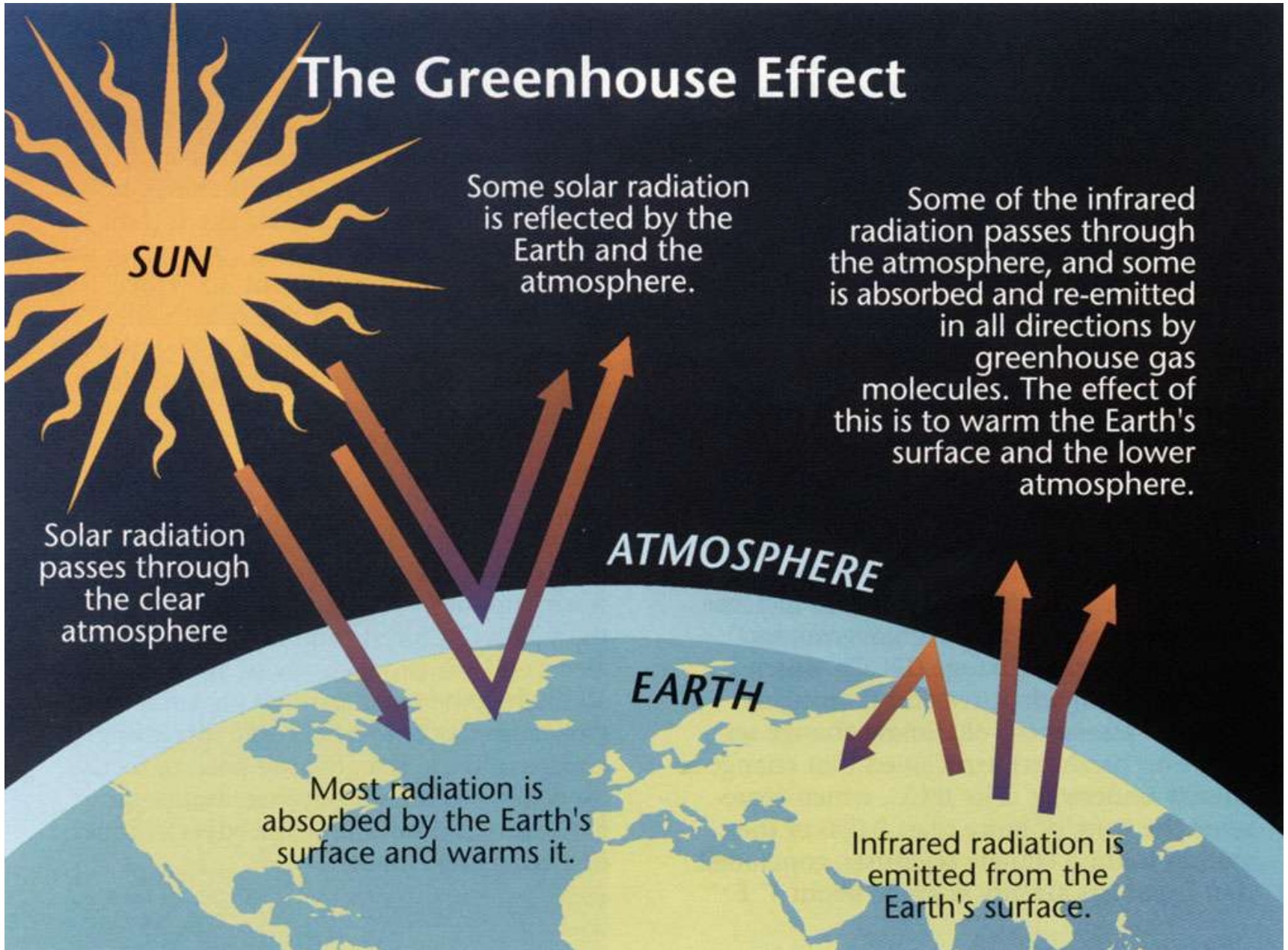


# Position of southern Africa in global climate change

Prof GF Midgley

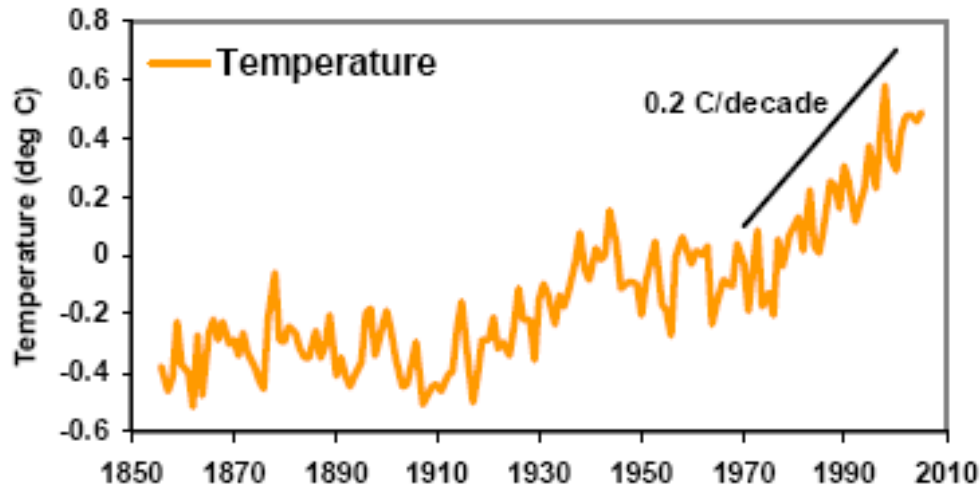
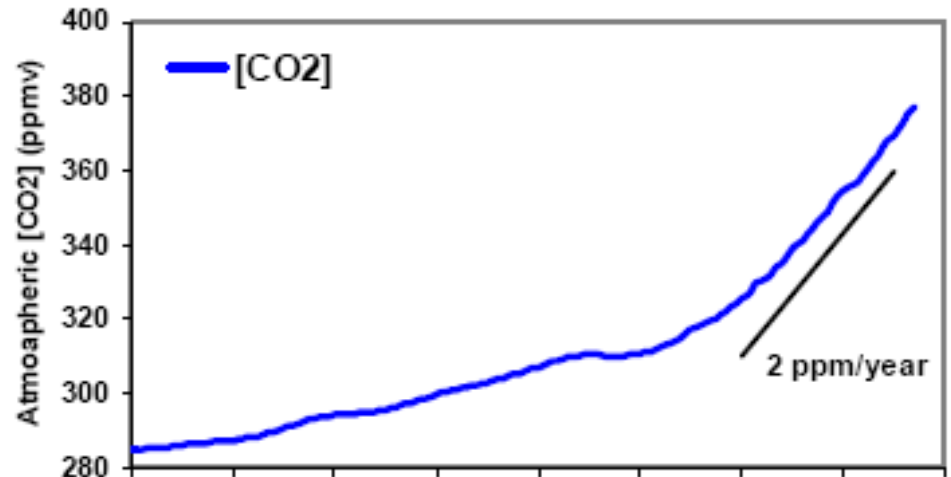
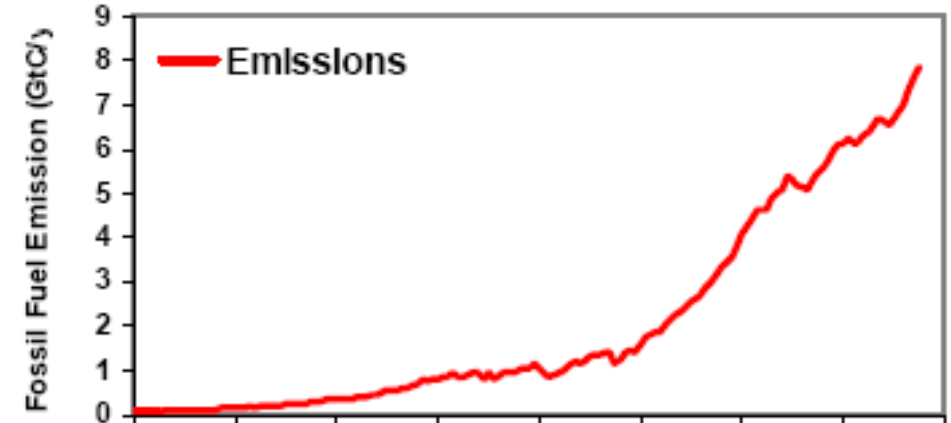
South African National Biodiversity  
Institute

# The Greenhouse Effect





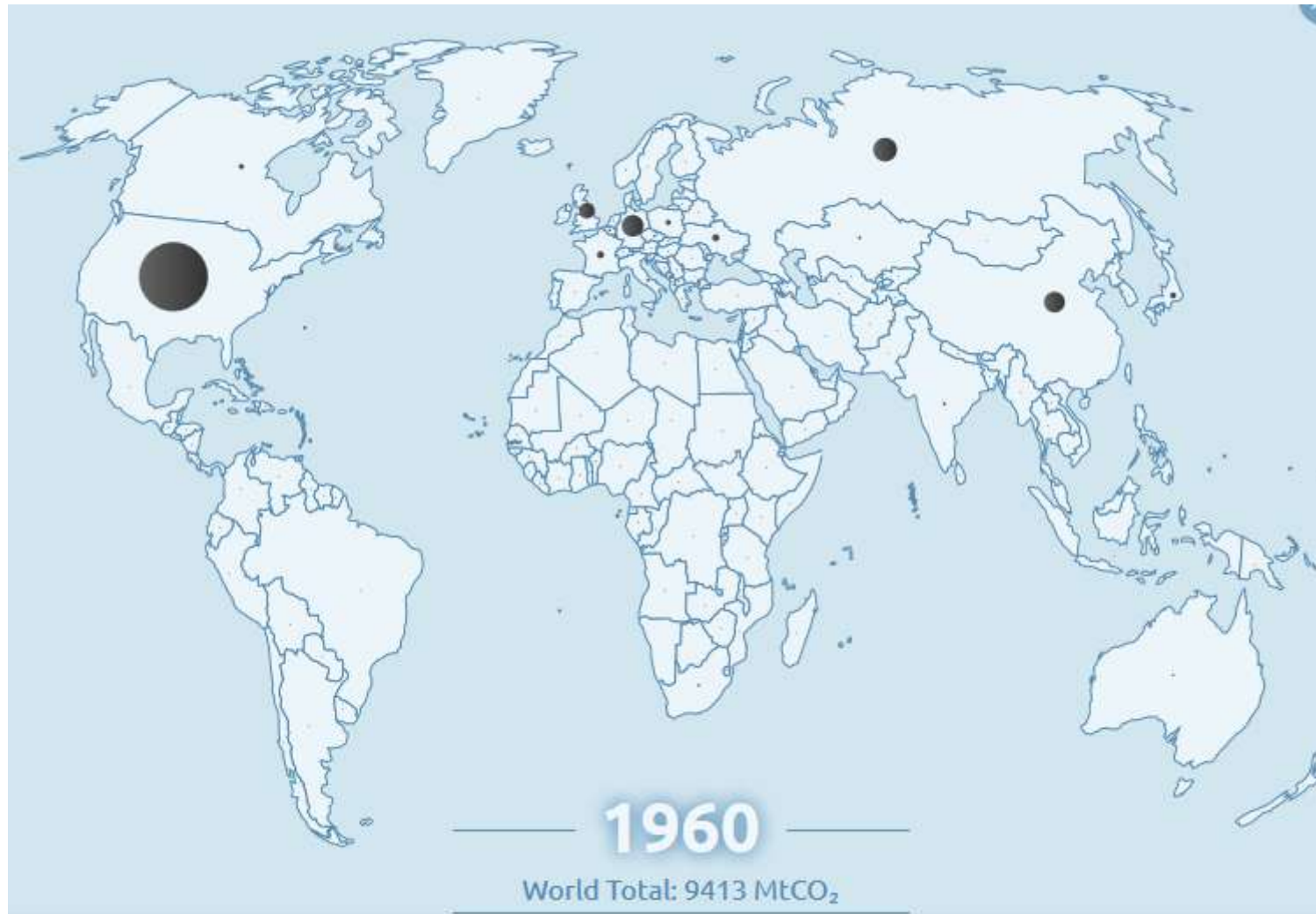
Our planet did not come with a book of instructions!



# Global emissions (all sources) 2012



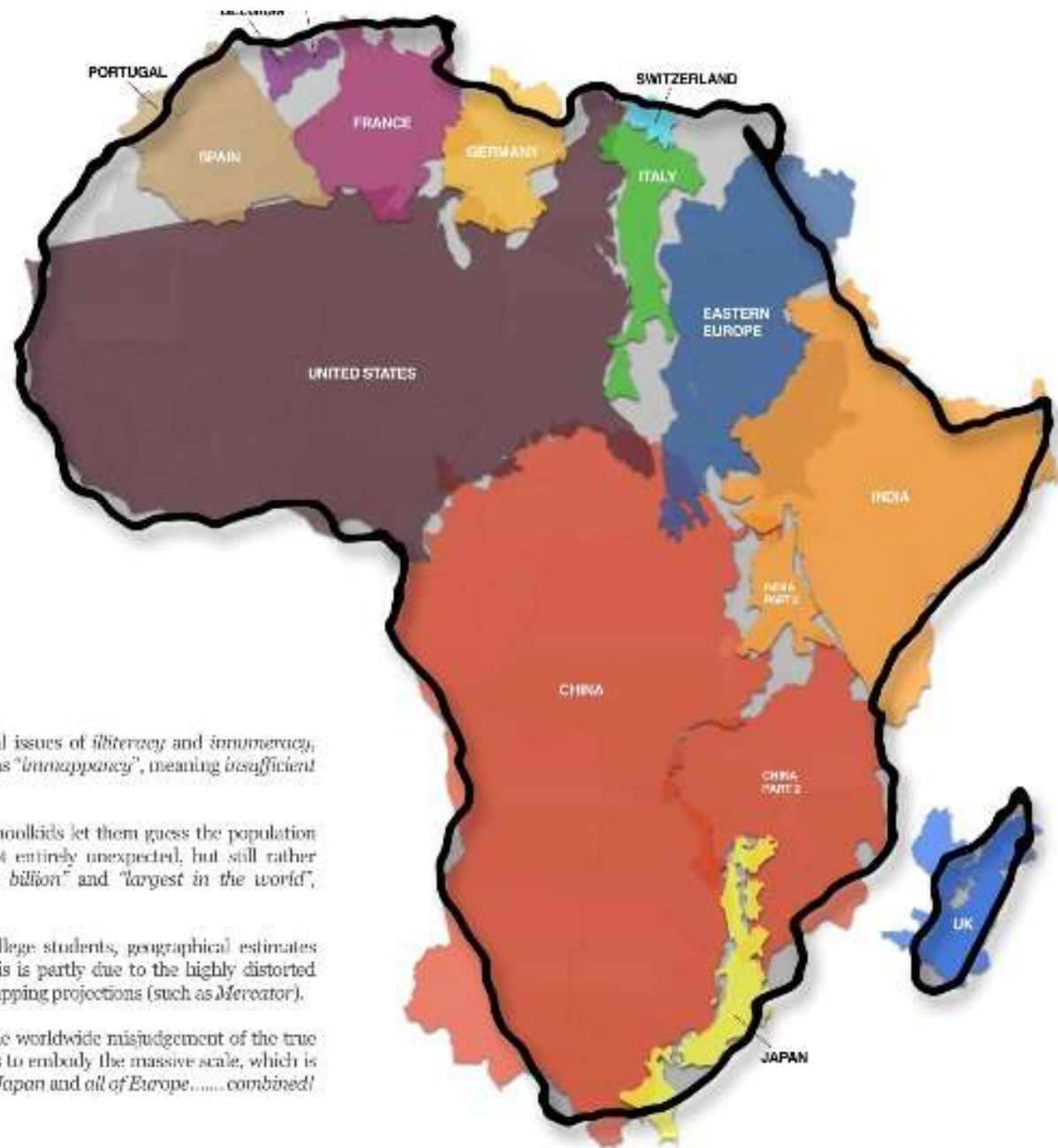
# Global emissions (all sources) 1960



# Global emissions (land use) 2012



COUNTRY	AREA x 1000 km <sup>2</sup>
China	9 587
USA	9 829
India	3 287
Mexico	1 984
Peru	1 285
France	633
Spain	508
Papua New Guinea	462
Sweden	441
Japan	378
Germany	357
Norway	326
Italy	301
New Zealand	270
United Kingdom	243
Nepal	147
Bangladesh	146
Greece	132
<b>TOTAL</b>	<b>30.102</b>
<b>AFRICA</b>	<b>30.221</b>



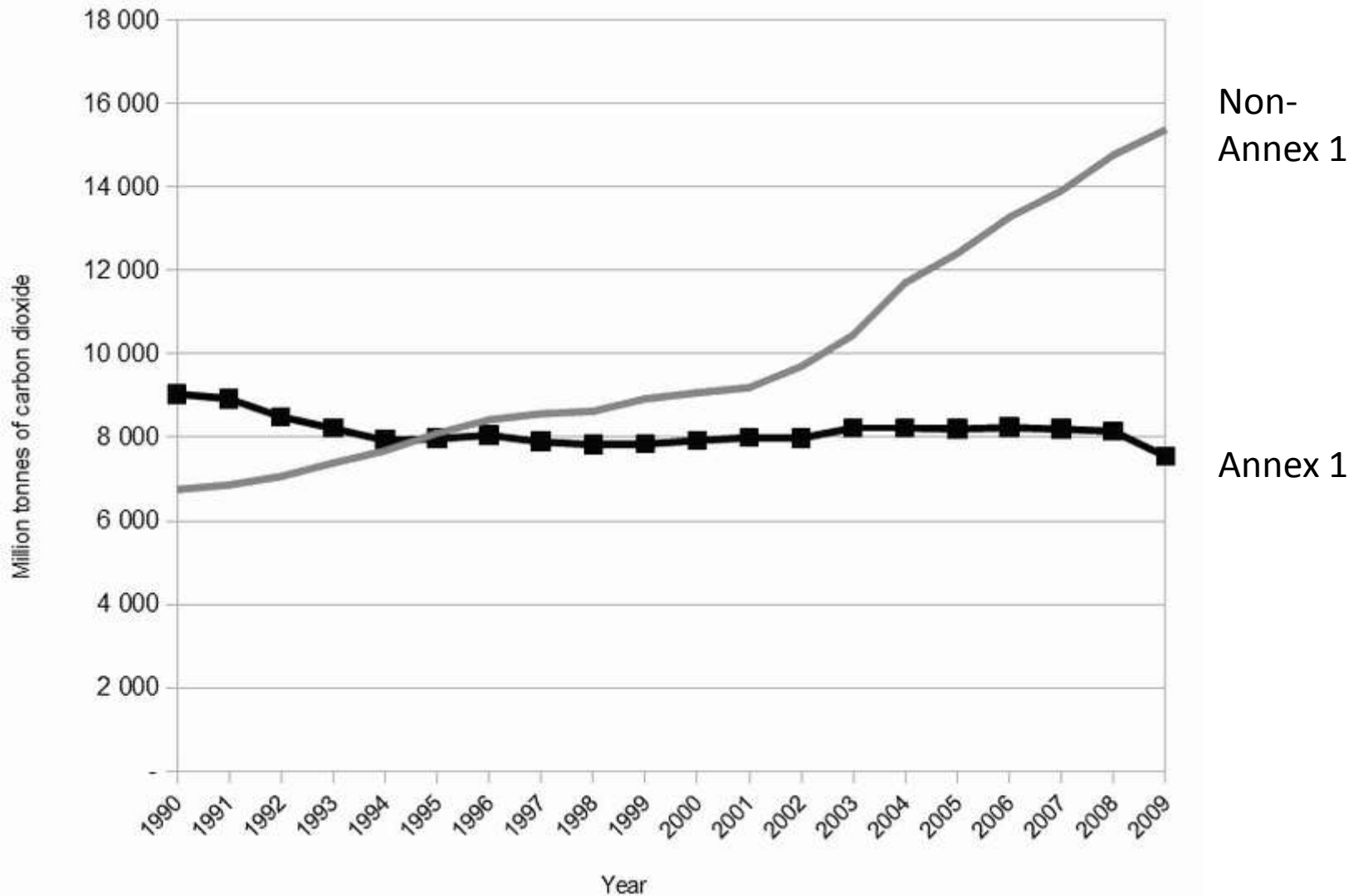
In addition to the well known social issues of *illiteracy* and *innumeracy*, there also should be such a concept as *inmappancy*, meaning *insufficient geographical knowledge*.

A survey with random American schoolkids let them guess the population and land area of their country. Not entirely unexpected, but still rather unsettling, the majority chose "1-2 billion" and "largest in the world", respectively.

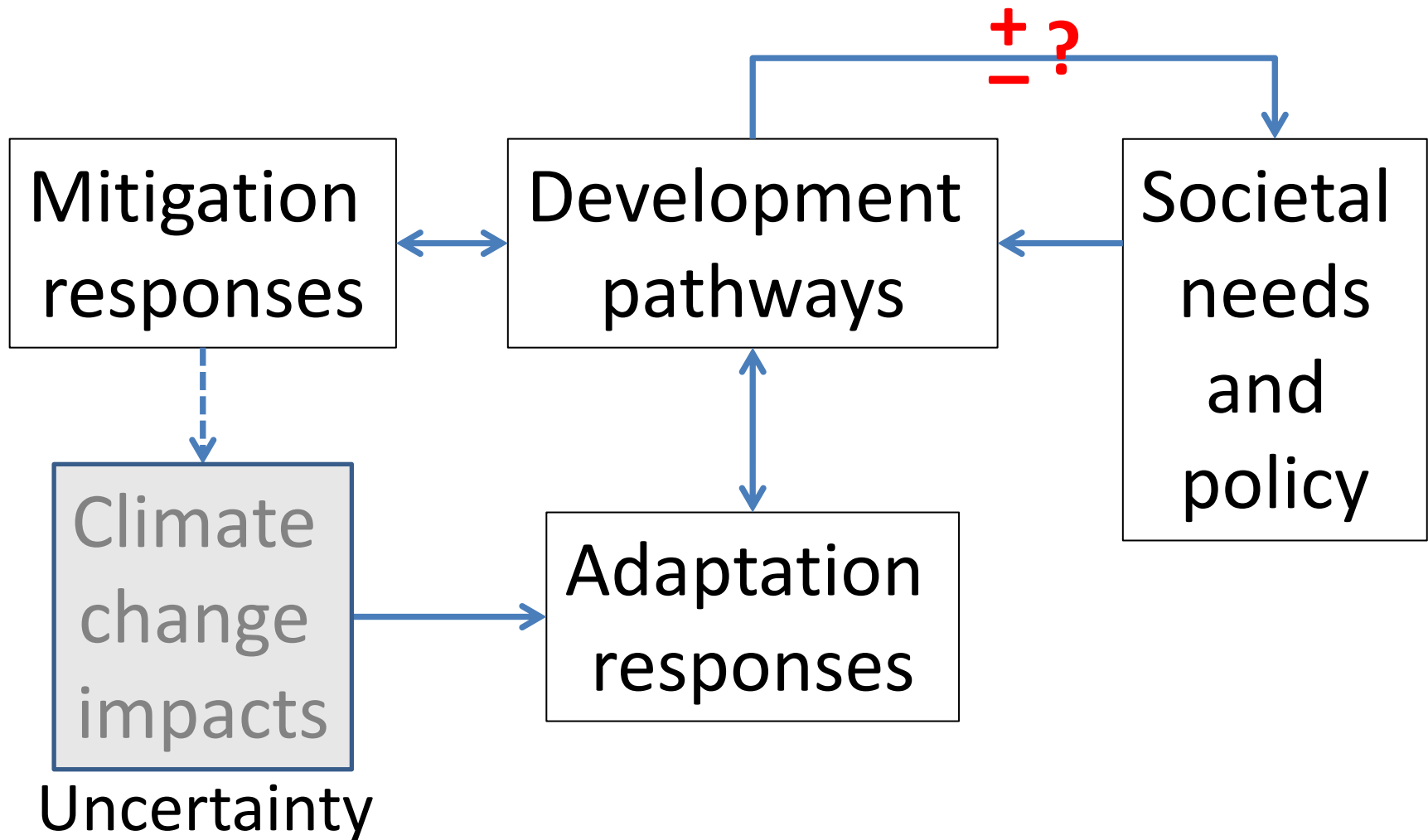
Even with Asian and European college students, geographical estimates were often off by factors of 2-3. This is partly due to the highly distorted nature of the predominantly used mapping projections (such as *Mercaator*).

A particularly extreme example is the worldwide misjudgement of the true size of *Africa*. This single image tries to embody the massive scale, which is larger than the *USA*, *China*, *India*, *Japan* and *all of Europe*..... combined!

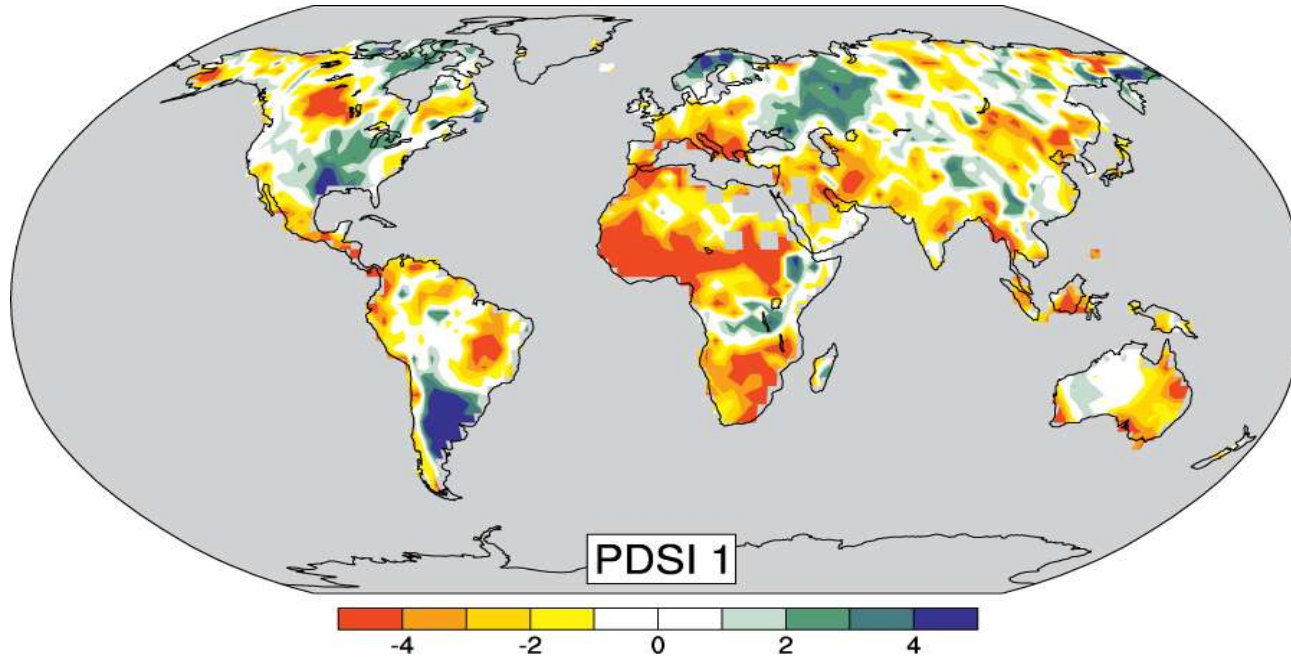
# Emissions Annex 1 and non-Annex 1 Kyoto Protocol



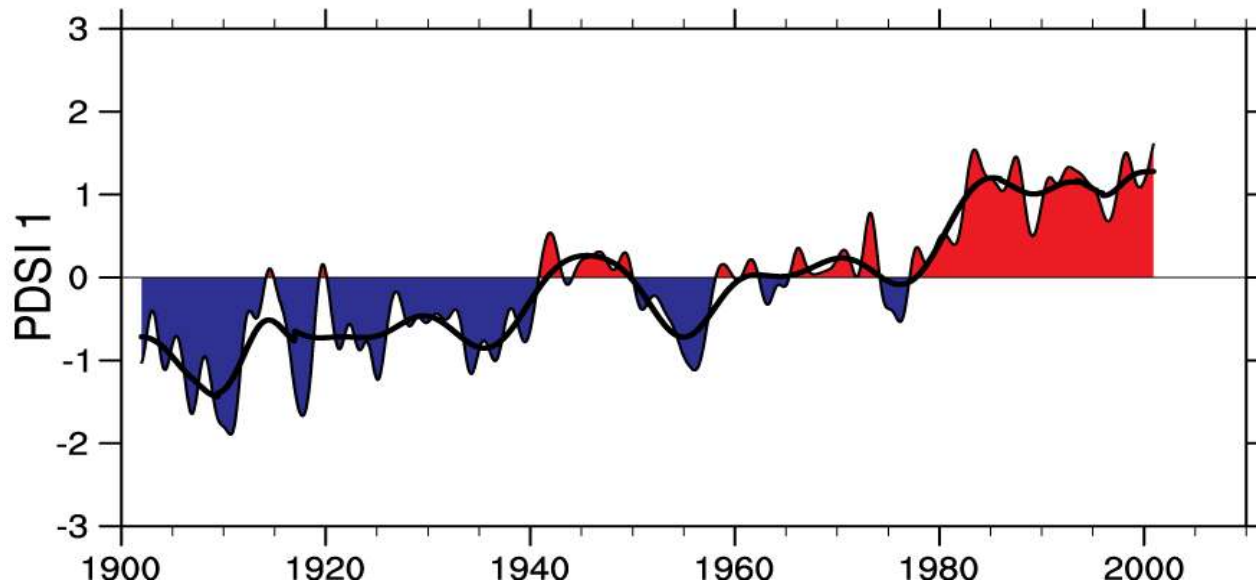
# Climate change and the wicked challenge of sustainable development



# Drought severity increased globally over the last century



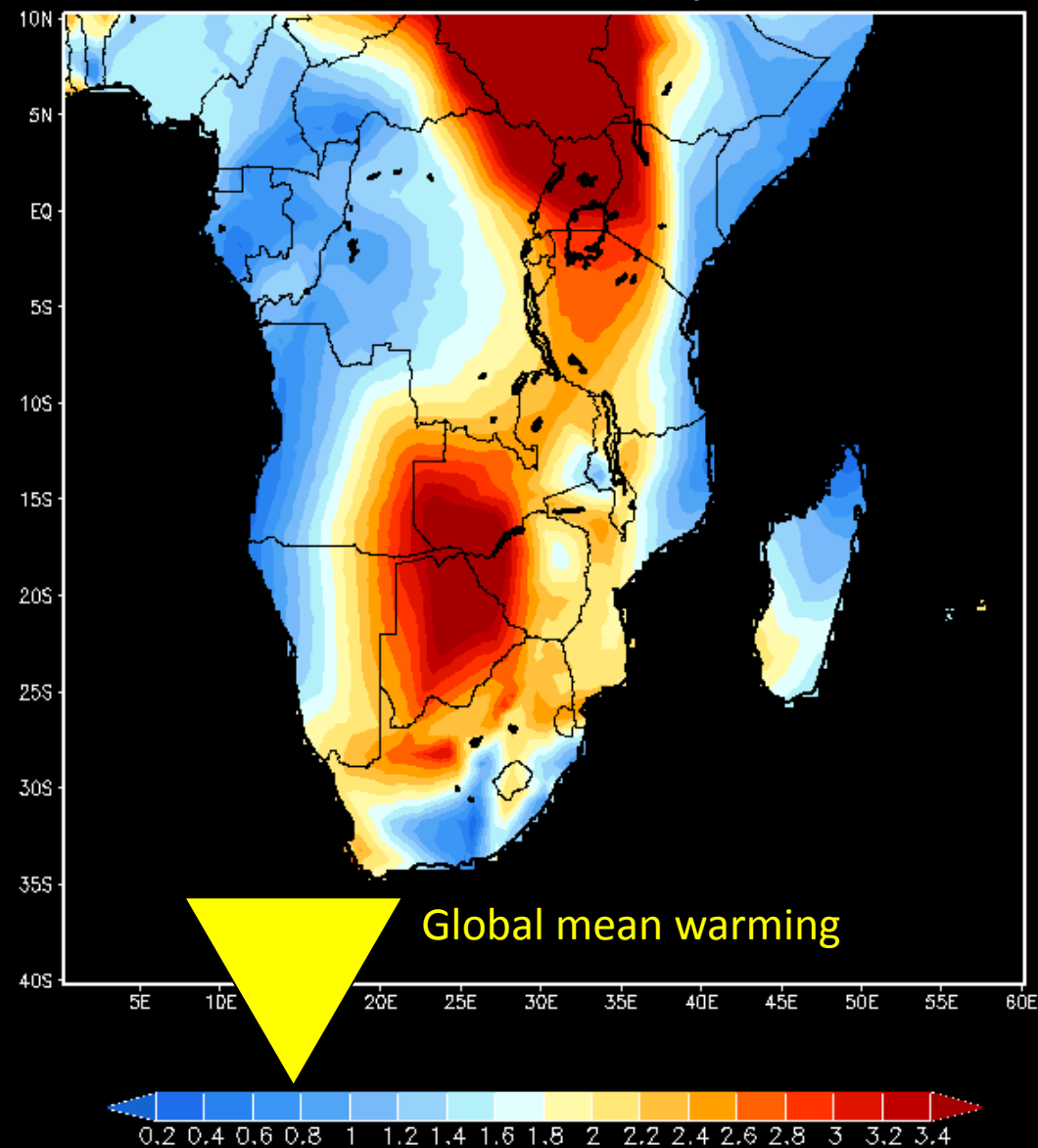
The most important spatial pattern (top) of the monthly Palmer Drought Severity Index (PDSI) for 1900 to 2002.



The time series (below) accounts for most of the trend in PDSI.

# Hadley Center: CRU 3.1 linear temperature trend 1961-2009

CRU 3.1 trend Ann ave temp 1961-2009

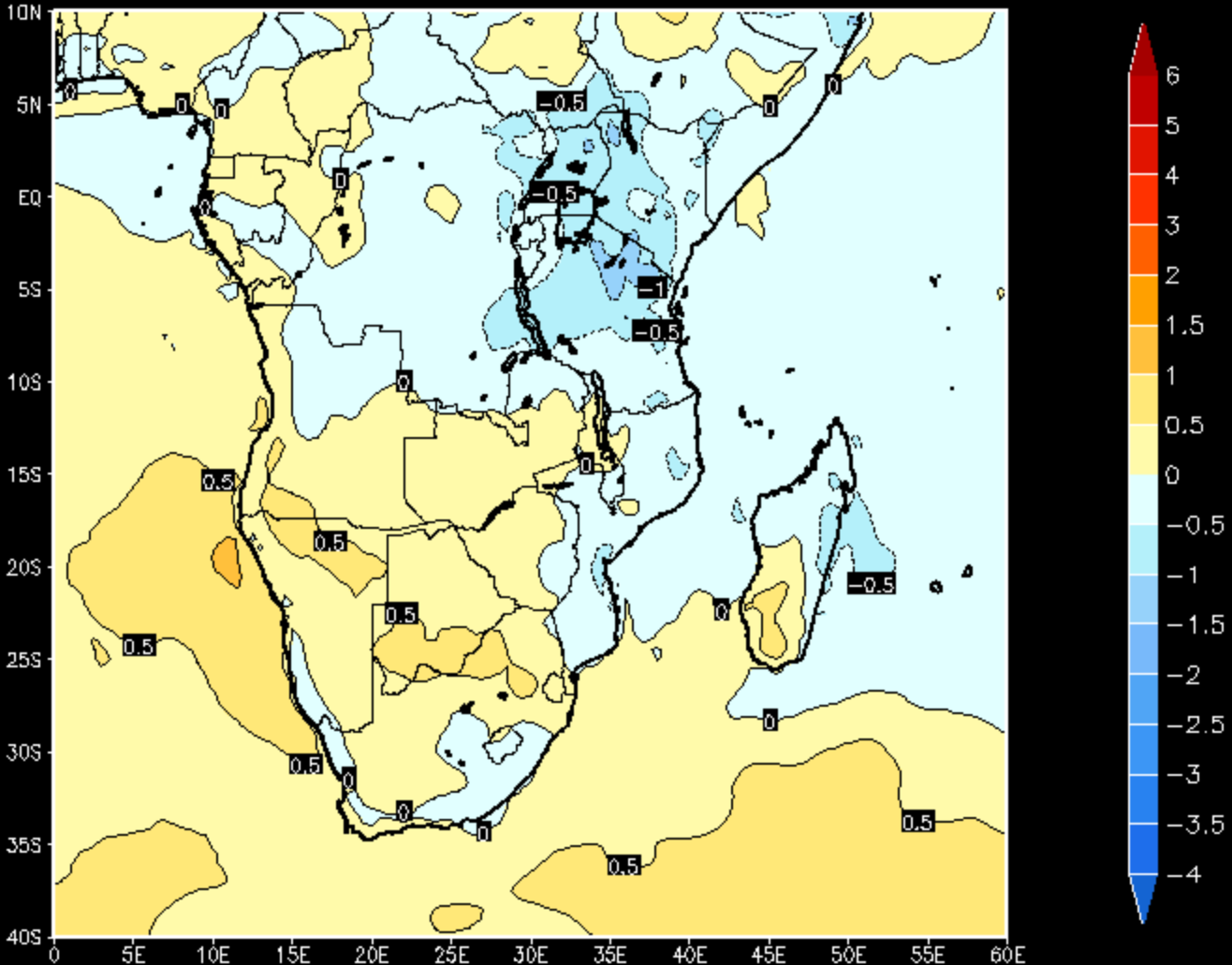


Strong warming has occurred  
over the central parts of  
southern Africa

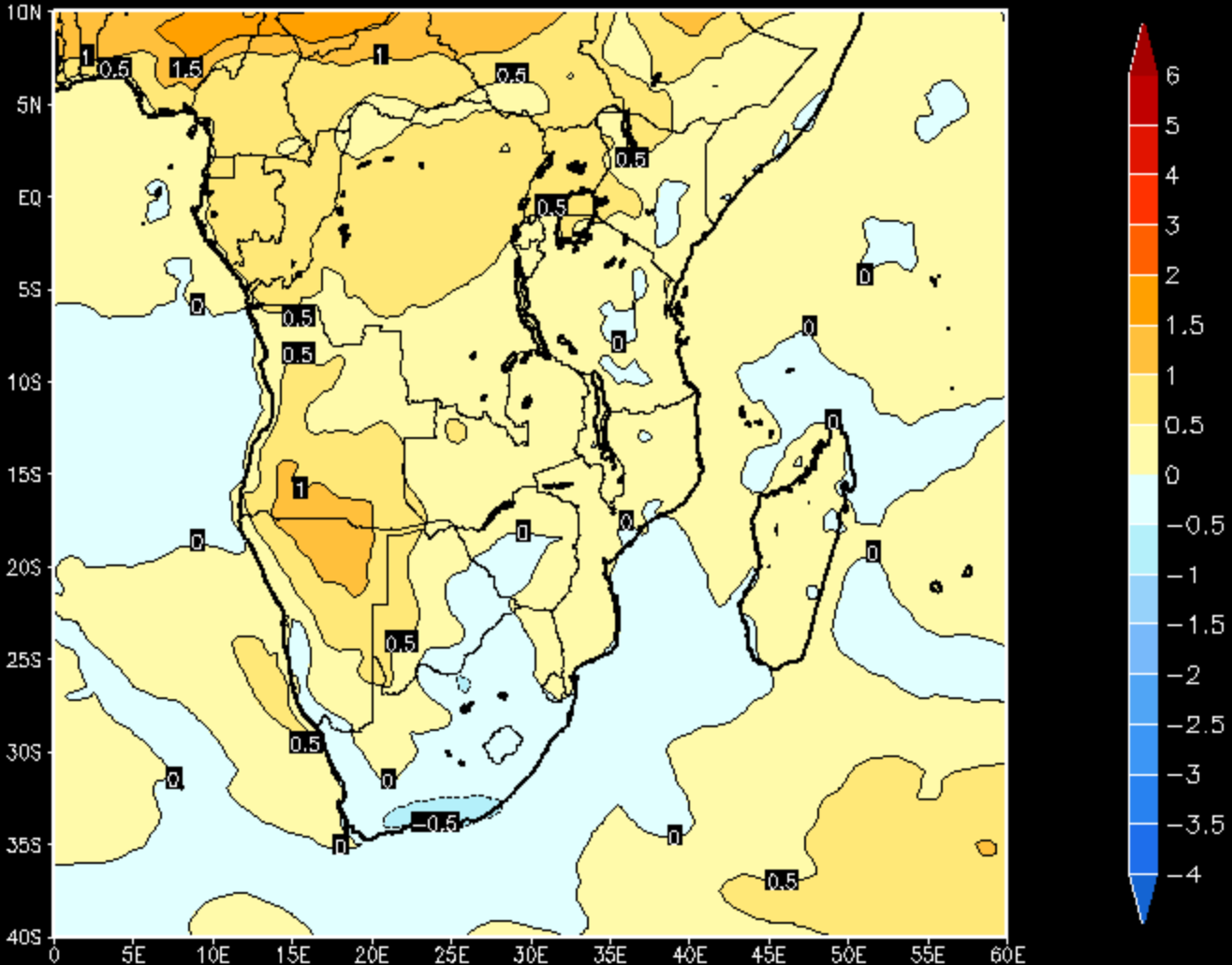
Warming more moderate  
along the coastal areas,  
except south-western SA and  
southern Mozambique



