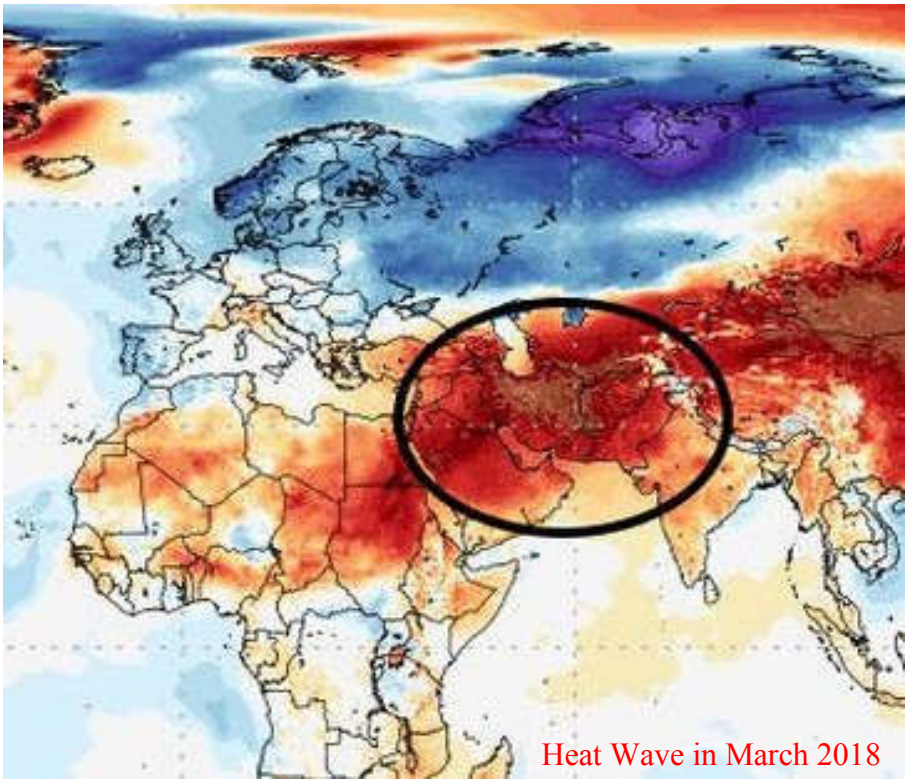
Pakistan Meteorological Department



2018

Climate of Pakistan

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Climate of Pakistan in 2018

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Climate of Pakistan in 2018

1. Introduction

Temperature and precipitation are two major elements which determine the climate of any region. Any persistent change in both or one with respect to the long term mean or normal values leads to the climate change of that region. Highlights of the analysis for the climate of Pakistan in 2018 are listed below.

2. Temperature

Average Monthly Temperatures of Pakistan for the year 2018 are compared with Average Monthly Normal Temperatures (1981-2010) in figure 1.

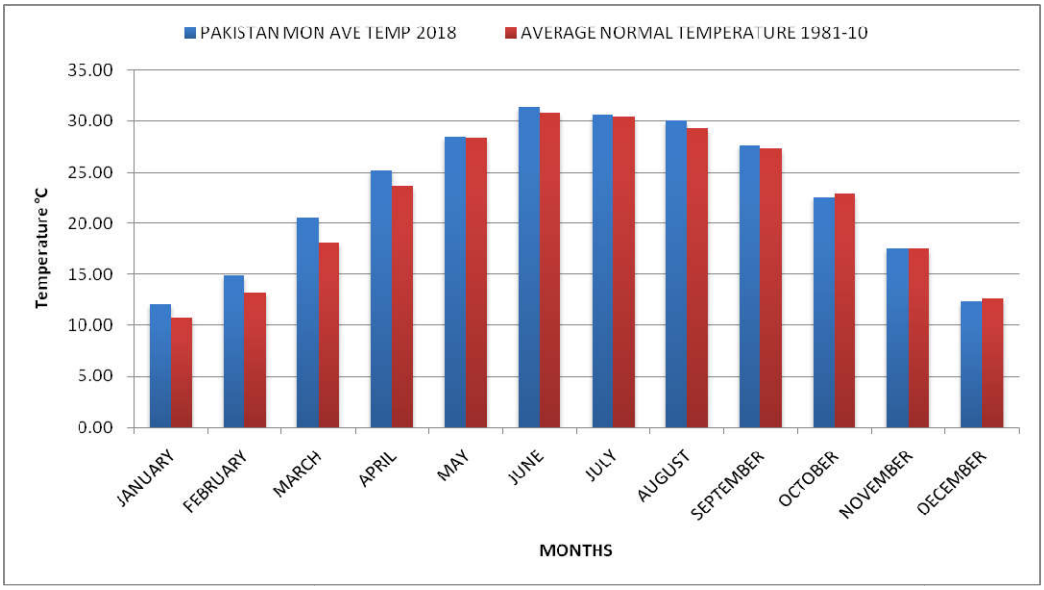


Figure 1: Departures of 2018 mean monthly temperatures from Normal (1981-2010)

Monthly mean temperatures of 2018 were above the 1981-2010's average normal temperatures in January, February, March and April. May, July and November temperatures were equal to normal while Jun and August were near to Normal. Whereas in October and December monthly mean temperatures remain slightly below normal (Fig. 1).

