



NORWEGIAN CAPACITY
OPERATED BY ARIIC



THE STATE OF CLIMATE OF AFRICA

A QUICK LOOK AT THE LAST
5 YEARS

JULY 2019



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Overview of the State of Climate of Africa

This publication is a summary of the main weather and climate events that occurred in Africa in recent years, focusing on the observed precipitation and temperature during 2014, 2015, 2016, 2017, 2018. The conventional dataset used is that produced by the US National Oceanic and Atmospheric Administration (NOAA). The major weather and climate events are documented using information obtained from Meteo France, various UN agencies, newspapers and reports from National Meteorological and Hydrological Services across the African continent.

Various international organizations contributed to this publication at different levels, including the World Meteorological Organization (WMO), Norwegian Capacity (NORCAP)-operated by NRC and ACMAD.

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Executive summary

The global mean temperature in 2018 was the 4th on record since 1950, with a warming level of approximately 1 °C above pre-industrial levels. It was ~0.40 °C above the 1981–2010 reference levels. The 1981–2010 period is reported to be around 0.3 °C warmer than 1961–1990, while the 1850–1900 period used by IPCC to represent pre-industrial conditions in the IPCC Global Warming of 1.5 °C report is around 0.3 °C cooler than 1961–1990 (WMO, 2018).

The years 2015 to 2018 were the **top 4** warmest years in the global temperature record (Table 1). It is worth noting that during the 21st century, the global land and ocean temperature departure from average has reached new record highs five times, i.e. 2005, 2010, 2014, 2015, and 2016, with three of those being set back-to-back. From 1880 to 1980, a new temperature record was set on average every 13 years; however, in the recent 39 years, from 1981 to 2018, the frequency of a new global record has increased on average to once every three years (WMO, 2018).

The average global temperature for 2013–2017 is close to 1 °C above that for 1850–1900 and is also the highest five-year average on record. The world also continued to see rising sea levels, with some acceleration, and increasing concentrations of greenhouse gases. The cryosphere continued its contraction, with Arctic and Antarctic sea ice shrinking (WMO, 2017a; WMO, 2017b).

Over the African continent, the first half of year 2019 has exhibited higher warming levels compared to the climatology (1981-2010), the warmest year on record (2010) and the previous year (2018), where for example, the months of **April, May and June** 2019 had warming levels of 0.60, 0.55 and 0.74 °C higher than the same months in 2010 and 2018 (Figure 2).

Year 2018 was the fourth warmest on record since 1950 (Table 2). The warming level in 2018 was 0.70 °C higher than the value during the reference period: 1981–2010. The warming levels during 2017, 2016, 2015, 2014 are 0.60, 0.83, 0.71, 0.59, respectively. Year 2018 was the warmest of the years not influenced by ENSO (neutral years) on record over Africa since 1950. Positive temperature anomalies were generally observed over most parts of Africa, with extremely warm conditions of at least 3°C were recorded over the Horn of Africa. Less warming situations, with negative anomalies were recorded over Madagascar, eastern Kenya and Tanzania, northern Mauritania and Morocco.

During the year 2018, higher warming levels were recorded over southern Africa, Central Africa and Northern Africa, with Madagascar exhibiting a cooler than normal condition (Table 3). The warming levels over the African continent is much higher than the Global warming level, as exhibited in this study (2014-2018, Figure 3).

There is a general warming trend at the continental level. For example, of the 10 warmest years on record in Africa, 9 warmest years have been observed in the last 10 years (Table 4). Based on NOAA data, the warming rate over the past 69 years is about **2.14 °C/century**. Considering the past 28 years, the warming rate is **3.57 °C/century** (Figure 1). With this warming trend, Africa may reach 2 °C warming above the 1981-2010 average in the next few decades.

In the recent past, several weather and climate related extreme events were experienced over the African continent. For example, well above average precipitation with floods were recorded over most parts of Africa, such as southern Mauritania, Mali, Niger, Kenya, Côte d'Ivoire, Cameroon, Lesotho, Somalia, Uganda, and southern Sudan, among others. It resulted in mudslides, significant loss of lives and properties over the continent in 2018.

In the same year, below average precipitation conditions were recorded over northern Somalia, Eritrea, Djibouti, Gabon, southwestern Madagascar and northern Namibia. These regions experienced drought conditions which affected livestock, food production and power generation. In South Africa for example, due to the precipitation deficit, there was a declaration of a "national disaster" over the drought that ravaged parts of the country and threatened to leave the city of Cape Town without domestic tap water.

So far in 2019, several cases of extreme weather events have been reported. For example, heavy rains flooded parts of Malawi in mid-March, before developing into Cyclone Idai which struck Mozambique and Zimbabwe on 14-15 March, 2019. The flooding led to destruction of homes and other properties. The humanitarian needs was enormous. Reports from Beira, Mozambique reveals that between 300 to 400 dead bodies lined the banks of a road out of the city of Beira, and flood waters formed an inland ocean that was clearly visible from outer space.

The information documented in this publication is sourced from several institutions, including Meteo France for tropical cyclones activities, National Oceanic and Atmospheric Administration (NOAA) for temperature and precipitation datasets, various UN agencies, newspapers and reports

from National Meteorological and Hydrological Services across the African continent for extreme weather and climate events and the associated impacts.

Key climate indicators

1. Temperature

1.1 Temperature trends and warming levels

The year 2018 was the fourth warmest on record over the African land mass. The warming level in 2018 was 0.70 °C higher than the value during the reference period (1981-2010), falling behind the years 2010, 2016 and 2015 which are the leading three warmest years over Africa on record since 1950, with warming levels of 0.90, 0.83 and 0.71 °C, respectively. The year was the warmest of the neutral years (years NOT influenced by ENSO) on record over Africa since 1950.

The northeastern region of the continent, particularly the Horn of Africa, was anomalously warm, with temperature anomalies reaching more than 2 °C above average. On the other hand, temperatures in some parts of Southern Africa were a little cooler than average, especially over Madagascar which had a warming level of 0.29 °C below the long term average value in 2018.

Over the continent, **May** and **September** are the warmest months. In year 2019, the months of April, May and June were warmer than the same months 2010, 2018 and the climatology, with temperature anomalies of 0.92 °C for 2010), 0.57 °C for 2018) and 1.53 °C for 2019, Figures 3 and 5.

