

## South Africa

In this section explore the latest projections about climate change

What is South Africa's climate like?

- South Africa, the southernmost country in Africa, is part of the Southern Hemisphere's subtropical zone
- Temperatures can often exceed 32°C in the summer and can drop several degrees below freezing point at higher elevations in winter
- The warm Agulhas ocean current sweeps southward along the Indian Ocean coastline, and the cold Benguela current sweeps northward along the Atlantic Ocean coastline. As a result, temperatures along the east coast of the country are about 5°C warmer than temperatures at same latitudes along the west coast
- There is very little difference in average temperatures from south to north. However, the daily temperature ranges are markedly higher on the plateau where clear winter weather allows overnight freezing temperatures to contrast with warm midday temperatures
- South Africa experiences a convective type rainy season in the summer months (November to March). The southwest region receives mostly mid-latitude frontal rainfall in winter months (May to August). Rainfall varies considerably from west to east, associated with the positioning of the ocean currents and the general anticyclonic circulation over the subcontinent. The north western region of the country receives less than 200 mm rainfall p.a. whereas the eastern parts receive over 500 mm rainfall annually
- El Niño Southern Oscillation events and sea-surface temperature anomalies in the Indian and South Atlantic Oceans significantly influence rainfall variability in South Africa

**Graph one: How did South Africa's temperature change between 1960 and 2009?**

- The black line shows the actual temperature anomaly for each year from 1960 to 2000. This is the difference in temperature between the year's recorded temperature and the average of all years between 1970 and 1999. If the anomaly is positive, that year was warmer than the 1970-1999 average. If it is negative, that year was colder than the 1970-1999 average
- The brown line shows past temperature anomalies as produced by a computer model with the brown shading showing the range of temperatures produced by the model
- Mean annual temperature averaged over South Africa increased by around 0.6°C between 1960 and 2006, at an average rate of 0.14°C per decade
- The green, blue and red lines show projected future temperatures from 2006 to 2100, according to three different emission scenarios – green (low), blue (medium) and red (high). The shading around each line shows the range of temperature that might be possible with each emission scenario
- The mean annual temperature is projected to increase by 1.1 to 2.4°C by the 2060s, and 1.6 to 4.3°C by the 2090s. The projected rate of warming is similar throughout the year. Warming is expected to be greater inland than in coastal regions

**Graphs two to four: How will South Africa's annual temperature change during the 2030s, 60s and 90s?**

- These 3 maps show projected temperatures in the 2030s, 60s and 90s (according to a high carbon dioxide emissions scenario, A2)
- All values are anomalies– the difference in temperature to the average of 1970 to 1999 temperatures

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- Areas shaded deep orange will be 6°C hotter than average temperatures from 1970 to 1999, whereas areas shaded green will be the same as the 1970-1999 average
- The numbers in the centre of each grid box is the average projected temperature; numbers in the upper and lower corners give the highest and lowest possible annual mean temperature
- The mean annual temperature is projected to increase by 1.1 to 2.4°C by the 2060s, and 1.6 to 4.3°C by the 2090s. The projected rate of warming is similar throughout the year

## **Graphs five to seven: How will South Africa's temperature change seasonally? – December, January, February**

- These 3 maps show projected December, January and February (DJF) temperatures in the 2030s, 60s and 90s (according to a high carbon dioxide emissions scenario, A2)
- All values are anomalies– the difference in temperature to the average of 1970 to 1999 temperatures
- Areas shaded red will be 6-7°C hotter than average temperatures from 1970 to 1999, whereas areas shaded green will be the same as the 1970-1999 average
- The number in the centre of each grid box is the average projected temperature; numbers in the upper and lower corners give the highest and lowest possible DJF mean temperature
- The projected rate of warming is similar throughout the year.

## **Graphs eight to 10: How will South Africa's temperature change seasonally? – March, April, May**

- These 3 maps show projected March, April and May (MAM) temperatures in the 2030s, 60s and 90s (according to a high carbon dioxide emissions scenario, A2)
- All values are anomalies– the difference in temperature to the average of 1970 to 1999 temperatures
- Areas shaded red will be 6-7°C hotter than average temperatures from 1970 to 1999, whereas areas shaded green will be about the same as the 1970-1999 average
- The number in the centre of each grid box is the average MAM temperature anomaly we expect having had high carbon dioxide emissions; the smaller numbers in the upper and lower corners give the range of average temperature anomalies that might occur
- The projected rate of warming is similar throughout the year.

## **Graphs 11 to 13: How will South Africa's temperature change seasonally? – June, July, August**

- These 3 maps show projected June, July and August (JJA) temperatures in the 2030s, 60s and 90s (according to a high carbon dioxide emissions scenario, A2)
- All values are anomalies– the difference in temperature to the average of 1970 to 1999 temperatures
- Areas shaded red will be 6-7°C hotter than average temperatures from 1970 to 1999, whereas areas shaded green will be about the same as the 1970-1999 average
- The number in the centre of each grid box is the average JJA temperature anomaly we expect having had high carbon dioxide emissions; the smaller numbers in the upper and lower corners give the range of average temperature anomalies that might occur
- The projected rate of warming is similar throughout the year

## **Graphs 14 to 16: How will South Africa's temperature change seasonally? – September, October, November**

- These 3 maps show projected September, October and November (SON) temperatures in the 2030s, 60s and 90s (according to a high carbon dioxide emissions scenario, A2)
- All values are anomalies– the difference in temperature to the average of 1970 to 1999 temperatures
- Areas shaded red will be 6-7°C hotter than average temperatures from 1970 to 1999, whereas areas shaded green will be about the same as the 1970-1999 average

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- The number in the centre of each grid box is the average temperature anomaly we expect having had high carbon dioxide emissions; the smaller numbers in the upper and lower corners give the range of average temperature anomalies that might occur
- The projected rate of warming is similar throughout the year

## Graphs 17 to 18: How will South Africa's frequency of hot days change?

- These two maps show the percentage of hot days expected during the 2060s and 2090s given high carbon dioxide emissions through the century (scenario A2)
- A hot day is defined by the temperature exceeded on 10% of days in 1970-1999. So, in 1970–1999, you would have expected 1 in 10 days to be hot. If the map shading indicates that more than 10% of days are hot, then there has been an increase in the number of hot days
- In areas shaded deep red, every day will be a hot day. Yellow areas will have 30% hot days
- The number in the centre of each grid box is the number of hot days we expect; the smaller numbers in the upper and lower corners give the range of numbers of hot days that might occur
- Annually, projections indicate that the frequency of 'hot' days will increase from about 11% during the period 1970-1999 to 16-25% of days by the 2060s, and 20-39% of days by the 2090s
- Days that are hot are projected to increase most rapidly in December to February, with up to 62% of days being hot by the 2090s

## Graphs 19 to 20: How will South Africa's frequency of hot nights change?

- These two maps show the percentage of hot nights expected during the 2060s and 2090s given high carbon dioxide emissions through the century (scenario A2)
- A hot night is defined by the temperature exceeded on 10% of nights in 1970-1999. So, in 1970–1999, you would have expected 1 in 10 nights to be hot. If the map shading indicates that more than 10% of nights are hot, then there has been an increase in the number of hot nights
- In areas shaded deep red, every night will be a hot night. Yellow areas will have 30% hot nights
- The number in the centre of each grid box is the number of hot nights we expect; the smaller numbers in the upper and lower corners give the range of numbers of hot nights that might occur
- Nights that are considered 'hot' are projected to increase from around 11% to 16-31% of nights by the 2060s and 19-44% of nights by the 2090s. Nights that are hot are projected to increase most rapidly in December - February, occurring on 27-78% of nights by the 2090s