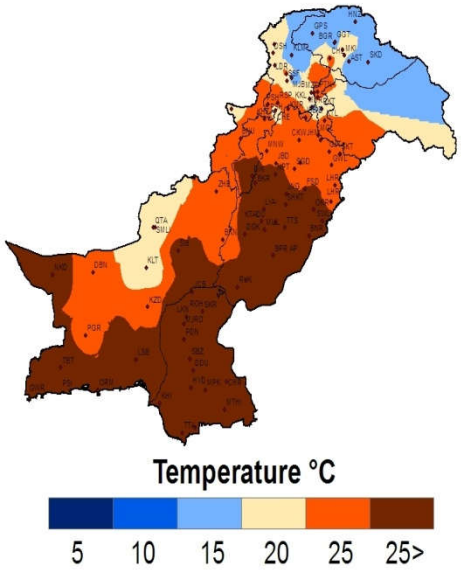


Figure 2: Spatial Distribution of Mean Annual Temperatures of Pakistan for 2018

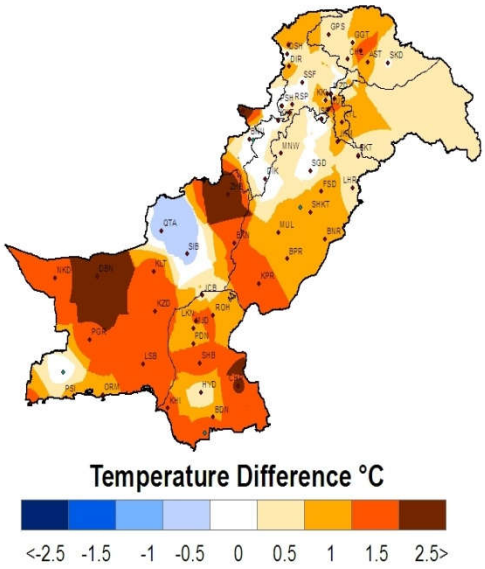


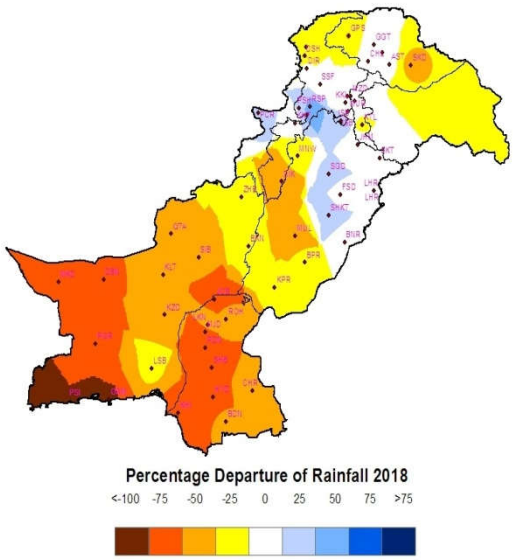
Figure 3: Mean Annual Temperatures (2018) Difference from Normal

Annual Mean Temperatures (actual) for 2018 remained on higher side in most of the country (Fig. 2). Whole Sindh remained above 25^0C, Punjab and major Portion of Baluchistan experienced temperatures ranging from 24^0C - 27^0C or even higher. Only parts of extreme Northern areas had temperatures ranging from 10^0C - 15^0C. Figure 3 above shows mean annual temperature departures from Normal 1981 - 2010. . The maximum difference of the mean annual temperature from the normal was experienced in Balochitan including Dalbandin and Zhob, whereas Chor in Sindh was also under that category.

3. Rainfall

In 2018, most districts of Pakistan suffered dryness due to well below normal rainfall. As shown in Figure 4. Western parts of KP, northern Punjab, parts of GB and AJK were near normal (1981-2010).

Major areas of Sind and most of Balochistan experienced mild to moderate drought like conditions during the year 2018.



