



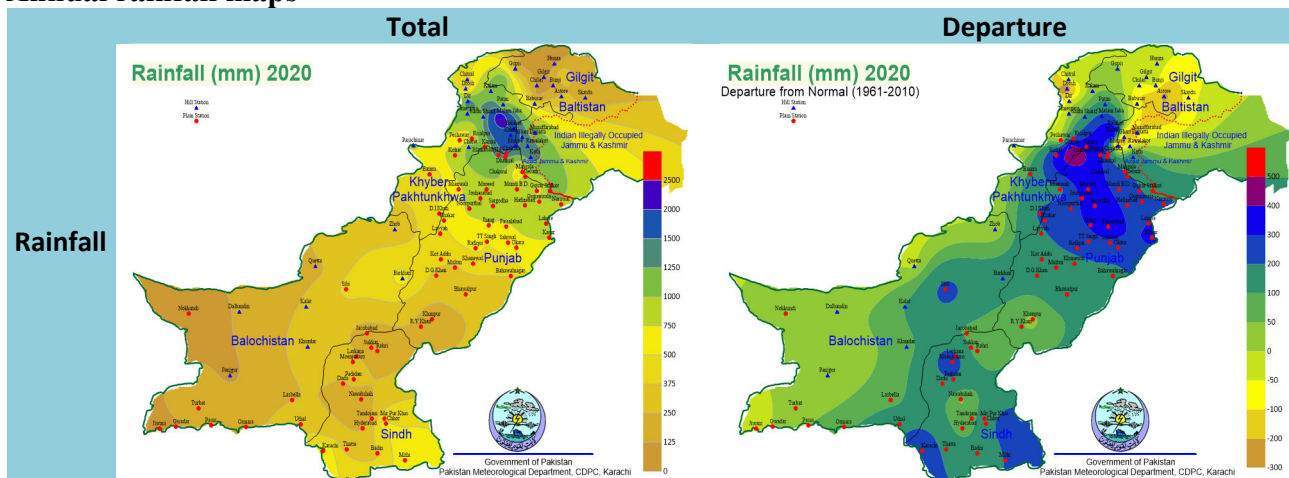
State of Pakistan's Climate in 2020

OVERVIEW

- The national total rainfall for the year 2020 was 38% above average with 2020 being the 4th wettest year since 1961.
- Rainfalls were in the ten highest of historical observations for Sindh (+105.5%), KP (+24%), Punjab (+43.8%) and Balochistan (+46.3%)
- The year commenced with heavy rainfall with January (+133 %) was 2nd wettest month in sixty years.
- Winter (JFM) of Punjab (166%) was the ever highest seasonal rainfall on record.
- Flooding affected much of country during August and September, particularly Sindh & Punjab.
- Sindh and Balochistan recorded August highest ever rainfall in last sixty years.
- In Karachi, the three sites; Faisal-Base (588.0 mm), Masroor (436.0 mm) & Airport (367.0 mm) recorded the wettest August in 48 years, 63 years & 89 years respectively.
- On 28th August Karachi-Faisal recorded 231.0 mm, the 24-hour (1-day) heaviest rainfall, and a new record.
- Pakistan's annual national mean temperature was 0.22 °C above average, the 9th warm year in decade.
- Indian Ocean Dipole event was mostly neutral throughout the year.
- La Niña was declared in September, reaching moderate strength by the end of the year.

RAINFALL

Annual rainfall maps



Pakistan annual rainfall in 2020 was very much above average over major area of country, although regions of Azad Jammu & Kashmir and Gilgit-Baltistan were near-to and below-than average respectively. The national total rainfall for the year 2020 was 38% above than the 1961–2010 average at 408.3 mm (the 1961–2010 average is 297.6 mm). This made 2020 the fourth wettest year since 1961, the earlier three were 1995 (+49.9%), 1994 (+46.2%) and 1997 (+41.3%). Rainfall for the year 2020 was in the ten highest of historical observations for most of provinces. The provinces of Sindh (+105.5%) and KP (+24 %) experienced record breaking rainfall and both seen the 5th wettest year since 1961. Punjab (+43.8%) and Balochistan (+46.3%) also recorded heavy rainfall and the year 2020 ranked as 7th and 10th wettest year respectively for them in last sixty years.