## Graph 21: How will South Africa's precipitation change?

- This graph shows the 'precipitation anomaly' – the difference in rain or snowfall to the 1970-1999 average. If the graph shows a positive number, then it is wetter than the 1970-1999 average. If the graph shows a negative number, then it is drier
- The black line shows the actual precipitation anomaly for each year from 1960 to 2006. This is the difference in rain/ snowfall between the year's recorded precipitation and the average of all years between 1970 and 1999
- The brown line shows past precipitation anomalies as produced by a computer model with the brown shading showing the range produced by the model
- The green, blue and red lines show projected future precipitation from 2006 to 2100, according to three different carbon dioxide emission scenarios – green (low), blue (medium) and red (high). The shading around each line shows the range of precipitation that might be possible with each emission scenario
- Mean rainfall over South Africa has decreased by 1.5mm per month (3.7%) per decade since 1960. In the March-May season, rainfall has decreased by 2.5mm per month (6.6%) per decade in rainfall

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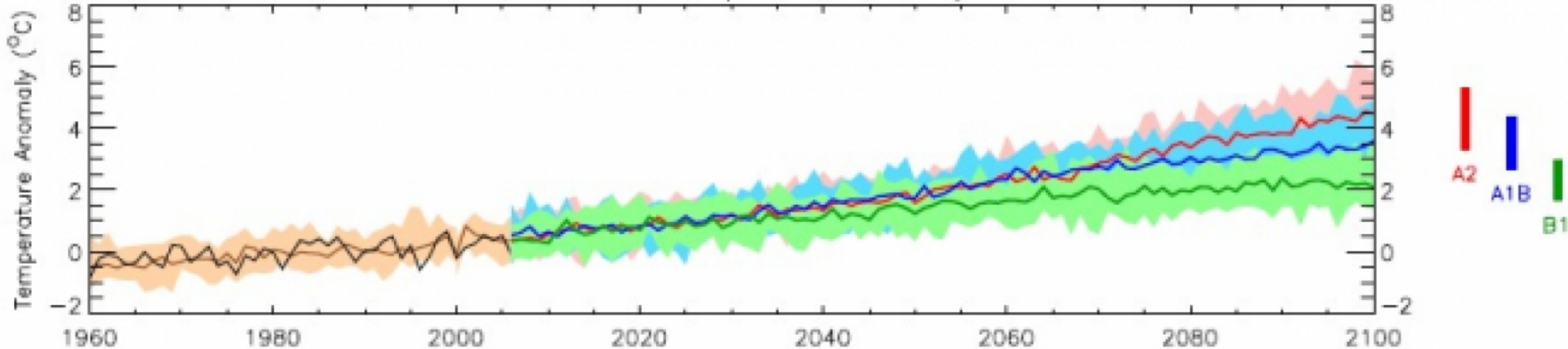
- In the future, rainfall will probably decrease slightly in South Africa. There will probably not be much change in the number of heavy rainfall events

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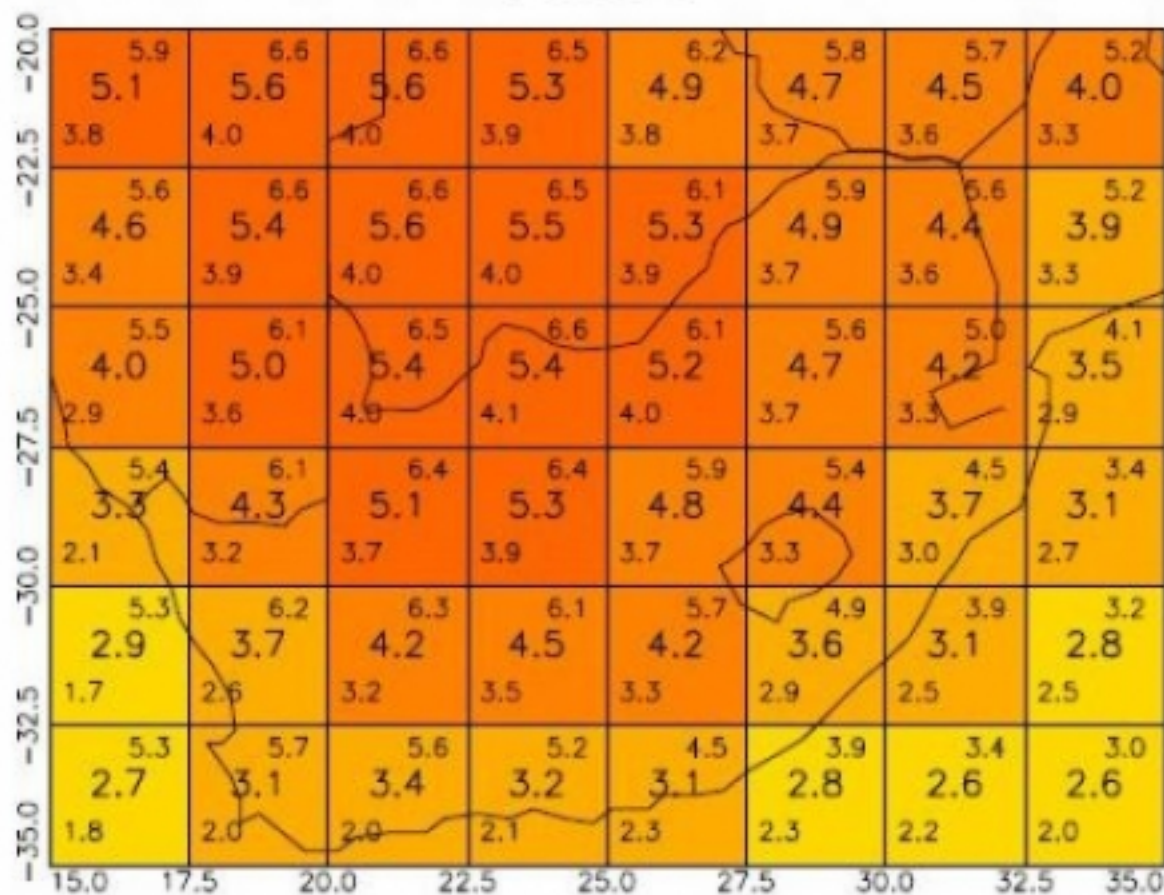
South Africa: Mean Temperature Anomaly Annual







# 2090s



(°C)

