

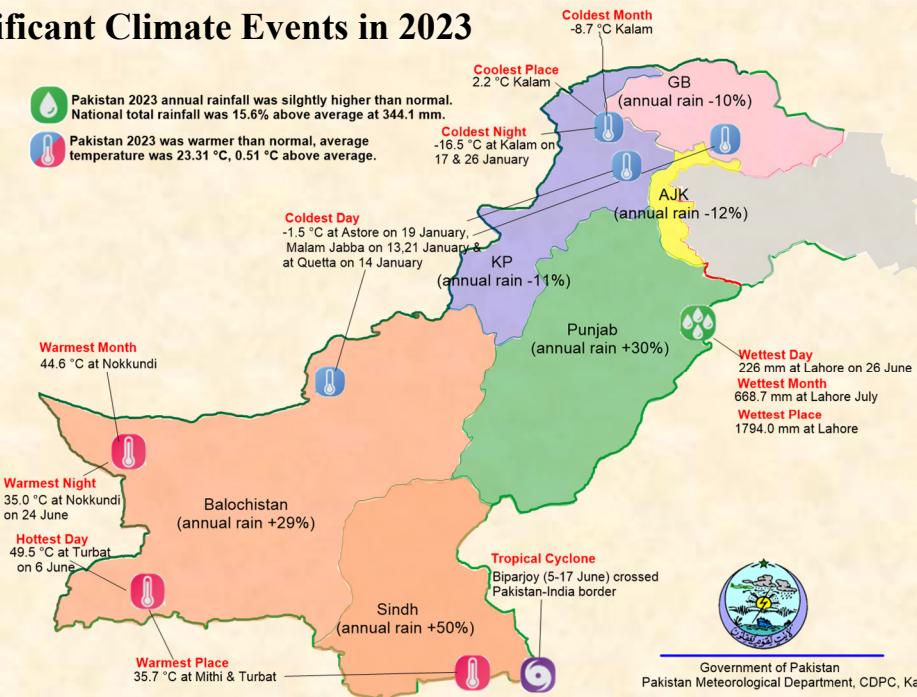


# State of Pakistan Climate in 2023

## 1. Pakistan Climate highlights in 2023

- The Extremely Sever Cyclonic Storm “Biparjoy” was the first cyclonic storm originated in the Arabian Sea in the year 2023.
- Biparjoy has been the longest duration cyclone over the Arabian Sea with 13 days and 3 hours lifetime and covered about 2500 km translational distance.
- Annual rainfall during the year 2023 was slightly above normal with national total rainfall being +16% of the average.
- Annual rainfall was above average over Balochistan (+29%), Sindh (+50 %) and Punjab (+30) while below normal over KP (-11 %), AJK (-12 %) and GB (-10 %).
- The annual rainfall of 2023 over Sindh & Punjab were significantly high and it ranked as the 16<sup>th</sup> and 12<sup>th</sup> wettest year respectively since 1961.
- The country witnessed one of the record-breaking seasonal (AMJ) 2023 rainfall (+92%), which stood 3<sup>rd</sup> heaviest seasonal rainfall since 1961.
- National monsoon (JAS) & post-monsoon (OND) seasons were near average while winter (JFM) was below average.
- Annual 2023 national mean temperature, for Pakistan, as a whole, was 0.51 °C above average.
- Positive phases of Indian Ocean Dipole (IOD) and El Niño developed during June-September 2023.

## 2. Significant Climate Events in 2023



Government of Pakistan  
Pakistan Meteorological Department, CDPC, Karachi

Figure 1. Significant climate events

### In this issue

|                                     |    |
|-------------------------------------|----|
| 2023 Climate highlights .....       | 1  |
| Significant Climate Events .....    | 1  |
| Synoptic Features of 2023.....      | 2  |
| Above average annual rainfall ..... | 3  |
| Another warmest year .....          | 6  |
| Tropical Cyclone BIPARJOY .....     | 9  |
| Extreme and record breaks .....     | 10 |
| Strong winds events of 2023 .....   | 14 |
| List of figures & tables .....      | 16 |

Table 1: Annual area-weighted rainfall-2023 of Pakistan and sub-regions

| Region               | Rank<br>(of 63) | Normal<br>(mm) | Average<br>(mm) | Departure<br>(percent) | Comment   |
|----------------------|-----------------|----------------|-----------------|------------------------|---|
| Pakistan             | 42              | 297.6          | 344.1           | 16                     | 22 <sup>nd</sup> highest (record 526.9 mm in 2022)  |
| Azad Jammu & Kashmir | 16              | 939.4          | 827.9           | -12                    | 48 <sup>th</sup> highest (record 1198.3 mm in 1992) |
| Balochistan          | 48              | 159.9          | 206.8           | 29                     | 6 <sup>th</sup> highest (record 409.4 mm in 2022)   |
| Gilgit Baltistan     | 27              | 193.6          | 174.4           | -10                    | 37 <sup>th</sup> highest (record 392.3 mm in 1996)  |
| Khyber Pakhtunkhwa   | 17              | 684.2          | 610.5           | -11                    | 47 <sup>th</sup> highest (record 995.9 mm in 2015)  |
| Punjab               | 52              | 387.0          | 503.3           | 30                     | 12 <sup>th</sup> highest (record 642.3 mm in 2015)  |
| Sindh                | 48              | 171.9          | 257.8           | 50                     | 16 <sup>th</sup> highest (record 741.6 mm in 2022)  |

Rank ranges from 1 (lowest) to 63 (highest).

Table 2: Annual area-averaged mean temperature-2023 Pakistan and sub-regions

| Region               | Rank (of 63) | Normal (°C) | Average (°C) | Anomaly (°C) | Comment   |
|----------------------|--------------|-------------|--------------|--------------|---|
| Pakistan             | 46           | 22.80       | 23.31        | 0.51         | 18 <sup>th</sup> highest (record 23.95°C in 2002) |
| Azad Jammu & Kashmir | 57           | 16.22       | 17.01        | 0.80         | 7 <sup>th</sup> highest (record 17.43°C in 2001)  |
| Balochistan          | 49           | 23.11       | 23.70        | 0.59         | 15 <sup>th</sup> highest (record 24.99°C in 2002) |
| Gilgit Baltistan     | 49           | 14.22       | 14.69        | 0.47         | 15 <sup>th</sup> highest (record 15.30°C in 1971) |
| Khyber Pakhtunkhwa   | 44           | 19.60       | 20.07        | 0.48         | 20 <sup>th</sup> highest (record 20.54°C in 2016) |
| Punjab               | 35           | 24.55       | 24.73        | 0.18         | 29 <sup>th</sup> highest (record 25.62°C in 1970) |
| Sindh                | 47           | 26.58       | 27.25        | 0.67         | 17 <sup>th</sup> highest (record 27.89°C in 2018) |

Rank ranges from 1 (lowest) to 63 (highest).



Figure 2: Monthly mean Temperature (left) and rainfall in 2023 versus corresponding averages.

### 3. Synoptic Features of 2023

Four westerly waves/western disturbances (WD) from 6-9, 10-13, 18-25 and 28-30 January approached Balochistan and spread over the country that resulted in widespread rain and snowfall across most parts of Balochistan, Khyber Pakhtunkhwa (KP), Punjab, Gilgit-Baltistan (GB) &

Kashmir. In February two WDs affected the central and upper parts of the country during 8-10 Feb and the last week of the month while southern parts remained under dry continental air during the month. March saw three WDs, from 8-11, 14-25 and 28-31 March that yielded widespread rain-thunderstorms and heavy hailstorms across most parts of the country. In the month April, four WDs entered the country during 1-6, 7-13, 21-23 & 25-30 April, which yielded widespread dust-thunderstorm, rain and few hailstorms in most parts of the country. May witnessed four back-to-back WDs during 1-9, 14-19, 21-23 & 25-31 May across most parts of the country that resulted moderate/ heavy rain accompanied with severe dust-thunder/hailstorms. June 2023 brought a most significant event, the formation of tropical cyclone (BIPARJOY) over the southeast Arabian Sea on 7 June. The TC BIPARJOY tracked along north-northwest direction from 7-14 June and gradually attained the intensity of an Extremely Severe Cyclone Storm (ESCS). Recurring Northeast on 15 June, it made landfall at Indian Port, Jakhau, southeast of Keti Bandar, Sindh on 16 June as a Very Severe Cyclonic Storm (VSCS) with maximum sustained winds of 120 Km/h and producing widespread heavy rains in Southeast Sindh. With seasonal/heat-low been located over west-northwest Balochistan, the moist currents from the Arabian Sea started penetrating into eastern parts of the country that caused pre-monsoon rains.

