Temperatures during winter of 2020

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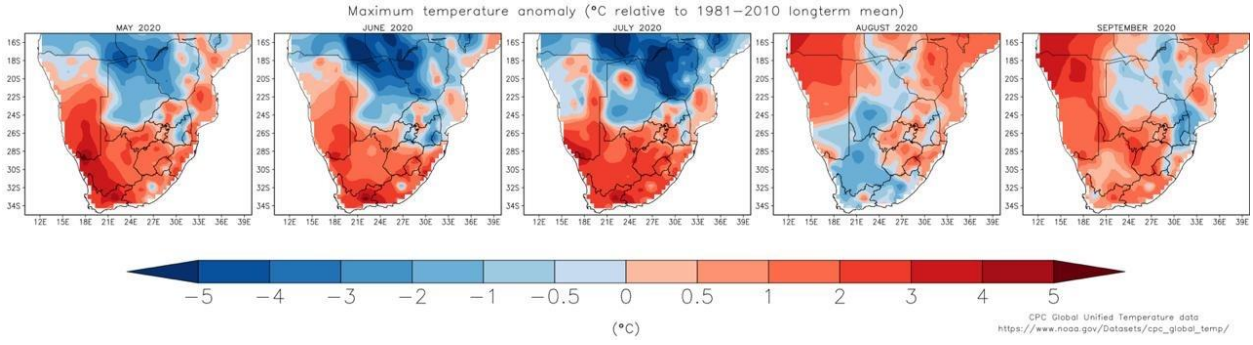
In South Africa temperatures are measured by institutions such as the South African Weather Service, Agricultural Research council and the Department of Water and Sanitation. Temperatures are measured either manually by an observer from a thermometer in a Steven Screen or, in recent years, by thermometers in automatic weather stations (AWS). An AWS can record temperatures as frequently as every 5 minutes. Daily temperatures are often expressed as maximum temperatures (the highest observed temperatures during the day) and minimum temperatures (the lowest observed temperature during the day). Maximum temperatures mostly occur in the afternoon, (about 14:00 local time in winter in South Africa) and minimum temperatures occur at sunrise.

The results shown here was obtained by using Global Unified Temperature data, which is available from the Climate Prediction Centre (CPC) (https://psl.noaa.gov/data/gridded/data.cpc.globaltemp.html). CPC is a sub division of National Oceanic and Atmospheric Administration (NOAA). This data is compiled from observed temperatures acquired from weather services globally, and is then converted to a gridded format.

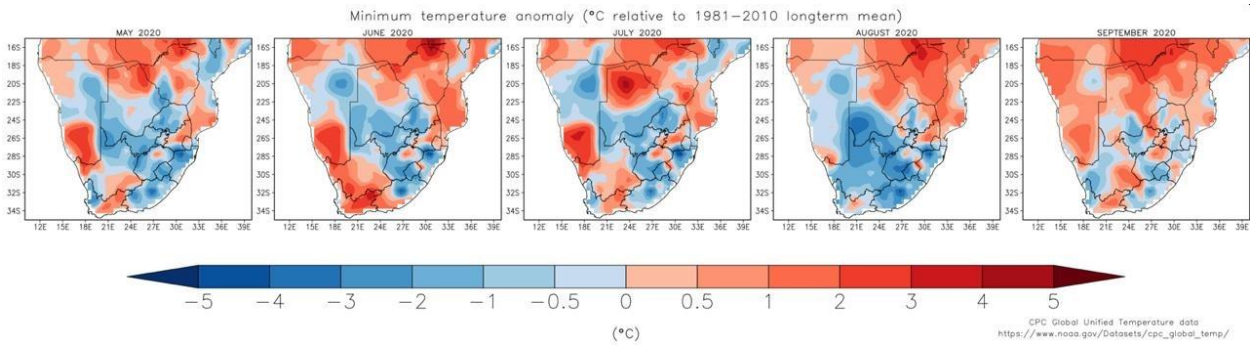
Daily minimum and maximum temperatures were obtained for May to August for the period 1981 to 2020. A 30-year climate (1981-2010) was constructed by calculating a monthly average maximum and minimum temperature for each month. The climatological average temperatures were subtracted form the 2020 monthly average temperatures in order to obtain temperature anomalies for every month in 2020. Negative values show that 2020 was colder than normal and positive values indicate above normal temperatures in 2020.