+7.0

+6.0

+5.0

+4.0

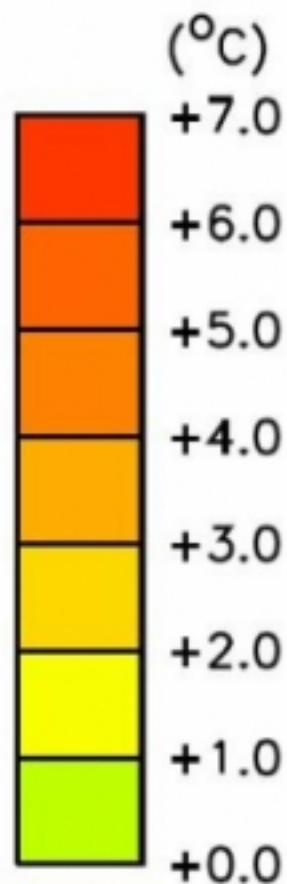
+3.0

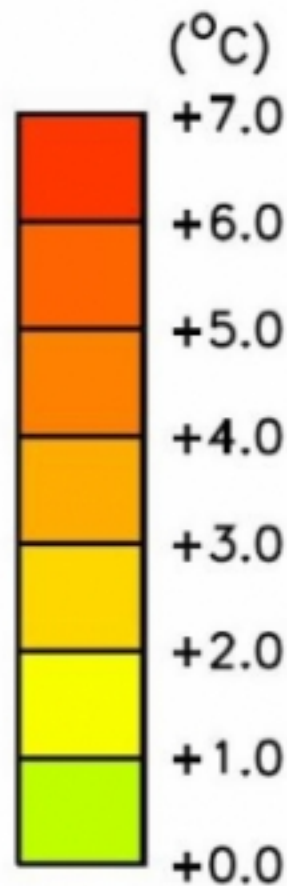
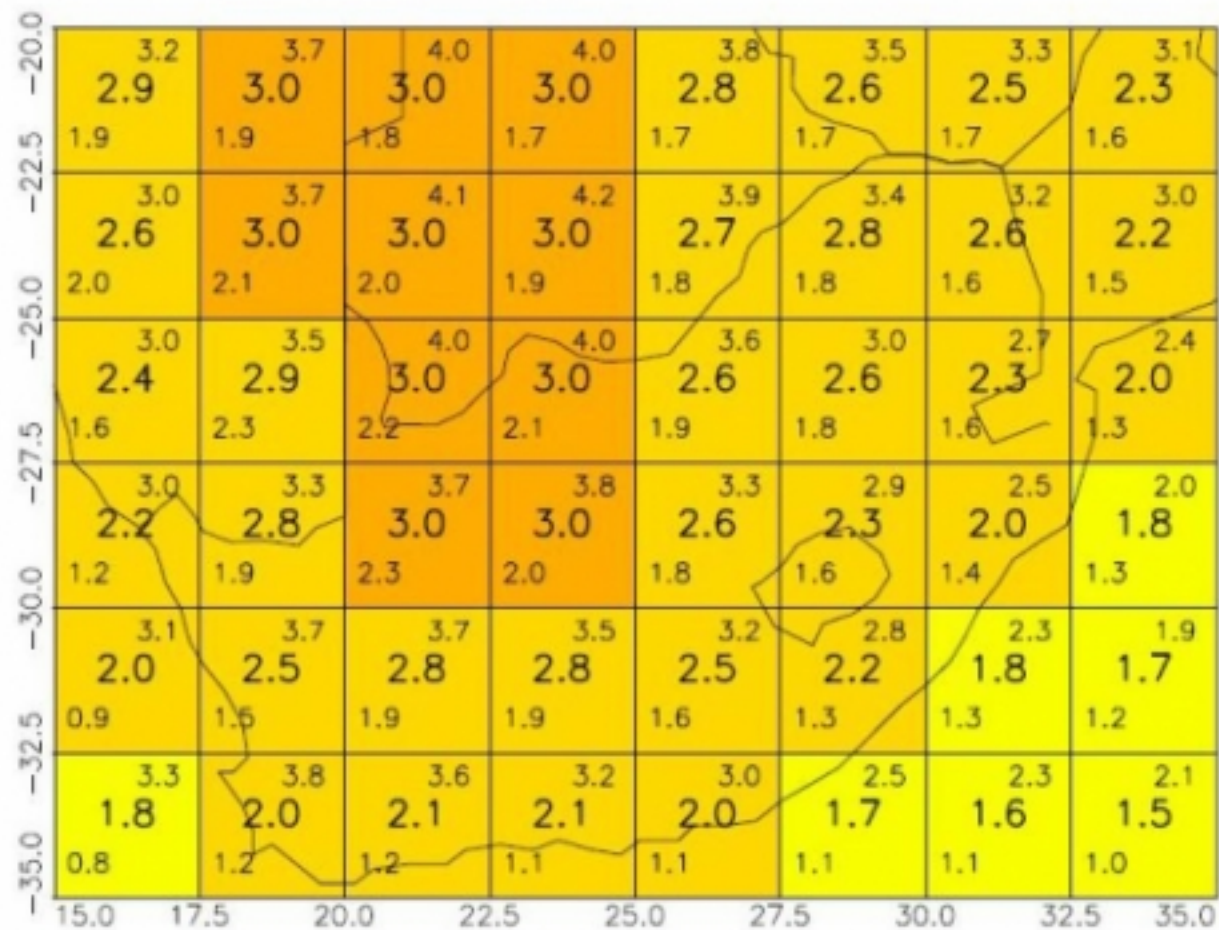
+2.0

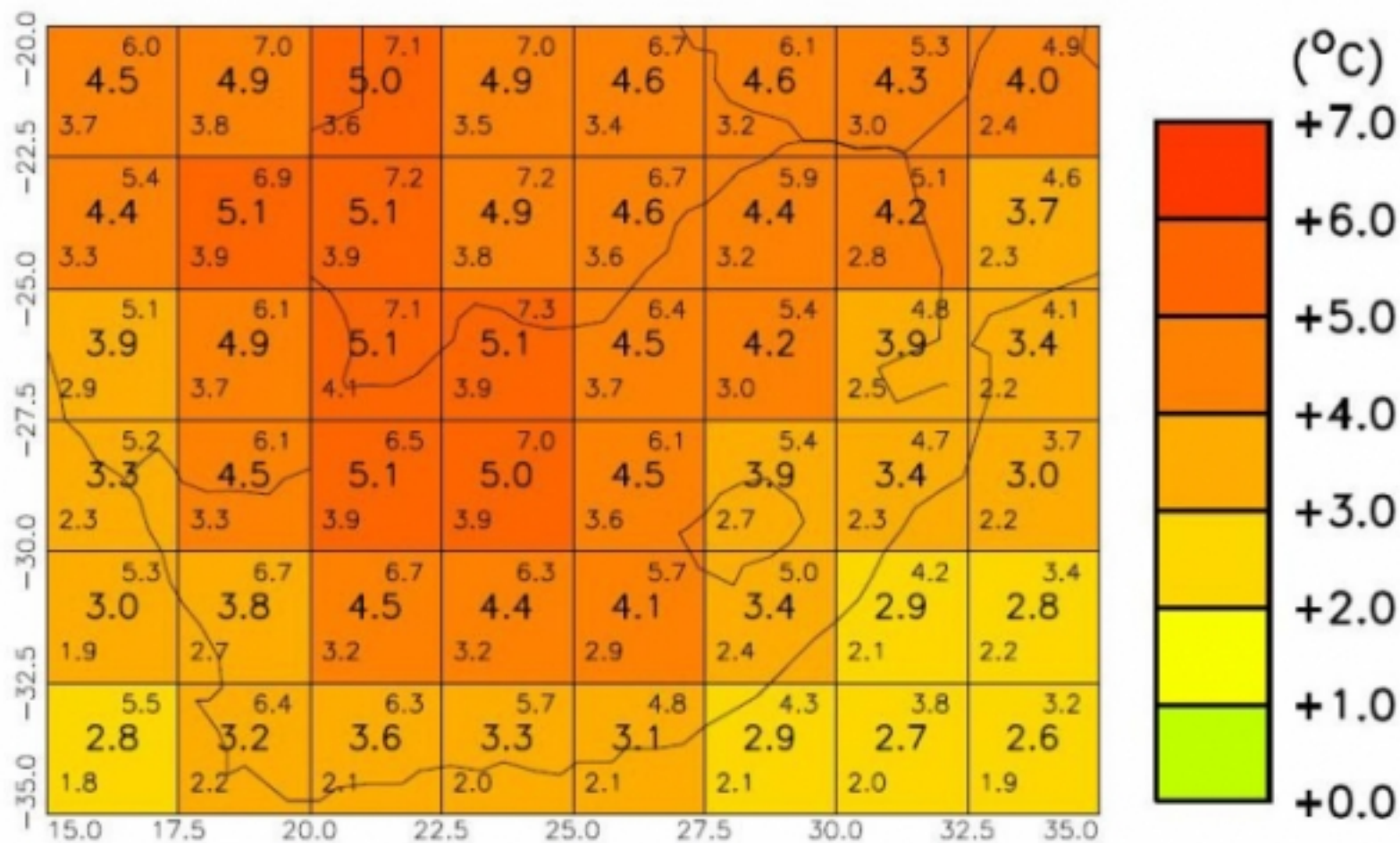
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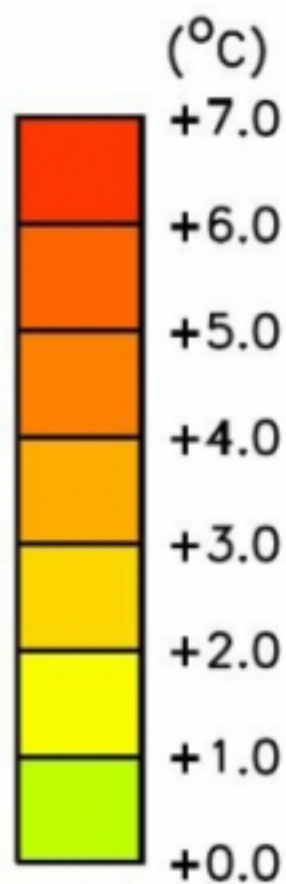
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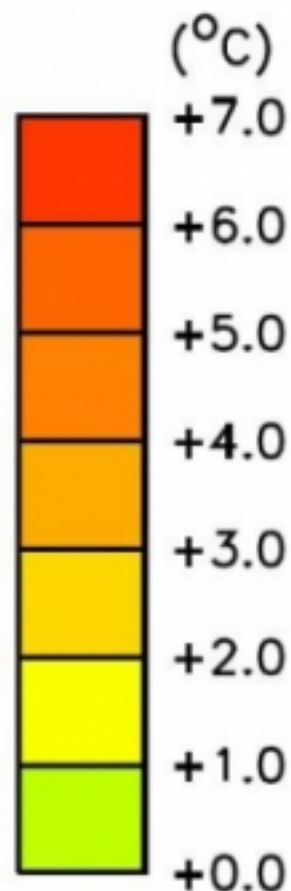
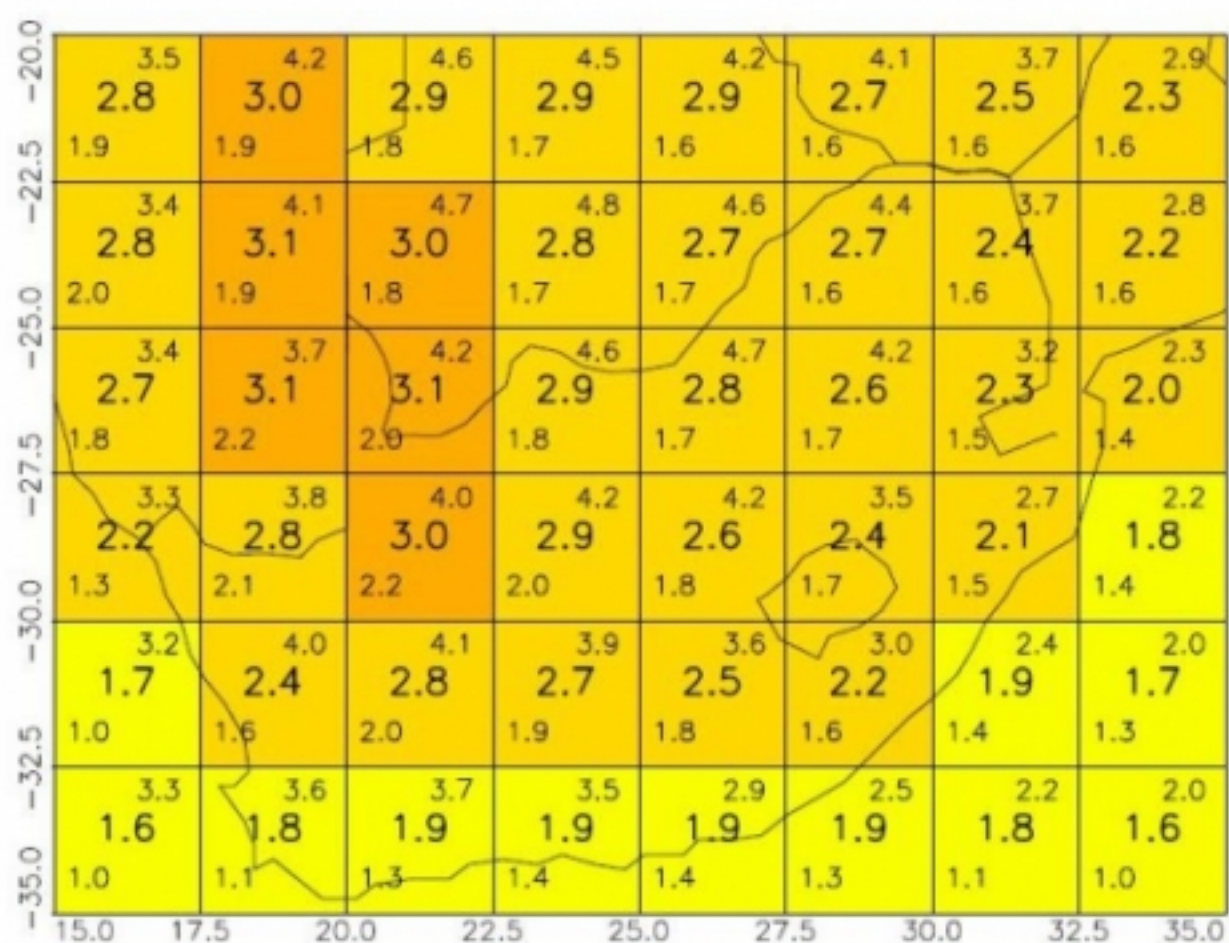