July's significant synoptic feature was the monsoon onset. From 2<sup>nd</sup> July, strong monsoon currents started penetrating into central and upper parts of the country till 10 July and from 11-16, 17-20, 21-26 and 27- end July which resulted in widespread very heavy/very heavy rainfall. August experienced a break monsoon feature when monsoon trough remained stuck near the foothills of Himalaya, which ultimately confined the monsoon currents only to north/ northeastern Pakistan. On the other hand, the heat-low prevailed invariably over north-northwest Balochistan. During September 1-19, the heat-low remained centred around north-northwest Balochistan and monsoon currents penetrated into southern and upper parts of the country from 20 - 24 September, which resulted in widespread rain/thundershowers over most parts of the country. The monsoon withdrew from the country on 26 September followed by the dry-continental air entrance in Balochistan and southern Sindh that caused a heatwave like conditions in Karachi and other southern districts of Sindh during 28-30 September. In October, two low-pressure areas formed over central Balochistan and eastern Sindh from 15-21 Oct that resulted some rain/thundershowers. November usually experiences the dry continental airflow. However, a westerly trough existed from 4-11 & 17-18 Nov yielding some moderate rainfall in KP, Punjab, GB, and Kashmir. During the last week, another westerly system approached southwest Balochistan resulting in isolated very heavy rainfall in South Balochistan. The dry continental air and dense fog remained the predominant features during December except two mild WDs entered the west Balochistan from 15-16 & 22-24 Dec, spread over most parts of the country and caused some light rainfall in west Balochistan, Northern areas of Punjab, KP, GB, Kashmir, and upper Sindh.

#### **4. Rainfall: Above average annual rainfall**

The national total rainfall for the years 2023 was 16% above the long-period average of 1961-2010 with 344.1 mm (average is 297.6 mm). Annual rainfall was so over Balochistan (+29%), Sindh (+50 %) and Punjab (+30) while below normal over KP (-11 %), AJK (-12 %) and GB (-10 %), (Figs. 3 & 4). It was significantly high in Sindh & Punjab and ranked record 16<sup>th</sup> and 12<sup>th</sup> wettest year respectively since 1961 (Table-1).

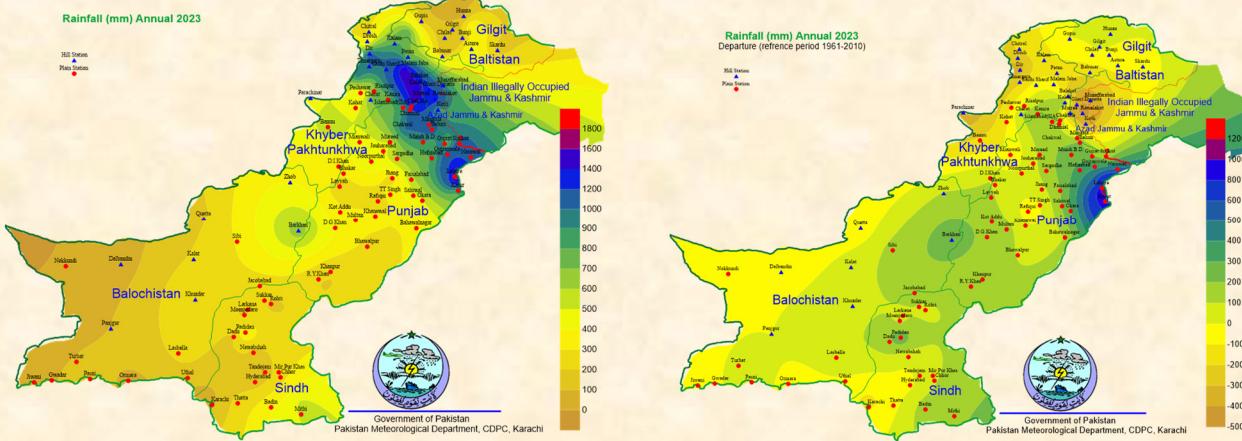


Figure 3: Pakistan spatial distribution of 2023 annual rainfall, actual (left) and departure (right)

The year 2023 started with deficient rainfall (-21% deviation) with January 2023 happened to be a below-average rainy month for Pakistan with only 14.9 mm area-weighted rain against 18.9 mm average rainfall in the month. The deficient trend persisted rather aggravated through the February with -77% deviation, the February 2023 was largely deficient-rain month for Pakistan with only 5.6 mm area-weighted rain against 24.9 mm average rainfall and ranked fifth driest February during past 63 years. The situation was more or less similar on a regional scale. March saw a sigh of relief from persistent drier months. With +42% deviation, March 2023 was largely above-average rainy month for Pakistan with 43.30 mm area-weighted rain against 30.50 mm average rainfall. On a regional scale with largely above-average rainfall, Balochistan (47.50/+132%) witnessed the 8<sup>th</sup> wettest March, Punjab (57.00mm/+104%) the 10<sup>th</sup> wettest March and Sindh (7.80mm/68%) the 11<sup>th</sup> wettest March during the past 63 years. In a sharp contrast, for GB (6.90mm/-74%) it ranked the 11<sup>th</sup> driest March, AJK (41.30mm/-59%) the 10<sup>th</sup> driest March since 1961 and KP (73.10mm/-21%) too faced with deficient month.

April 2023 with 12.5% rainfall was slightly above average for Pakistan as a whole. On a regional scale, extreme above-average rainfall occurred in Sindh (9.50/+205.2%) and ranked 7<sup>th</sup> wettest April during past 63 years. During May 2023, Pakistan experienced four moderate to heavy rainfall events accompanied with severe dust-hailstorms. May 2023 rainfall with 127% was largely above average for Pakistan as a whole and stands 2<sup>nd</sup> wettest May on record (the record is 34.30 mm in 1987). The situation remained similar on regional scale too i.e. extremely above-average rainfall occurred in Punjab with 58.20 mm/+273% and ranked as the wettest ever May during past 63 years (record being 43.30 mm in 1987). Balochistan with 21.30 mm/+255.60% (record being 27.30 mm in 1987) and Sindh with 13.10 mm/+348% (record being 58.70 mm in 1999) both have had the 2<sup>nd</sup> wettest May during past 63 years. June 2023 rainfall was largely above average (160%) for Pakistan as a whole and stands 2<sup>nd</sup> wettest June on record (the record being 88.10 mm in 2007). The situation was so on regional scale; largely above-average rainfall in Balochistan with 27.20 mm/+199% (record is 114.00 mm in 2007) and Sindh with 49.60 mm/+385% (record is 51.60 mm in 1964) both recording the 3<sup>rd</sup> wettest June during past 63 years. For Punjab with 80.10 mm/+172% (record is 93.60 mm in 2007), it ranked as the 4<sup>th</sup> wettest June, KP with 67.90 mm/+89% (record is 82.90 mm in 2008) the 7<sup>th</sup> wettest June, AJK with 93.50 mm/+48% (record

is 172.40 mm in 1971) the 8<sup>th</sup> wettest June during past 63 years. The GB was the only region that witnessed nearly average rainfall with 11.70 mm/+9%. One of significant feature of this month was tropical cyclone formation in the North Arabian Sea. TC Biparjoy formed over southeast Arabian Sea on 6 June and made landfall between Keti Bandar, Sindh and Gujarat (India) on evening of 16 June as a Very Severe Cyclonic Storm with maximum sustained winds of 120 Kts/h. It also caused severe heatwave like conditions over Karachi and other districts of lower Sindh for 4 days, 09-12 June, culminating into a dust-thunderstorms and widespread heavy rains in Southeast Sindh with light/moderate rainfall in Karachi during 13- 17 June 2023.

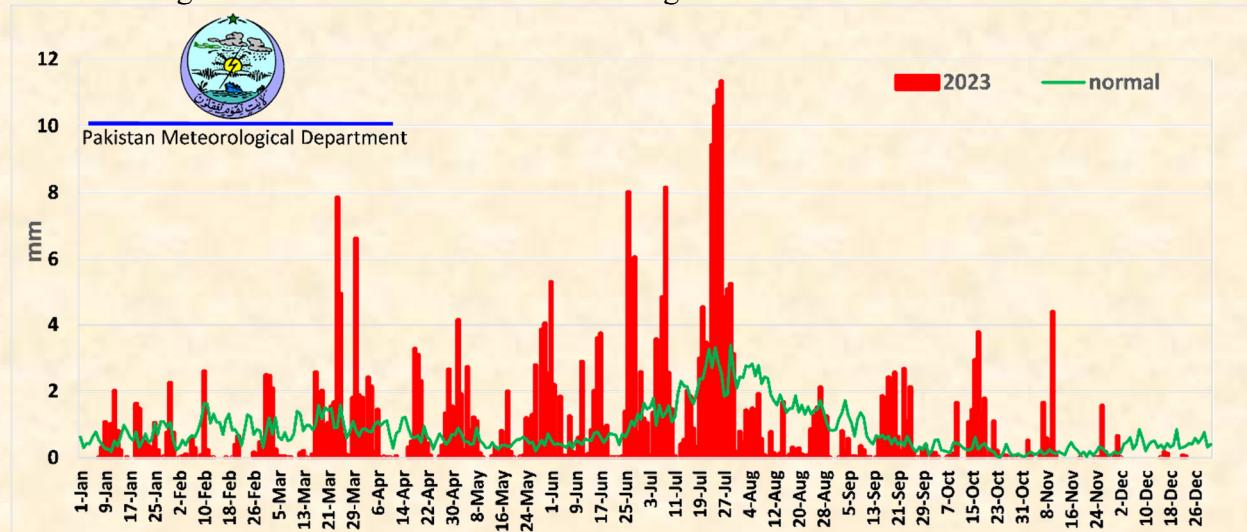


Figure 4: Pakistan 2023 area-weighted observed & normal rainfall

July 2023 rainfall was largely above average (70%) for Pakistan as a whole and stands as the 9th wettest July on record (the record being 177.80 mm in 2022) July during past 63 years respectively. A similar situation prevailed on a regional scale too. GB recorded largely above average (44.30 mm/+233%) saw the wettest ever July (record was 44.20 mm in 1993), for Balochistan with 62.70 mm/+111% (record is 163.30 mm in 2022) and Sindh 146.0 mm/+143% (record is 245.40 mm in 2022) the month ranked 7<sup>th</sup> and 9<sup>th</sup> wettest respectively. Punjab with 152.80 mm/+47%, AJK with 27.70 mm/+31% and KP with 127.30 mm/+19% also observed above normal rainfall. August 2023 rainfall was largely below average (-66%) for Pakistan and stands 2<sup>nd</sup> driest August on record (the driest ever being in 1993 with 16.40 mm). The situation was similar on regional scale too; for Balochistan with 2.40 mm (-89%), it stands the driest ever (past driest being 3.5mm in 1963), for Punjab with 39.2mm (-58%) & KP with 50.40mm (-51%) both happened to be the 2<sup>nd</sup> driest August (driest ever being 28.7mm & 41.1mm respectively in 1993). Sindh with 0.90mm (-98%) recorded the 6<sup>th</sup> driest August during the past 63 years. September 2023 rainfall was near average, -7% for Pakistan as a whole.

