

Annual State of the Climate of South Africa 2020

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Executive Summary

Surface Temperature

South Africa experienced a year that was somewhat colder than the previous years. The annual mean temperature anomalies for 2020, based on the data of 26 climate stations, was on average about 0.5°C above the reference period (1981-2010). A warming trend of 0.16 °C per decade is indicated for the country since 1951, statistically significant at the 5% level.

Precipitation

The most significant feature of the rainfall during 2020 was the abatement of dry conditions in the west of South Africa. However, a significant region is still dry, particularly in the southern parts of the Northern Cape and the west of the Eastern Cape Provinces. The remainder of the country received close to normal rainfall and no significant area of South Africa received substantially more than the normal amount of rainfall except for the southern parts of the North-West Province.

Noteworthy climate and weather events

In South Africa, dry conditions persisted over large parts of the west of the country. In some parts the dry conditions have continued now for approximately seven years, but it should be noted that some regions received good rains in the beginning of the 2020/21 summer rainfall season.

The year started off in January with these dry conditions persisting in most parts of the western interior, with warmer than usual conditions in the central parts. The Northern Cape was declared a disaster area after drought that crippled the province for the past couple of years. R200 million was set aside to help address the crisis. KwaZulu-Natal Province was also hit hard by a shorter-term drought, accompanied by very high temperatures that affected 256 towns and surrounding communities. The identified hotspot areas include Uthukela, Umzinyathi, Amajuba, Zululand, Uthungulu and Umgungundlovu districts. Good rains were received in the southern and north-eastern parts of the country, with some storms causing extensive damage to infrastructure.

By February, above normal rainfall conditions spread to the central and south-eastern interior but late-summer rainfall ended abruptly during the month with drier conditions experienced in March. Again heavy storms were reported with extensive damage, especially in the Gauteng and Eastern Cape Provinces. However, April saw very good rains over the eastern half of South Africa, with some places receiving more than twice the normal amounts. Localised flooding was reported in several places.

The winter season (July to August) was characterised by colder than normal conditions over most of South Africa and well above-normal rainfall over most of the south-western Cape.

The early summer, starting already in October, experienced well above-normal rainfall in the North-West Province extending south-eastwards over the central and eastern interior into southern KwaZulu-Natal. This was accompanied by heavy storms with extensive damage and some loss of life and damage to hundreds of residential dwellings.

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Severe weather events — 2020

February: Heavy rain that started in Gauteng caused flooding in parts of the province especially Johannesburg, West Rand and Tshwane on the 7th. Over 220 people were relocated to the Kliptown community hall after they lost their shacks. Two fatalities were reported in Johannesburg and a woman from the West Rand was reported to have drowned but her body was not found. Road flooding was reported in parts of Ekurhuleni but no fatalities and damages were reported. Several residents in Itireleng informal settlement near Laudium in Tshwane were woken up by floods that were in ankle deep as they mopped water off the floor. Several houses were flooded in Lotus Gardens and Atteridgeville area. Firefighters and local towing services assisted motorists to safety from 12 vehicles that were trapped in water at a bridge in WF Nkomo Street in Pretoria West.

November: Large hailstones affected Seshego and neighbouring Luthuli Park in Polokwane on the 25th, leaving houses damaged, car windows smashed, caused car accidents, brought down trees, damaging power lines and knocking out electricity in some areas. The storm lasted for about 4 hours.

March: The province was hit by extreme weather that brought two severe events on the 17th. Massive hailstones and a tornado were observed around Richmond area but fortunately no damages were reported.

January: Large parts of Mangaung Metro were washed away when a severe thunderstorm and cloud burst hit the area on the 10th. Affected areas include Khayelitsha, Bergman Square, Caleb Mtsabi, and Dinaweng where residents had to be evacuated to temporary shelters. This also led to several stores and roads being flooded in the city.

January: A heavy storm that hit Empumelelweni in Emalahleni on the 13th uprooted a tree that fell on a shack where a 13 year old girl was sleeping. The girl was certified dead when the emergency services arrived. Her mother was also injured.

March: The province was hit by extreme weather that brought two severe events on the 17th. Massive hailstones and a tornado were observed around Richmond area but fortunately no damages were reported.

November: Pietermaritzburg and some areas in the KwaZulu-Natal Midlands were hit by hailstorm and heavy rains on the 18th. Hailstones were the size of golf balls and bigger damaging roof tiles, vehicles and windows. The heavy rain caused flooding at several homes. 18 houses were damaged by the storm with four in Ncwadi, another four in Ashdown, five in Kwa-Pata, three in Jika Joe and two at Caluza. Msunduzi Hospice reported that a number of its vehicles were damaged in the storm impacting on their ability to visit patients. Several insurance companies and Glasfit were inundated by phone calls from motorists regarding the replacement of windscreens and rear vehicle lights. Two people were seriously injured after a tree collapsed onto a passing taxi on Trafford Road in Westmead in KwaZulu-Natal. Public roads in Reservoir Hills and Pinetown were also flooded.

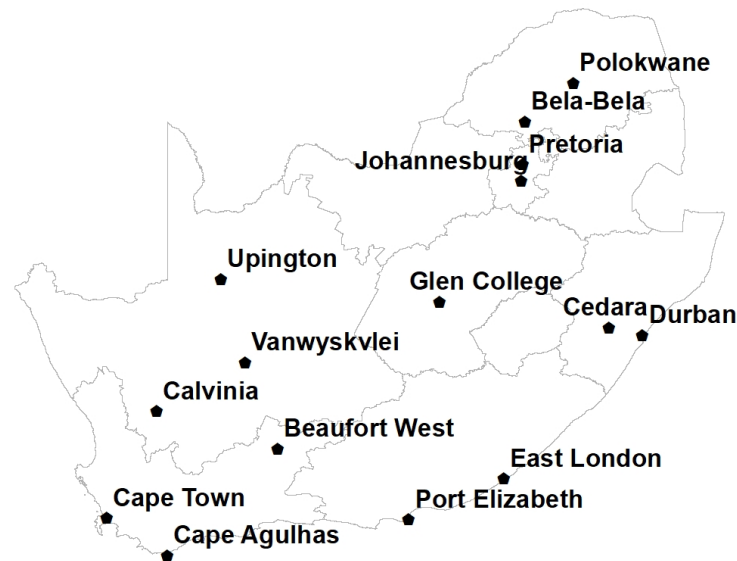
January: The Black South-Easter wreaked havoc across the city of Cape Town and surrounding areas on the 18th when roofs were blown off, trees uprooted, delivery scooters stopped and people scurrying away from the flying debris. Several roofs were damaged by the strong winds in several areas. Shack dwellers in the Vygieskraal informal settlement tried to stay indoors after witnessing objects being flung around dangerously by the winds. No death or injuries were reported. Several events that were scheduled to take place were cancelled due to the safety of people. The wind also affected the repair of underwater cables that failed and left parts of the continent with slow internet.

November: A severe weather phenomenon that was described as a tornado moved through several villages in the province on the 17th. High winds destroyed everything in its path. Thousands of villagers were displaced and hundreds of homes were destroyed. Of the three fatalities, one was a child. Dozens of people were taken to hospital. The tornado ripped off roof sheets, damaged infrastructure and a car

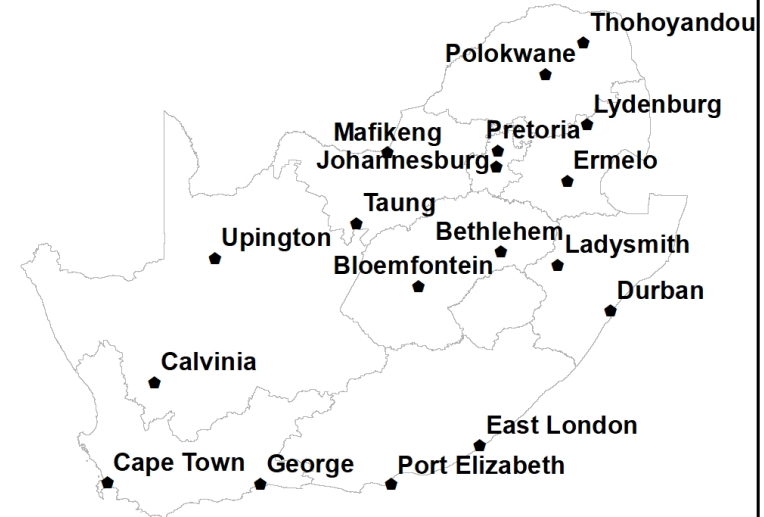
Long-term climate statistics

In this section the long term climate statistics are provided for a set of selected weather stations across South Africa, with locations presented in the maps below.