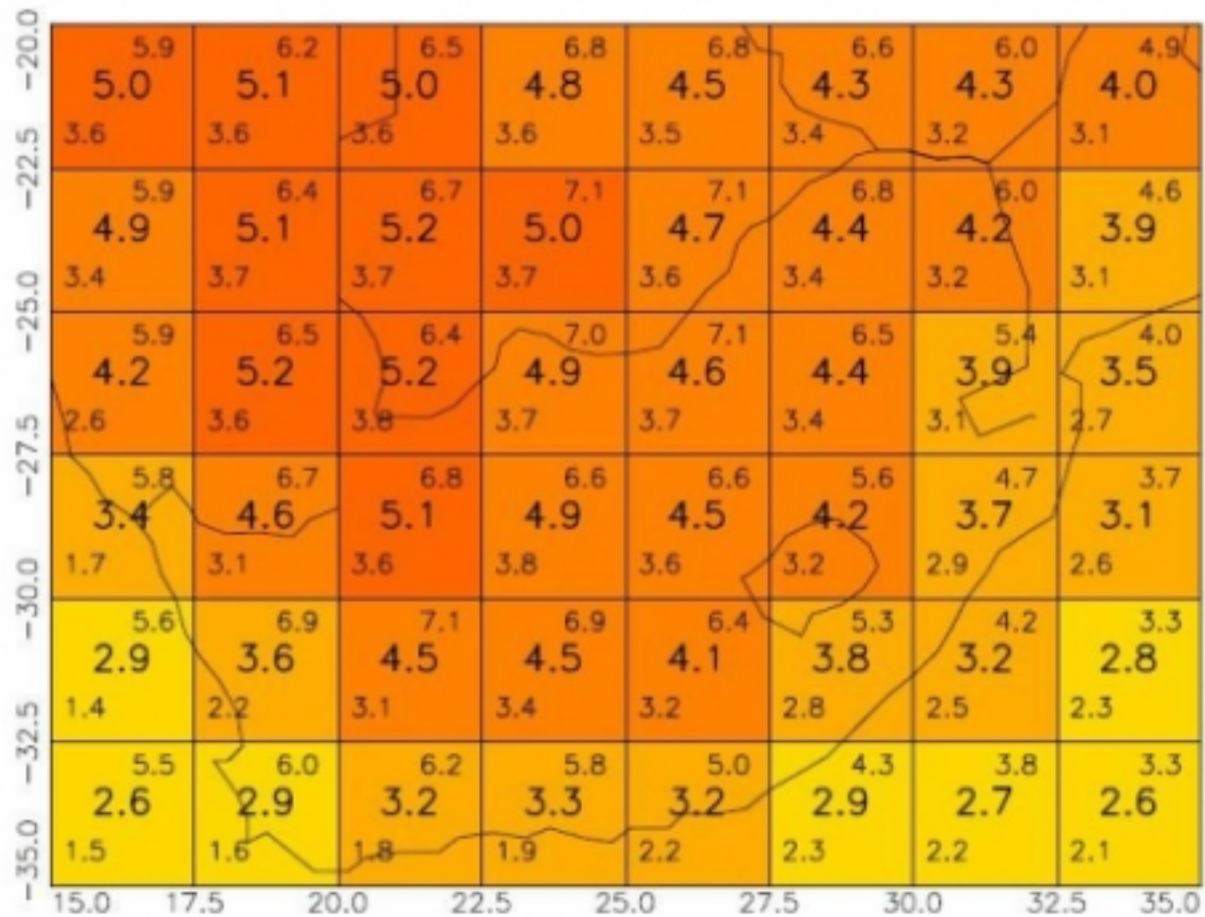












MAM

(°C)