October 2023 rainfall was above average with 16.1mm (+102%) for Pakistan as a whole and stands 9<sup>th</sup> highest rainfall in October (record is 52.7mm in 1997). On regional scale: Punjab with 27.1mm (+234%) observed the 3<sup>rd</sup> highest October rainfall (record is 83.1mm in 1997); Balochistan with 9.8mm (+230%) observed the 7<sup>th</sup> highest (record is 51.8mm in 1997), GB with 15.3mm (+96%) observed the 8<sup>th</sup> highest October rainfall (record is 97.8mm 1987) and AJK with 49.4mm (+59%) too experienced excessively above average rainfall during the month. In contrast, Sindh with only 1.4mm (-67%) was the only region having excessively below average rainfall. November 2023 rainfall was excessively above average, with 9.6mm mm (+87%), for Pakistan as a whole. On

regional scale: Punjab with 11.4mm (+173%) observed the 7<sup>th</sup> highest November rainfall (record is 22.5mm in 1982), Balochistan with 8.1mm (+214%) also observed the 7<sup>th</sup> highest (record is 25.8mm in 2019) and Sindh with 4.1mm (+156%) observed the 8<sup>th</sup> highest (record is 25.9mm in 2019), while, KP with 20.6mm (+17%) recoded slightly above average rainfall. December 2023 rainfall was excessively below average, with only 1.1mm (-92%), for Pakistan as a whole and stands 6<sup>th</sup> driest December during past 63 years (driest ever being 0.0mm in 1999). A similar situation prevailed over the regions with Sindh recorded no rain accept traces at Jacobabad, Punjab with only 0.2mm (-98%) observed the 9<sup>th</sup> driest December (driest ever being 0.0mm in 3 different years) and GB with only 0.3mm (-97%) also observed the 4<sup>th</sup> driest December rainfall (driest ever is 0.0mm in 1999).

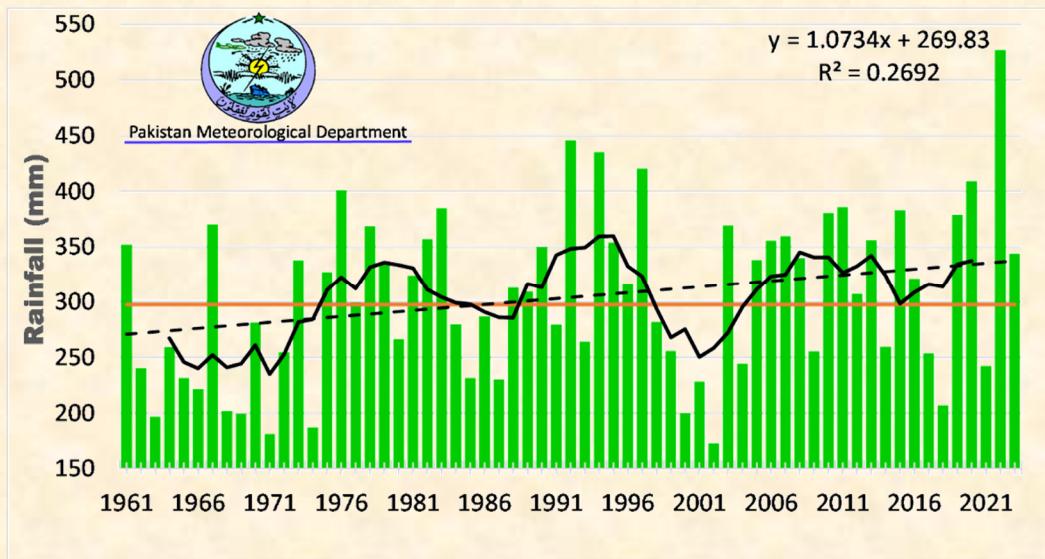


Figure 5: Pakistan annual rainfall time-series over 63-years (1961-2023). The black line indicates the 7-year moving average, positioned over middle year of the each 7-year block. The red straight line shows the national annual long-term (1961-2010) average. The black dotted line shows a trend over the period.

## 5. Temperature: Another warmest year of Pakistan

The annual national mean temperature for 2023, for Pakistan as a whole, was 0.51 °C above the 1961–1990 average, placing it as 18<sup>th</sup> warmest year on record during past sixty-three years (Table 2). The 2023 mean annual maximum temperature at country-level was 30.23 °C being 0.53 °C warmer than average of 29.69 °C and was so in all regions of the country (Fig. 8). The mean annual minimum temperature was 16.36 °C, being 1.02 °C warmer than the country average of 15.34 °C being fourth warmest on record. It was so at sub-regional basis as well with Sindh being first and AJK & Balochistan the eighth warmest minimum on record. The annual minimum temperature over Punjab was also above average, placing the province in upper ten warmer years (Fig. 9).

January 2023 was -1.25 °C cooler than average with national mean monthly temperature of 9.98 °C against the average 11.24 °C. February 2023 was +3.55 °C warmer than average with national mean monthly being 17.16 °C against the average 13.60 °C and ranked as the 2<sup>nd</sup> warmest February during past 63 years (record is 17.79 °C in 2006). March 2023 was also warmer than average by +1.63 °C with national mean monthly being 20.49 °C against the average 18.86 °C and ranked as the 13<sup>th</sup> warmest March during past 63 years (record is 22.92 °C in 2022). April

2023 was  $-0.26^{\circ}\text{C}$  slightly cooler than average with national mean monthly being  $24.28^{\circ}\text{C}$  against the average  $24.54^{\circ}\text{C}$ . May 2023 was also cooler than average by  $-0.71^{\circ}\text{C}$  with national mean monthly temperature being  $28.23^{\circ}\text{C}$  against the average  $28.94^{\circ}\text{C}$ . June 2023 too happened to be  $-0.72^{\circ}\text{C}$  cooler than average with national mean monthly temperature being  $31.26^{\circ}\text{C}$  against the average of  $31.98^{\circ}\text{C}$ .

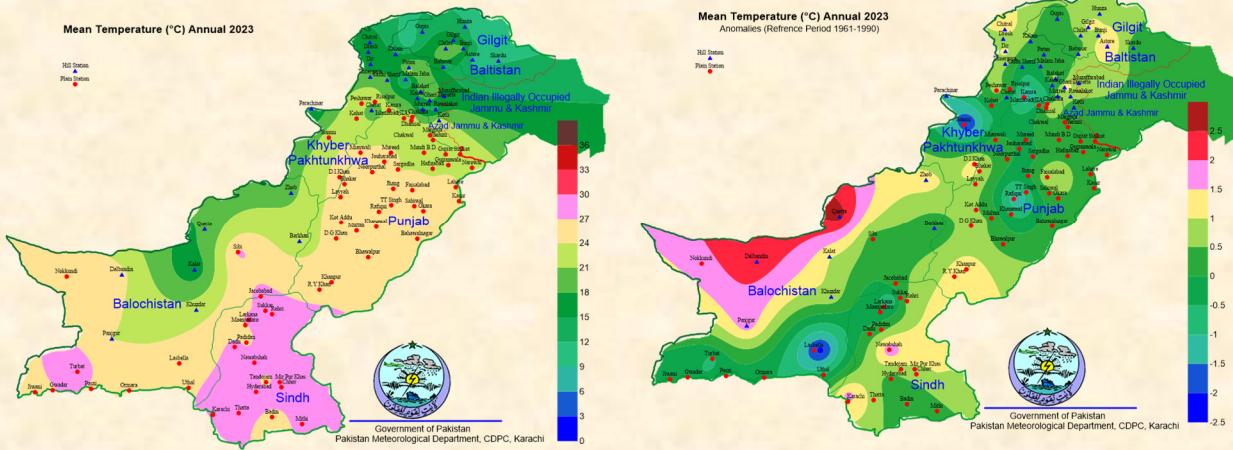


Figure 6: Pakistan spatial distribution of 2023 annual mean temperature, actual (left) and anomaly (right)