Temperature Anomaly over Africa

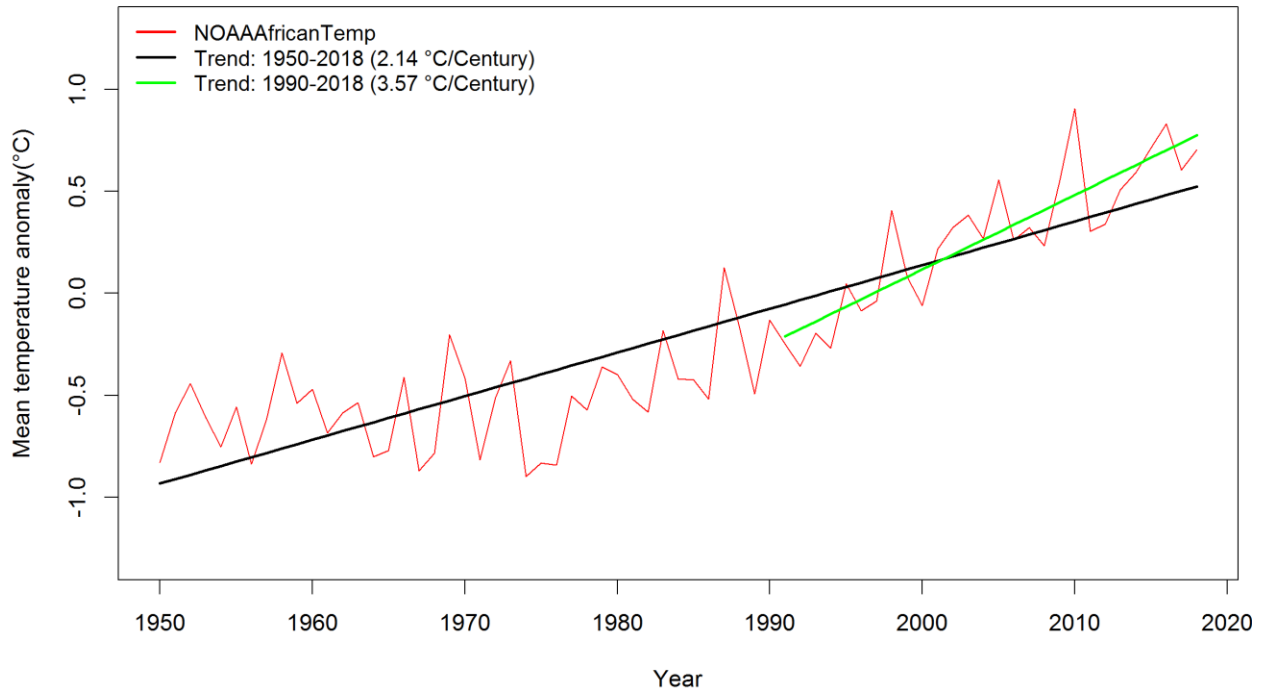


Figure 1. Trends in the mean annual temperature anomalies (°C) over Africa for 1950-2018 period.
 Data source: <http://iridl.ldeo.columbia.edu/SOURCES/.NOAA/.NCEP/.CPC/.GHCM/.gridded/.deg0p5/.temp/>

Table 1: Observed global mean surface temperature anomalies in the last 5 years

<i>Year</i>	<i>Value (°C)</i>	<i>Ranking</i>
2018	+0.40	4 th
2017	+0.46	2 nd
2016	+ 0.56	1 st
2015	+ 0.45	3 rd
2014	+ 0.30	5 th

Table 2: Observed mean surface temperature anomalies over Africa in the last 5 years

<i>Year</i>	<i>Value (°C)</i>	<i>Ranking</i>
2018	+0.70	4 th
2017	+0.60	5 th
2016	+0.83	2 nd
2015	+0.71	3 rd
2014	+0.59	6 th

Table 3: Observed mean surface temperature anomalies over Africa and sub-regions in 2018.

<i>Region</i>	<i>Year</i>	<i>Value (°C)</i>	<i>Ranking</i>
African Continent	2018	+0.70	4th
Northern Africa	2018	+0.84	3rd
Southern Africa	2018	+ 0.86	3rd
Western Africa	2018	+ 0.52	7th
Eastern Africa	2018	+ 0.70	5th
Central Africa	2018	+0.82	3rd
Madagascar	2018	-0.29	35th

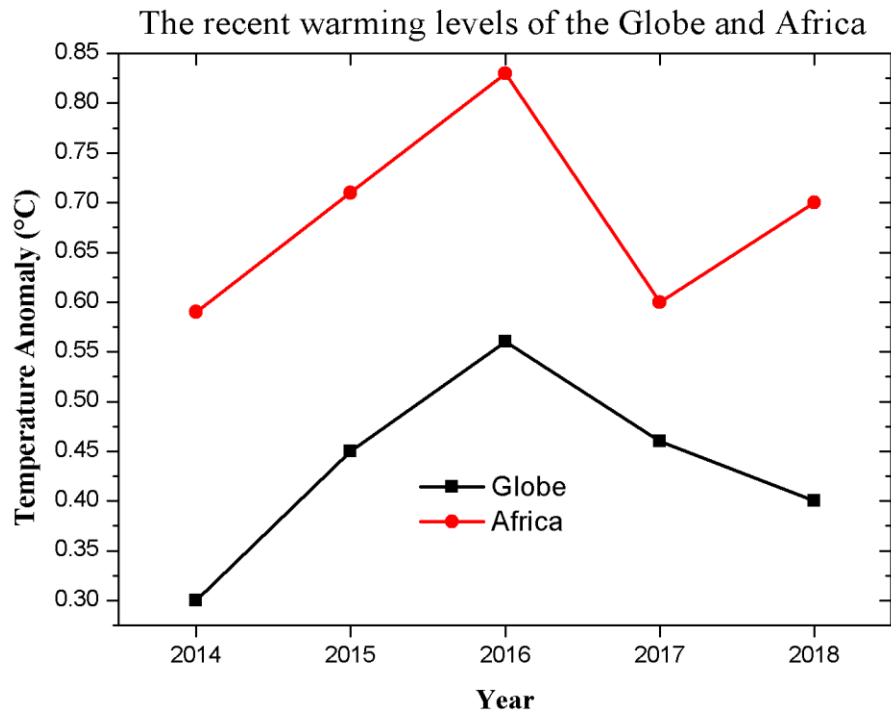


Figure 2: Mean temperature anomalies (°C) for the globe (in black) and Africa (in red) with respect to 1981-2010 reference period.

1.2 Annual cycle of temperature over Africa

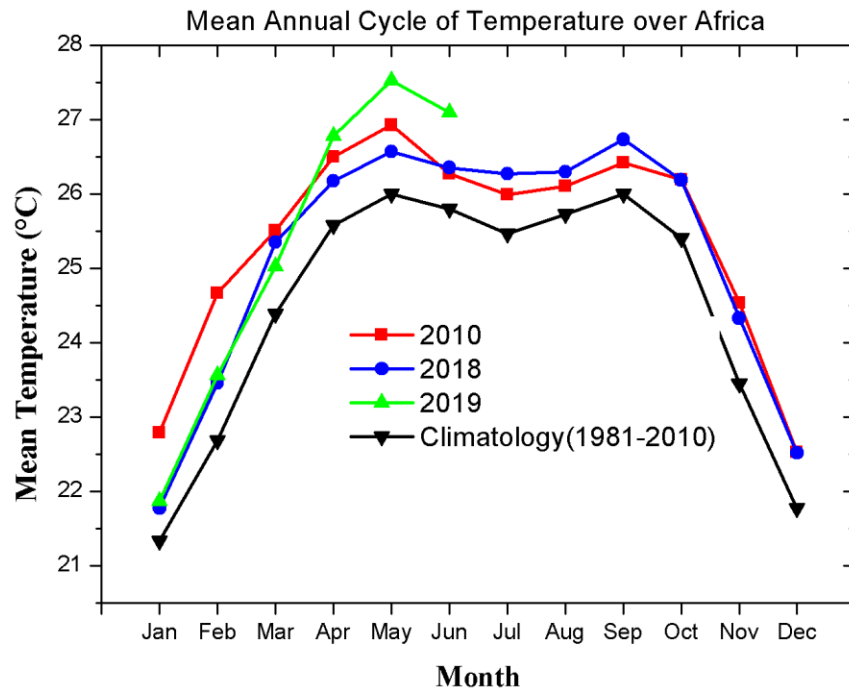


Figure 3: Mean annual cycle of temperature (°C) for 2019 (*green*), 2018 (*blue*), warmest year 2010 (*red*) and the climatology based on 1981-2010 reference period (*black*).