Stations used in Temperature Table



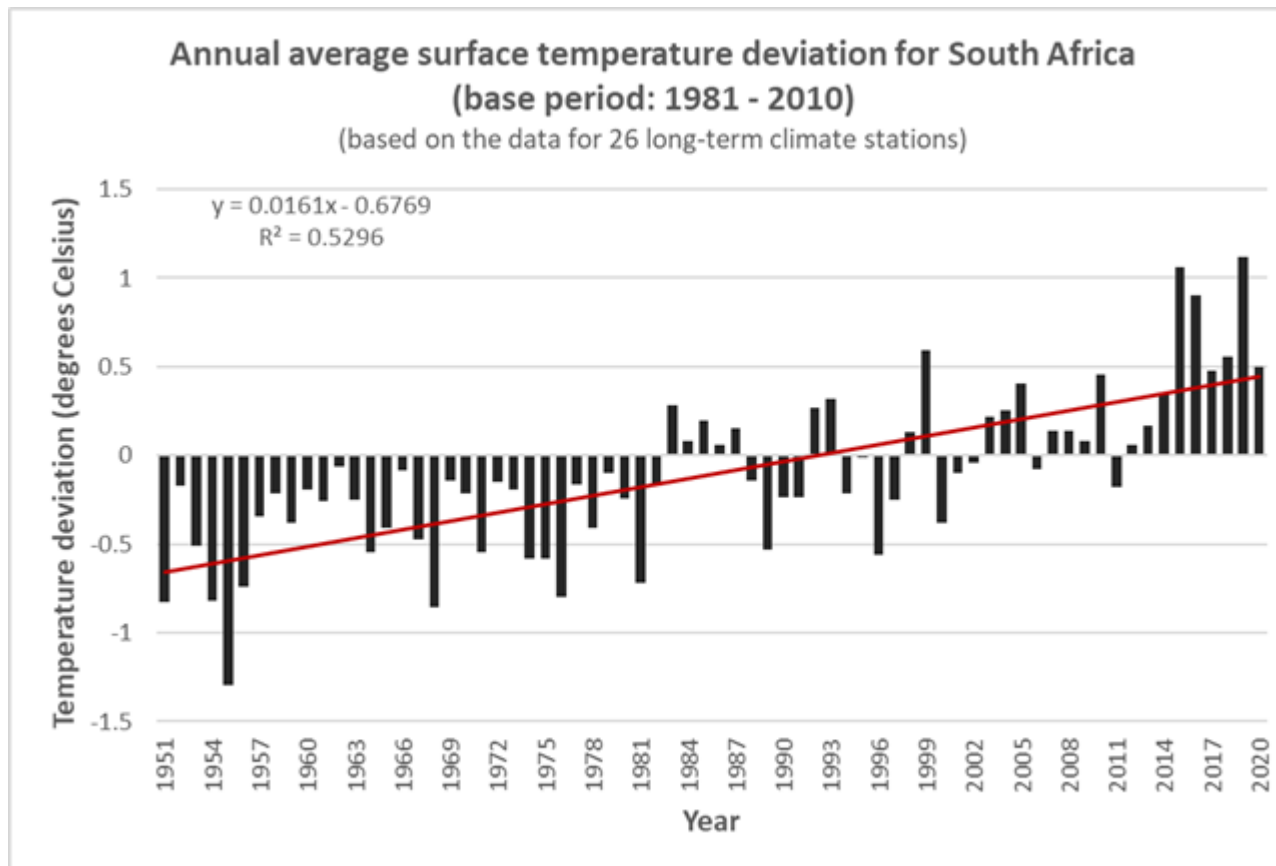
Stations used in Rainfall Table



Climate overview

Average Surface Temperature

Mean annual temperature anomalies were calculated from 26 spatially well-distributed and representative climate stations. The annual average temperature for 2020 for South Africa was in the region of 0,5°C higher than the 1981—2010 average. The long-term trend is estimated to be around 1,6°C per decade, higher than the average global trend.



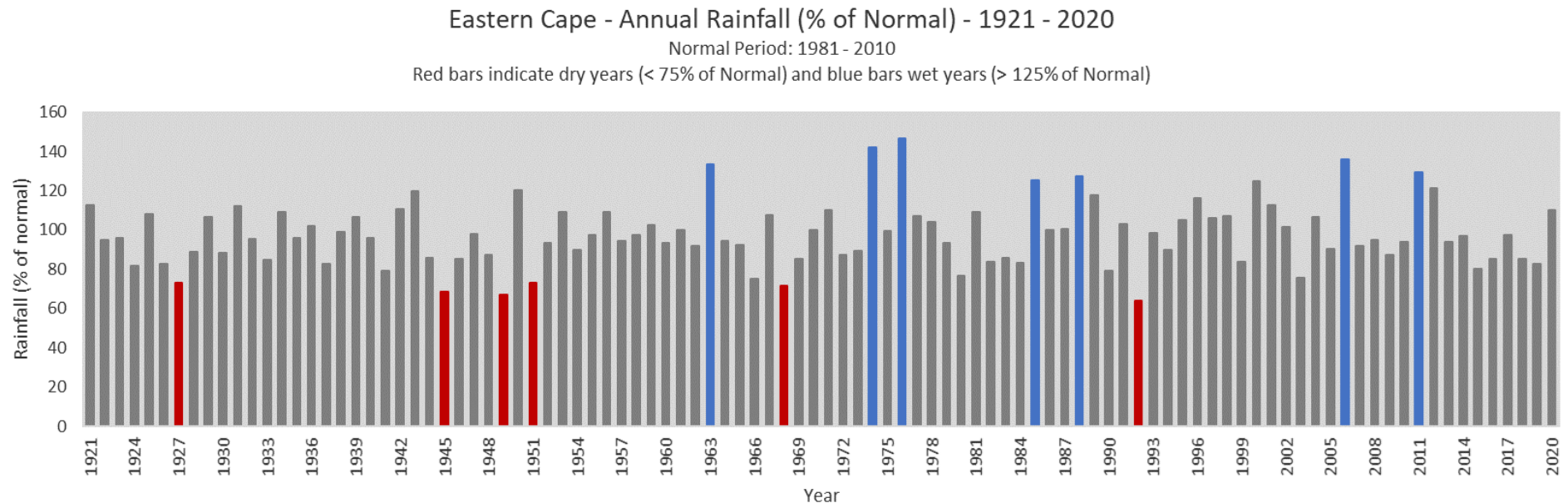
Maximum Temperature (°C) overview for some long-term climate stations for 2020									
Station	Average -2020	Normal (1981- 2010)	Rank (Highest since 1951)	Highest Annual Average (since 1951)	Lowest An- nual Avera- ge (since 1951)	Highest Daily - 2020 (Date)	Highest Daily (since 1951)	Lowest Daily - 2020 (Date)	Lowest Daily (since 1951)
Limpopo Province									
Bela Bela	29.2	28.5	11	30.1 (2019)	27.3 (1976)	40.0 (2020-01-06)	43.7	15.8 (2020-04-28)	8.1
Polokwane	25	25.2	42	26.6 (2019)	23.9 (1955)	35.6 (2020-11-08)	38.4	13.9 (2020-06-12)	8.4
Gauteng									
OR Tambo (Jhb)	22.4	22.3	37	24.2 (2015)	20.8 (2000)	32.6 (2020-10-18)	36.2	7.8 (2020-06-16)	2.5
UP Exp Farm (Pta)	25.8	25.6	10	27.6 (2015)	24.3 (1971)	36.1 (2020-11-80)	40.1	13.7 2020-06-12)	6.8
Free State									
Glen College (Bfn)	27.1	26	7	28.8 (2015)	24.2 (1955)	39.1 (2020-10-25)	42.9	11.6 (2020-08-18)	3.9
KwaZulu-Natal									
Cedara	23.7	22.9	7	24.3 (2015)	21.6 (1968)	36.7 (2020-11-08)	40.1	9.4 (2020-09-27)	5.2
Mt Edgecombe (Dn)	27.4	25.6	2	27.6 (2018)	23.5 (1951)	38.0 (2020-09-25)	42.4	16.8 (2020-08-30)	11.9
Northern Cape									
Calvinia	25.5	24.6	5	26.0 (2019)	23.0 (1955)	41.2 (2020-01-15)	41.9	5.8 (2020-06-11)	2.2
Upington	29.6	29.2	18	30.9 (2019)	26.9 (1955)	41.9 (2020-01-16)	45.3	12.8 (2020-06-12)	6.9
Vanwyksvlei	28.4	27.4	6	29.4 (2019)	25.7 (1955)	43.6 (2020-01-16)	43.9	10.3 (2020-06-11)	7
Western Cape									
Beaufort West	26.2	24.7	4	27.0 (2019)	23.1 (1976)	44.5 (2020-01-16)	44.5	10.2 (2020-08-29)	4.8
Cape Town	22.4	22.2	21	23.4 (1999)	20.9 (1954)	36.8 (2020-02-25)	42.3	11.4 (2020-08-31)	9.4
Cape Agulhas	20.6	20.3	9	20.9 (2019)	19.1 (1955)	28.6 (2020-07-24)	35.6	13.2 (2020-08-29)	10
Eastern Cape									
East London	24	23.5	4	24.3 (1999)	22.7 (1971)	37.2 (2020-02-05)	43.3	13.6 (2020-08-05)	9.4
Port Elizabeth	23.1	22.5	8	23.4 (2019)	21.4 (1955)	40.2 (2020-02-16)	40.7	11.5 (2020-08-18)	9.5

Minimum Temperature (°C) overview for some long-term climate stations for 2020									
Station	Average -2020	Normal (1981-2010)	Rank (Highest since 1951)	Highest Annual Average (since 1951)	Lowest Annual Average (since 1951)	Highest Daily - 2020 (Date)	Highest Daily (since 1951)	Lowest Daily - 2020 (Date)	Lowest Daily (since 1951)
Limpopo Province									
Bela Bela	10.5	12.3	66	14.3 (2015)	10.3 (1953)	22.0 (2020-01-08)	27.4	-4.2 (2020-07-15)	-7.4
Polokwane	12.3	10.4	3	12.9 (2019)	9.4 (1955)	21.3 (2020-12-12)	23.8	-1.7 (2020-07-17)	-3.8
Gauteng									
OR Tambo (Jhb)	10.6	9.6	11	11.6 (2019)	8.3 (1955)	19.6 (2020-10-18)	23	-5.3 (2020-07-15)	-9.7
UP Exp Farm (Pta)	11.8	10.3	5	12.4 (2019)	8.0 (1951)	21.4 (2020-02-18)	25.7	-1.6 (2020-07-16)	-6.4
Free State									
Glen College (Bfn)	7	7.8	61	9.0 (2016)	6.2 (1955)	19.1 (2020-10-29)	24	-9.4 (2020-08-19)	-11
KwaZulu-Natal									
Cedara	9.7	9.1	6	10.8 (2016)	7.7 (1951)	18.8 (2020-12-21)	21.6	-3.8 (2020-06-14)	-7.1
Mt Edgecombe (Dn)	16.4	14.7	3	16.7 (2019)	12.8 (1951)	24.3 (2020-02-15)	24.3	6.6 (2020-07-18)	1.9
Northern Cape									
Calvinia	8.8	8.4	7	9.7 (1999)	7.4 (2003)	23 (2020-12-21)	28	-2.8 (2020-08-30)	-9
Upington	12.8	12.9	23	14.2 (1999)	10.4 (1955)	27.5 (2020-01-17)	29.6	-2.8 (2020-09-15)	-7.9
Vanwyksvlei	10.7	10.1	8	11.7 (1999)	8.7 (1968)	27.5 (2020-01-17)	27.7	-5.0 (2020-06-13)	-9
Western Cape									
Beaufort West	11.8	10.1	2	12.1 (2019)	8.5 (1956)	25.9 (2020-03-04)	25.9	-2.1 (2020-07-15)	-8.8
Cape Town	11.9	11.7	22	12.6 (2014)	10.0 (1951)	20.2 (2020-01-15)	22.4	1.8 (2020-07-27)	-1.9
Cape Agulhas	14.8	14.5	10	15.3 (2004)	13.1 (1955)	21.7 (2020-02-02)	22.6	6.5 (2020-08-30)	0.8
Eastern Cape									
East London	14.4	14.6	48	15.5 (1952)	14.0 (2013)	22.4 (2020-01-14)	26.5	4.8 (2020-07-17)	2.4
Port Elizabeth	13	12.6	15	13.5 (1999)	10.1 (1955)	22.1 (2020-01-16)	23.4	1.6 (2020-07-17)	-2.3