July 2023 was  $-0.52^{\circ}\text{C}$ , cooler than average with national mean monthly temperature being  $30.70^{\circ}\text{C}$  against the average of  $31.22^{\circ}\text{C}$ . August 2023 was  $0.19^{\circ}\text{C}$ , warmer than average with national mean monthly temperature being  $30.44^{\circ}\text{C}$  against the average of  $30.25^{\circ}\text{C}$ . September 2023 was  $1.12^{\circ}\text{C}$ , warmer than average with national mean monthly temperature being  $29.10^{\circ}\text{C}$  against the average of  $27.98^{\circ}\text{C}$  and stands 4<sup>th</sup> warmest mean temperature during past 63 years (the record is

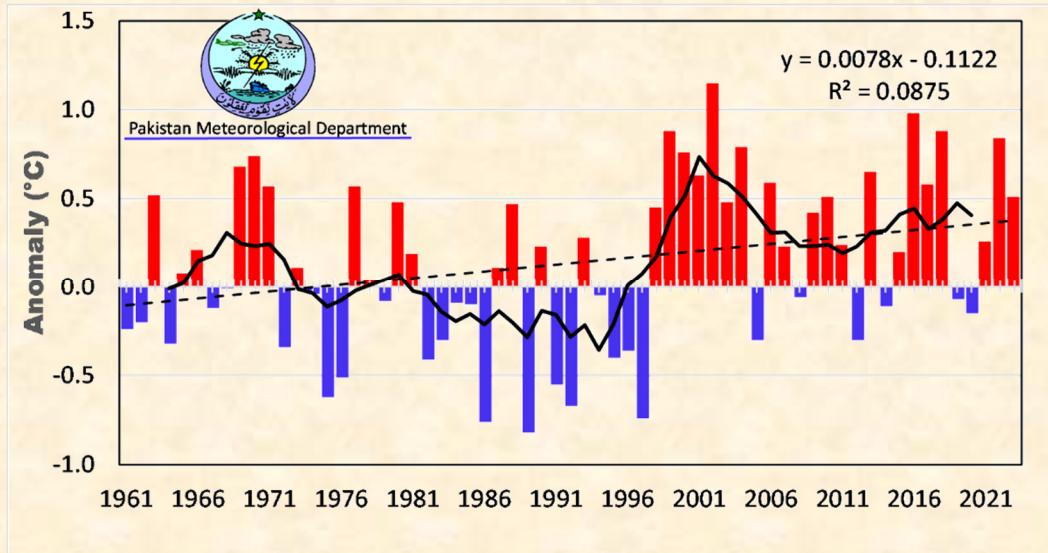


Figure 7: Pakistan annual mean temperature anomalies (with 1961-1990 the base period) over 1961-2023. The black solid line indicates 7-year moving average with average positioned over middle year of each 7-year block. The black dotted line shows the trend over the period.

29.79 in 2019). So was the situation in all regions; AJK with 24.32°C (+1.89°C) observed the 2<sup>nd</sup> highest monthly mean (the record being 24.43°C in 2019), KP with 27.02 °C (+1.21°C) observed the 5<sup>th</sup> highest mean (the record being 27.61°C in 1961), Punjab with 31.14°C (+1.13°C) observed the 4<sup>th</sup> highest mean (the record being 31.57°C in 1961), Sindh with 31.50 °C (+1.06°C) observed the 6<sup>th</sup> highest mean (the record being 32.39°C in 2021), Balochistan with 29.01°C (+1.10 °C) and GB with 22.38 (+0.85 °C) all exhibited warmer than average temperatures. October 2023 was 1.00 °C, warmer than average with national mean monthly temperature being 24.59°C against the average of 23.59 °C. So was the situation in the regions; Balochistan with 24.99 (+1.65), Sindh with 29.64°C (+1.61°C) observed the 5<sup>th</sup> highest monthly mean (the record being 29.87°C in 2017). November 2023 remained 1.24 °C warmer than average with national mean monthly temperature being 19.10°C against the average of 17.87 °C and ranks as 8<sup>th</sup> warmest November (record is 19.87 °C in 2011). December 2023 remained 1.59 °C, warmer than average with national mean monthly temperature being 14.35°C against the average of 12.77 °C and ranks as 6<sup>th</sup> warmest December (record is 15.64 °C in 2016).

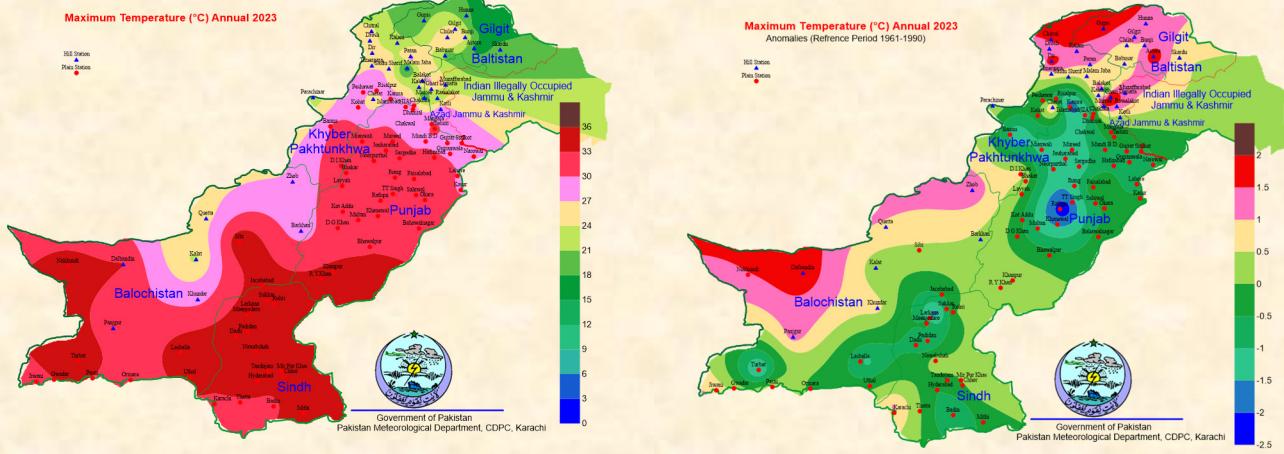


Figure 8: Pakistan spatial distribution of 2023 annual maximum temperature, actual (left) and anomaly (right)

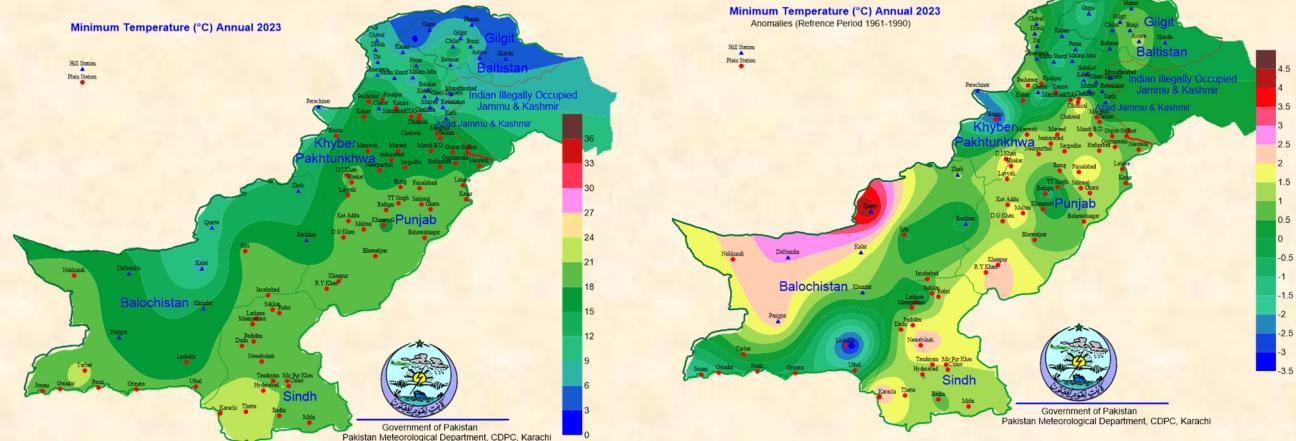


Figure 9: Pakistan spatial distribution of 2023 annual minimum temperature, actual (left) and anomaly (right)

## 6. Tropical Cyclones BIPARJOY

Biparjoy has been the longest duration cyclone over the Arabian Sea with 13 days and 3 hours lifetime and covered about 2500km translational distance (Depression-to-Depression stage) with minimum estimated central pressure 958 hPa and maximum sustained surface wind 180 km/h.