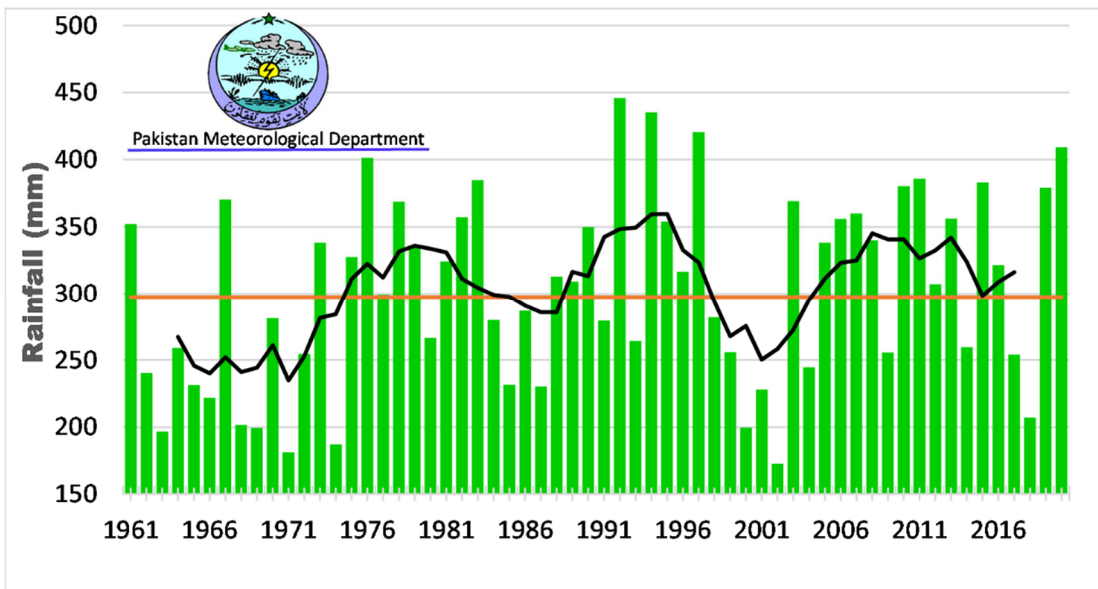


Figure 1. Pakistan annual rainfall for the period 1961-2020. The black line indicates the 7-year moving average. The value for 7-year average is positioned over the middle year of each 7-year block. The red straight line shows the national annual long-term average (1961-2010).

January 2020 was one of the wettest month on record with national rain recorded as 133 % above average, 2nd heaviest rain since 1961. It was rain almost over whole of the country, both Punjab and Balochistan observed the 2nd heaviest rainfall, while GB and Sindh were ranked 8th & 9th heaviest rain recipient respectively in past 60 years. In contrast to previous month, February 2020 was the driest month all over the country, as it recorded 51% below than normal value. The month of March again saw excessive rains over almost all parts of country, with 119% above normal. In this month, the rainfall was above normal in all provinces except GB where it was below normal. The national rainfall of whole winter season (JFM) 2020 was 66% above normal. On regional scale, the winter season rainfall was above normal over Balochistan, Punjab & KP, close to normal over AJK & Sindh and below normal over GB. The winter 2020 rainfall over the country ranked 4th highest seasonal rainfall since 1961, the other three were 2005 (111%), 1982 (74%) and 1992

(66%). It is pertinent to mention that winter 2020 rainfall over Punjab (166%) was the heaviest seasonal rainfall over province during last sixty years of period.