Rainfall (mm) overview for some long-term climate stations for 2020								
Station	Total 2020	Normal (1981-2010)	Highest Annual Total (since 1981)	Lowest Annual Total (since 1981)	Highest Daily Total 2019	Highest Daily Total (since 1981)	Number of days with rain >= 1mm -2020	Average number of days per year with rain >= 1mm (1981-2010)
Limpopo Province								
Thohoyandou	818	765	1654 (2000)	331 (1983)	83	199 (2000-02-23)	60	58
Polokwane	435	491	950 (1996)	256 (2002)	58	110 (2018-02-19)	32	45
Gauteng								
Pretoria (Irene)	717	692	977 (2014)	340 (2003)	50	122 (2018-03-22)	47	67
Johannesburg	688	750	1089 (2000)	443 (1984)	51	110 (1985-10-30)	66	71
North-West								
Mafikeng	546	544	874 (1997)	293 (2015)	51	128 (1995-11-18)	46	52
Taung	612	438	1008 (1988)	73 (2009)	64	160 (1988-02-20)	53	44
Mpumalanga								
Ermelo	523	719	974 (2000)	454 (2001)	29	108 (2017-01-17)	68	68
Lydenburg	493	445	1067 (1987)	84 (2005)	44	81 (2012-12-25)	47	44
Free State								
Bethlehem	790	562	974 (2000)	465 (2015)	40	116 (1992-11-08)	79	73
Bloemfontein	701	569	1064 (1988)	260 (1992)	66	142 (1988-02-21)	67	58
KwaZulu-Natal								
Ladysmith	718	749	1111 (1987)	300 (1993)	50	141 (1987-09-29)	67	68
Durban	1078	1021	1422 (1996)	471 (1992)	68	265 (1996-01-12)	107	87
Northern Cape								
Upington	221	189	364 (1991)	53 (1986)	41	85 (1996-02-29)	24	24
Calvinia	135	209	379 (1995)	68 (2019)	23	59 (2010-10-15)	22	34
Western Cape								
Cape Town	382	542	707 (1996)	323 (2010)	34	94 (1993-04-11)	54	68
George	608	716	1220 (1981)	374 (2009)	69	230 (2006-08-01)	83	80
Eastern Cape								
Port Elizabeth	597	581	1033 (2012)	395 (2019)	44	224 (1981-03-25)	81	71
East London	709	855	1318 (1985)	550 (1981)	62	313 (2002-08-15)	83	79

Provincial Rainfall

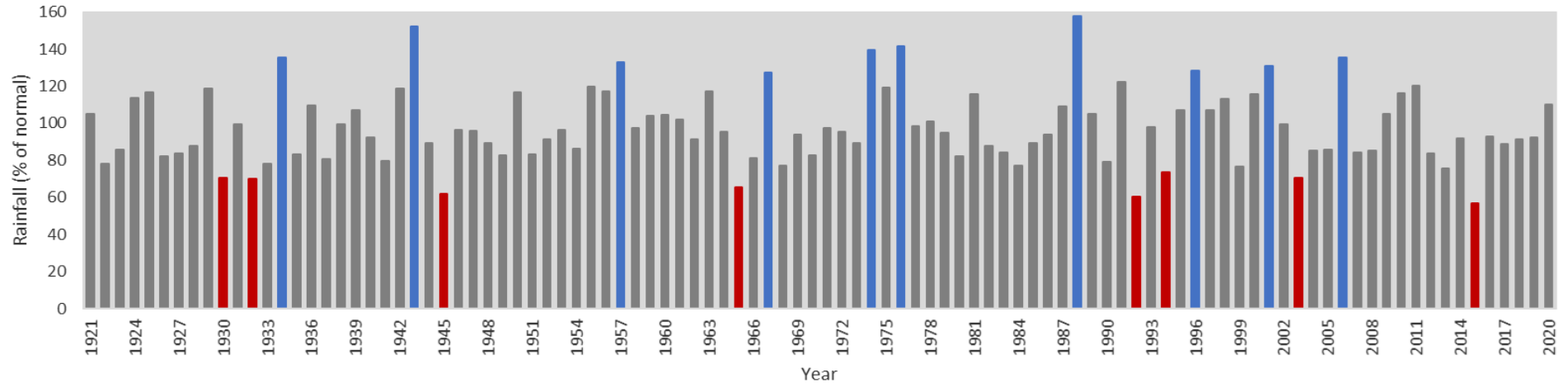
The provincial rainfall statistics are based on the average rainfall of the homogeneous rainfall districts, developed by SAWS, that mostly falls within a particular province. This approach ensures a more even weighting of rainfall stations in the spatial rainfall estimations. South Africa received near-normal rainfall across all the provinces, with a significant improvement in the Northern Cape which has been recording below-normal rainfall in recent years.



Free State - Annual Rainfall (% of Normal) - 1921 - 2020

Normal Period: 1981 - 2010

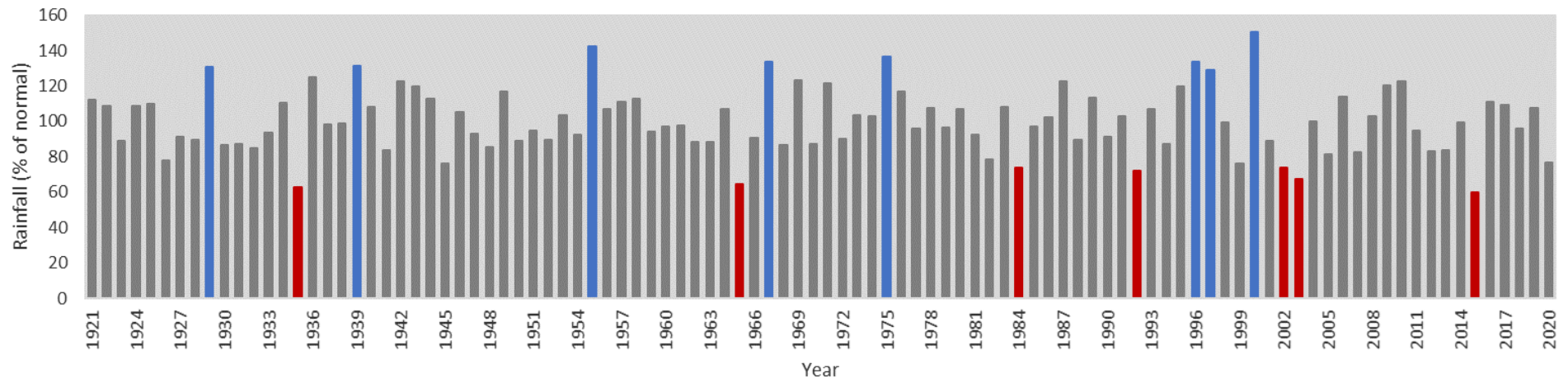
Red bars indicate dry years (< 75% of Normal) and blue bars wet years (> 125% of Normal)



Gauteng - Annual Rainfall (% of Normal) - 1921 - 2020

Normal Period: 1981 - 2010

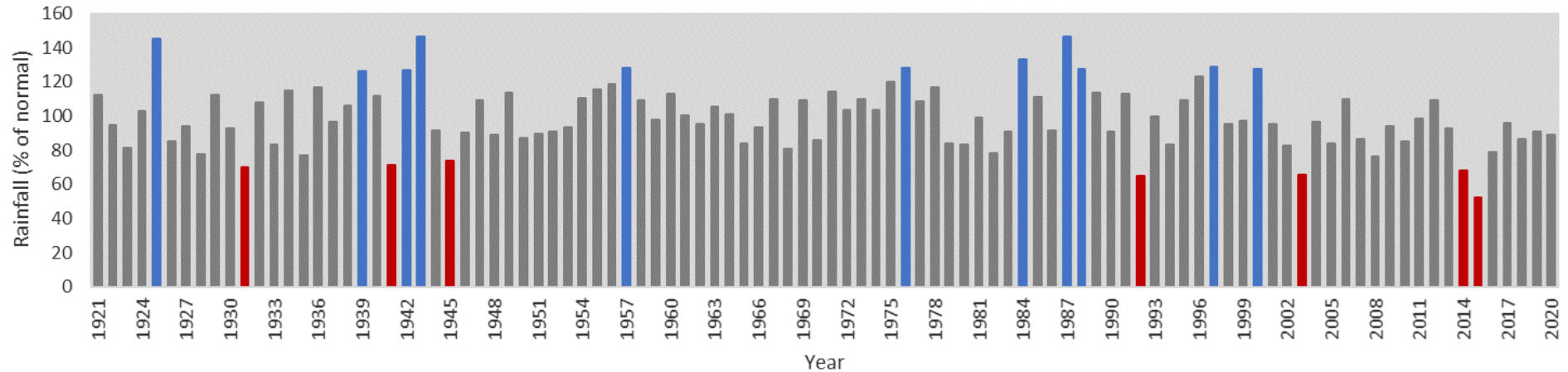
Red bars indicate dry years (< 75% of Normal) and blue bars wet years (> 125% of Normal)