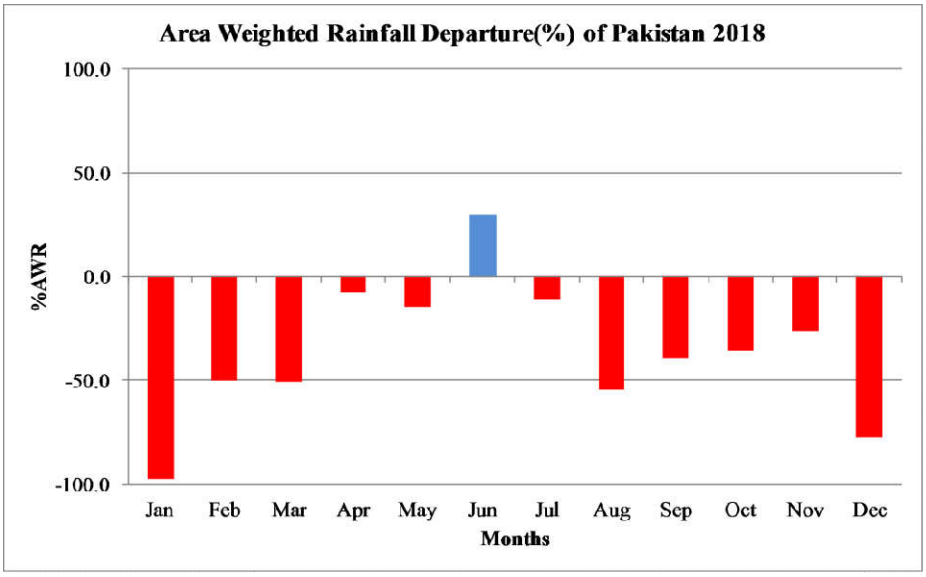


Figure 5: Percentage Departures from Normal of Rainfall 2018

In figure 5, percentage area weighted departure of monthly rainfall of 2018 from normal monthly rainfall of 1981-2010 is shown. The analysis shows that 2018 was very dry year in Pakistan. All the months except Jun has experienced below normal precipitation. Amongst these dry months, January was the driest month with 96% below normal rainfall. In the month of June rainfall was above normal (25%).

Major parts of Pakistan did not receive enough rainfall from the western disturbances, peculiar of winter season. The monsoon season was going dry from pre-monsoon, yet Jun received well above normal precipitation which provided some moisture relief to the soil. Again the dry spell continued from July till December leading to drought like situation especially in southern half of the country.

The country's annual average analysis shows below normal rainfall (-35.28%) during 2018. the provinces of Balochistan, Sindh and GB & AJK experienced -3.43%, -70.89% and -26.29% below normal respectively, whereas Punjab received 258.46% and KP received 287.58% above normal rains. As evident from figure 5 major rains were received in Monsoon period especially in the month of Jun 2018.

Spatial distribution of total annual rain fall over Pakistan for 2018 depicts extreme rainfall over monsoon region including parts of north western Punjab, AJK and Eastern KP which exceeded 1000mm (Fig.6). It is obvious from fig. 5 that it happened in the month of Jun. Lower half of Pakistan received very little rainfall ranging from 50 to 400 mm whereas Balochistan and Sindh remained almost dry. This indicates meteorological drought in most of the area.

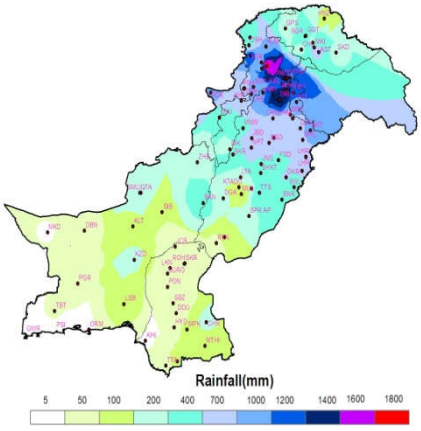


Figure 6: Spatial Distribution of Annual Total Rainfall over Pakistan for 2018

4. Extreme Events

Highest Maximum and lowest Minimum Temperatures of Province-wise cities of Pakistan during 2018 are shown in Figure 7(a-e).