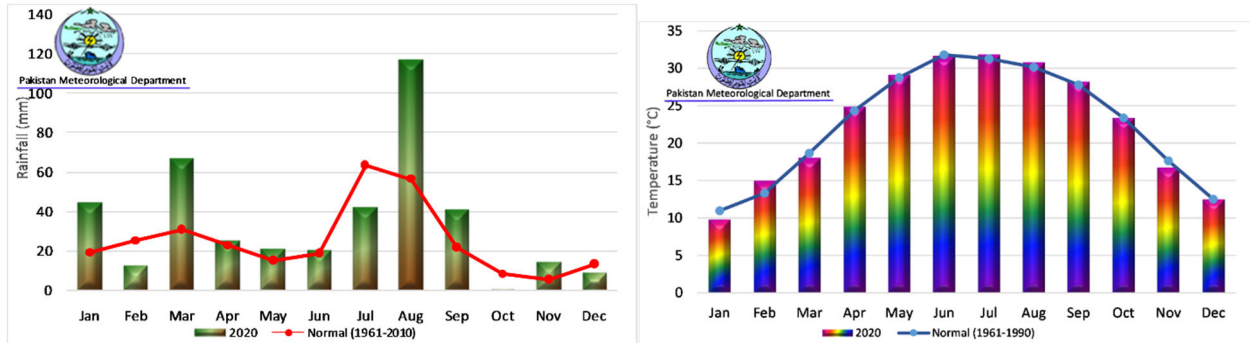


Figure 2. Monthly rainfall (left) & mean temperature (right) in 2020 compared with their corresponding average.

April rainfall over the country was close to average (+9%). April rainfall was below average over Sindh, GB & Balochistan and above average over Punjab & KP while it was near average over AJK. May was relatively wetter month with national rainfall being +40% in all provinces except GB & Sindh which received below average rain. In June 2020, the rainfall over the country was close to average (+7%) and was below average over AJK, Sindh, GB & Balochistan while above average over Punjab & KP. During the season (AMJ), the rainfall over the country was 16% above average.

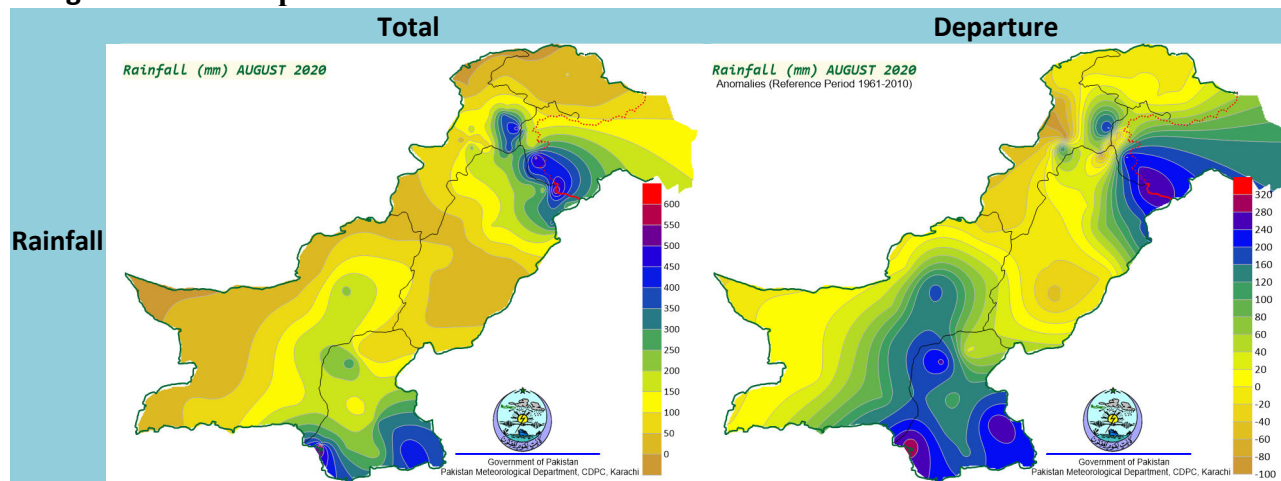
Record breaking heavy rainfall and flooding in August 2020

Pakistan received above-average rainfall with southern half (Sindh and Balochistan provinces) recording exceptionally above- average during August 2020. Two significant rain events occurred during August 2020, both bringing substantial rain to country, especially to southern & eastern parts of Sindh. A number of weather observing sites registered highest ever record of August daily and monthly rainfall totals as a result of these events.