KwaZulu-Natal - Annual Rainfall (% of Normal) - 1921 - 2020

Normal Period: 1981 - 2010

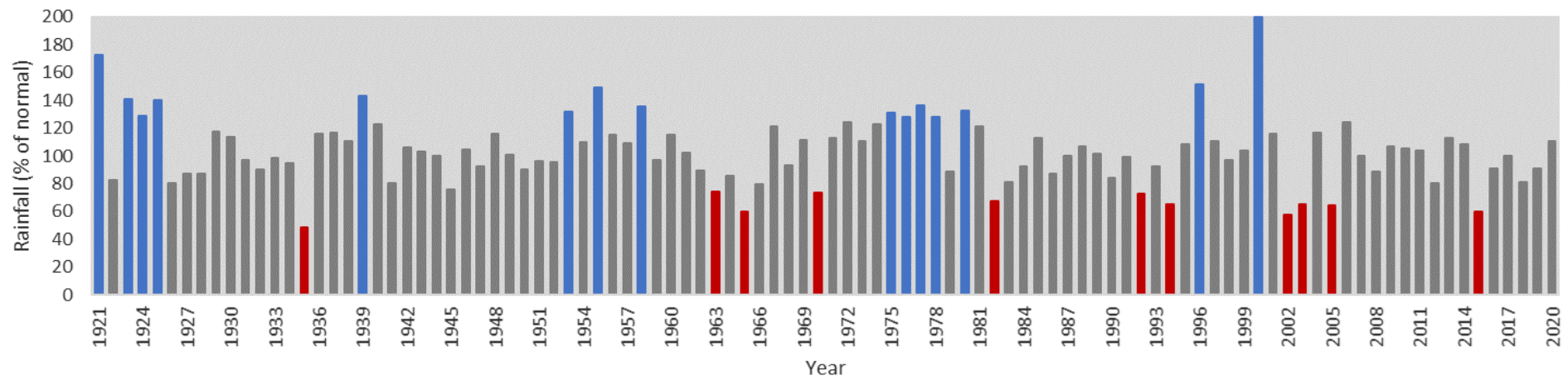
Red bars indicate dry years (< 75% of Normal) and blue bars wet years (> 125% of Normal)



Limpopo - Annual Rainfall (% of Normal) - 1921 - 2020

Normal Period: 1981 - 2010

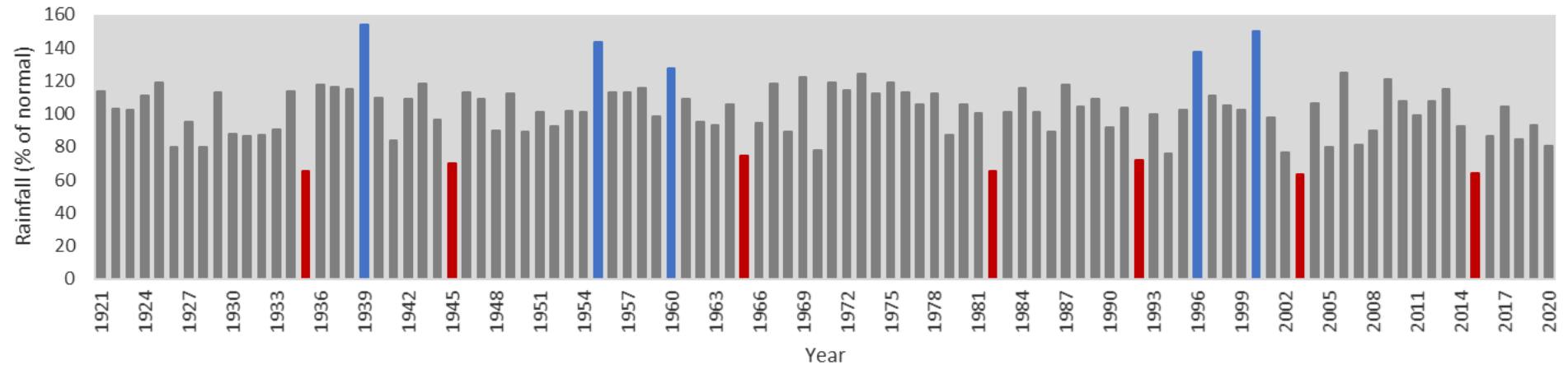
Red bars indicate dry years (< 75% of Normal) and blue bars wet years (> 125% of Normal)



Mpumalanga - Annual Rainfall (% of Normal) - 1921 - 2020

Normal Period: 1981 - 2010

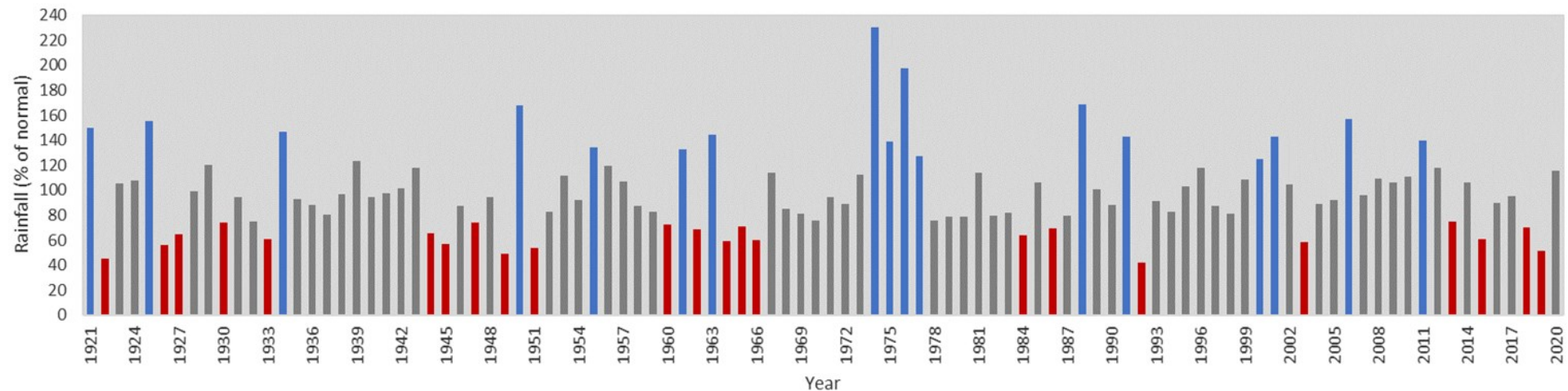
Red bars indicate dry years (< 75% of Normal) and blue bars wet years (> 125% of Normal)



Northern Cape - Annual Rainfall (% of Normal) - 1921 - 2020

Normal Period: 1981 - 2010

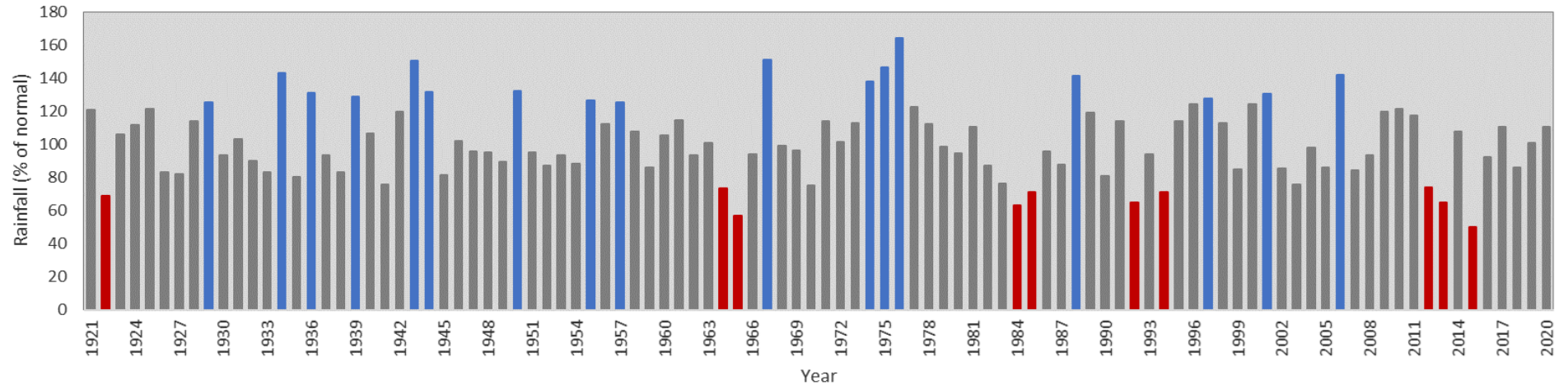
Red bars indicate dry years (< 75% of Normal) and blue bars wet years (> 125% of Normal)



North-West - Annual Rainfall (% of Normal) - 1921 - 2020

Normal Period: 1981 - 2010

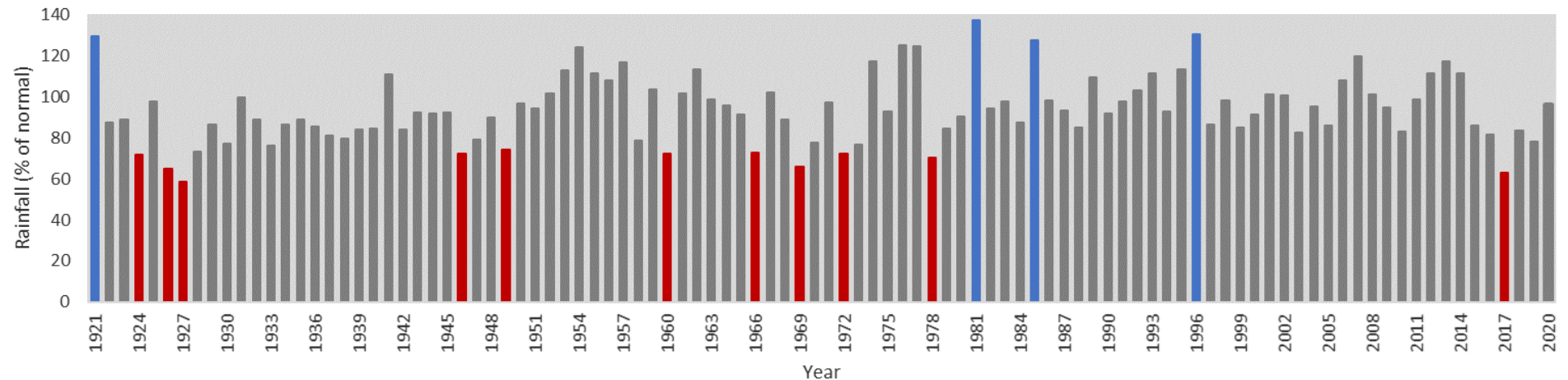
Red bars indicate dry years (< 75% of Normal) and blue bars wet years (> 125% of Normal)