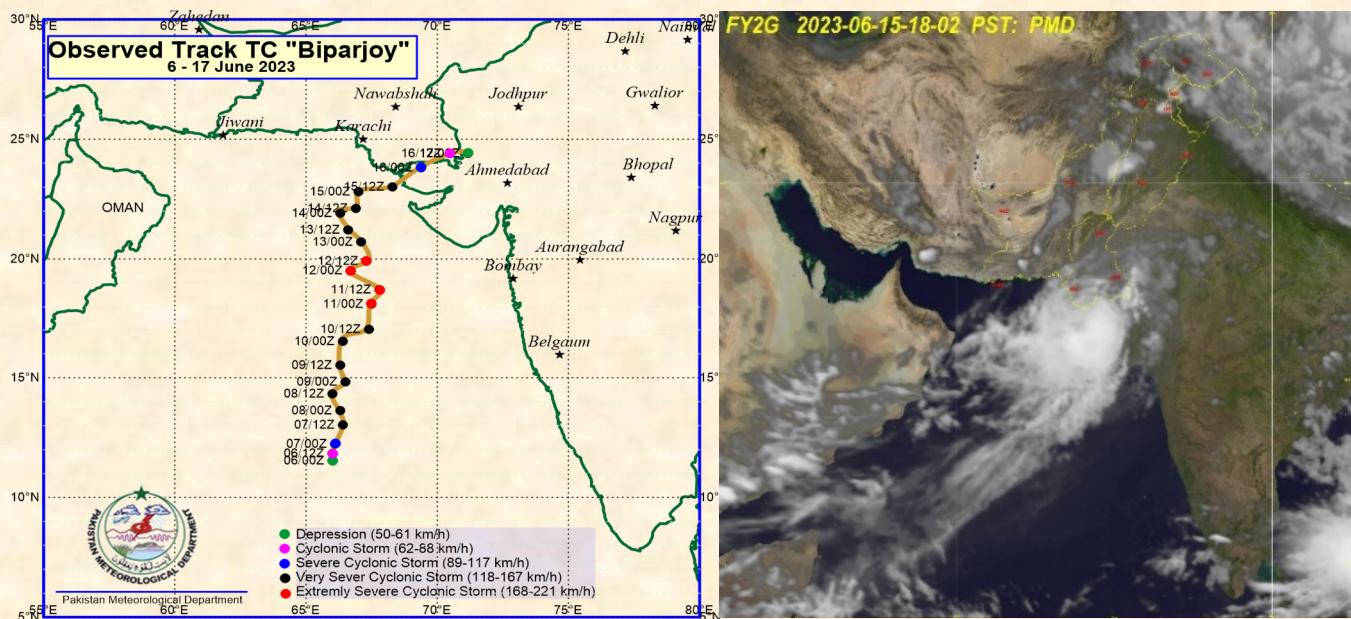


Figure 10: Observed Track of TC BIPARJOY

Figure 11. Satellite image of VSCS-Biparjoy at landfall.

Initially, a low-pressure area formed over the southeast Arabian Sea about 1550 km south of Karachi in the evening of 5 June, strengthened into a Depression on early morning of 6 June. Due to favorable environmental conditions the depression further intensified into a Cyclonic Storm, CS (and named *Biparjoy*) on the evening of 6 June. The CS Biparjoy further intensified into a Severe Cyclonic Storm (SCS) during early morning of 7 June and into a Very Severe Cyclonic Storm (VSCS) over the same region around noon of 7 June with estimated central pressure drop to 983 hPa and maximum sustained surface wind to 130km/h. From 7 – 11 June the intensity was same as VSCS followed by an Extremely Severe Cyclonic Storm (ESCS) in the early morning of 11 June with estimated central pressure drop to 960 hPa and maximum sustained surface wind 220km/h at a distance of 760 km south of Karachi (Figs. 10 &11). For at least 40 hours Biparjoy maintained its strength as ESCS then weakened into VSCS in the night of 12 June with estimated central pressure 962 hPa and maximum sustained surface wind 160 km/h at a distance about 470 km south of Karachi.

Biparjoy started landfalling as a VSCS by the evening of 15 June and crossed adjoining Pakistan-India Border near Latitude 23.3°N & Longitude 68.5°E at a distance of 135km from Keti Bandar, Pakistan. Making landfall, the system weakened into a Severe Cyclonic Storm (SCS), further into Cyclonic Storm (CS) by the morning of 16 June and moved further northeastwards. The CS further weakened into a depression by 17 June over Tharparker and adjoining southeast Rajasthan (India) and moved further eastwards.

## 7. Extreme, record breaking and Strong winds events of 2023

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. Number of extreme records broken during 2023. New records of heavy rainfall events on daily and monthly timescales have set in 2023 (Tables 3 & 4). Twenty-seven stations' record of lowest maximum temperature and eighteen 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  $\geq 30$  knots) during the year 2023 have been listed in Table 9.

Table 3. New highest 24-hours rainfall (mm) records

| S No | STATION             | Month    | New Record |            | Old Record |            | No of years examined. |
|------|---------------------|----------|------------|------------|------------|------------|-----------------------|
|      |                     |          | Value      | Date       | Value      | Date       |                       |
| 1    | Bannu               | Mar-2023 | 57.0       | 25/03/2023 | 30.0       | 04/03/1999 | 25                    |
| 2    | Mithi               | Mar-2023 | 20.0       | 22/03/2023 | 12.8       | 12/03/2007 | 20                    |
| 3    | Sakrand             | Mar-2023 | 15.0       | 19/03/2023 | 8.0        | 06/03/2020 | 9                     |
| 4    | Thatta              | Mar-2023 | 9.0        | 24/03/2023 | 7.8        | 02/03/2013 | 20                    |
| 5    | Khanpur             | May-2023 | 28.0       | 16/05/2023 | 27.0       | 18/05/2014 | 70                    |
| 6    | Mirpurkhas          | May-2023 | 3.5        | 30/05/2023 | 0.0        | ----       | 20                    |
| 7    | Mithi               | May-2023 | 24.0       | 30/05/2023 | 16.6       | 28/05/2005 | 20                    |
| 8    | Multan              | May-2023 | 42.3       | 29/05/2023 | 40.0       | 28/05/2002 | 70                    |
| 9    | Quetta Sh. Manda    | May-2023 | 40.0       | 01/05/2023 | 18.0       | 25/05/2003 | 27                    |
| 10   | Rahim Yar Khan      | May-2023 | 23.5       | 30/05/2023 | 7.2        | 10/05/2014 | 22                    |
| 11   | Tandojam            | May-2023 | 5.0        | 31/05/2023 | 4.0        | 07/05/2010 | 16                    |
| 12   | Lahore Airport      | Jun-2023 | 226.0      | 26/06/2023 | 98.0       | 29/06/2011 | 70                    |
| 13   | Lahore City         | Jun-2023 | 161.8      | 26/06/2023 | 125.5      | 18/06/1894 | 143                   |
| 14   | Mithi               | Jun-2023 | 165.0      | 17/06/2023 | 42.0       | 20/06/2021 | 20                    |
| 15   | Padidan             | Jun-2023 | 65.0       | 28/06/2023 | 60.4       | 13/06/2013 | 83                    |
| 16   | Zhob                | Jun-2023 | 40.0       | 27/06/2023 | 37.0       | 27/06/2006 | 70                    |
| 17   | Mirpurkhas          | Jul-2023 | 72.0       | 24/07/2023 | 61.0       | 24/07/2009 | 20                    |
| 18   | Padidan             | Jul-2023 | 163.6      | 26/07/2023 | 138.0      | 31/07/1992 | 83                    |
| 19   | Sibi                | Jul-2023 | 127.0      | 26/07/2023 | 88.9       | 25/07/1969 | 98                    |
| 20   | Sukkur              | Jul-2023 | 90.0       | 25/07/2023 | 64.0       | 26/07/2015 | 27                    |
| 21   | Barkhan             | Nov-2023 | 31.0       | 07/11/2023 | 23.0       | 07/11/2013 | 57                    |
| 22   | Islamabad ZeroPoint | Nov-2023 | 43.9       | 10/11/2023 | 40.5       | 20/11/1992 | 41                    |
| 23   | Mianwali            | Nov-2023 | 47.0       | 10/11/2023 | 25.4       | 08/11/1979 | 62                    |
| 24   | Mirpurkhas          | Nov-2023 | 3.0        | 26/11/2023 | 1.0        | 02/11/2019 | 20                    |
| 25   | Pasni               | Nov-2023 | 94.0       | 26/11/2023 | 76.0       | 22/11/2019 | 63                    |
| 26   | Rawalpindi          | Nov-2023 | 83.0       | 10/11/2023 | 79.7       | 16/11/1982 | 70                    |
| 27   | Sibi                | 2023     | 127.0      | 26/07/2023 | 109.2      | 11/03/1949 | 98                    |