+7.0

+6.0

+5.0

+4.0

+3.0

+2.0

+1.0

+0.0



(°C)

+7.0

+6.0

+5.0

+4.0

+3.0

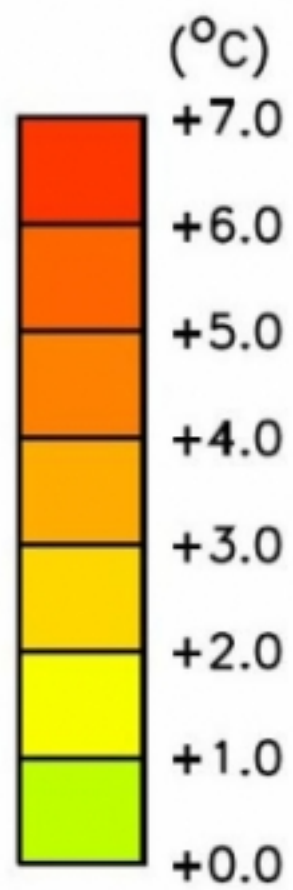
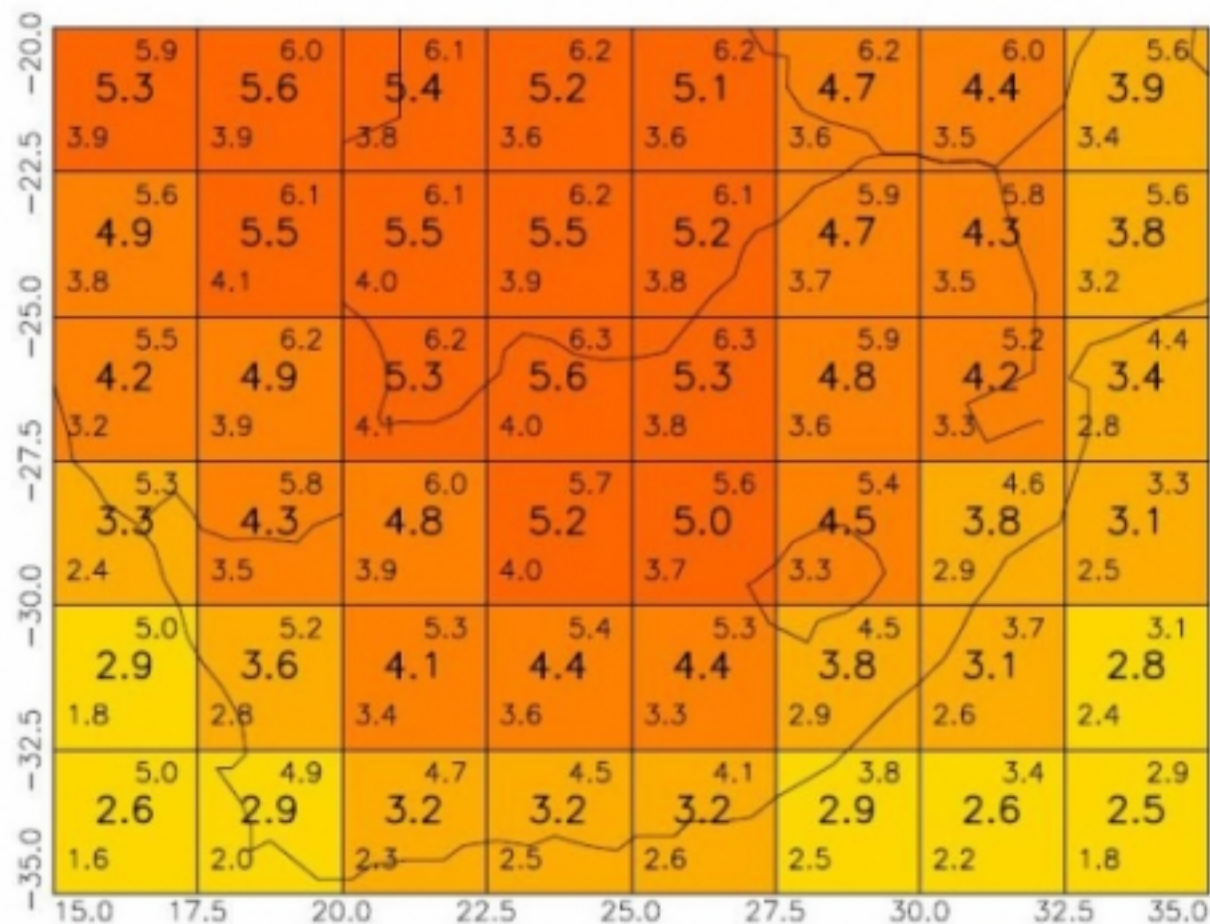
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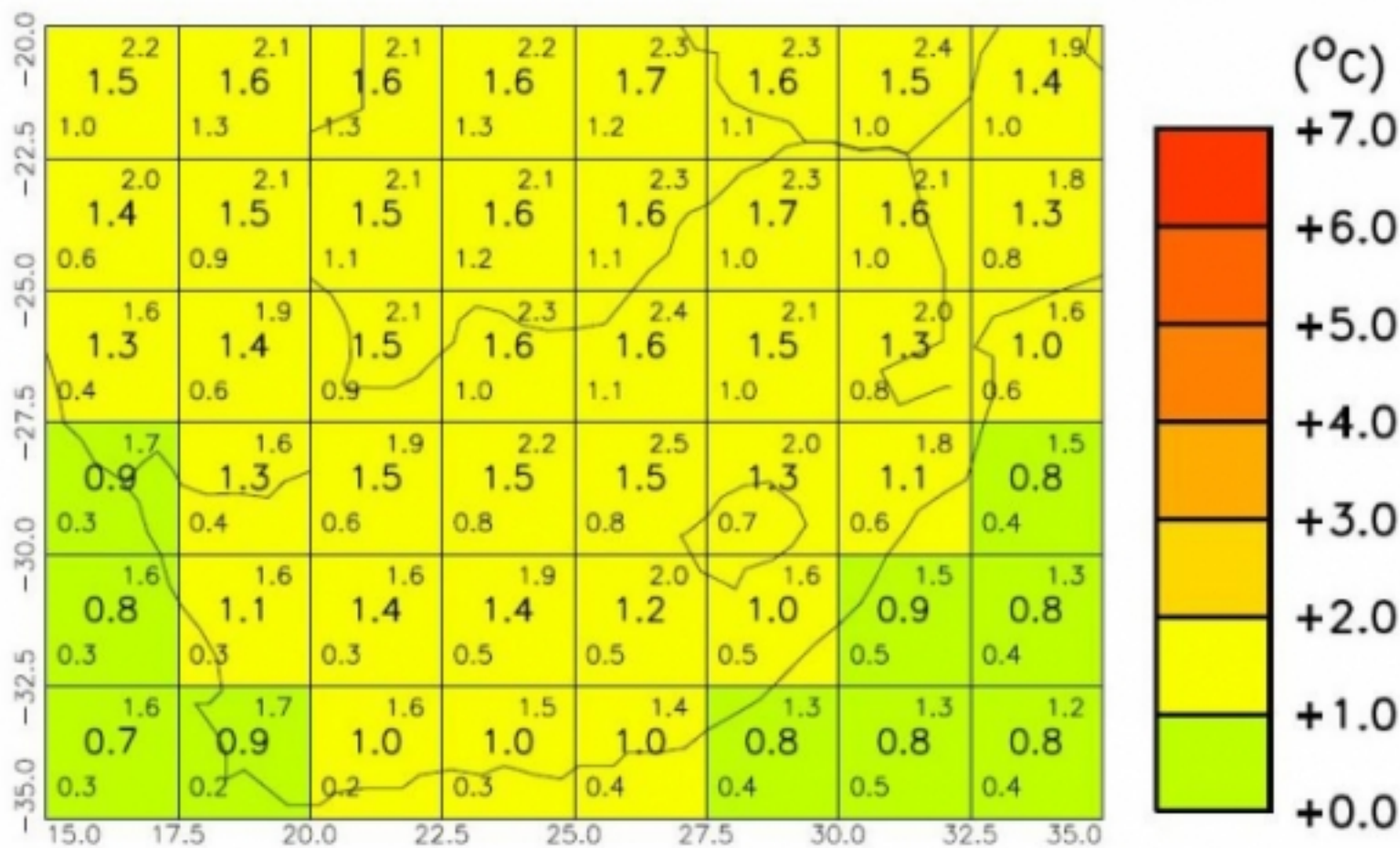