1.3 Rates of temperature change and the warmest years on record over Africa

There is a general warming trend at the continental level. For example, of the 10 warmest years on record in Africa, 9 warmest years have been observed in the last 10 years (Table 4). Based on NOAA data, the warming rate over the past 69 years is about **2.14 °C/century**. Considering the past 28 years, the warming rate is **3.57 °C/century** (Figure 1). With this warming trend, Africa may reach 2 °C warming above the 1981-2010 average in the next few decades.

Table 4: The **10** warmest years on record over Africa

<i>Year</i>	<i>Anomaly with respect to 1981-2010 average (°C)</i>
2010	+0.90
2016	+0.83
2015	+0.71
2018	+0.70
2017	+0.60
2014	+0.59
2005	+0.56
2009	+0.55
2013	+0.51
1998	+0.41

During year 2018, temperature anomalies exhibited varying warming levels over the different sub-regions of Africa. Over Northern Africa, the average temperature anomaly was 0.84°C warmer than the long term mean. As such, year 2018 was ranked as the 3rd warmest year on record over this region since 1950. The rate at which temperature has been increasing in this region over the period; 1950-2018 and 1990-2018 was found to be 2.3 °C and 4.29 °C per century, respectively.

Year 2018 was ranked as the seventh warmest year on record, with temperature anomaly of 0.52 °C above average over the West African region, well behind the warmest year 2010 which had temperature anomaly of 1.03 °C over this region.

Over Central Africa, year 2018 was noted as the 3rd warmest year on record since 1950, exhibiting temperature of 0.82 °C above average. The warmest year over this region is year 2016, with a warming level of 0.97 °C.

Over Eastern Africa, 2018 was ranked as the 5th warmest year on record over this region, with temperature anomaly of 0.70 °C above average, and 2010 remains the warmest year on record over this area since 1950 with temperature anomaly of 0.98 °C.

Over the Southern Africa region, 2018 was the 3rd warmest year on record, exhibiting a temperature anomaly of 0.86 °C above average. The warmest year on record is still year 2015 which was 1.36 °C warmer than the long term mean. On the other hand, temperatures in 2018 were mild over the island countries in the Indian Ocean. For example over Madagascar, 2018 had temperature anomaly of 0.29 °C below average. It was ranked as the 35th warmest year over Madagascar, well below the warmest year (2006, with temperature anomaly of 0.48 °C) on rec-

ord since 1950. The lowest rate of temperature rise was noted over Southern Africa, with a rate of rise of 2.82 °C/century. On the other hand, in the same period (1990-2018), there is a decreasing trend in temperature over Madagascar, with a rate of decrease of 1.57 °C/century (Table 5).

Over the African continent, **May** and **September** are the warmest months. In year 2019, the months of April, May and June were warmer than the same months in 2010, 2018 and the climatology, with temperature anomalies of 0.92 °C for 2010, 0.57 °C for 2018 and 1.53 °C for 2019 (Figures 3, 5).

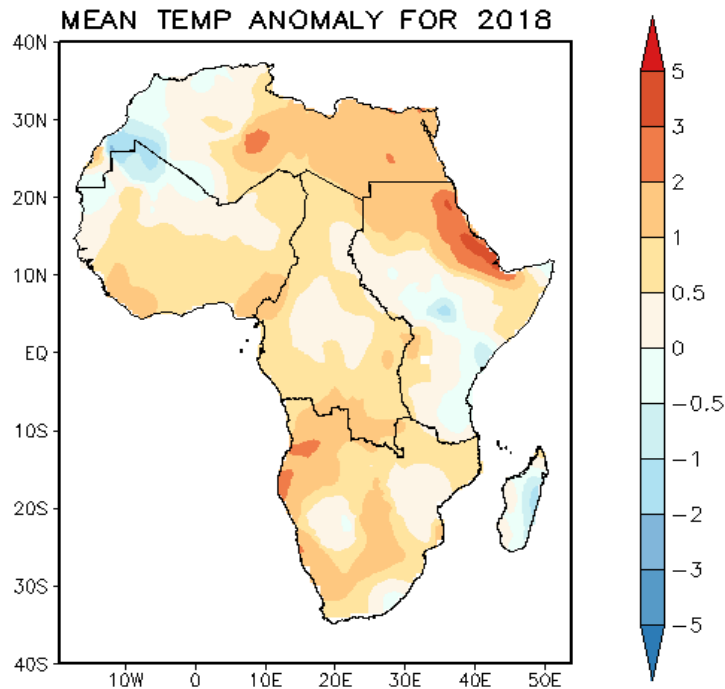


Figure 4: Mean annual temperature anomalies (°C) over Africa in 2018, relative to 1981-2010 reference Period. Data source; http://iridl.ldeo.columbia.edu/SOURCES/NOAA/NCEP/CPC/GHCN_CAMS/gridded/deg0p5/temp/

Table 5: Rate of temperature change over the African continent

<i>Region</i>	<i>Rate of temperature change (°C/century): 1950-2018</i>	<i>Rate of temperature change (°C/century): 1990-2018</i>
Africa	2.14	3.57
Northern Africa	2.30	4.29
West Africa	2.27	3.88
Central Africa	2.33	3.65
Eastern Africa	2.24	3.72
Southern Africa	1.91	2.82
Madagascar	1.23	-1.57