Table 4. New wettest month/year rainfall (mm) records

| S No | STATION          | Month    | New Record |          | Old Record |          | No of years examined. |
|------|------------------|----------|------------|----------|------------|----------|-----------------------|
|      |                  |          | Value      | Date     | Value      | Date     |                       |
| 1    | Lahore Airport   | 2023     | 1794.0     | 2023     | 1243.5     | 2013     | 70                    |
| 2    | Lahore City      | 2023     | 1314.7     | 2023     | 1232.5     | 1997     | 143                   |
| 3    | Mithi            | Mar-2023 | 20.0       | Mar-2023 | 12.8       | Mar-2007 | 20                    |
| 4    | Sakrand          | Mar-2023 | 16.0       | Mar-2023 | 11.0       | Mar-2020 | 9                     |
| 5    | Thatta           | Mar-2023 | 9.0        | Mar-2023 | 7.8        | Mar-2013 | 20                    |
| 6    | Bahawalnagar     | May-2023 | 125.0      | May-2023 | 113.3      | May-1993 | 61                    |
| 7    | Khanpur          | May-2023 | 49.0       | May-2023 | 37.8       | May-2014 | 70                    |
| 8    | Mirpurkhas       | May-2023 | 3.5        | May-2023 | 0.0        | ----     | 20                    |
| 9    | Mithi            | May-2023 | 32.2       | May-2023 | 16.6       | May-2005 | 20                    |
| 10   | Multan           | May-2023 | 72.5       | May-2023 | 66.7       | May-2014 | 70                    |
| 11   | Quetta Sh. Manda | May-2023 | 63.0       | May-2023 | 38.0       | May-2005 | 27                    |
| 12   | Rahim Yar Khan   | May-2023 | 27.3       | May-2023 | 10.2       | May-2014 | 22                    |
| 13   | Tandojam         | May-2023 | 5.0        | May-2023 | 4.0        | May-2010 | 16                    |
| 14   | Chhor            | Jun-2023 | 124.3      | Jun-2023 | 112.2      | Jun-1978 | 86                    |
| 15   | Dera Ismail Khan | Jun-2023 | 113.0      | Jun-2023 | 100.4      | Jun-2013 | 143                   |
| 16   | Jehlum           | Jun-2023 | 190.1      | Jun-2023 | 184.8      | Jun-2008 | 76                    |
| 17   | Lahore Airport   | Jun-2023 | 392.5      | Jun-2023 | 224.1      | Jun-2011 | 70                    |
| 18   | Lahore City      | Jun-2023 | 291.1      | Jun-2023 | 208.6      | Jun-1996 | 143                   |
| 19   | Mithi            | Jun-2023 | 209.0      | Jun-2023 | 58.2       | Jun-2007 | 20                    |
| 20   | Zhob             | Jun-2023 | 87.0       | Jun-2023 | 77.0       | Jun-2007 | 70                    |
| 21   | Astore           | Jul-2023 | 93.6       | Jul-2023 | 89.3       | Jul-1978 | 63                    |
| 22   | Lahore Airport   | Jul-2023 | 668.7      | Jul-2023 | 665.4      | Jul-1980 | 70                    |
| 23   | Mirpurkhas       | Jul-2023 | 133.0      | Jul-2023 | 125.0      | Jul-2022 | 20                    |
| 24   | Sibi             | Jul-2023 | 241.0      | Jul-2023 | 159.0      | Jul-2022 | 98                    |
| 25   | Cherat           | Oct-2023 | 112.0      | Oct-2023 | 111.8      | Oct-1931 | 93                    |
| 26   | Risalpur         | Oct-2023 | 123.0      | Oct-2023 | 117.0      | Oct-2004 | 71                    |
| 27   | Barkhan          | Nov-2023 | 36.0       | Nov-2023 | 27.0       | Nov-2019 | 57                    |
| 28   | Mianwali         | Nov-2023 | 47.0       | Nov-2023 | 36.7       | Nov-1979 | 57                    |
| 29   | Mirpurkhas       | Nov-2023 | 4.0        | Nov-2023 | 1.0        | Nov-2019 | 20                    |
| 30   | Pasni            | Nov-2023 | 94.0       | Nov-2023 | 79.0       | Nov-2019 | 63                    |

Table 5. New highest maximum temperatures (°C) records

| S No | STATION | Month    | New Record |                 | Old Record |            | No of years examined. |
|------|---------|----------|------------|-----------------|------------|------------|-----------------------|
|      |         |          | Value      | Date            | Value      | Date       |                       |
| 1    | Balakot | Feb-2023 | 27.0       | 24/02/2023      | 27.0       | 25/02/2016 | 67                    |
| 2    | Barkhan | Feb-2023 | 30.5       | (15&17)/02/2023 | 28.9       | 11/02/1993 | 57                    |
| 3    | Bunji   | Feb-2023 | 21.7       | 19/02/2023      | 21.5       | 11/02/1993 | 63                    |
| 4    | Gilgit  | Feb-2023 | 22.0       | (18&19)/02/2023 | 22.0       | 22/02/2021 | 63                    |

Table 5. New highest maximum temperatures (°C) records

|    |                      |          |      |                 |      |              |     |
|----|----------------------|----------|------|-----------------|------|--------------|-----|
| 5  | Kalat                | Feb-2023 | 26.0 | 16/02/2023      | 25.0 | 16/02/2004   | 128 |
| 6  | Khanpur              | Feb-2023 | 34.0 | 24/02/2023      | 34.0 | 28/02/1960   | 70  |
| 7  | Mithi                | Feb-2023 | 40.0 | 16/02/2023      | 38.5 | 19/02/2017   | 20  |
| 8  | Thatta               | Feb-2023 | 36.5 | 27/02/2023      | 36.0 | 27/02/2009   | 20  |
| 9  | Bunji                | Jun-2023 | 43.3 | 24/06/2023      | 43.3 | 30/06/2022   | 63  |
| 10 | Gilgit               | Jun-2023 | 43.5 | 24/06/2023      | 43.5 | (03)/06/1990 | 63  |
| 11 | Zhob                 | Jun-2023 | 43.0 | 25/06/2023      | 43.0 | 11/06/2021   | 69  |
| 12 | Bannu                | Sep-2023 | 41.5 | 15/09/2023      | 41.0 | 14/09/2018   | 25  |
| 13 | Garhi Dupatta        | Sep-2023 | 38.5 | 02/09/2023      | 38.0 | (03)/09/2019 | 63  |
| 14 | Islamabad Zero Point | Sep-2023 | 37.2 | (04&15)/09/2023 | 37.2 | 13/09/2019   | 41  |
| 15 | Mithi                | Sep-2023 | 42.5 | (07&08)/09/2023 | 42.0 | 22/09/2018   | 20  |
| 16 | Quetta Sh. Manda     | Sep-2023 | 38.5 | 12/09/2023      | 38.0 | 09/09/2021   | 27  |
| 17 | Barkhan              | Oct-2023 | 37.0 | 06/10/2023      | 37.0 | 01/10/2009   | 57  |
| 1  | Zhob                 | Oct-2023 | 36.0 | 06/10/2023      | 36.0 | 01/10/2016   | 63  |

Table 6. New lowest maximum temperatures (°C) records

| S No | STATION              | Month    | New Record |                 | Old Record |            | No of years examined. |
|------|----------------------|----------|------------|-----------------|------------|------------|-----------------------|
|      |                      |          | Value      | Date            | Value      | Date       |                       |
| 1    | Chitral              | Jan-2023 | 0.6        | 25/01/2023      | 1.0        | 29/01/1977 | 59                    |
| 2    | Drosh                | Jan-2023 | 1.0        | 25/01/2023      | 1.0        | 08/01/2008 | 63                    |
| 3    | Gawadar              | Jan-2023 | 17.5       | 14/01/2023      | 18.0       | 16/01/2020 | 22                    |
| 4    | Turbat               | Jan-2023 | 14.0       | 14/01/2023      | 14.5       | 21/01/2009 | 27                    |
| 5    | Bahawalpur City      | May-2023 | 26.2       | 02/05/2023      | 26.8       | 0705/1998  | 63                    |
| 6    | Dadu                 | May-2023 | 33.0       | 30/05/2023      | 33.5       | 04/05/2005 | 20                    |
| 7    | Rahim Yar Khan       | May-2023 | 31.5       | 30/05/2023      | 32.7       | 14/05/2014 | 22                    |
| 8    | Bannu                | Jun-2023 | 26.0       | 02/06/2023      | 26.2       | 30/06/2007 | 25                    |
| 9    | Cherat               | Jun-2023 | 16.0       | 02/06/2023      | 16.7       | 09/06/1988 | 63                    |
| 10   | Faisalabad           | Jun-2023 | 25.0       | 02/06/2023      | 27.5       | 30/06/2018 | 63                    |
| 11   | Garhi Dupatta        | Jun-2023 | 15.5       | 01/06/2023      | 19.5       | 22/06/2022 | 63                    |
| 12   | Islamabad Zero Point | Jun-2023 | 23.0       | (01&02)/06/2023 | 23.0       | 22/06/2022 | 41                    |
| 13   | Jehlum               | Jun-2023 | 23.0       | 02/06/2023      | 25.4       | 22/06/2022 | 63                    |
| 14   | Kotli                | Jun-2023 | 20.6       | 01/06/2023      | 21.9       | 22/06/2022 | 63                    |
| 15   | Lahore Airport       | Jun-2023 | 24.3       | 01/06/2023      | 26.2       | 17/06/2006 | 63                    |
| 16   | Lahore City          | Jun-2023 | 25.4       | 01/06/2023      | 25.8       | 15/06/2013 | 63                    |
| 17   | Mithi                | Jun-2023 | 27.0       | 17/06/2023      | 29.8       | 27/06/2007 | 20                    |
| 18   | Mizaffarabad         | Jun-2023 | 19.5       | 02/06/2023      | 20.0       | 22/06/2022 | 63                    |
| 19   | Murree               | Jun-2023 | 11.7       | 01/06/2023      | 12.0       | 22/06/2022 | 63                    |
| 20   | Peshawar             | Jun-2023 | 23.5       | 02/06/2023      | 23.5       | 05/06/2010 | 63                    |
| 21   | Rawalpindi           | Jun-2023 | 22.5       | 02/06/2023      | 23.0       | 22/06/2022 | 63                    |
| 22   | Sialkot              | Jun-2023 | 23.0       | 01/06/2023      | 24.0       | 22/06/2017 | 63                    |

