28.95 °C and 33.41 °C respectively both in 2007), the KP (+1.61°C) ranked the 5th highest. Whereas, it remained slightly warmer (+0.16°C) than average due to persistent thick smog/fog over central and south Punjab. The month's mean minimum (night-time) temperature of 13.4 °C across Pakistan was warmer by a significant magnitude (+4.07 °C) and ranked as the highest mean minimum temperature (record was 12.22 °C in 2011). A very similar trend was found across all the regions: Sindh with 18.85°C (+4.97 °C), Punjab with 14.98 °C (+4.46 °C), Balochistan with 13.60 °C (+4.39 °C) and KP with 10.11 °C (+2.90 °C) all experienced significantly warmer than average temperatures and ranked as the highest mean minimum temperatures of the month during past 64 years (the records were 18.58°C in 2011, 14.23°C in 2011, 11.98°C in 1963 and 9.26°C in 1977 respectively). The AJK (+1.73 °C) and GB (+1.13 °C) ranked as the 4th & 8th warmest mean minimum temperature respectively. In contrast to previous two months, **December 2024** mean temperature of Pakistan was slightly cooler than average (-0.49 °C). A similar cooler than average trend prevailed at regional scale with negative anomalies of -0.11°C to -0.79°C. The month's mean maximum (daytime) temperature of Pakistan was slightly cooler than average (-0.22 °C). On a regional scale, Sindh (-1.02 °C), Punjab (-0.90 °C) and Balochistan (-0.06 °C) all observed cooler-than-average temperatures, while, KP (+0.72 °C), GB (+0.47 °C) and AJK (+0.11 °C) recorded the warmer-than-average temperatures. The month's mean minimum (night-time) temperature of Pakistan also been cooler by -0.35 °C. A diverse trend was found across the sub-regions i.e. GB with -5.20°C (-2.15 °C), AJ&K with -0.71°C (-1.19 °C), KP with 1.87 °C (-0.98 °C) and Balochistan with 4.14 °C (-0.95 °C), all experienced cooler than average minimum temperatures. While Punjab (+0.71 °C) and Sindh (+0.70 °C) experienced warmer than average minimum temperatures.

5.7. Seasonal Post-monsoon (Oct-Dec, OND) Mean Temperatures

The post-monsoon (OND) seasonal mean temperature was warmer than average (+1.6 °C) at country-level and ranked as 2nd highest. Whereas, Sindh with 24.89°C (+2.15 °C) ranked the warmest seasonal mean temperature during past 64 years (record was 24.62 °C in 2001), KP with positive anomaly of +1.35 °C ranked 2nd highest, Punjab (+1.37 °C) ranked 3rd highest, and Balochistan (+1.8 °C) ranked 5th highest mean temperature of the season. The season's mean maximum (daytime) temperature of Pakistan (+1.23 °C) remained warmer than average and ranked 8th highest, whereas Balochistan (+1.85 °C) ranked 4th highest and KP (+1.33 °C) ranked 9th highest. The mean maximum of other regions also remained warmer than average with anomalies range of +0.28°C to +1.16°C. The season's mean minimum (nighttime) temperature for Pakistan with 12.23°C (+2.43 °C), Sindh with 17.62°C (+3.43 °C) & Punjab with 17.62 °C (+3.11 °C) ranked as 1st highest (records were 11.91°C in 2023, 17.21°C & 13.71°C respectively). Whereas, Balochistan (+2.41°C) & KP (+1.35°C) ranked 2nd highest and AJK (+0.83°C) ranked the 9th highest during past 64 years.

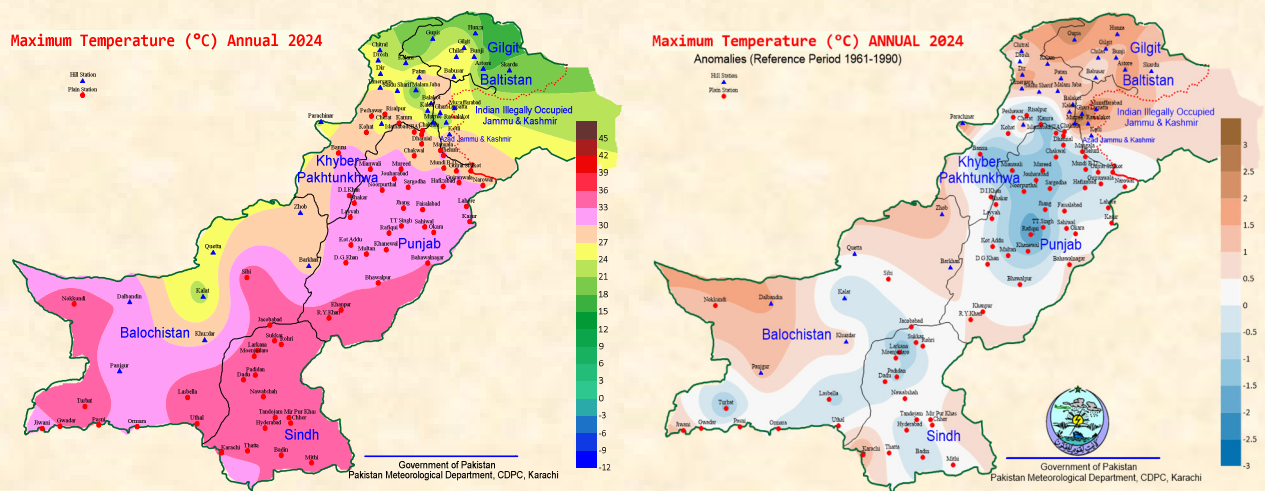


Figure 10: Pakistan spatial distribution of 2024 annual maximum temperature, actual (left) and anomaly (right)