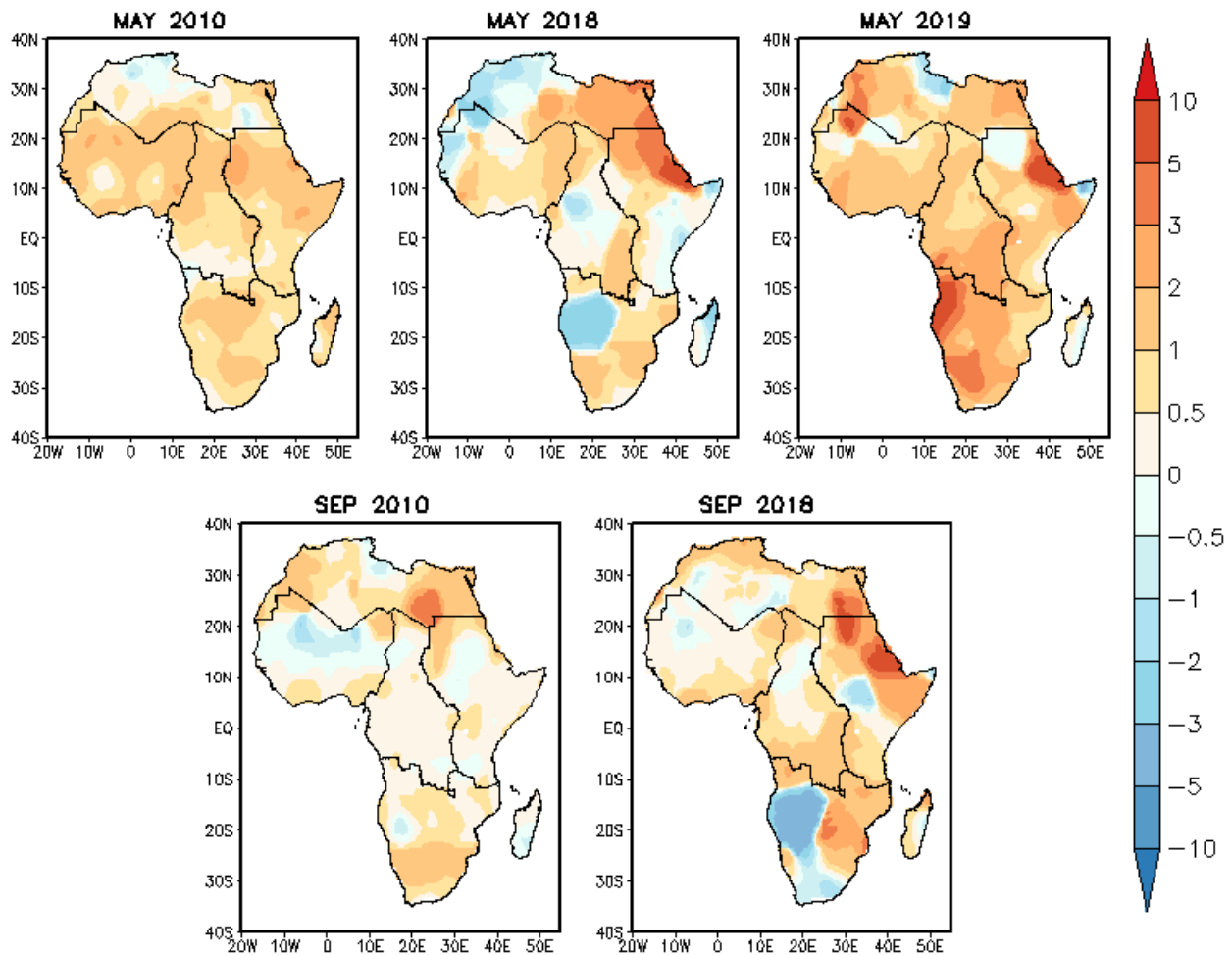


Figure 5: (a) Mean temperature anomalies ($^{\circ}\text{C}$) during the warmest months (May and September) for 2010, 2018 and 2019.

Data source: http://iridl.ldeo.columbia.edu/SOURCES/NOAA/NCEP/CPC/GHCN_CAMS/.gridded/.deg0p5/.temp/

The sub-regional temperature analysis over the periods: 1950-2018 and 1990-2018 reveals that the sub-regions exhibit varying rates of temperature rise (Figure 6), as well as warming levels in 2018. For example, over **North Africa**, 2018 was the 3rd warmest year on record since 1950, and the rate of increase in temp was 2.30°C for the period 1950-2018 and 4.29°C for 1990-2018 per century.

Over **West Africa**, 2018 was the 7th warmest year on record. The rate of increase in temp was 2.27°C (1950-2018) and 3.88°C (1990-2018) per century.

Year 2018 was the 5th warmest year over **Eastern Africa**, with a rate of increase in temp of 2.24°C (1950-2018) and 3.72°C (1990-2018) per century.

Over **Central Africa**, 2018 was the 3rd warmest year on record since 1950. The rate of increase in temp was 2.33^oC (1950-2018) and 3.65^oC (1990-2018) per century.

Considering **Southern Africa**, 2018 was the 3rd warmest year on record. The rate of increase in temp was 1.91^oC (1950-2018) and 2.82^oC (1990-2018) per century.

Over the Islands (e.g. **Madagascar**), 2018 was the 35th warmest year on record. The rate of increase in temp was 1.23^oC (1950-2018) and rate of **decrease** was 1.57^oC (1990-2018) per century.

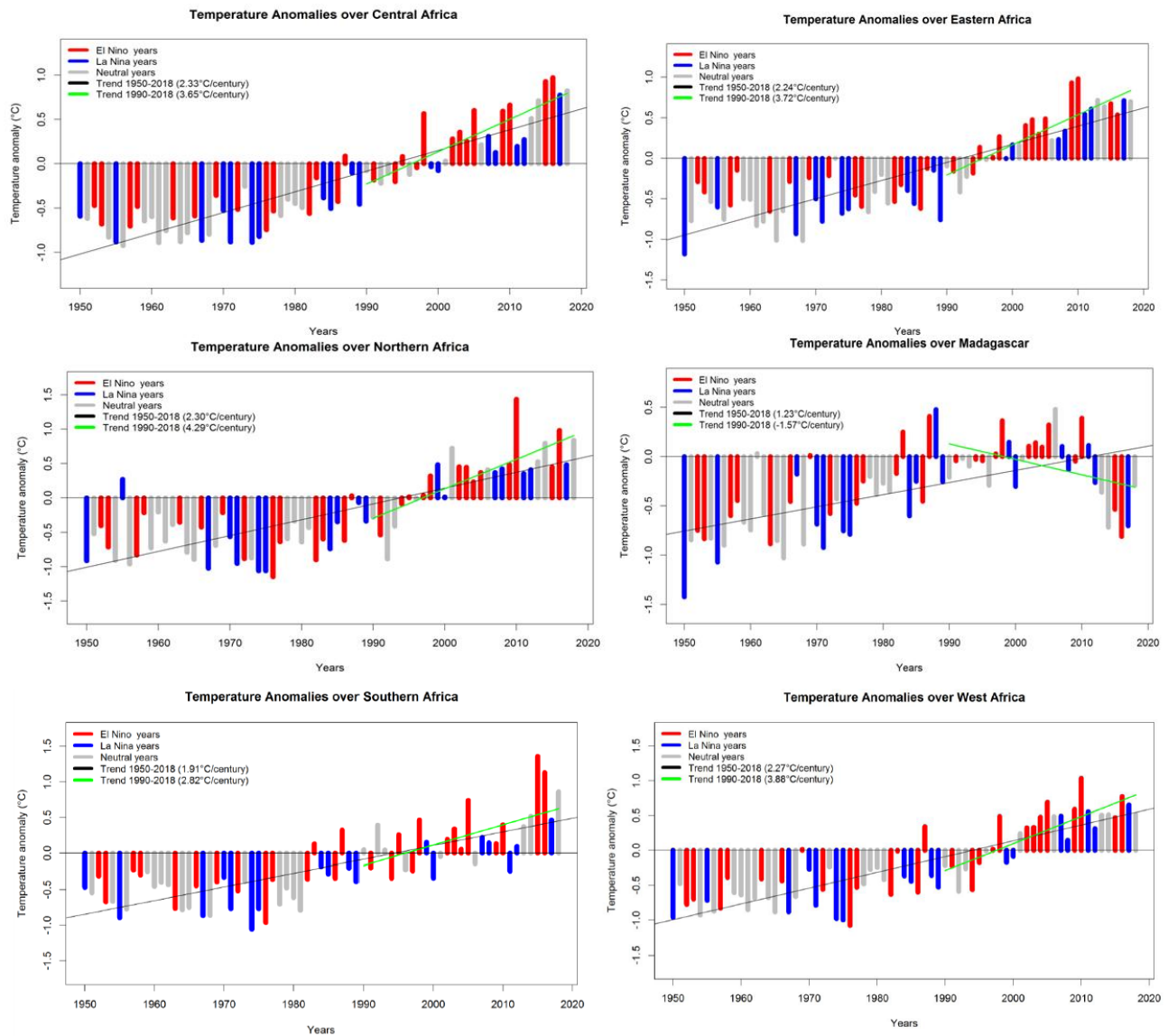


Figure 6: Trends in the mean annual temperature anomalies (°C) for the African sub-regions over the periods:1950 to 2018 and 1990 to 2018 Data source: http://iridl.ldeo.columbia.edu/SOURCES/NOAA/NCEP/CPC/GHCN_CAMS/gridded/deg0p5/temp/

2.Precipitation

2.1 Mean annual precipitation in percent of average for the period: 2014-2018

The mean annual precipitation in percent of average over Africa for the period: 2014-2018, presented in Figure 7 reveals that well above average precipitation was mainly observed over the Sahel, including southern Mauritania, Mali, Niger and southern Sudan. This resulted in several cases of floods and mudslides occurrence over these regions. Well below average precipitation amounts were recorded over Eritrea, Djibouti, central Zambia and Malawi, western Madagascar parts of South Africa, and northern Libya. Seasonal rainfall deficits were recorded over several regions, exhibiting devastating impacts, for example in South Africa, there was a declaration of a "national disaster" over the drought that ravaged parts of the country and threatened to leave the city of Cape Town without domestic tap water due to precipitation deficit.