Table 6. New lowest maximum temperatures (°C) records

|    |                    |          |      |            |      |            |    |
|----|--------------------|----------|------|------------|------|------------|----|
| 23 | Lahore Airport     | Jul-2023 | 25.0 | 05/07/2023 | 25.0 | 18/07/1978 | 63 |
| 24 | Shorekot (Rafiqui) | Jul-2023 | 27.0 | 23/07/2023 | 27.0 | 12/07/1976 | 63 |
| 25 | Pasni              | Nov-2023 | 21.5 | 25/11/2023 | 22.2 | 25/11/1963 | 63 |
| 26 | Chitral            | 2023     | 0.6  | 25/01/2023 | 1.0  | 29/01/1977 | 59 |
| 27 | Turbat             | 2023     | 14.0 | 14/01/2023 | 14.5 | 21/01/2009 | 27 |

Table 7. New highest minimum temperatures (°C) records

| S No | STATION         | Month    | New Record |                 | Old Record |            | No of years examined. |
|------|-----------------|----------|------------|-----------------|------------|------------|-----------------------|
|      |                 |          | Value      | Date            | Value      | Date       |                       |
| 1    | Balakot         | Feb-2023 | 12.8       | 20/02/2023      | 12.7       | 16/02/1999 | 63                    |
| 2    | Gilgit          | Feb-2023 | 10.6       | 20/02/2023      | 8.9        | 16/02/1993 | 63                    |
| 3    | Jacobabad       | Feb-2023 | 18.0       | (26&28)/02/2023 | 17.5       | 26/02/2021 | 63                    |
| 4    | Larkana         | Feb-2023 | 19.8       | 27/02/2023      | 19.0       | 28/02/2009 | 38                    |
| 5    | Rohri           | Feb-2023 | 19.5       | 28/02/2023      | 19.5       | 22/02/2006 | 63                    |
| 6    | Quetta Samungli | Jun-2023 | 26.0       | (24&25)/06/2023 | 25.7       | 22/06/1986 | 63                    |
| 7    | Astore          | Sep-2023 | 18.3       | 18/09/2023      | 18.3       | 08/09/1970 | 63                    |
| 8    | D.I.KHAN(City)  | Sep-2023 | 29.0       | (01&02)/09/2023 | 29.0       | 01/09/2007 | 63                    |
| 9    | Dalbandin       | Sep-2023 | 29.0       | (01&03)/09/2023 | 28.3       | 05/09/1983 | 63                    |
| 10   | Jehlum          | Sep-2023 | 29.5       | 14/09/2023      | 29.2       | 07/09/2021 | 63                    |
| 11   | Kotli           | Sep-2023 | 27.4       | (13-15)/09/2023 | 27.0       | 05/09/2019 | 63                    |
| 12   | Peshawar        | Sep-2023 | 28.5       | (01&02)/09/2023 | 28.5       | 25/09/2021 | 63                    |
| 13   | Bahawalnagar    | Nov-2023 | 20.5       | 01/11/2023      | 19.7       | 02/11/2001 | 63                    |
| 14   | D.I.KHAN(City)  | Nov-2023 | 20.5       | 01/11/2023      | 20.0       | 01/11/2019 | 65                    |
| 15   | Dadu            | Nov-2023 | 22.0       | (01-03)/11/2023 | 21.8       | 01/11/2018 | 22                    |
| 16   | Faisalabad      | Nov-2023 | 20.5       | 02/11/2023      | 19.3       | 02/11/2018 | 65                    |
| 17   | Larkana         | Nov-2023 | 22.5       | 01/11/2023      | 22.5       | 02/11/2022 | 38                    |
| 18   | Rahim Yar Khan  | Nov-2023 | 19.9       | 07/11/2023      | 19.5       | 05/11/2011 | 24                    |
| 19   | Mianwali        | Dec-2023 | 12.5       | 02/12/2023      | 12.5       | 10/12/2018 | 64                    |
| 20   | Peshawar        | Dec-2023 | 12.0       | (23&24)/12/2023 | 12.0       | 08/12/2020 | 65                    |
| 21   | Jacobabad       | 2023     | 33.0       | 18/06/2023      | 33.0       | 21/06/2016 | 63                    |

Table 8. New lowest minimum temperatures (°C) records

| S No | STATION        | Month    | New Record |                 | Old Record |            | No of years examined. |
|------|----------------|----------|------------|-----------------|------------|------------|-----------------------|
|      |                |          | Value      | Date            | Value      | Date       |                       |
| 1    | Nokkundi       | Jan-2023 | -10.0      | 14/01/2023      | -10.0      | 04/01/1934 | 91                    |
| 2    | Saidu Sharif   | Jan-2023 | -4.0       | (18&19)/01/2023 | -3.0       | 27/01/2008 | 50                    |
| 3    | Saidu Sharif   | May-2023 | 5.5        | 26/05/2023      | 7.0        | 09/05/1998 | 50                    |
| 4    | Bahawalnagar   | Jun-2023 | 17.5       | 01/06/2023      | 18.3       | 12/06/1985 | 61                    |
| 5    | Lahore Airport | Jun-2023 | 17.5       | 26/06/2023      | 18.0       | 17/06/2011 | 70                    |

Table 8. New lowest minimum temperatures (°C) records

|    |                      |          |       |                 |       |            |    |
|----|----------------------|----------|-------|-----------------|-------|------------|----|
| 6  | Lasbella             | Jun-2023 | 18.0  | 11/06/2023      | 18.0  | 03/06/1935 | 63 |
| 7  | Multan               | Jun-2023 | 19.5  | 01/06/2023      | 19.5  | 03/06/1998 | 70 |
| 8  | Chilas               | Jul-2023 | 12.0  | 07/07/2023      | 15.0  | 23/07/2010 | 63 |
| 9  | Islamabad Zero Point | Jul-2023 | 18.0  | 09/07/2023      | 18.0  | 11/07/2019 | 41 |
| 10 | Nookundi             | 2023     | -10.0 | 14/01/2023      | -10.0 | 09/02/1974 | 91 |
| 11 | Saidu Sharif         | 2023     | -4.0  | (18&19)/01/2023 | -3.0  | 27/01/2008 | 50 |

Table 9: Strong winds reported (speed 30 knots or stronger) during the year 2023

| Date   | Station         | Max Wind Knots | Date   | Station   | Max Wind Knots | Date   | Station        | Max Wind Knots |
|--------|-----------------|----------------|--------|-----------|----------------|--------|----------------|----------------|
| 26-May | Bahawalnagar    | 40             | 17-May | Jhang     | 44             | 04-Sep | Mangla         | 35             |
| 31-May | Bahawalnagar    | 40             | 04-Sep | Jhelum    | 30             | 16-Jun | Mithi          | 30             |
| 01-Jun | Bahawalnagar    | 40             | 17-May | Joharabad | 50             | 31-Jul | Moin Jo Daro   | 30             |
| 11-Jun | Bahawalnagar    | 60             | 11-Jun | Joharabad | 50             | 15-Mar | Multan AP      | 34             |
| 25-Jul | Bahawalnagar    | 34             | 22-Sep | Joharabad | 37             | 16-Mar | Multan AP      | 34             |
| 26-Jul | Bahawalnagar    | 30             | 09-Nov | Joharabad | 37             | 21-Mar | Multan AP      | 30             |
| 17-Apr | Bahawalpur AP   | 30             | 04-May | Kasur     | 45             | 04-Apr | Multan AP      | 45             |
| 04-May | Bahawalpur AP   | 30             | 26-Jun | Kasur     | 45             | 05-Apr | Multan AP      | 45             |
| 15-May | Bahawalpur AP   | 40             | 14-Oct | Kasur     | 45             | 18-Apr | Multan AP      | 30             |
| 17-May | Bahawalpur AP   | 32             | 17-May | Khanewal  | 38             | 27-Apr | Multan AP      | 30             |
| 01-Jun | Bahawalpur AP   | 34             | 29-May | Khanewal  | 42             | 01-May | Multan AP      | 30             |
| 04-Jun | Bahawalpur AP   | 46             | 01-Jun | Khanewal  | 36             | 04-May | Multan AP      | 30             |
| 07-Jun | Bahawalpur AP   | 36             | 17-May | Kot Addu  | 30             | 16-May | Multan AP      | 54             |
| 11-Jun | Bahawalpur AP   | 44             | 11-Jun | Kot Addu  | 35             | 17-May | Multan AP      | 54             |
| 02-Jul | Bahawalpur AP   | 46             | 29-Aug | Kot Addu  | 30             | 27-May | Multan AP      | 32             |
| 03-Jul | Bahawalpur AP   | 55             | 29-May | Kotli     | 35             | 28-May | Multan AP      | 32             |
| 04-Jul | Bahawalpur AP   | 36             | 15-Mar | Lahore AP | 35             | 29-May | Multan AP      | 35             |
| 06-Jul | Bahawalpur AP   | 40             | 16-Mar | Lahore AP | 40             | 31-May | Multan AP      | 30             |
| 19-Jul | Bahawalpur AP   | 35             | 29-Mar | Lahore AP | 30             | 03-Jun | Multan AP      | 38             |
| 22-Jul | Bahawalpur AP   | 33             | 31-Mar | Lahore AP | 30             | 06-Jun | Multan AP      | 36             |
| 05-Apr | Bahawalpur City | 35             | 05-Apr | Lahore AP | 48             | 07-Jun | Multan AP      | 36             |
| 17-Apr | Bahawalpur City | 32             | 18-Apr | Lahore AP | 50             | 27-Aug | Multan AP      | 50             |
| 04-May | Bahawalpur City | 36             | 22-Apr | Lahore AP | 35             | 26-Jun | Narowal        | 40             |
| 15-May | Bahawalpur City | 36             | 29-Apr | Lahore AP | 35             | 03-Jun | Padidan        | 30             |
| 17-May | Bahawalpur City | 30             | 04-May | Lahore AP | 55             | 13-May | Peshawar AP    | 40             |
| 28-May | Bahawalpur City | 44             | 06-May | Lahore AP | 55             | 29-May | Peshawar AP    | 30             |
| 04-Jun | Bahawalpur City | 42             | 07-May | Lahore AP | 30             | 02-Sep | Peshawar AP    | 35             |
| 11-Jun | Bahawalpur City | 42             | 08-May | Lahore AP | 30             | 04-Sep | Peshawar AP    | 32             |
| 03-Jul | Bahawalpur City | 34             | 13-May | Lahore AP | 40             | 22-Mar | Peshawar BKIAP | 30             |
| 07-Jul | Bahawalpur City | 36             | 16-May | Lahore AP | 30             | 20-Apr | Peshawar BKIAP | 42             |