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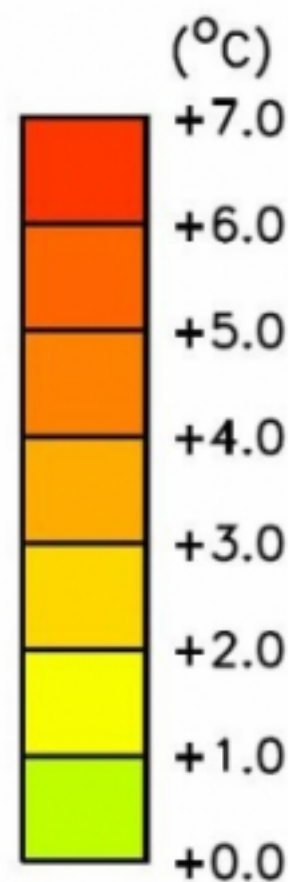
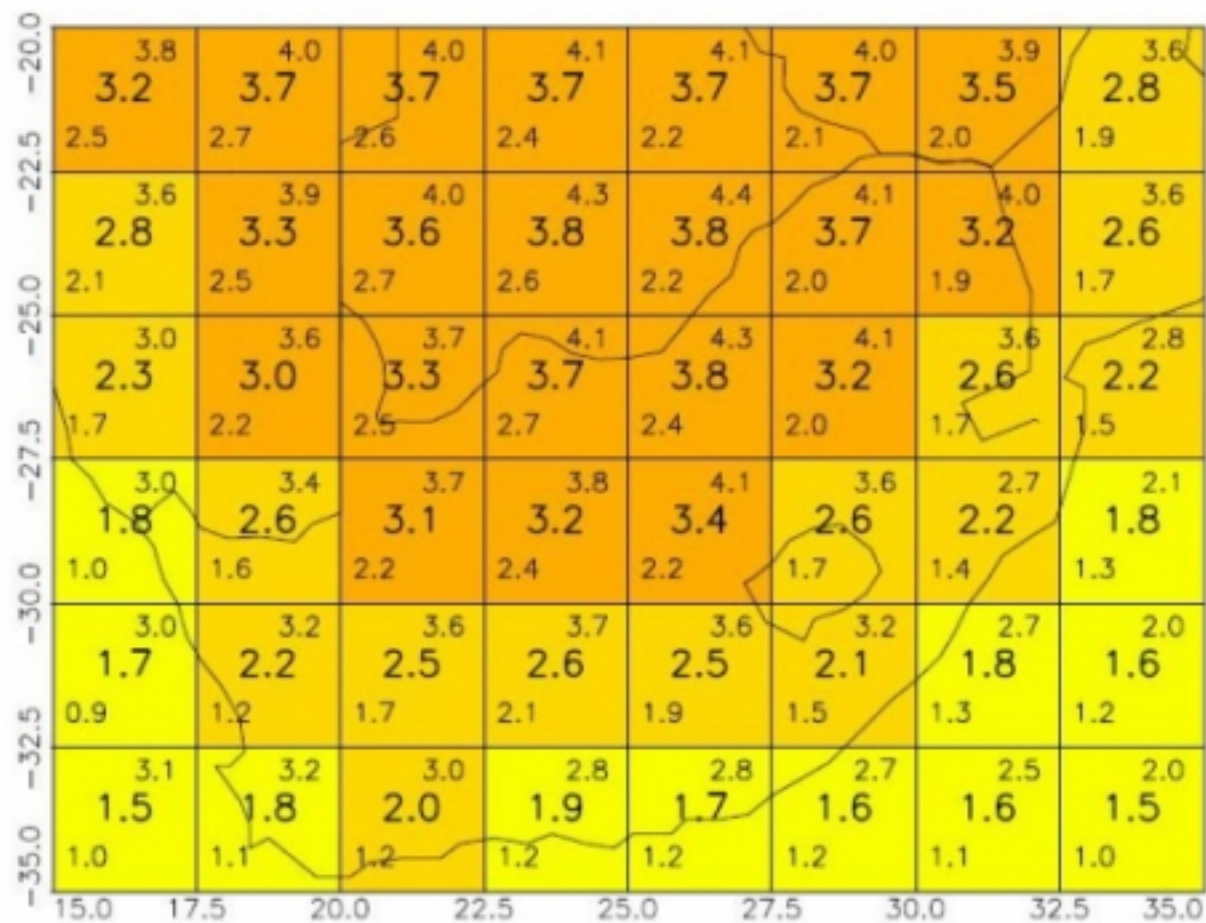
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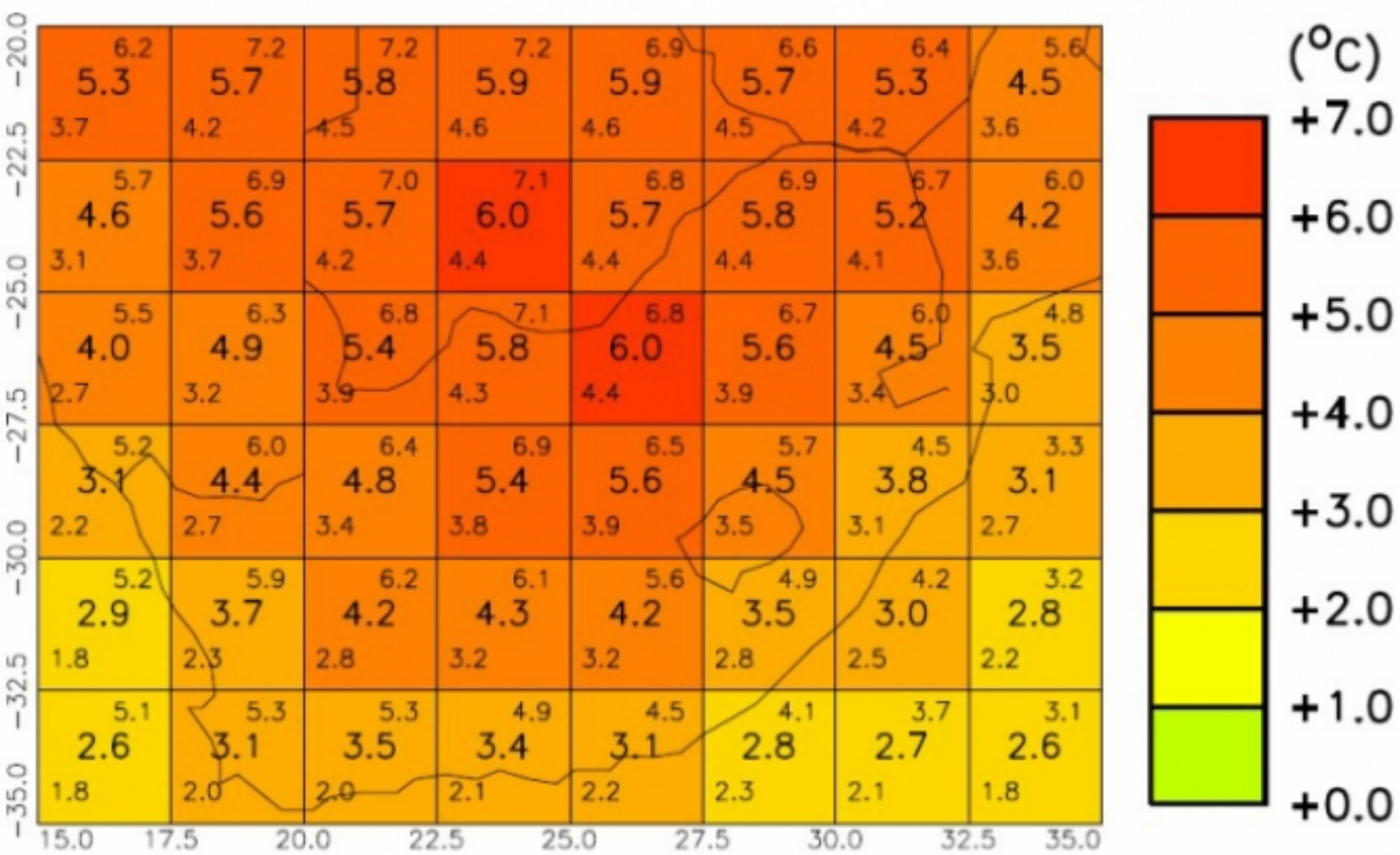