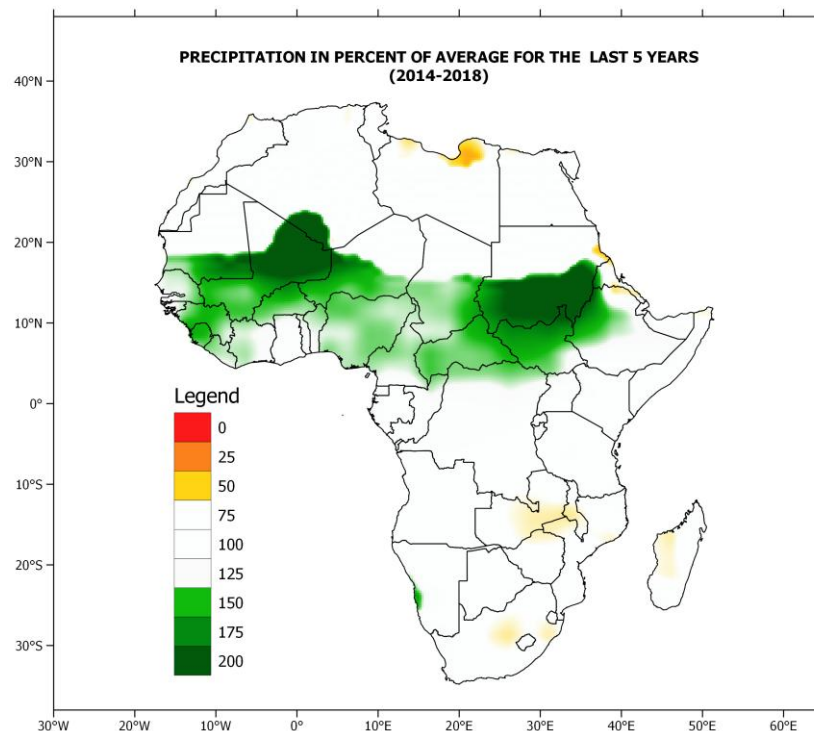


Figure 7: Mean annual precipitation in percent of average over Africa for the period: 2014-2018. Data source: http://iridl.ldeo.columbia.edu/SOURCES/NOAA/NCEP/CPC/CAMS_OPI/v0208/mean/prcp/

2.2 Precipitation trend over Africa during 1981-2018

Analysis of the precipitation trend over the African continent (Figure 8) reveals that there is a significant increasing trend of the annual precipitation over most parts of the Sahel region of West Africa.

On the other hand, significantly decreasing trends are exhibited over parts of the Horn of Africa, central Madagascar and Sierra Leone.

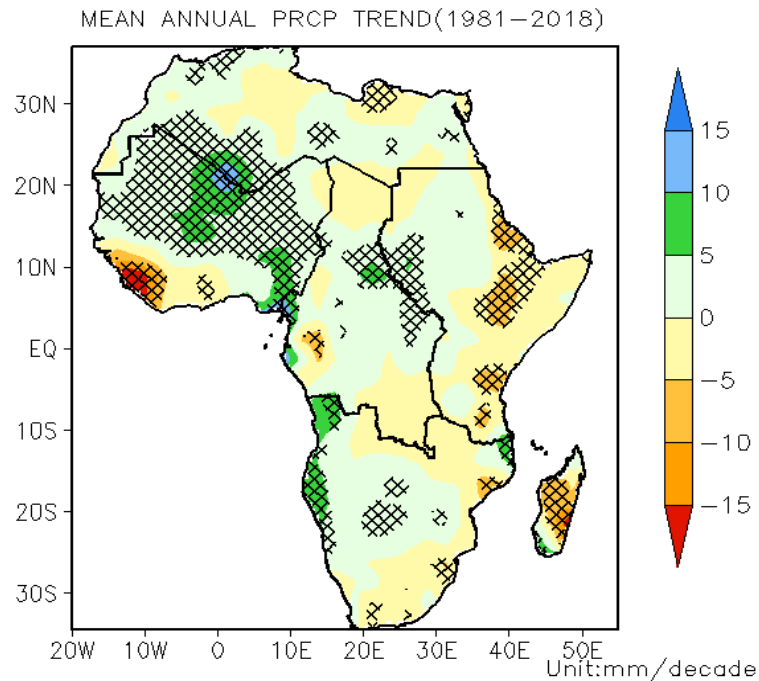


Figure 8: Annual precipitation trend over Africa for the period from 1981-2018. Hatched areas show significant increase (positive) or decrease (negative) at 95% level of confidence. Data source: https://iridl.ldeo.columbia.edu/SOURCES/.NOAA/.NCEP/.CPC/.CAMS_OPI/.v0208/.mean/.prcp/

2.3 Annual Precipitation percentage over Sahel and Gulf of Guinea

Precipitation in percent of average based on the reference year 1981-2010, Figure 9 reveals that there is a substantial increase in precipitation over Sahel region over the period from 1981 to 2018. On the other, there is a notable decreasing tendency in the annual precipitation over the Gulf of Guinea region, particularly over Guinea, Sierra Leone, and Liberia, exhibited in Figure 10 and depicted in Figure 8.

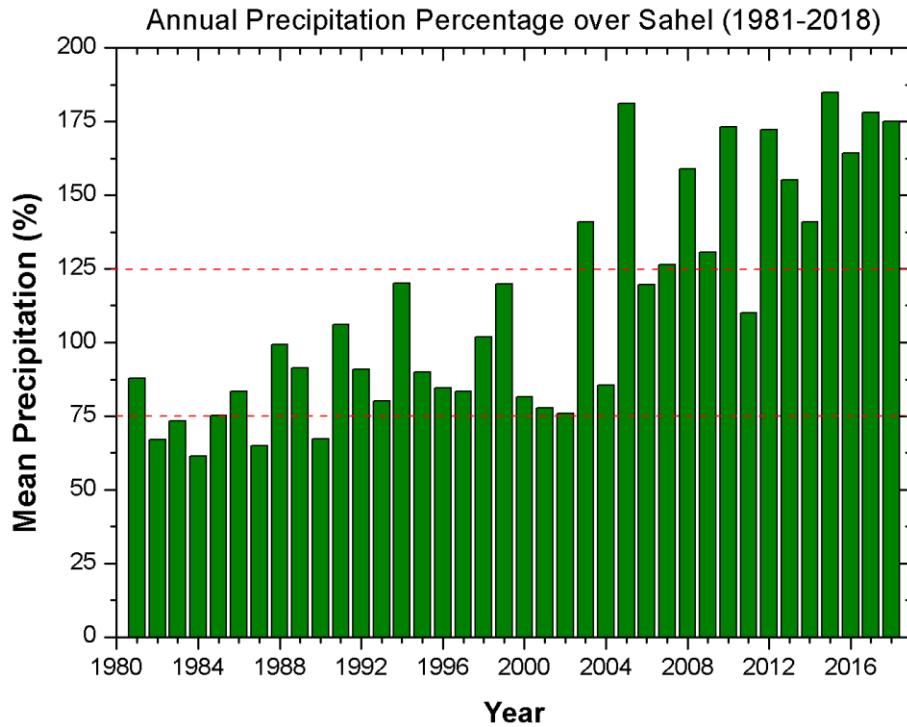


Figure 9 : Mean annual precipitation in percent of average over the Sahel for period:1981-2018, averaged over longitudes 5°W -7°E and latitudes 14°N-21°N (See Figure 8).