In July 2020, Pakistan as whole, recorded 34% below normal rainfall. On regional scale, all provinces except GB recorded below average rainfall. National rainfall for the month of August was 108% above normal for Pakistan as a whole and ranked ever highest wettest month since 1961. The provinces of Sindh and Balochistan experienced exceptionally excessive rainfall of 363% & 271% more than average respectively with both recording August highest ever rainfall in last sixty years. These extreme rainfall affected many areas of Sindh & Balochistan provinces. August 2020 was noteworthy for the number of significant rain events. To elaborate this, in Sindh; 6 stations had their wettest August on record and three had their wettest August-day on record; in Balochistan

these figures were fourth and 2nd respectively. National rainfall for the month of September was 89% above normal for Pakistan as a whole and ranked ninth highest wettest month since 1961. All provinces except Balochistan (-96%) experienced excessive rainfall of 139% (Punjab), 120% (KP), 113% (GB), 87% (Sindh) & 24% (AJK). The September rainfall over KP, Punjab & GB are ranked as 3rd, 6th & 7th highest respectively, the heaviest monthly rainfall during last sixty years period. During the whole monsoon season (JAS) 2020, country recorded 41% above average rainfall. On regional scale; GB, Balochistan, Sindh & Punjab recorded above normal rainfall whereas KP & AJK recorded close to and below normal rainfall respectively. The monsoon 2020 rainfall of Pakistan can be grouped among ten heaviest monsoon rainfall since 1961. The seasonal 2020 rainfall over Sind province was exceptional, 148% above normal and ranked as third heaviest rainfall during last sixty years period, the other two were +276% (1994) and +222% (2011).

August rainfall maps



Record breaking rainfall in Karachi

The total rainfalls of August 2020 in Karachi city were particularly notable. It recorded 588.0 mm at Karachi-Faisal, 436.0 mm at Karachi-Masroor & 367.0 mm at Karachi-Airport, being wettest August in 48-, 63- & 89-years respectively of record. On 28th august, Karachi-Faisal site recorded 231.0 mm 24-hours rainfall, the heaviest one-day rainfall on record. This was also the highest 24-hours rainfall for any month among three Karachi sites. The previous August record in the city was 209.8 mm at Karachi-Masroor on 18th August 1978, and the previous record for any month was 211.3 mm also at Karachi-Masroor on 26th July, 1967. As a result of this unprecedented August rainfall, one of the history's worst urban flooding occurred at Metropolis of Karachi affecting millions of people and inflicting widespread infrastructure damages.

October 2020 was the driest month on record since 1961 equaling the previous record rain-deficient month in 2007. The national rainfall for the month was largely deficient, 97% below

normal in sharp contrasting to the previous month of September 2020 which was one of the rainiest month with 89% above average rain recorded. November 2020 National rainfall was again 168% above normal for Pakistan as a whole and ranked 7th highest wettest month since 1961. A number of weather observing sites registered highest ever record of November daily and monthly rainfall totals. Islamabad (92.8 mm) and Karma (98 mm) recorded ever highest monthly rainfall of November. The province of KP experienced exceptionally excessive rainfall of 285% more than average rainfall and thus November happened to be ever highest rainy month in last sixty years. The provinces of AJK (+182%), Punjab (+100%) and Balochistan (+135%) also recorded excessive rainfall of the month and ranked as 4th, 10th and 12th highest rainfall respectively since 1961. December 2020 National rainfall was 8.2 mm against its normal rain of 13.3 mm being 38% below normal. The national OND season 2020 rainfall was 15.9% below average. All the provinces except AJK and KP recorded below average seasonal rain while the latter one observed slightly above average.