Western Cape - Annual Rainfall (% of Normal) - 1921 - 2020

Normal Period: 1981 - 2010

Red bars indicate dry years (< 75% of Normal) and blue bars wet years (> 125% of Normal)

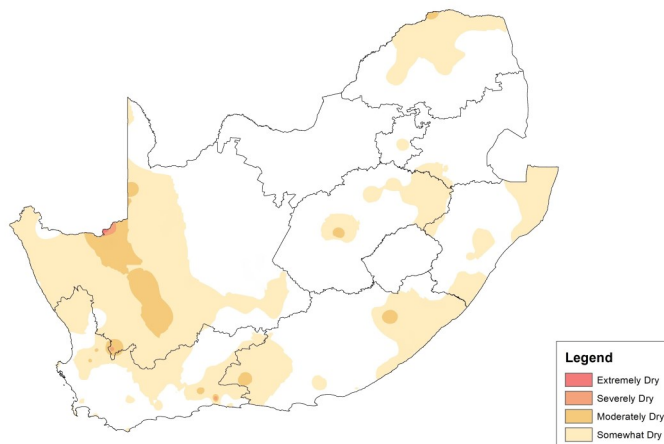


Indications of drought

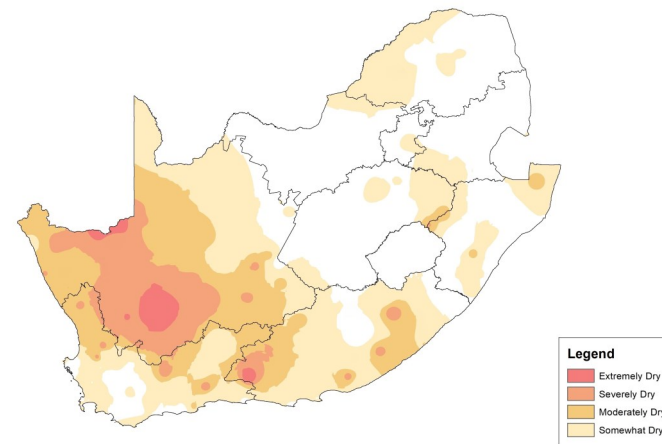
A meteorological drought is defined on the basis of the degree of dryness in comparison to “normal” or average amounts of rainfall for a particular area or place and the duration of the dry period.

The Standardized Precipitation Index (SPI) is an index based on the probability of rainfall for any time scale and can assist in assessing the severity of drought. Long-term drought usually occur when moisture supply is abnormally below average for periods of up to two years, where-after widespread desiccation occurs. A 12-month and 24-month SPI is a comparison of the precipitation for 12 and 24 consecutive months with the same 12 and 24 consecutive months during all the previous years of available data respectively. SPI's of these longer timescales are useful in identifying areas of drought, as they are linked to streamflow, reservoir levels and even groundwater levels. The most noteworthy in the 24-month SPI map below are the moderately dry to extremely dry western parts of the Northern Cape, extending to western parts of the Eastern Cape.

12-month SPI for January 2020 to December 2020



24-month SPI for January 2019 to December 2020



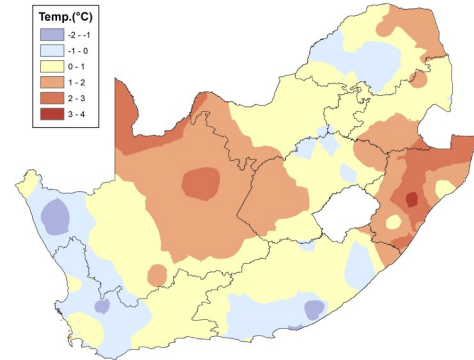
Monthly maps

Following are monthly maps for

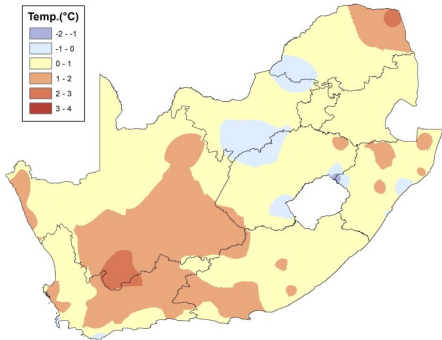
- Maximum temperature deviations from the 1981-2010 normal
- Minimum temperature deviations from the 1981-2010 normal
- Standardized Precipitation Index (SPI), indicating dry areas
- Lightning-stroke density indicating the number of strokes per square kilometer