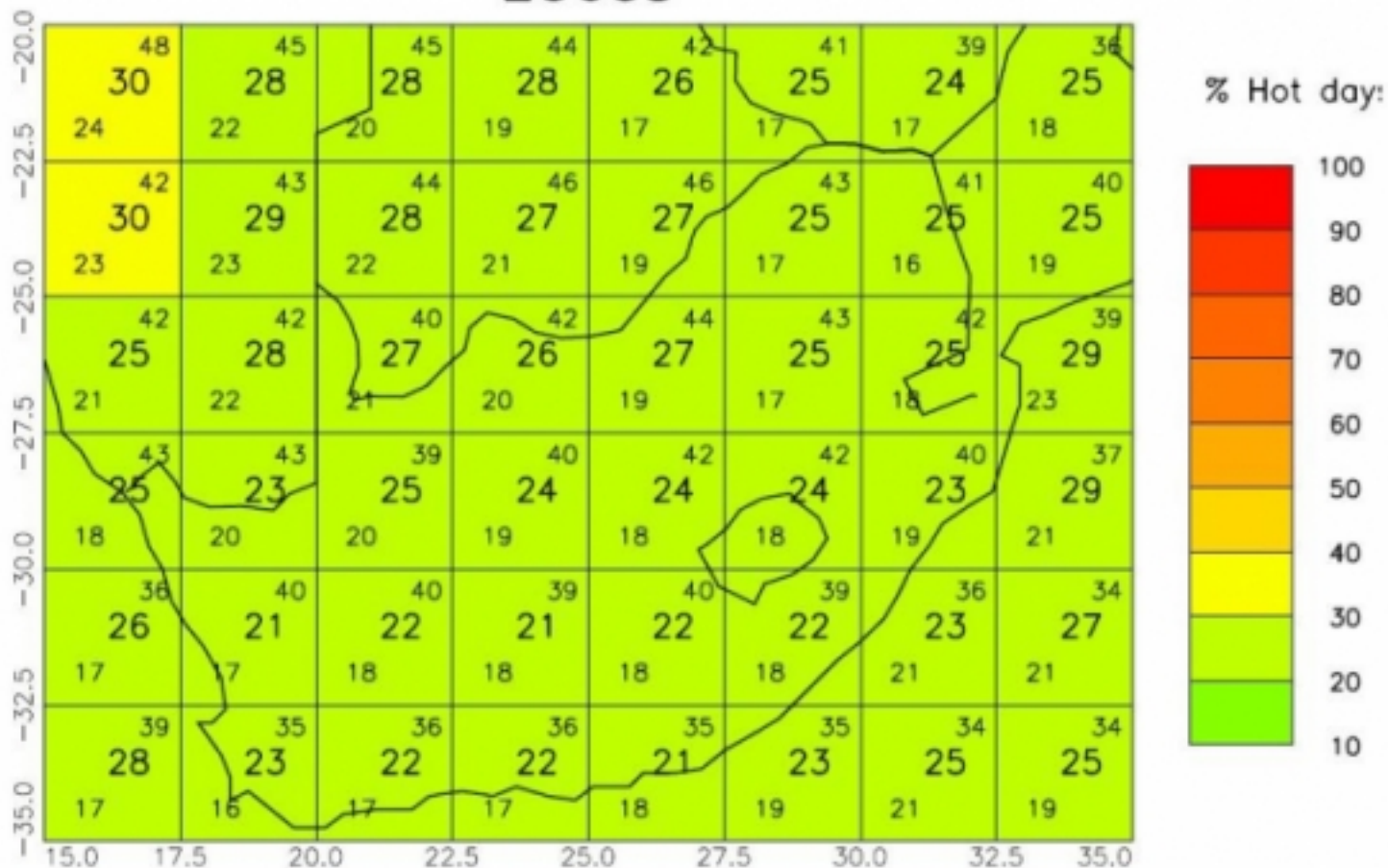




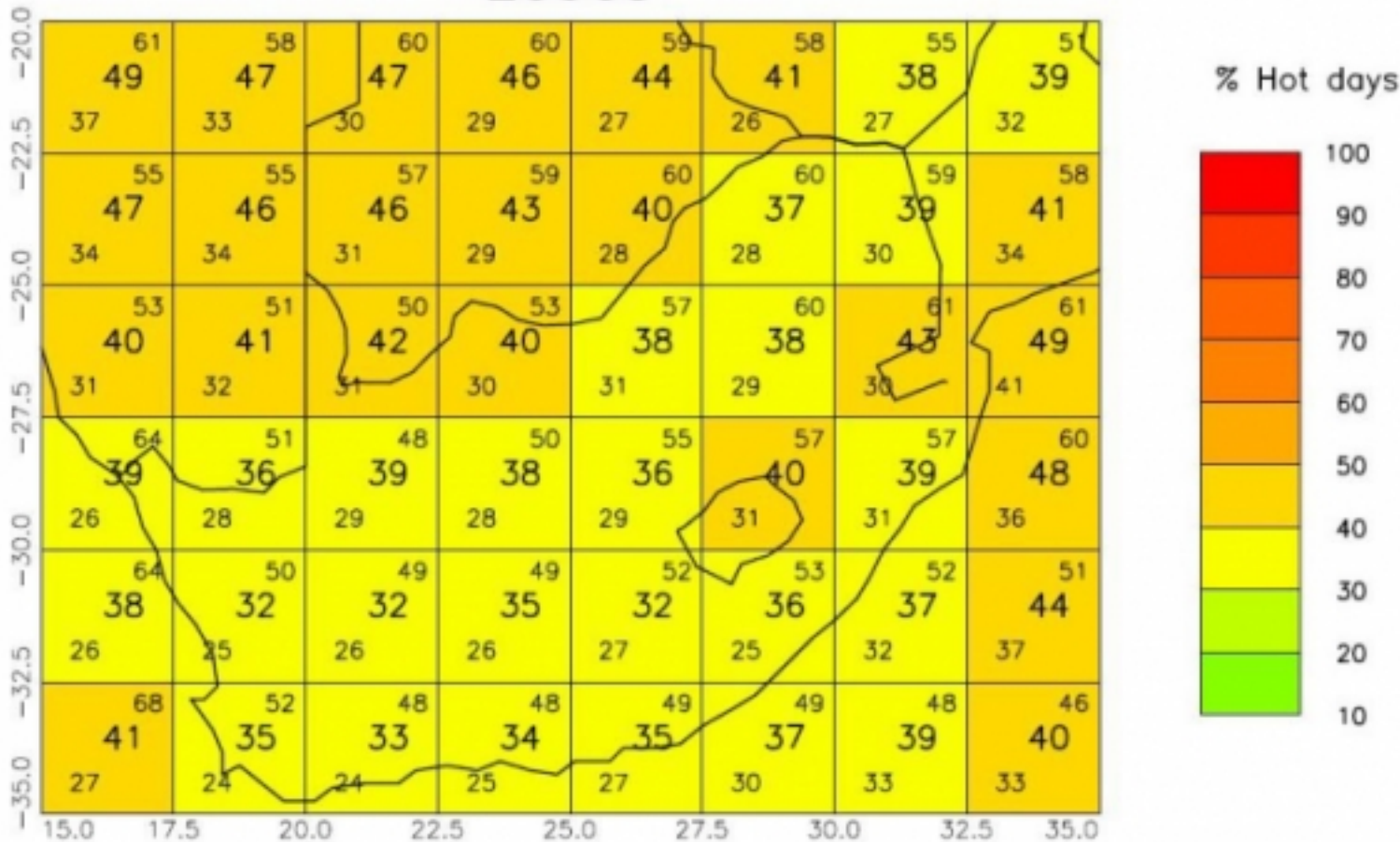




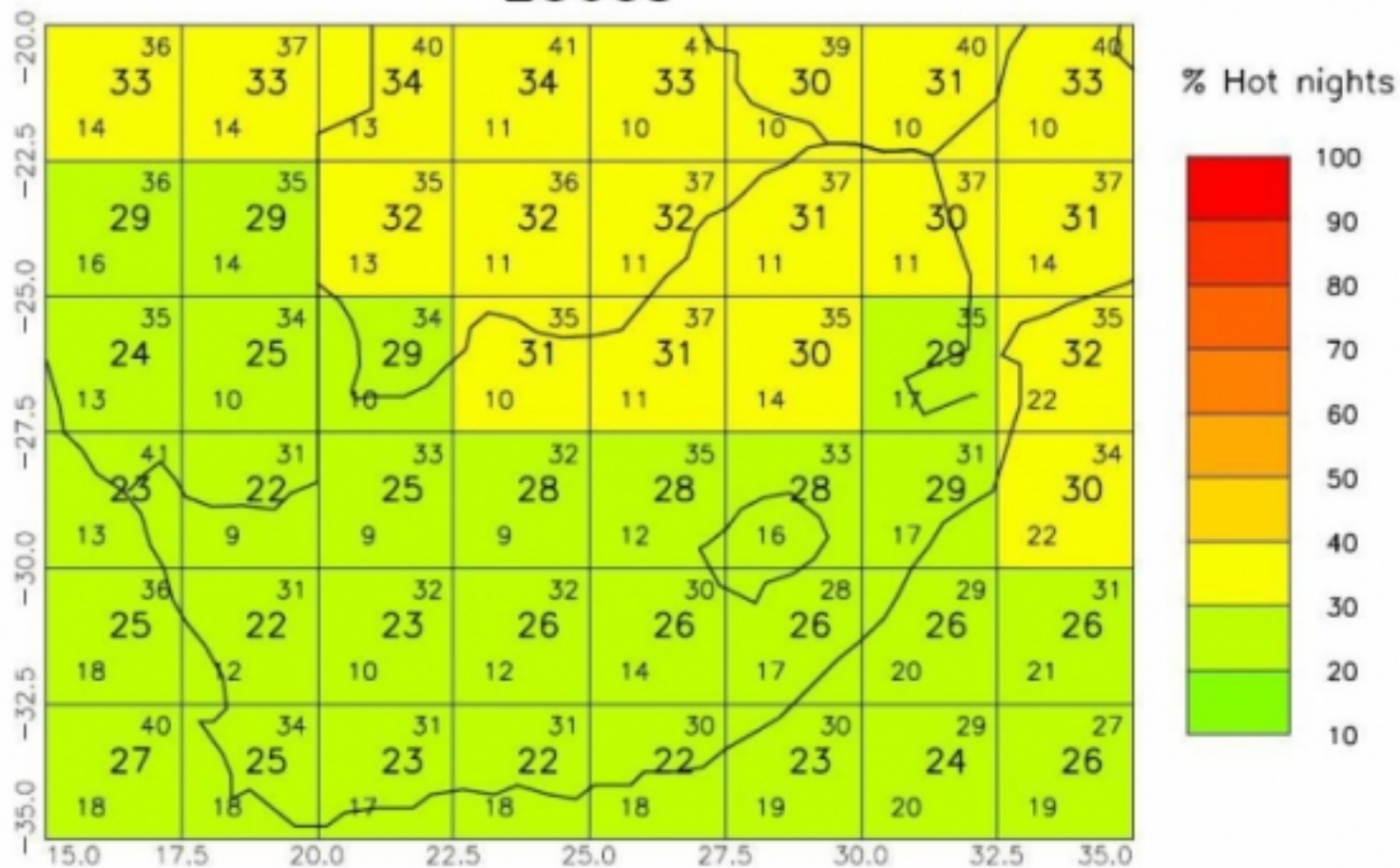