Data Source: https://iridl.ldeo.columbia.edu/SOURCES/NOAA/NCEP/CPC/CAMS_OPI.v0208/mean/prcp/

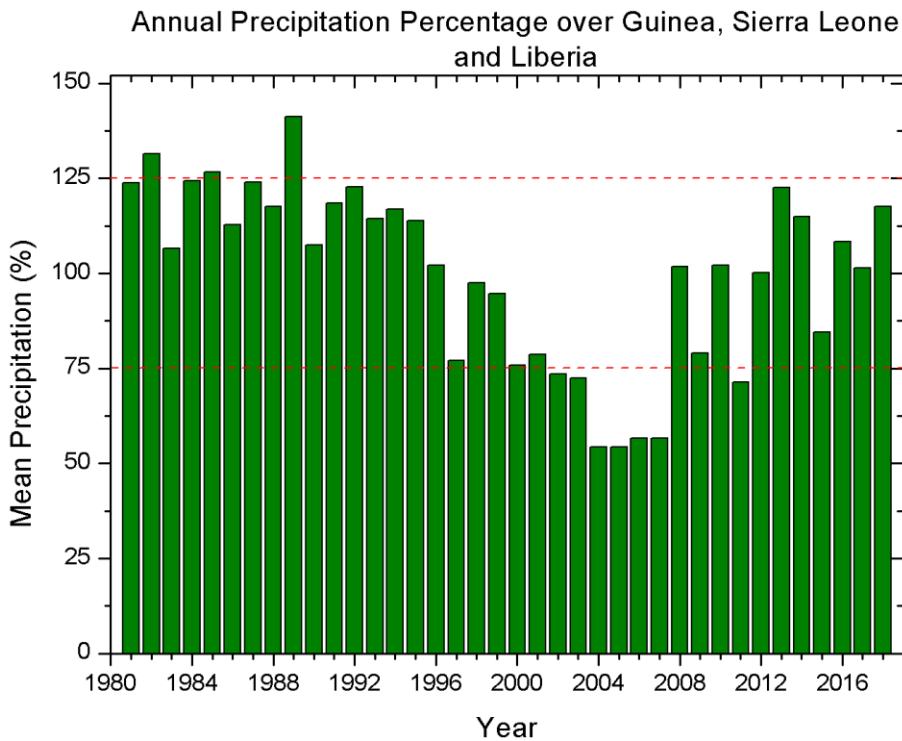


Figure 10: Annual precipitation percentage over Guinea, Sierra Leone and Liberia for the period:1981-2018, averaged over longitudes 12°W -8°W and latitudes 5°N-7°N (See Figure 8).

Data Source: https://iridl.ldeo.columbia.edu/SOURCES/NOAA/NCEP/CPC/CAMS_OPI.v0208/mean/prcp/

3. Tropical cyclones in the southwest Indian Ocean Basin

The 2017-2018 tropical cyclone season over the southwest Indian Ocean basin recorded 3 tropical storms and 5 cyclones (Figure 11). The recorded storms were below the long term mean occurrence in the region.

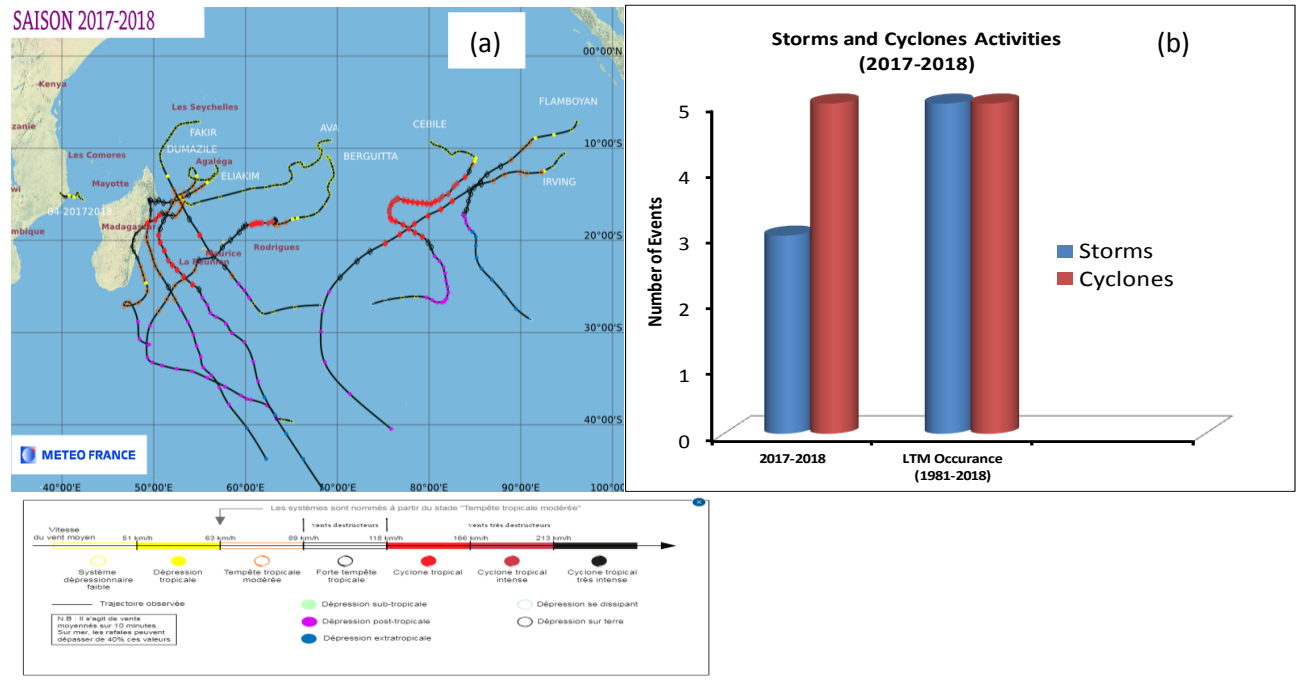
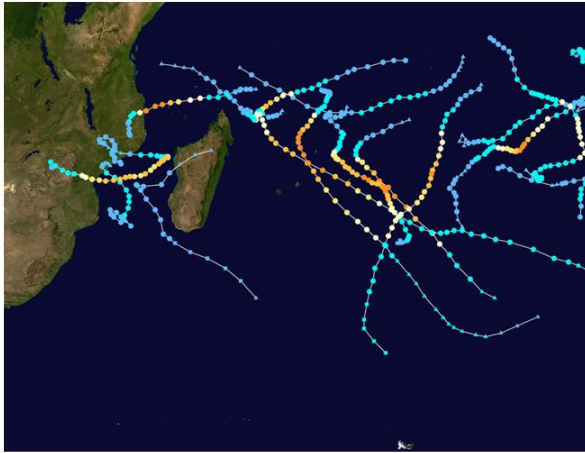


Figure 11: (a) South-west Indian Ocean tropical cyclone 2017-2018 season (b) Number of storm and cyclone occurrence compared with the respective long term mean (LTM) occurrences.