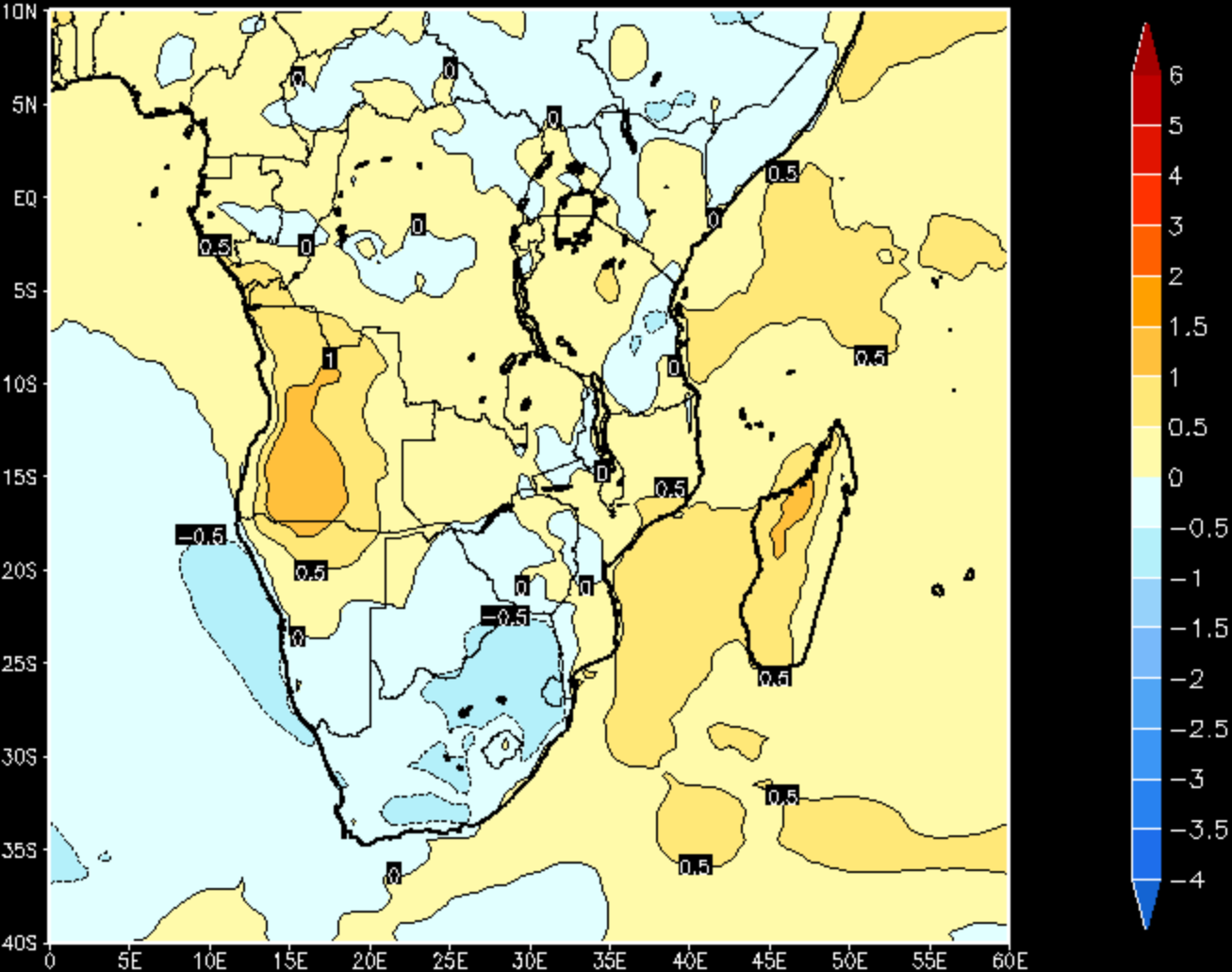
# Temp anomaly 1984



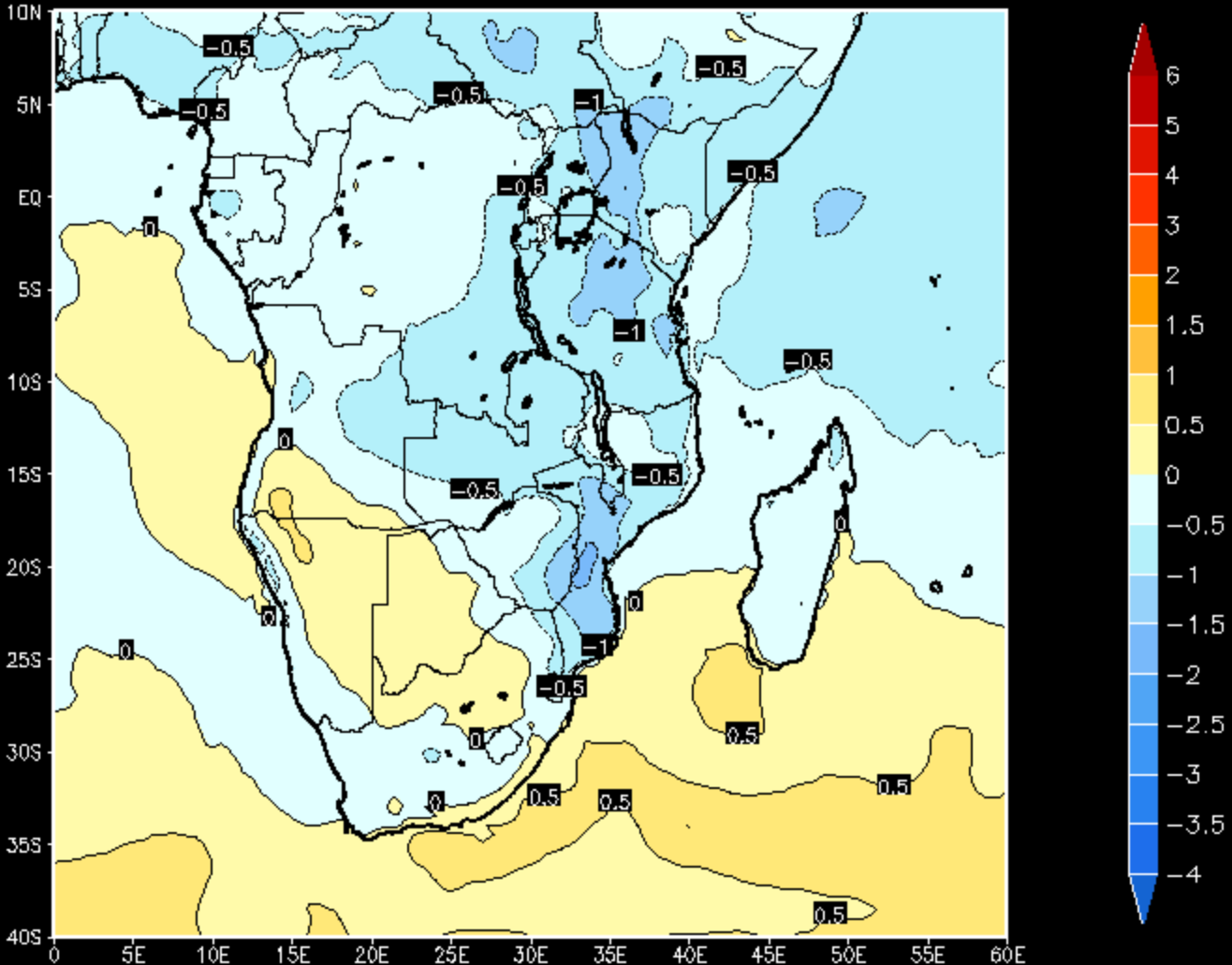
# Temp anomaly 1985



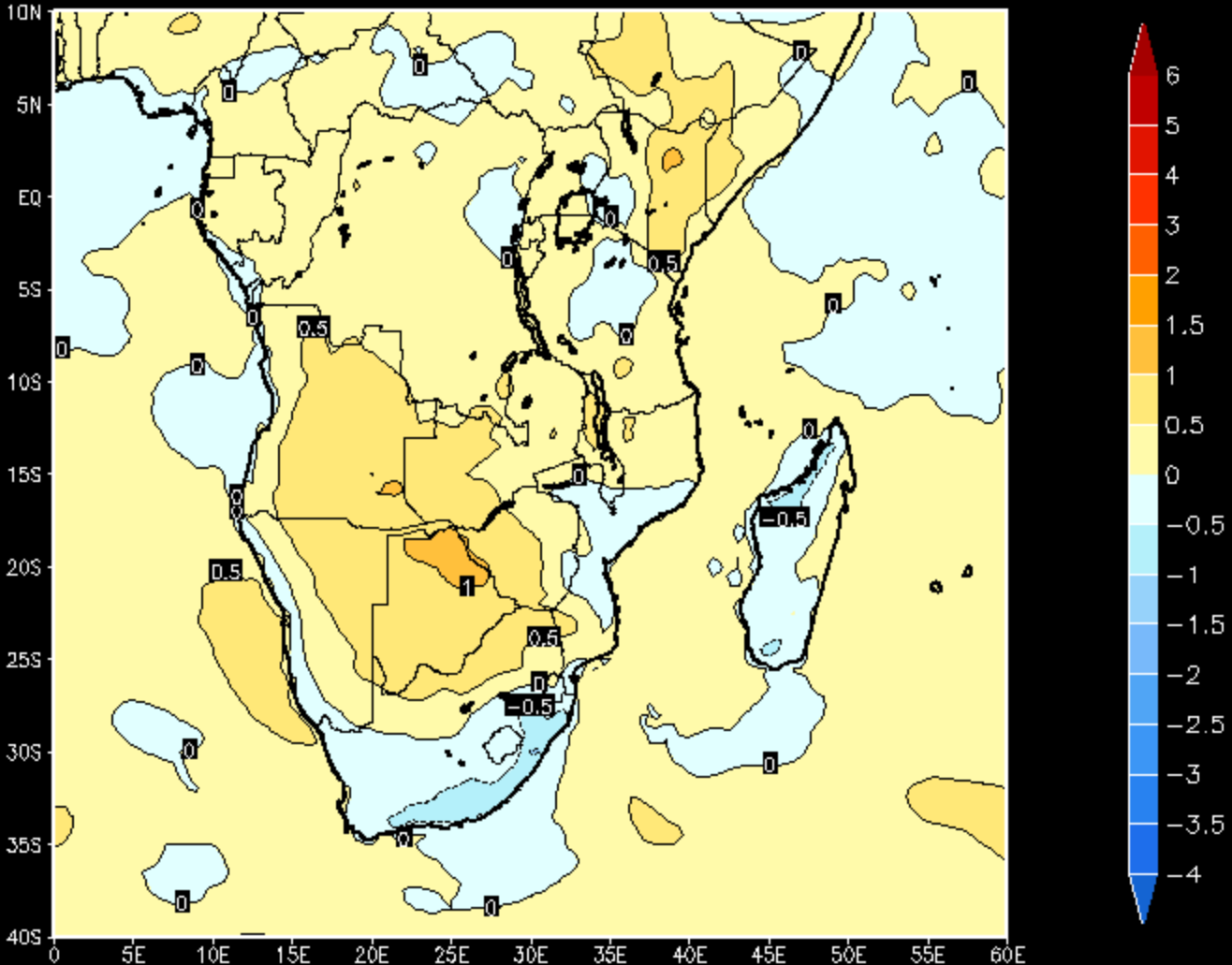
# Temp anomaly 1986



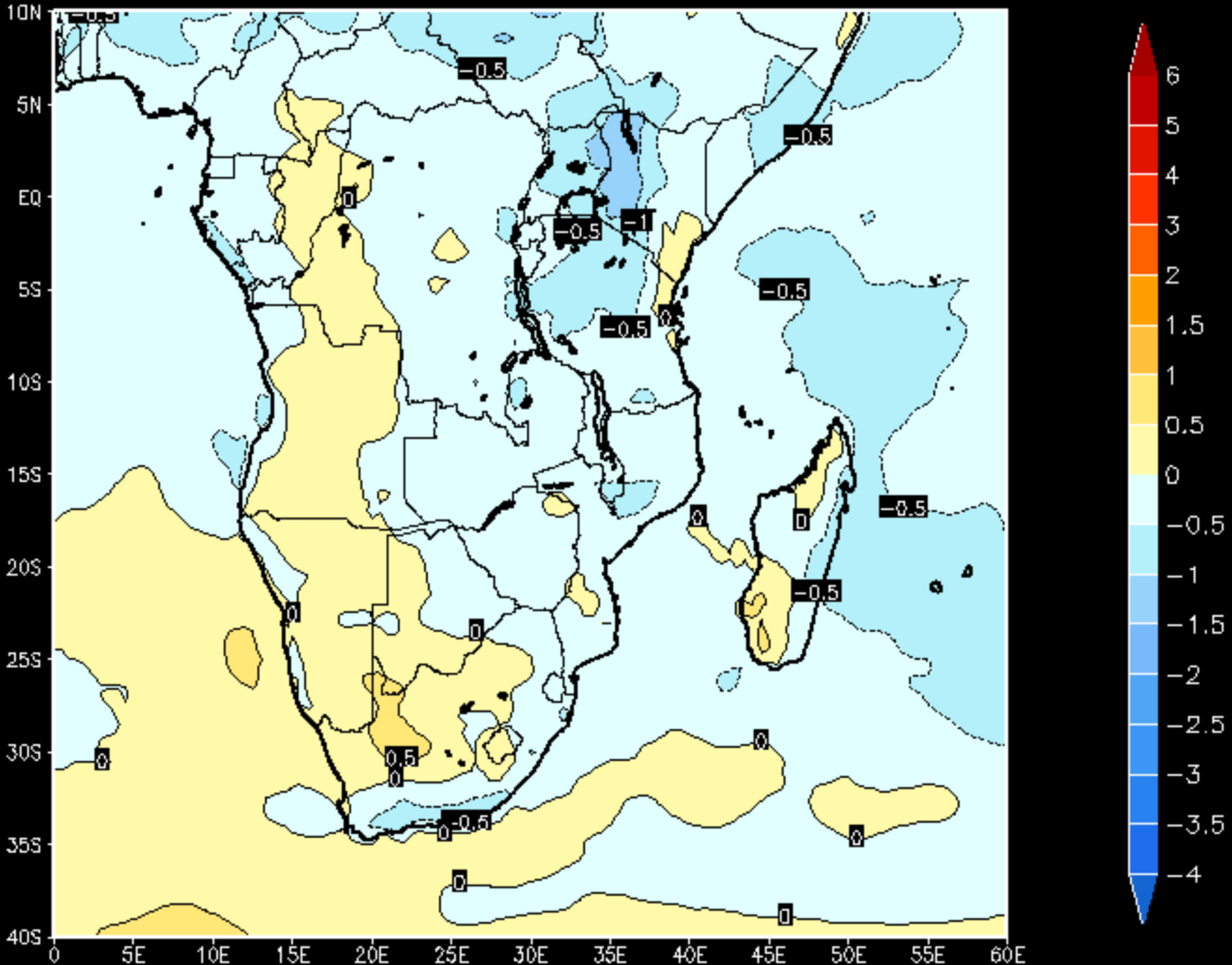
# Temp anomaly 1987



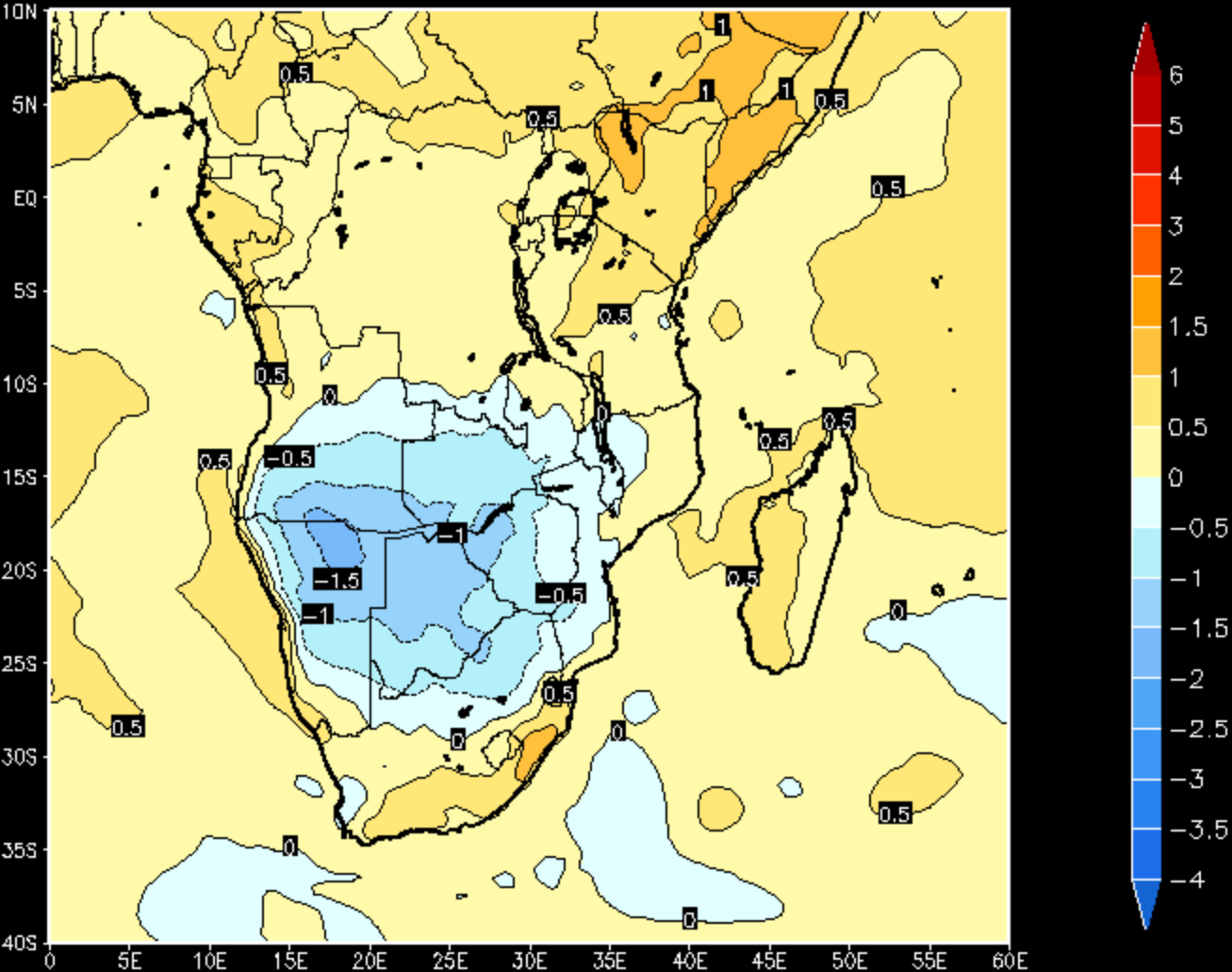
# Temp anomaly 1988



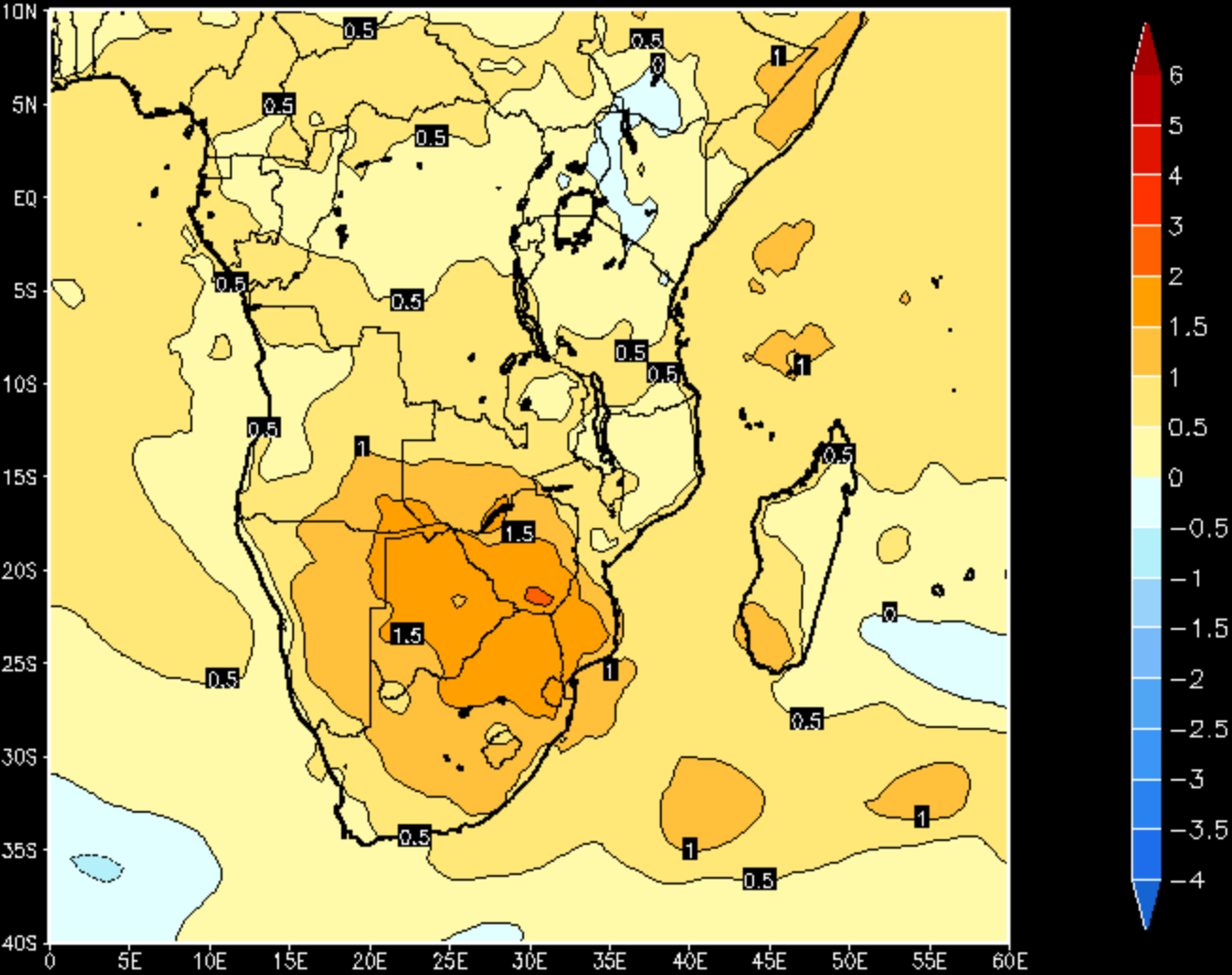
# Temp anomaly 1989



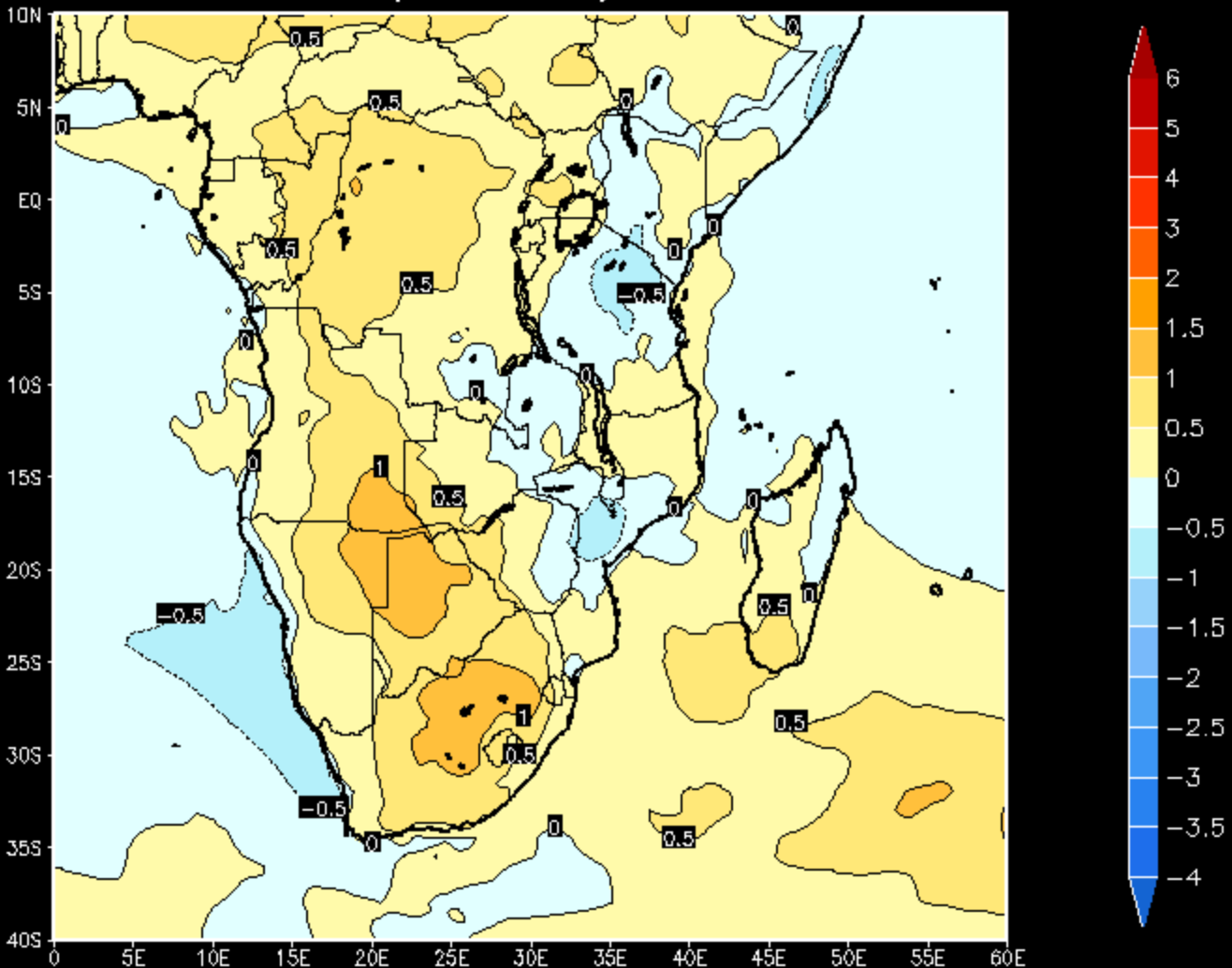
# Temp anomaly 1990



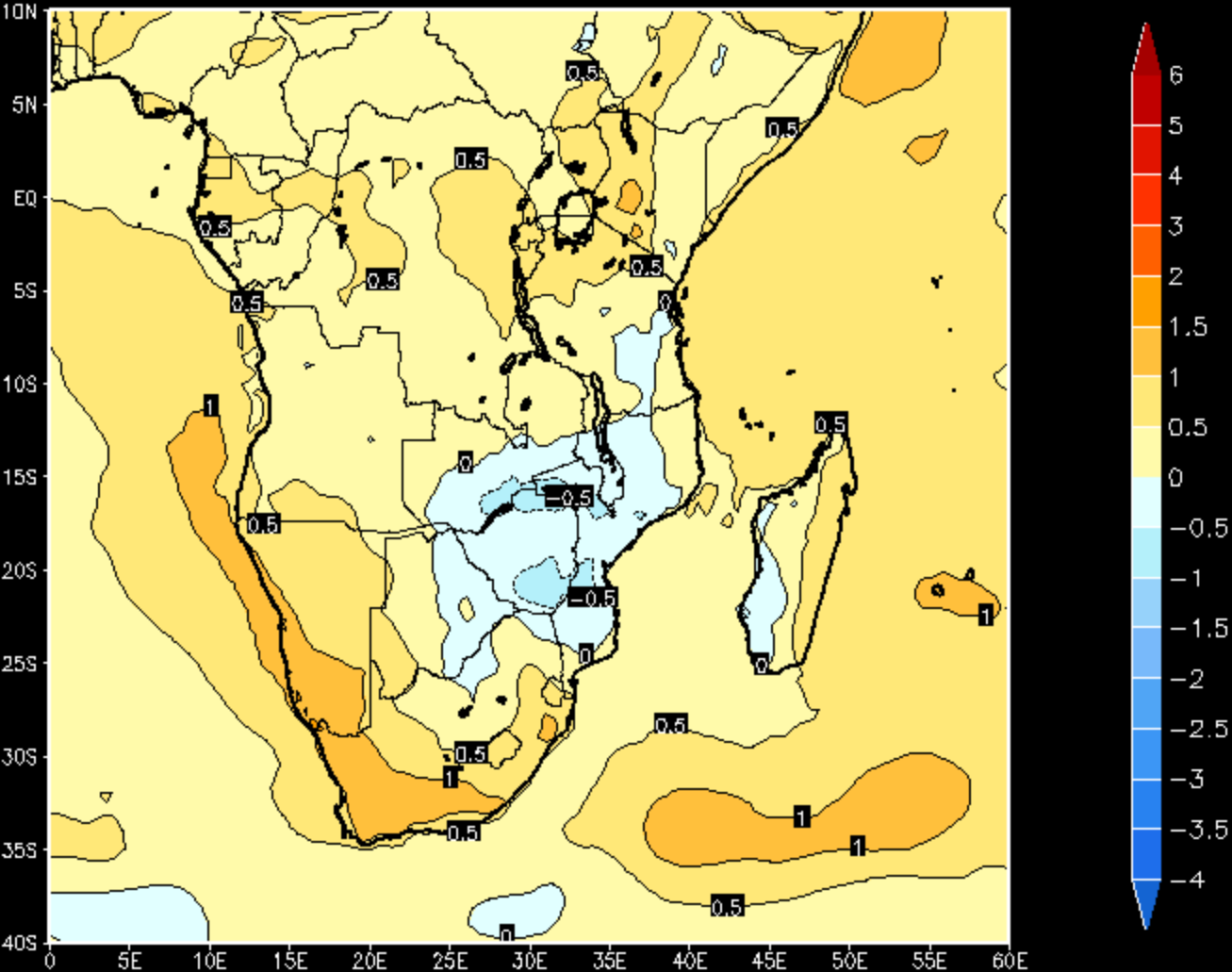
# Temp anomaly 1991



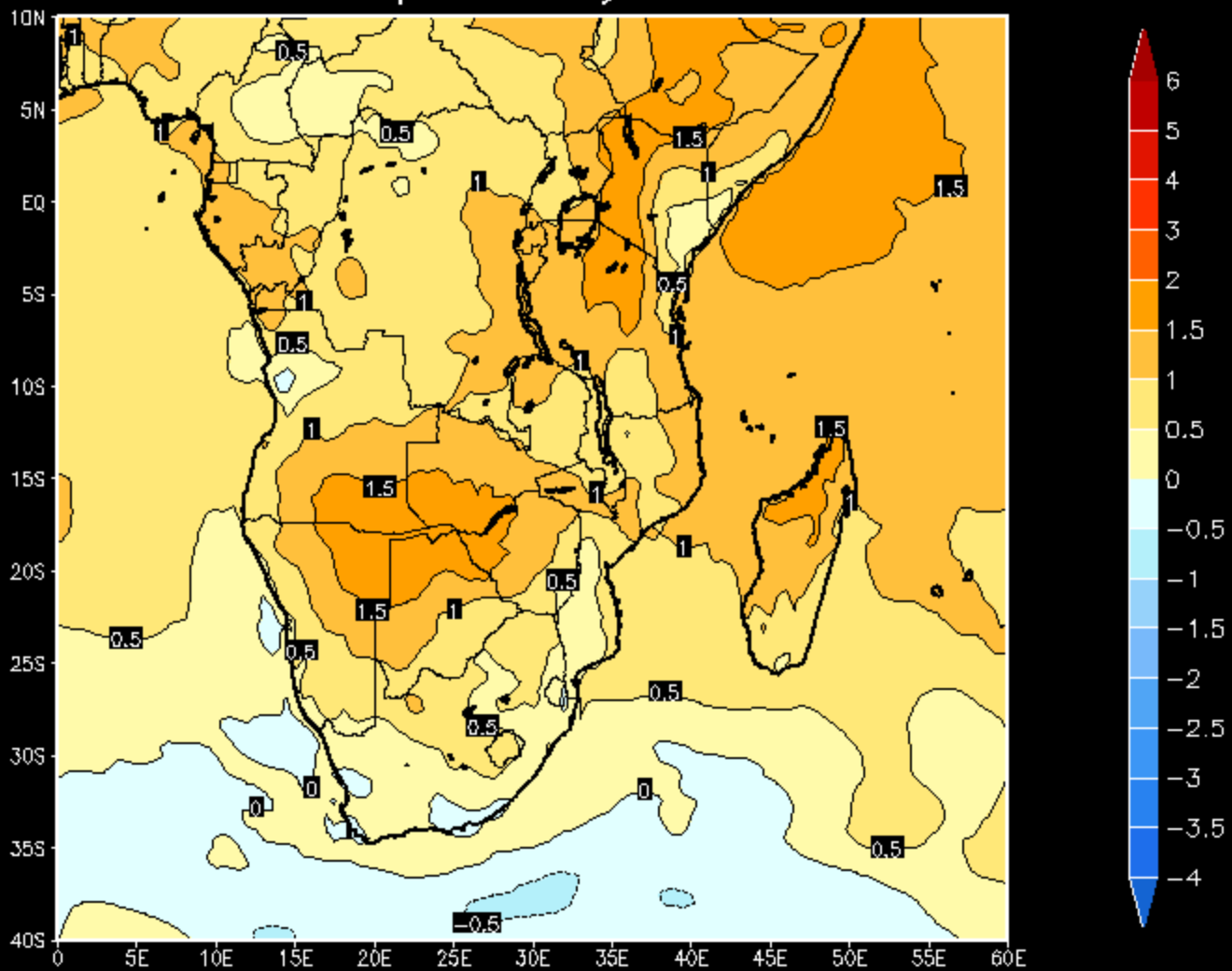
# Temp anomaly 1992



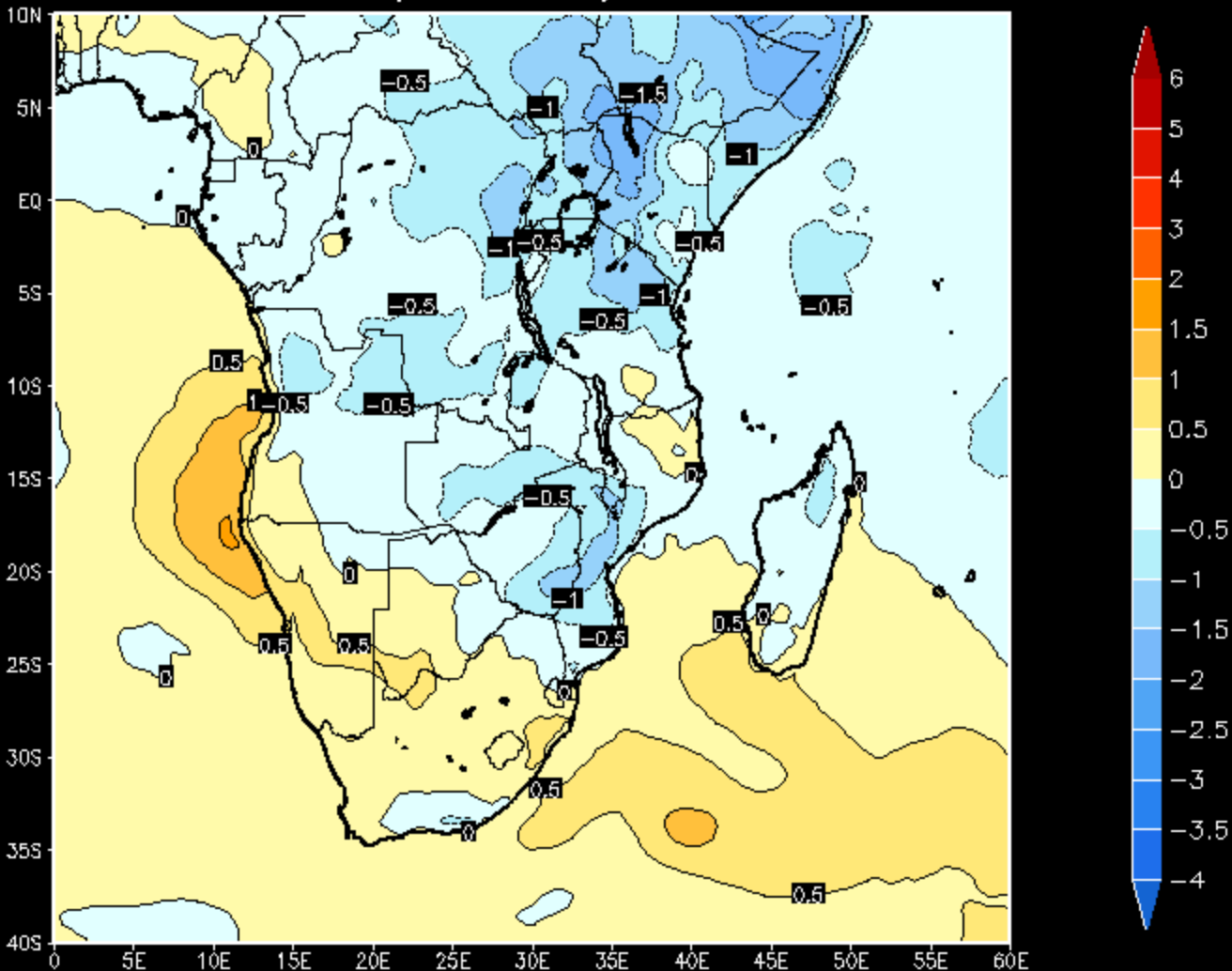
# Temp anomaly 1993



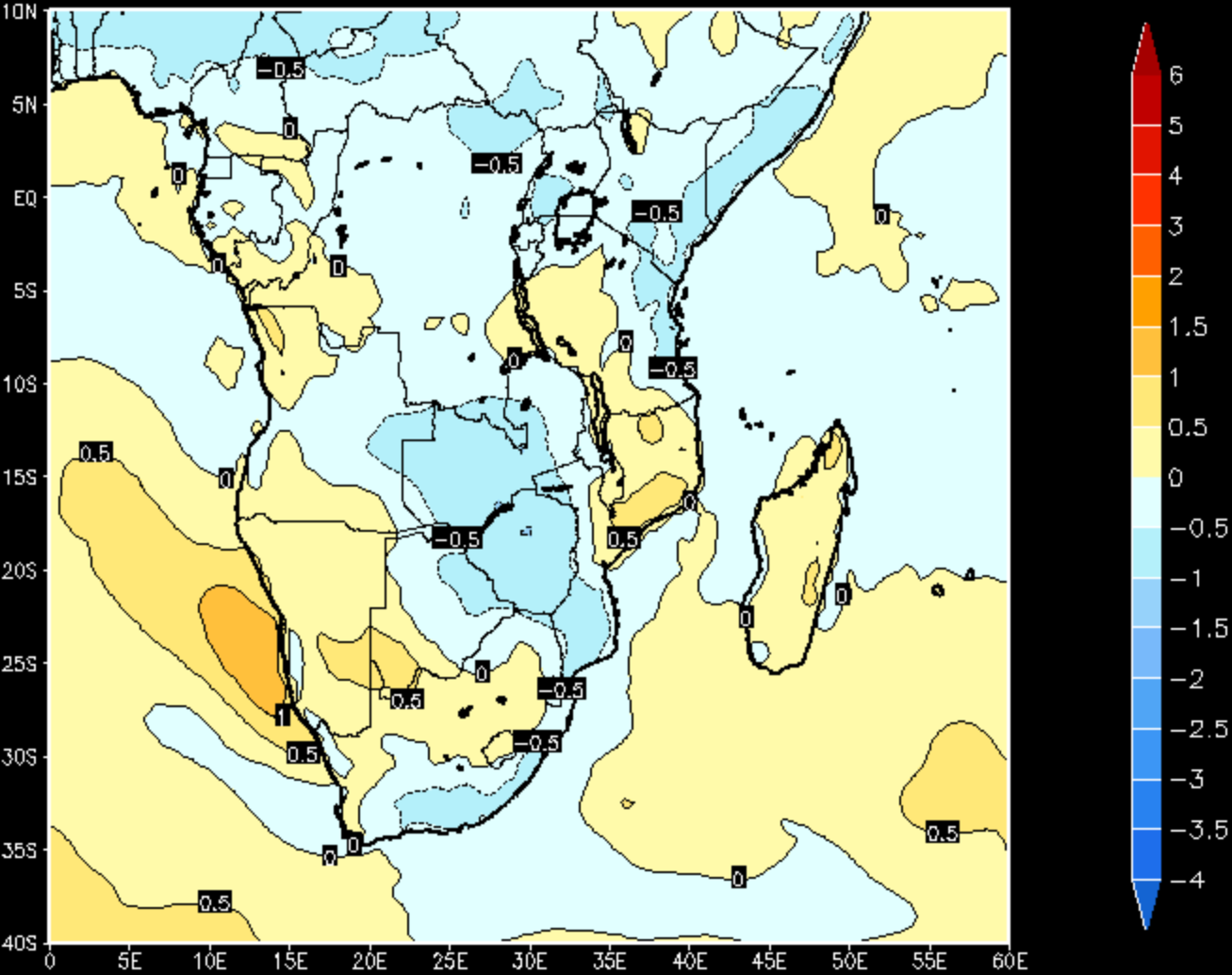
# Temp anomaly 1994



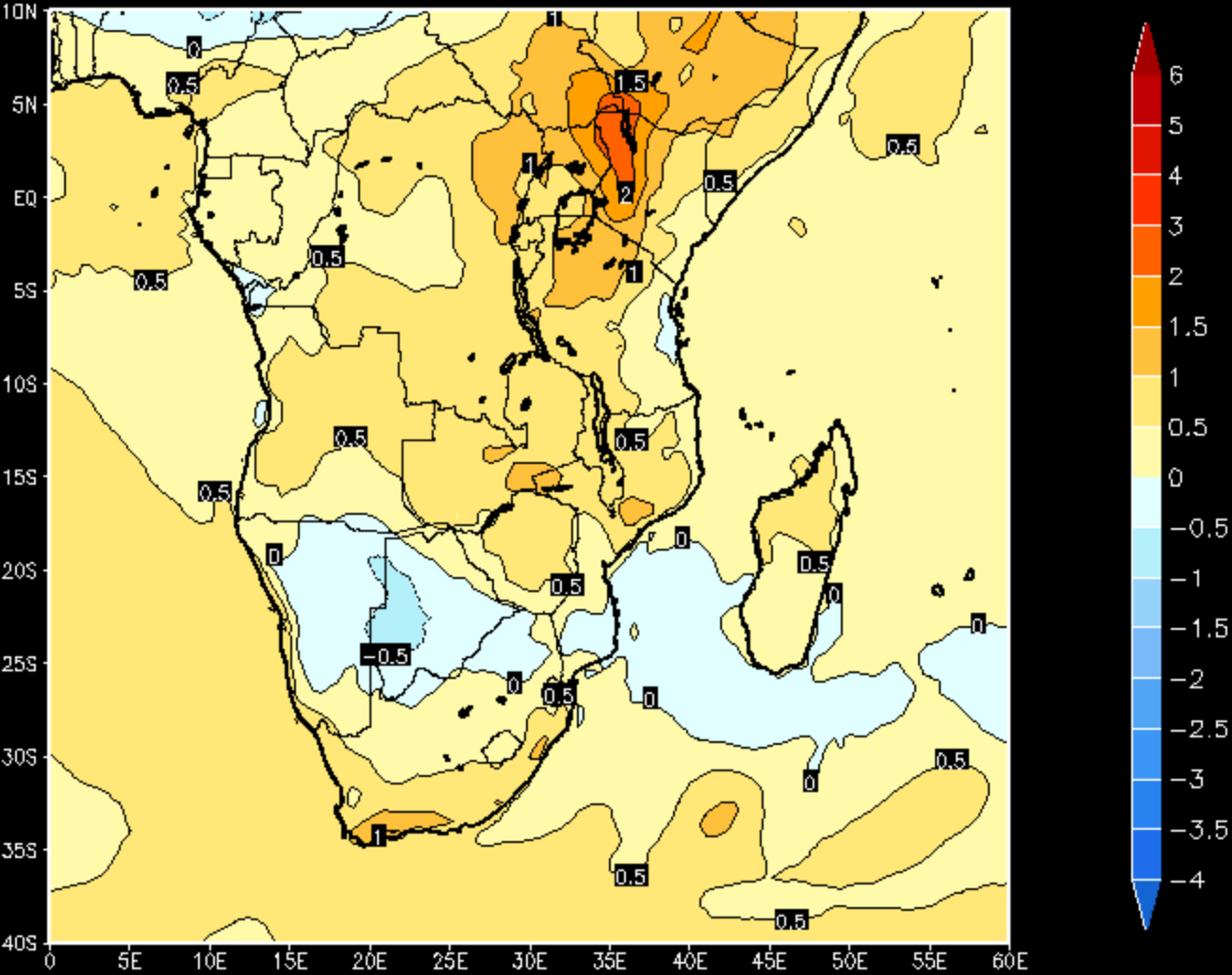
# Temp anomaly 1995



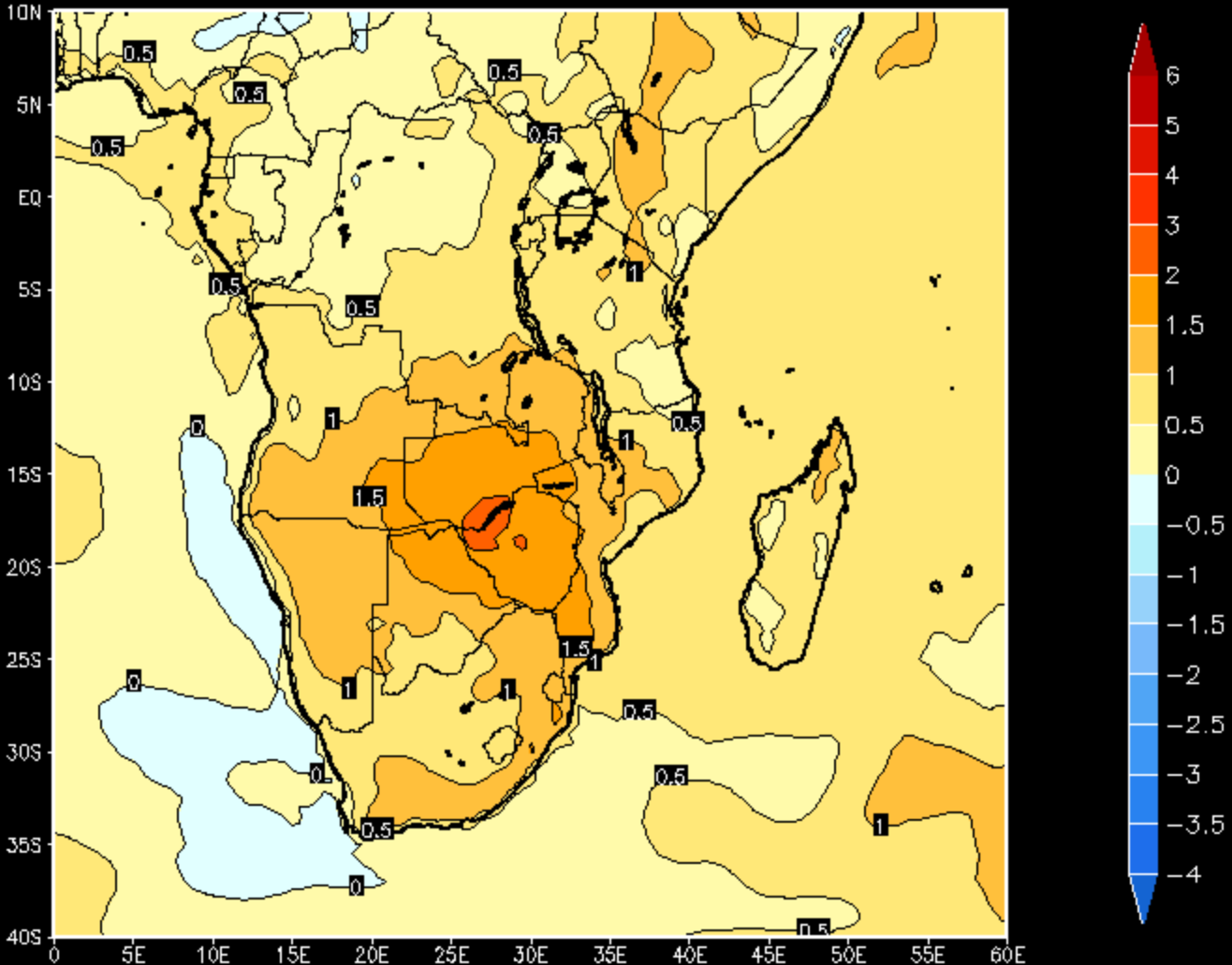
# Temp anomaly 1996



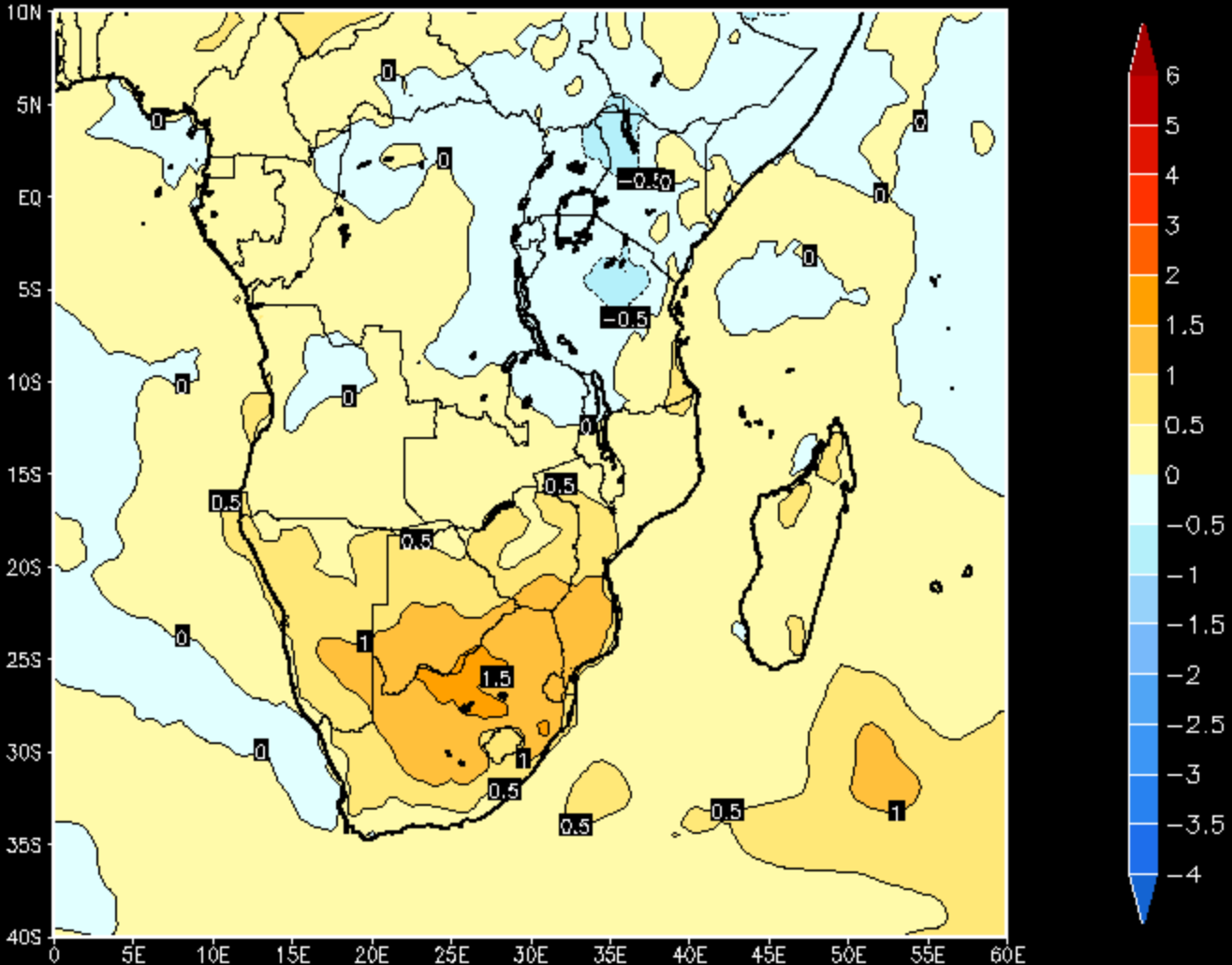