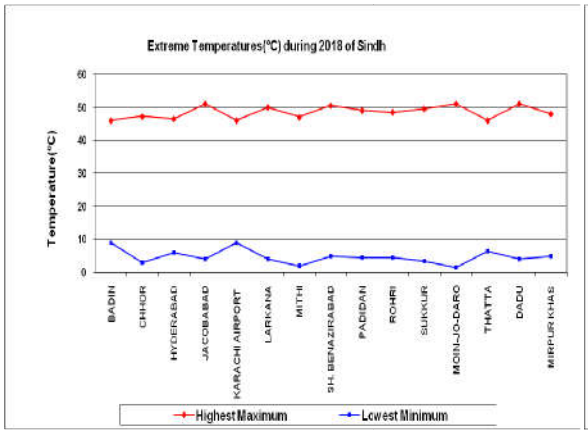


Figure 7 (a): Extreme Temperatures of Sindh

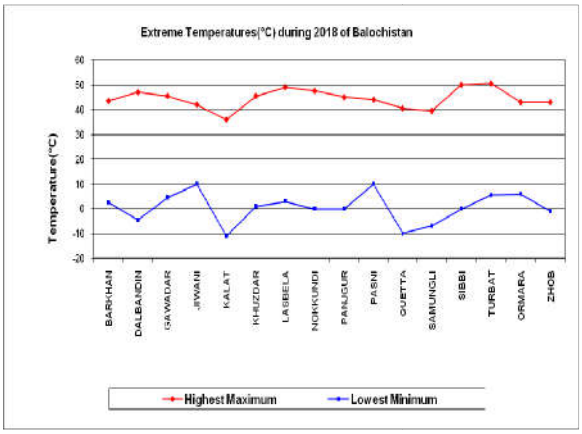


Figure 7(b): Extreme Temperatures of Balochistan

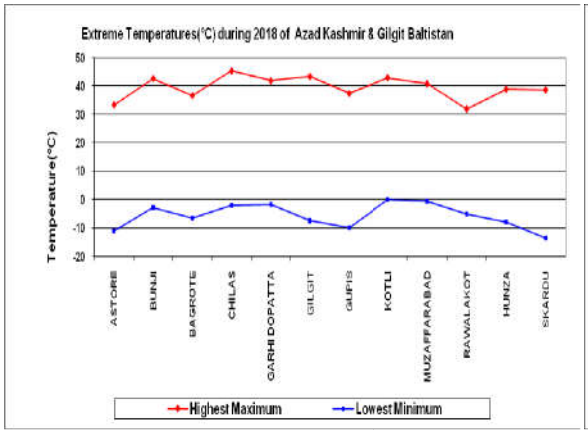


Figure 7 (c): Extreme Temperatures of AK & GB

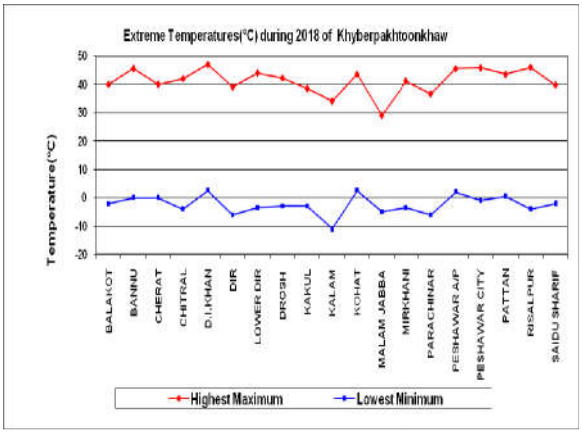


Figure 7 (d): Extreme Temperatures of KP

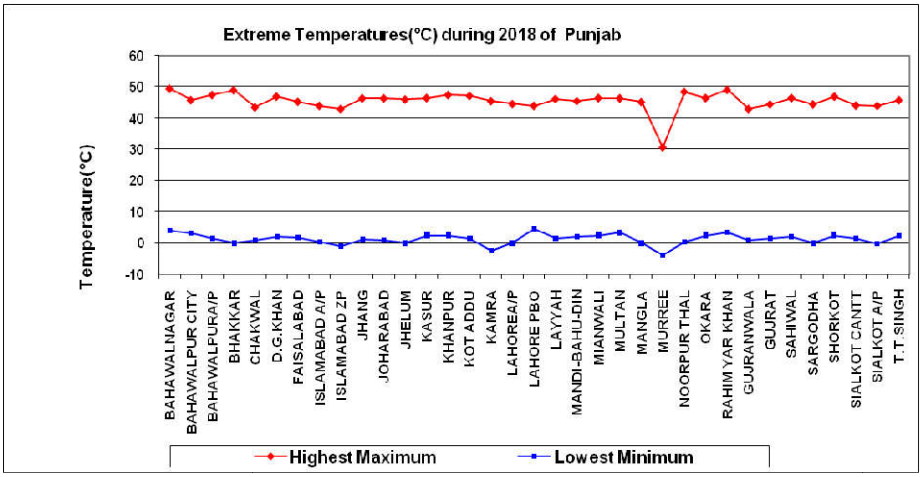


Figure 7 (e): Extreme Temperatures of Punjab

Highest daily Rainfall in 2018 for different cities of Pakistan Province-wise is given in Figure 8(a-e).