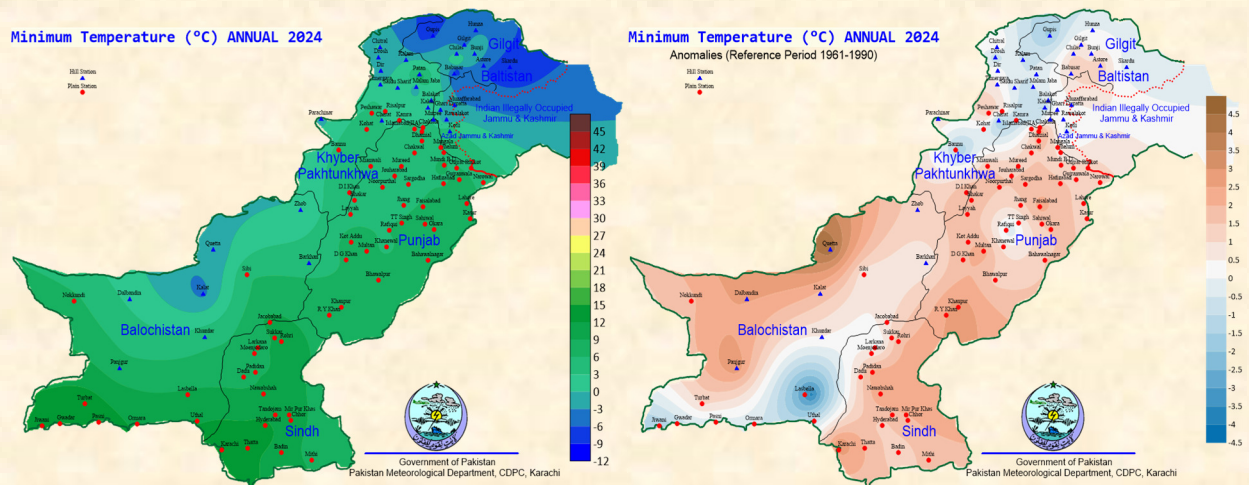


Figure 11: Pakistan spatial distribution of 2024 annual minimum temperature, actual (left) and anomaly (right)

To see the trend of Pakistan annual mean temperature over long period (64 yrs), the analysis for the period 1961-2024 given in Fig. 12 shows some mixed trend of positive and negative anomalies over 1961- 1997 with three consecutive positively anomalous years in early 70s. But that became pronounced from 1998 onwards with exception of few individual years like 2005, 2021 & 2022 with 2002 standing out of all these with positive anomaly of over 1 °C followed by 2016 nearing to +1 °C. The slope equation shows that annual mean temperature increase is 0.0082 °C per year.

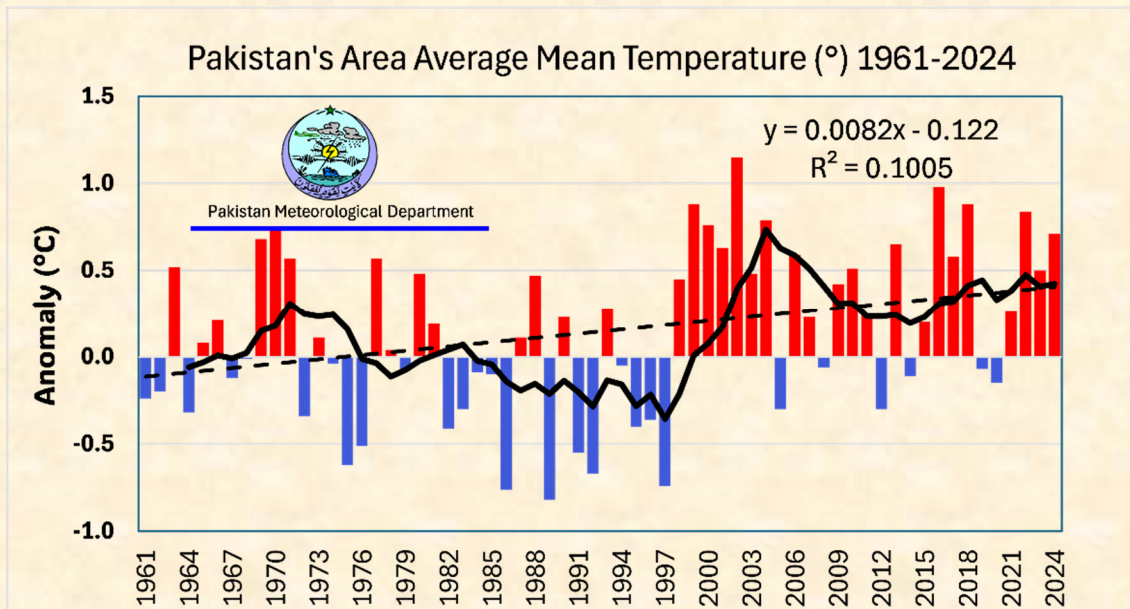


Figure 12: Pakistan annual mean temperature anomalies (with 1961-1990 base period) over 1961-2024. The black solid line indicates 7-year moving average with average positioned over middle year of each 7-year block. The black dotted line shows the trend over the period.