# Temp anomaly 1997



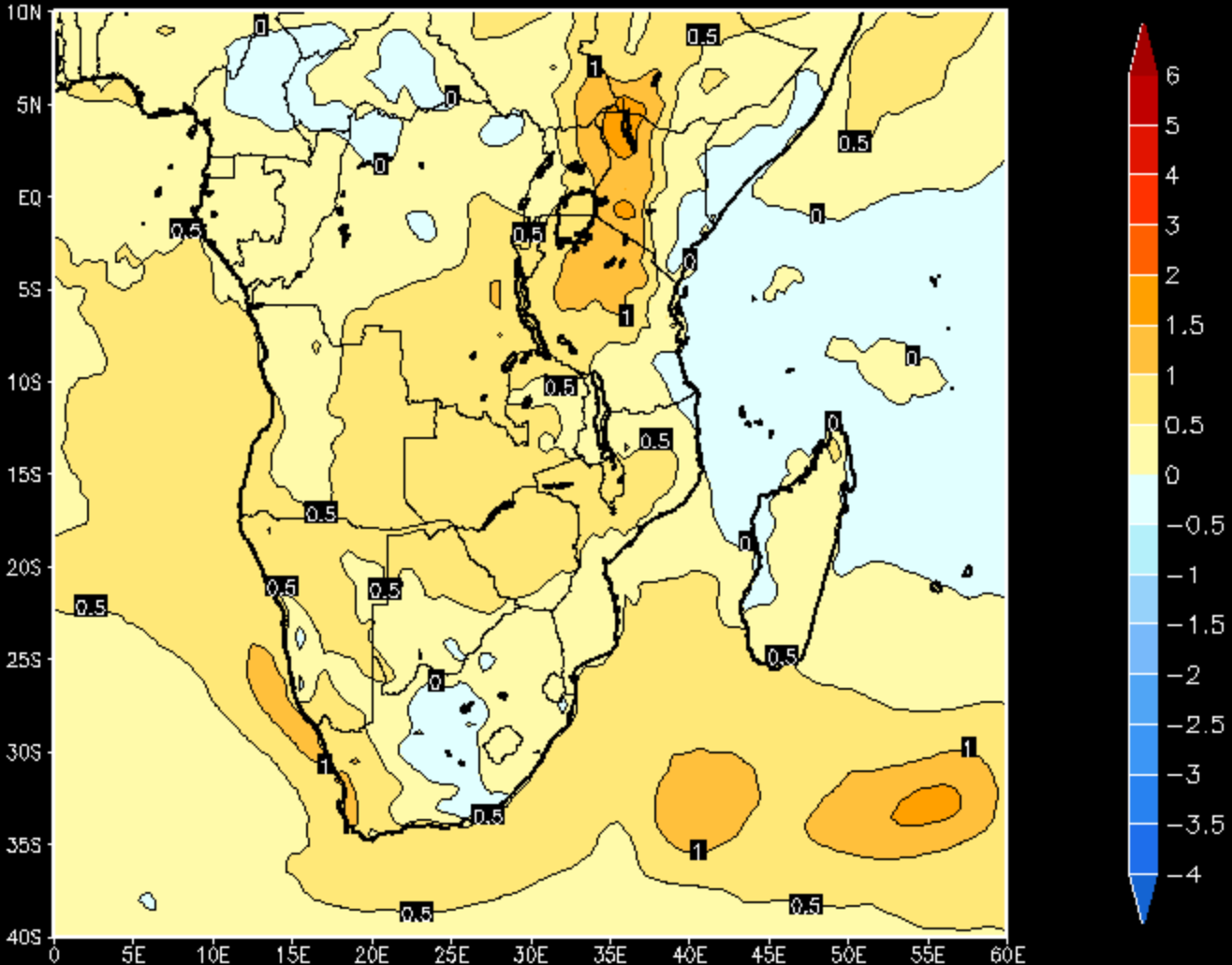
# Temp anomaly 1998



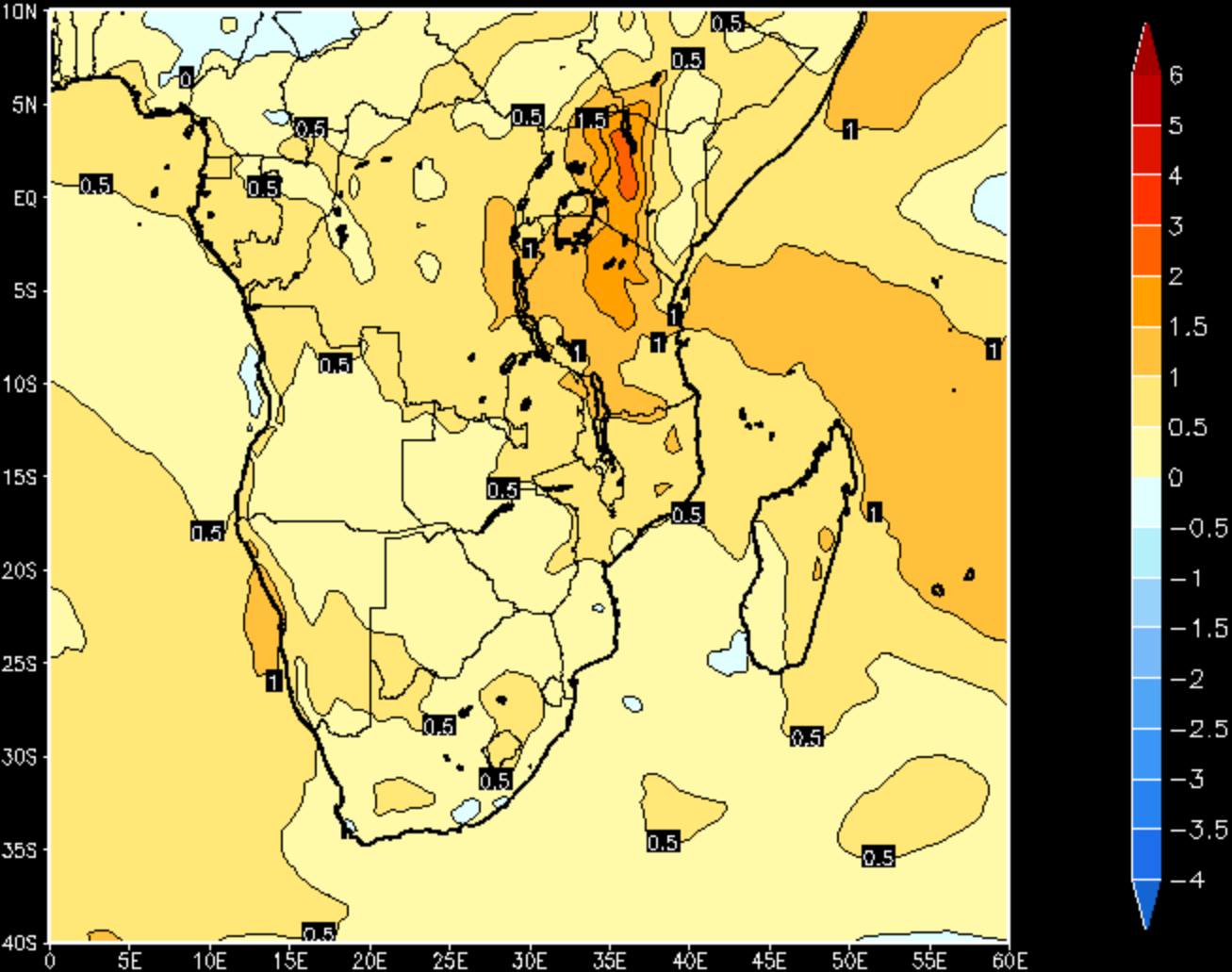
# Temp anomaly 1999



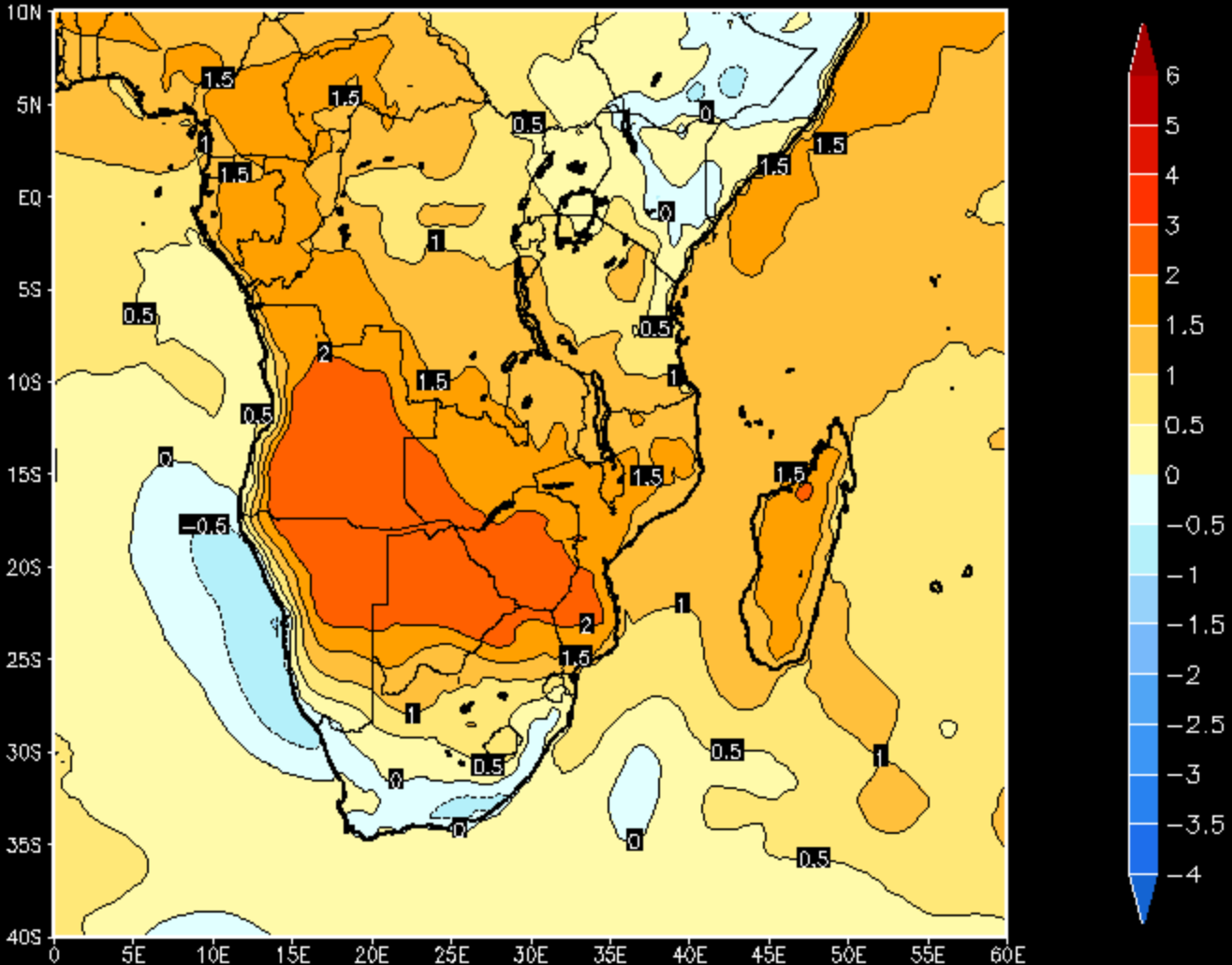
# Temp anomaly 2000



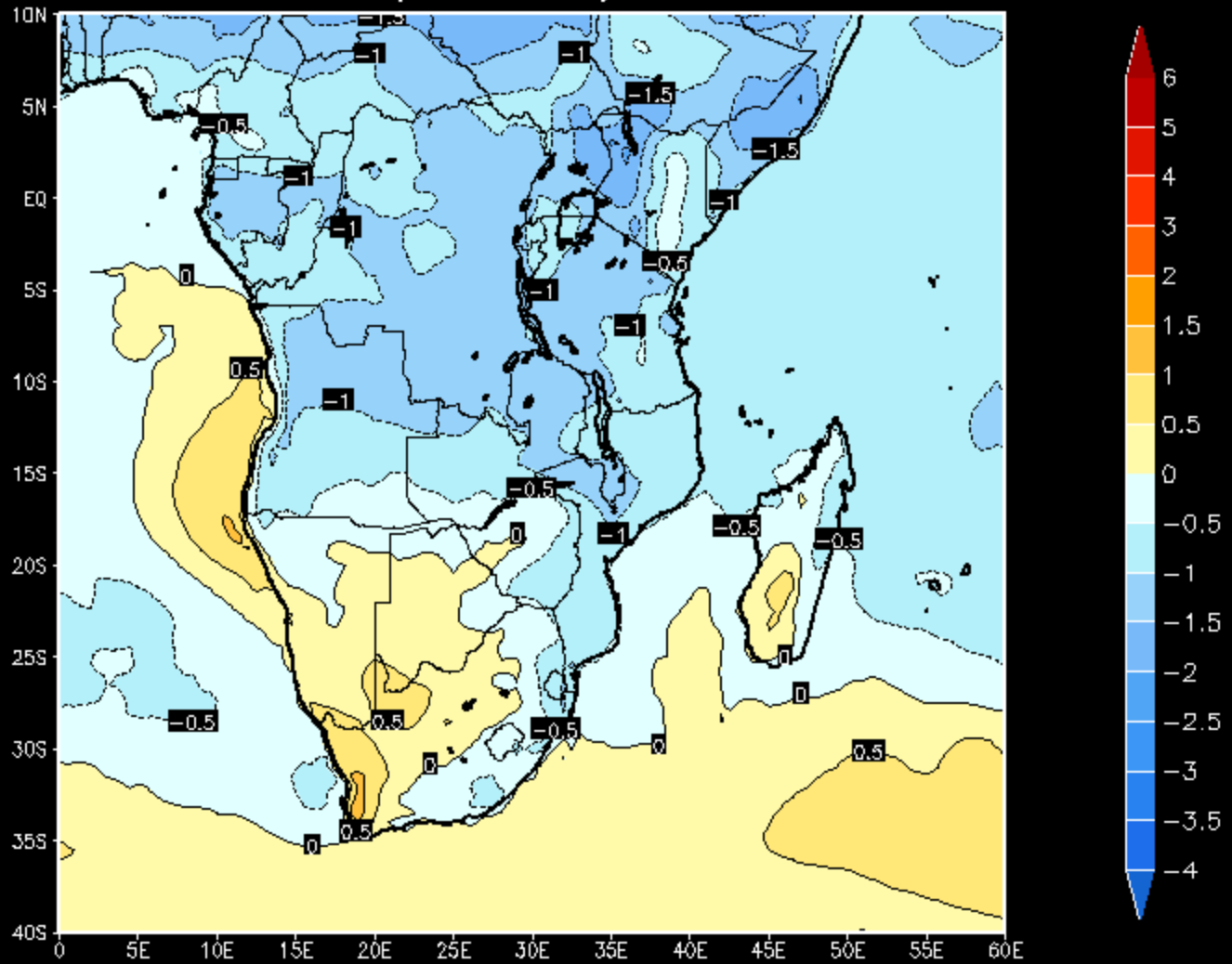
# Temp anomaly 2001



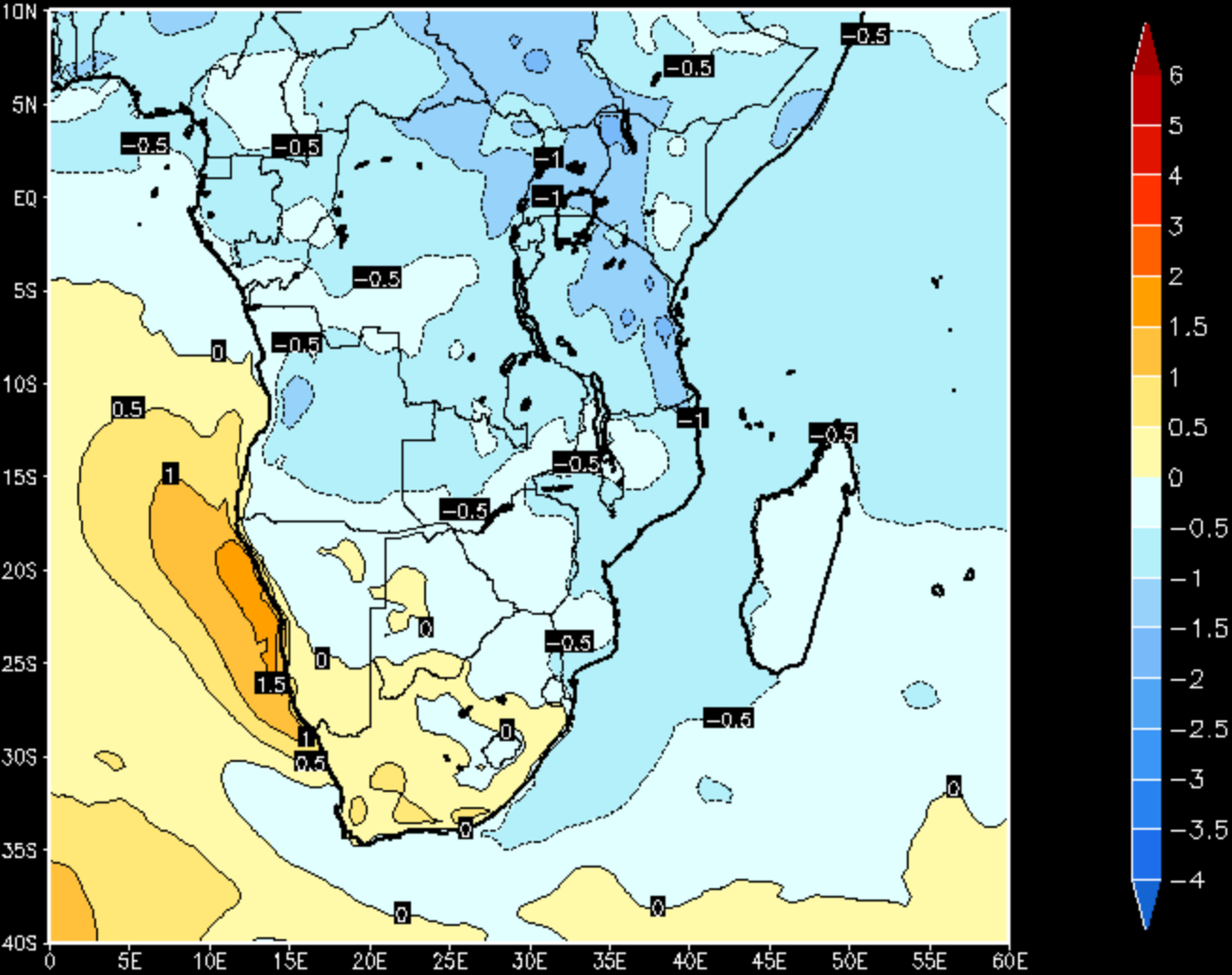
# Temp anomaly 2002



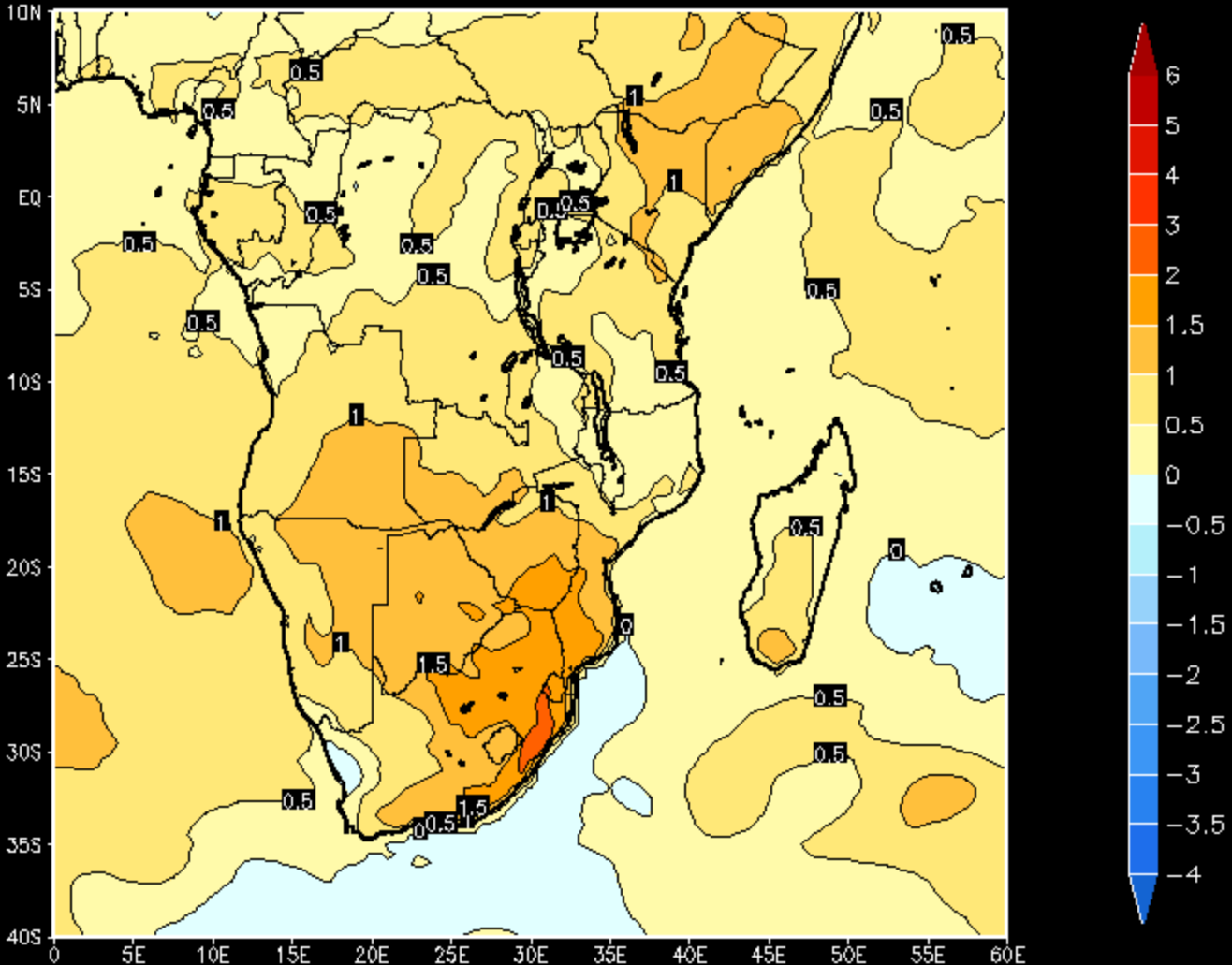
# Temp anomaly 2003



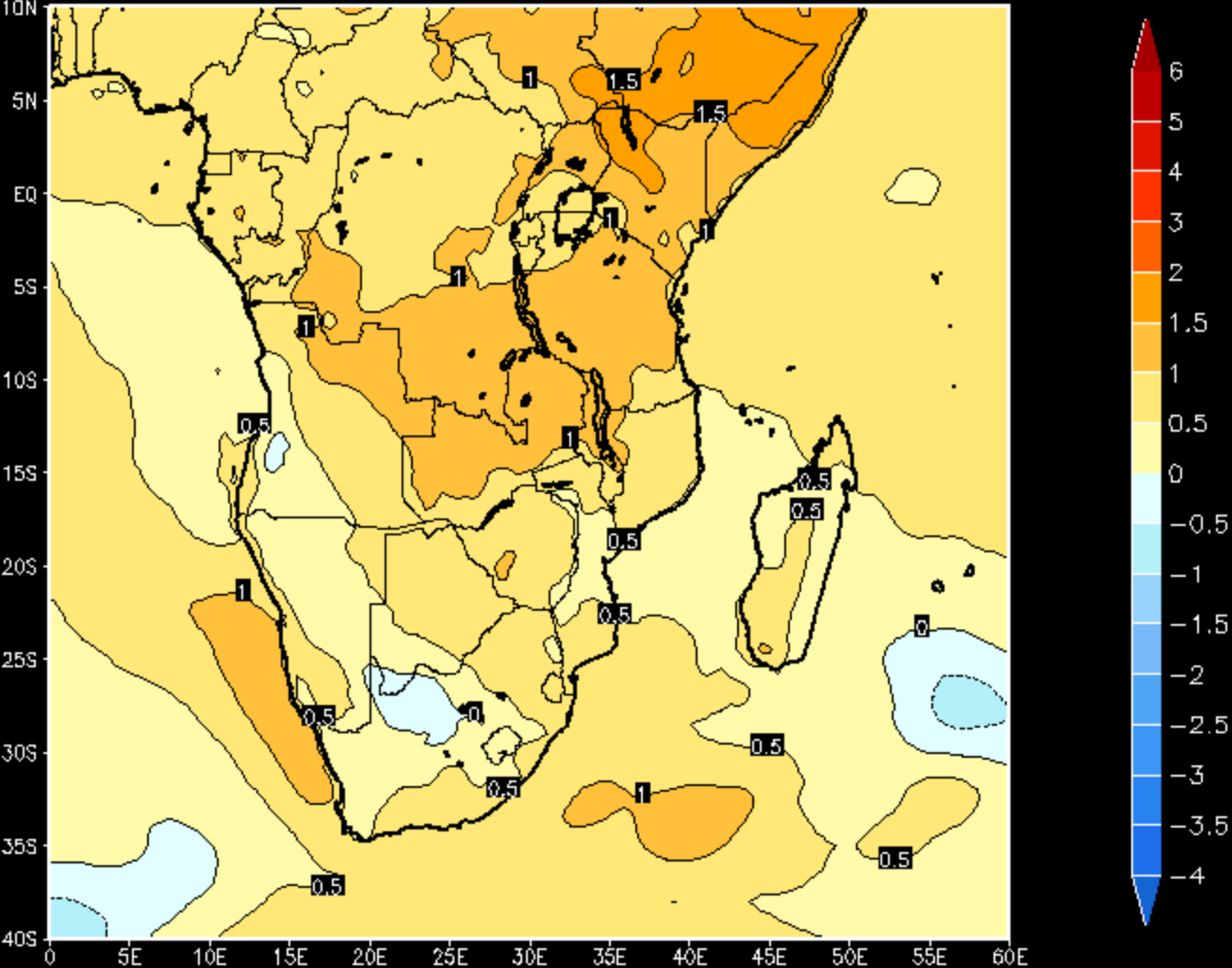
# Temp anomaly 2004



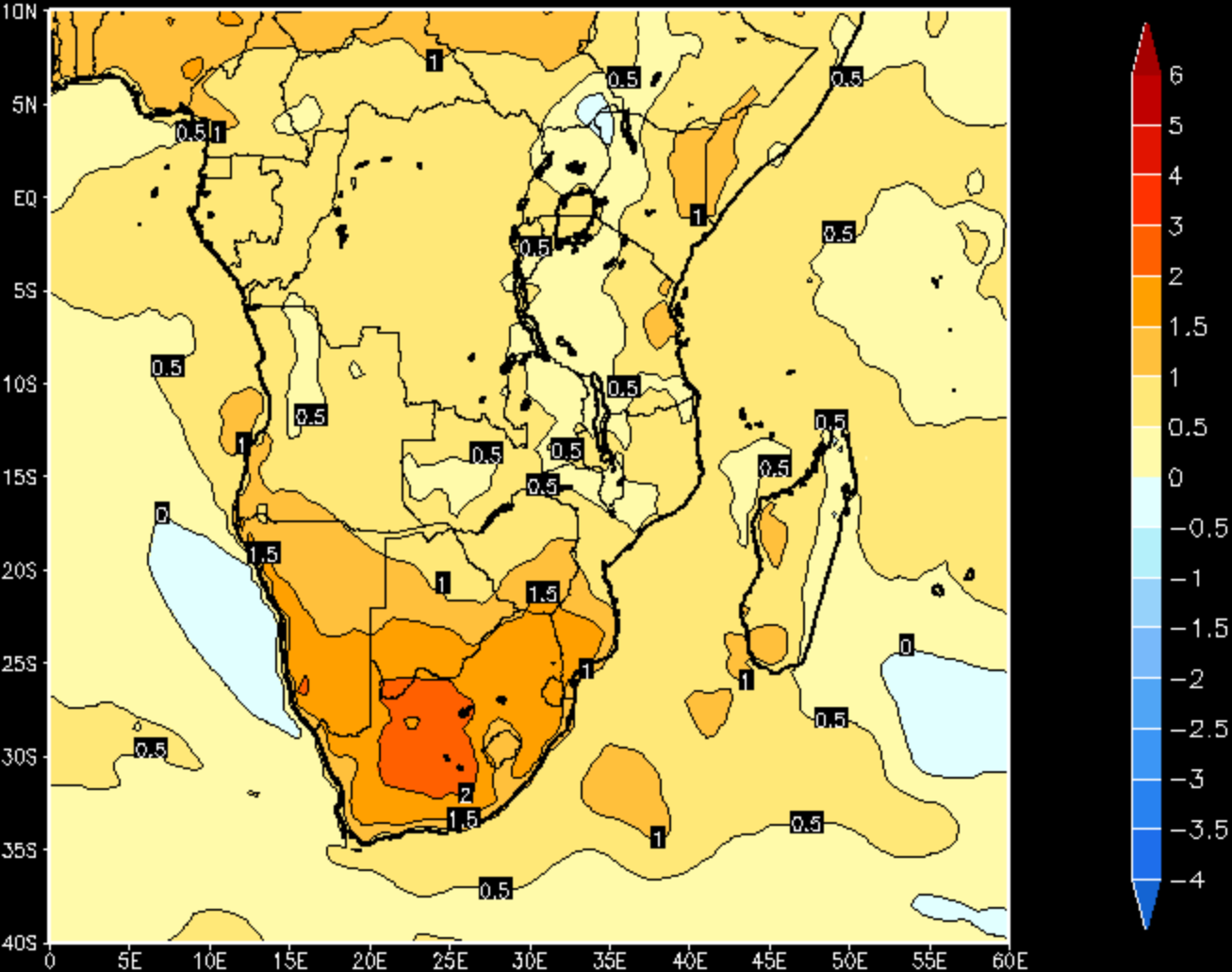
# Temp anomaly 2005



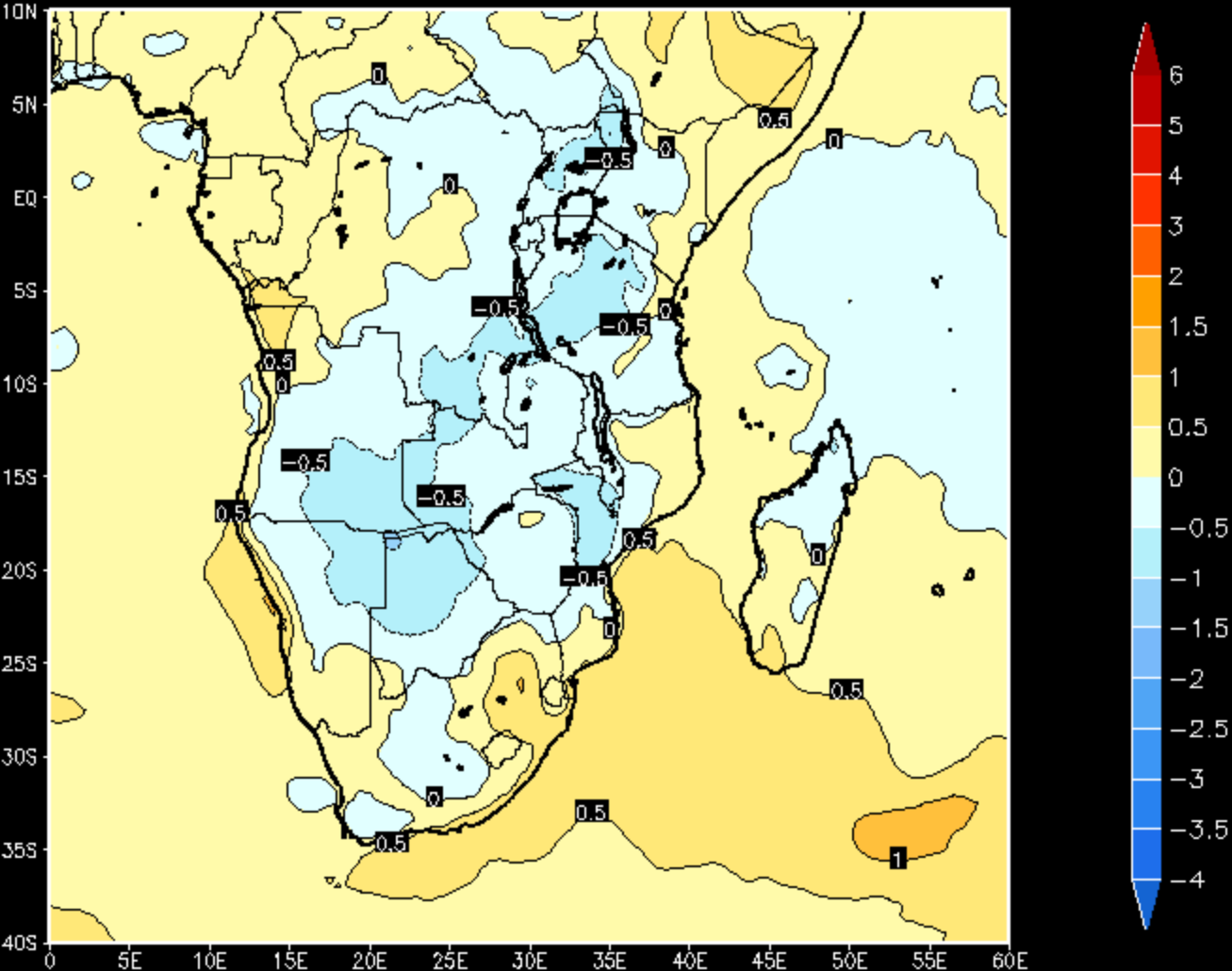
# Temp anomaly 2006



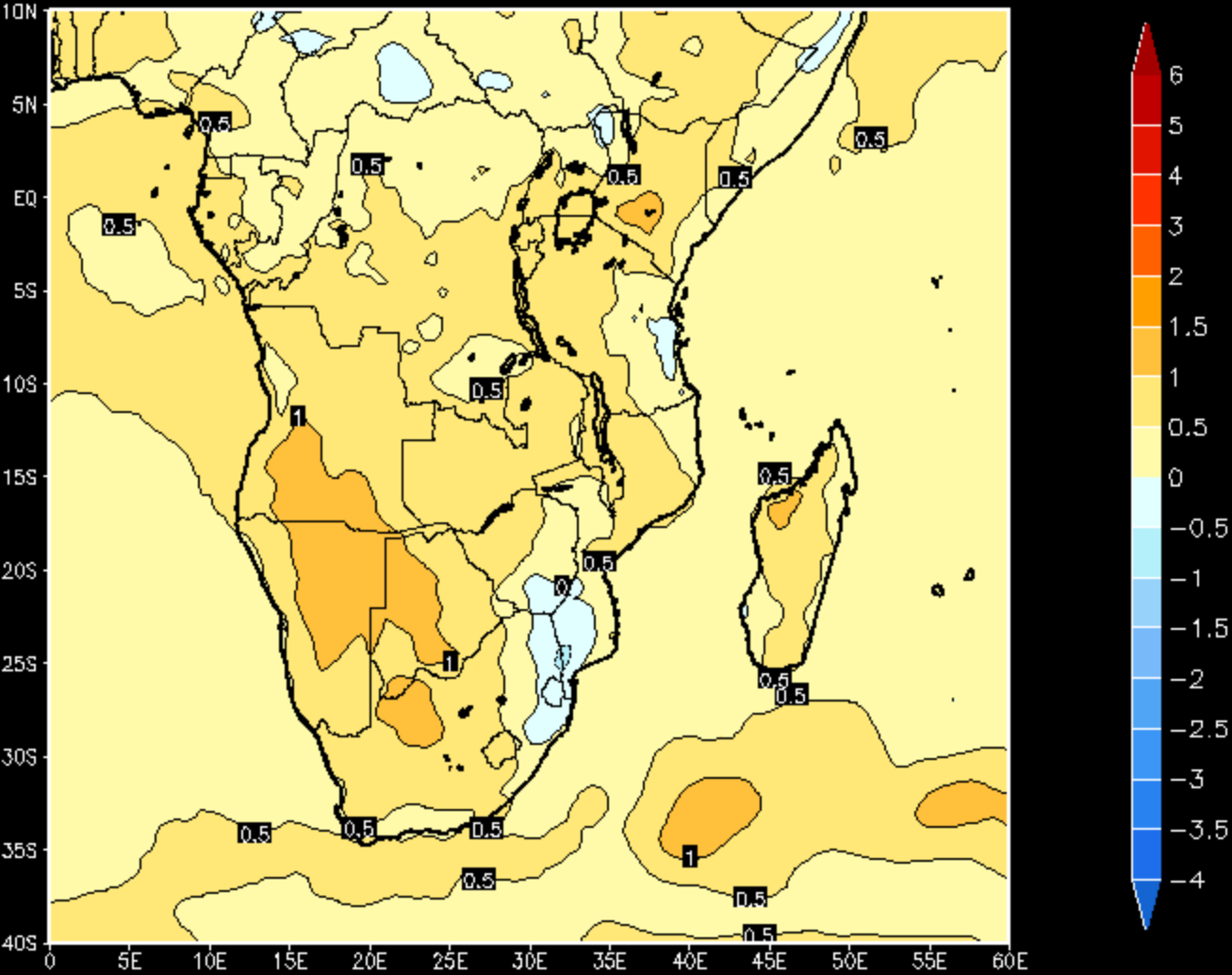
# Temp anomaly 2007



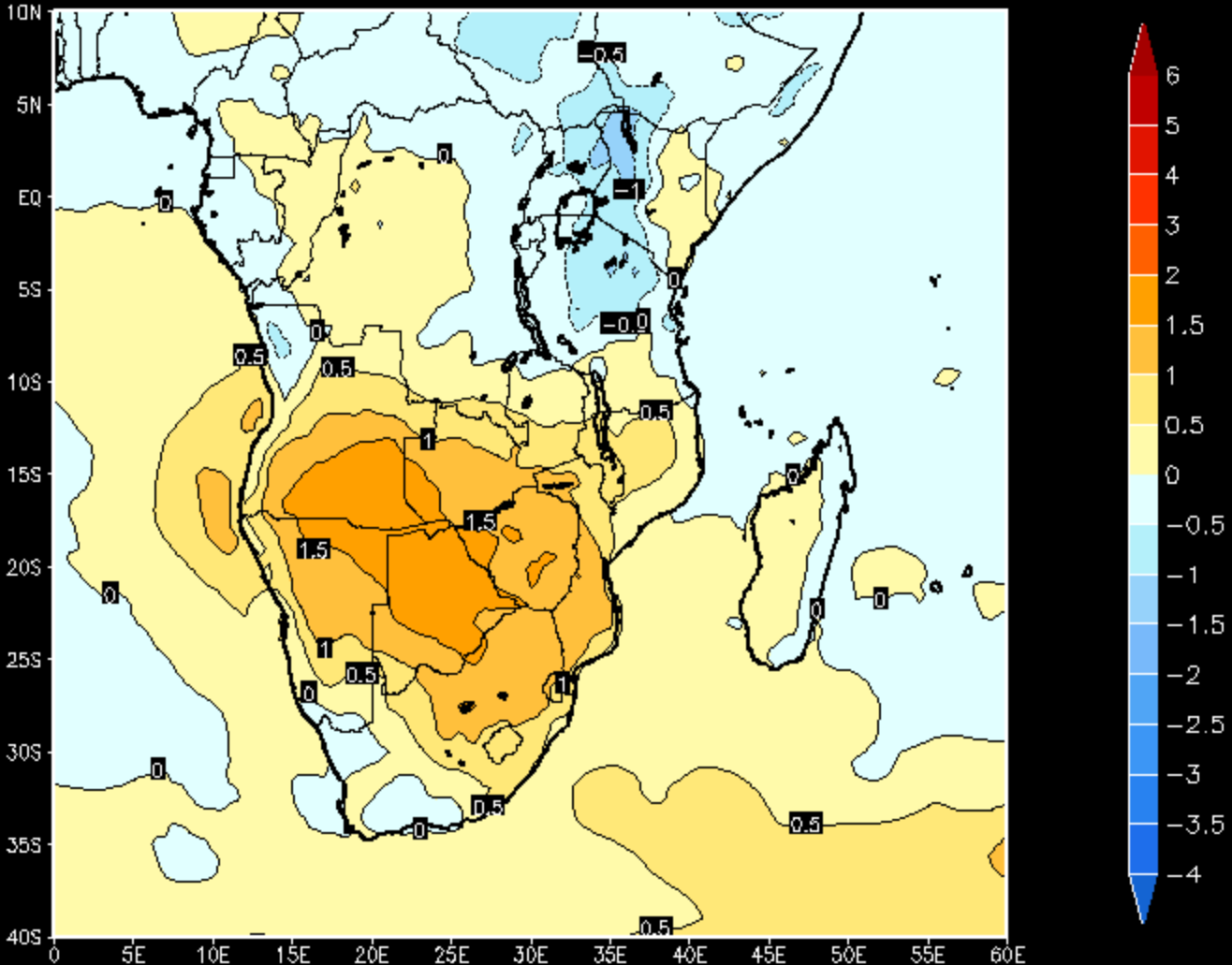
# Temp anomaly 2008



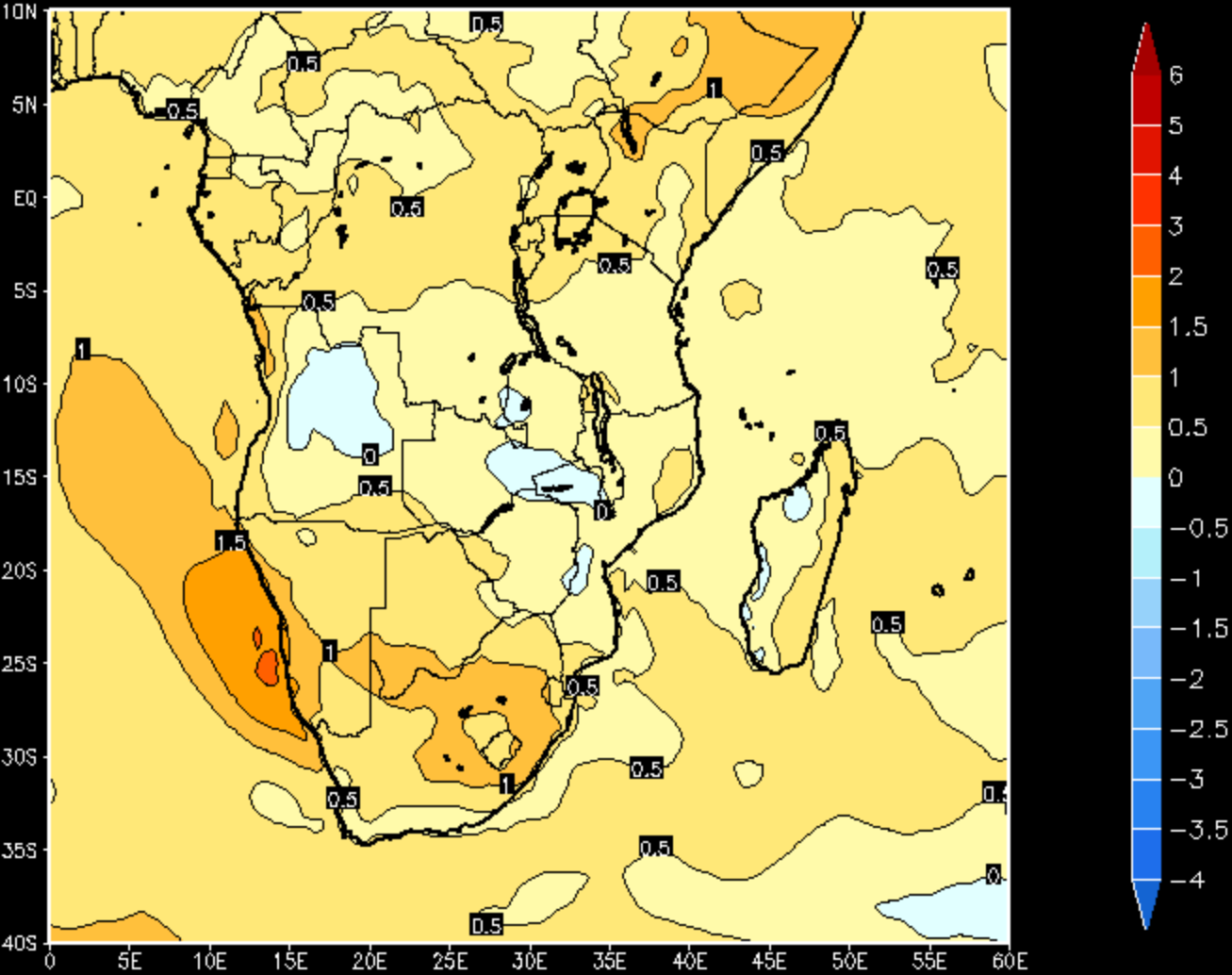
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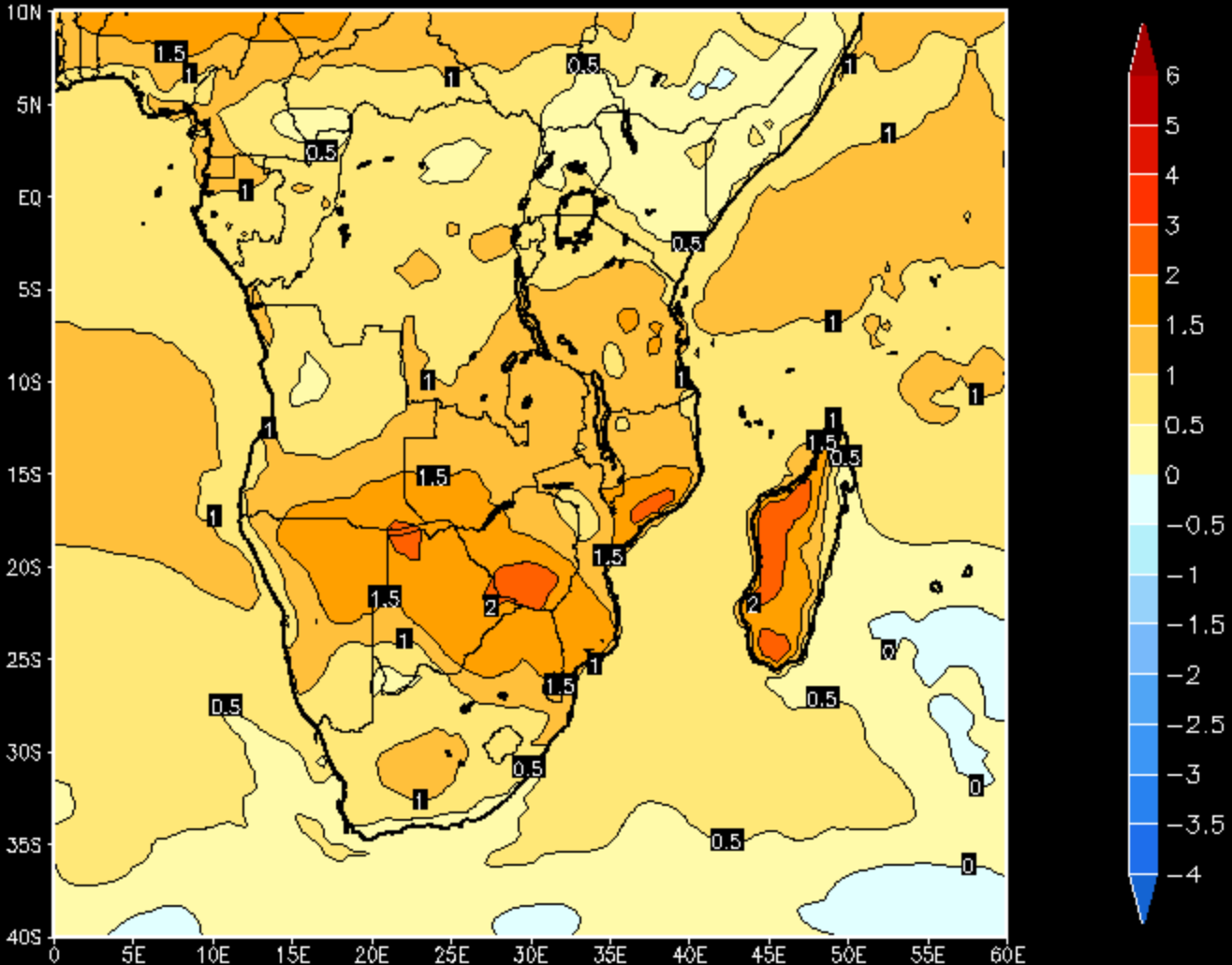
# Temp anomaly 2010