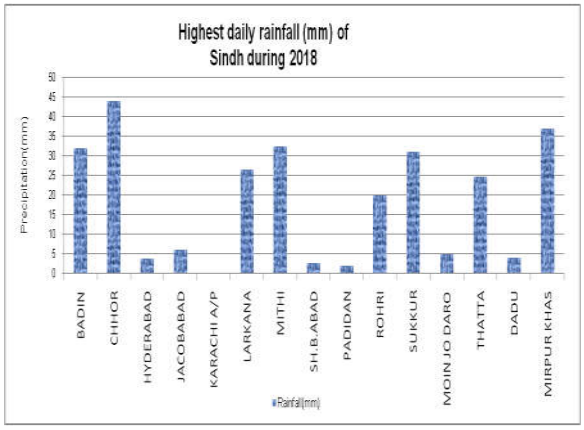


Figure 8 (a): Highest daily Rainfall of Sindh

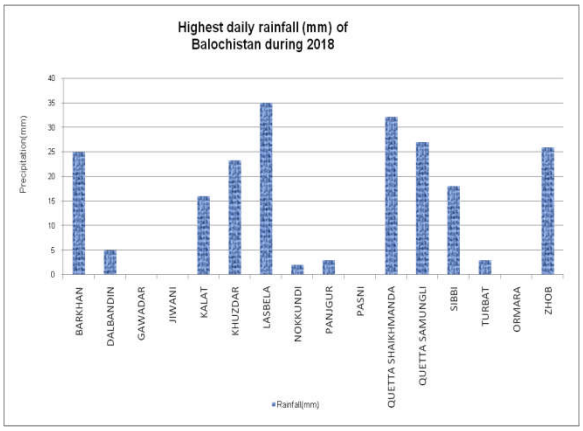


Figure 8 (b): Highest daily Rainfall of Balochistan

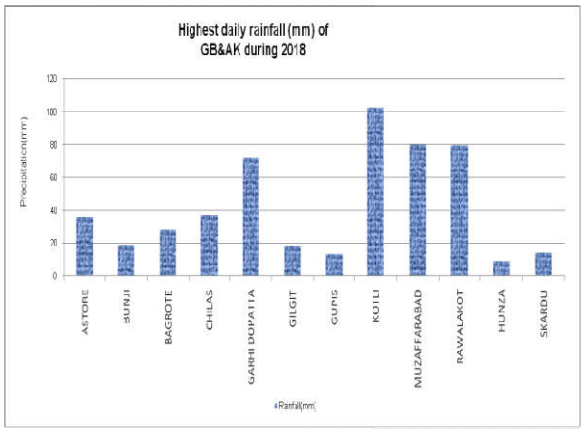


Figure 8 (c): Highest daily Rainfall of AK & GB

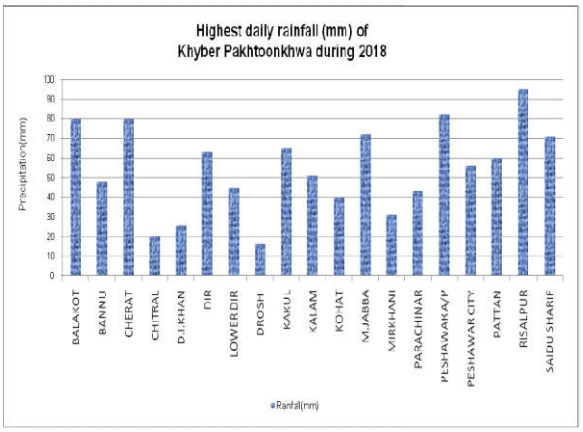


Figure 8 (d): Highest daily Rainfall of KPK

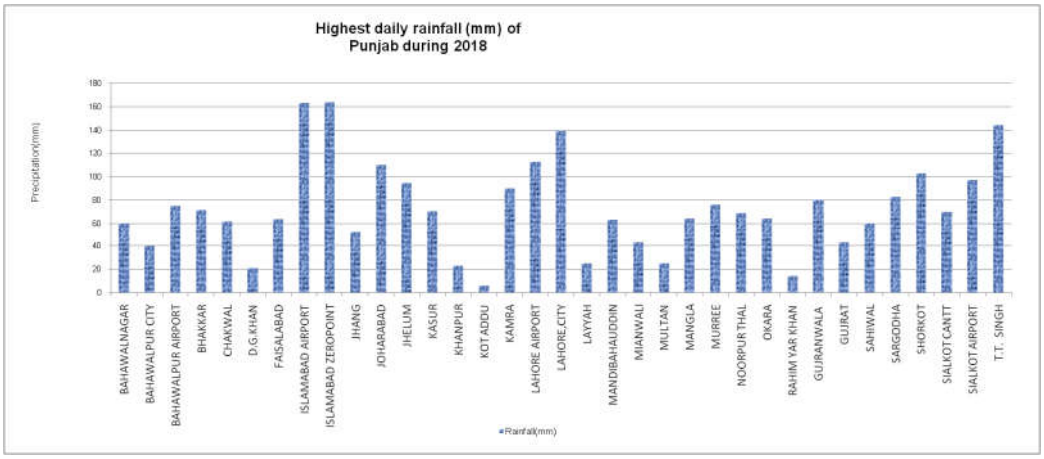


Figure 8 (e): Highest daily Rainfall of Punjab

5. Other extreme Events of 2018

(a) Heat Wave in Pakistan March and April, 2018

The definition of heat wave recommended by the World Meteorological Organization is when the daily temperature of more than five consecutive days exceeds the average maximum temperature by 5°C (9° F). Average maximum or Normal maximum temperature for Pakistan has been taken for the period from 1981 to 2010. An analysis of extreme temperatures during 1965-2009 shows that major parts of the country have been experiencing a warming trend. The frequency of extreme maximum temperature events are increasing significantly in Northern Areas, Southern Punjab, Sindh and Balochistan.