6. Cyclonic Storm, CS (ASNA, اسنی)

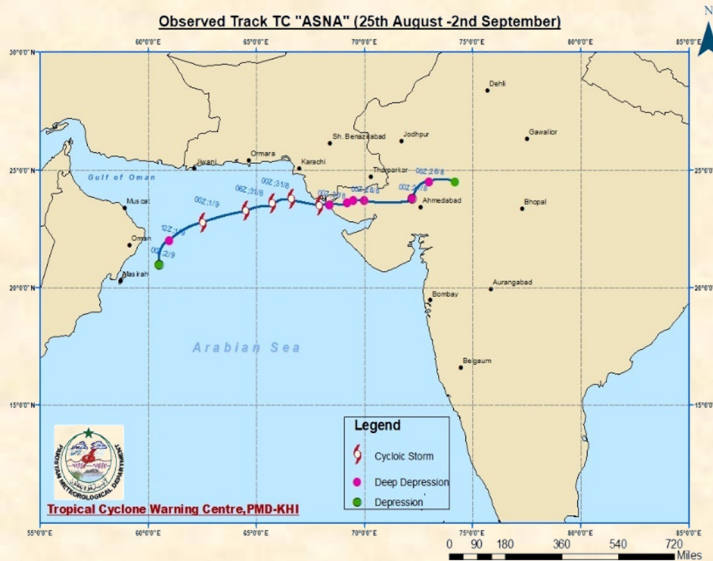


Figure 13: Observed Track of CS ASNA

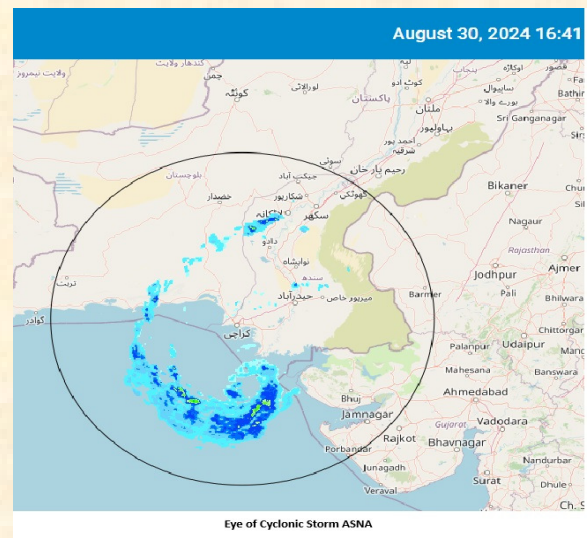


Figure 14. PMD Radar image of CS-ASNA 30Aug2024.

The formation of a Cyclonic Storm (CS, *ASNA*) in a peak monsoon month of August was a rare phenomenon. Normally, cyclones do not form during the monsoon primarily because of strong vertical wind shear (VWS). Before this there were only three instances when the CS formed in August, i.e. 1944, 1964 and 1976 during the entire data period of 1893-2023. The CS, *ASNA* (31

Aug- 2 Sep) dates back when a monsoon low formed on 16 Aug at Bay of Bengal (BoB), gradually intensified first into well marked low over Utter Pradesh (India) then into a depression over Madhya Pradesh (India) on 25 Aug. It further intensified into Deep Depression (DD) over East Rajasthan (India) on 26 Aug. Moving westward it remerged into the Northeast Arabian Sea and further intensified into Cyclonic Storm, ASNA (اسنى) on 30th August. After tracking west-southwest for the next two days it gradually weakened first into Deep Depression on 1st Sep then into a depression on 2nd September (Fig-13). Nevertheless, the CS triggered squally winds of 40-46 knots in Karachi division, Sujawal, Thatta and parts of Badin districts associated with widespread rain/thunderstorm with some extremely heavy falls over southern Sindh which uprooted dozens of trees, smashed signboards and blown away loose structures. Apart from this, its induced circulation also produced heavy rains in Balochistan, Khyber Pakhtunkhwa (KP), Punjab, Gilgit Baltistan (GB) and Azad Jammu & Kashmir (AJK) during 25-31 August. According to the National Disaster Management Authority¹, about 357 people have been died, 668 people have been injured, about 501km of roads, 42 bridges, 58191 houses and 2282 livestock have been affected/damaged during Monsoon from 1st July to 13th September 2024

7. Extreme, record breaking and Strong winds events of 2024

Observations show an increase in the intensity of heavy rainfall and extreme temperature events in Pakistan that occurred on timescales of month and a day. The Number of extreme records has broken during 2024. New records of heavy rainfall events on daily and monthly timescales have been set in 2024 (Tables 3 & 4). Sixteen stations' record of lowest maximum temperature and thirty-four stations' record of highest maximum temperatures have broken (Tables 5 & 6). Sizable number of extreme night temperature records have also broken (Tables 7 & 8). Strong winds reported (speed \geq 30knots) during the year 2024 have been listed in Table 9.