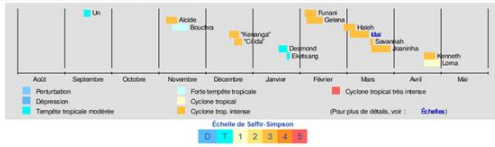
Data source: <http://www.meteofrance.re/>

Example of cyclone activities in 2019

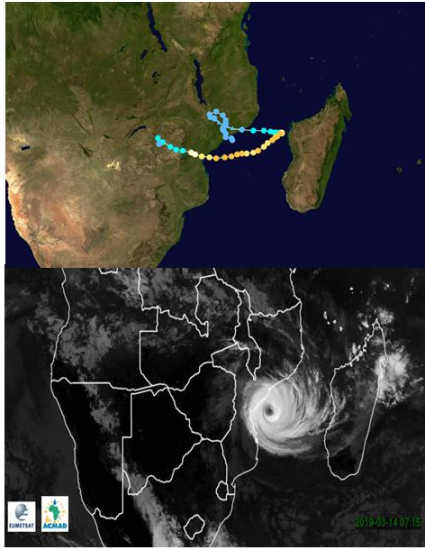
2018-2019 Cyclone season



Chronologie des événements [modifier | modifier le code]



Cyclone Idai



Cyclone Kenneth

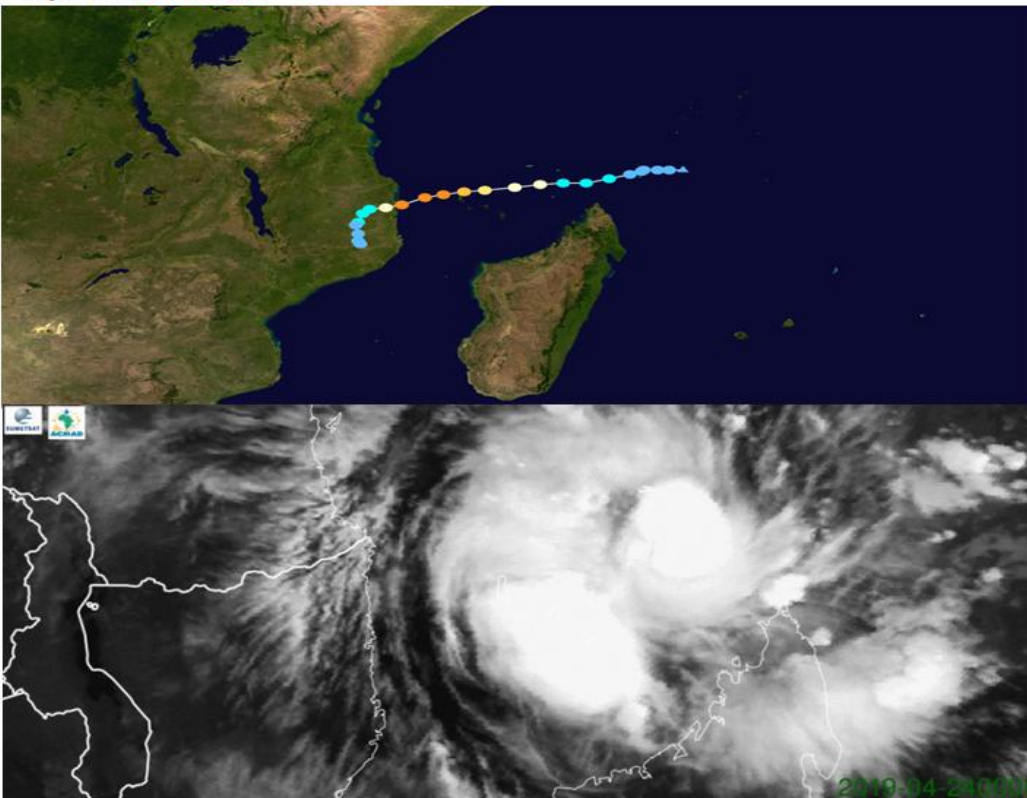


Figure 12: (a) South-west Indian Ocean tropical cyclone 2018-2019 season

4 Climate risks and related impacts

During the year 2018, several weather and climate related extreme events were experienced over the African continent (Figure 13). Well above average precipitation with floods and mudslides were recorded over West Africa (e.g. in Nigeria, Niger and Ghana, among others), Eastern Africa (e.g., Uganda, Kenya, Tanzania and Ethiopia), Central Africa (e.g. DRC) and Southern Africa (e.g. Lesotho), among others. On the other hand, precipitation deficit led to drought conditions over several regions as the year progressed. A severe drought conditions was recorded over parts of Southern Africa, where a declaration of a "national disaster" was made over the drought that ravaged parts of the country and threatened to leave the city of Cape Town without domestic tap water due to precipitation deficit. Table 5 provides a detailed information on selected significant weather and climate events observed in Africa during the year 2018.

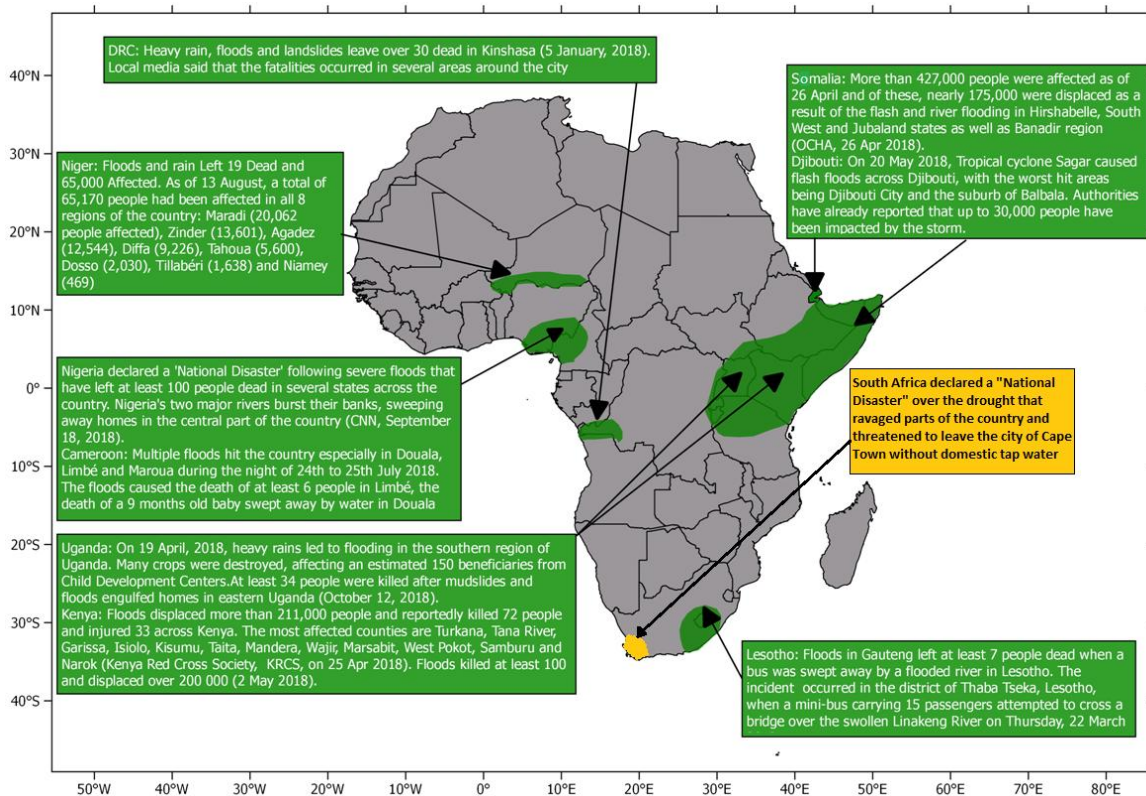


Figure 13: Selected extreme weather and climate events experienced in the year 2018 in Africa

Table 6: Detailed information of **sampled** significant events, hazards and impacts per region and country.