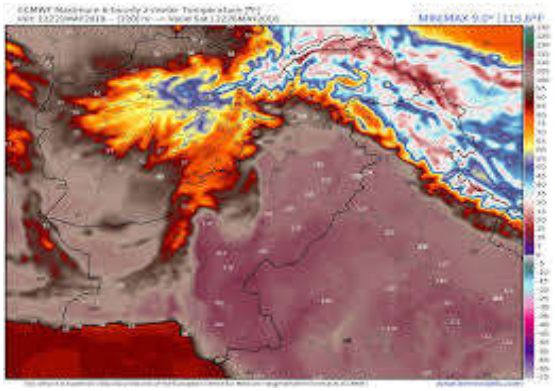
Two major heat waves thump the country in March and April 2018. In March the heat wave period was from 25th March to 31st March and almost all of the stations were under its grip. A few stations suffered even longer period of the heat wave from 23th to 31st March, these include Jehlum, Garhi Dopatta, Gupis, Skardu, Balakot, Cherat, Chitral, Drosh and Padidan. In April the most of the country experienced heat wave again during 24th to 30th. The stations include from Punjab (Bahawalnagar, Bahawalpur, Faisalabad, Islamabad, Jehlum, Khanpur, Kamra, Lahore, Mianwali, Multan, Murree, Sargodha and Shorkot), Gilgit Baltistan and AJK (Chilas, Garhi Dopaata, Gilgit, Gupis Kotli and Muzaffarabad), Khyber Pakhtunkhwa (Balakot, Bannu, Cherat, Chitral, D.I.Khan,, Dir, Drosh, Kakul, Kohat, Parachinar, Peshawar, Risalpur and Saidu Sharif), Sindh (Jacobabad, Larkana, Padidan, Rohri, Shaheed Benazirabad, Sukkur and Moin-Jo-Daro), and Baluchistan included (Panjgur, Sibbi, Turbat and Zhob).

A few stations even suffered from the heat waves in the months of May, June and August. Jehlum and Sialkot experienced the heat wave from 25th to 31st May, Garhi Dopatta and Lasbella had it from 27th to 31st May, Karachi seen it from 19th to 23rd May and in Pasni from 18th to 23rd May. In June Bahawalpur had heat wave from 1st to 5th of the month; temperature reached 49.5 ºC. Bunji and Gilgit suffered from 3rd to 8th June and Khuzdar had it from 4th to 8th June. Bunji still suffered from 3rd to 7th August, temperatures rose up to 43 ºC against a normal of 34.7 ºC.

Heat Wave Alert	Another Heat wave spell is likely to prevail over Karachi and surrounding areas from Tuesday 29-05-218 to Thursday 31-05-2018. Maximum temperature is expected to remain in the range of 41-45°C during the period. Sea breeze is likely to remain cut-off and wind from Northwest to North is expected to prevail during this period.

Karachi — 3 – Days Forecast — 28th May, 2018

Weather Elements	Day 1 (28th May)	Day 2 (29th May)	Day 3 (30th May)
Weather	Hot	Hot/Very Hot	Hot/Very Hot
Maximum Temperature (°C)	38 – 40 °C	43 – 45 °C	42 – 44 °C
Minimum Temperature (°C)	28.5 °C	30 – 32 °C	29 – 31 °C
Humidity Morning (%)	50 – 60 %	20 – 30 %	20 –30 %
Humidity Evening (%)	40 – 50 %	05 – 15 %	10 – 20 %
Wind Direction	Westerly/ Southwesterly	North/ Northwesterly	North/ Northwesterly



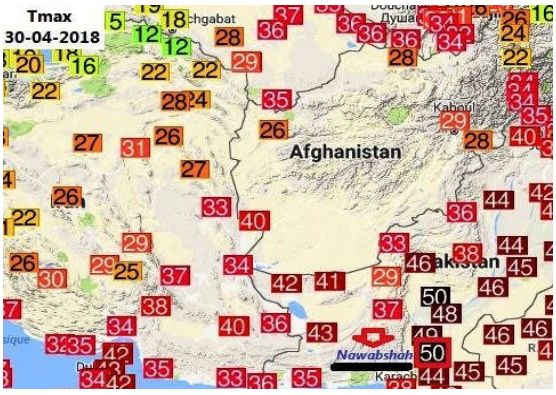


Figure 11: Glimpses of hot summer in Pakistan during 2018

(b) Flash Flood / Flood in 2018

Although the country received well below normal (-35.28 %) rainfall this year, yet Punjab and Khyber Pakhtoonkha received high above normal (256.48 % and 287.58 % respectively) rainfall. As evident from figure 5 major rains were received during monsoon period especially in the month of Jun 2018.These extreme rainfalls / torrential rain events during monsoon caused flash flood / flooding situations in some urban regions and land slide in mountainous areas.