Table 3. New Monthly/Annual records of Heaviest one day Rainfall (mm) in 2024

S No	Stations	Month/Year	New Record		Old Record		No of years examined.
			Value	Date	Value	Date	
1	GWADAR	Feb-2024	125.2	28/Feb/2024	38.0	01/Feb/2008	23
2	GWADAR	Apr-2024	79.5	18/Apr/2024	62.0	08/Apr/2013	23
3	ORMARA	Apr-2024	77.0	18/Apr/2024	57.1	09/Apr/1961	96
4	QUETTA (SH MANDA)	Apr-2024	46.0	15/Apr/2024	32.2	16/Apr/2018	30
5	LAHORE AIRPORT	Aug-2024	337.0	01/Aug/2024	221.0	13/Aug/2008	73
6	RAHIM YAR KHAN	Aug-2024	92.2	04/Aug/2024	71.0	02/Aug/2008	34
7	SUKKUR	Aug-2024	100.0	18/Aug/2024	92.0	04/Aug/2008	28
8	GAWADAR	Sep-2024	3.0	01/Sep/2024	0.0	---	23
9	KHUZDAR	Nov-2024	54.3	30/Nov/2024	27.0	25/Nov/1997	61
10	LAHORE AIRPORT	Annual	337.0	01/Aug/2024	332.5	31/Jul/1980	73

Table 4. New records of wettest Month/Annual rainfall (mm) in 2024

S No	Stations	Month/Year	New Record		Old Record		No of years examined.
			Value	Date	Value	Date	
1	GWADAR	Feb-2024	207.1	Feb-2024	54.3	Feb-2019	23

Table 4. New records of wettest Month/Annual rainfall (mm) in 2024

S No	Stations	Month/Year	New Record		Old Record		No of years examined.
			Value	Date	Value	Date	
2	CHITRAL	Apr-2024	283.5	Apr-2024	208.3	Apr-1965	64
3	DALBANDIN	Apr-2024	78.0	Apr-2024	75.2	Apr-1924	116
4	DIR	Apr-2024	461.9	Apr-2024	353.0	Apr-1995	60
5	DROSH	Apr-2024	300.4	Apr-2024	278.4	Apr-1908	126
6	GAWADAR	Apr-2024	100.3	Apr-2024	62.0	Apr-2013	23
7	KAKUL	Apr-2024	289.0	Apr-2024	254.3	Apr-1961	74
8	KALAT	Apr-2024	71.0	Apr-2024	52.0	Apr-2012	131
9	ORMARA	Apr-2024	84.0	Apr-2024	76.7	Apr-1933	96
10	PANJGUR	Apr-2024	81.0	Apr-2024	66.8	Apr-1997	116
11	PASNI	Apr-2024	156.0	Apr-2024	136.4	Apr-1933	115
12	QUETTA (SH MANDA)	Apr-2024	110.1	Apr-2024	85.0	Apr-2012	30
13	KHUZDAR	Aug-2024	237.7	Aug-2024	227.1	Aug/2022	61
14	LAHORE AIRPORT	Aug-2024	603.1	Aug-2024	512.4	Aug/2013	73
15	MIRPUR KHAS	Aug-2024	384.9	Aug-2024	348.0	Aug/2020	21
16	MULTAN AIRPORT	Aug-2024	275.6	Aug-2024	217.3	Aug/1992	73
17	RAHIM YAR KHAN	Aug-2024	258.2	Aug-2024	224.1	Aug/2022	34
18	GAWADAR	Sep-2024	3.0	Sep-2024	0.0	---	23
19	KHUZDAR	Nov-2024	54.3	Nov-2024	53.0	Nov-2019	61

Table 5. New Monthly/Annual records of Hottest day Temperatures (°C) in 2024

S No	Stations	Month/Year	New Record		Old Record		No of years examined.
			Value	Date	Value	Date	
1	ASTORE	Jan-2024	12.5	13/Jan/2024	12.3	30/Jan/2001	64
2	GILGIT	Jan-2024	17.5	13/Jan/2024	17.5	31/Jan/2007	64
3	GUPIS	Jan-2024	14.0	14/Jan/2024	13.0	19/Jan/2010	64
4	JACOBABAD	May-2024	52.0	26/May/2024	52.0	27/May/1914	96
5	KHANPUR	May-2024	50.2	26/May/2024	49.2	28/May/2010	73
6	TANDOJAM	May-2024	47.5	27/May/2024	47.5	20/May/2010	17
7	THATTA	Jun-2024	44.0	24/Jun/2024	44.0	12/Jun/2004	21
8	GWADAR	Jul-2024	42.5	02/Jul/2024	40.0	19/Jul/2020	23
9	QUETTA. (SH MANDA)	Jul-2024	41.5	04/Jul/2024	41.5	2days/Jul/2022	28
10	NOKKUNDI	Jan-2024	48.5	15/Jan/2024	48.0	08/Aug/1955	93
11	BAHAWALNAGAR	Oct-2024	42.0	03/Oct/2024	41.5	06/Oct/2002	64
12	DADU	Oct-2024	44.5	03/Oct/2024	42.2	05/Oct/2006	21
13	MOIN-JO-DARO	Oct-2024	42.5	03/Oct/2024	42.3	02/Oct/1998	47
14	MULTAN AIRPORT	Oct-2024	40.8	02/Oct/2024	40.6	01/Oct/1968	73
15	PARACHINAR	Oct-2024	32.5	01&02/Oct/2024	32.2	08/Oct/1989	126
17	SHORKOT	Oct-2024	40.2	03/Oct/2024	40.0	08/Oct/2021	54
18	ASTORE	Nov/2024	22.0	7&8/Nov/2024	21.0	02/Nov/1977	64