January 2020

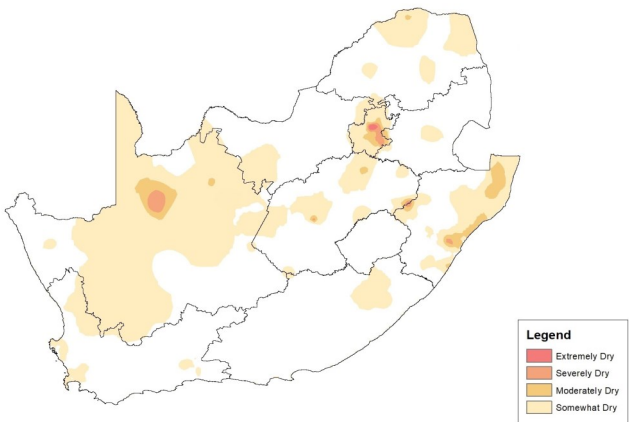
Maximum temperature deviations



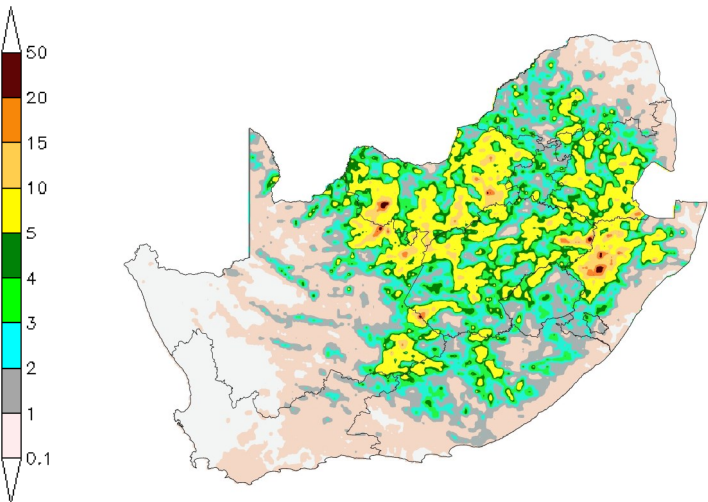
Minimum temperature deviations



SPI

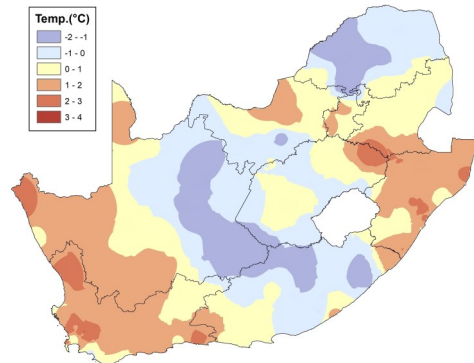


Lightning-stroke density

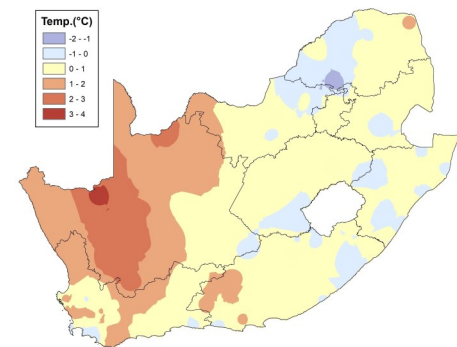


February 2020

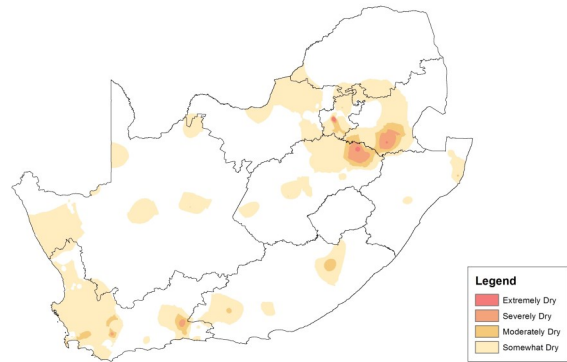
Maximum temperature deviations



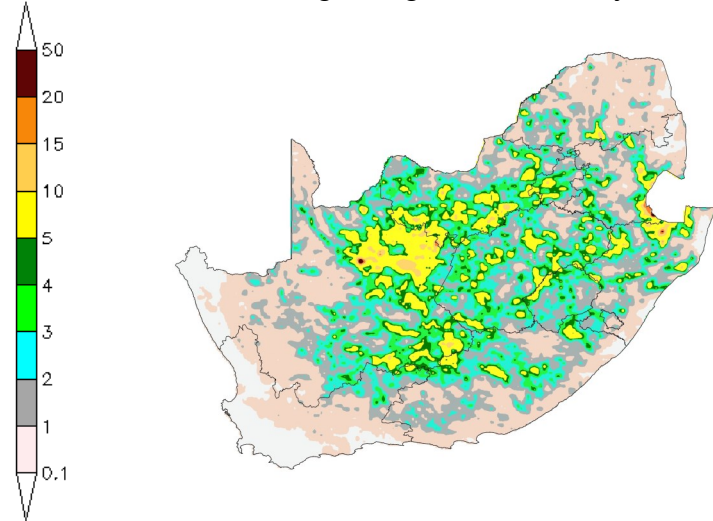
Minimum temperature deviations



SPI

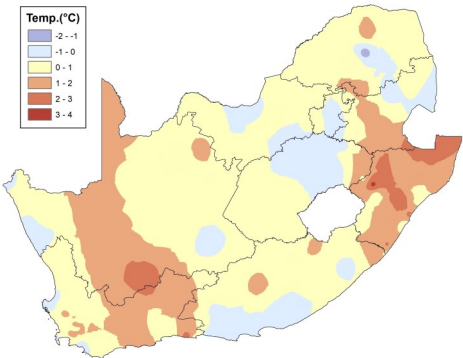


Lightning-stroke density

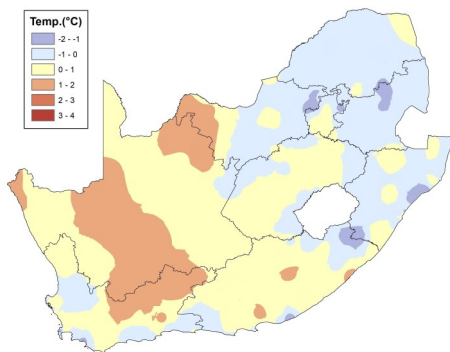


March 2020

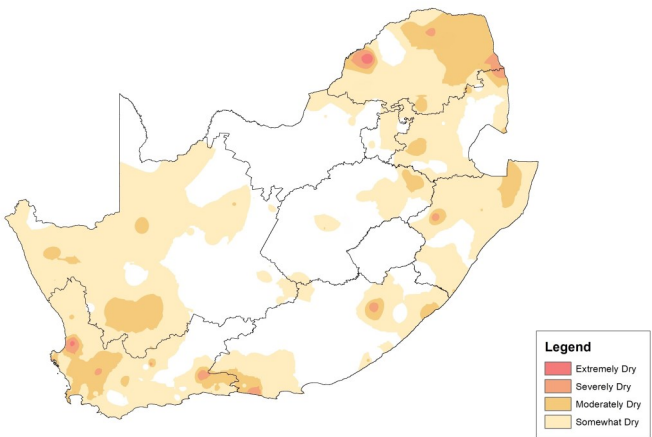
Maximum temperature deviations



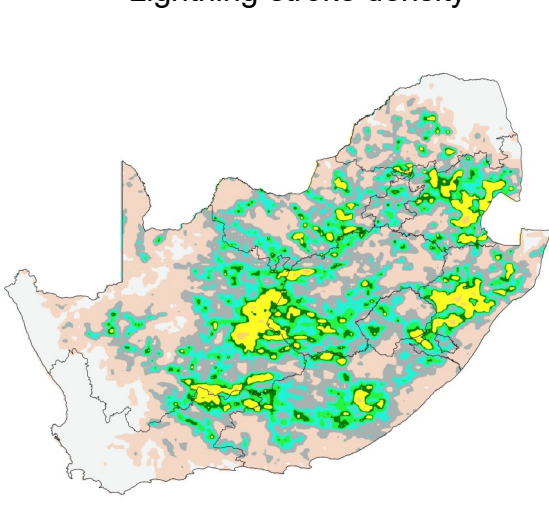
Minimum temperature deviations



SPI

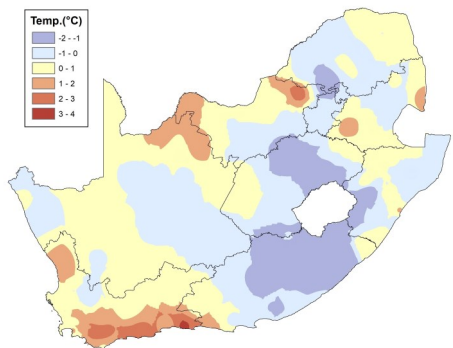


Lightning-stroke density

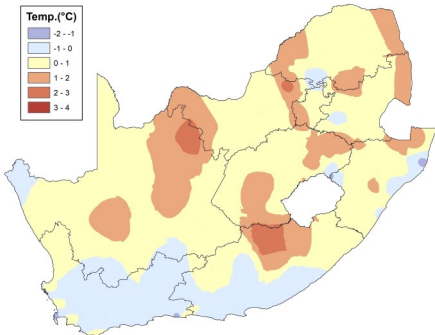


April 2020

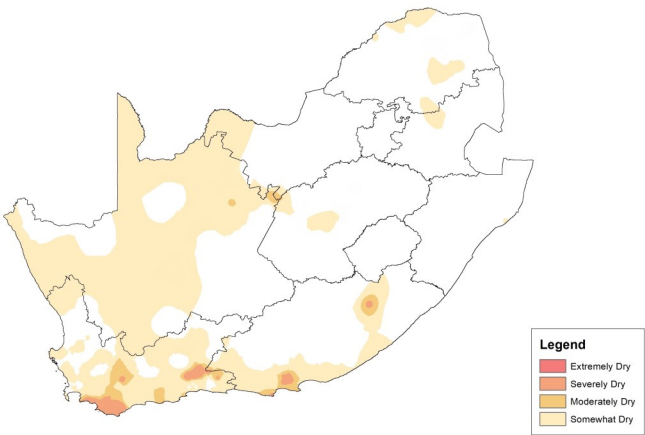
Maximum temperature deviations



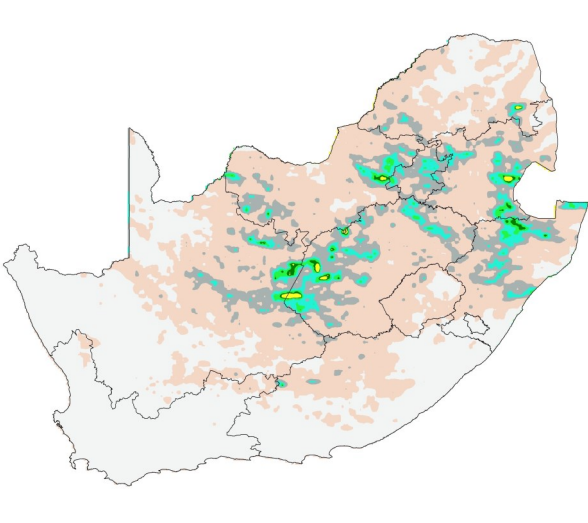
Minimum temperature deviations



SPI

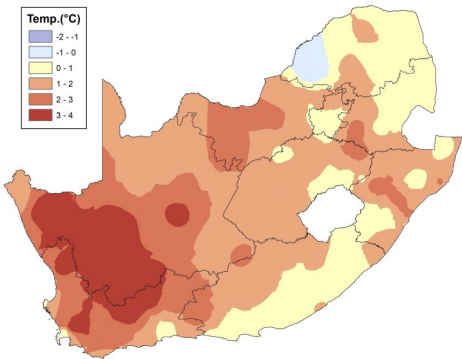


Lightning-stroke density

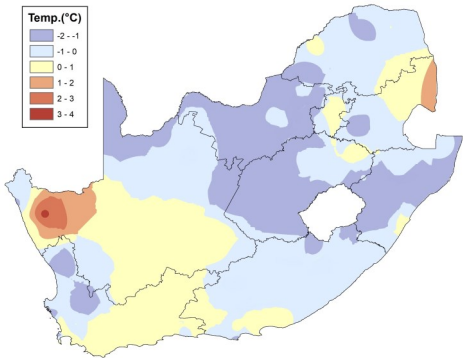


May 2020

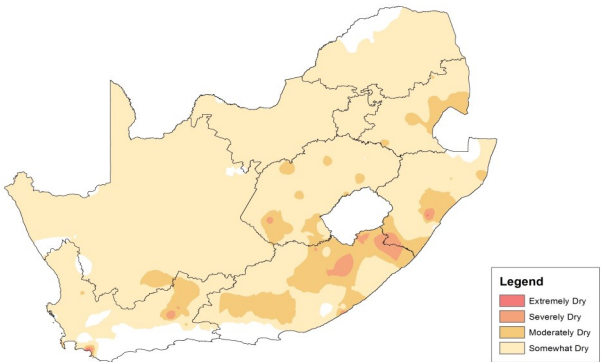
Maximum temperature deviations



Minimum temperature deviations



SPI

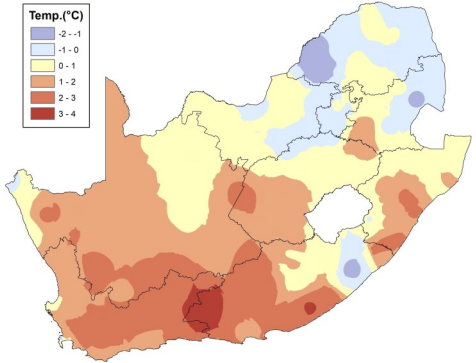