During June 2018, amount of rainfall was well above normal in Sindh (223.4 %) and Punjab (28.1%). Punjab again received 35.9% above normal rains in the month of July. Balochistan recieved67.1% and 50% above normal rainfall during May and September respectively. Although Khyber Pakhtunkhwa had seen below normal rainfall throughout the year yet certain northern areas suffered flooding due to overflow of some streams. Dir experienced 82.7 mm and 160 mm rains in the moths of June and July which were 26.3% and 5.5 % above normal respectively, which caused flood like situation at some places of Dir district.

Figure 12: Scenes of flash flood/flooding in Pakistan during 2018

(c) Maximum Temperature in Sindh, April 2018

The Sindh province has observed the highest temperature ever recorded on Earth in the month of April.

Maximum temperature reached 50.2 degrees Celsius in Shaheed Benazirabad on April 30. This left dozens suffering from heat strokes and leading business activities to a halt in the city.

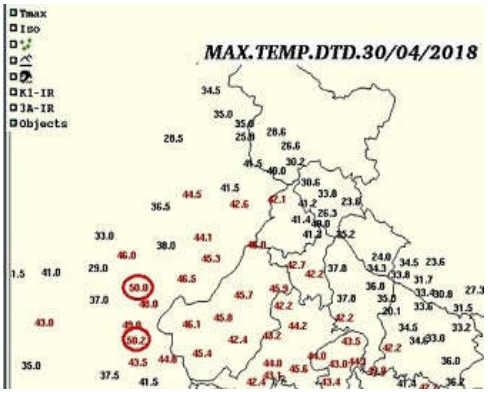


Figure 13: Shaheed Benazirabad 50.2 ºC

(d) Urban / Flash Flood in Lahore, July 2018

Lahore district of Punjab received 60.5% and 151% above normal rainfall in the months of June and July respectively. More over flash flooding was reported at different places of Lahore ranging from 323 mm to 559 mm in 24 hours during July 2018. This created flood like situation which caused heavy damage to buildings and roads. Alongside death toll of 6 persons was reported by District Administration.

Figure 14: Mall Road, Lahore

(e) Stream Flooding at Lower Dir, July 2018

Lower Dir, a district of Khyber Pakhtunkhwa received 82.5 mm and 160 mm rains in June and July which were 26.3% and 5.5% above normal respectively.

On July 23rd there was 47 mm downpour in 24 hours and some parts of lower Dir experienced flood like situation. There was a major damage to roads due to a flooding stream in Uch Kharkai area which took up at least three human lives as reported by news agencies.

Figure 15: Flooded stream, Dir

6. Drought Monitor

National Drought Monitoring Centre of PMD monitors drought events on fortnightly basis; according to which in 2018 there were normal to slightly wet conditions in most parts of Punjab, Khyber Pakhtunkhwa ,Gilgit Baltistan & Azad Jammu and Kashmir whereas Balochistan and most regions of Sindh experienced moderate to severe drought. In this regard, three drought alerts have been issued by National drought monitroing centre (NDMC) of PMD i.e 6th June, 6th Septmeber and 7th December, 2018.

Below normal rainfall was recorded over most of the southern parts of the country as predicted by PMD. Major rainfall deficit was experienced over the provinces of Sindh (-71.9%), Khyber Pakhtunkhwa (-46.9%) and Balochistan (-44.2%) during June to November, 2018. The area weighted rainfall departure (%) detail is as under table-1;

Table-1 Area weighted rainfall departure (%) of Pakistan

	Jun	Jul	Aug	Sep	Oct	Nov	Jul-Sep	Oct-Nov	Jun-Nov
Sindh	223.4	-85.0	-90.5	-97.6	-99.9	-100.0	**-89.3**	**-100.0**	**-71.9**
Balochistan	-20.1	-39.3	-74.2	44.9	-97.8	-82.5	**-49.5**	**-91.3**	**-44.2**
KP	-51.8	-17.0	-61.6	-42.6	4.4	-53.2	-46.0	-48.3	-46.9
GB/Kashmir	-19.2	8.1	-30.8	-36.3	44.7	344.9	-26.7	-40.3	0.3
Punjab	28.1	35.9	-33.8	-26.7	-8.9	-53.7	-5.2	60.6	-0.8
Pakistan	17.7	-8.7	-54.0	-34.8	1.9	-27.3	-33.9	-37.9	-26.4

The provinces of Sindh and Balochistan faced moderate to severe droughts based on the satellite and observation data analysis. The list of 19 districts of Sindh and 11 districts of Balochistan experienced moderate to severe droughts are shown in table-2 and table-3. Figure 16 below shows the drought conditions of whole Pakistan for 2018.