# 2060s



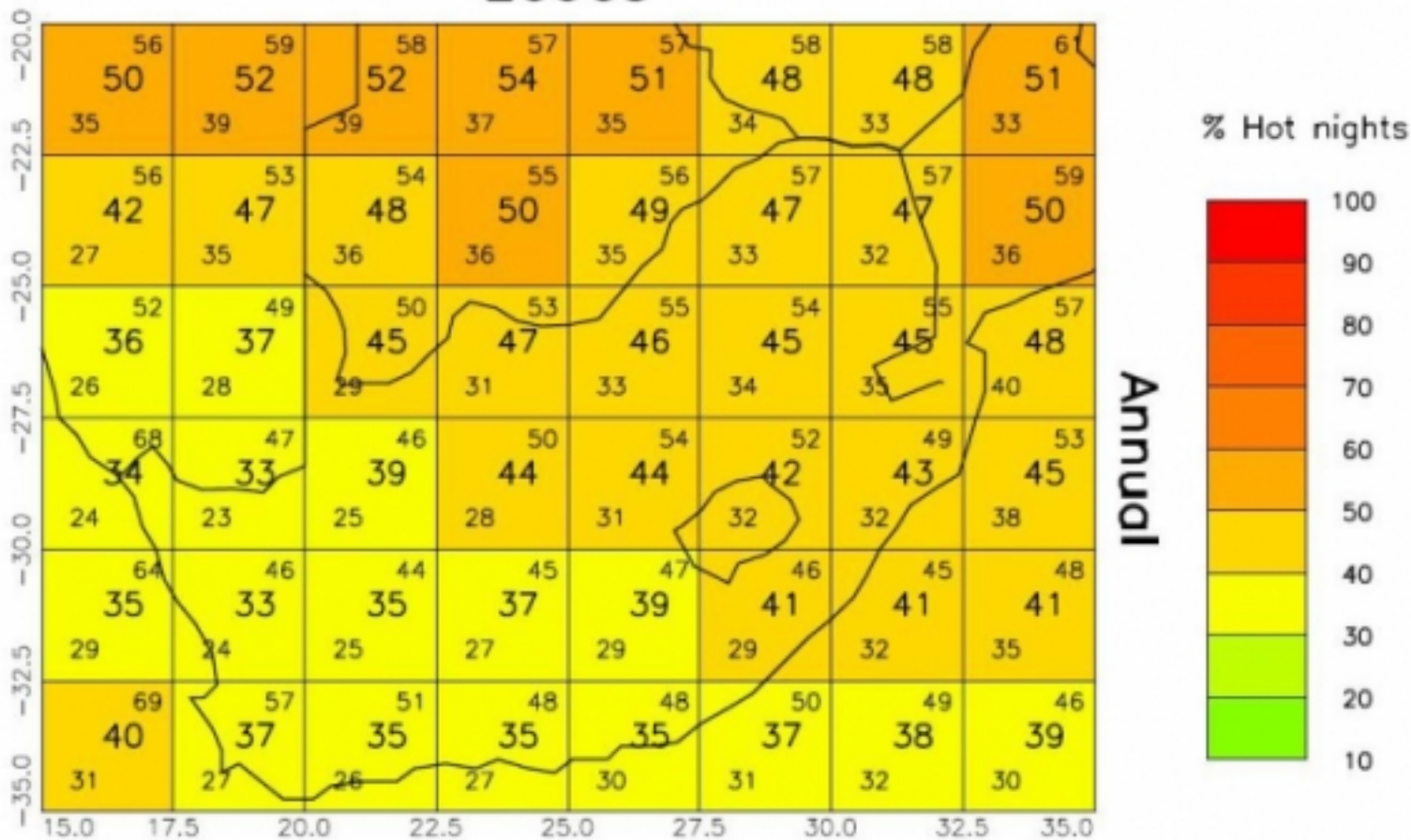
# 2090s



# 2060s



# 2090s





South Africa: Monthly Precipitation Anomaly Annual