Table 5. New Monthly/Annual records of Hottest day Temperatures (°C) in 2024

S No	Stations	Month/Year	New Record		Old Record		No of years examined.
			Value	Date	Value	Date	
19	BANNU	Nov-2024	34.0	01/Nov/2024	33.5	01/Nov/2007	26
20	D.I.KHAN(City)	Nov-2024	35.5	01/Nov/2024	35.0	01/Nov/1996	144
21	DADU	Nov-2024	39.0	01/Nov/2024	37.0	01/Nov/2017	21
22	DALBANDIN	Nov/2024	37.0	5&6/Nov/2024	35.6	07/Nov/2008	84
23	GUPIS	Nov-2024	25.0	06/Nov/2024	24.0	02/Nov/2017	64
24	KHUZDAR	Nov-2024	33.0	05/Nov/2024	32.5	06/Nov/2008	64
25	LARKANA	Nov-2024	37.5	07/Nov/2024	37.0	02/Nov/2001	37
26	MIRPUR KHAS	Nov-2024	38.5	01/Nov/2024	37.0	(02)/Nov/2022	21
27	NOKKUNDI	Nov-2024	37.5	06/Nov/2024	36.7	01/Nov/2001	92
28	PANJGUR	Nov-2024	35.5	06/Nov/2024	34.0	01/Nov/1977	114
29	PARACHINAR	Nov/2024	29.5	1&4/Nov/2024	27.4	01/Nov/1996	124
30	QUETTA. (SH MANDA)	Nov/2024	29.5	5&6/Nov/2024	29.0	01/Nov/2001	28
31	SUKKUR	Nov-2024	37.5	07/Nov/2024	37.5	01/Nov/2017	28
32	THATTA	Nov-2024	38.0	01/Nov/2024	38.0	01/Nov/2009	21
33	TURBAT	Nov-2024	41.0	03/Nov/2024	40.0	01/Nov/1999	28
34	TANDOJAM	Annual	47.5	28/May/2024	47.5	'20-May-2010	17

Table 6. New Monthly/Annual records of Coldest day Temperatures (°C) in 2024

S No	Stations	Month/Year	New Record		Old Record		No of years examined.
			Value	Date	Value	Date	
1	JHELUM	Jan-2024	7.5	08/Jan/2024	8.3	02/Jan/2002	64
2	ROHRI	Jan-2024	11.0	24/Jan/2024	11.0	15/Jan/1993	64
3	DALBANDIN	Mar-2024	6.5	01/Mar/2024	10.0	11/Mar/2020	64
4	JIWANI	Mar-2024	19.0	02/Mar/2024	19.5	01/Mar/2005	64
5	KALAT	Mar-2024	-4.5	02/Mar/2024	1.0	11/Mar/1975	64
6	NOKKUNDI	Mar-2024	8.5	01/Mar/2024	10.0	05/Mar/1979	64
7	PANJGUR	Mar-2024	7.5	01/Mar/2024	11.0	08/Mar/1979	64
8	QUETTA. (SAMUNGLI)	Mar-2024	-1.5	02/Mar/2024	0.0	07/Mar/1979	64
9	QUETTA. (SH MANDA)	Mar-2024	0.0	02/Mar/2024	5.0	14/Mar/2015	28
10	TURBAT	Mar/2024	19.0	1&2/Mar/2024	19.0	01/Mar/2005	28
11	CHITRAL	Apr-2024	3.2	15/Apr/2024	3.3	01/Apr/2007	64
12	DROSH	Apr-2024	3.4	15/Apr/2024	4.1	26/Apr/1986	66
13	HYDERABAD	Apr-2024	26.0	14/Apr/2024	27.2	29/Apr/1967	66
14	JHELUM	Jan-2024	7.5	09/Jan/2024	8.0	29/Dec/2019	64
15	JHELUM	Annual	7.5	09/Jan/2024	8.0	29/Dec/2019	64
16	ROHRI	Annual	11.0	25/Jan/2024	11.0	15/Jan/1993	64