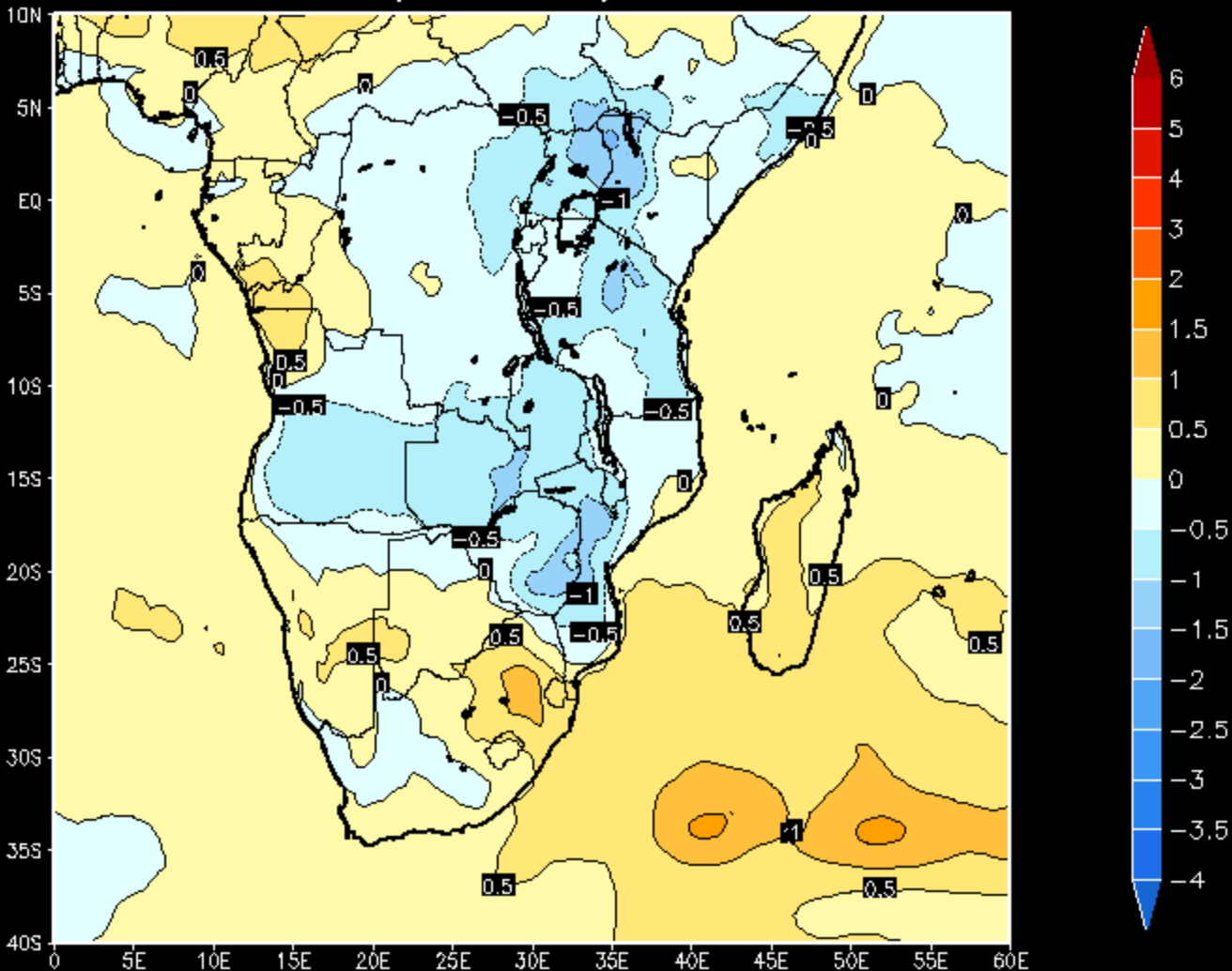
# Temp anomaly 2011



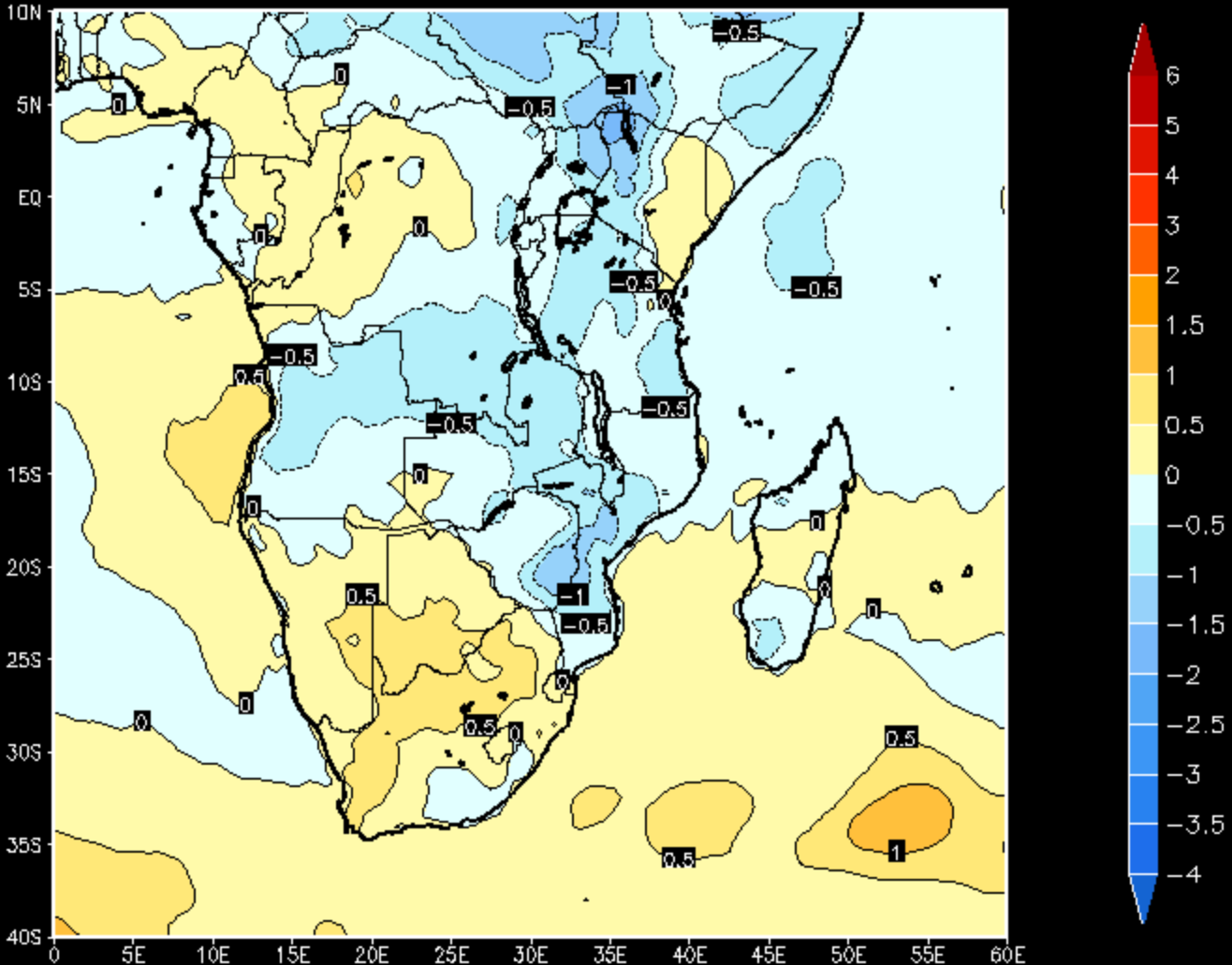
# Temp anomaly 2012



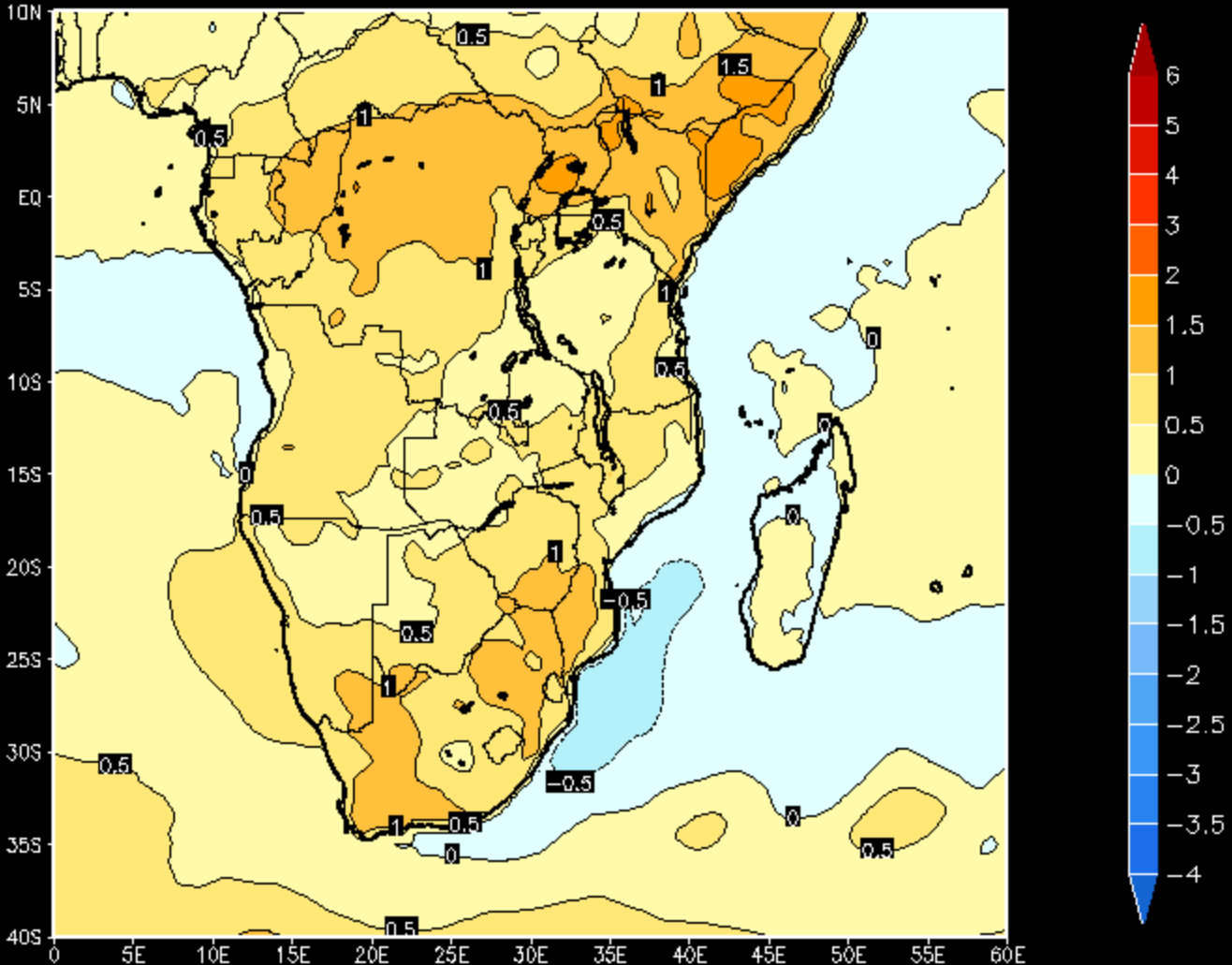
# Temp anomaly 2013



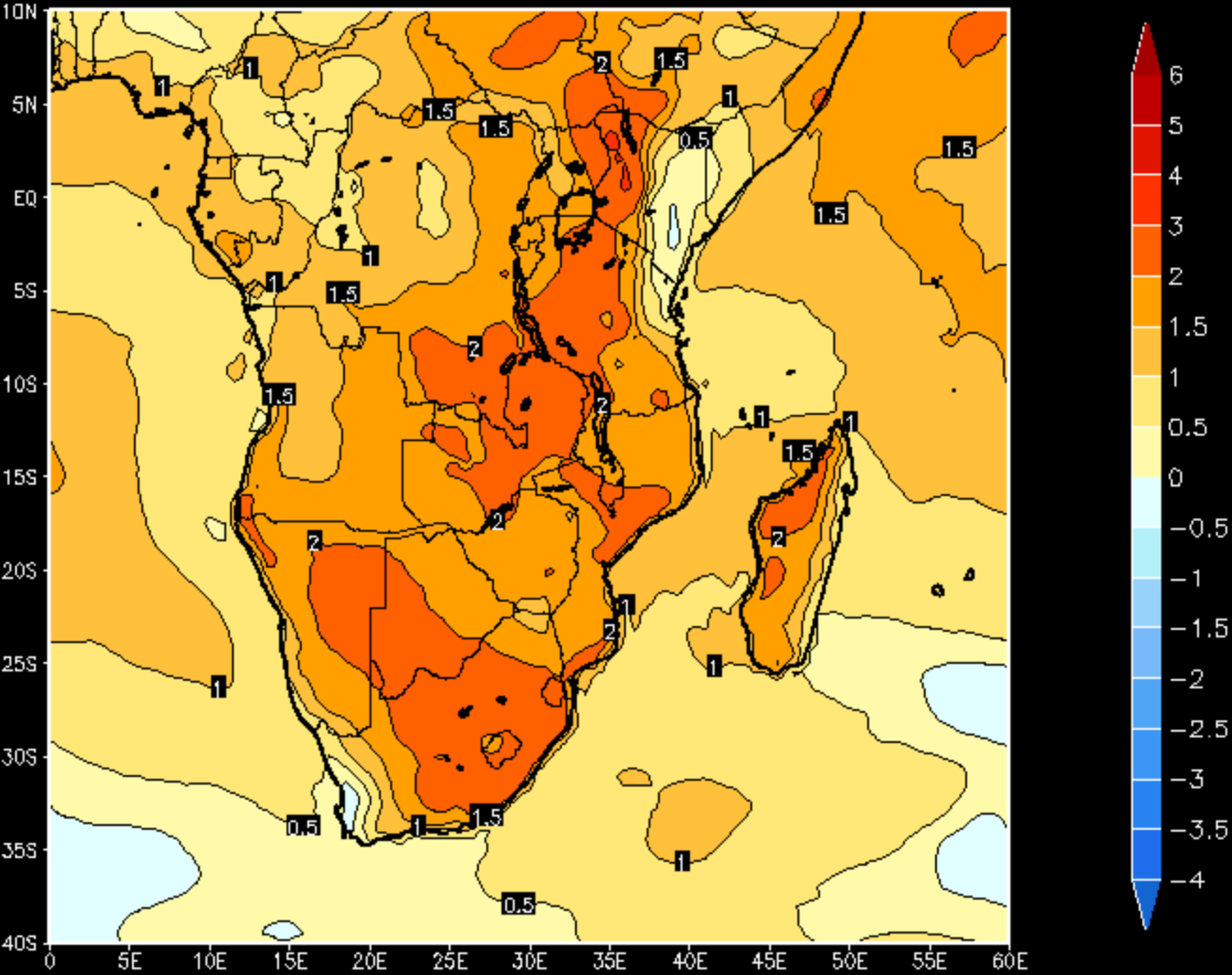
# Temp anomaly 2014



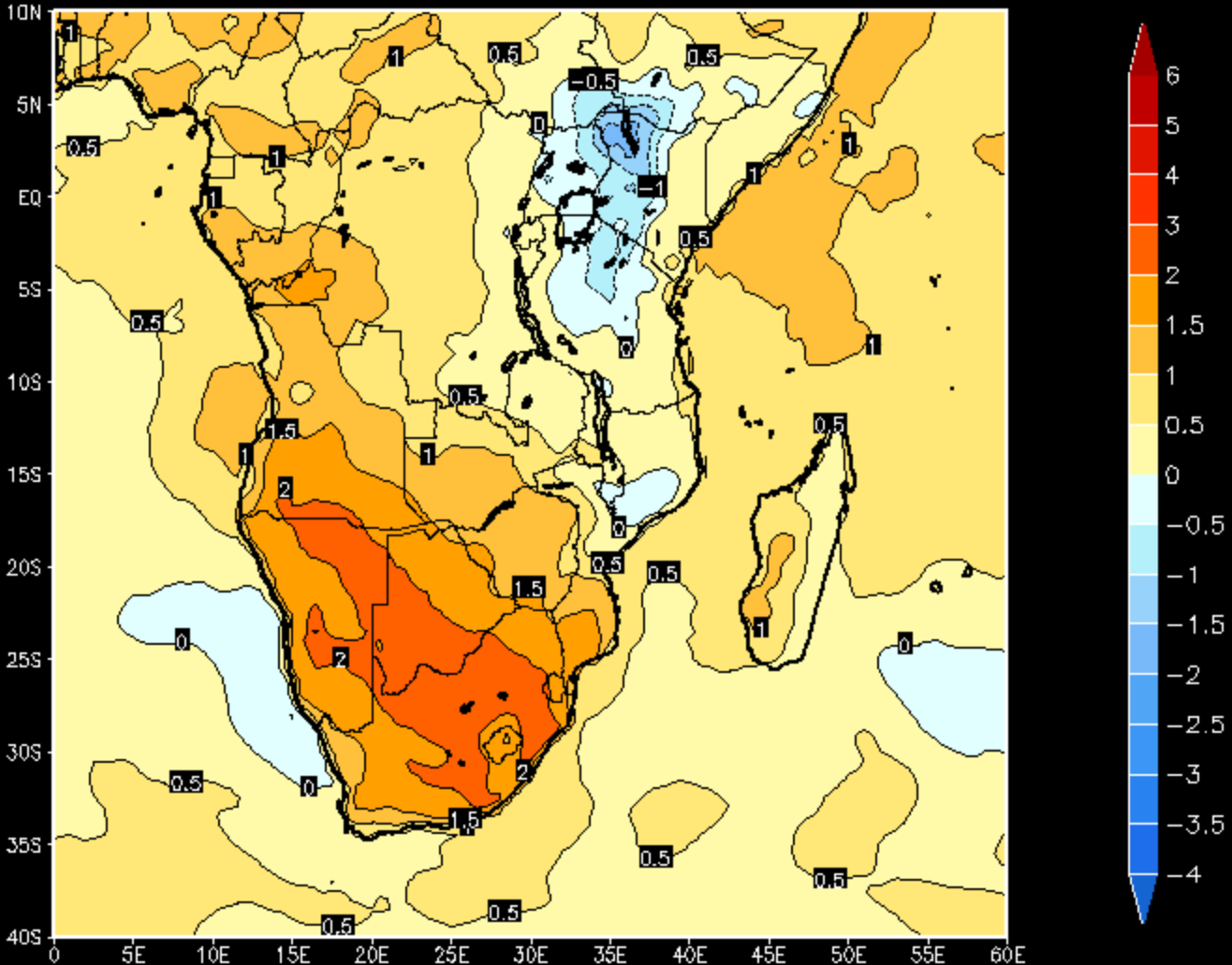
# Temp anomaly 2015



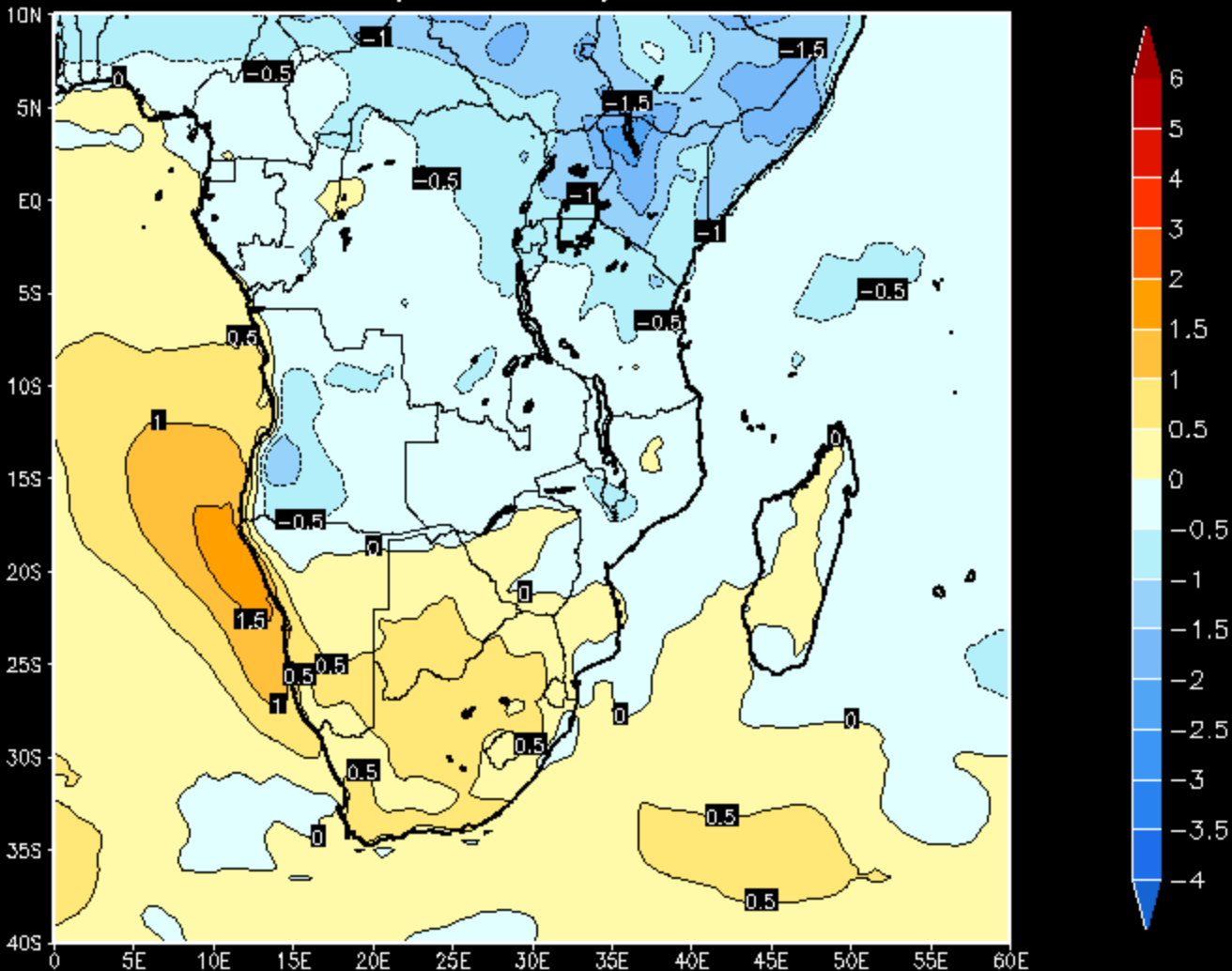
# Temp anomaly 2016



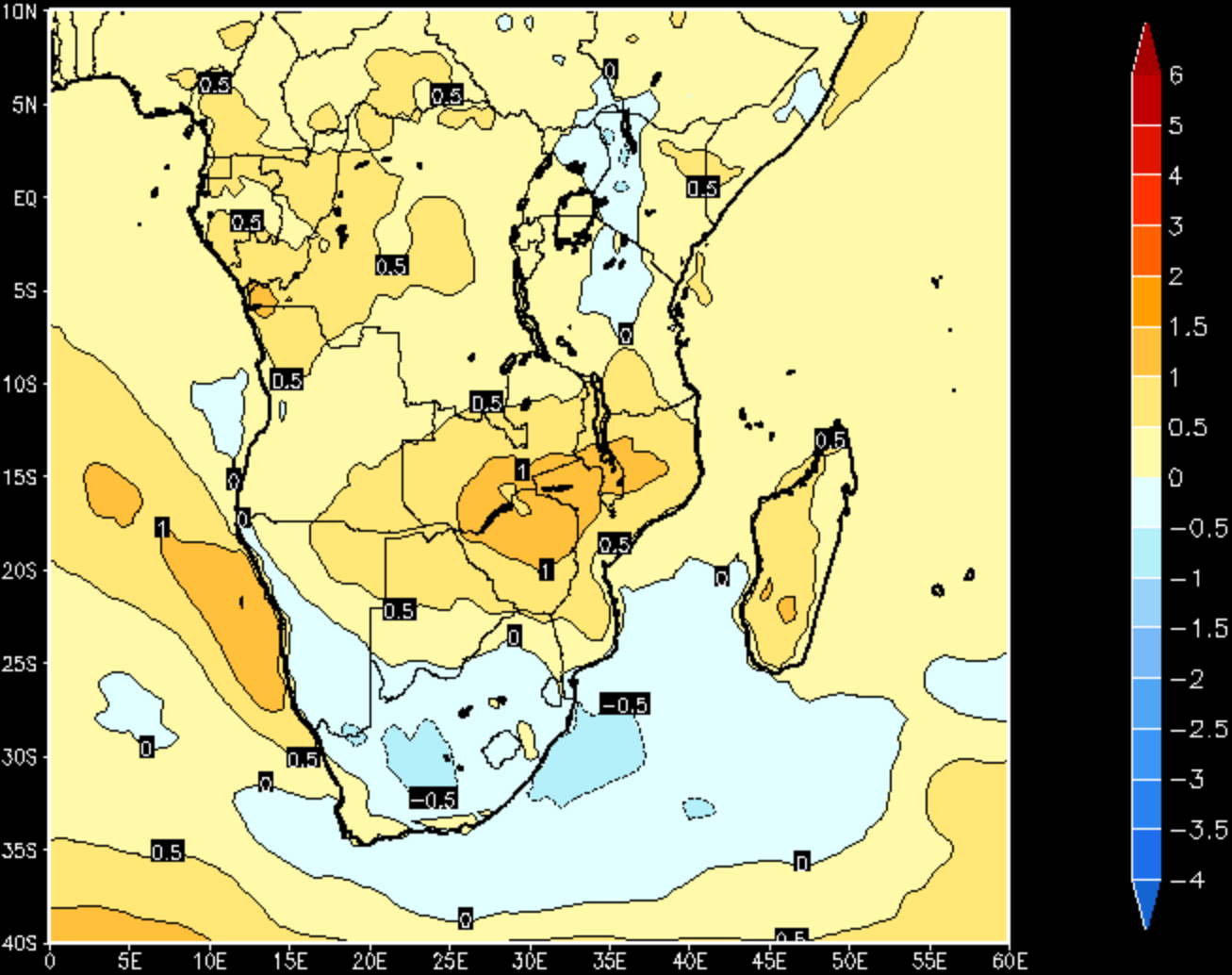
# Temp anomaly 2017



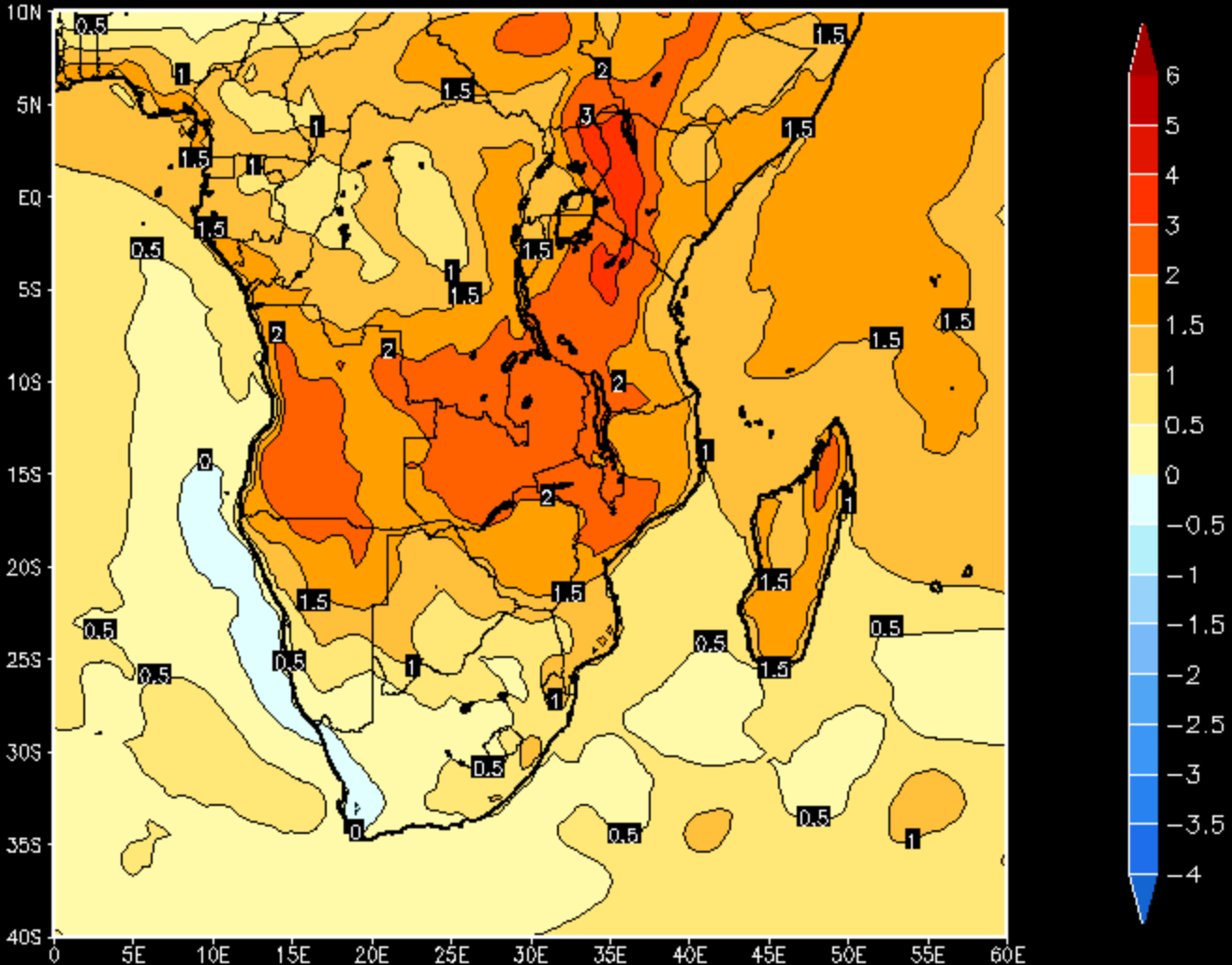
# Temp anomaly 2018



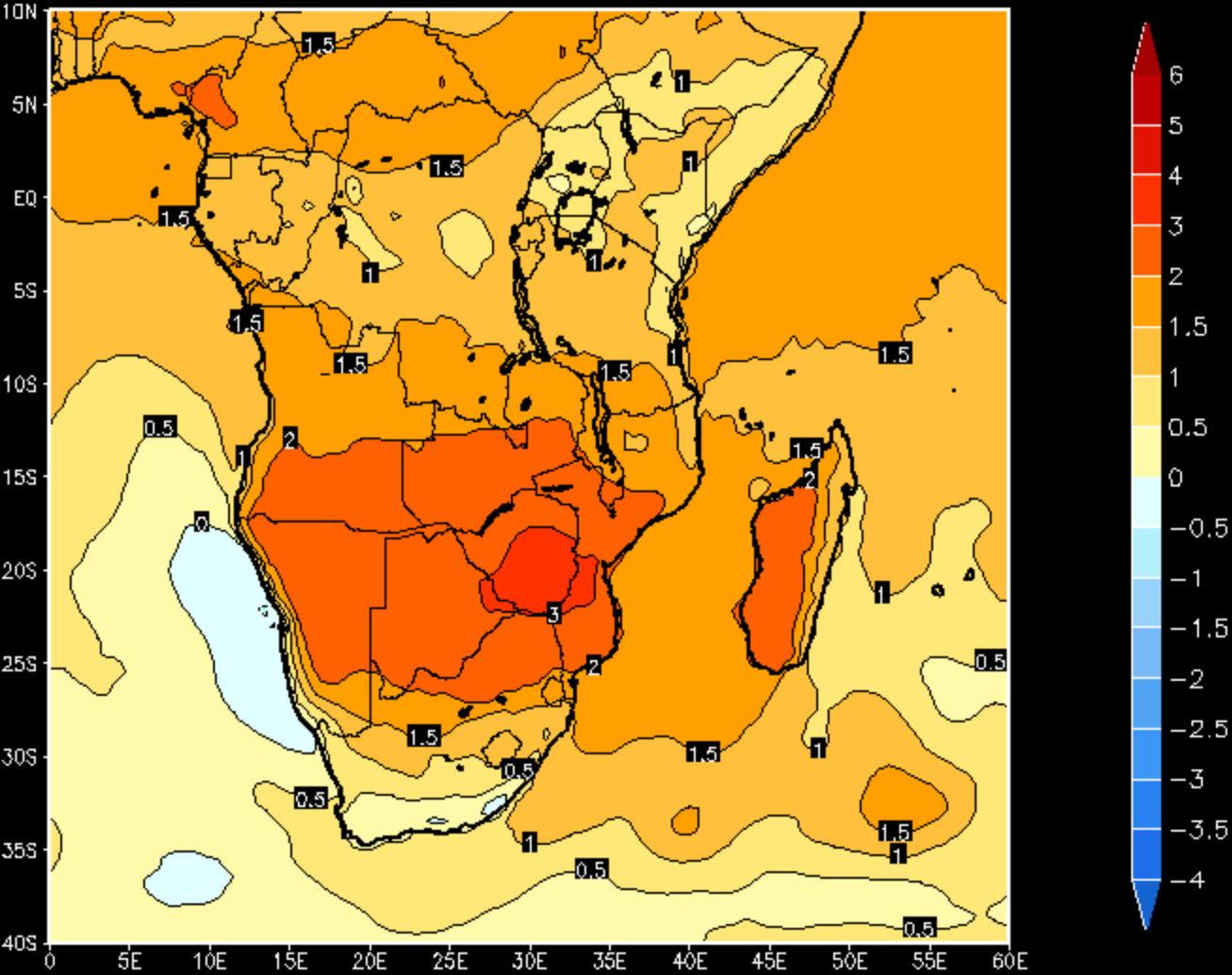
# Temp anomaly 2019



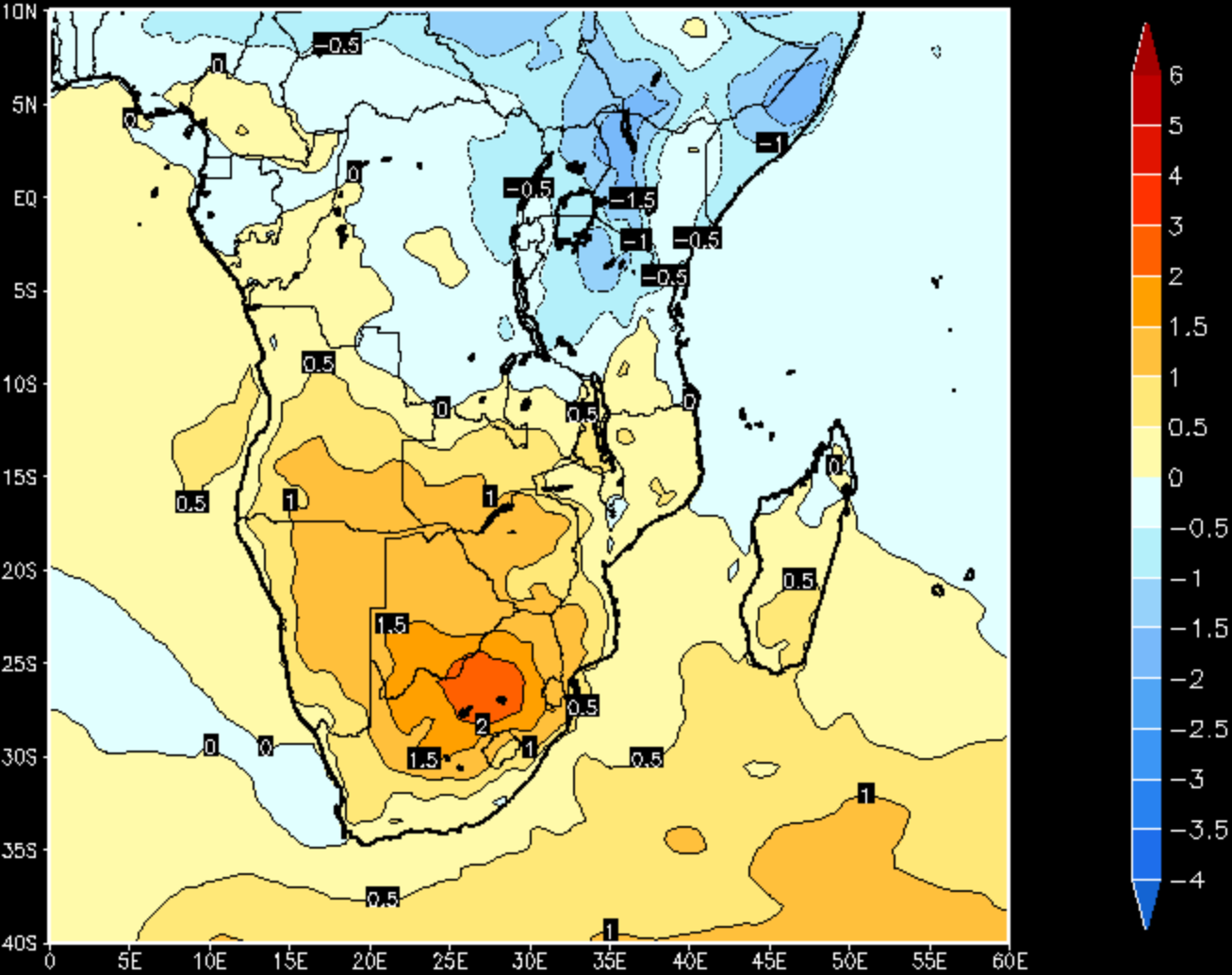
# Temp anomaly 2020



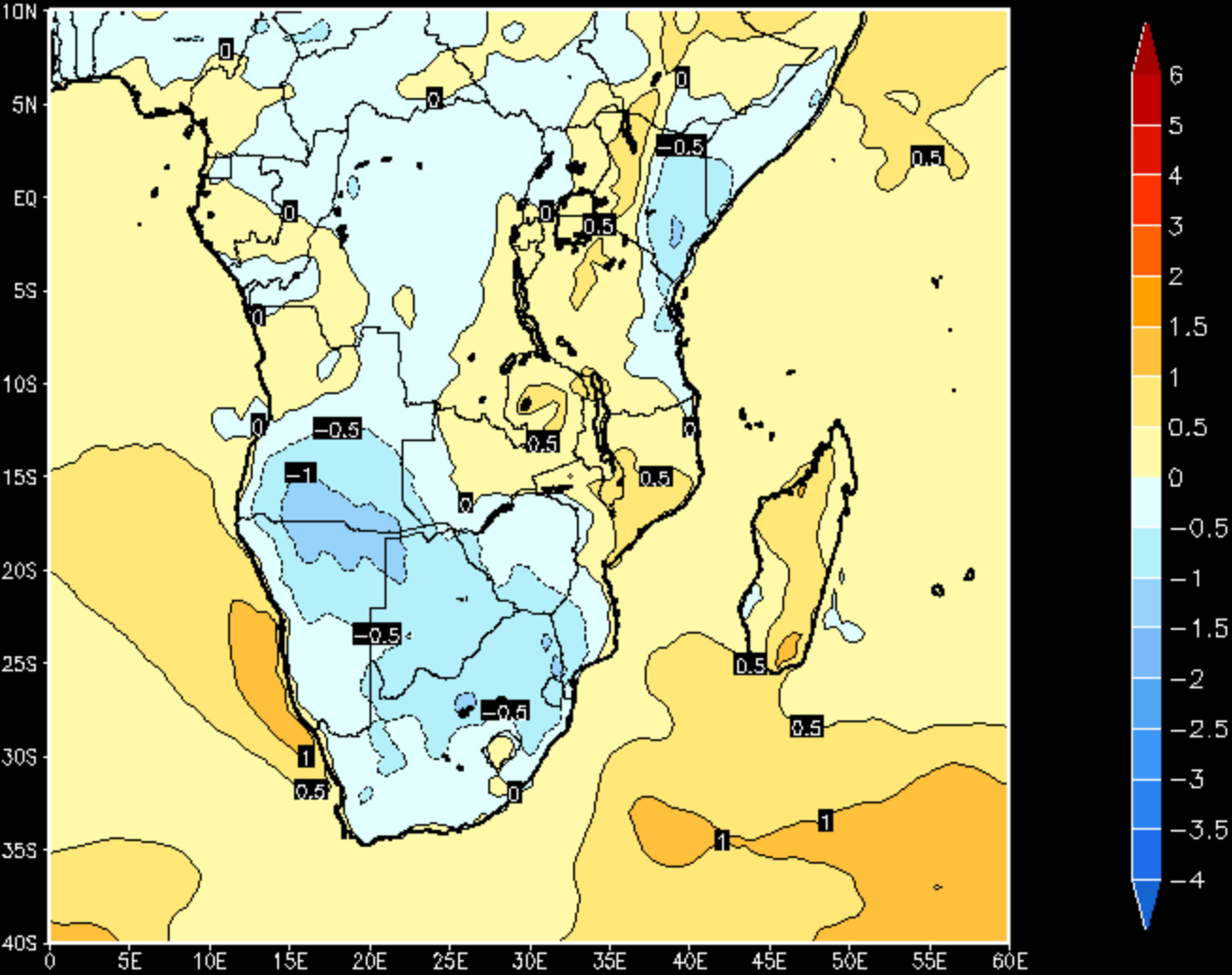
# Temp anomaly 2021



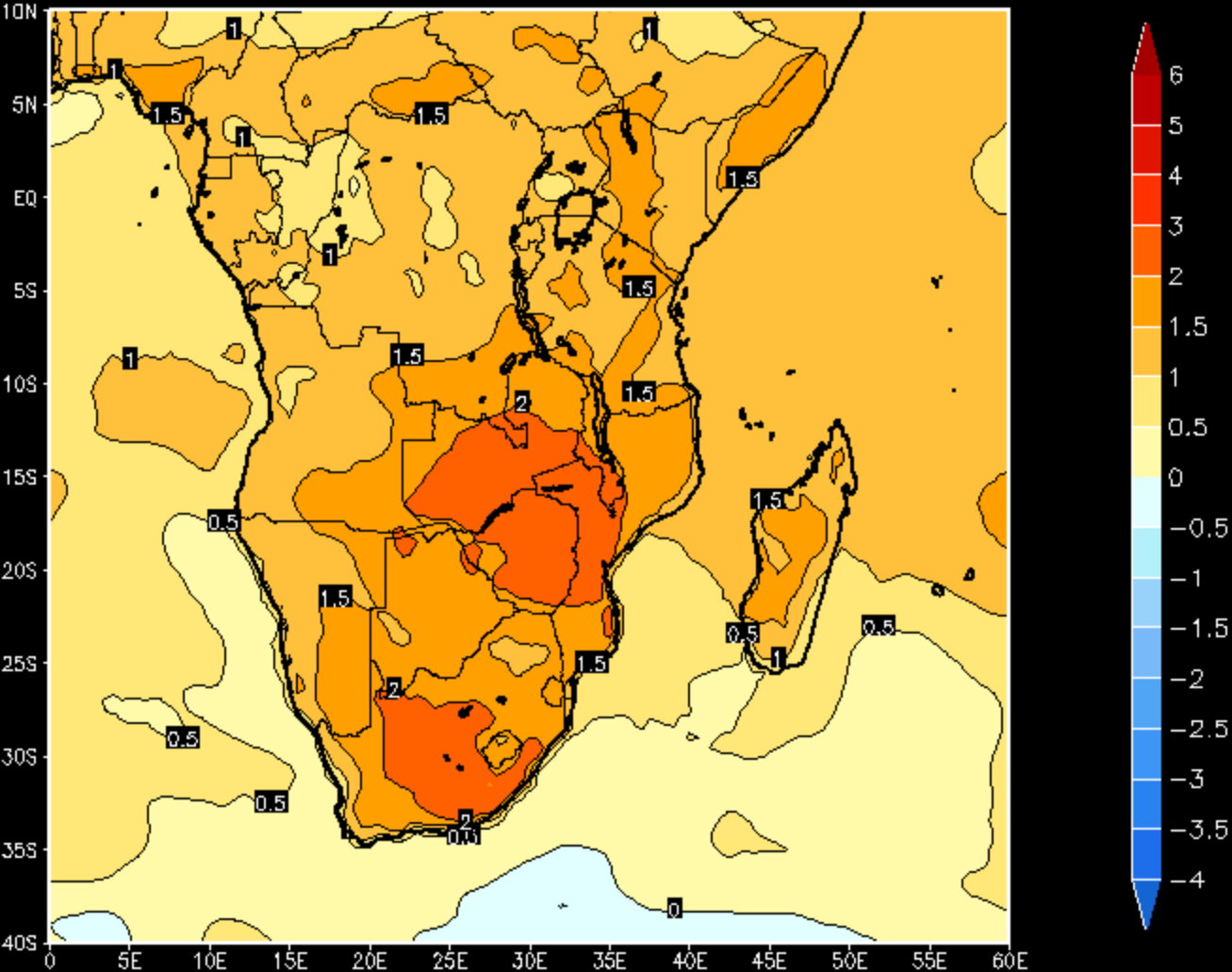
# Temp anomaly 2022



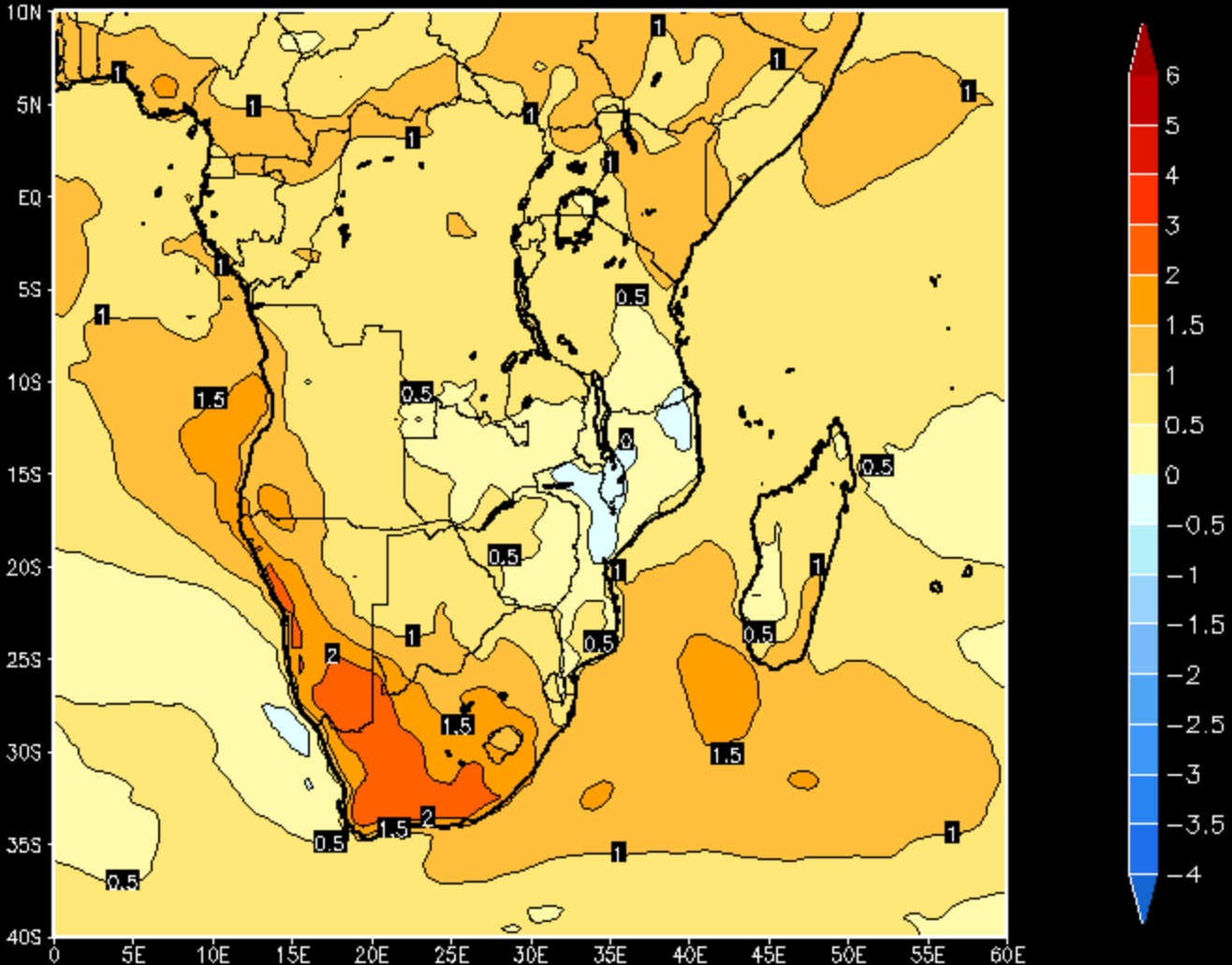
# Temp anomaly 2023



# Temp anomaly 2024

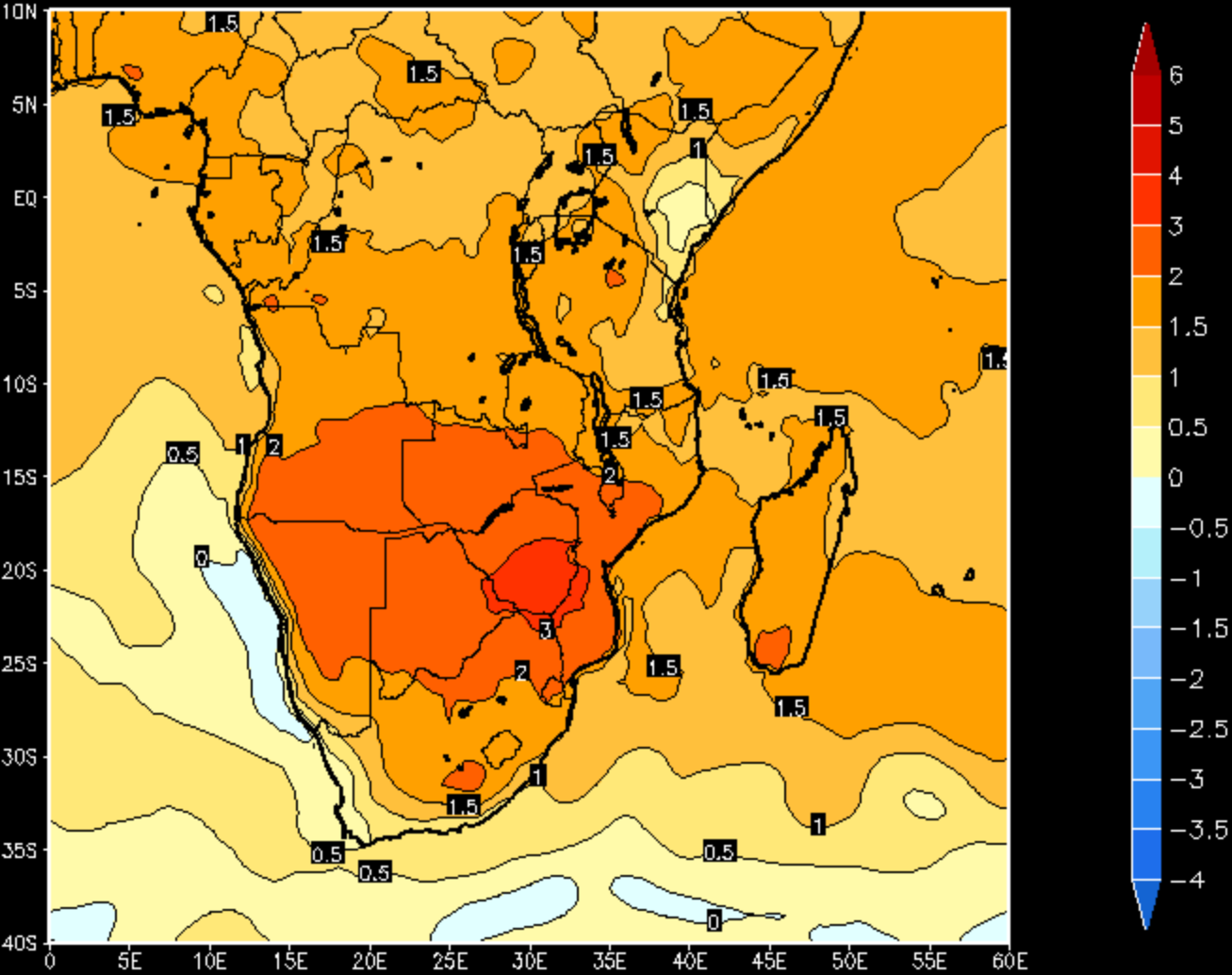


# Temp anomaly 2025

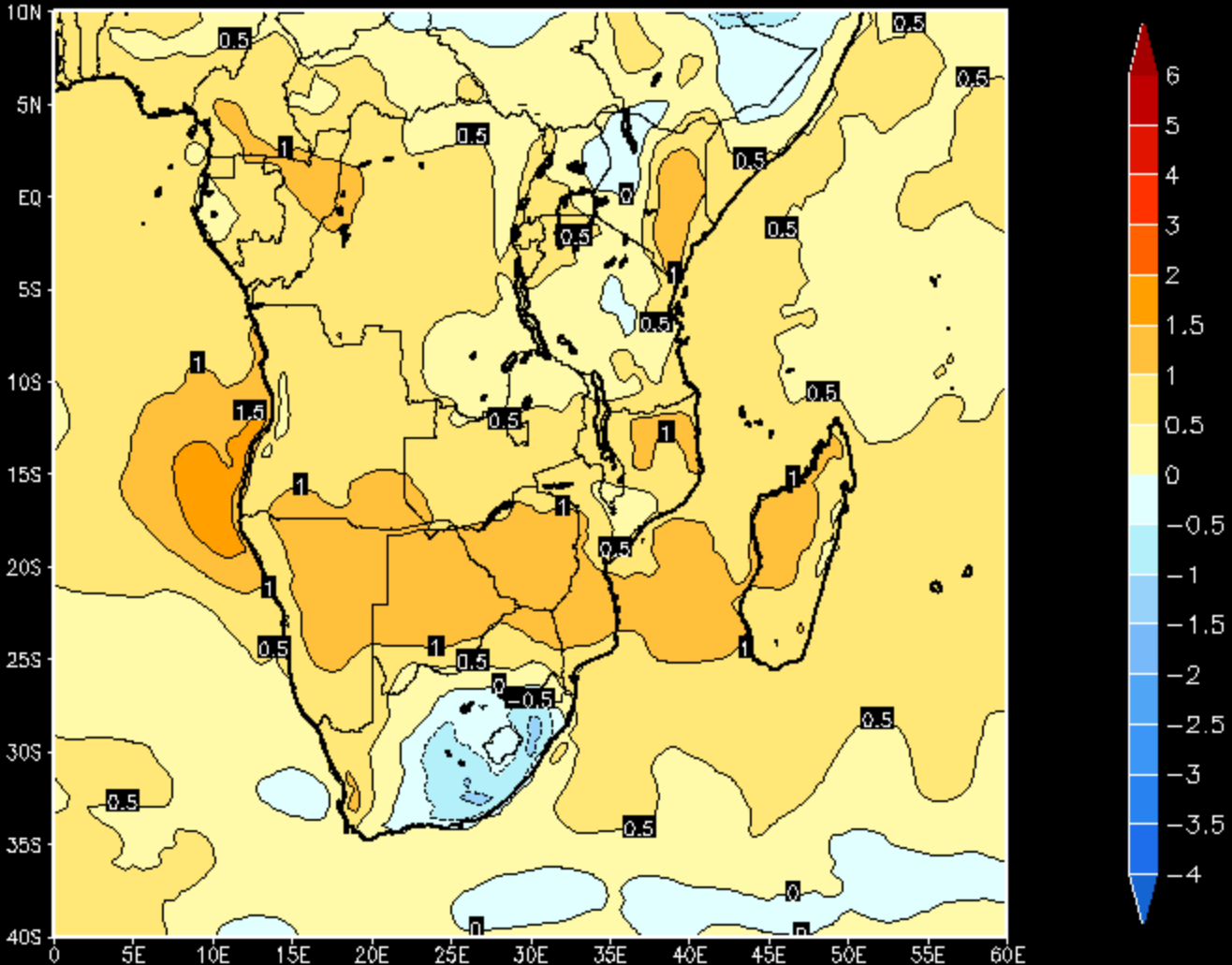




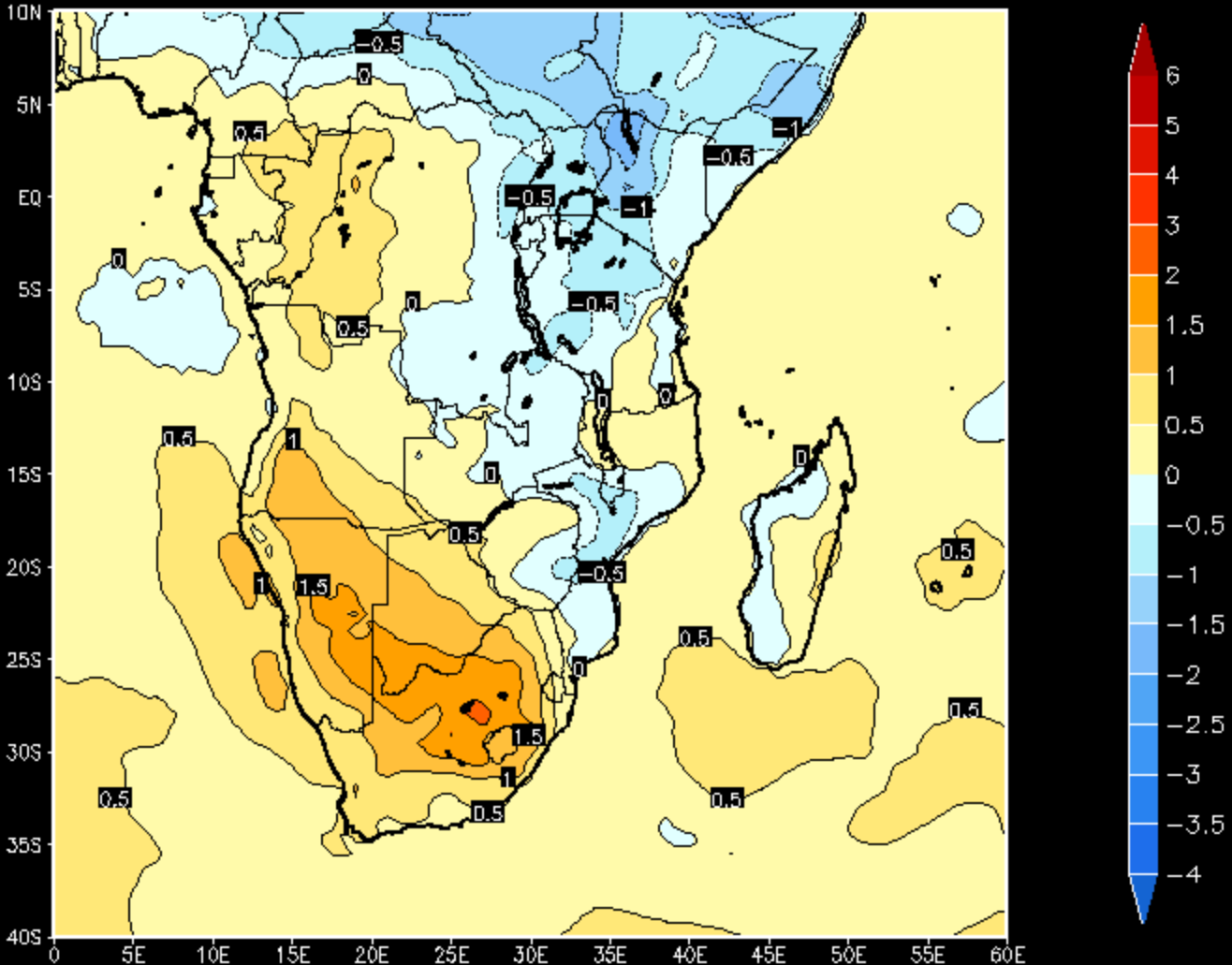