Lightning-stroke density

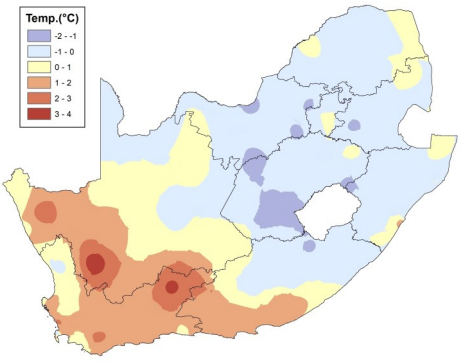


June 2020

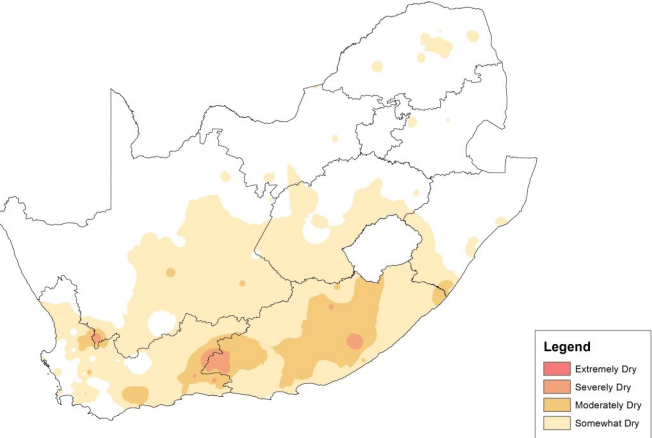
Maximum temperature deviations



Minimum temperature deviations



SPI

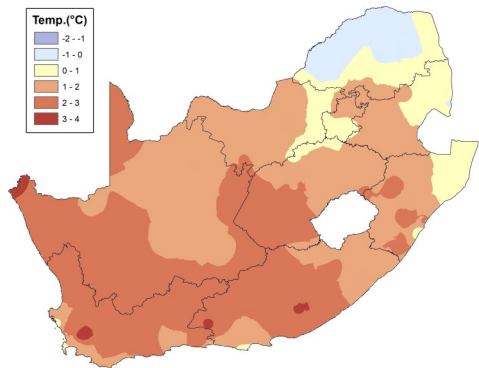


Lightning-stroke density

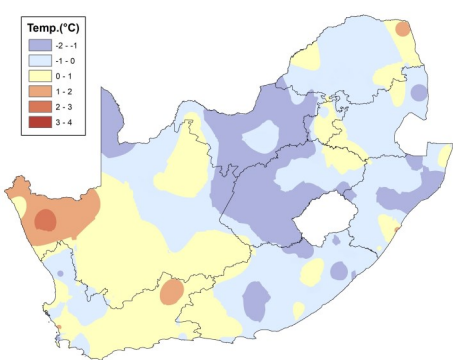


July 2020

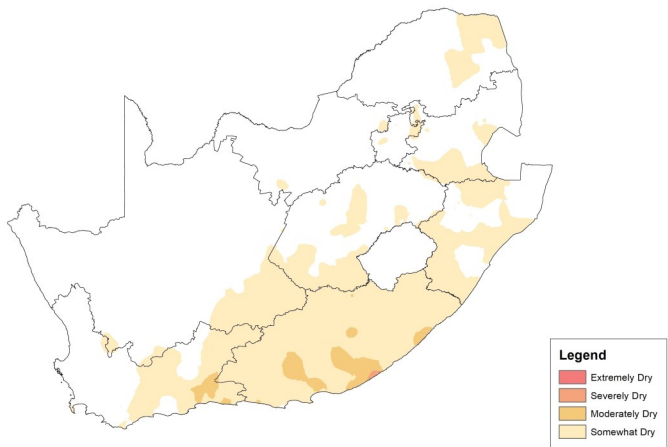
Maximum temperature deviations



Minimum temperature deviations



SPI

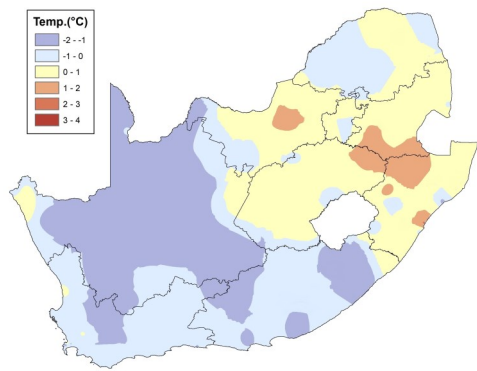


Lightning-stroke density

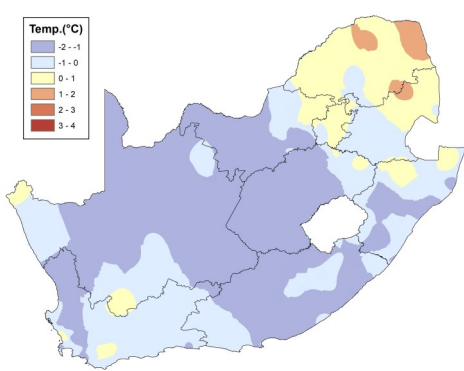


August 2020

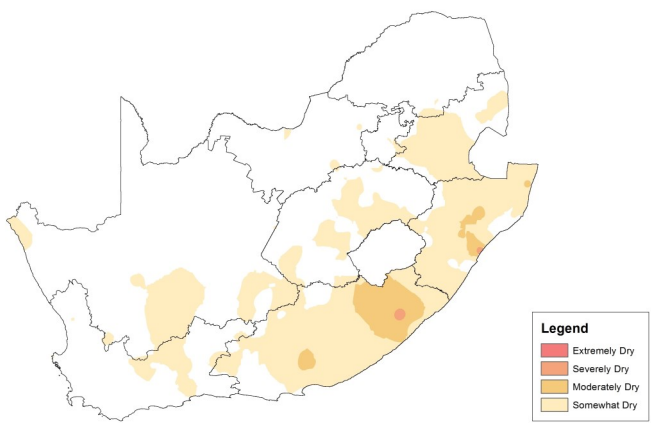
Maximum temperature deviations



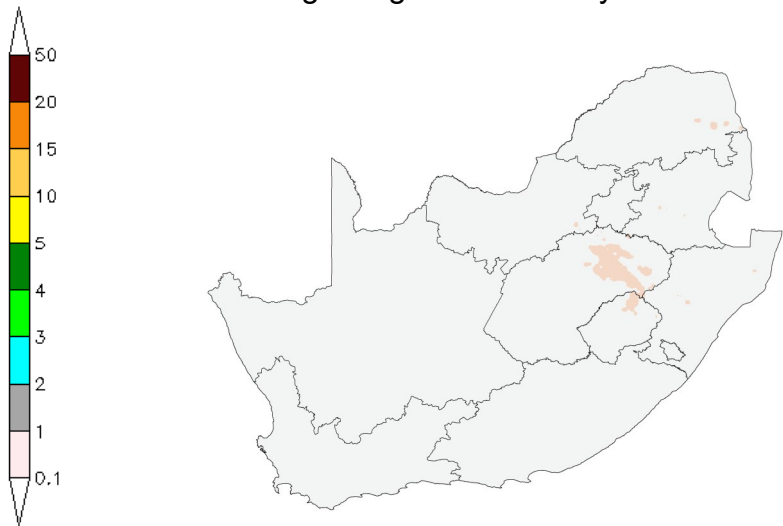
Minimum temperature deviations



SPI

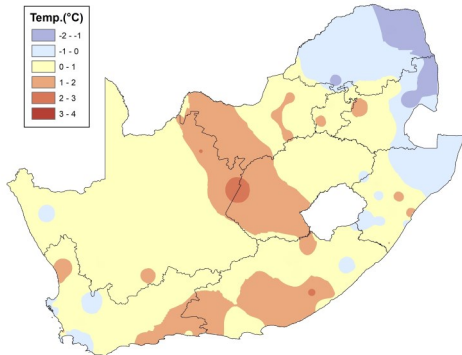


Lightning-stroke density

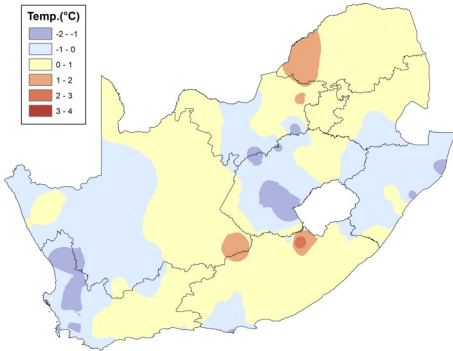


September 2020

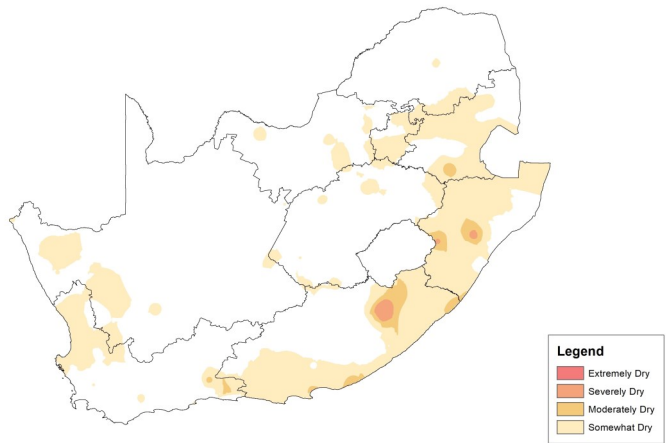
Maximum temperature deviations



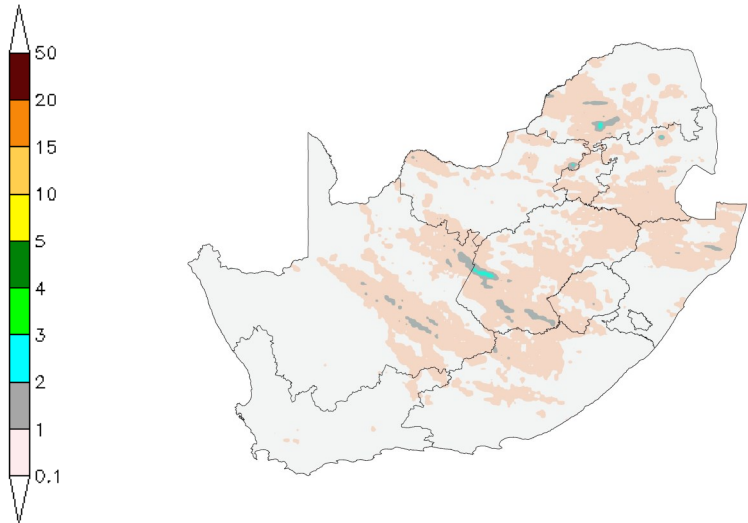
Minimum temperature deviations



SPI

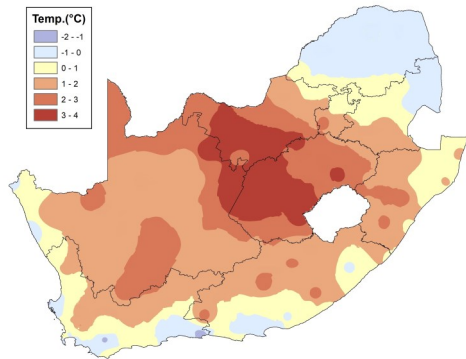


Lightning-stroke density

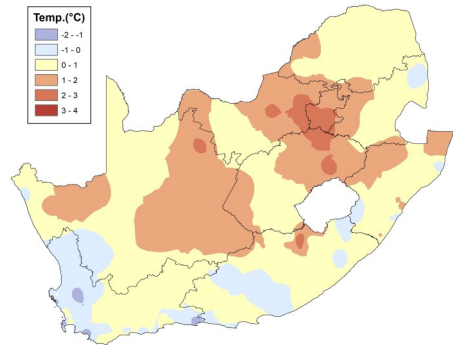


October 2020

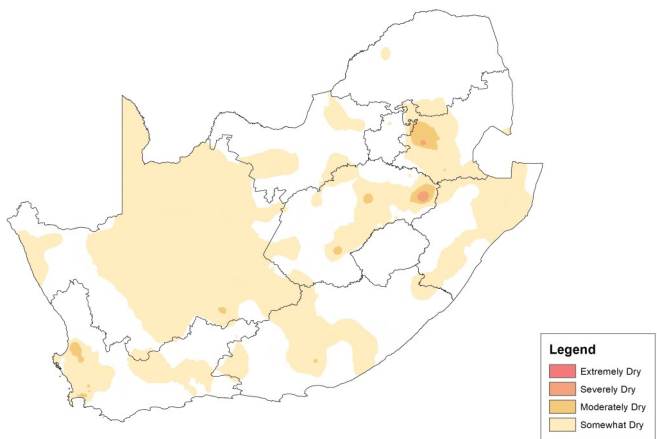
Maximum temperature deviations



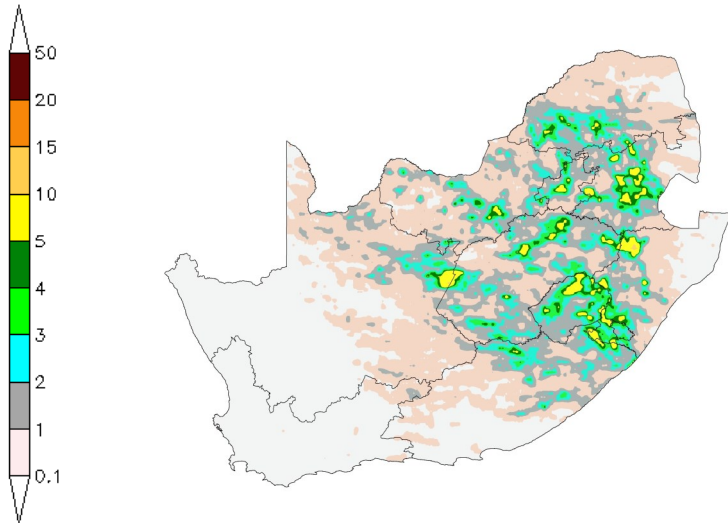
Minimum temperature deviations



SPI