For May to July maximum temperatures over South Africa were generally above normal. The exception being Gauteng, Mpumalanga and Limpopo Provinces in June and July where temperatures were below normal. In August the afternoon temperatures in the western and central interior were below normal and in September the eastern extremes of the country experienced below normal temperatures.



The minimum temperatures for all winter months were generally below normal. In August the entire country experienced below normal minimum temperatures and in the Free State and Eastern Cape temperatures were as much as 5 degrees Celsius below normal. Sunrise is close to 07:00 over the eastern interior in mid-winter and closer to 08:00 in the western parts. As minimum temperatures

usually occur close to sunrise, the below normal temperatures during this time may very conceivably resulted in increased electricity demand during the morning peak periods.



The graphs below show the temperature anomalies from 1929 to 2020 for 4 different regions in South Africa namely the South Western Cape, South coast, Northern Cape and Highveld. Minimum and maximum temperature anomalies are shown for two periods. Only for the month of August (the coldest of the winter months in 2020) and then considering June, July and August together (JJA).

Temperatures in all four regions were below normal in August, the only exception being maximum temperatures over the Highveld where above normal temperatures occurred. Even though the temperatures were generally below normal in these four regions in August, it is only in the Northern Cape where minimum temperatures in August were the lowest in the past 10 years.

If one consider the entire winter (June, July and August) then the below normal temperature signal is absent in these four regions. This indicated that during the winter period there were cold events, which resulted in below normal temperatures for shorter periods. In general for the three month of winter temperatures remained normal to above normal.

We are not aware what data Eskom's CEO used when stating that *South African experienced the coldest winter in 10 years*. One should note that Eskom has their own network of observation stations and it may be that this data was analysed.

Considering the data to our disposal we conclude that during late winter minimum temperatures were significant below normal and during the same period maximum temperatures over the western parts were below normal but above normal in the east. It is only in the Northern Cape where temperatures in August were the coldest in 10 years.

One should be cautious when considering these results as the chosen areas as well as the month considered will influence the significance of the results. A more thorough analysis is needed to draw decisive conclusions.