# Temp anomaly 2027



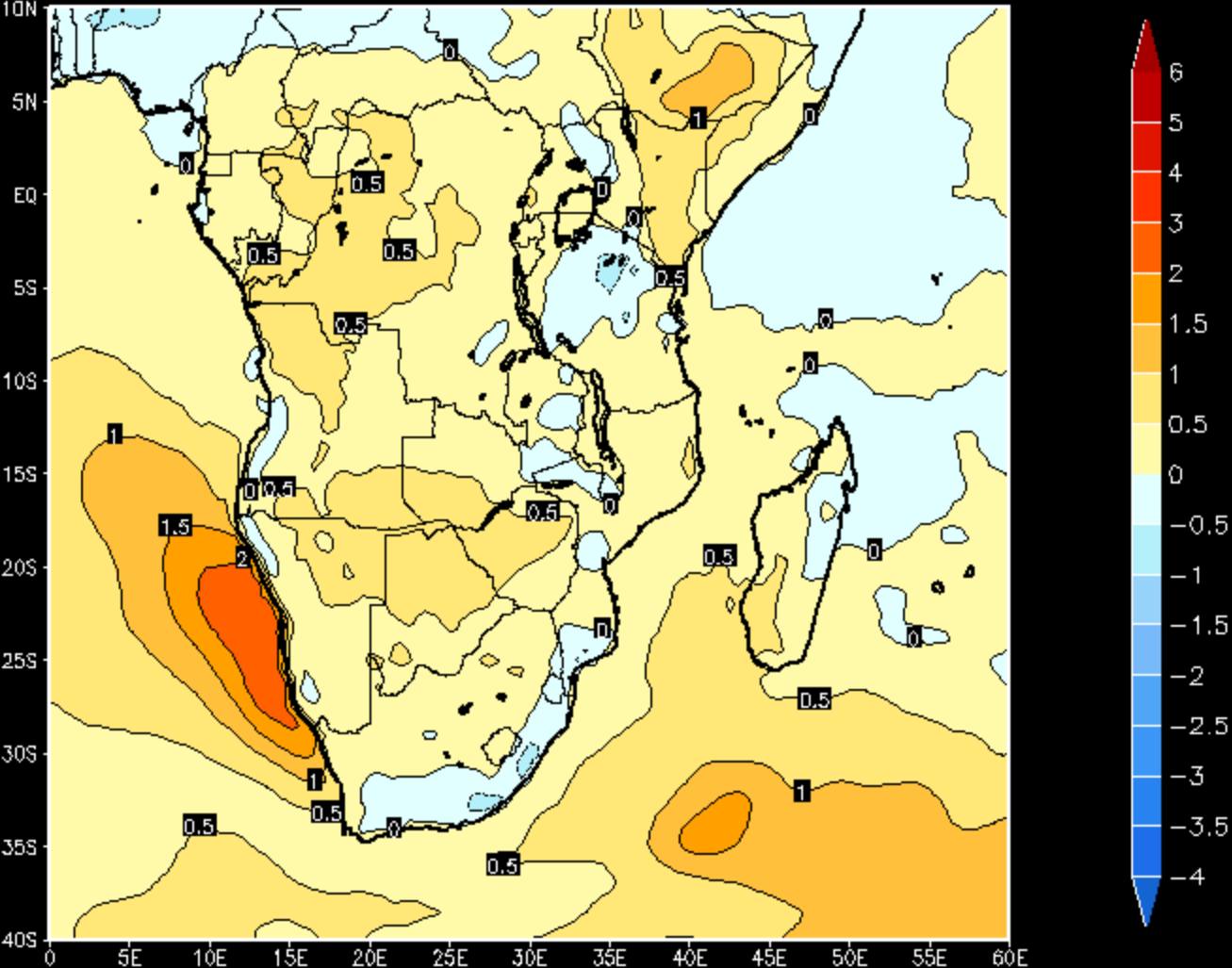
# Temp anomaly 2028



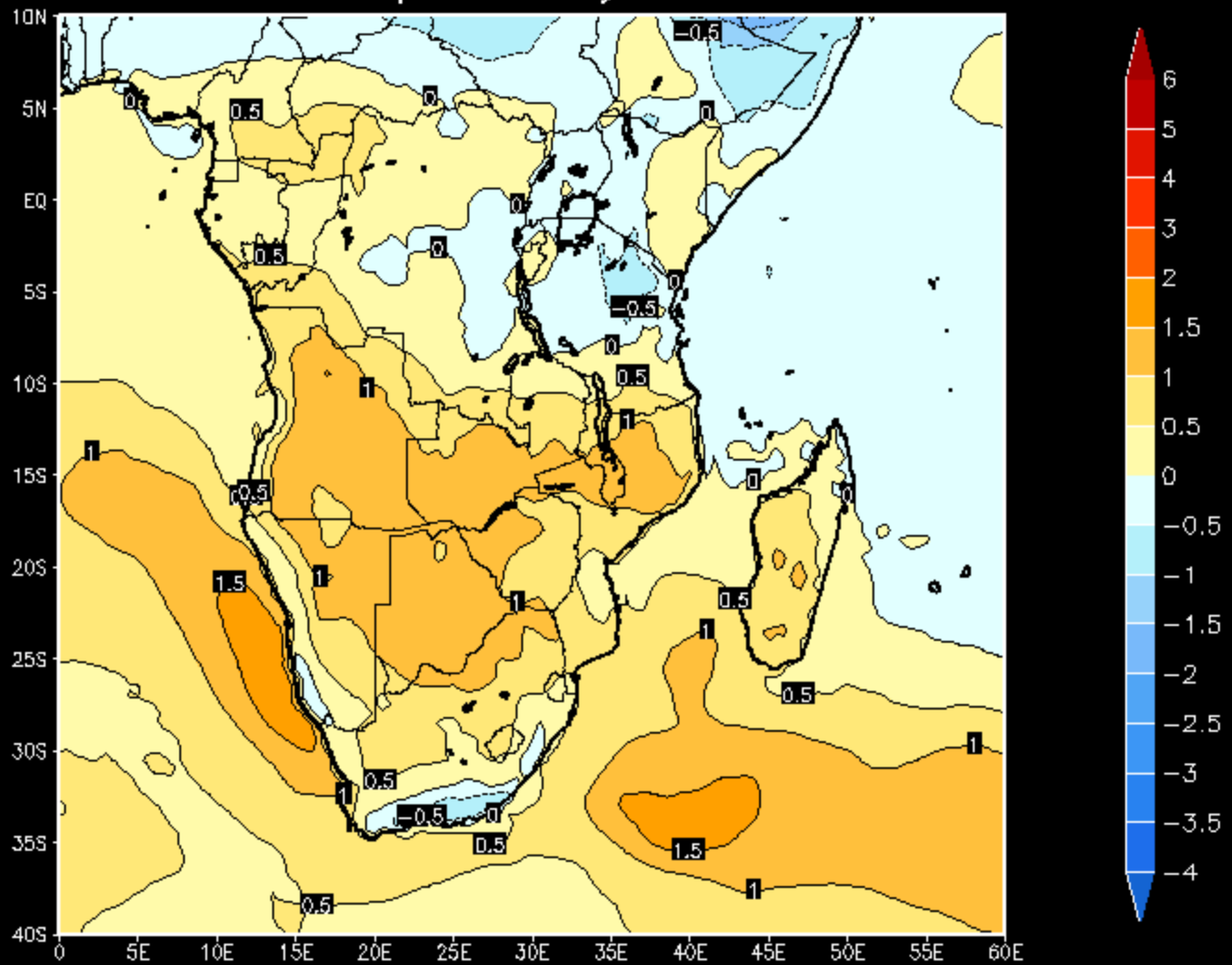
# Temp anomaly 2029



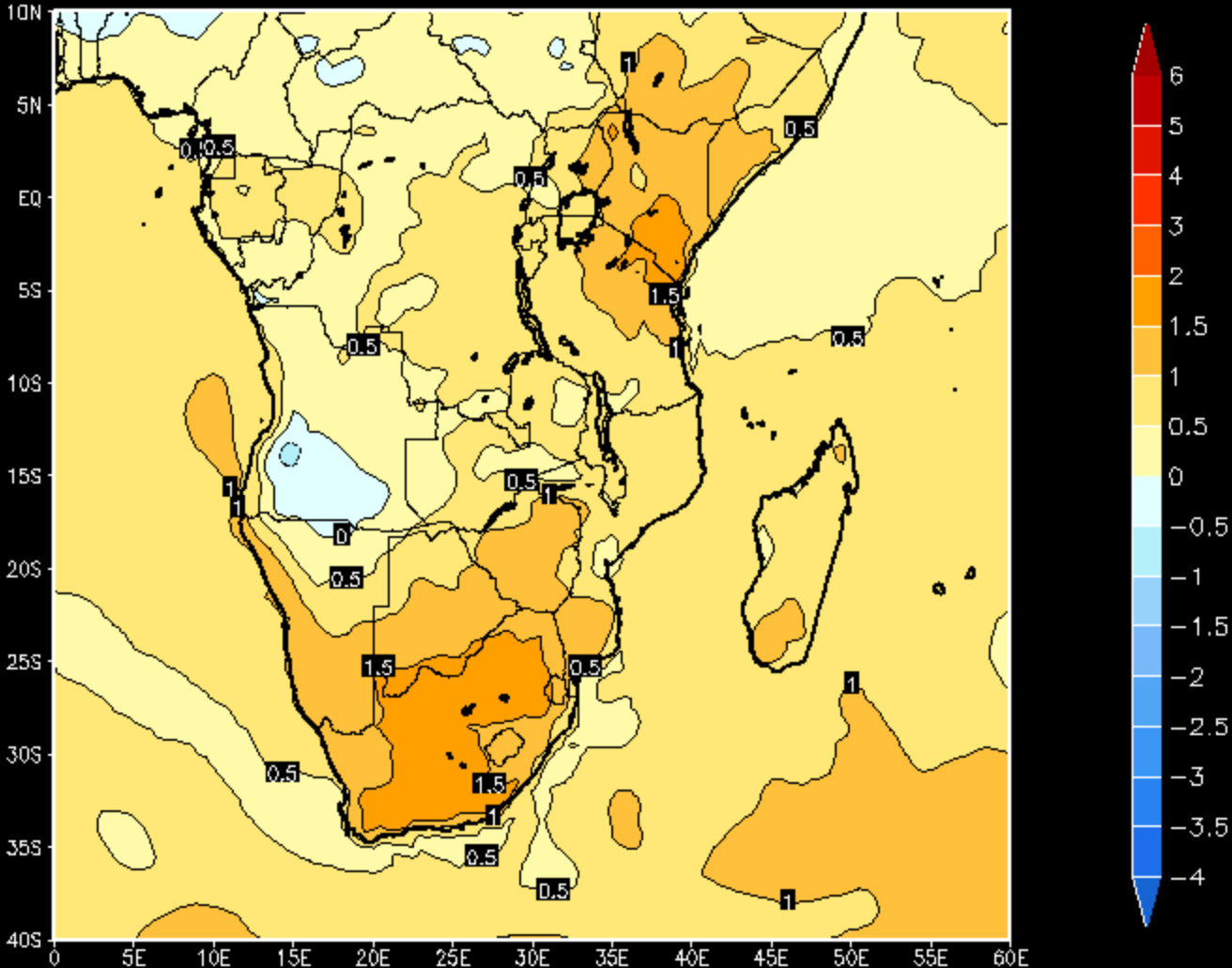
# Temp anomaly 2030



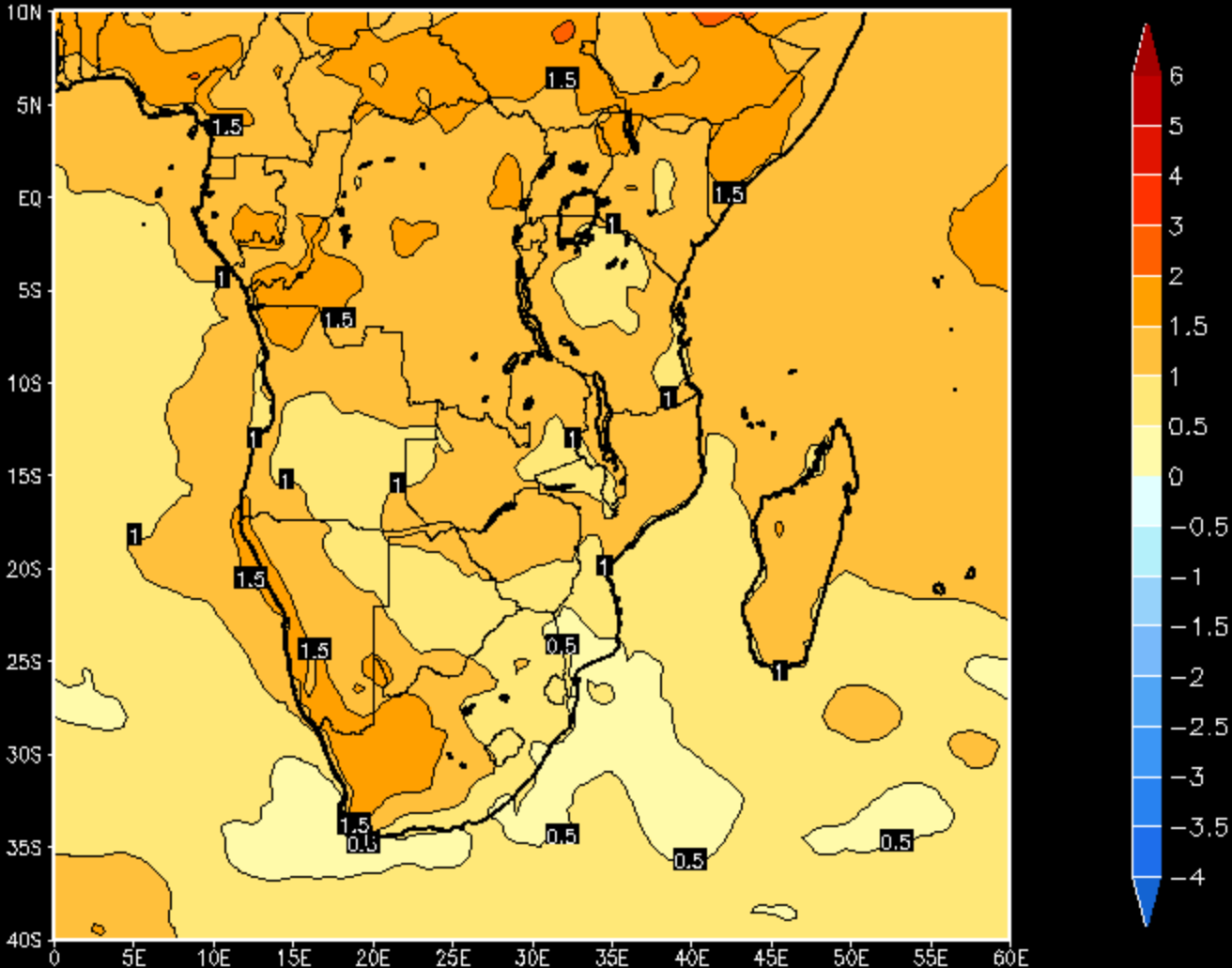
# Temp anomaly 2031



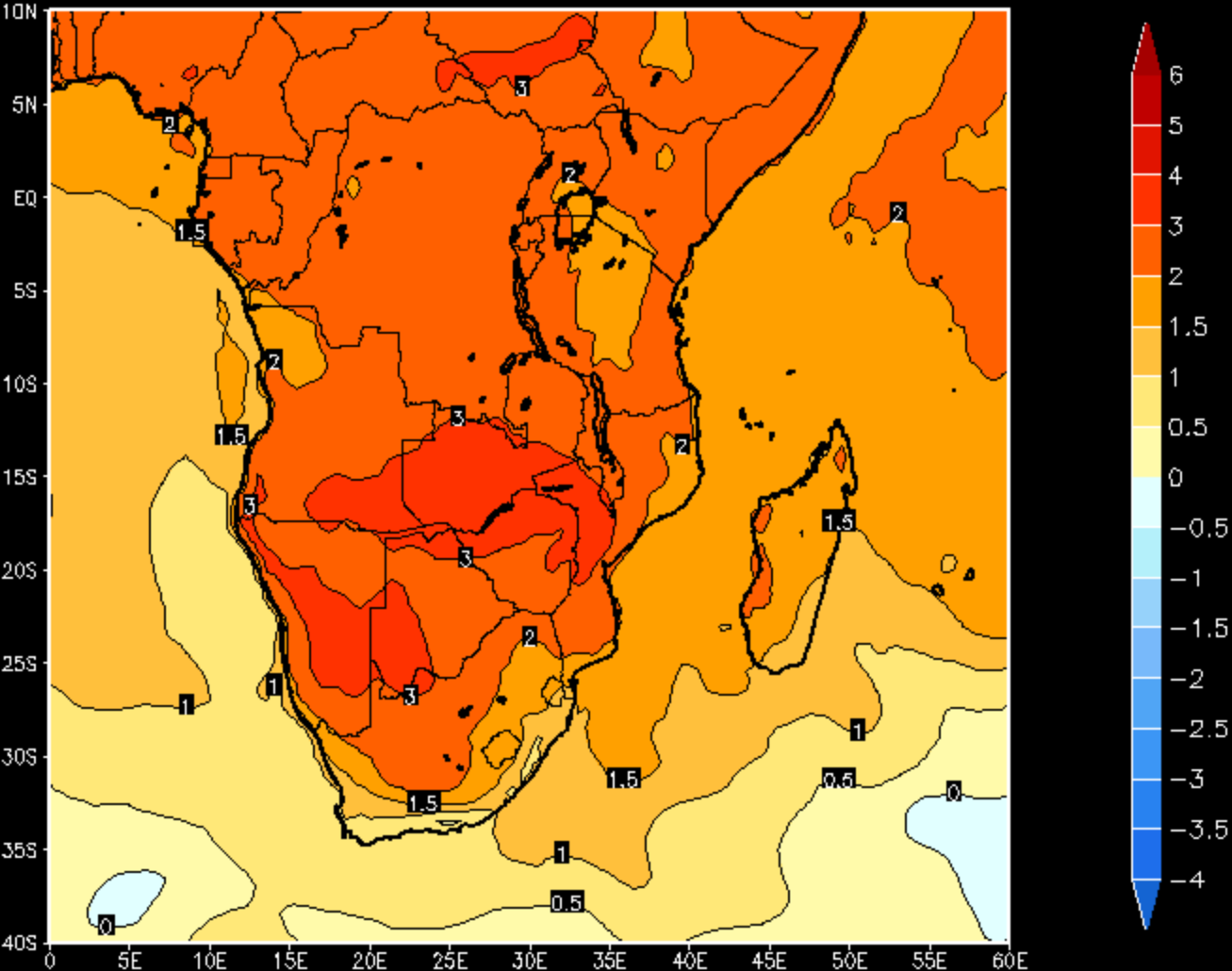
# Temp anomaly 2032



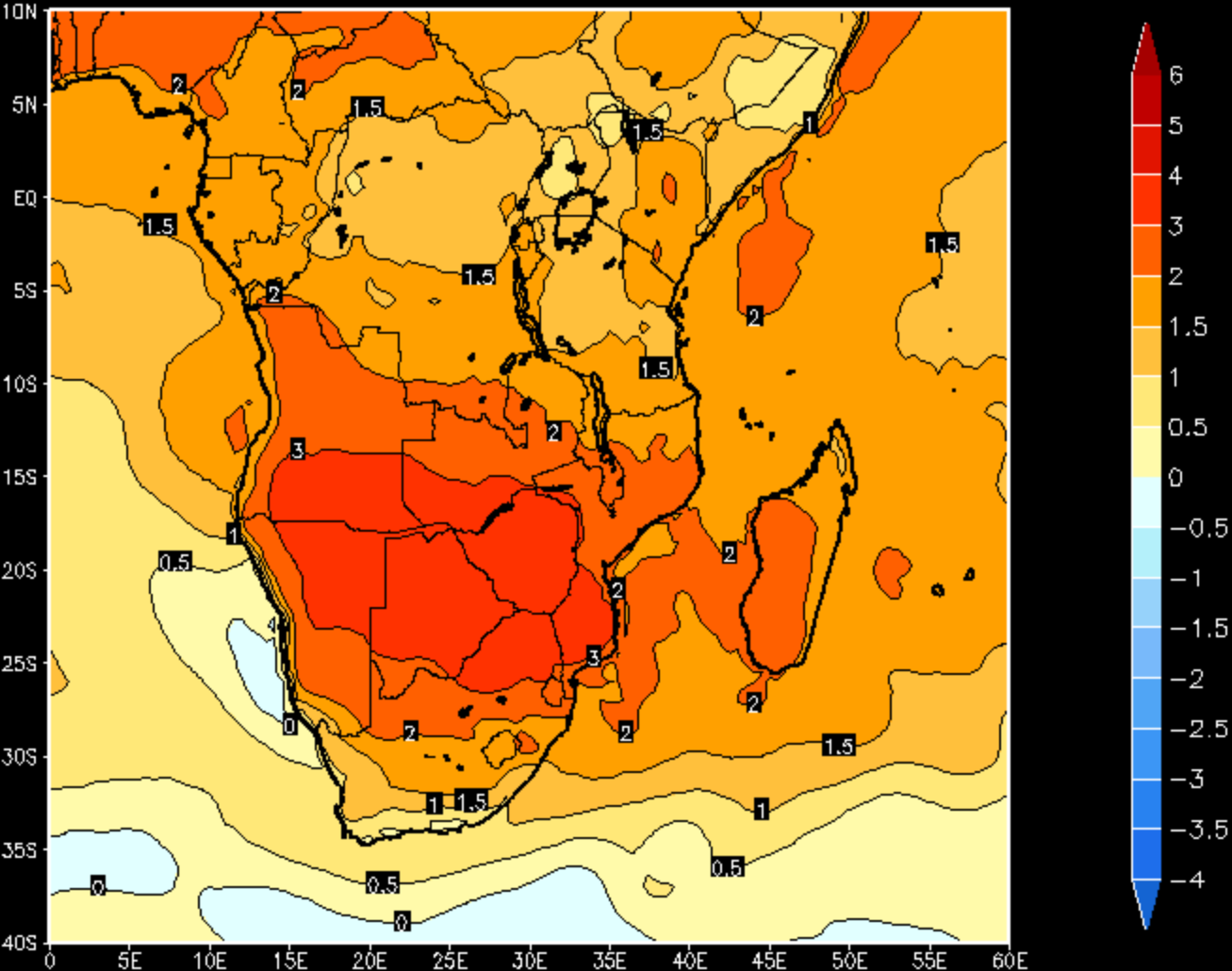
# Temp anomaly 2033



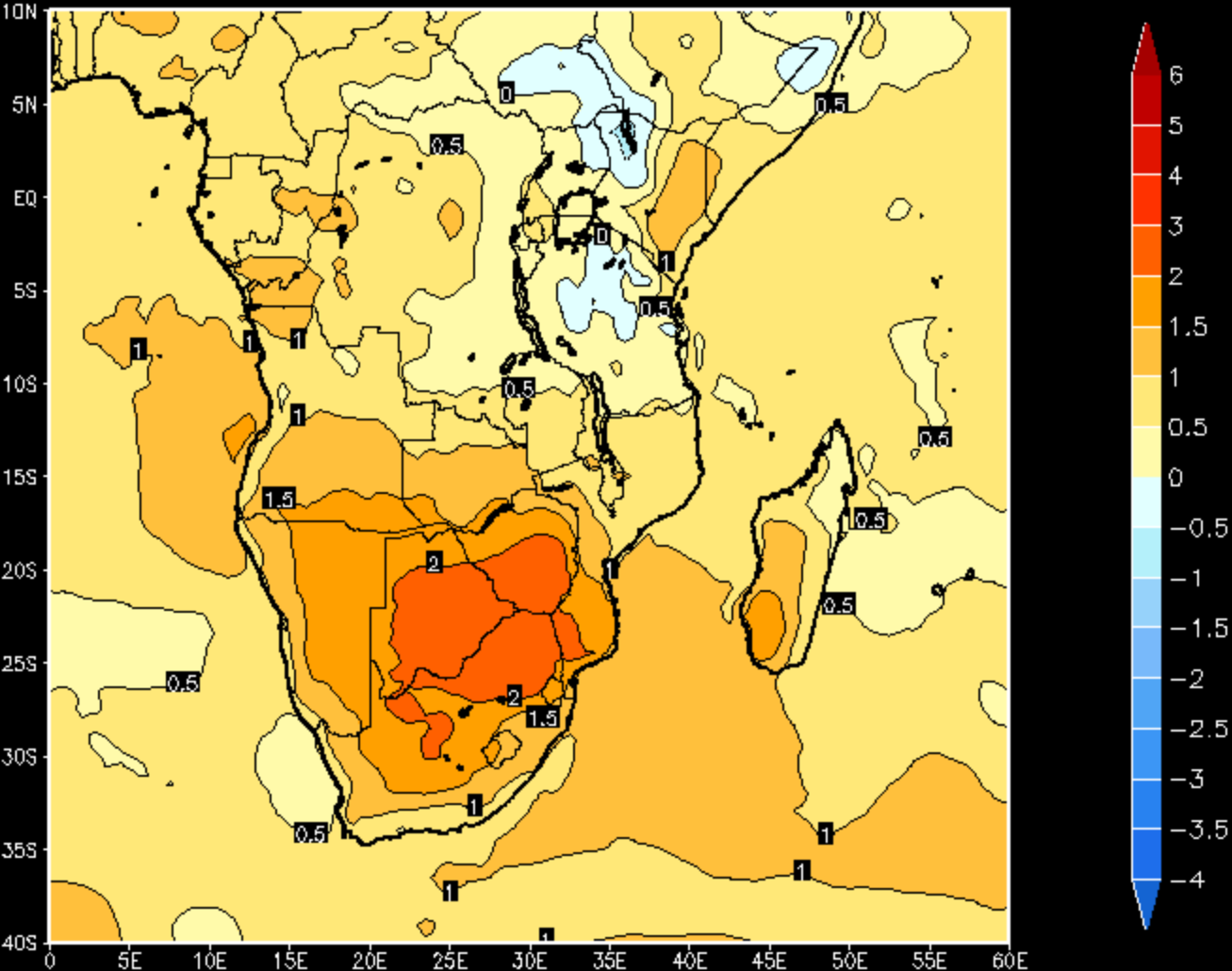
# Temp anomaly 2034



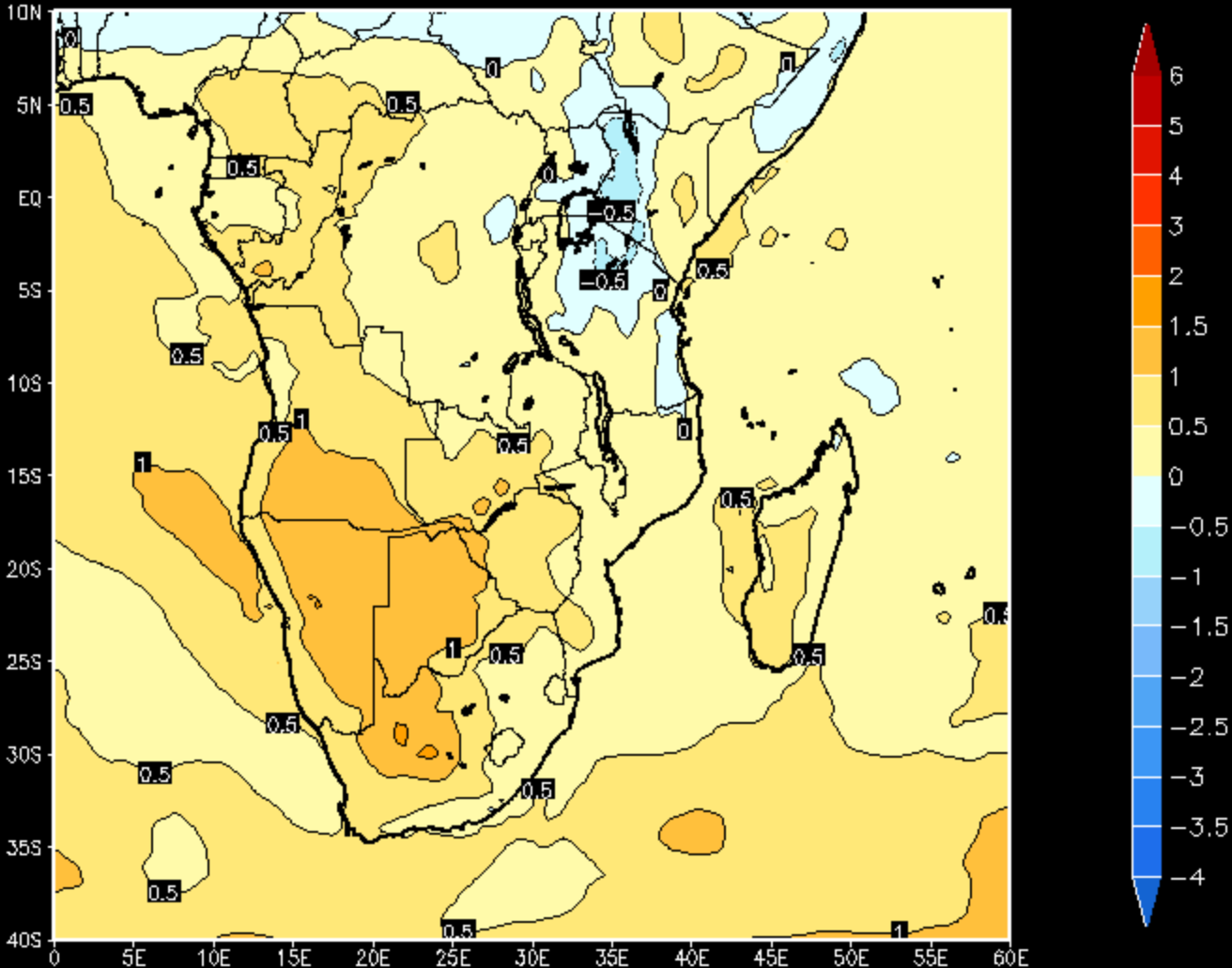
# Temp anomaly 2035



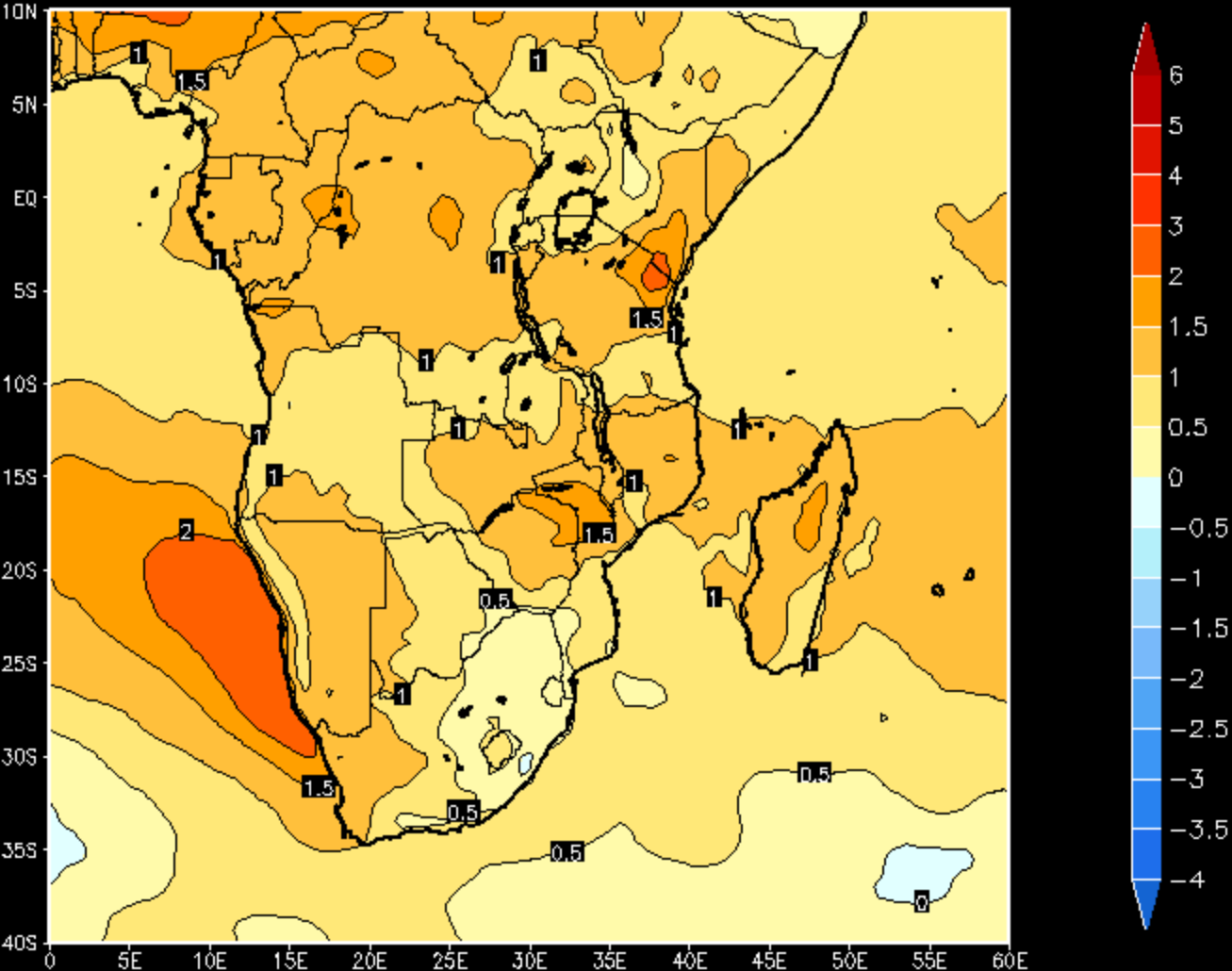
# Temp anomaly 2036



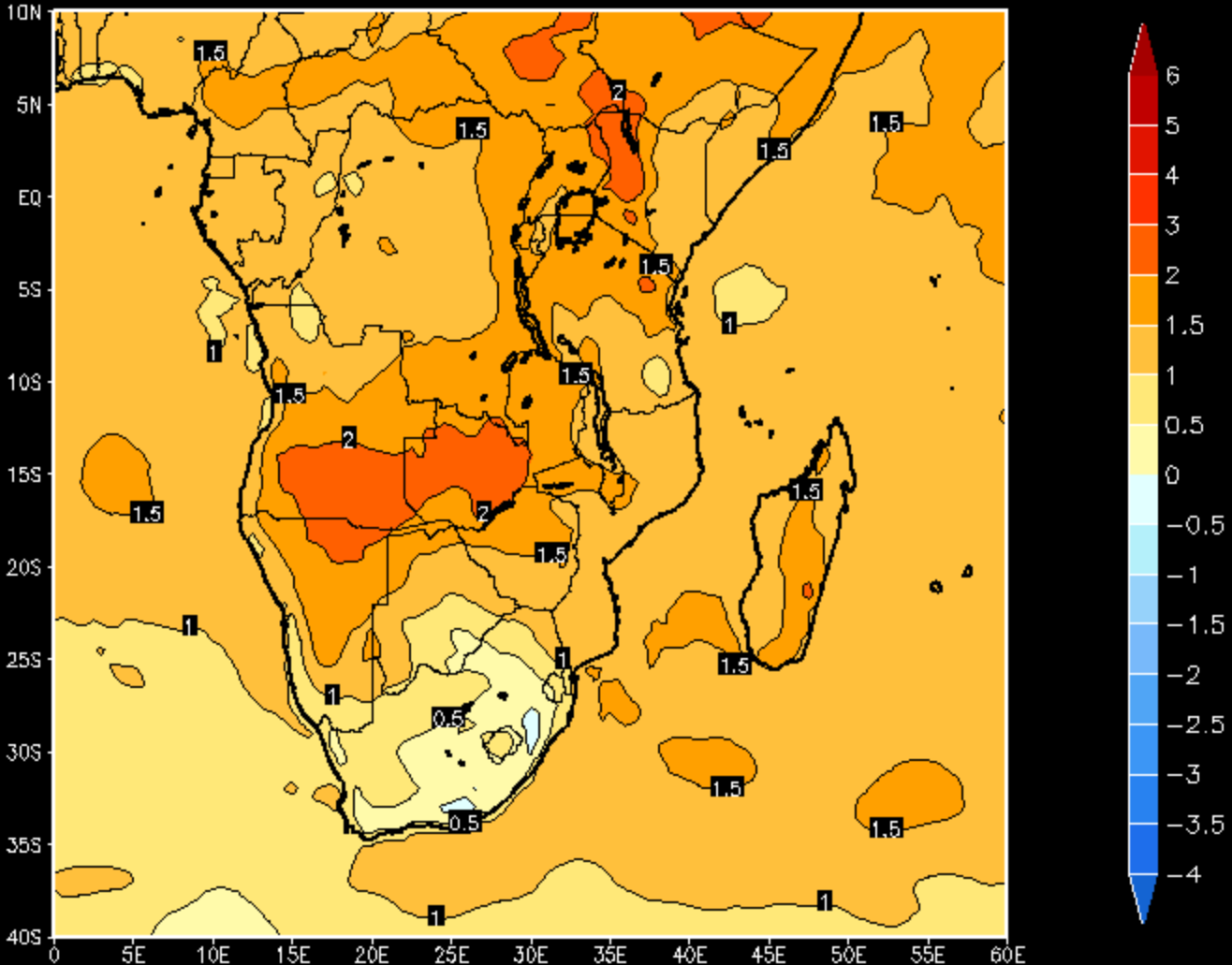
# Temp anomaly 2037



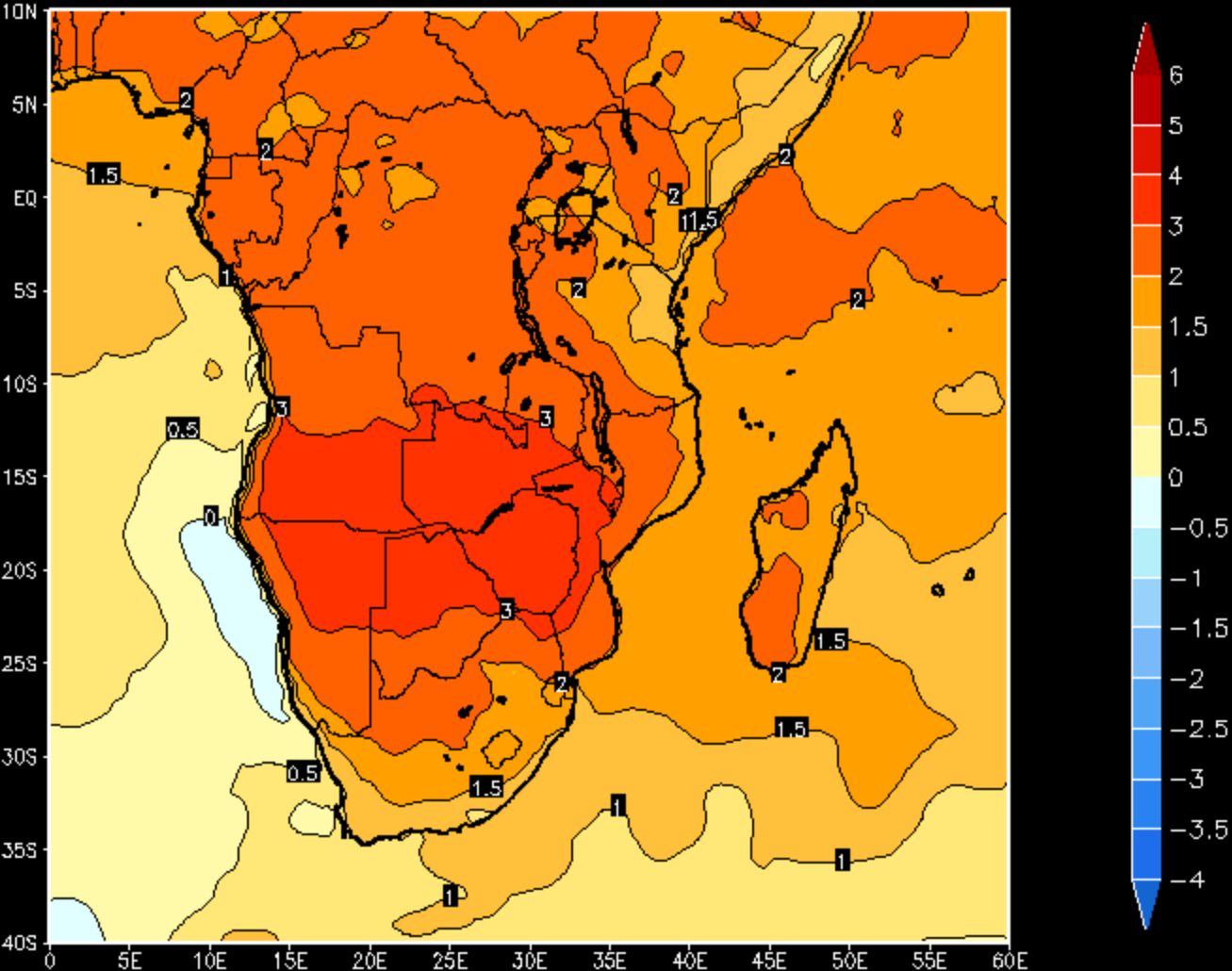
# Temp anomaly 2038



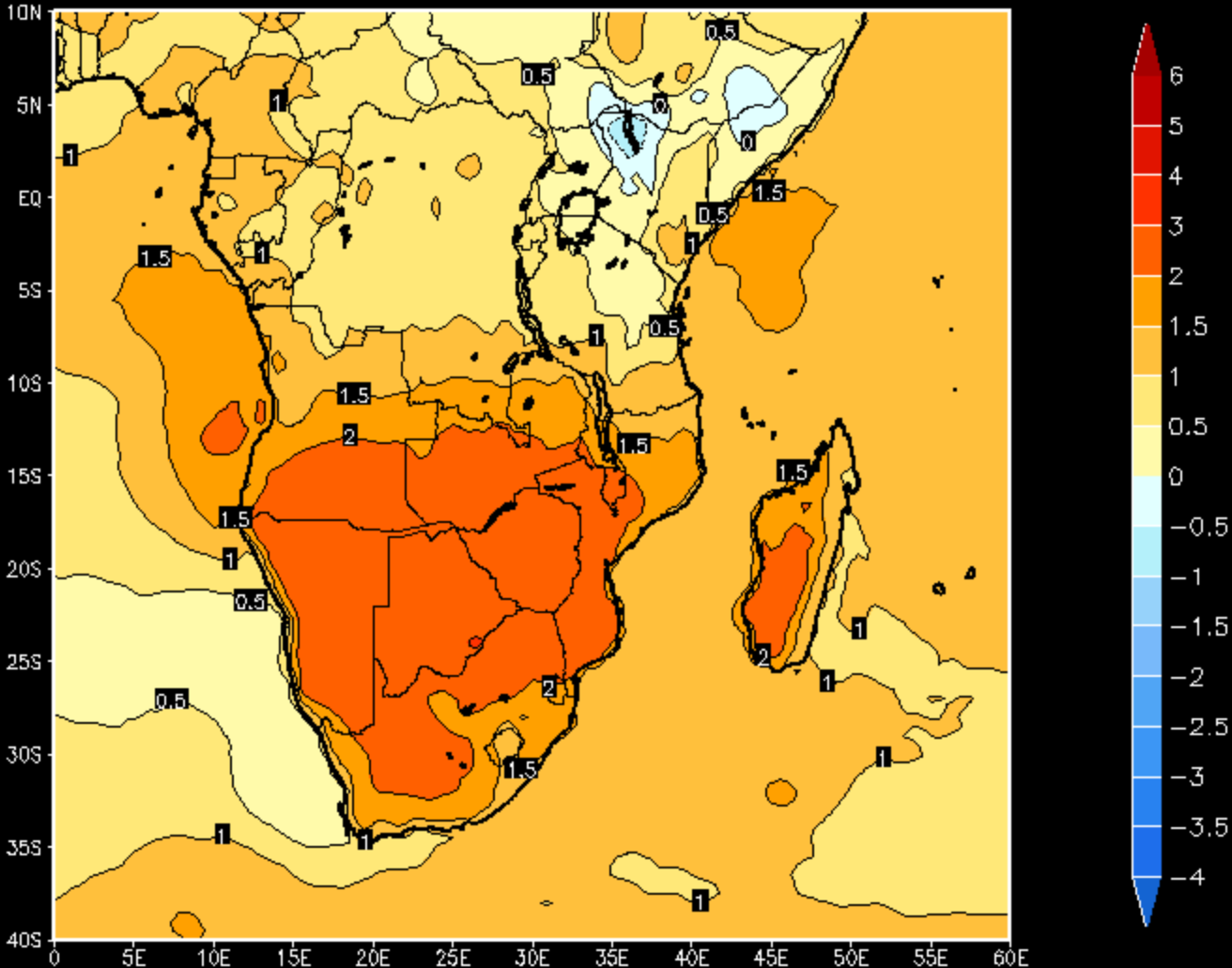
# Temp anomaly 2039



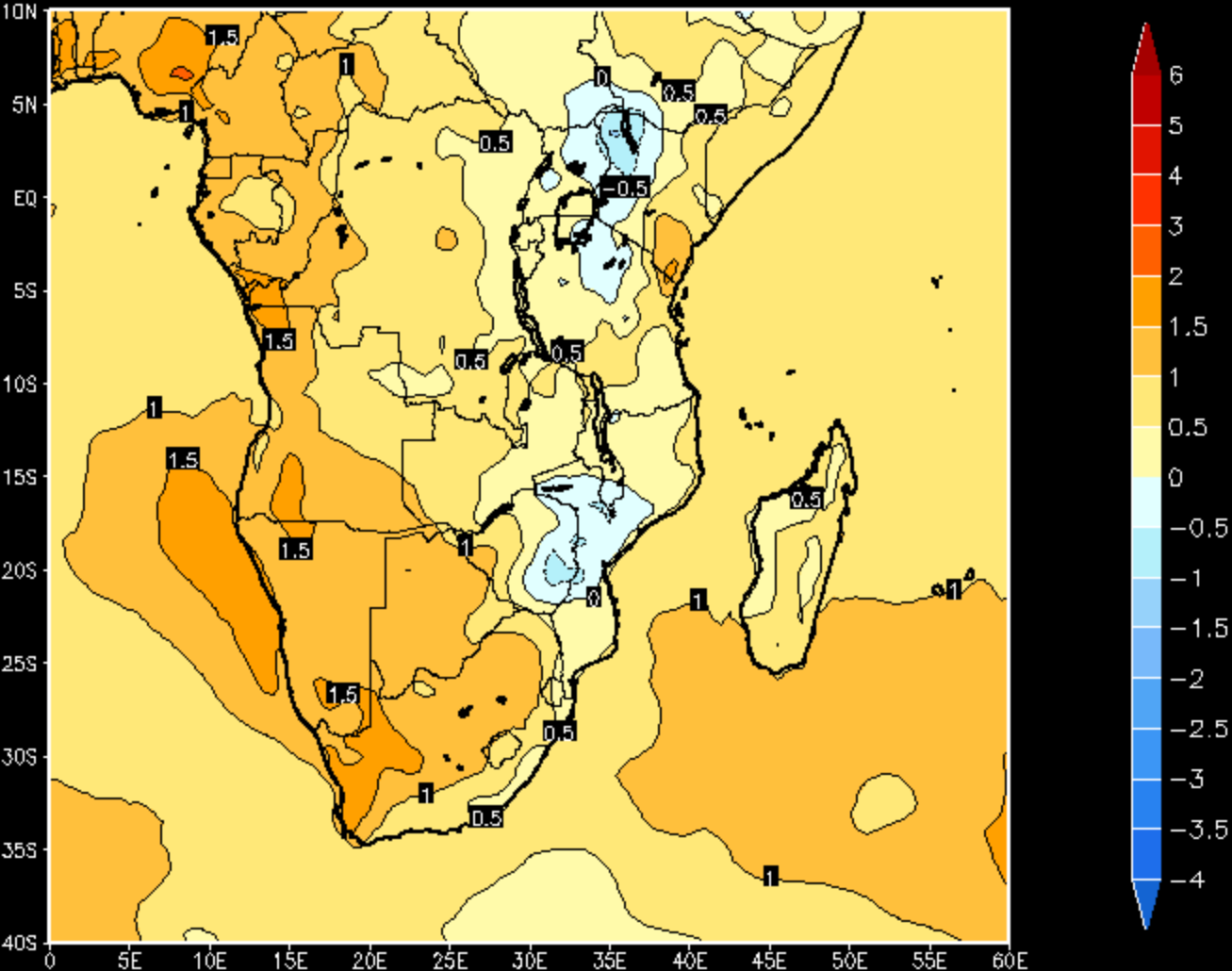
# Temp anomaly 2040



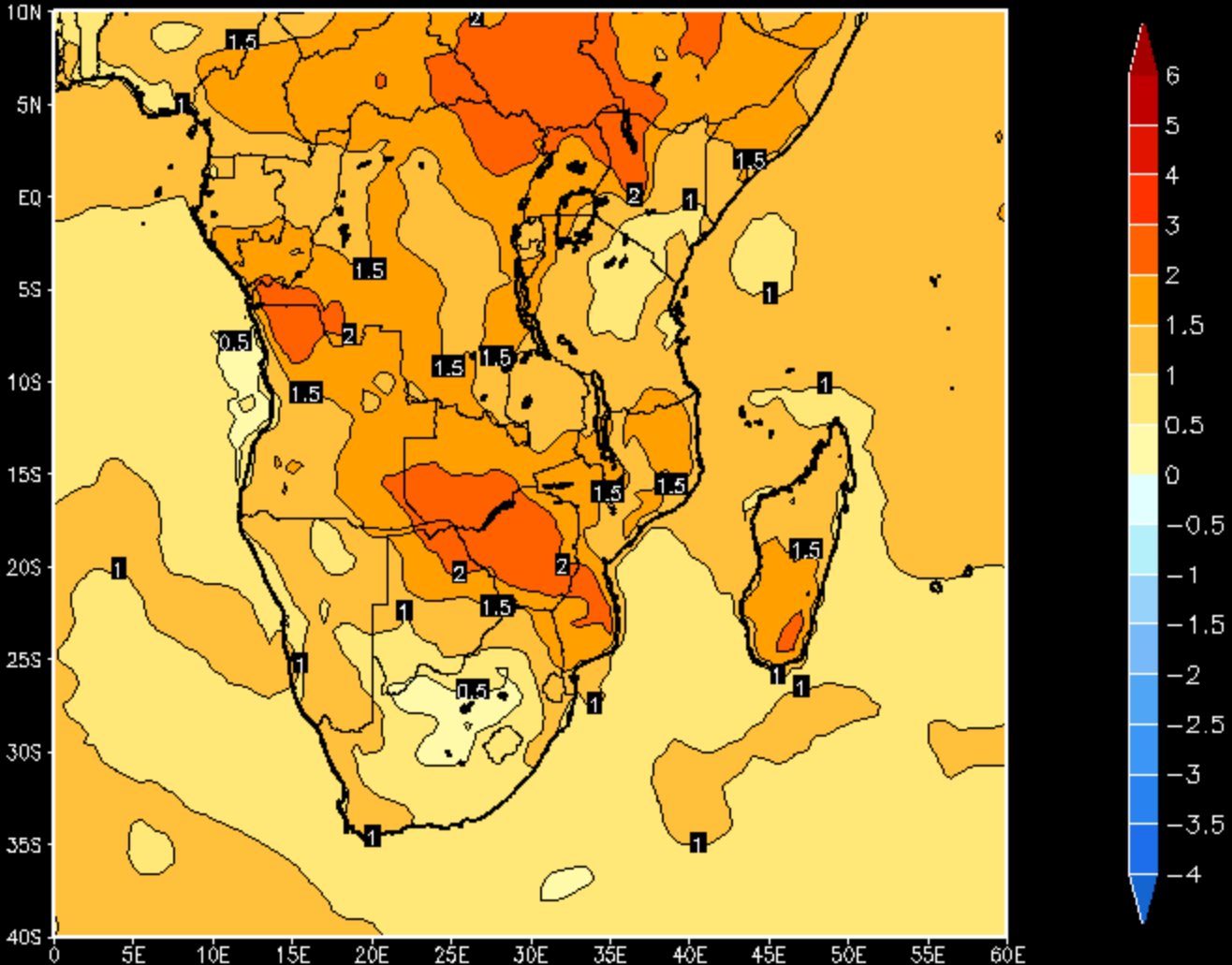
# Temp anomaly 2041



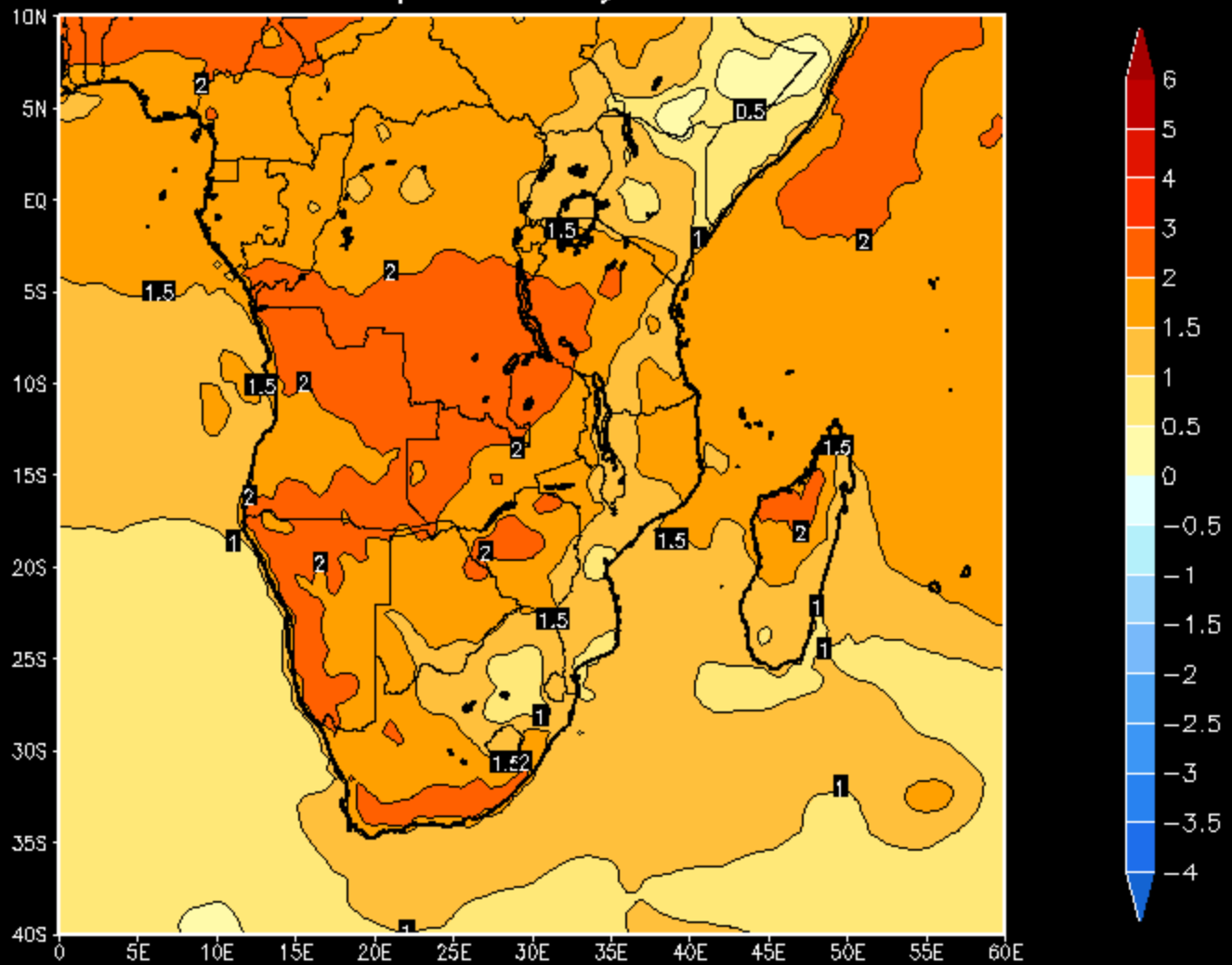
# Temp anomaly 2042



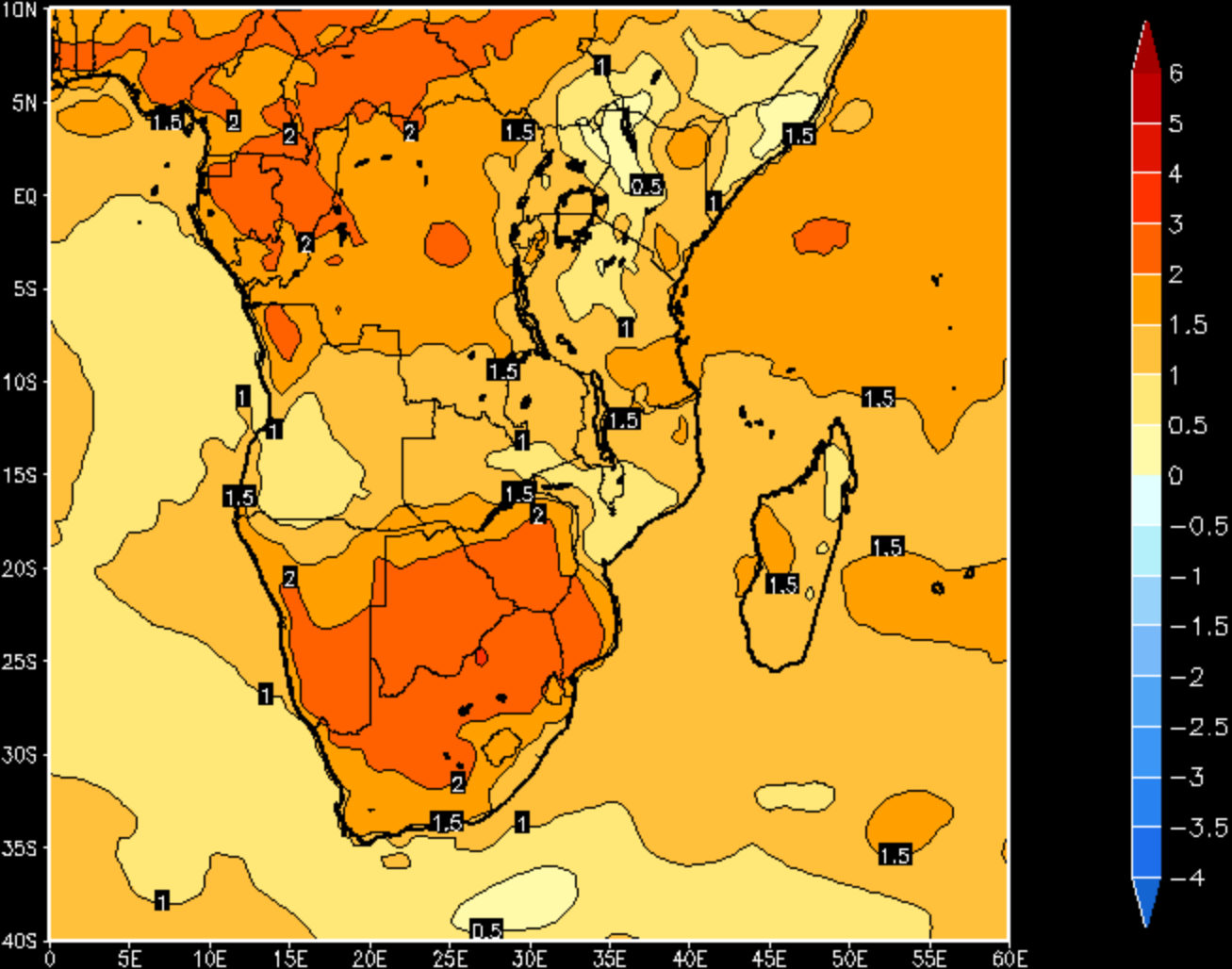