Table 9: Strong winds reported (speed 30 knots or stronger) during the year 2023

| Date   | Station         | Max Wind Knots | Date   | Station        | Max Wind Knots | Date   | Station         | Max Wind Knots |
|--------|-----------------|----------------|--------|----------------|----------------|--------|-----------------|----------------|
| 28-Jul | Bahawalpur City | 35             | 23-May | Lahore AP      | 55             | 13-May | Peshawar BKIAP  | 40             |
| 18-Jun | Bannu           | 46             | 25-May | Lahore AP      | 45             | 15-May | Peshawar BKIAP  | 30             |
| 22-Jul | Bannu           | 34             | 26-May | Lahore AP      | 45             | 17-May | Peshawar BKIAP  | 42             |
| 17-May | Bhakkar         | 30             | 28-May | Lahore AP      | 42             | 29-May | Peshawar BKIAP  | 30             |
| 22-Apr | Cherat          | 30             | 07-Jun | Lahore AP      | 52             | 11-Jun | Peshawar BKIAP  | 35             |
| 12-Sep | Cherat          | 30             | 10-Jun | Lahore AP      | 40             | 20-Apr | Peshawar City   | 40             |
| 27-Jun | Chhor           | 40             | 11-Jun | Lahore AP      | 60             | 13-May | Peshawar City   | 40             |
| 27-Jul | Chhor           | 32             | 15-Jun | Lahore AP      | 55             | 26-Jun | Peshawar City   | 30             |
| 01-Jun | D.G.Khan        | 54             | 19-Jun | Lahore AP      | 60             | 09-Feb | Quetta Samungli | 30             |
| 06-Jul | D.G.Khan        | 30             | 26-Jun | Lahore AP      | 70             | 18-Mar | Quetta Samungli | 30             |
| 29-Jul | D.I.Khan(AP)    | 30             | 30-Jun | Lahore AP      | 30             | 26-Apr | Quetta Samungli | 32             |
| 22-Sep | D.I.Khan(AP)    | 40             | 02-Aug | Lahore AP      | 55             | 15-Jun | Quetta Samungli | 30             |
| 01-Jun | D.I.Khan(City)  | 30             | 05-Aug | Lahore AP      | 30             | 16-Jun | Quetta Samungli | 34             |
| 28-Jul | D.I.Khan(City)  | 36             | 07-Aug | Lahore AP      | 30             | 25-Jun | Quetta Samungli | 30             |
| 29-Aug | D.I.Khan(City)  | 41             | 10-Aug | Lahore AP      | 32             | 13-May | Rawalpindi      | 30             |
| 05-Apr | Faisalabad      | 34             | 11-Aug | Lahore AP      | 35             | 29-May | Rawalpindi      | 30             |
| 10-Jun | Faisalabad      | 30             | 26-Aug | Lahore AP      | 47             | 10-Jun | Rawalpindi      | 35             |
| 31-Jul | Faisalabad      | 30             | 28-Aug | Lahore AP      | 40             | 14-Jun | Rawalpindi      | 35             |
| 09-Nov | Faisalabad      | 31             | 17-Sep | Lahore AP      | 40             | 30-Jun | Rawalpindi      | 30             |
| 09-Oct | Gujranwala      | 40             | 22-Sep | Lahore AP      | 50             | 04-Sep | Rawalpindi      | 38             |
| 06-Aug | Hyderabad       | 30             | 14-Oct | Lahore AP      | 50             | 29-Sep | Rawalpindi      | 38             |
| 07-Aug | Hyderabad       | 30             | 04-May | Lahore City    | 42             | 17-May | Sahiwal         | 32             |
| 02-May | Islamabad AP    | 30             | 06-May | Lahore City    | 36             | 29-May | Sialkot AP      | 35             |
| 04-May | Islamabad AP    | 37             | 17-May | Lahore City    | 45             | 19-Jun | Sialkot AP      | 35             |
| 06-May | Islamabad AP    | 45             | 23-May | Lahore City    | 35             | 03-Aug | Sialkot AP      | 35             |
| 13-May | Islamabad AP    | 34             | 11-Jun | Lahore City    | 42             | 15-Aug | Sialkot AP      | 35             |
| 23-May | Islamabad AP    | 34             | 26-Jun | Lahore City    | 55             | 04-Sep | Sialkot AP      | 30             |
| 11-Jun | Islamabad AP    | 41             | 02-Aug | Lahore City    | 32             | 15-Jun | Thatta          | 32             |
| 14-Jun | Islamabad AP    | 32             | 26-Aug | Lahore City    | 32             | 12-Aug | Thatta          | 30             |
| 24-Jun | Islamabad AP    | 35             | 28-Aug | Lahore City    | 36             | 23-May | Toba Tek Singh  | 32             |
| 30-Jun | Islamabad AP    | 34             | 27-Jun | Larkana        | 34             | 09-Oct | Toba Tek Singh  | 32             |
| 07-Aug | Islamabad AP    | 40             | 17-May | Layyah         | 30             | 19-Mar | Turbat          | 35             |
| 15-Aug | Islamabad AP    | 30             | 11-Jun | Layyah         | 40             | 01-Apr | Turbat          | 30             |
| 09-Sep | Islamabad AP    | 33             | 17-May | Mandibahauddin | 32             | 27-Apr | Turbat          | 60             |
| 29-Sep | Islamabad AP    | 30             | 19-Jun | Mandibahauddin | 30             | 13-Jun | Turbat          | 30             |
| 09-Oct | Islamabad AP    | 36             | 24-Mar | Mangla         | 45             | 14-Jun | Turbat          | 30             |
| 16-Oct | Islamabad AP    | 31             | 23-May | Mangla         | 44             | 28-Jun | Turbat          | 30             |
| 17-May | Islamabad ZP    | 30             | 24-May | Mangla         | 43             | 27-Aug | Turbat          | 30             |

Table 9: Strong winds reported (speed 30 knots or stronger) during the year 2023

| Date   | Station      | Max Wind Knots | Date   | Station | Max Wind Knots | Date   | Station | Max Wind Knots |
|--------|--------------|----------------|--------|---------|----------------|--------|---------|----------------|
| 11-Aug | Islamabad ZP | 40             | 06-Jun | Mangla  | 39             | 30-Oct | Turbat  | 40             |
| 04-Sep | Islamabad ZP | 45             | 14-Aug | Mangla  | 30             |        |         |                |
| 22-Sep | Islamabad ZP | 35             | 19-Aug | Mangla  | 30             |        |         |                |

Page ~

## List of Tables

1. Table 1: Annual area-weighted rainfall ..... 2
2. Table 2: Annual area-averaged mean temperature ..... 2
3. Table 3: New highest 24-hours rainfall (mm) records ..... 10
4. Table 4: New wettest month/year rainfall (mm) records ..... 11
5. Table 5: New highest maximum temperatures records ..... 11
6. Table 6: New lowest maximum temperatures records ..... 12
7. Table 7: New highest minimum temperatures records ..... 13
8. Table 8: New lowest minimum temperatures records ..... 13
9. Table 9: Strong winds during the year ..... 14

## List of Figures

1. Figure 1: Significant climate events ..... 1
2. Figure 2(a): Mean monthly temperature ..... 2
3. Figure 2(b): Mean monthly rainfall ..... 2
4. Figure 3: Pakistan spatial distribution of 2023 annual rainfall ..... 4
5. Figure 4: Daily average rainfall ..... 5
6. Figure 5: Pakistan annual rainfall time-series 1961-2023 ..... 6
7. Figure 6: Pakistan spatial distribution of 2023 annual mean temperature ..... 7
8. Figure 7: Pakistan annual mean temperature anomalies 1961-2023 ..... 7
9. Figure 8: Pakistan spatial distribution of 2023 annual maximum temperature ..... 8
10. Figure 9: Pakistan spatial distribution of 2023 annual minimum temperature ..... 8
11. Figure 10: Observed Track of TC BIPARJOY ..... 9
12. Figure 11: Satellite image of VSCS-Biparjoy at landfall ..... 9

The State of Pakistan's Climate in 2023 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 preliminaryIf 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](mailto:info.cdpc@pmd.gov.pk)

Published on 24<sup>th</sup> January 2024