Table 7. New Monthly/Annual records of Hottest Night Temperatures (°C) in 2024

S No	Stations	Month/Year	New Record		Old Record		No of years examined.
			Value	Date	Value	Date	
1	PANJGUR	Jan-2024	14.0	29&30/Jan/2024	13.3	06/Jan/1964	64
2	QUETTA. (SAMUNGLI)	Mar-2024	16.5	27/Mar/2024	16.5	31/Mar/2007	64
3	QUETTA. (SH MANDA)	Mar-2024	16.0	27/Mar/2024	16.0	27/Mar/2015	28
4	RAHIM YAR KHAN	Mar-2024	22.7	27/Mar/2024	22.0	22/Mar/2004	23
5	SHAHEED BENAZIRABAD	Mar-2024	24.0	28/Mar/2024	23.0	26/Mar/2015	64
6	SUKKUR	Mar-2024	24.5	27/Mar/2024	24.5	22/Mar/2004	28
7	MIRPUR KHAS	May-2024	28.5	28/May/2024	28.5	21/May/2010	21
8	PANJGUR	May-2024	29.0	30&31/May/2024	28.3	23/May/1970	64
9	SUKKUR	May-2024	34.0	25/May/2024	32.4	23/May/2004	28
10	BADIN	Jul-2024	30.0	21&22/Jul/2024	30.0	01/Jul/2016	64
11	BARKHAN	Jul-2024	28.5	01/Jul/2024	28.5	2days/Jul/2019	60
12	CHHOR	Jul-2024	31.0	21/Jul/2024	30.8	08/Jul/2020	64
13	DALBANDIN	Jul-2024	35.0	29/Jul/2024	33.6	18/Jul/1988	64
14	JACOBABAD	Jul-2024	32.0	4 days/Jul/2024	32.0	09/Jul/2021	64
15	KARACHI AIRPORT	Jul-2024	32.0	3 days/Jul/2024	31.0	14/Jul/2021	64
16	MIRPUR KHAS	Jul-2024	29.5	22/Jul/2024	29.5	2days/Jul/2017	21
17	MULTAN AIRPORT	Jul-2024	34.0	04/Jul/2024	33.7	03/Jul/2006	64
18	QUETTA. (SAMUNGLI)	Jul-2024	26.5	28&29/Jul/2024	26.5	08/Jul/2010	64
19	QUETTA. (SH MANDA)	Jul-2024	26.5	28/Jul/2024	25.5	27/Jul/2021	28
20	SARGODHA AIRBASE	Jul-2024	33.5	03/Jul/2024	33.0	08/Jul/2006	64
21	SHORKOT	Jul-2024	32.5	04/Jul/2024	32.5	05/Jul/2003	52
22	THATTA	Jul-2024	30.5	18&19/Jul/2024	30.5	08/Jul/2020	21
23	ASTORE	Aug-2024	22.5	07/Aug/2024	21.7	11/Aug/1969	64
24	DALBANDIN	Aug-2024	32.5	02/Aug/2024	32.5	01/Aug/2013	64
25	PESHAWAR AIRPORT	Aug-2024	31.5	09/Aug/2024	30.9	01/Aug/2013	64
26	QUETTA. (SAMUNGLI)	Aug-2024	26.0	02/Aug/2024	25.4	02/Aug/1982	64
27	PARACHINAR	Sep-2024	24.5	25/Sep/2024	22.2	24/Sep/1990	64
28	QUETTA. (SAMUNGLI)	Sep-2024	24.5	01/Sep/2024	22.2	01/Sep/2002	64
29	BAHAWALNAGAR	Oct-2024	28.5	01/Oct/2024	28.1	01/Oct/1998	64
30	BANNU	Oct-2024	25.0	01&02/Oct/2024	24.6	01/Oct/2001	26
31	D.I.KHAN(City)	Oct-2024	26.5	01/Oct/2024	26.0	02/Oct/2021	64
32	DADU	Oct-2024	27.0	01/Oct/2024	26.0	01&02/Oct/2023	21
33	KHANPUR	Oct-2024	26.8	01/Oct/2024	26.7	05/Oct/2021	64
34	SUKKUR	Oct-2024	28.0	25/Oct/2024	27.5	01&02/Oct/2019	28
35	BAHAWALPUR,CITY	Nov-2024	20.2	07/Nov/2024	20.0	08/Nov/1979	64
36	BARKHAN	Nov-2024	18.0	07/Nov/2024	18.0	02/Nov/1976	58
37	BUNJI	Nov-2024	13.9	11/Nov/2024	13.9	01/Nov/2022	64
38	JACOBABAD	Nov-2024	22.0	01/Nov/2024	22.0	(03)/Nov/2022	64
39	KHANPUR	Nov-2024	20.3	01/Nov/2024	19.8	02/Nov/2019	64

Table 7. New Monthly/Annual records of Hottest Night Temperatures (°C) in 2024

S No	Stations	Month/Year	New Record		Old Record		No of years examined.
			Value	Date	Value	Date	
40	LARKANA	Nov-2024	23.5	01/Nov/2024	22.5	01/Nov/2023	37
41	MOIN-JO-DARO	Nov-2024	21.5	01/Nov/2024	21.5	01/Nov/2019	46
42	PADIDAN	Nov-2024	22.0	1&2/Nov/2024	22.0	07/Nov/2014	64
43	PARACHINAR	Nov-2024	16.0	05/Nov/2024	13.3	05/Nov/1963	64
44	RAHIM YAR KHAN	Nov-2024	20.5	01/Nov/2024	19.9	07/Nov/2023	23
45	ROHRI	Nov-2024	23.0	1&3/Nov/2024	23.0	07/Nov/2014	64
46	SHORKOT	Nov-2024	20.0	11/Nov/2024	20.0	01/Nov/1977	53
47	SUKKUR	Nov-2024	21.8	07/Nov/2024	21.5	(02)/Nov/2019	28
48	THATTA	Nov-2024	25.2	01/Nov/2024	25.0	01/Nov/2019	21
49	D.I.KHAN(City)	Dec-2024	13.5	03/Dec/2024	13.0	06/Dec/1994	64
50	JACOBABAD	Dec-2024	17.0	02/Dec/2024	17.0	02/Dec/2011	64
51	MIANWALI AIRBASE	Dec-2024	12.5	02/Dec/2024	12.5	10/Dec/2018	64
52	MOIN-JO-DARO	Dec-2024	17.0	02/Dec/2024	17.0	02/Dec/2011	47
53	PANJGUR	Dec-2024	14.5	01/Dec/2024	14.4	19/Dec/1962	64
54	SUKKUR	Dec-2024	16.5	2&3/Dec/2024	16.5	2Days/Dec/2008	28
55	DALBANDIN	Annual	35.0	29/Jul/2024	33.6	18/Jul/1988	64
56	QUETTA. (SH MANDA)	Annual	26.5	28/Jul/2024	26.5	(02)/Jun/2016	28