# Temp anomaly 2043



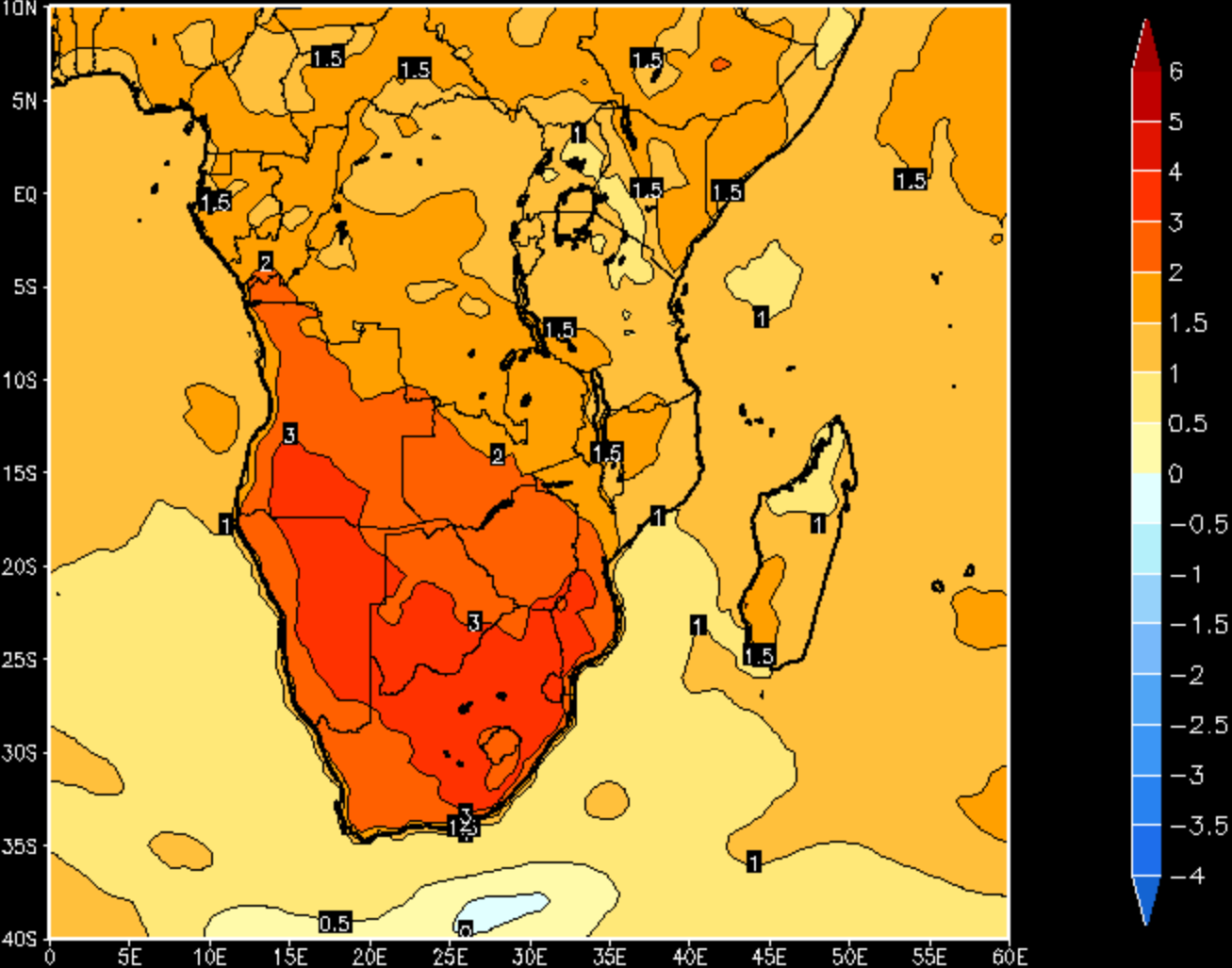
# Temp anomaly 2044



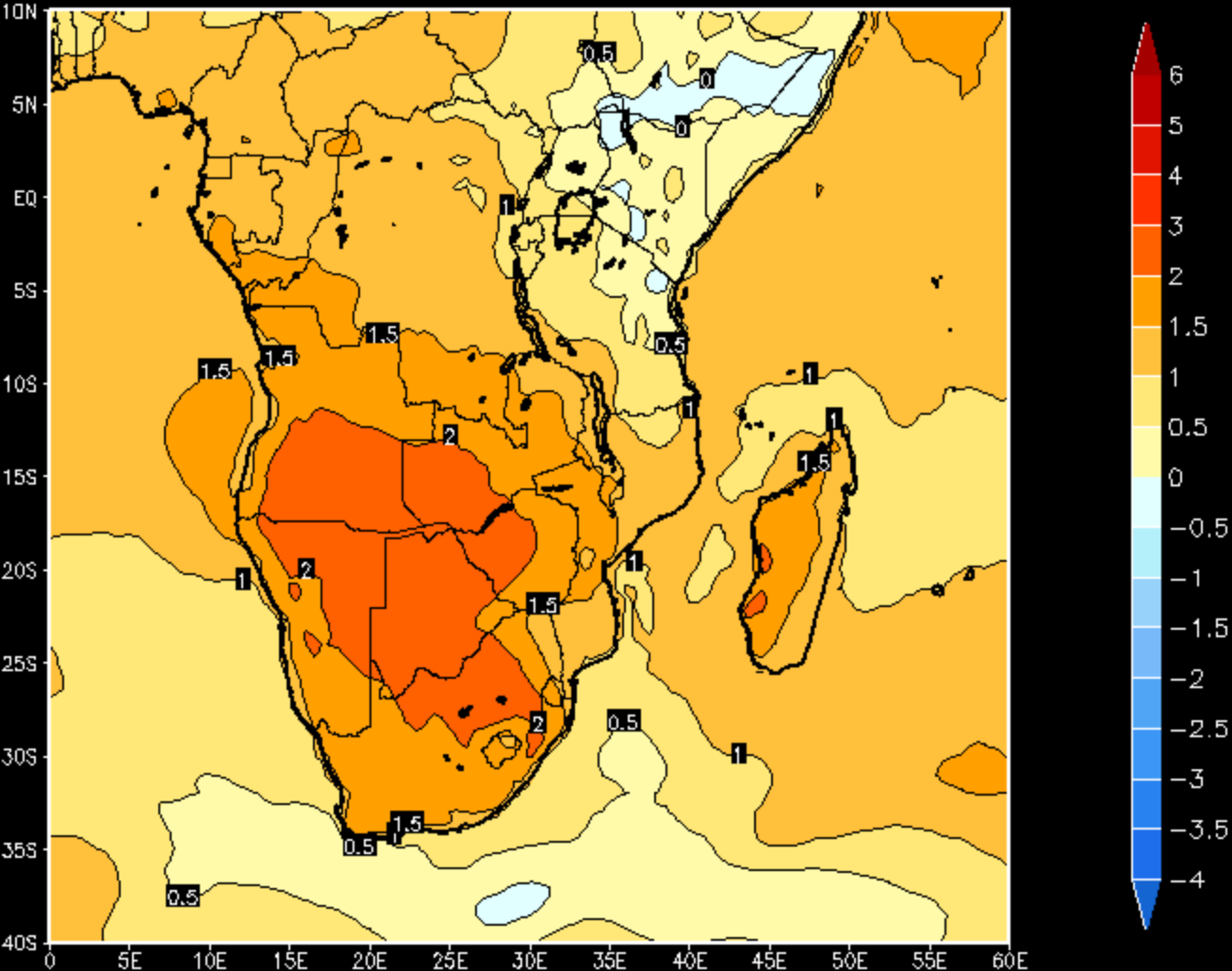
# Temp anomaly 2045



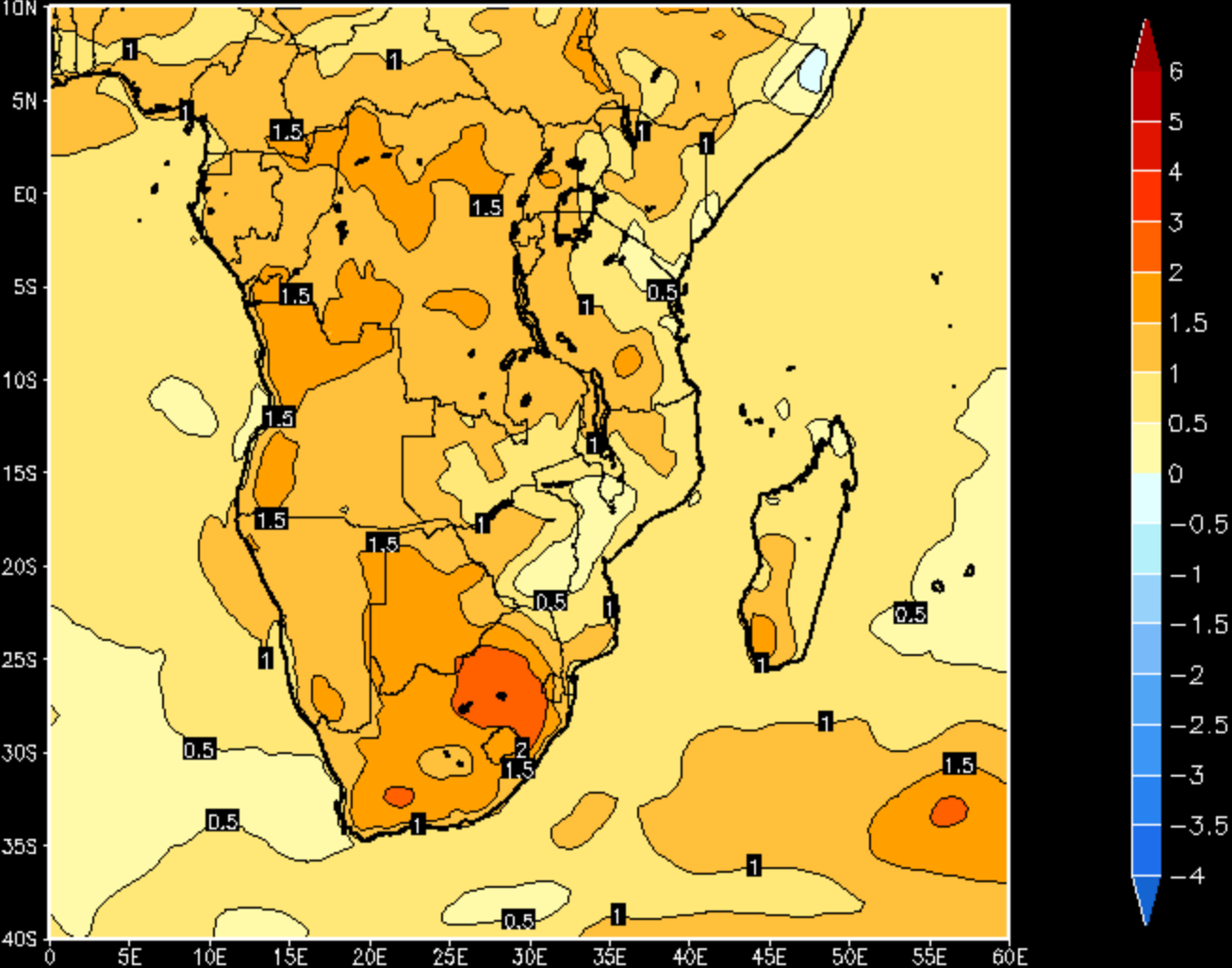
# Temp anomaly 2046



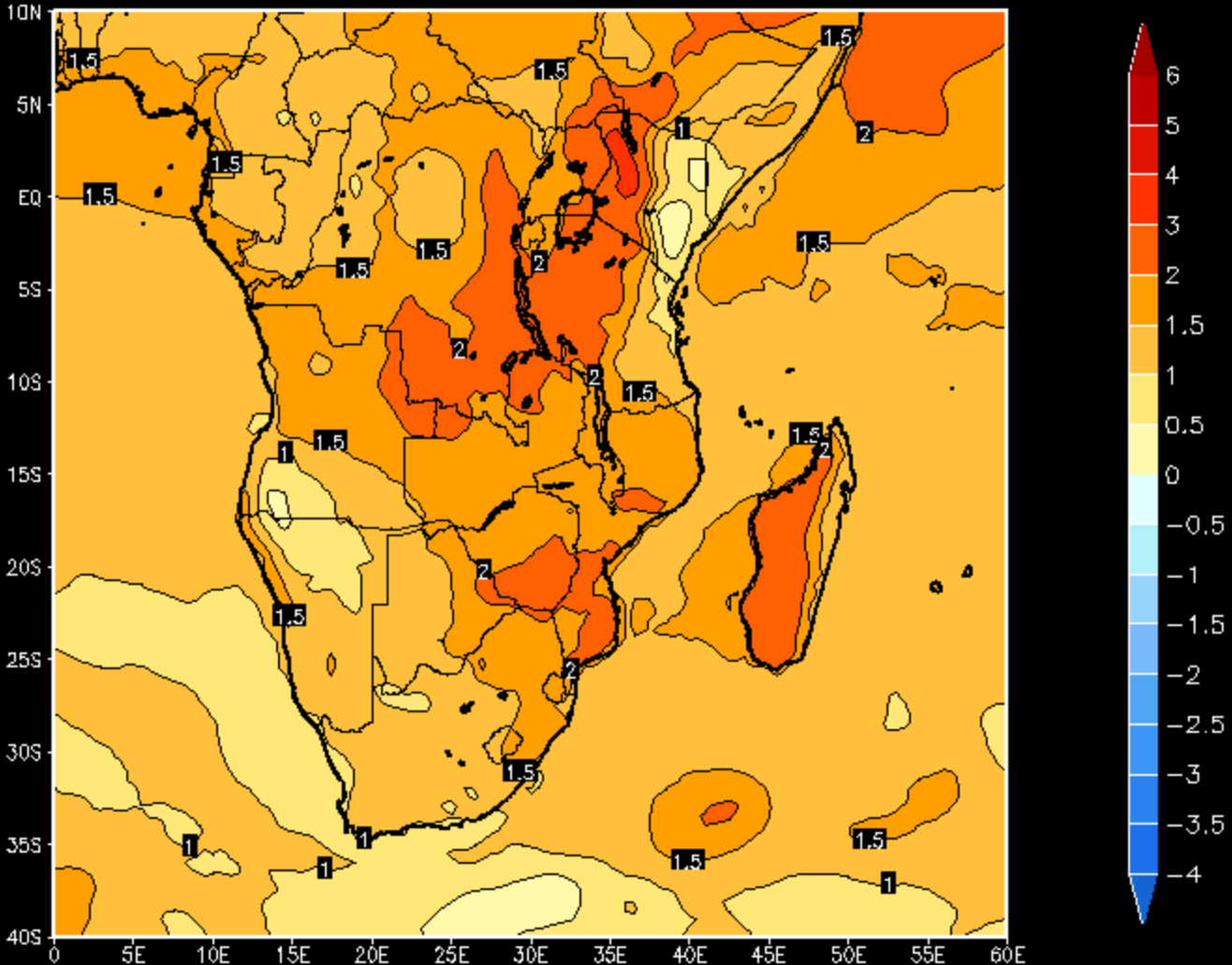
# Temp anomaly 2047



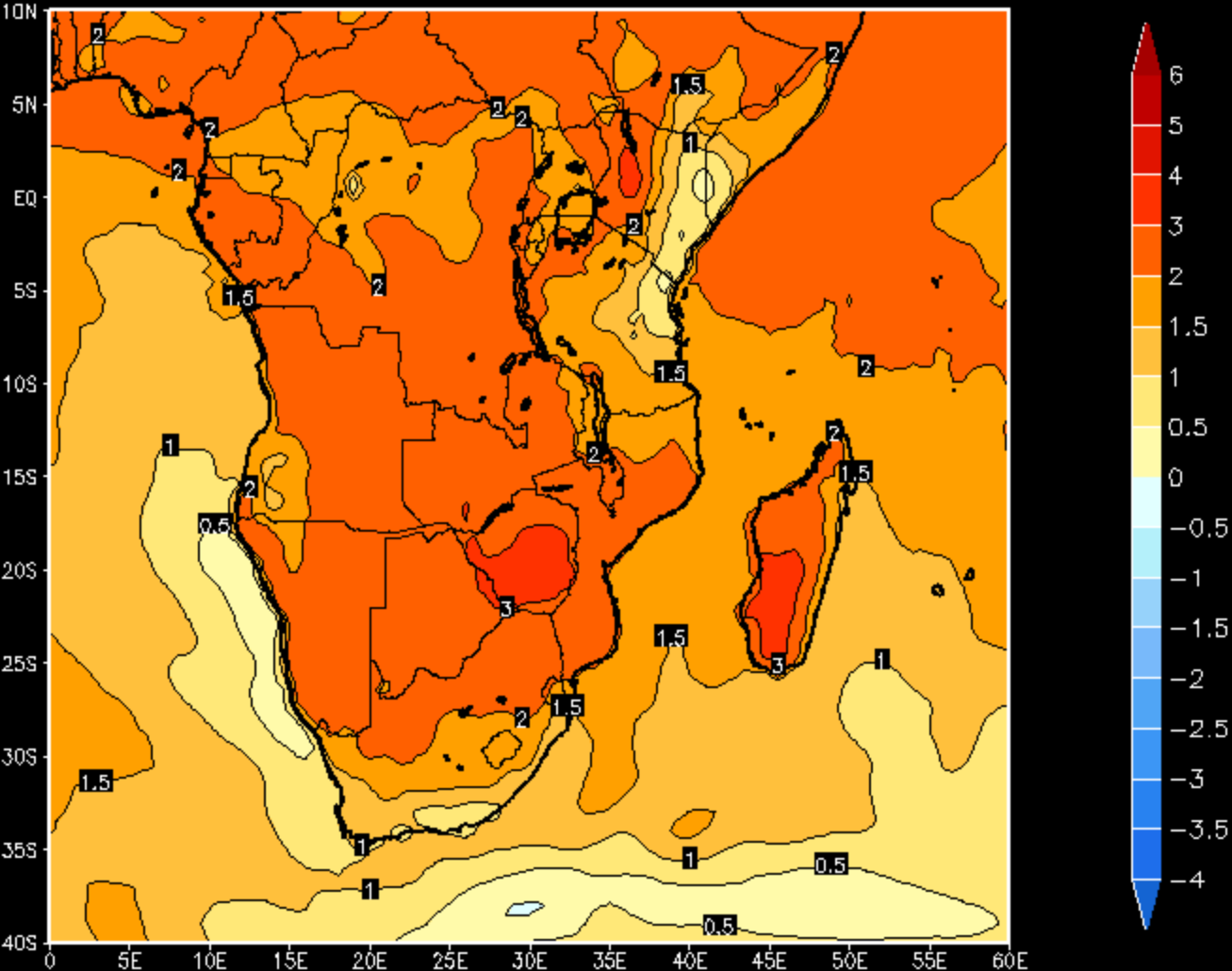
# Temp anomaly 2048



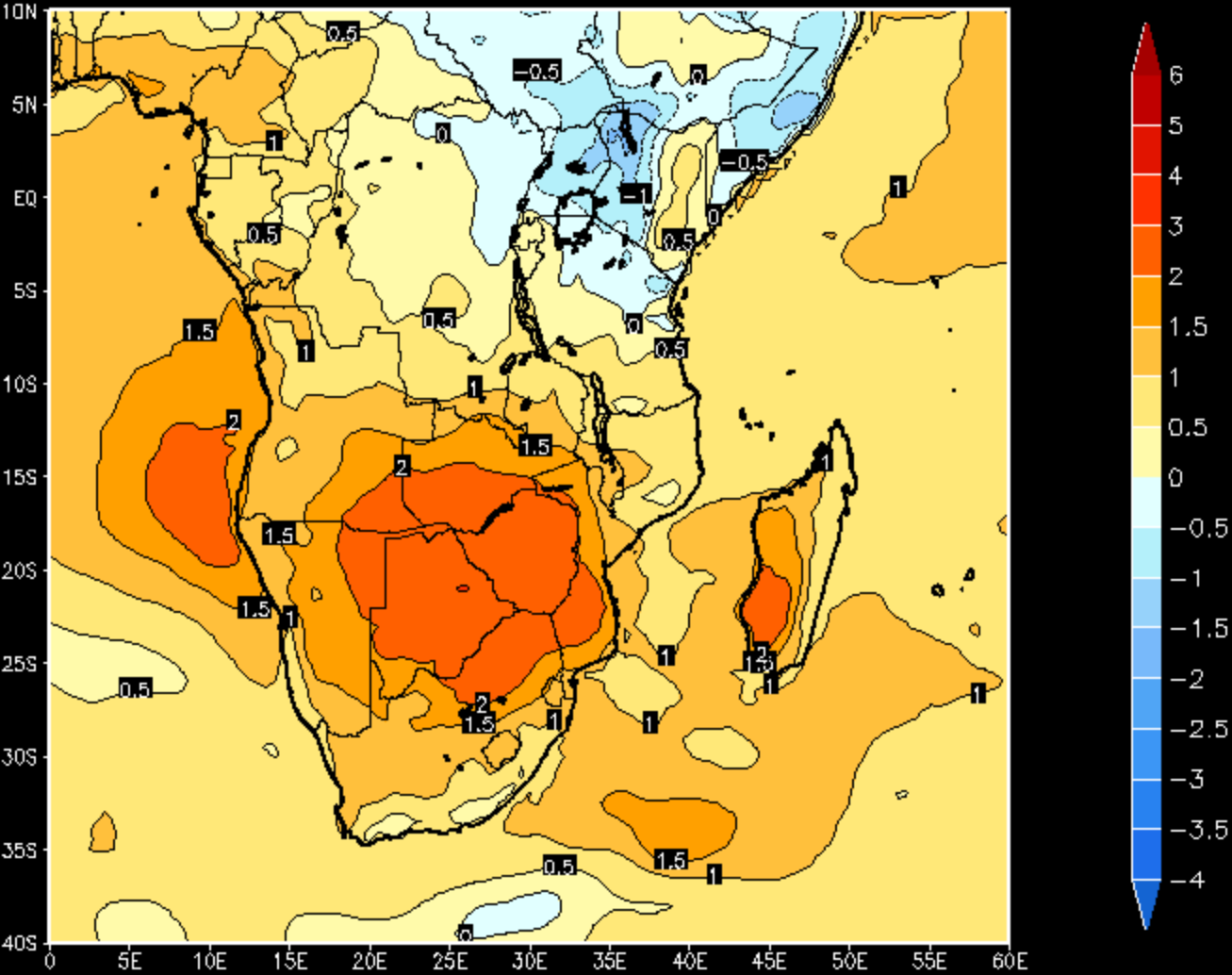
# Temp anomaly 2049



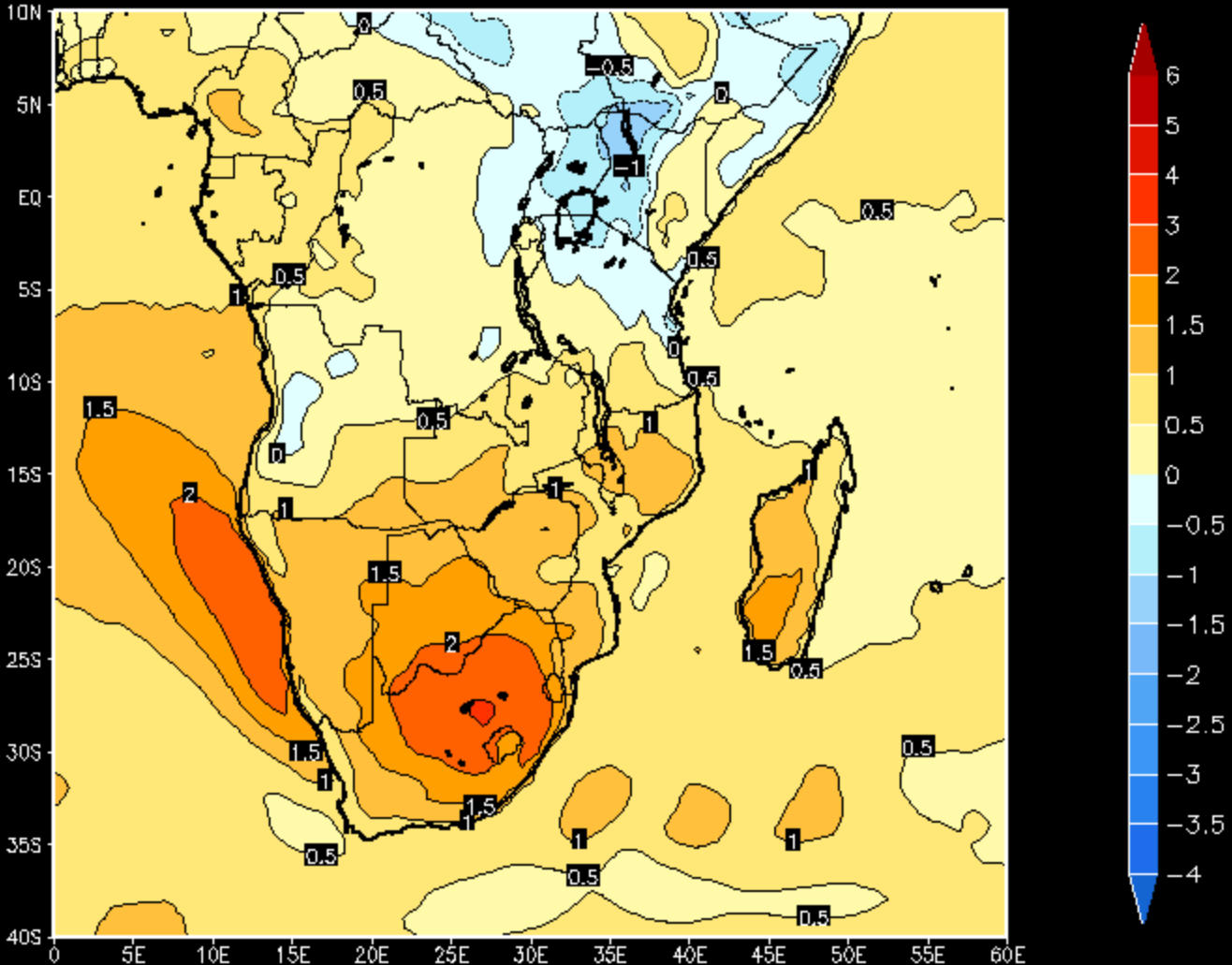
# Temp anomaly 2050



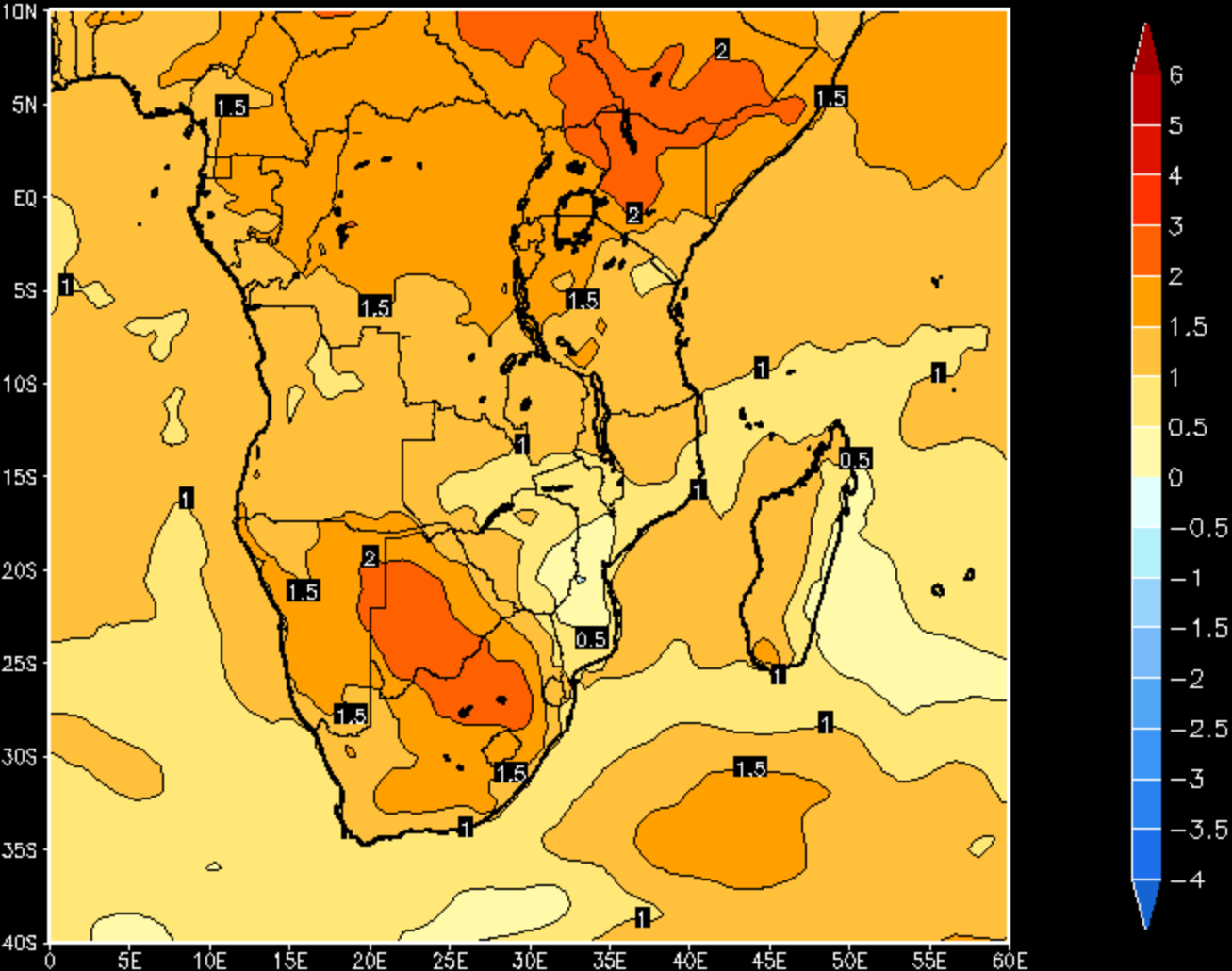
# Temp anomaly 2051



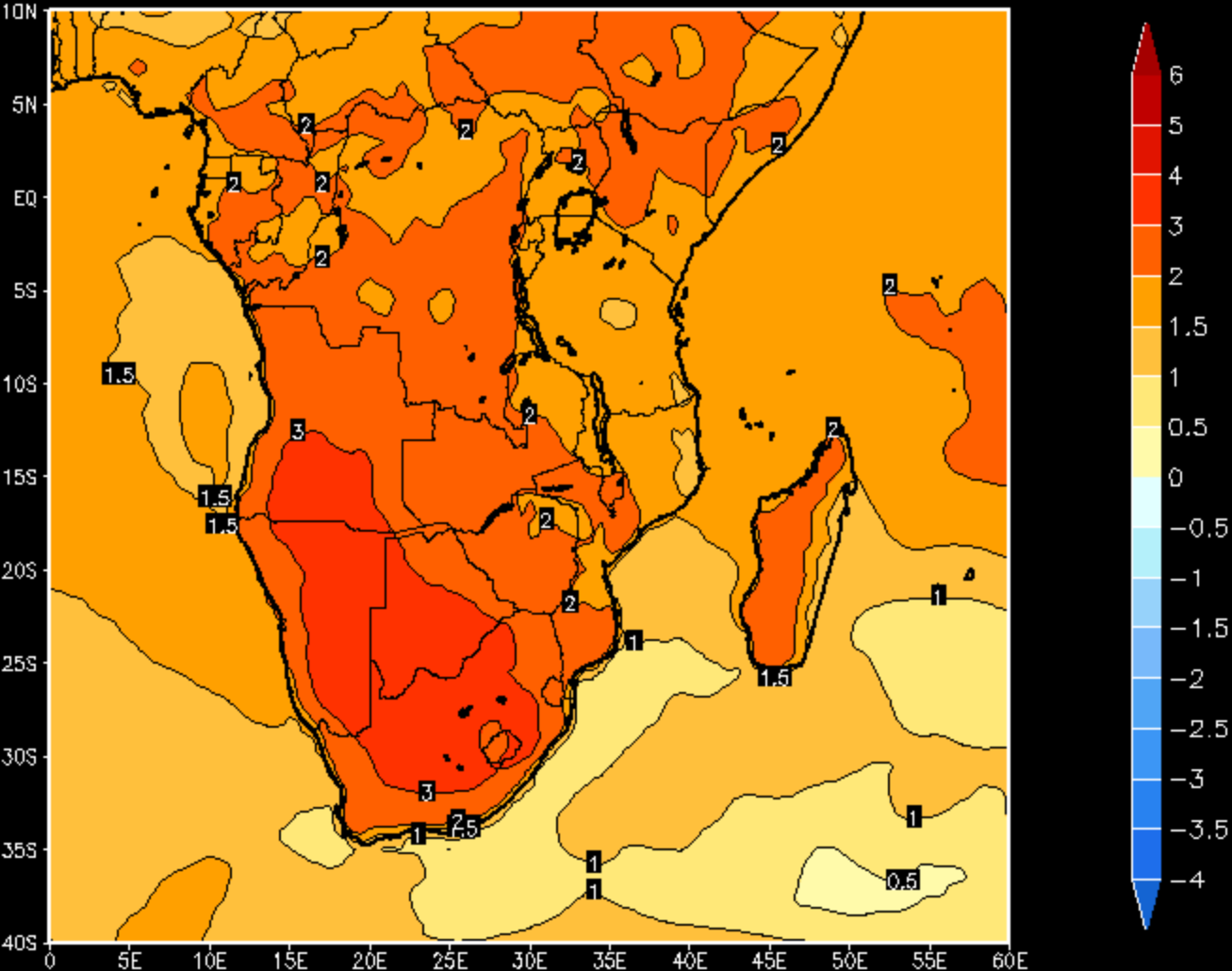
# Temp anomaly 2052



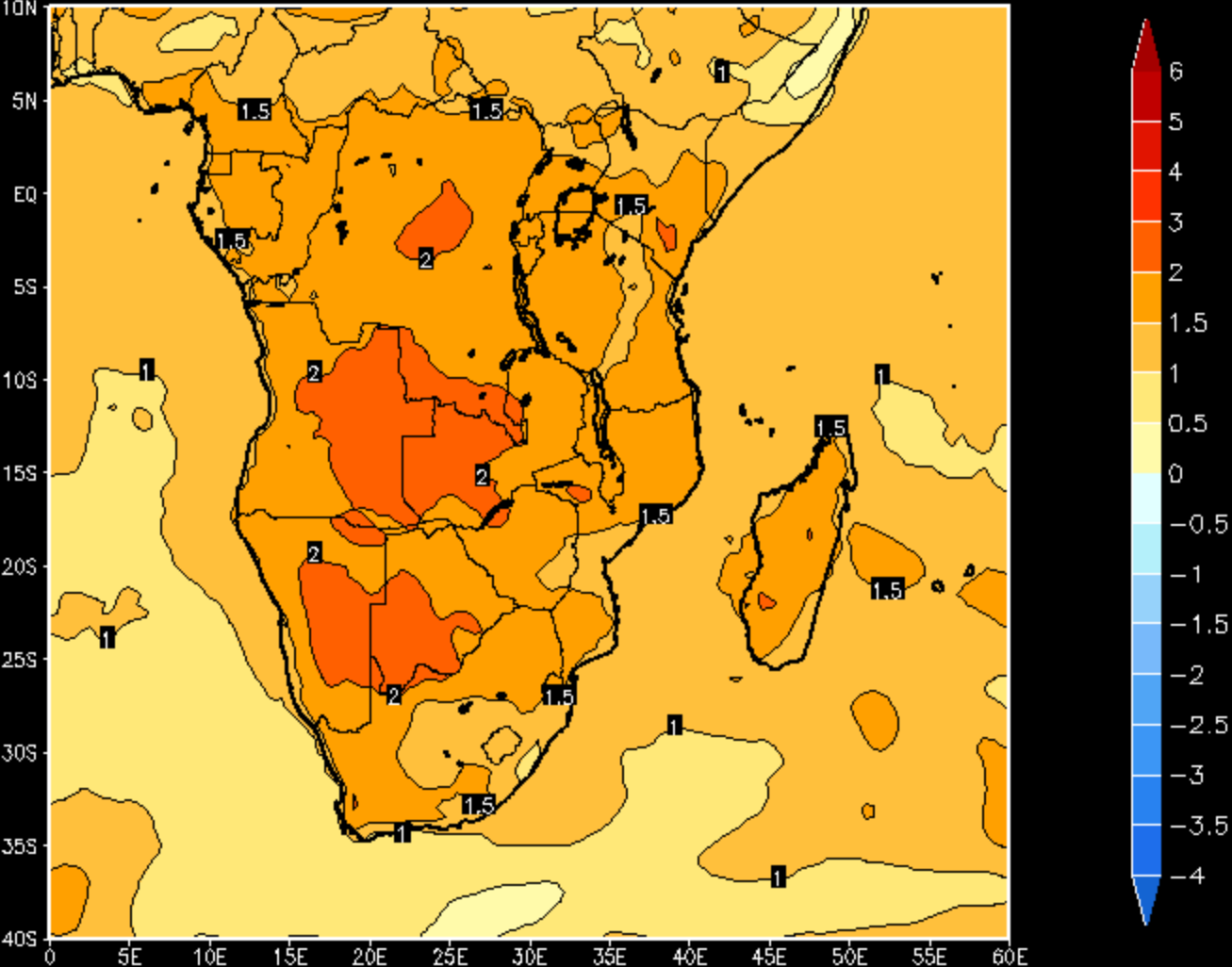
# Temp anomaly 2053



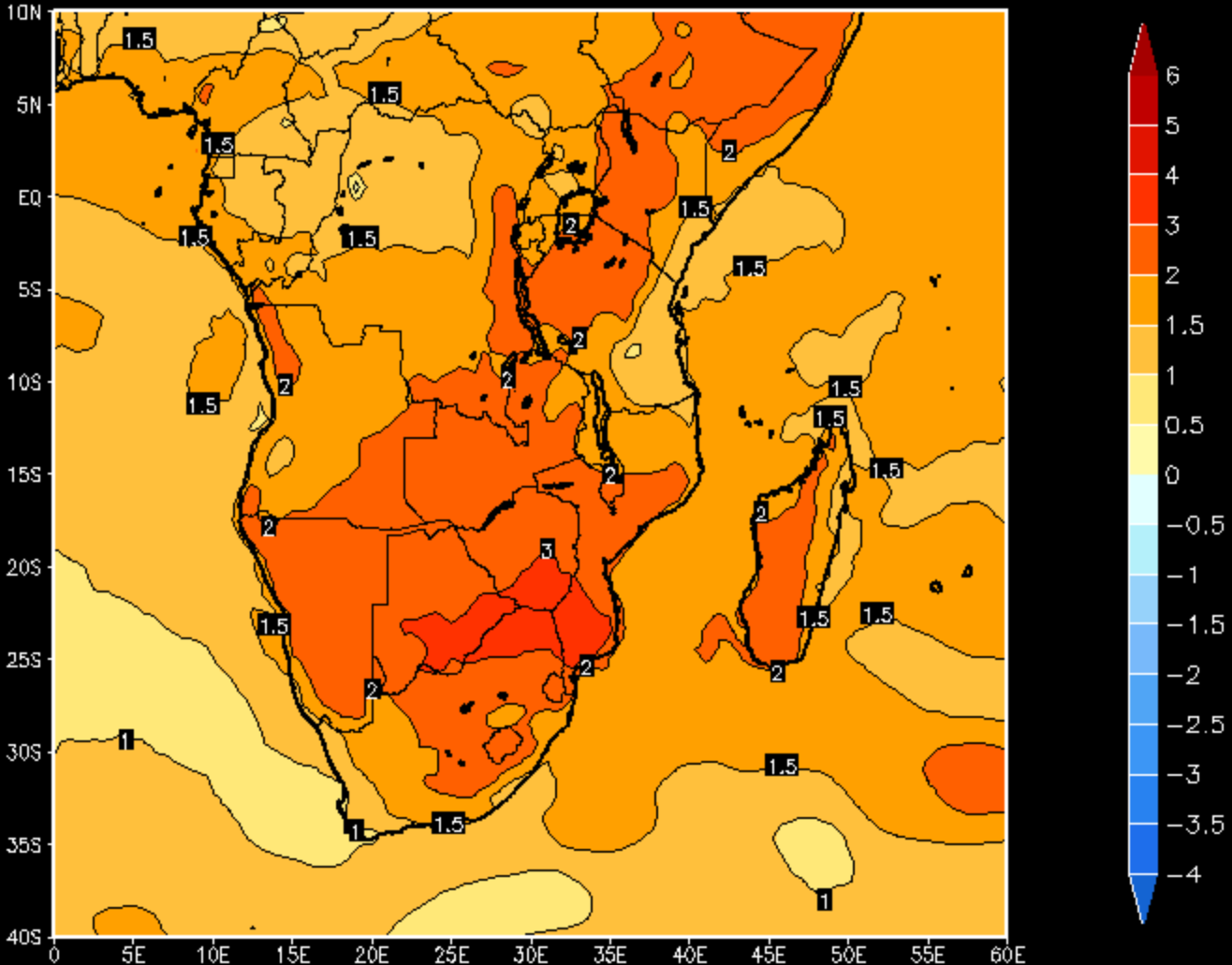
# Temp anomaly 2054



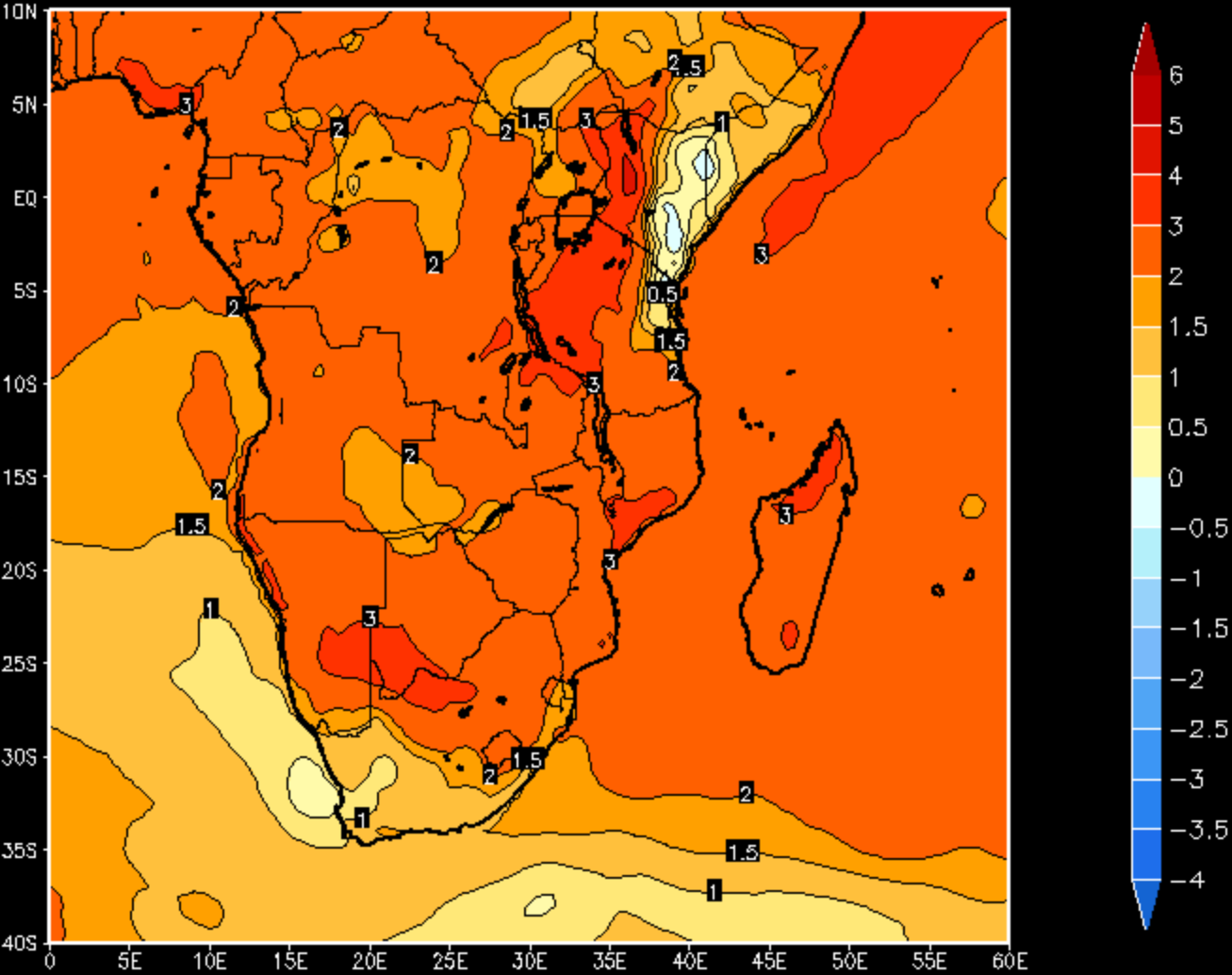
# Temp anomaly 2055



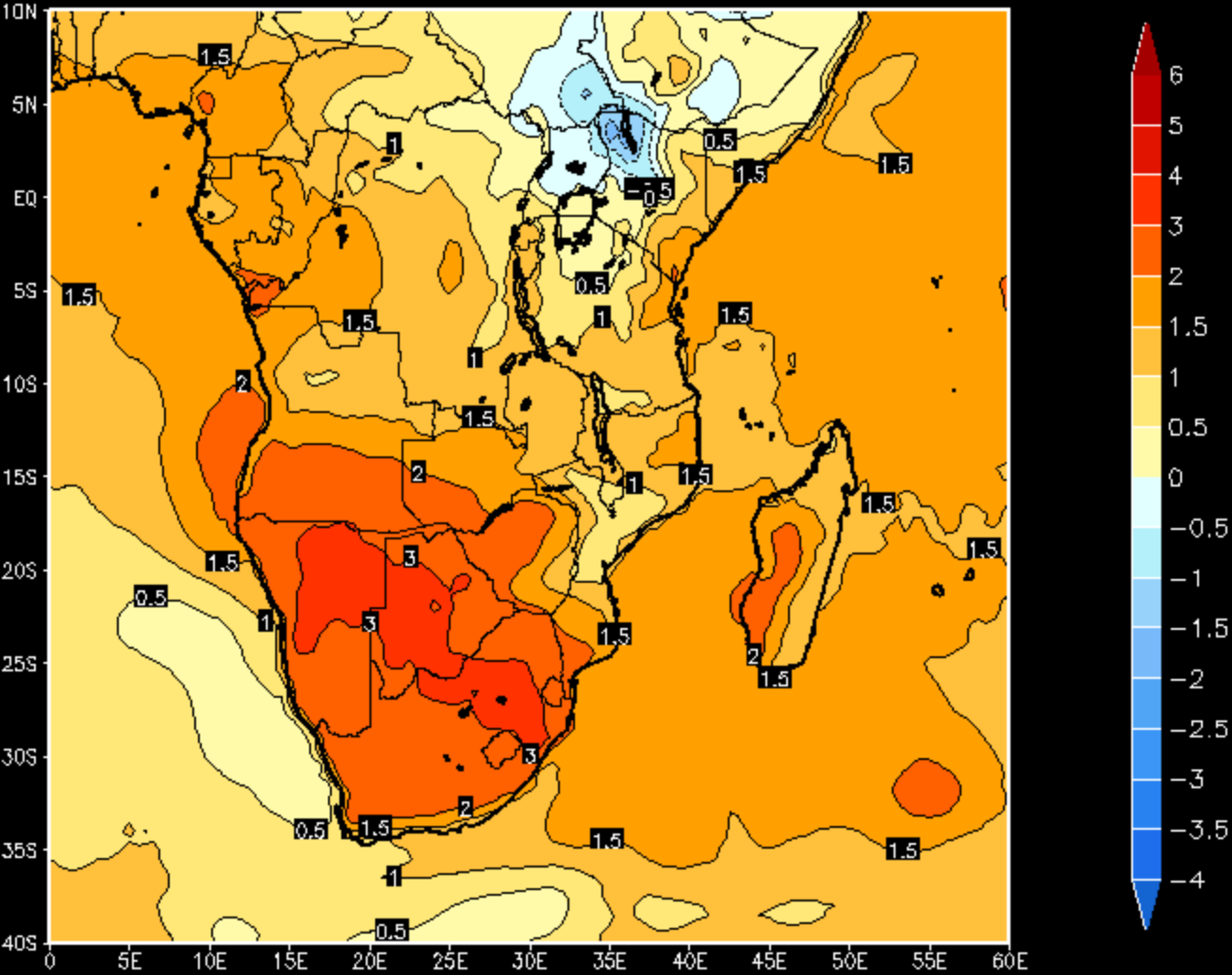
# Temp anomaly 2056



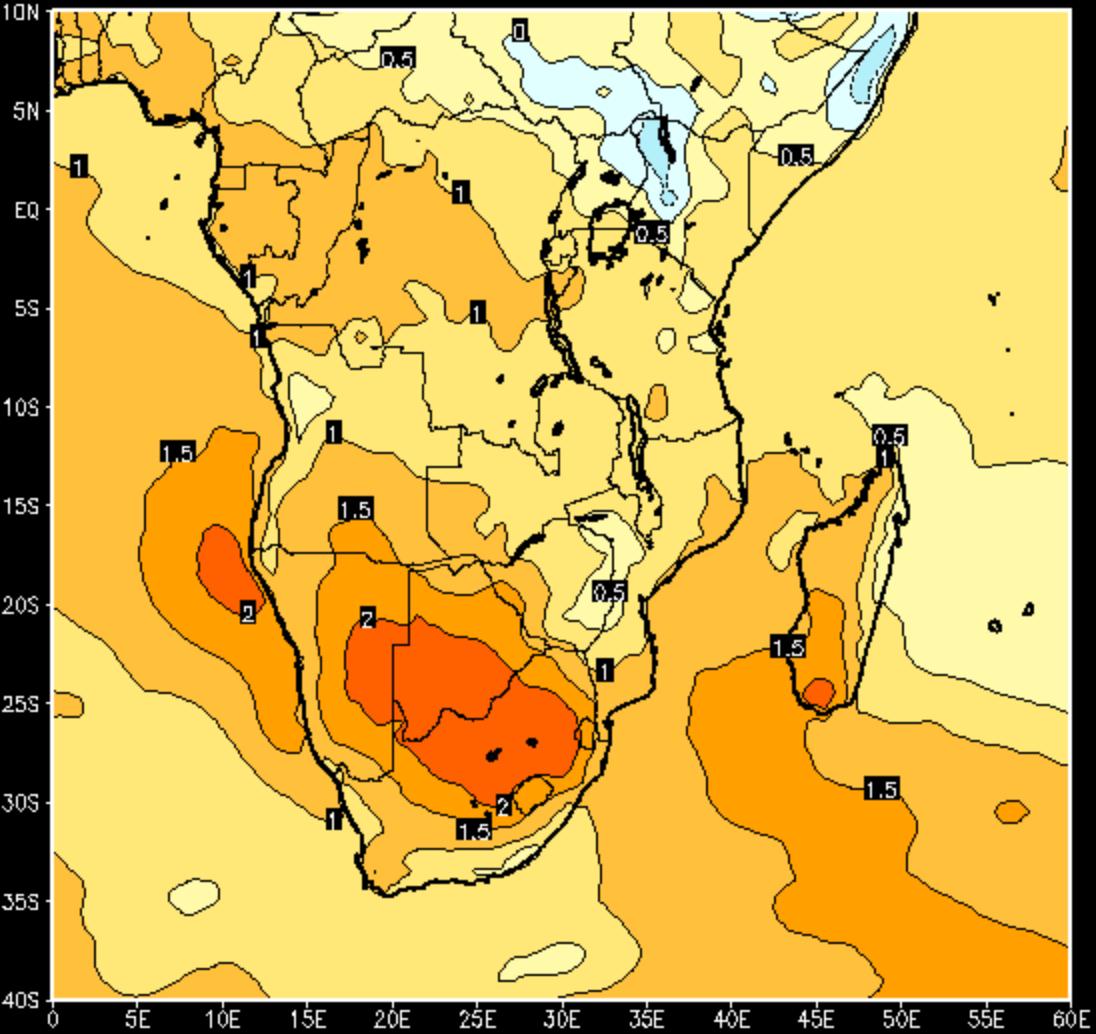
# Temp anomaly 2057



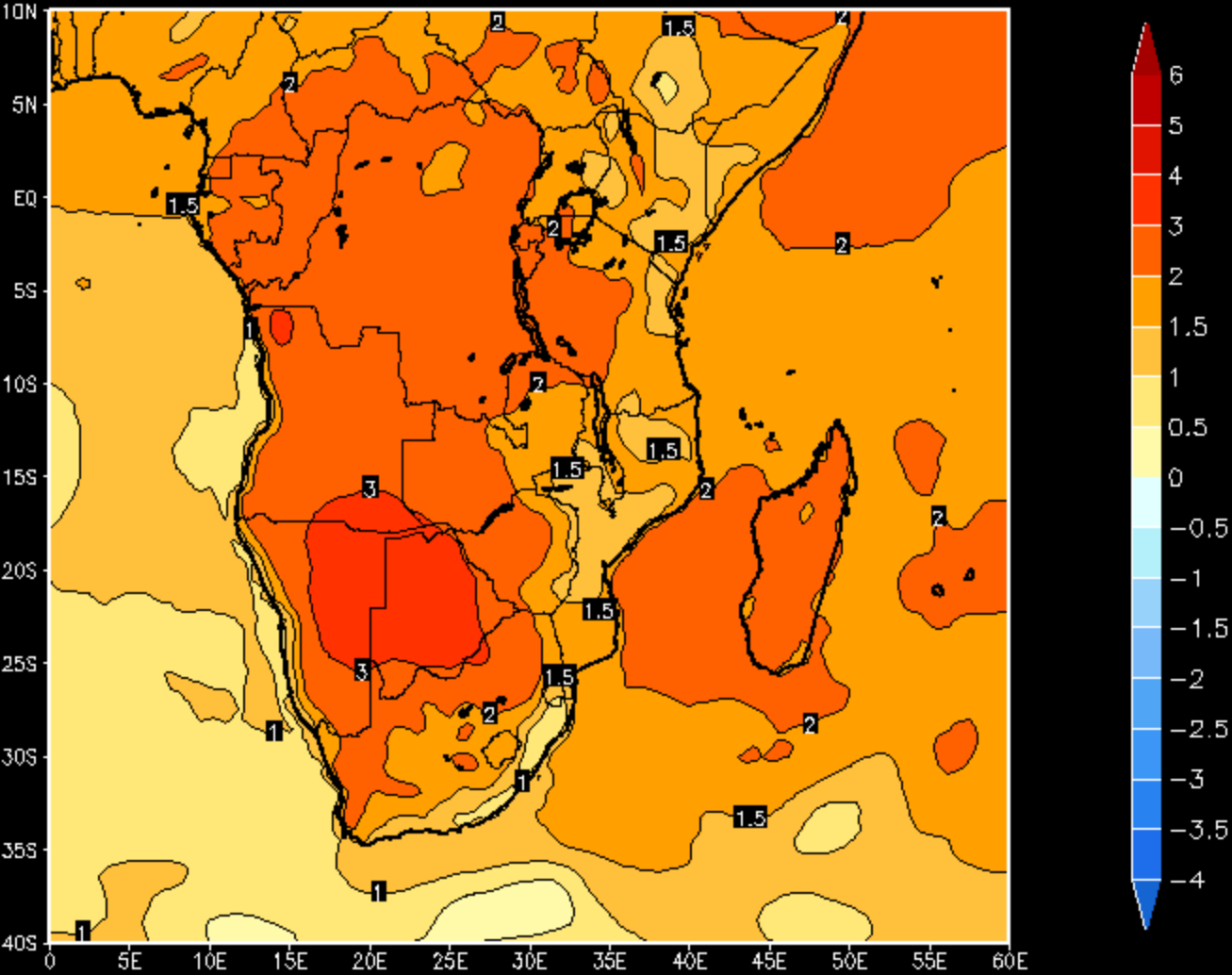