Table-2 Drought affected districts of Balochistan province, Pakistan

Drought affected districts of Sindh province					
S.No.	**Districts Name**	**S.No.**	**Districts Name**	**S.No.**	**Districts Name**
1	Badin	8	Larkana	15	Sanghar
2	Dadu	9	Mityari	16	Shaheed Benzairabad
3	Hyderabad	10	Mohenjodaro	17	Tharparkar
4	Jacobabad	11	Padidan	18	Thatta
5	Jamshoro	12	Qambar Shadadkot	19	Umerkot
6	Karachi	13	Rohri		
7	Khairpur	14	Sajwal		

Table-3 Drought affected districts of Balochistan province, Pakistan

Drought affected districts of Balochistan province					
S.No.	**Districts Name**	**S.No.**	**Districts Name**	**S.No.**	**Districts Name**
1	Awaran	5	Kech	9	Panjgur
2	Bolan	6	Kharan	10	Quetta
3	Chagi	7	Noushki	11	Washuk
4	Gawadar	8	Mastung		

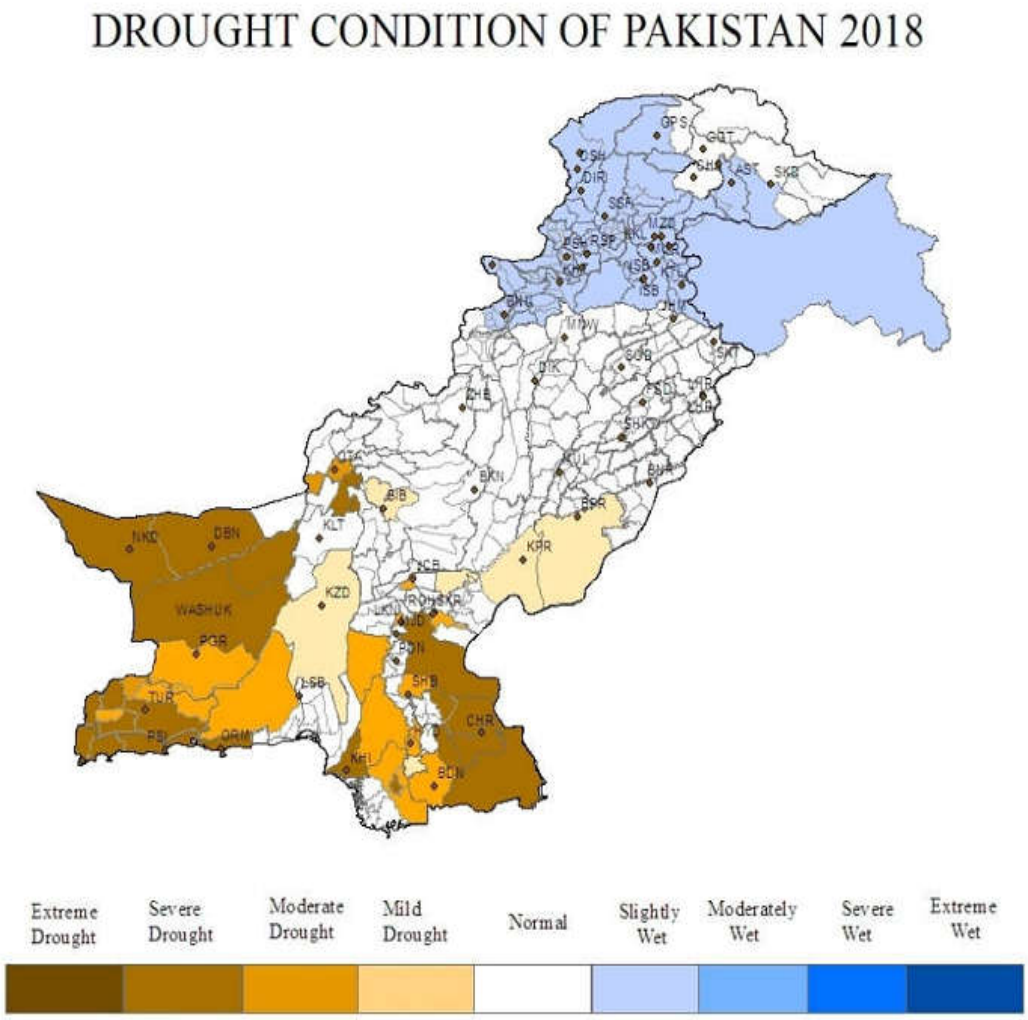


Figure 16: Drought analysis for Pakistan for the year 2018