Sea surface temperatures in the Indian Ocean were close to average during most of the period. Indian Ocean Dipole event was neutral throughout the year 2020 except for the month of June. The El Niño–Southern Oscillation was neutral during the first half of 2020 with La Niña established during September, and reached the moderate strength by the end of the year.

TEMPERATURE

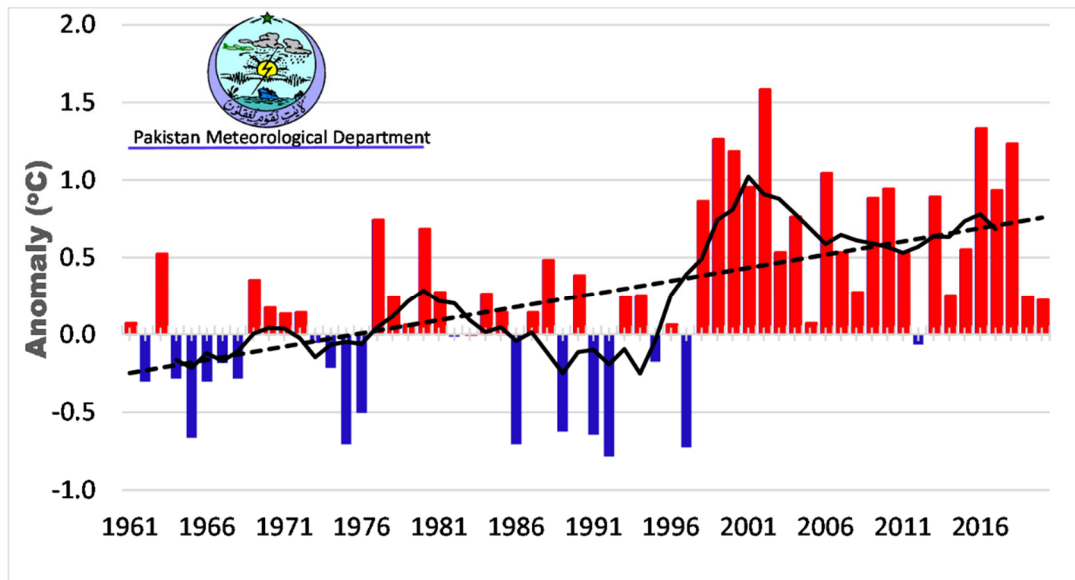
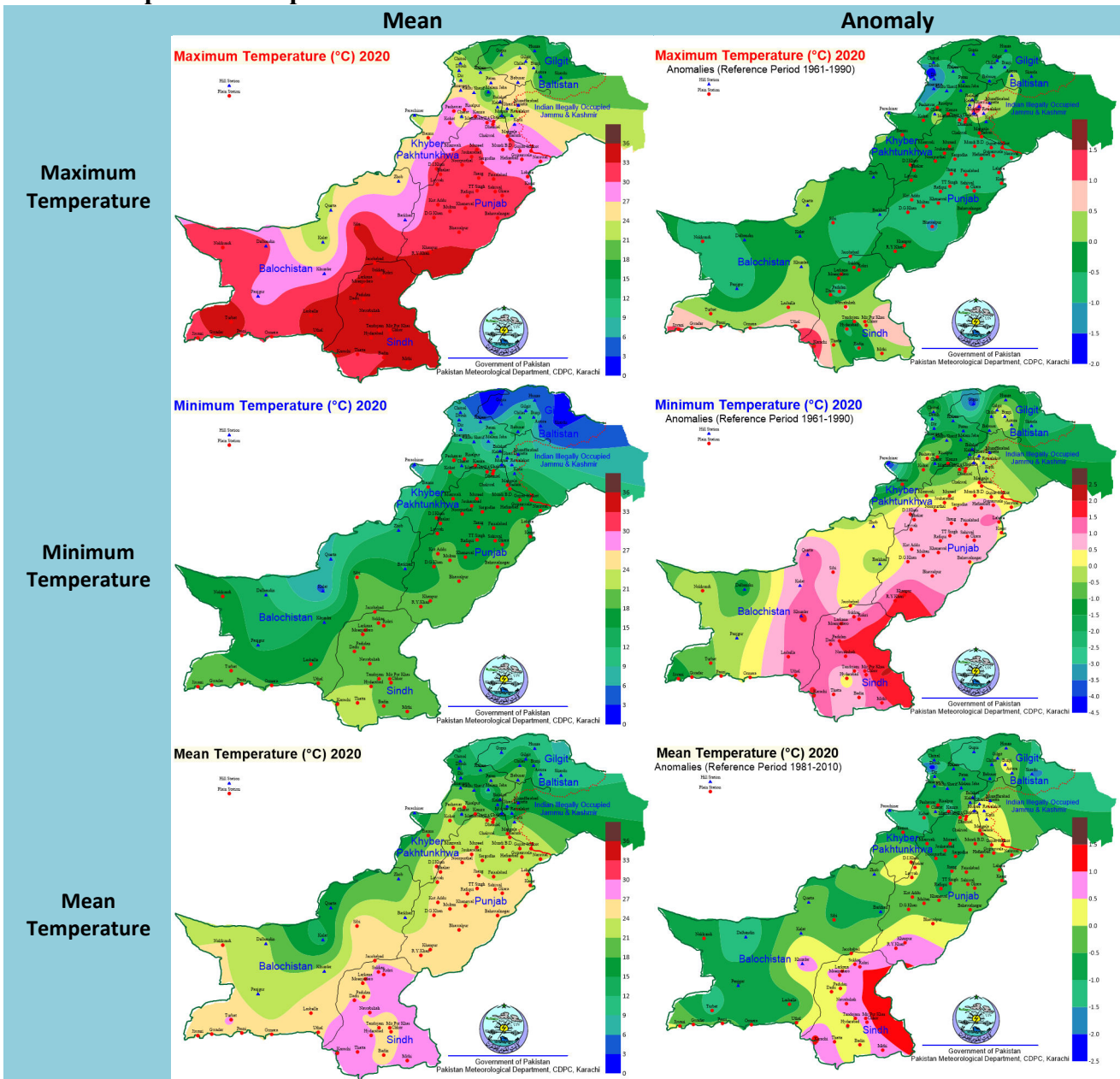