# Temp anomaly 2058



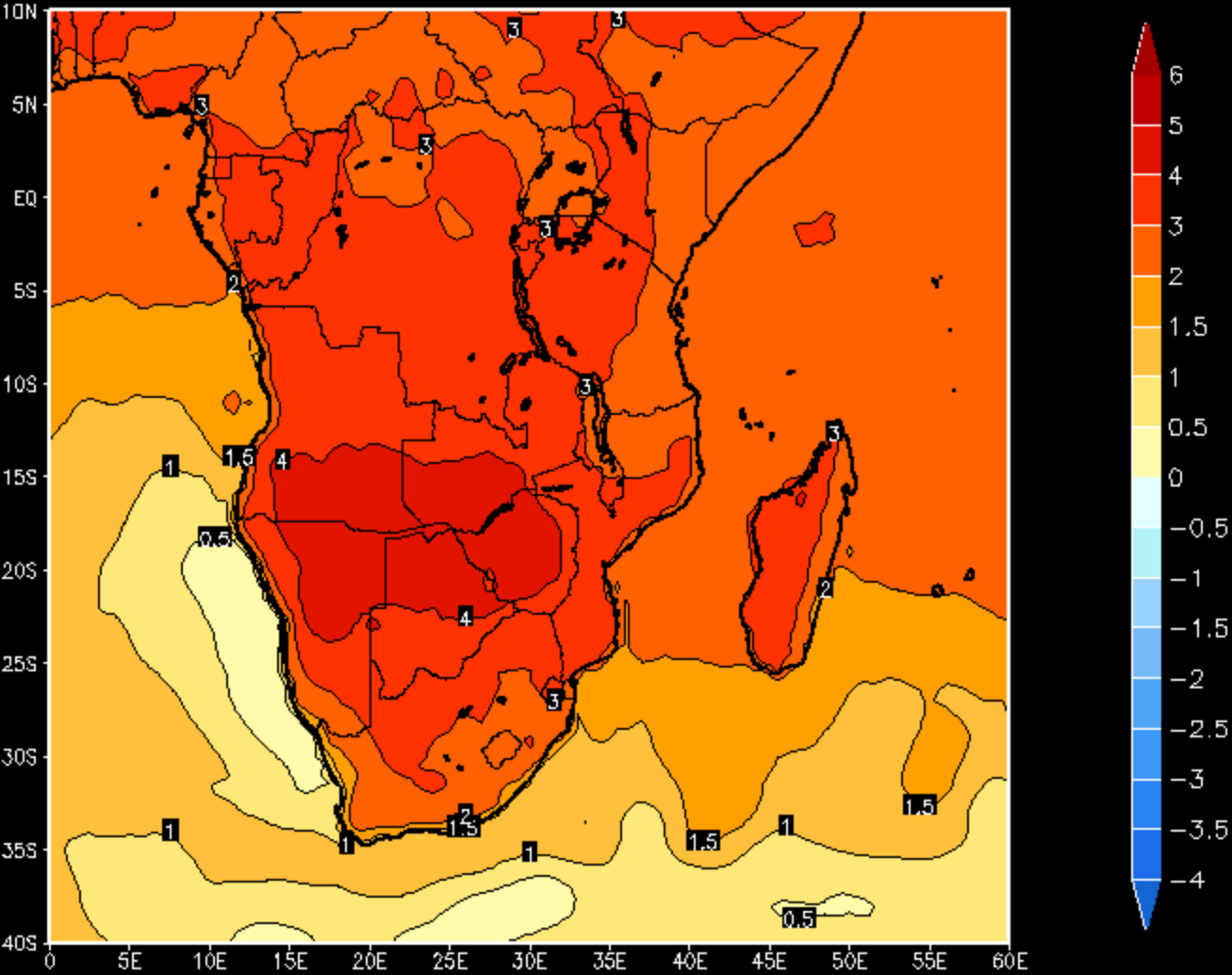
# Temp anomaly 2059



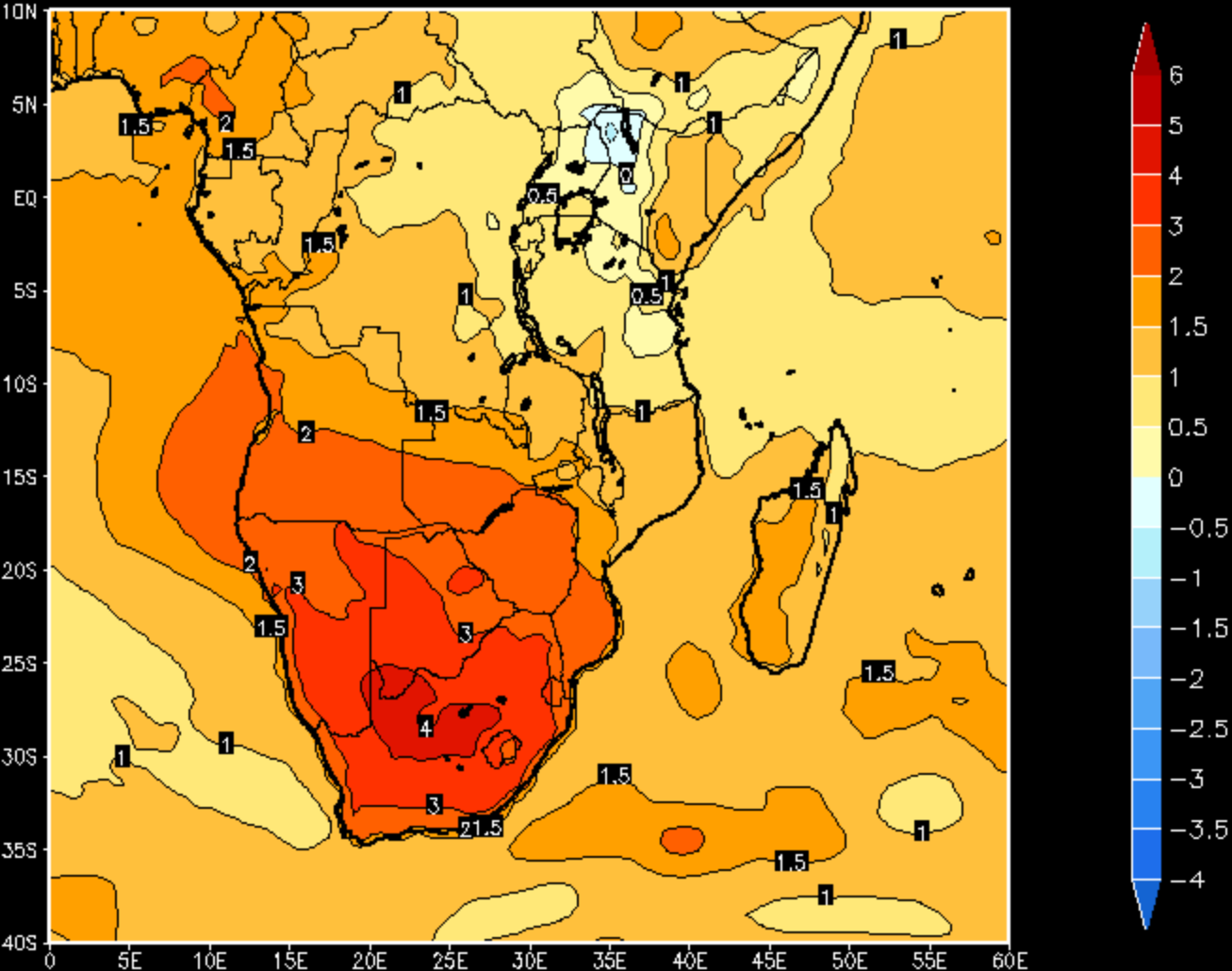
# Temp anomaly 2060



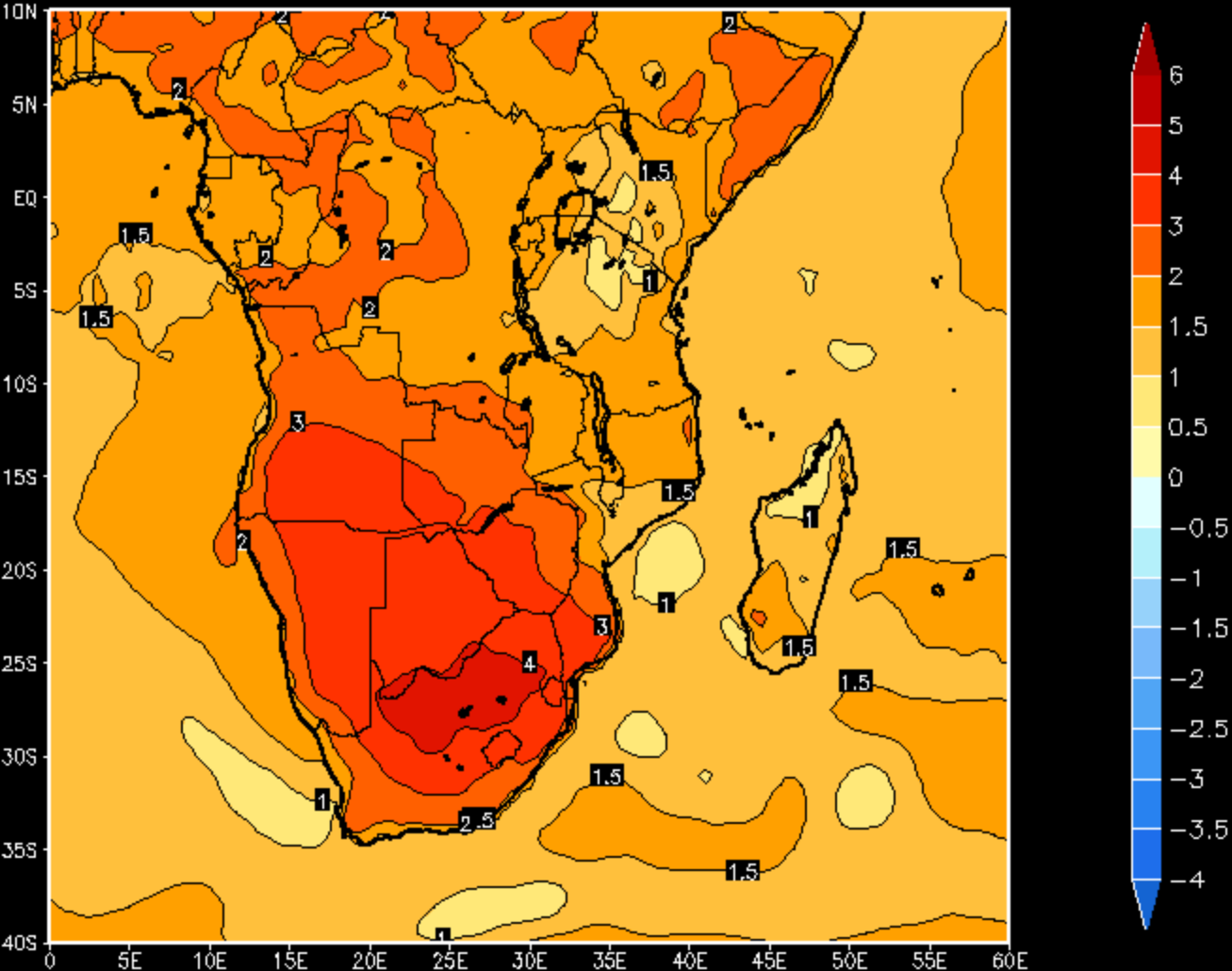
# Temp anomaly 2061



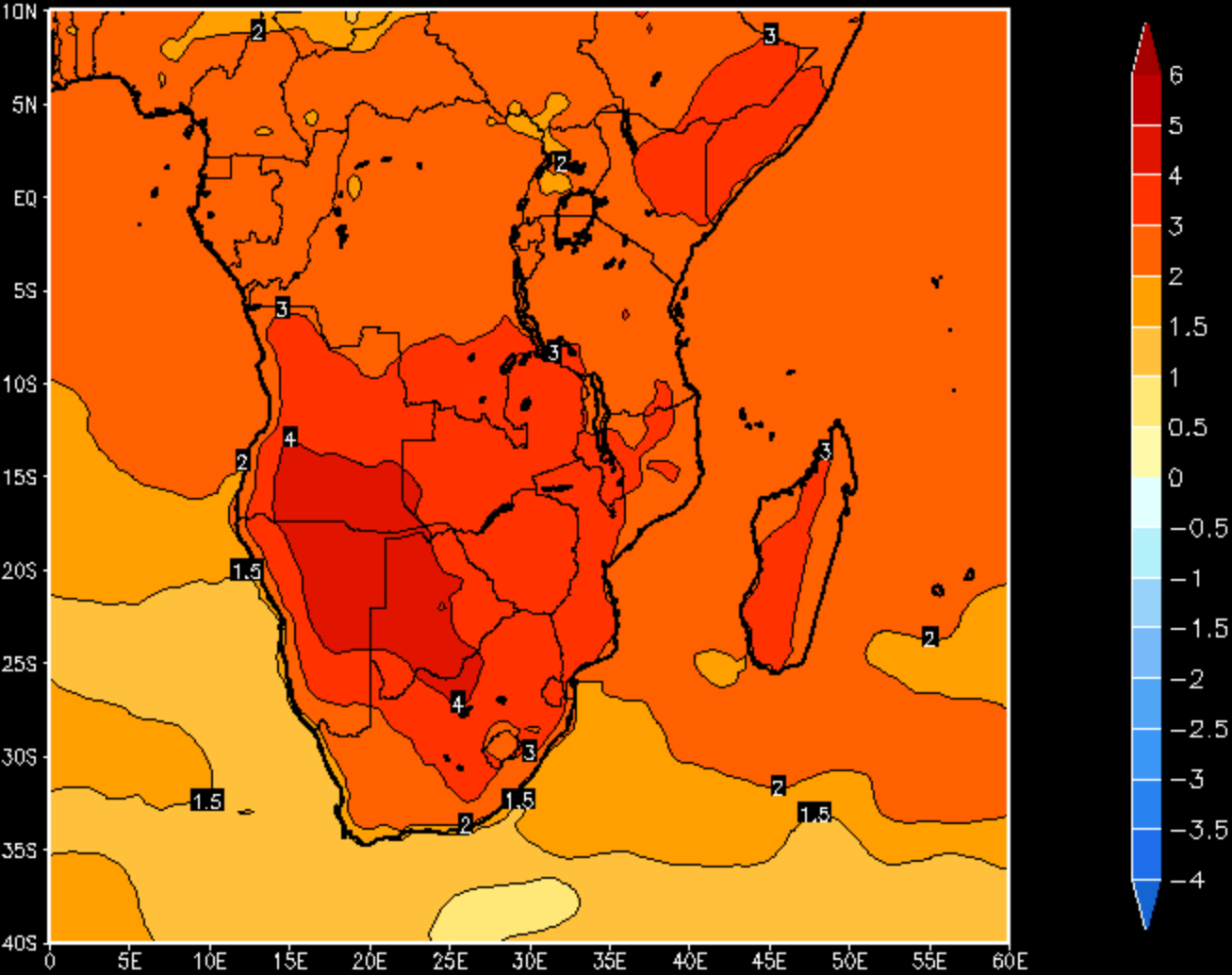
# Temp anomaly 2062



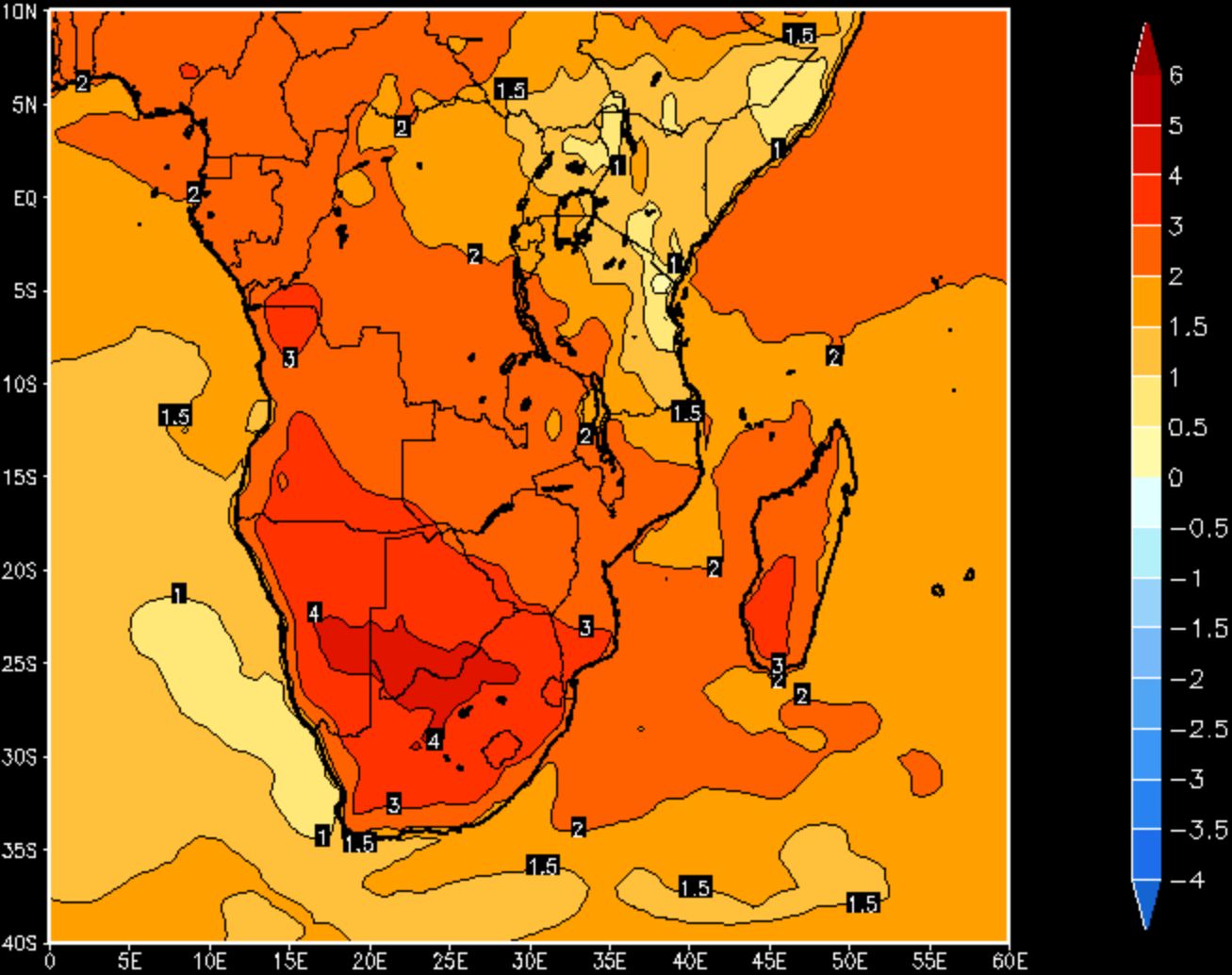
# Temp anomaly 2063



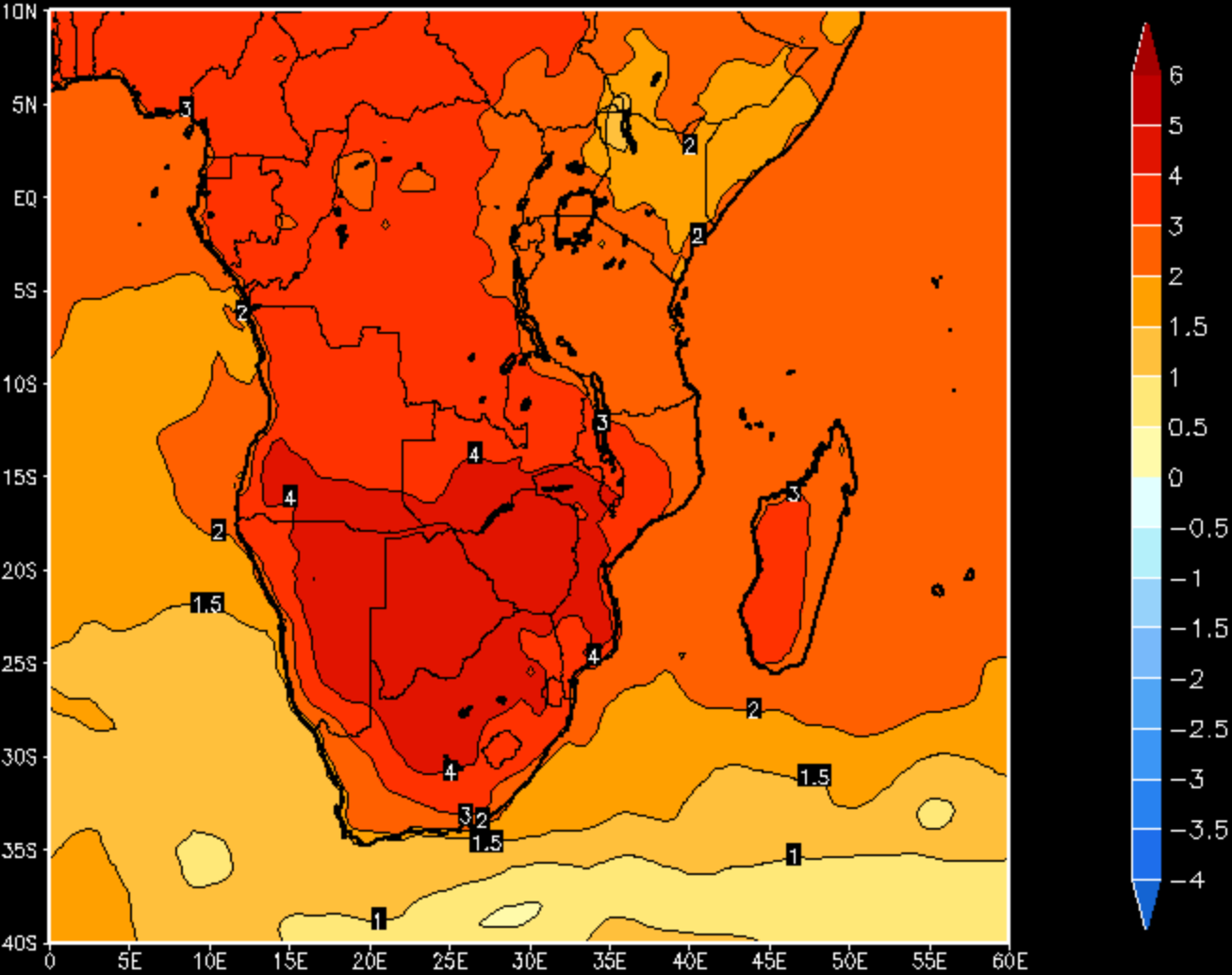
# Temp anomaly 2064



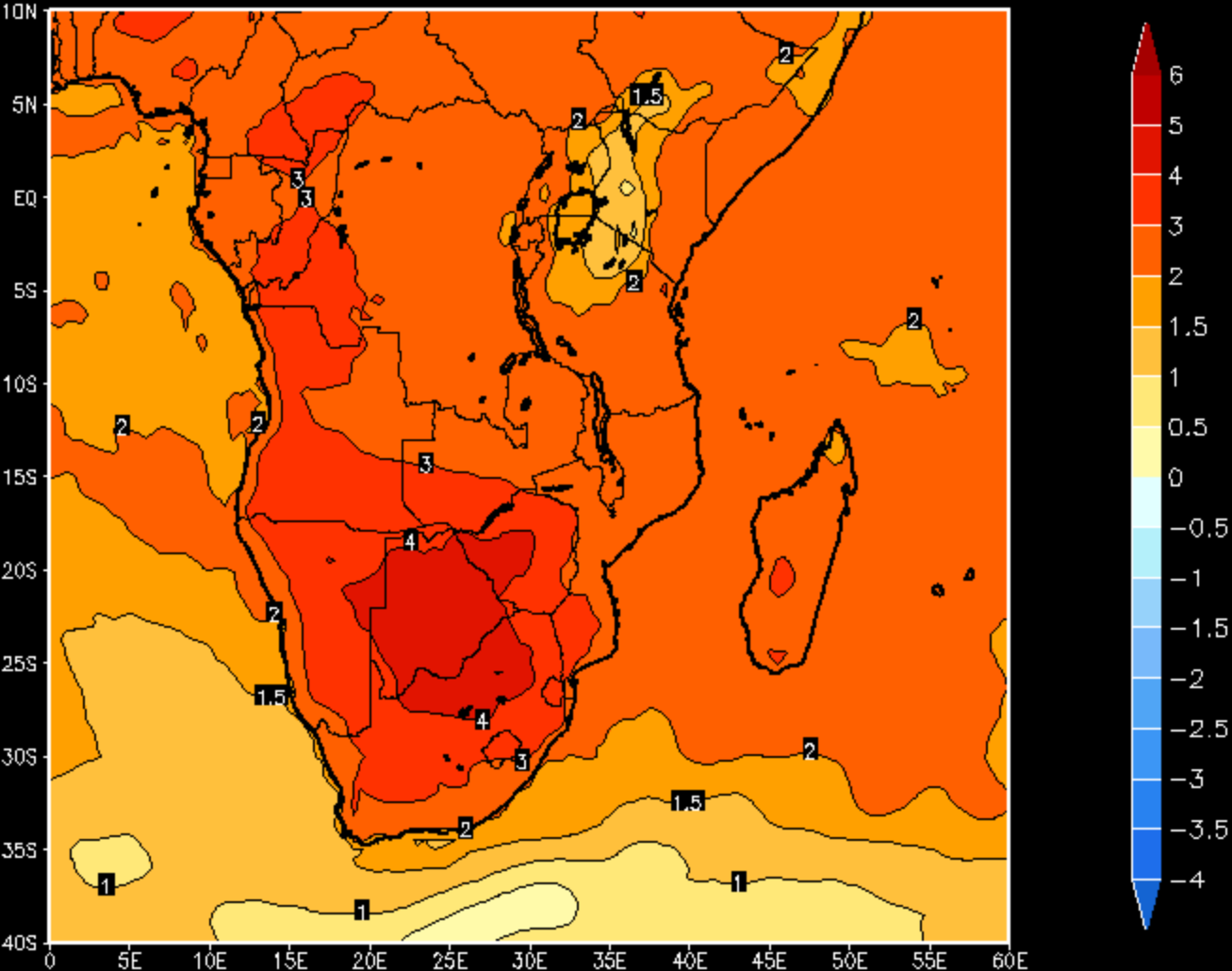
# Temp anomaly 2065



# Temp anomaly 2066

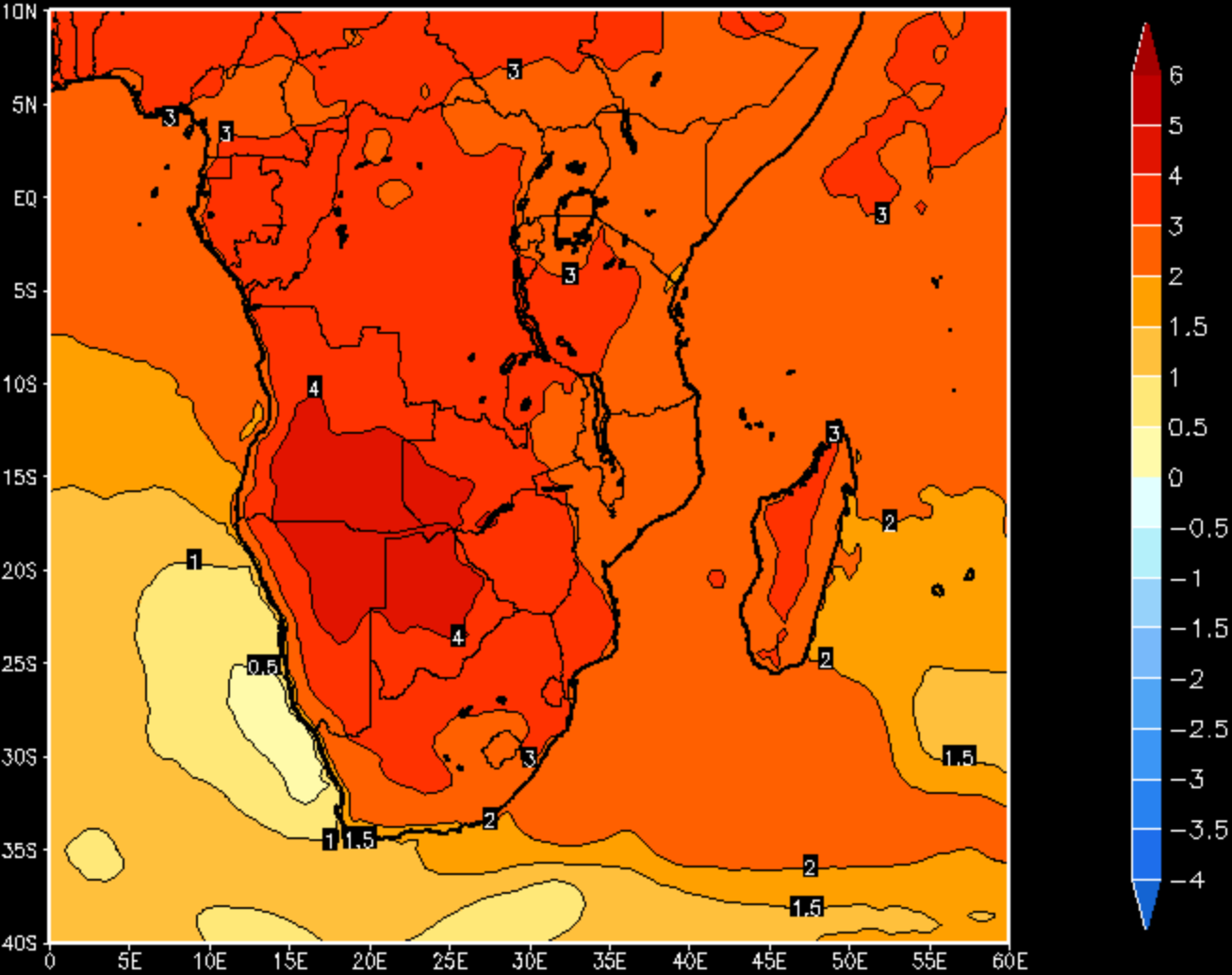


# Temp anomaly 2067

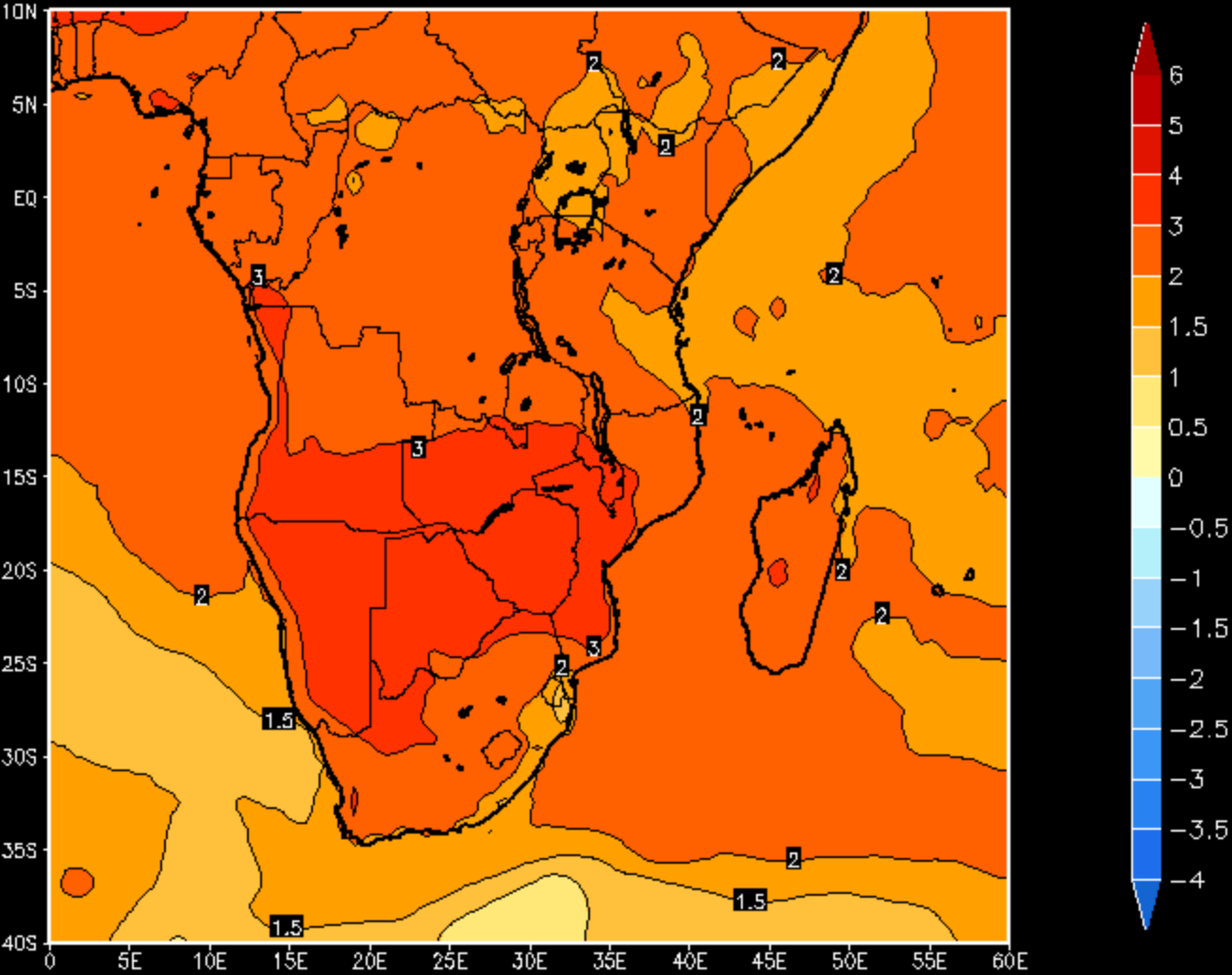




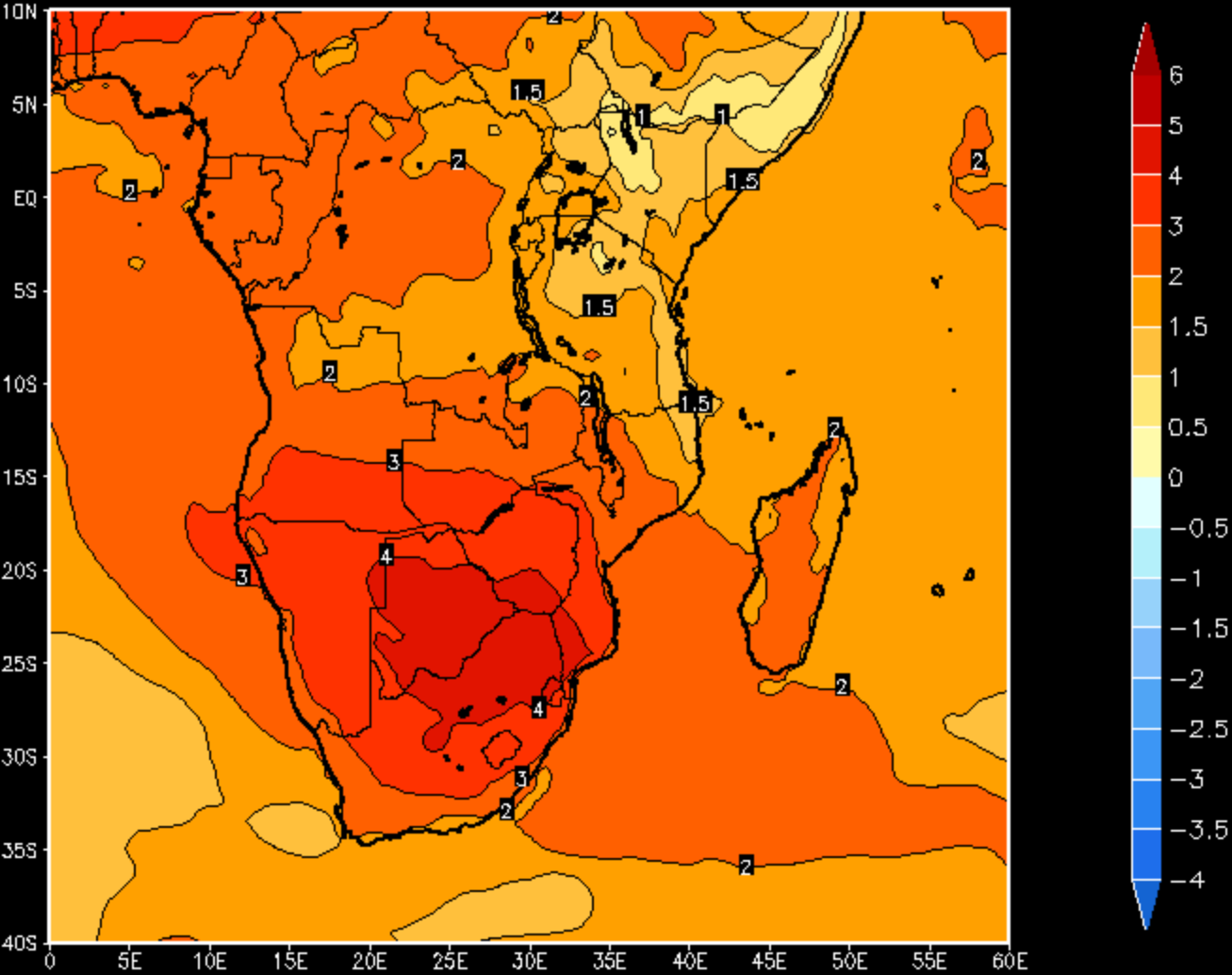
# Temp anomaly 2069



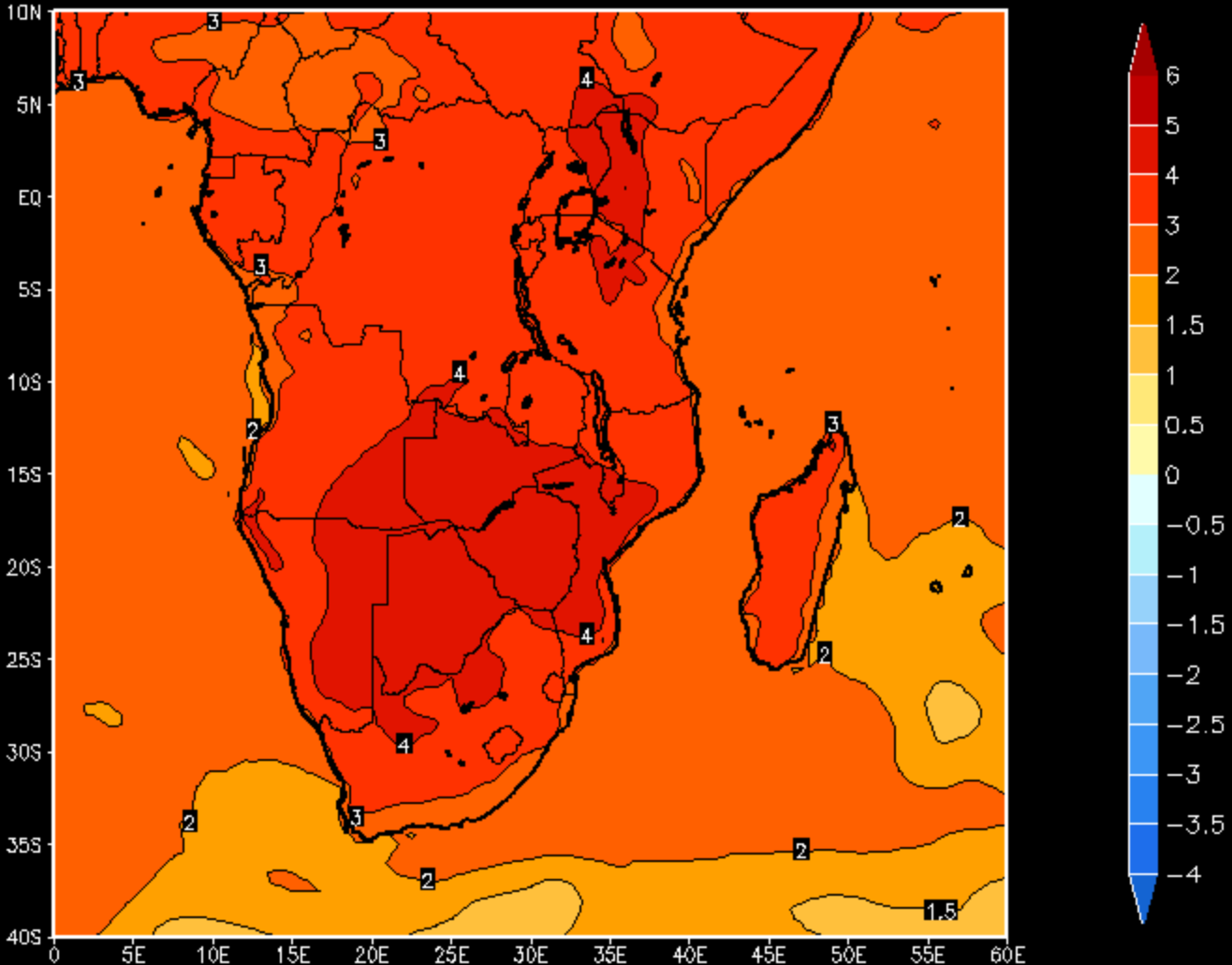
# Temp anomaly 2070



# Temp anomaly 2071

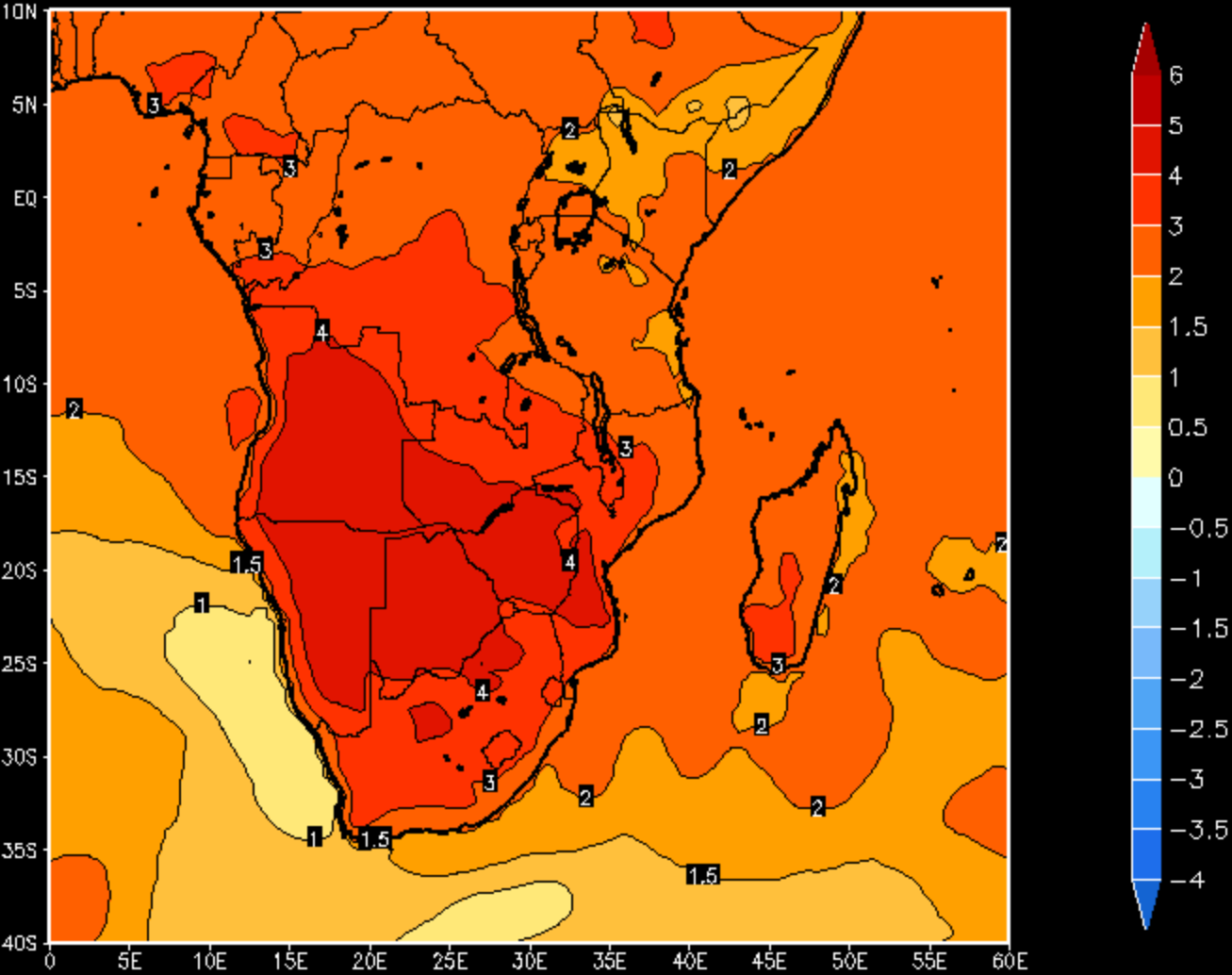


# Temp anomaly 2072

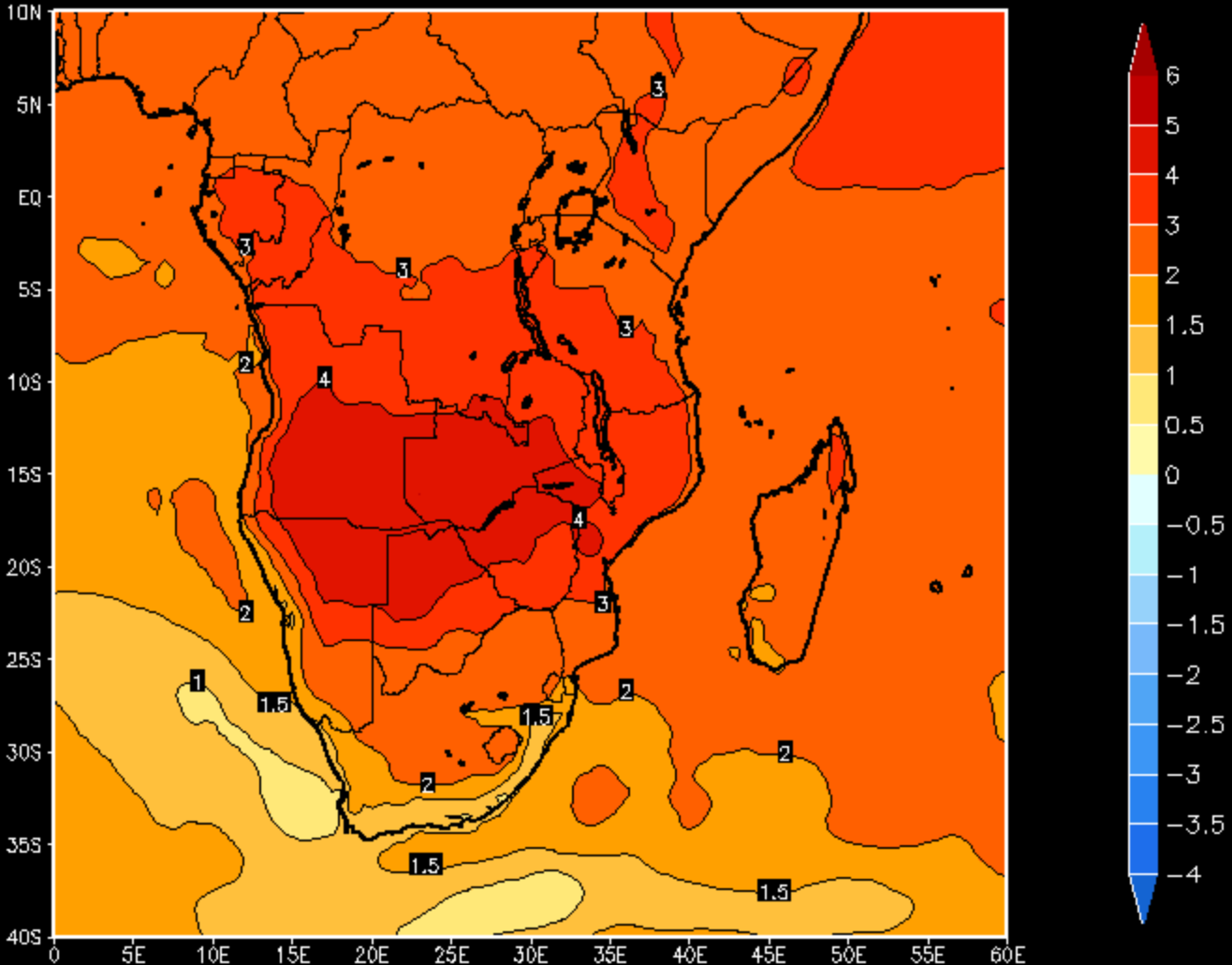




# Temp anomaly 2074

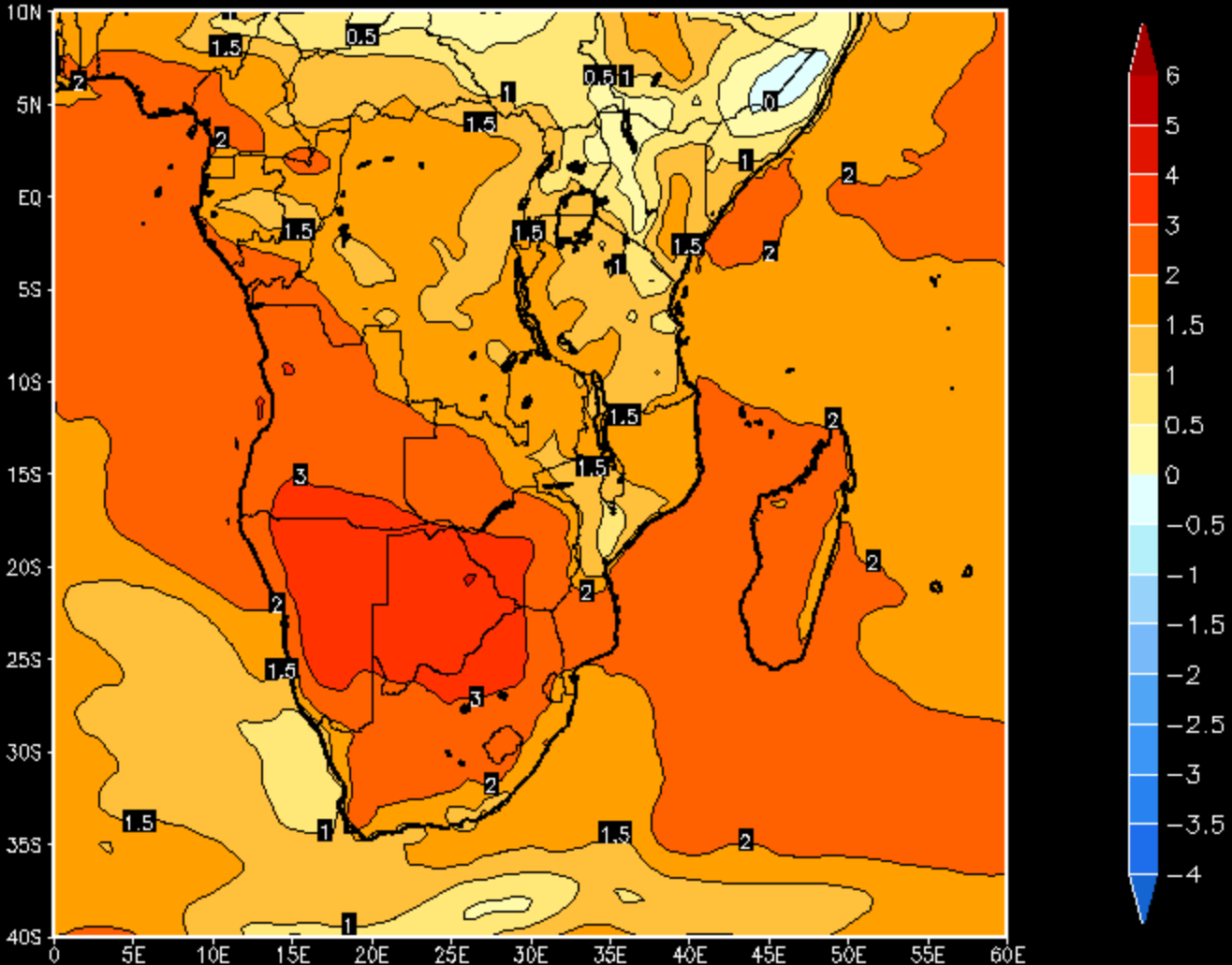


# Temp anomaly 2075

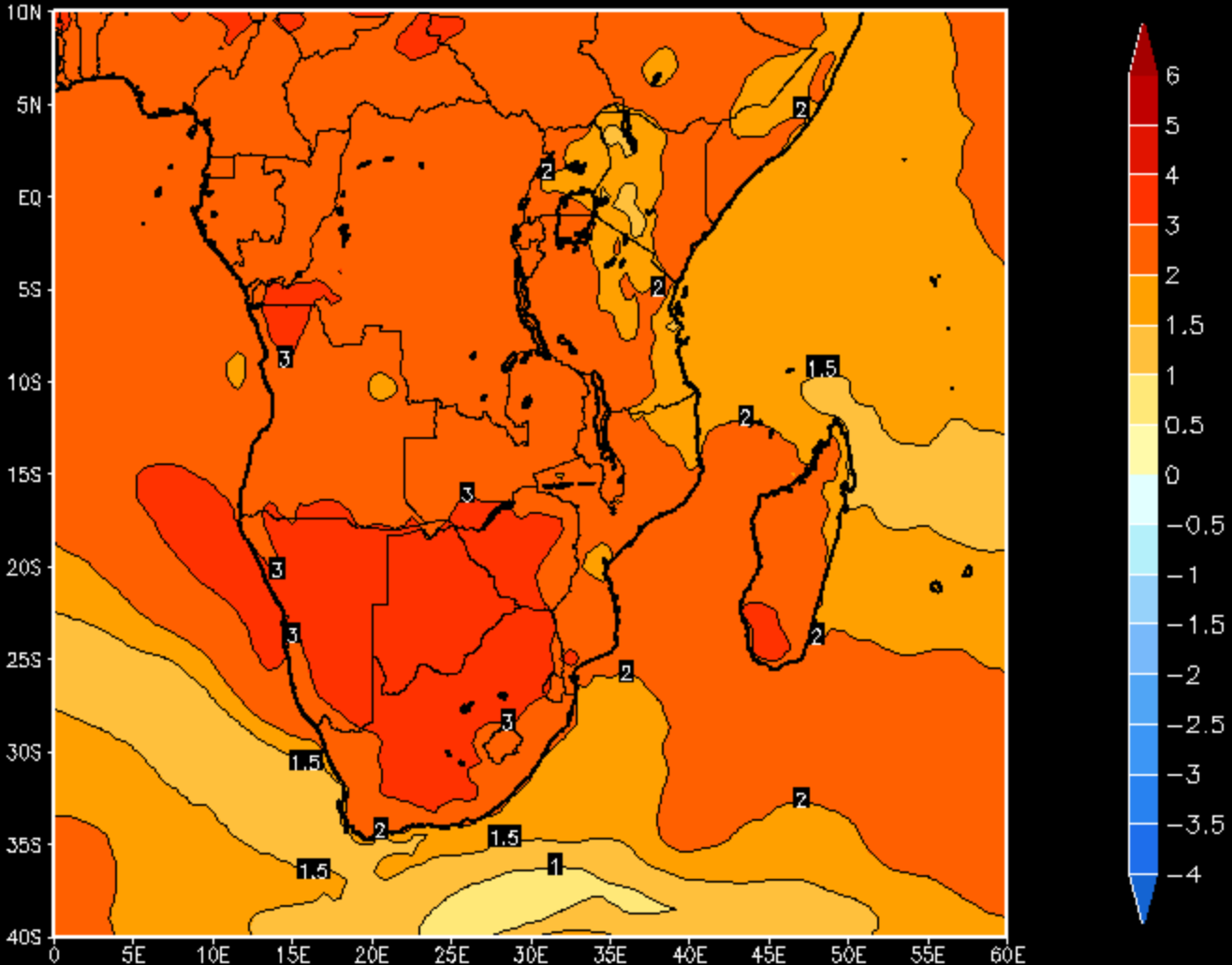




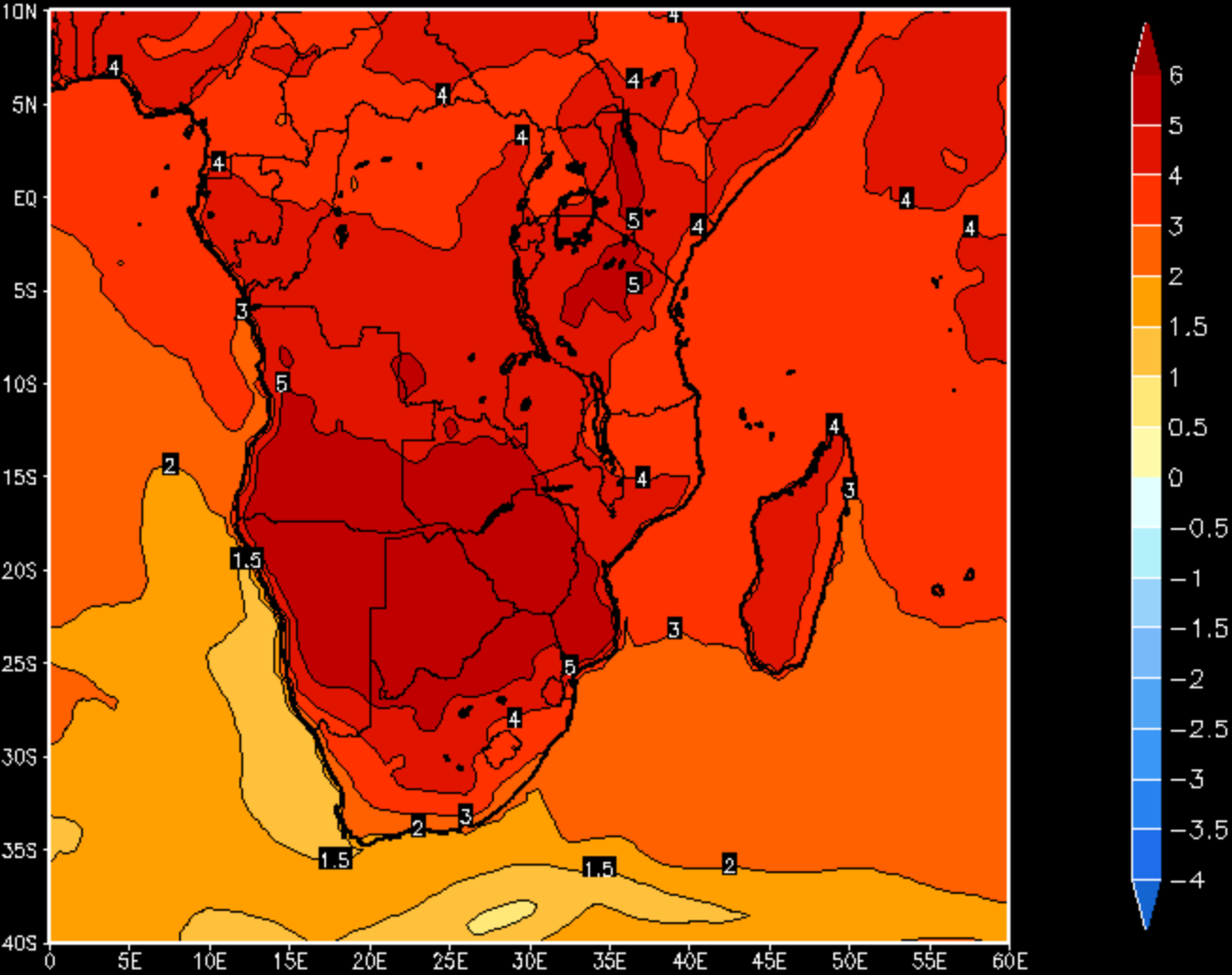