Table 8. New Monthly/Annual records of Coldest Night Temperatures (°C) in 2024

S No	Stations	Month/Year	New Record		Old Record		No of years examined.
			Value	Date	Value	Date	
1	BUNJI	Feb-2024	-3.3	(5days)/Feb/2024	-3.3	10/Feb/1986	53
2	JIWANI	Mar-2024	5.5	03/Mar/2024	8.0	04/Mar/2003	81
3	LASBELA	Mar-2024	4.0	4&5/Mar/2024	5.0	06/Mar/1945	94
4	MIRPUR KHAS	Mar-2024	6.5	04/Mar/2024	9.0	14/Mar/2017	21
5	MITHI	Mar-2024	3.0	03/Mar/2024	4.5	12/Mar/2017	21
6	MOIN-JO-DARO	Mar-2024	1.0	01/Mar/2024	2.2	03/Mar/1983	46
7	ORMARA	Mar-2024	8.0	04/Mar/2024	8.0	12/Mar/2017	94
8	SHORKOT	Mar-2024	4.0	03/Mar/2024	4.0	09/Mar/1979	52
9	THATTA	Mar-2024	10.0	03/Mar/2024	10.0	02/Mar/2015	21
10	ZHOB	Mar-2024	-3.0	04/Mar/2024	-2.0	(04)/Mar/1979	70
11	BANNU	May-2024	12.5	01/May/2024	13.0	13/May/2014	26
12	RISALPUR	May-2024	11.0	01/May/2024	11.0	07/May/1960	71
13	Kalam	May-2024	-1.5	01/May/2024	1.0	05/May/2005	22
14	LASBELA	Jun-2024	16.5	08/Jun/2024	18.0	11/Jun/2023	94
15	RAWALPINDI	Jul-2024	17.7	12/Jul/2024	17.8	05/Jul/1966	73
16	SHORKOT	Oct-2024	10.0	10/Oct/2024	11.0	30/Oct/2004	52
17	RISALPUR	Dec-2024	-4.6	20/Dec/2024	-4.0	28/Dec/2018	71

Table-9: Strong Wind Speed reported (30 knots or more) during the year 2024

Date	Station	Max Wind Knots	Date	Station	Max Wind Knots	Date	Station	Max Wind Knots
17-May	Peshawar City	42	29-Jun	Sialkot AP	48	27-Aug	Lahore AP	30
04-Jun	Peshawar City	30	12-Jul	Sialkot AP	35	29-Aug	Lahore AP	35
09-May	Peshawar AP	30	27-Sep	Sialkot AP	30	02-Sep	Lahore AP	36
20-May	Peshawar AP	36	20-Jun	D.I.Khan(City)	46	03-Sep	Lahore AP	38
24-May	Peshawar AP	40	15-Aug	D-I-Khan AP	70	24-May	Gujranwala	32
15-Jul	Peshawar AP	30	24-May	Faisalabad	30	06-Jun	Gujranwala	40
23-Jul	Peshawar AP	30	05-Jun	Faisalabad	30	24-May	Narowal	34
03-Aug	Peshawar AP	30	10-Jul	Faisalabad	35	03-Jun	Narowal	36
06-Sep	Peshawar AP	30	12-Jul	Faisalabad	35	05-Jul	Okara	35
31-May	Rawalpindi	30	22-Jul	Faisalabad	30	02-Feb	Quetta Samungli	30
05-Jun	Rawalpindi	30	29-Jul	Faisalabad	30	17-May	Quetta Samungli	32
27-Jun	Rawalpindi	40	27-Sep	Faisalabad	30	27-May	Quetta Samungli	34
20-Aug	Rawalpindi	46	10-May	Joharabad	50	30-Aug	Quetta Samungli	30
19-Feb	Islamabad AP	40	05-Jun	Joharabad	40	18-Apr	Layyah	32
12-Apr	Islamabad AP	34	20-Jun	Joharabad	35	15-Aug	Layyah	30
23-Apr	Islamabad AP	34	20-Jun	Joharabad	38	16-Aug	Layyah	34
12-May	Islamabad AP	41	09-Jun	Jhang	32	05-Jun	Multan City	36
17-May	Islamabad AP	31	20-Jun	Jhang	38	06-Jun	Multan City	38
24-May	Islamabad AP	44	10-May	T.T. Singh	32	11-Jul	Multan City	30
03-Jun	Islamabad AP	40	24-May	T.T. Singh	34	21-Apr	Multan AP	32
05-Jun	Islamabad AP	50	05-Jun	T.T. Singh	32	22-Apr	Multan AP	32
06-Jun	Islamabad AP	40	27-Jun	T.T. Singh	30	25-Apr	Multan AP	30
13-Jun	Islamabad AP	37	05-Jul	T.T. Singh	32	26-Apr	Multan AP	30
20-Jun	Islamabad AP	43	12-Jul	T.T. Singh	40	10-May	Multan AP	33
03-Jul	Islamabad AP	40	26-Apr	Lahore City	30	04-Jun	Multan AP	42
05-Jul	Islamabad AP	32	11-May	Lahore City	35	05-Jun	Multan AP	65
11-Jul	Islamabad AP	44	24-May	Lahore City	35	06-Jun	Multan AP	65
12-Jul	Islamabad AP	47	05-Jun	Lahore City	40	19-Jun	Multan AP	52
17-Jul	Islamabad AP	30	19-Jun	Lahore City	40	20-Jun	Multan AP	52
10-Aug	Islamabad AP	44	30-Jun	Lahore City	40	06-Jul	Multan AP	35
16-Aug	Islamabad AP	34	01-Jul	Lahore City	30	11-Jul	Multan AP	35
19-Aug	Islamabad AP	34	05-Jul	Lahore City	36	12-Jul	Multan AP	35
20-Aug	Islamabad AP	32	19-Feb	Lahore AP	35	18-Jul	Multan AP	30
26-Aug	Islamabad AP	40	15-Apr	Lahore AP	50	19-Jul	Multan AP	30
02-Sep	Islamabad AP	30	19-Apr	Lahore AP	35	27-Aug	Multan AP	35
26-Sep	Islamabad AP	50	22-Apr	Lahore AP	33	05-Jun	Khanewal	30
19-Feb	Mangla	30	26-Apr	Lahore AP	55	23-Jul	Bahawalnagar	30
05-Jun	Mangla	38	29-Apr	Lahore AP	55	10-May	Kasur	55
05-Jul	Mangla	46	30-Apr	Lahore AP	35	05-Jun	Kasur	45