Figure 4. Pakistan annual mean temperature anomalies (with 1961-1990 the base period) for the period 1961-2020. The black line indicates the 7-year moving average. The value for 7-year average is positioned over the middle year of each 7-year block. The black dotted line shows the trend over the period.

Pakistan 2020 annual mean land surface air temperature was 22.67 °C, which is 0.22 °C above than the 1961–1990 average, making 2020 the ninth warm year in the decade. Anomaly in the mean temperature over most parts of the country was generally in the range of 0 to -1.0 C. However, major parts of Sindh were warmer by 1.0 °C. The anomalies of annual maximum temperature over the most parts of the country were close to average. The minimum (night temperature) temperatures’ anomalies were higher than average over major areas of Sindh, Punjab and eastern Balochistan with a range of -1.0 °C to -2.0 °C elsewhere.

Annual temperature maps



NOTABLE WEATHER EVENTS IN 2020

Record highest 24-hours rainfall (mm)

SN	Stations	New Records		Previous Record		Years of record
		Amount	Date	Amount	Date	
1	Karachi-Faisal	231.0	28 August 2020	164.0	07 August 1979	48

Record highest monthly total rainfall (mm)

SN	Stations	New Record	Normal	Previous Record	Years of record
1	Karachi-Faisal	588.0	68.0	298.4 in 1984	48
2	Karachi-Masroor	436.0	55.0	272 in 2007	63
3	Karachi-airport	367.0	60.9	262.5 in 1979	89

Weather records

SN	Variable	2020			ever record		
		value	location	date	value	location	date
1	Coldest day	-21.6 °C	Skardu	24 th January	-24.1 °C	Skardu	7 th January 1995
2	Hottest day	51.0 °C	Jacobabad	17 th June	54.0 °C	Turbat	28 th May 2017
3	Wettest day	231.0 mm	Karachi-Faisal	28 th August	591.9 mm	Islamabad	24 July 2001
4	Coldest month	-13.7 °C	Skardu	January	-18.2 °C	Skardu	January 1988
5	Hottest month	45.6 °C	Dadu & Moenjo Daro	June	48.4 °C	Sibbi	June 1988
6	Wettest month	588 mm	Karachi-Faisal	August	1038.6 mm	Islamabad	July 2001
7	Coldest station	2.1 °C	Kalam	---	1.6 °C	Astore	1957
8	Hottest station	35.8 °C	Nawabshah	---	37.4 °C	Nawabshah	2002
9	Wettest station	2456.0 mm	Malam Jabba	---	2488.3 mm	Balakot	1977
10	Driest station	64.7 mm	Gawadar	---	---	---	---

Annual area-weighted rainfall

Region	Rank (of 60)	Normal (mm)	Average (mm)	Departure (percent)	Comment
Pakistan	57	297.6	409.3	37.5	4 th highest (record 445.9 mm in 1992)
Azad Jammu & Kashmir	31	777.2	763.6	-1.8	----
Balochistan	51	160.1	234.2	46.3	10 th highest (record 341.0 mm in 1997)
Gilgit Baltistan	19	213.5	165.8	-22.3	-----
Khyber Pakhtunkhwa	56	736.0	912.7	24.0	5 th highest (record 1094.9 mm in 2015)
Punjab	54	386.8	556.3	43.8	7 th highest (record 642.4 mm in 2015)
Sindh	56	172.0	353.5	105.5	5 th highest (record 524.9 mm in 1994)

Seasonal area-weighted rainfall

Region	Pakistan	Azad Jammu & Kashmir	Balochistan	Gilgit-Baltistan	Khyber-Pakhtunkhwa	Punjab	Sindh
Jan-Mar							
Normal (mm)	74.3	218.3	57.5	68.3	212.2	66.8	12.7
Observed (mm)	123.0	233.3	97.5	49.8	292.2	177.6	13.5
Departure (%)	65.5	6.9	69.6	-27.1	37.7	165.8	6.2
Apr-Jun							
Normal (mm)	56.0	179.7	25.9	77.8	158.2	65.6	16.3
Observed (mm)	65.2	185.6	25.0	44.0	220.1	97.4	5.9
Departure (%)	16.4	3.3	-3.3	-43.4	39.1	48.5	-63.4
Jul-Sep							
Normal (mm)	140.9	294.2	58.3	41.6	290.6	231.9	133.7
Observed (mm)	198.9	248.5	101.7	56.9	306.4	264.0	332.0
Departure (%)	41.2	-15.6	74.3	36.8	5.4	13.8	148.3
Oct-Dec							
Normal (mm)	26.4	85.0	18.4	25.8	75.0	22.5	9.3
Observed (mm)	22.2	96.2	10.1	15.1	94.0	17.3	2.0
Departure (%)	-15.9	13.3	-45.2	-41.6	25.4	-23.0	-79.0

Normal period 1961-2010

Weather in picture



Karachi August flooding (left two pictures) and 21-22 January snow at village Minimart, Astore (right two pictures)

The State of Pakistan's Climate in 2020 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 contained above can be considered only preliminary. If you have any comments or suggestions, please contact us:

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