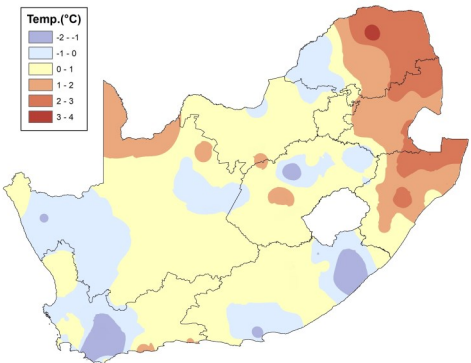


Lightning-stroke density

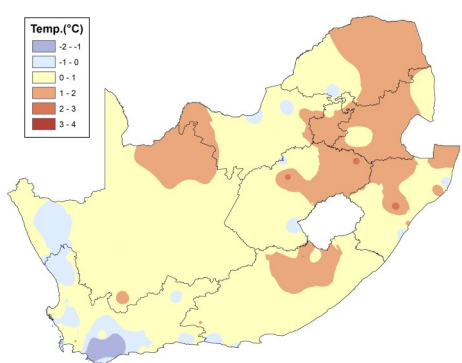


November 2020

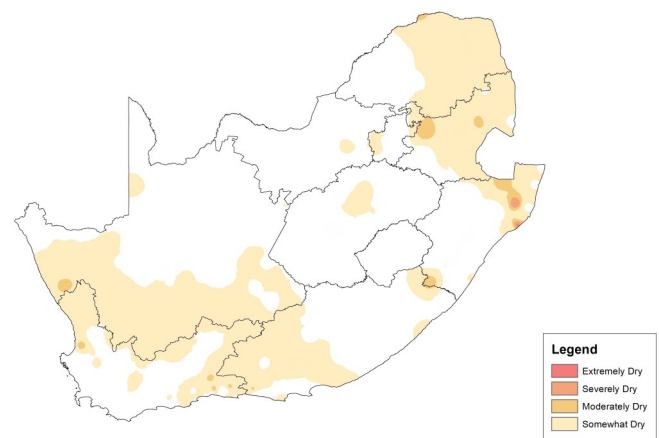
Maximum temperature deviations



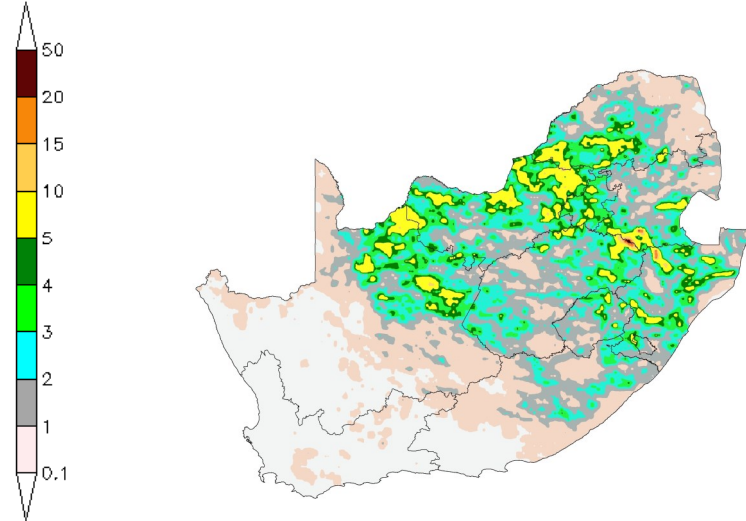
Minimum temperature deviations



SPI

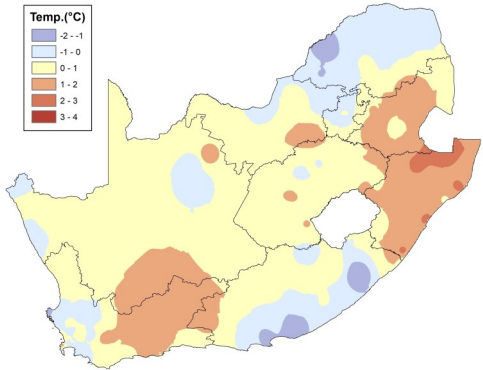


Lightning-stroke density

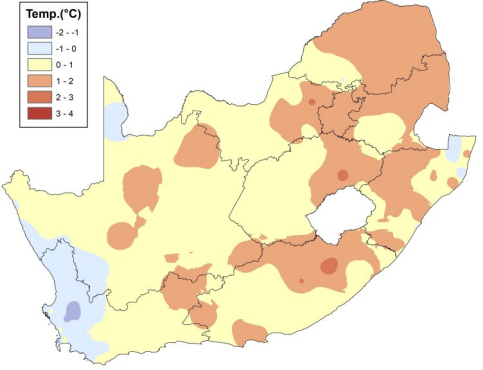


December 2020

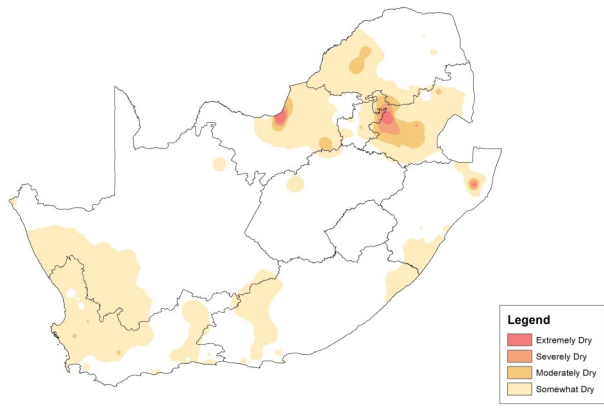
Maximum temperature deviations



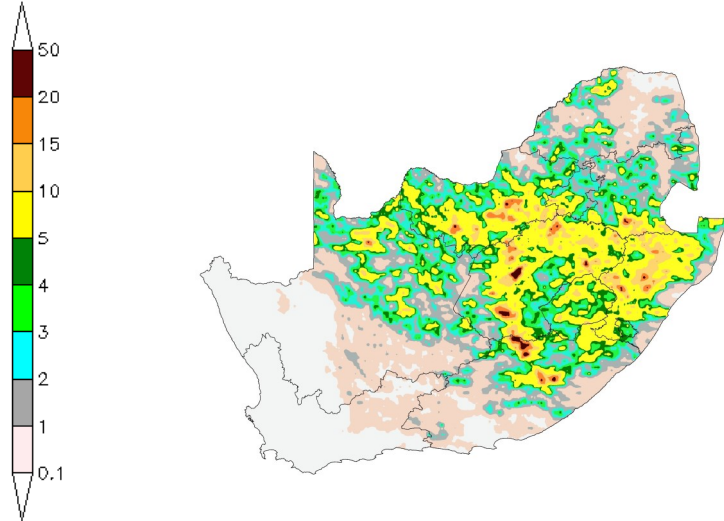
Minimum temperature deviations



SPI



Lightning-stroke density



Sunshine in the main centres

The daily average sunshine in the main centres of Cape Town, Port Elizabeth, Bloemfontein, Durban and Johannesburg is presented in the table below. Compared to the 1981—2010 average all of the large cities experienced close to normal expected sunshine. Bloemfontein and Johannesburg received slightly below average sunshine, an indication of the good rainfall received during the summer months. In contrast, Durban received above-normal sunshine due to the dry conditions in the beginning of 2020.

City	Daily average sunshine in 2020	Daily average sunshine (1981—2010)
Cape Town	8,5	8,2
Port Elizabeth	7,6	7,6
Bloemfontein	8,7	8,9
Durban	6,8	6,4
Johannesburg	8,3	8,5