Table-9: Strong Wind Speed reported (30 knots or more) during the year 2024

Date	Station	Max Wind Knots	Date	Station	Max Wind Knots	Date	Station	Max Wind Knots
10-Jul	Mangla	30	10-May	Lahore AP	30	20-Jun	Kasur	35
13-Jul	Mangla	30	11-May	Lahore AP	60	02-Jul	Kasur	45
17-Jul	Mangla	35	24-May	Lahore AP	55	06-Jul	Kasur	35
10-Aug	Mangla	35	03-Jun	Lahore AP	62	20-Jun	Sahiwal	34
12-Apr	Islamabad ZP	30	05-Jun	Lahore AP	55	15-Jun	Bahawalpur,City	30
05-Jun	Islamabad ZP	45	13-Jun	Lahore AP	32	20-Jun	Bahawalpur,City	42
24-Jun	Islamabad ZP	40	19-Jun	Lahore AP	45	12-Jul	Bahawalpur,City	42
05-Jul	Islamabad ZP	45	20-Jun	Lahore AP	55	26-Apr	Khanpur	40
10-Jul	Islamabad ZP	36	29-Jun	Lahore AP	40	06-Jun	Khanpur	40
11-Jul	Islamabad ZP	35	01-Jul	Lahore AP	45	07-Jun	Turbat	30
14-Jul	Islamabad ZP	30	03-Jul	Lahore AP	40	28-May	Panjgur	30
19-Aug	Islamabad ZP	35	06-Jul	Lahore AP	60	31-Jul	Panjgur	60
06-Sep	Islamabad ZP	30	10-Jul	Lahore AP	65	06-Jun	Padidan	30
12-Sep	Islamabad ZP	35	11-Jul	Lahore AP	36	07-Jun	Padidan	40
26-Sep	Islamabad ZP	30	12-Jul	Lahore AP	32	21-Jun	Padidan	30
24-May	Jhelum	32	18-Jul	Lahore AP	40	15-Aug	Moin Jo Daro	40
12-Jul	Jhelum	35	22-Jul	Lahore AP	30	27-Aug	Sh.Benzirabad	45
10-Apr	Sialkot AP	32	25-Jul	Lahore AP	50	21-Apr	Hyderabad	30
29-Apr	Sialkot AP	35	28-Jul	Lahore AP	40	27-Jun	Hyderabad	30
24-May	Sialkot AP	38	30-Jul	Lahore AP	30	18-Jul	Hyderabad	35
03-Jun	Sialkot AP	45	01-Aug	Lahore AP	36	14-May	Chhor	36
05-Jun	Sialkot AP	35	04-Aug	Lahore AP	30	24-May	Kotli	30
05-Jun	Sialkot AP	42	11-Aug	Lahore AP	35	17-May	Peshawar BKIA	40
06-Jun	Sialkot AP	35	18-Aug	Lahore AP	35	20-May	Peshawar BKIA	30
19-Jun	Sialkot AP	35	19-Aug	Lahore AP	30	04-Jun	Peshawar BKIA	35
20-Jun	Sialkot AP	40	21-Aug	Lahore AP	40			

Reference

1. NDMA, Monsoon Daily Situation Report. No. 75, vide Director Response No. F.2 (E)/2024-NDMA (MW/SITREP-75) dated 13 September 2024
<https://www.ndma.gov.pk/storage/sitreps/October2024/gXzrhlenhal38kbEdUfi.pdf>

The State of Pakistan's Climate in 2024 is produced by Pakistan Meteorological Department, Climate Data Processing Centre, Karachi to provide informative overview of the temperatures, rainfall and significant weather events in Pakistan for the year. Some of the information is based on real time data and/or electronic reports, therefore the results above can be considered only preliminary. The records mentioned for area-weighted rainfall and area average temperatures have been examined for the past 64 years i.e. from 1961-2024. If you have any comments or suggestions, please contact us:

Director, Climate Data Processing Centre,

Pakistan Meteorological Department, Meteorological Complex, University Road, Karachi-75290,

<http://www.pmd.gov.pk/cdpc/home.htm>; info.cdpc@pmd.gov.pk

Published on 26th January 2025