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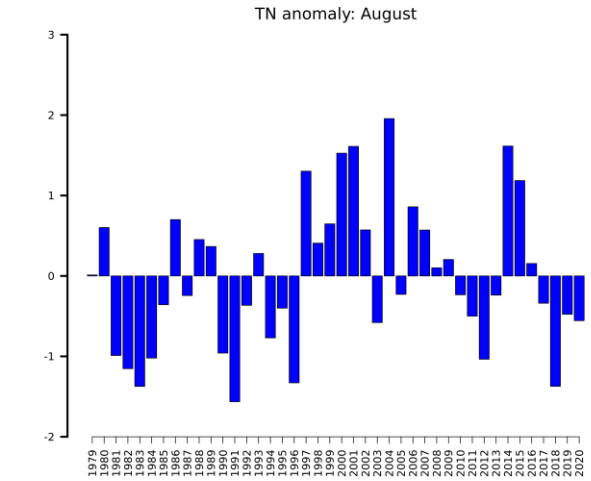
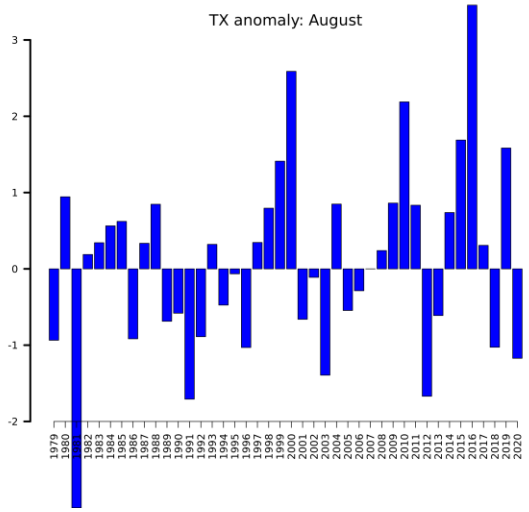
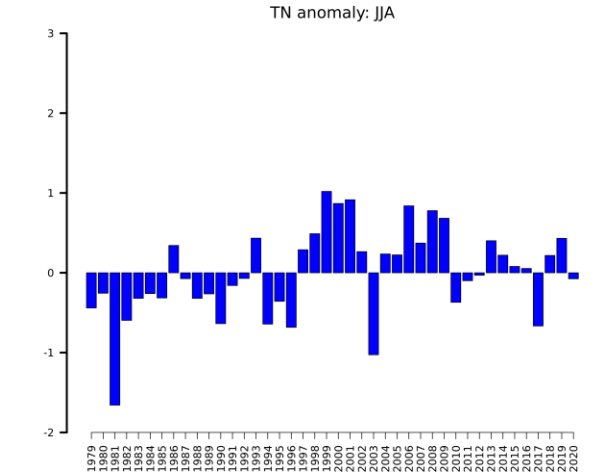
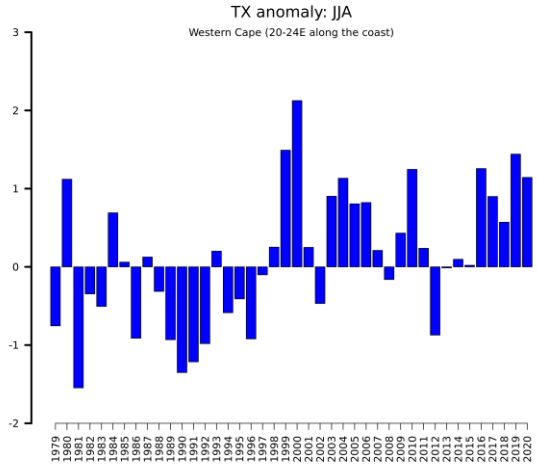
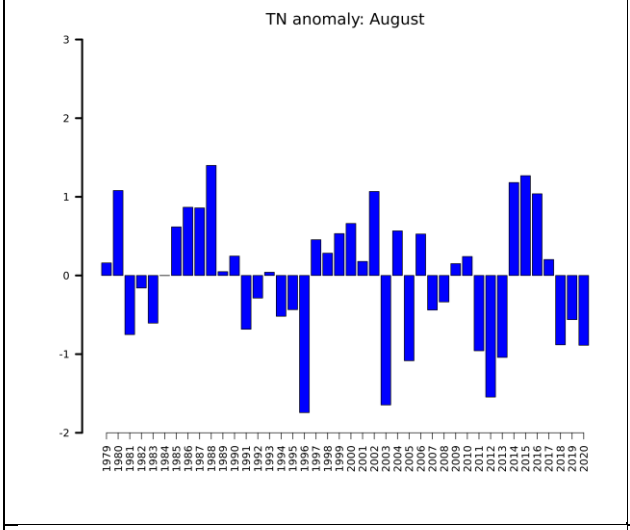
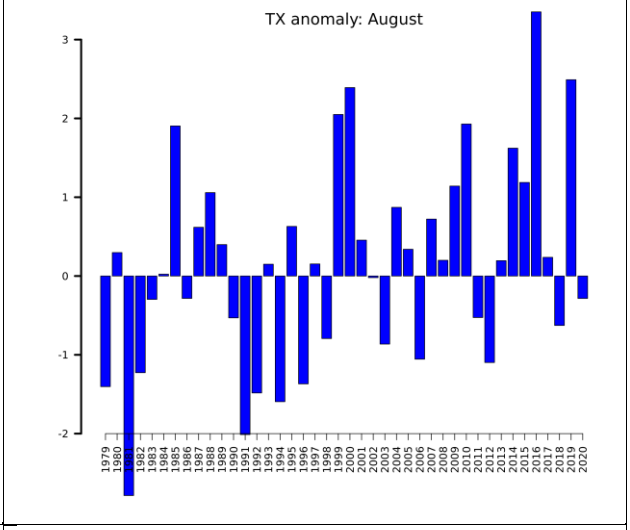
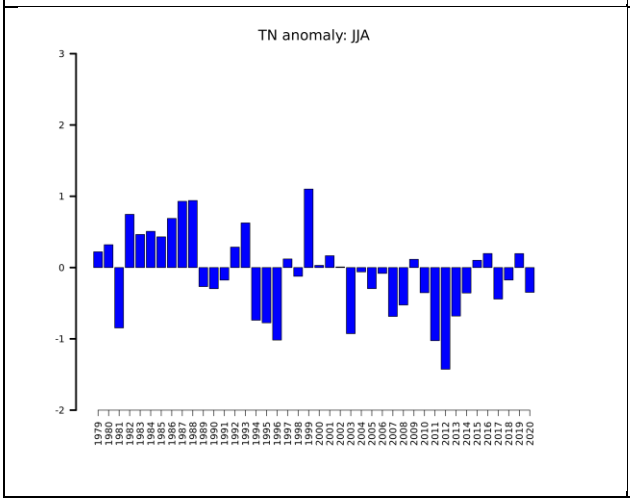
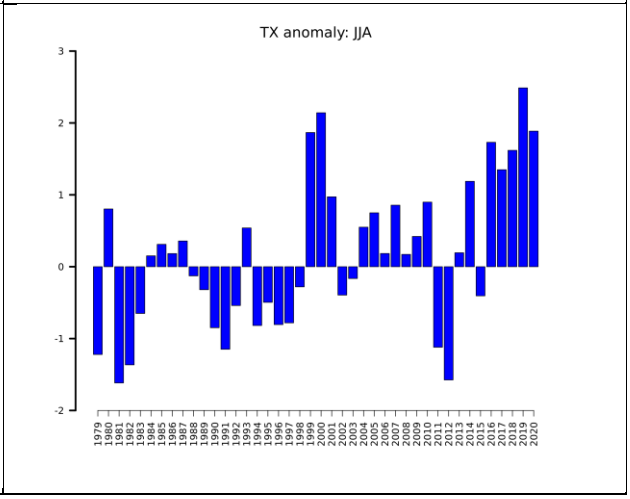
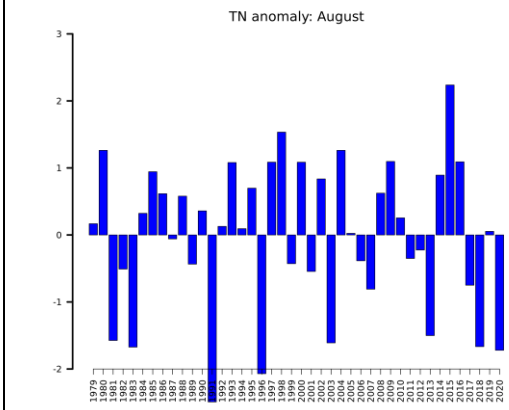
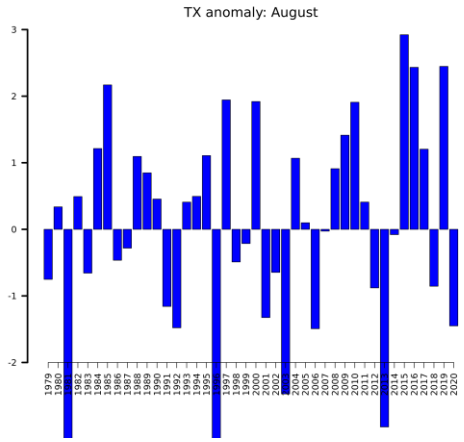