Eastern Africa	
Uganda (Oct 12, 2018)	At least 34 people were killed after mudslides and floods engulfed homes in eastern Uganda. At least six villages in Bududa district, located on the border with Kenya were affected (October 12, 2018, CNN-Kampala, Uganda). https://edition.cnn.com/2018/10/12/africa/uganda-mudslides-40-dead/index.html
Kenya (25 Apr 2018; 2 May 2018)	Floods displaced more than 211,000 people and reportedly killed 72 people and injured 33 across Kenya. The most affected counties are Turkana, Tana River, Garissa, Isiolo, Kisumu, Taita, Mandera, Wajir, Marsabit, West Pokot, Samburu and Narok (Kenya Red Cross Society, KRCS). The floods disrupted livelihoods, with at least 8,450 acres of farmland submerged in water and more than 6,000 livestock killed, destroyed houses and damaged infrastructure, such as roads and health facilities (OCHA, 25 Apr 2018). https://reliefweb.int/report/kenya/ocha-flash-update-1-floods-kenya-25-april-2018 Floods killed at least 100 and displaced over 200 000 (2 May 2018). https://www.news24.com/Africa/News/pics-kenya-floods-kill-at-least-100-displace-over-200-000-20180502
Djibouti (20 May 2018)	20 May 2018, Tropical cyclone Sagar caused flash floods across Djibouti, with the worst hit areas being Djibouti City and the suburb of Balbala. Authorities have already reported that up to 30,000 people have been impacted by the storm. https://disasterscharter.org/en/web/guest/activations/-/article/flood-in-djibouti-activation-572-
Sudan (During June, Jul and early November, 2018)	During Jul 2018, floods affected over 45,000 people, led to 23 human deaths and 61 injuries. In addition, more than 8,900 families were rendered homeless. Over 200,000 people in 15 of Sudan's 18 states were affected by heavy rains and flash floods between June and early November, according to the Government's Humanitarian Aid Commission (HAC). This is almost double the 122,500 people affected by floods the same time last year. The worst affected states are Kassala (47,500 people), Sennar (33,800 people) and West Kordofan (33,200 people). (OCHA, 4 Nov 2018). https://reliefweb.int/disaster/fl-2018-000128-sdn
Somalia (26 April, 2018)	More than 427,000 people were affected as of 26 April and of these, nearly 175,000 were displaced as a result of the flash and river flooding in Hirshabelle, South West and Jubaland states as well as Banadir region (OCHA, 26 Apr 2018). https://reliefweb.int/disaster/ff-2018-000041-som
Burundi (04 May, 2018)	Severe flooding in Gatumba on 04 May affected 12,956 people and 2,133 houses in 9 locations. Red Cross said that the flooding resulted from a period of heavy rain causing the overflow of two rivers, Rusizi 1 and 2, which are tributaries of Lake Tanganyika crossing Gatumba area from Kivu. http://floodlist.com/africa/burundi-buterefloods-april-may-2018-in
West Africa	
Nigeria (September 18, 2018; October 9, 2018)	Nigeria declared a 'national disaster' following severe floods that have left at least 100 people dead in several states across the country. Nigeria's two major rivers burst their banks, sweeping away homes in the central part of the country (CNN, September 18, 2018). https://edition.cnn.com/2018/09/18/africa/nigeria-flood-national-disaster/index.html By October 9, 2018, a total of 103 Local Government areas across 10 states in Nigeria, were impacted by severe flooding with an estimated 1.9 million people affected.
Niger (13 August, 2018)	Floods and rain Left 19 Dead and 65,000 Affected. As of 13 August, a total of 65,170 people had been affected in all 8 regions of the country: Maradi (20,062 people affected), Zinder (13,601), Agadez (12,544), Diffa (9,226), Tahoua (5,600), Dosso (2,030), Tillabéri (1,638) and Niamey (469). http://floodlist.com/africa/niger-floods-july-august-2018
Southern Africa	
Lesotho (22 March 2018)	Floods in Gauteng left at least 7 people dead when a bus was swept away by a flooded river in Lesotho. The incident occurred in the district of Thaba Tseka, Lesotho, when a mini-bus carrying 15 passengers attempted to cross a bridge over the swollen Linakeng River on Thursday, 22 March 2018. Put this text in tabular format. http://floodlist.com/tag/south-africa
South Africa	South Africa declared a "national disaster" over a drought that ravaged parts of the country and threatened to leave the city of Cape Town without domestic tap water. https://phys.org/news/2018-06-safrica-state-disaster-

(13 February 2018)	drought.html#jCp (The City of Cape Town said on its web site that Day Zero had been “pushed out to 2019.” Residents had to live with stringent consumption restrictions, which stood at 50 litres per person per day)
Mauritius (24 April, 2018)	Mauritius experienced heavy rain from tropical cyclone Fakir that Triggered deadly landslide on 24 April, 2018. http://floodlist.com/africa/reunion-mauritius-cyclone-fakir-april-2018
Central Africa	
DRC (5 January, 2018)	Heavy rain, floods and landslides leave over 30 dead in Kinshasa (5 January, 2018). At least 37 people are thought to have died, and it is feared that this figure could rise as further assessments are carried out. Local media said that the fatalities occurred in several areas around the city, including in Ngaliema, Selembao, Bandalungwa, Limete and Barumbu. http://floodlist.com/africa/drc-floods-landslides-kinshasa-january-2018
Côte d’Ivoire (18 June 2018)	The Country’s National Civil Protection Office (ONPC) said that heavy rainfall on 18 June 2018 resulted in flooding that caused at least 18 deaths in Abidjan and severe material damage. As of 19 June, 115 people had been rescued from the floods and provided with shelter by authorities. http://floodlist.com/africa/ivory-coast-abidjan-floods-june-2018
Cameroon (24th & 25th July 2018)	Multiple floods hit the country especially in Douala, Limbé and Maroua during the night of 24th to 25th July 2018. The floods caused the death of at least 6 people in Limbé, the death of a 9 months old baby swept away by water in Douala and important material damages estimated in several hundred millions FCFA francs in Limbé as well as in Douala and the destruction of 700 houses in Maroua, that consequently left thousands homeless and concerns on the economic activities in the whole region. http://www.africanews.com/2018/07/25/cameroon-cities-of-douala-limbe-hit-by-heavy-flooding/ (Africa News; GardaWorld Crisi24 News Alerts; Tebopost news, ...)

[A glance at significant events, hazards and impacts in 2019.](#)

Heavy rains flooded parts of Malawi in mid-March 2019, before developing into Cyclone Idai which struck Mozambique and Zimbabwe on 14-15 March, 2019. The flooding led to destruction of homes and other properties. The humanitarian needs was enormous (ReliefWeb, 22 Mar 2019). Reports from Beira, Mozambique reveals that between 300 to 400 dead bodies lined the banks of a road out of the city of Beira, and flood waters formed an inland ocean that was visible from outer space (Cardovillis et. al, CNN- March 25, 2019).

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