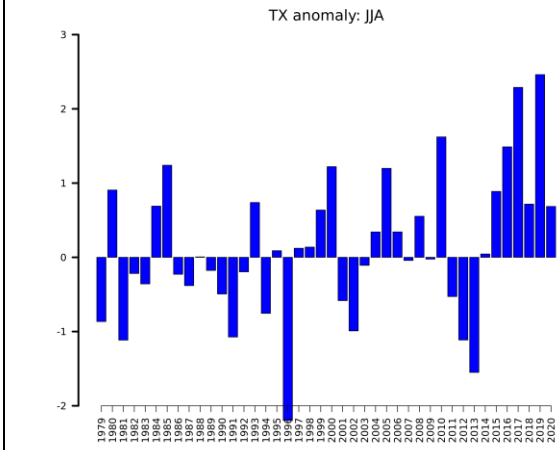
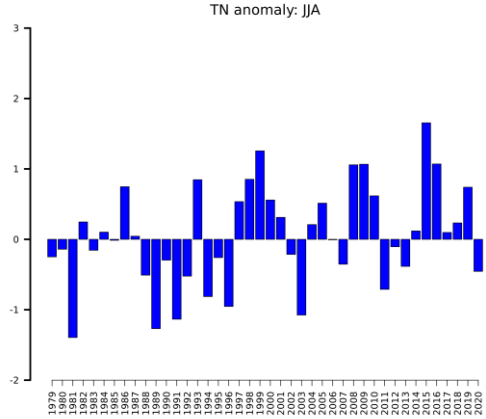
South Western Cape: Minimum temperature anomalies	South Western Cape: Maximum temperature anomalies
	
	

South coast : Minimum temperature anomalies	South coast : Maximum temperature anomalies
	
	

Northern Cape : Minimum temperature anomalies	Northern Cape : Maximum temperature anomalies
	
	

Highveld : Minimum temperature anomalies	Highveld : Maximum temperature anomalies