# Temp anomaly 2077



# Temp anomaly 2078

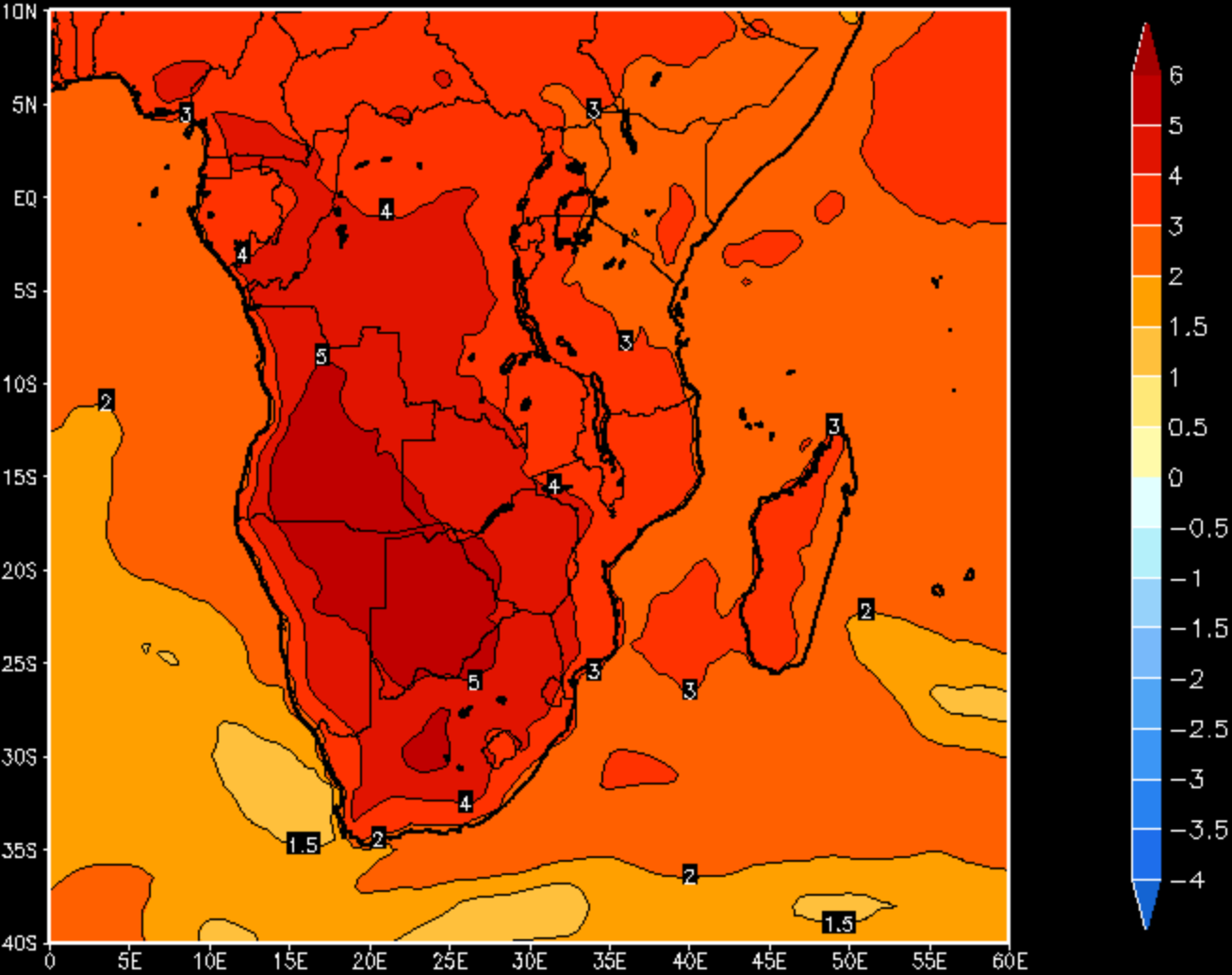


# Temp anomaly 2079

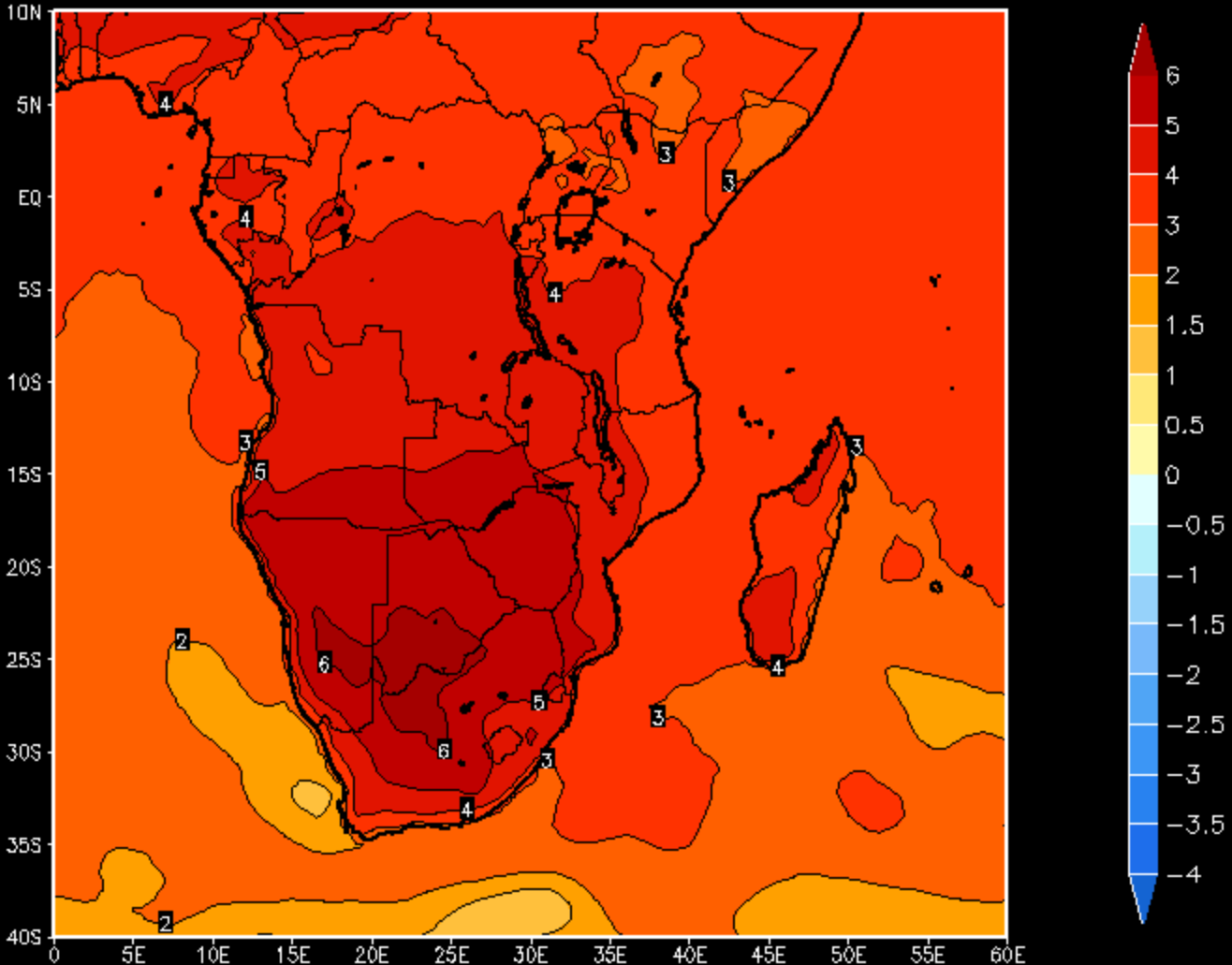




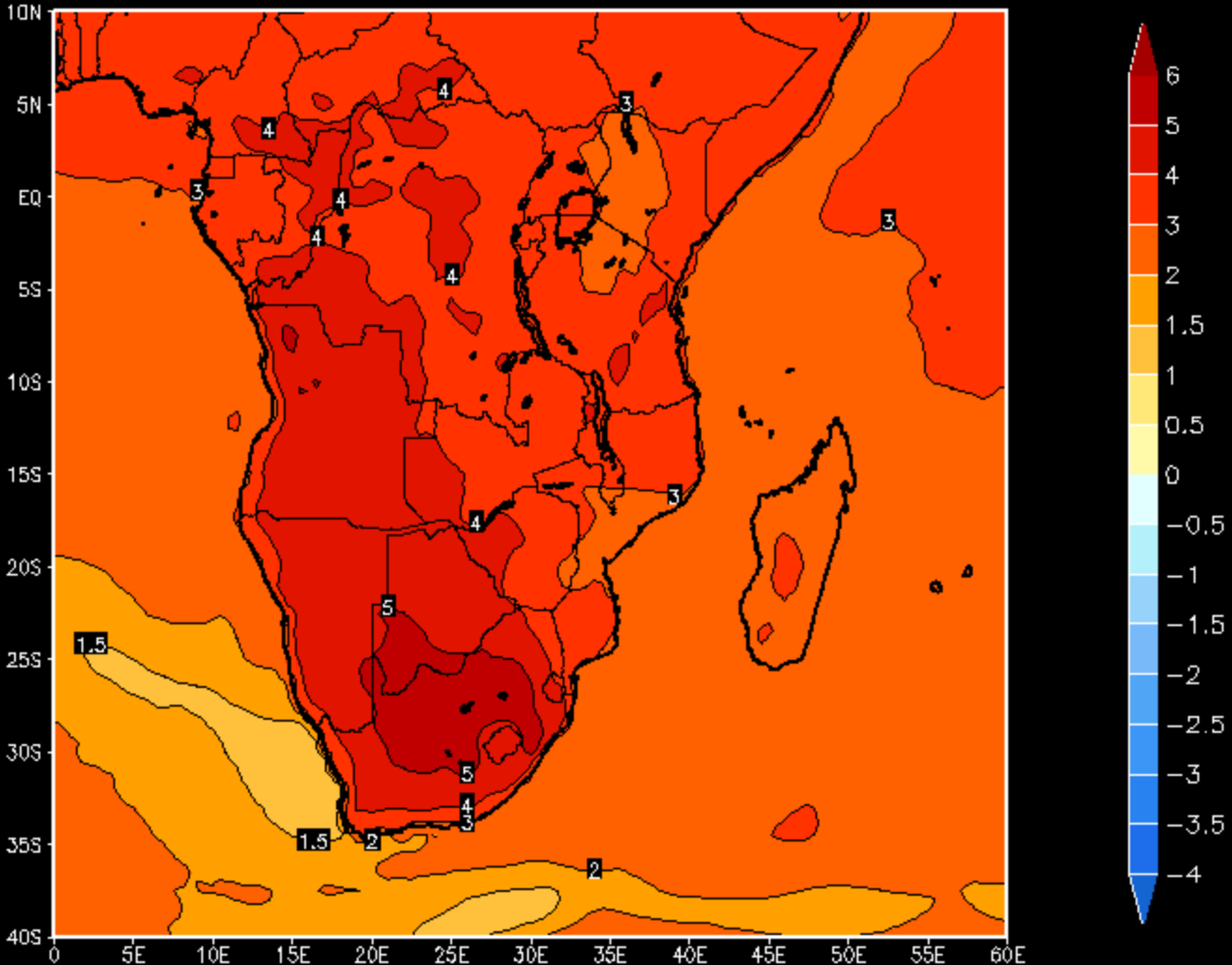
# Temp anomaly 2081



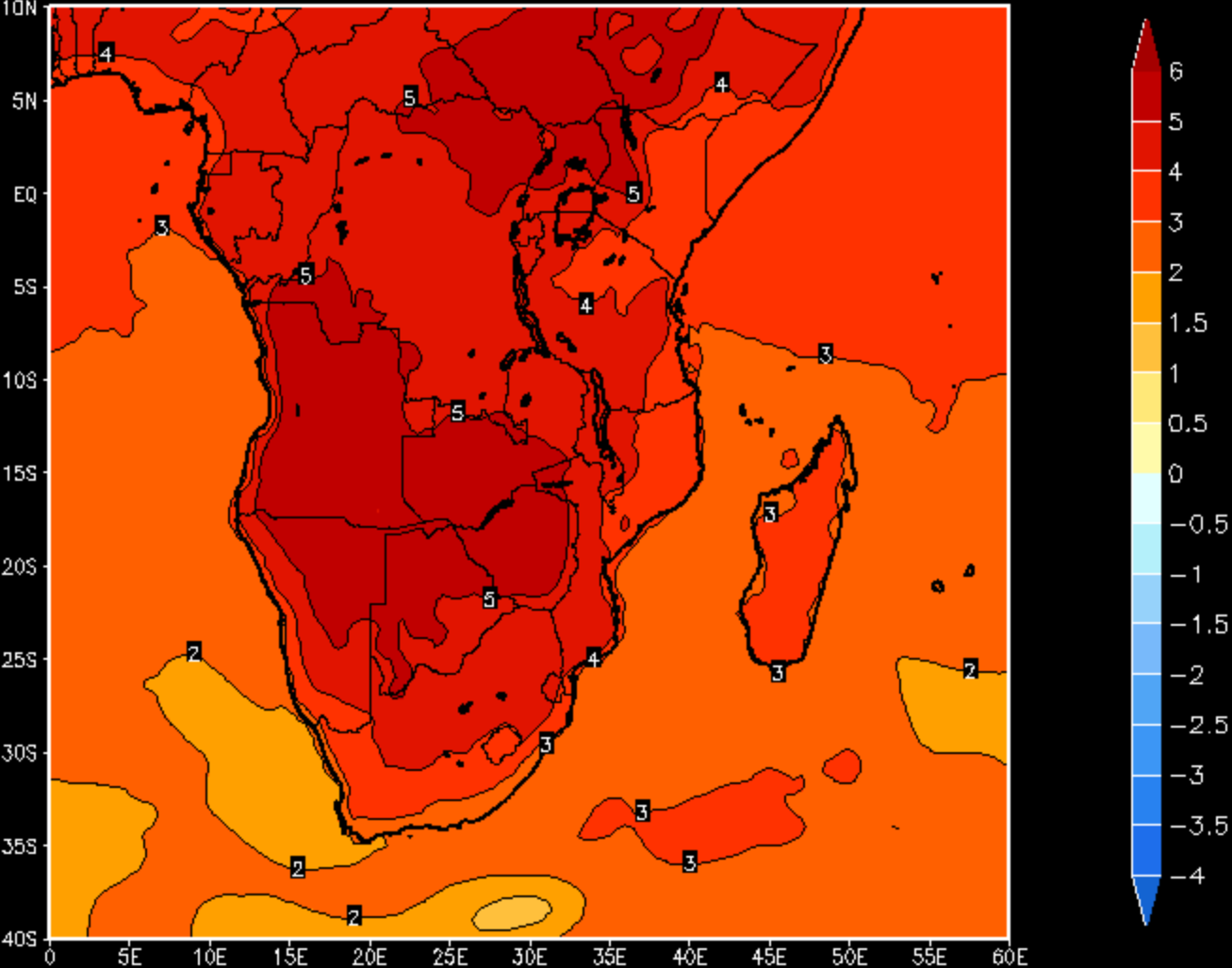
# Temp anomaly 2082



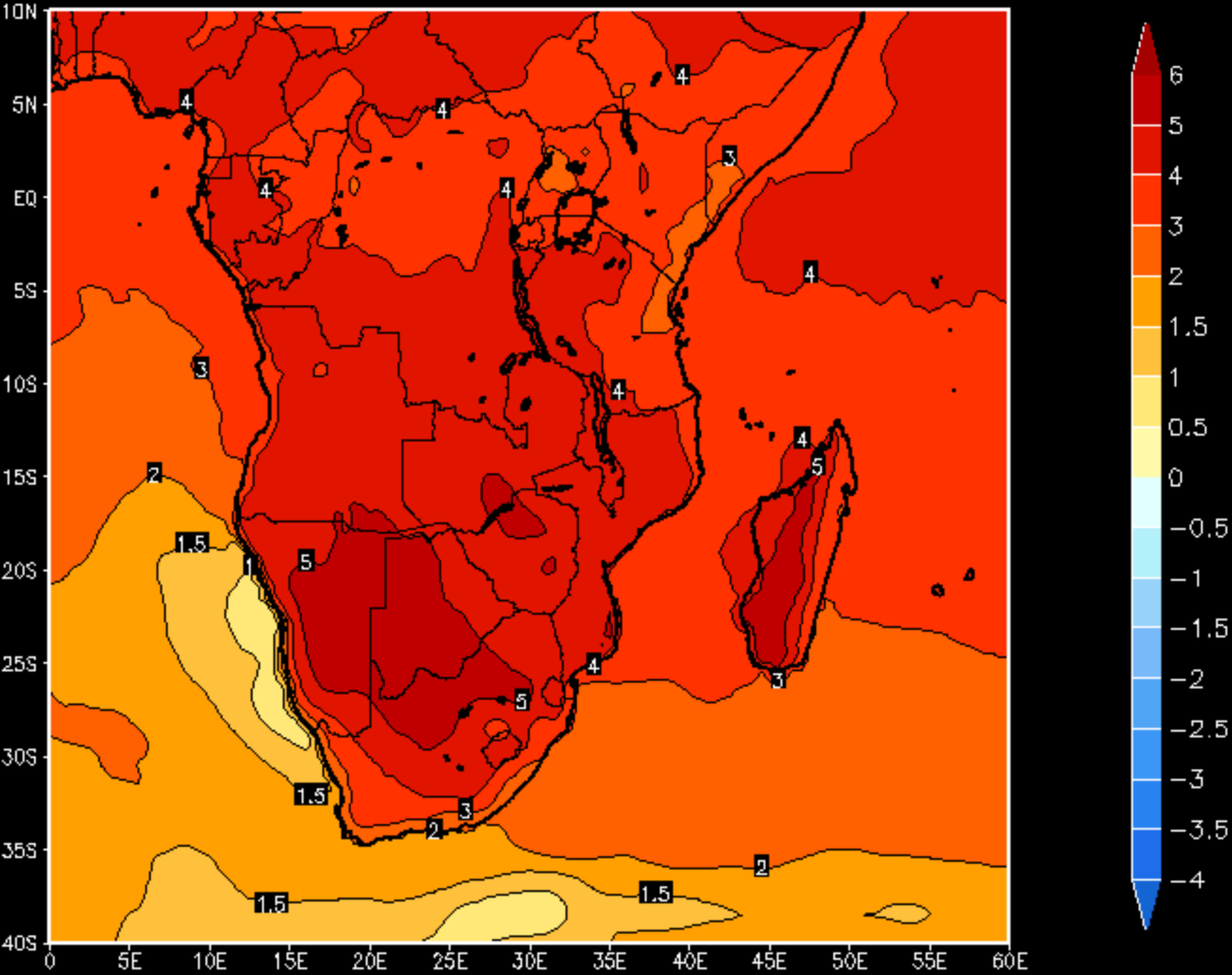
# Temp anomaly 2083



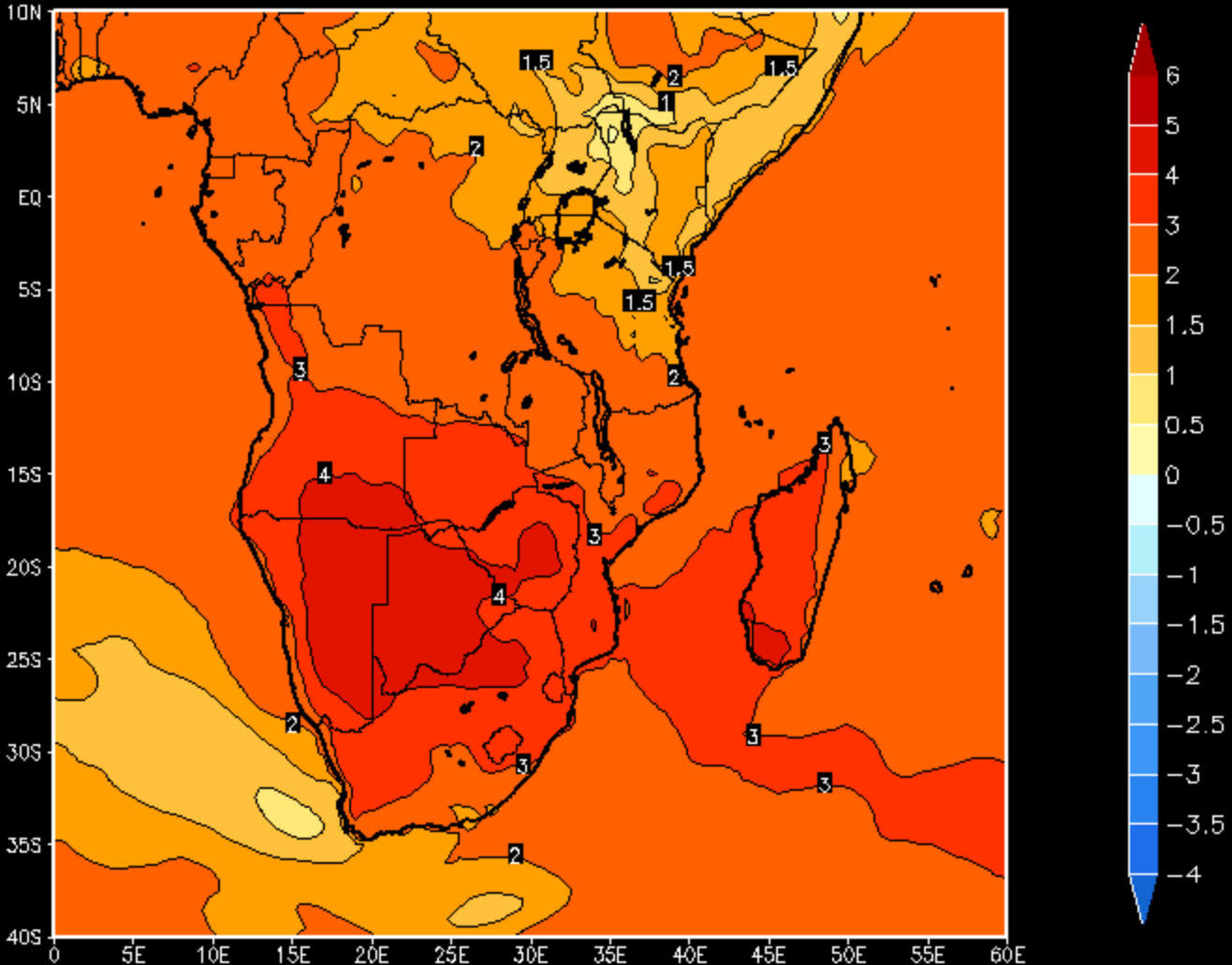
# Temp anomaly 2084



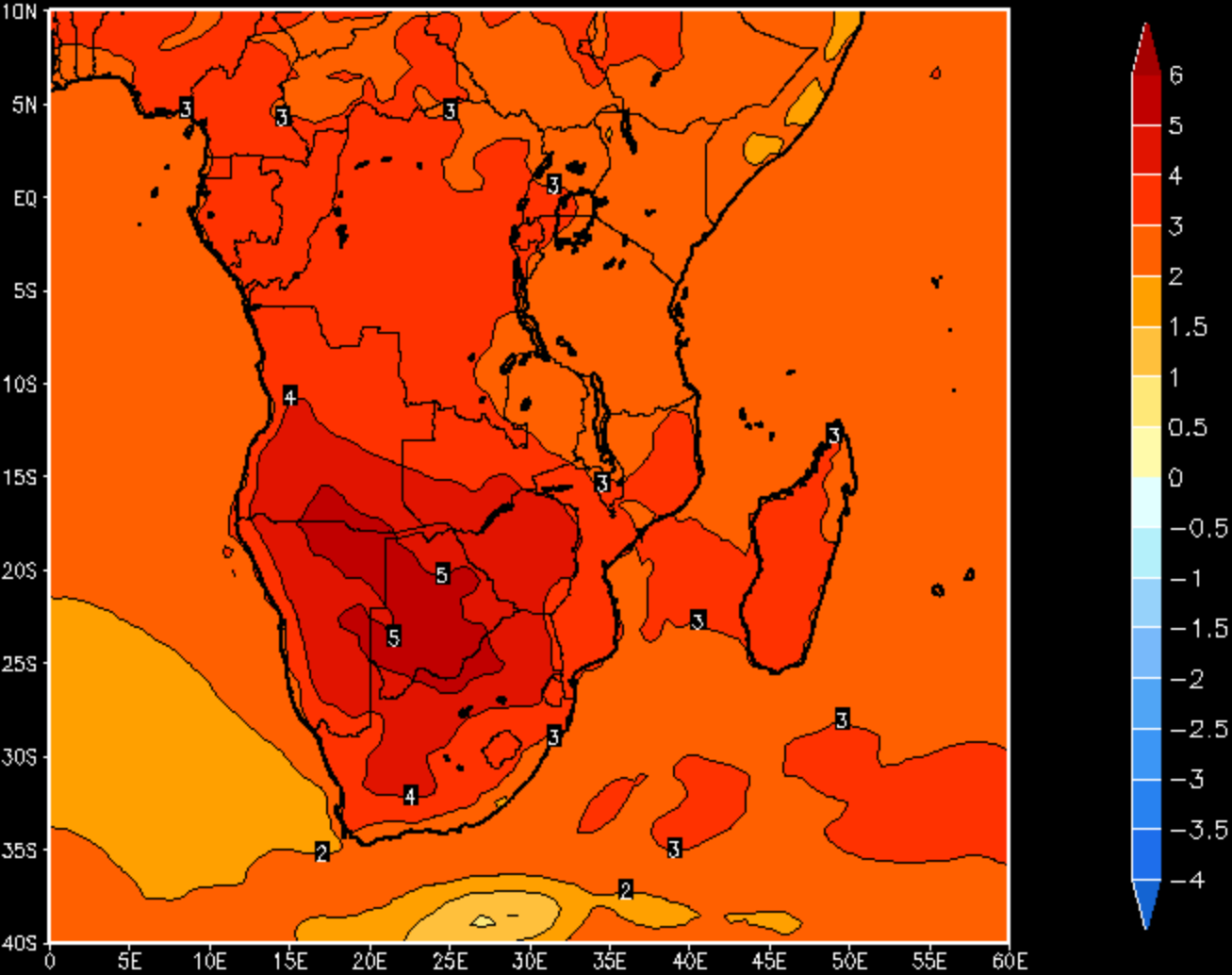
# Temp anomaly 2085



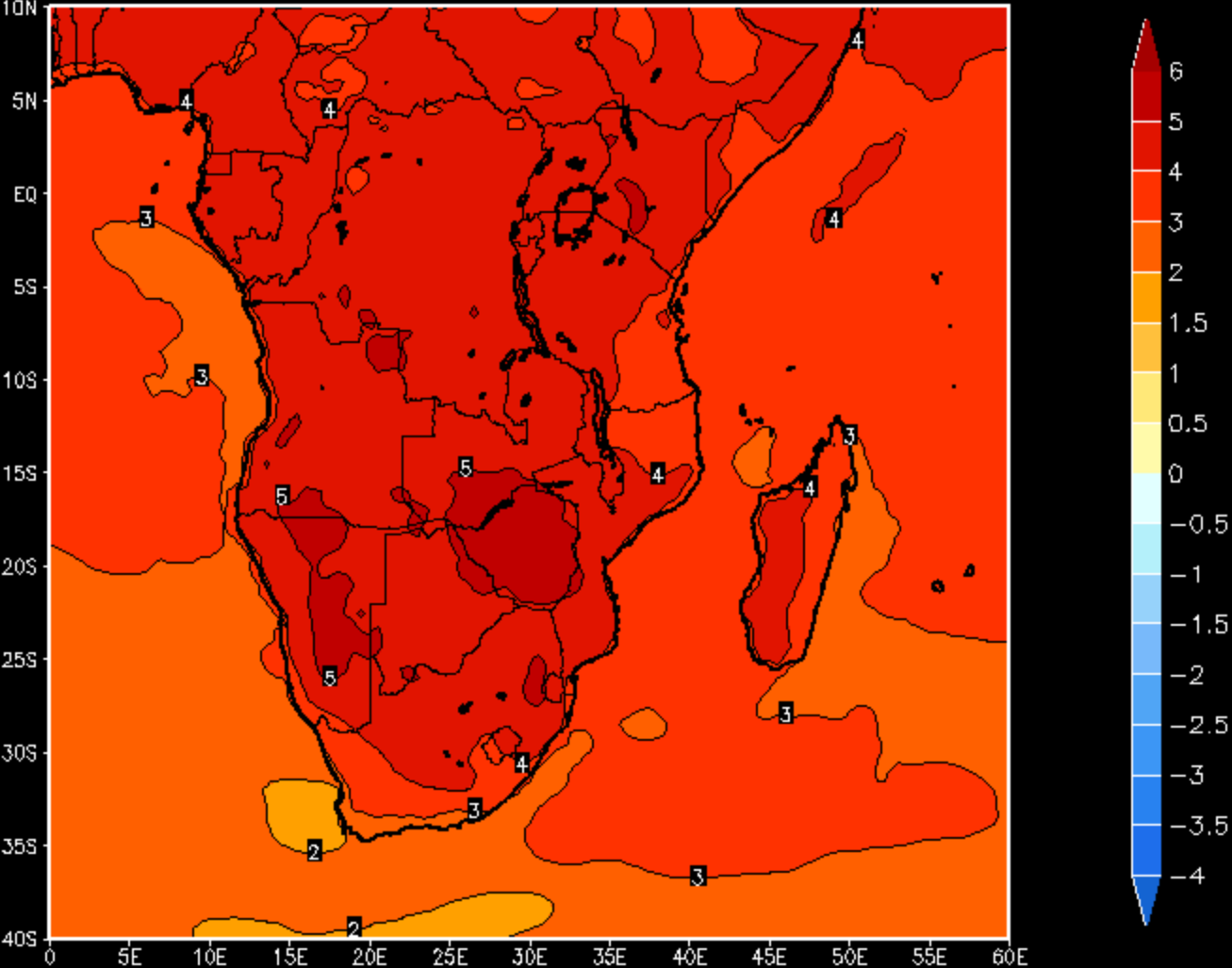
# Temp anomaly 2086



# Temp anomaly 2087

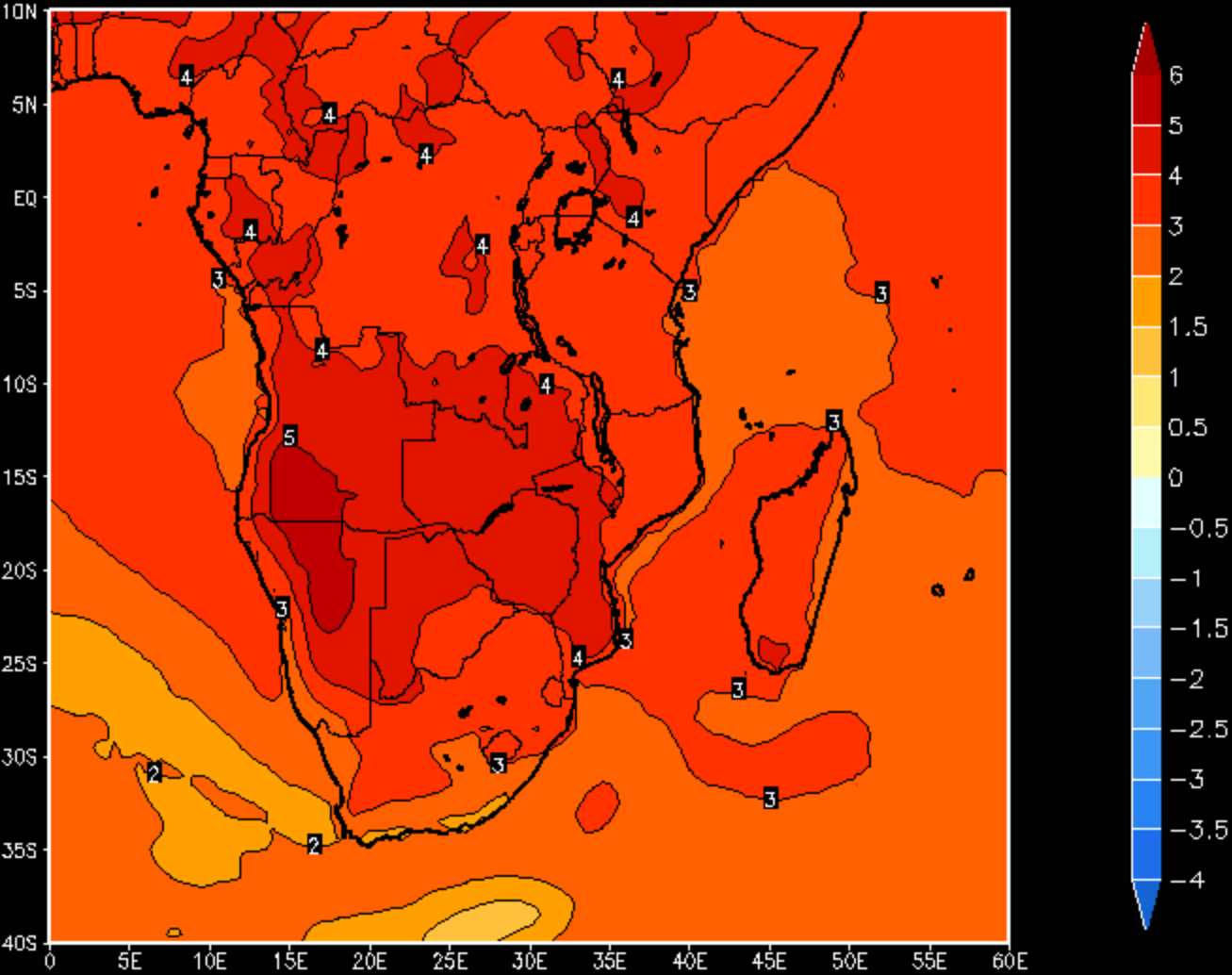


# Temp anomaly 2088

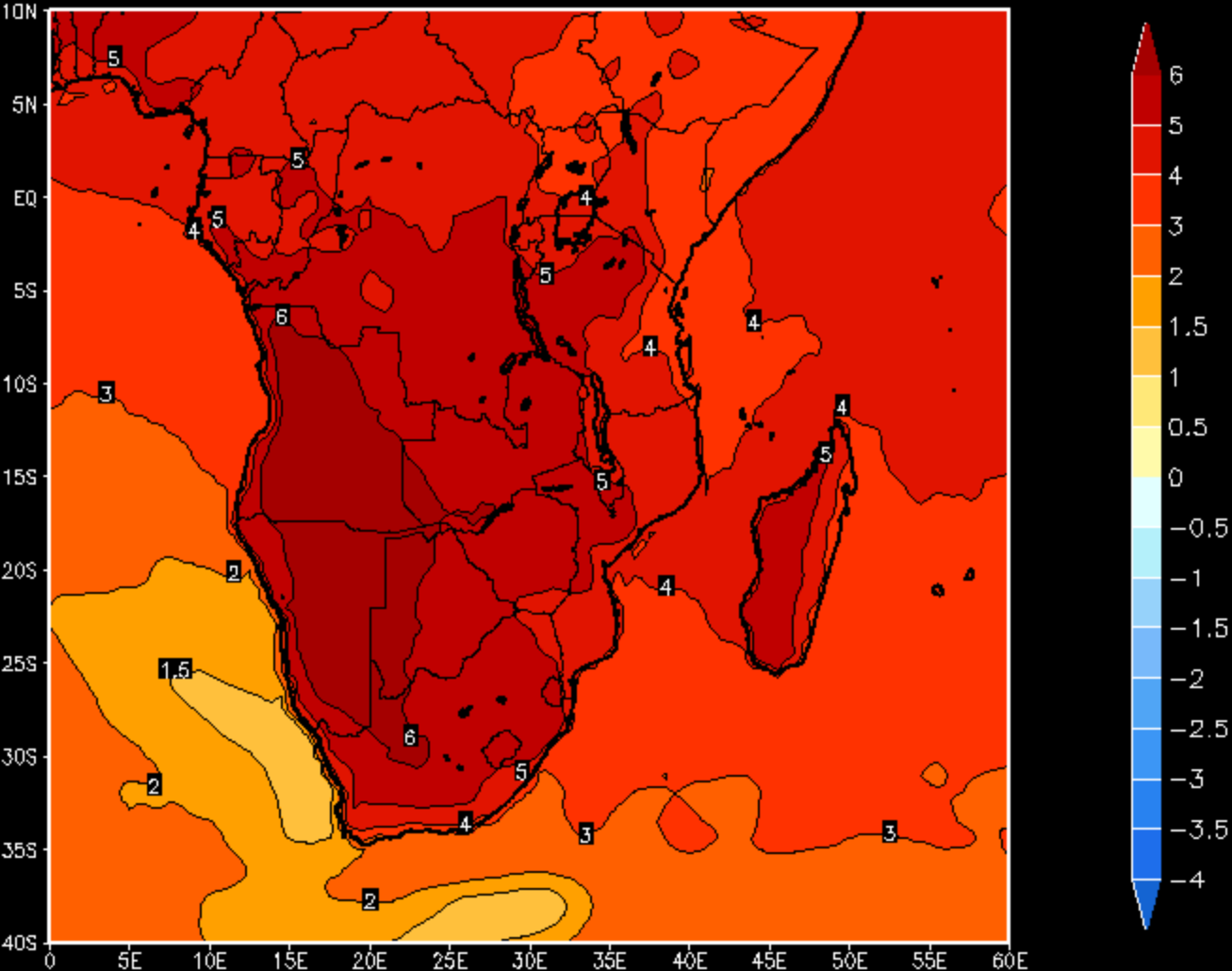




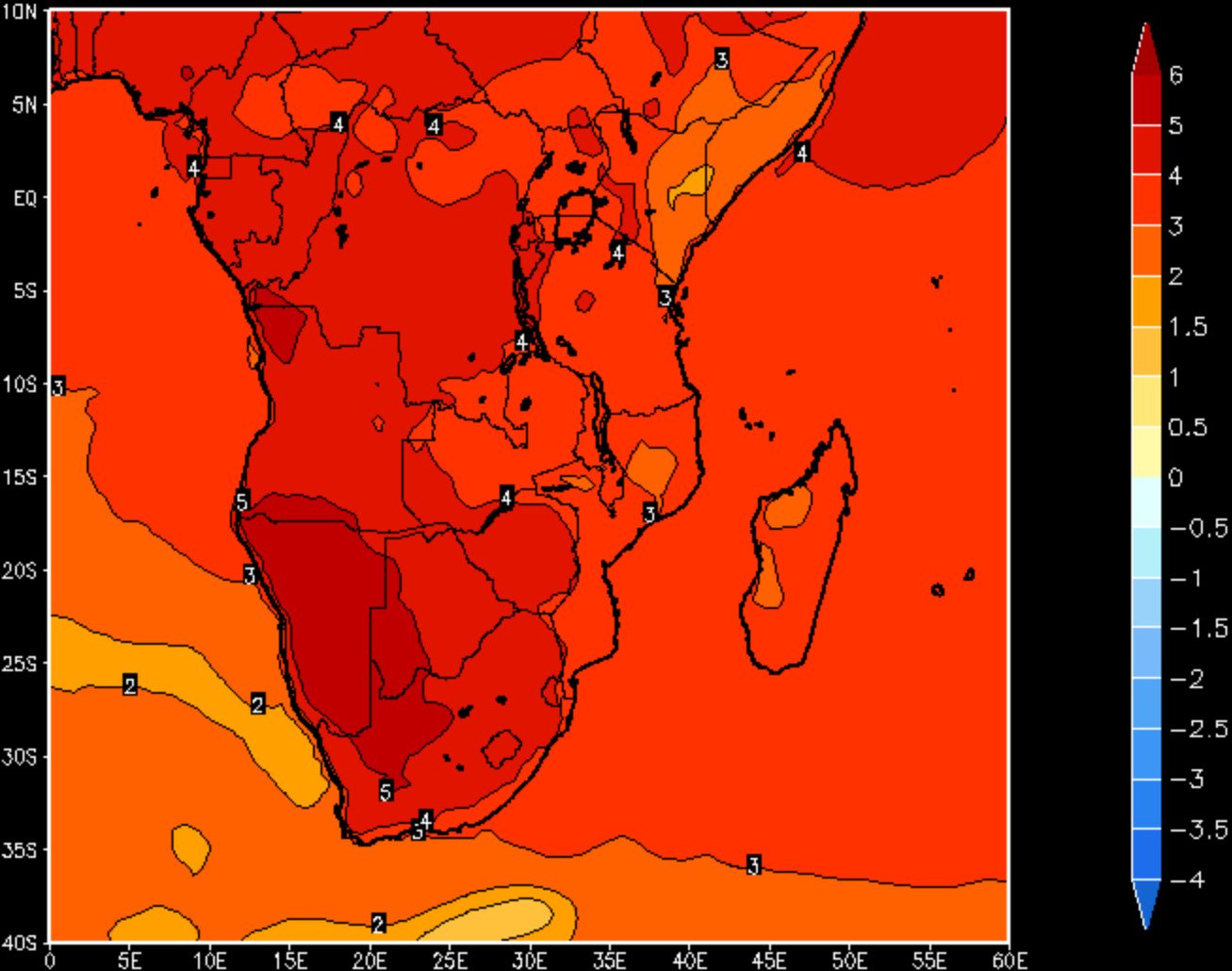
# Temp anomaly 2090



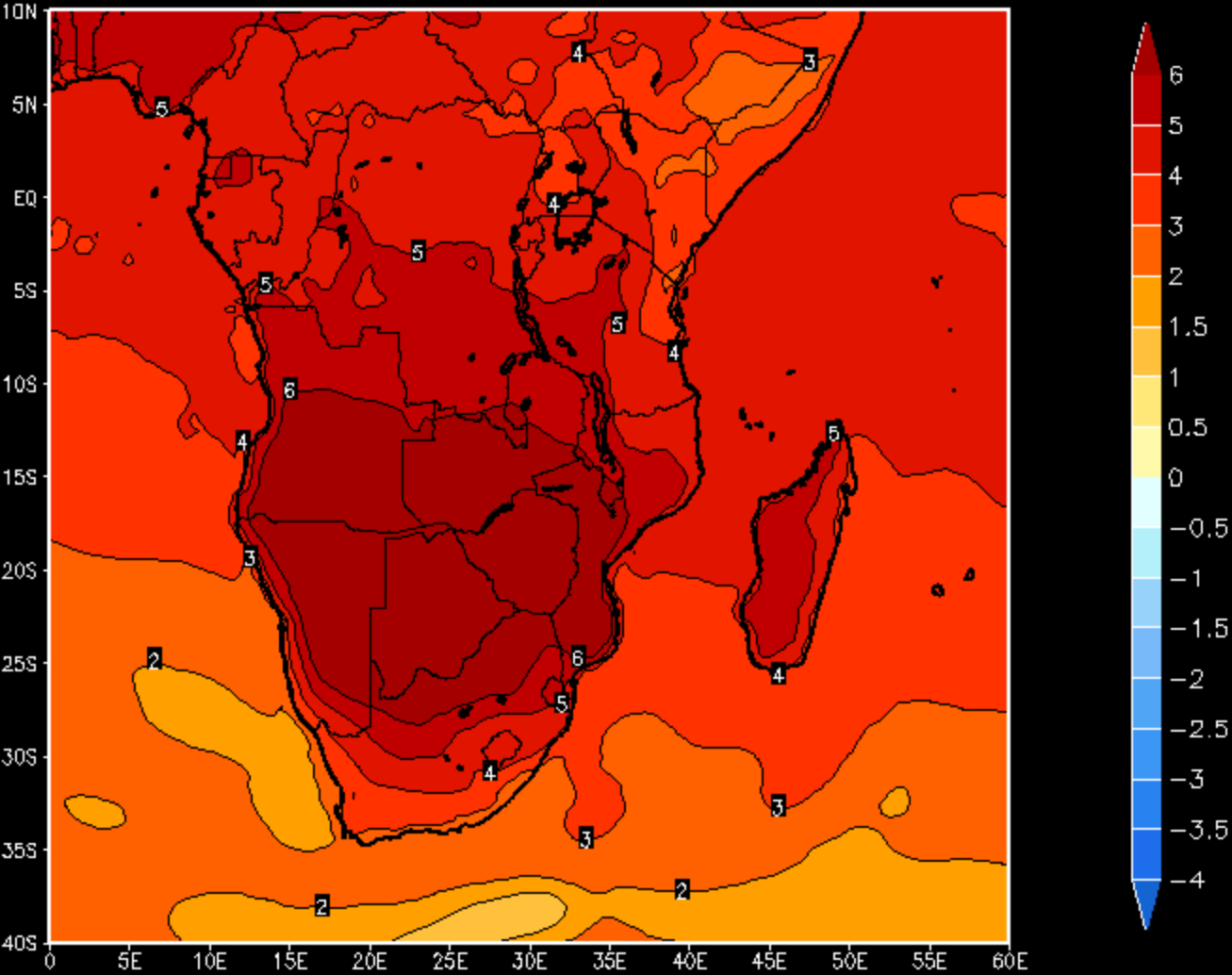
# Temp anomaly 2091



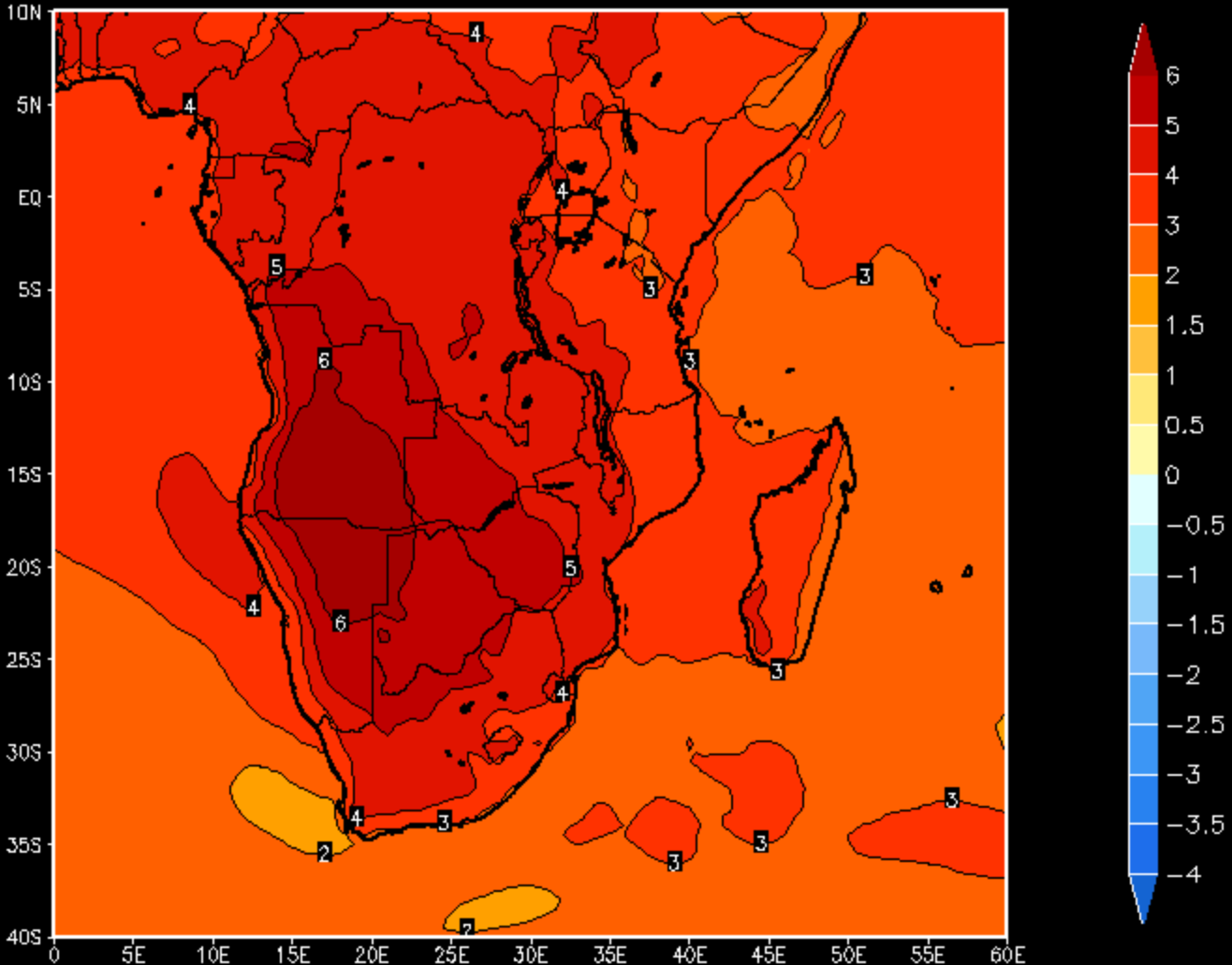
# Temp anomaly 2092



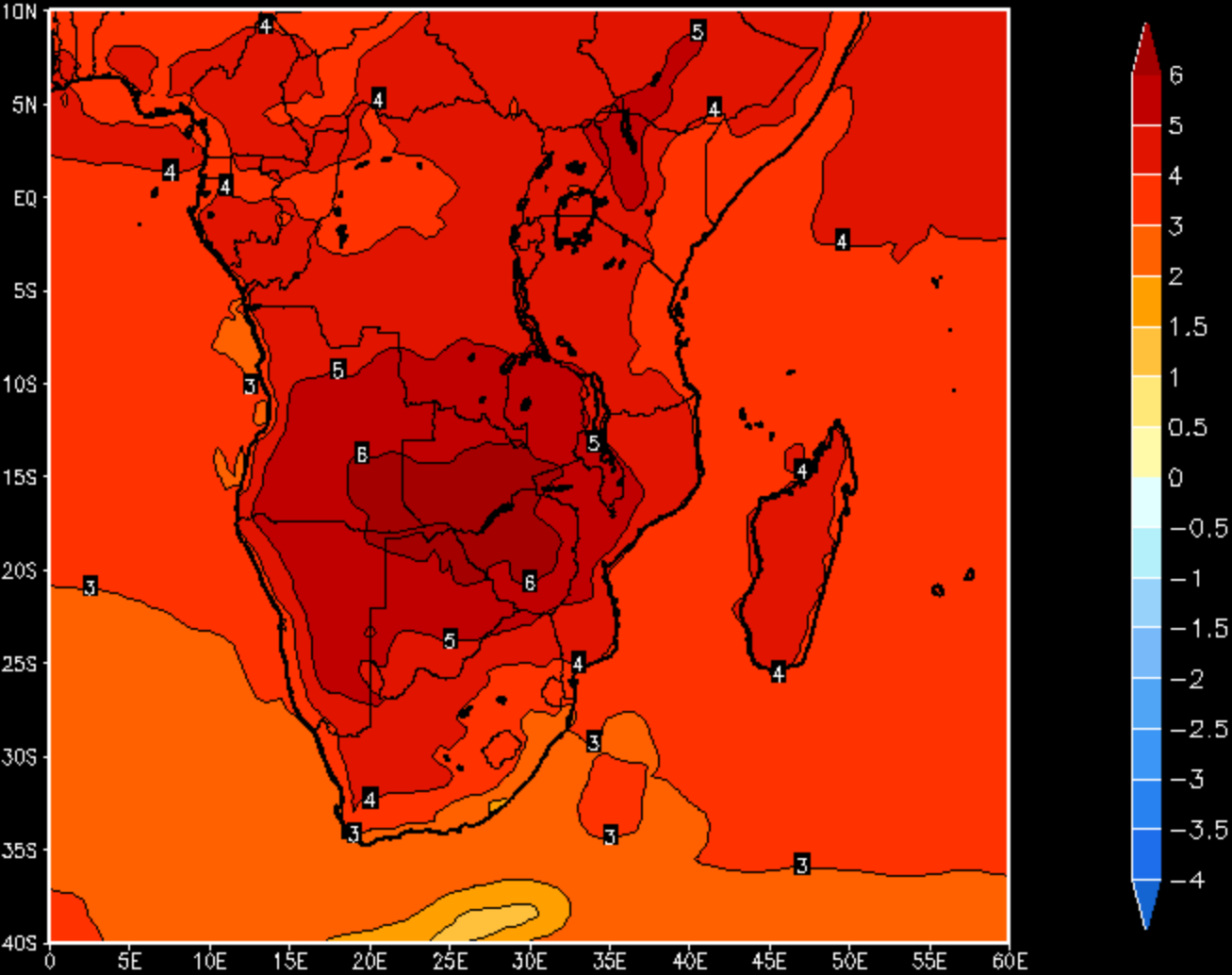
# Temp anomaly 2093



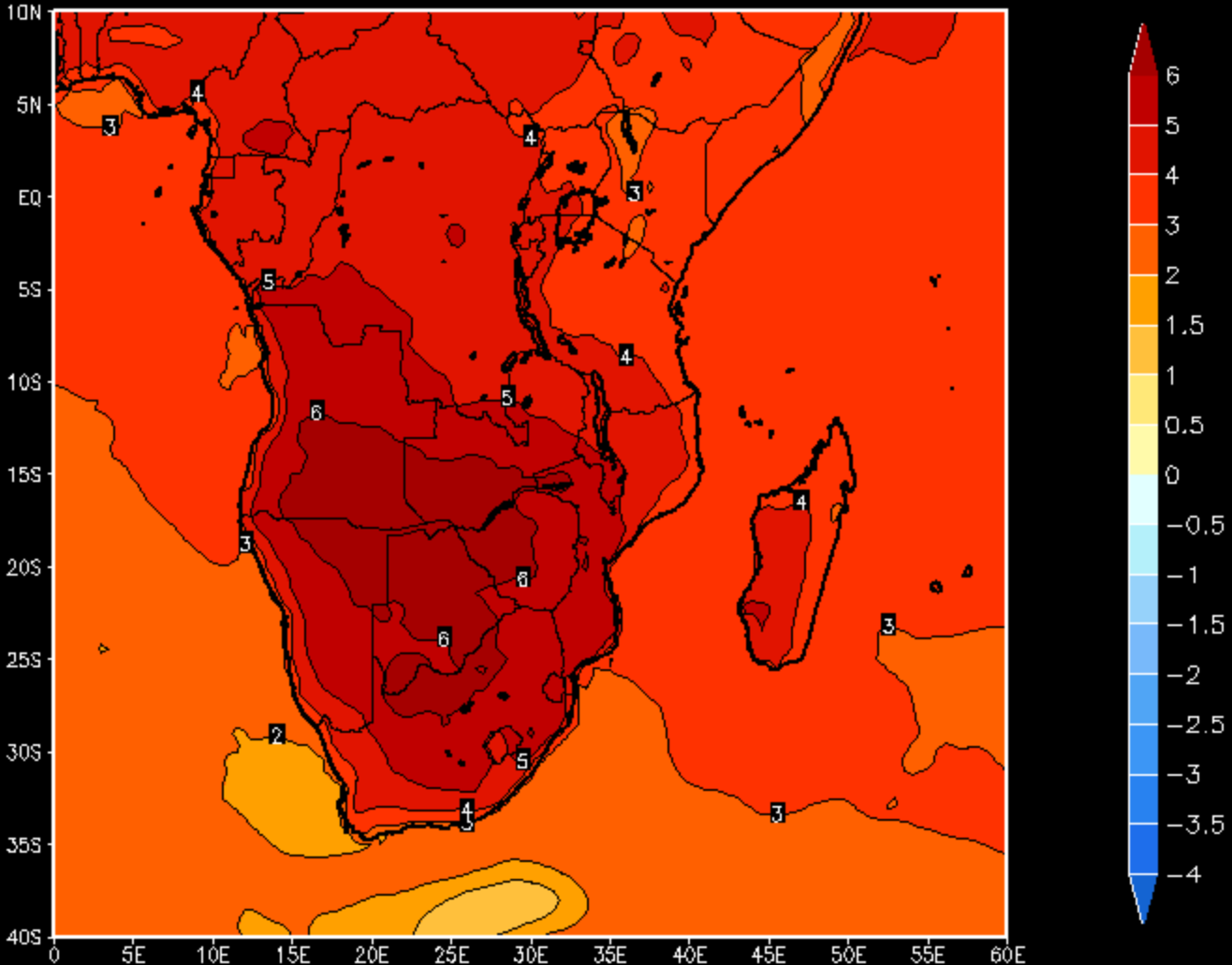
# Temp anomaly 2094



# Temp anomaly 2095

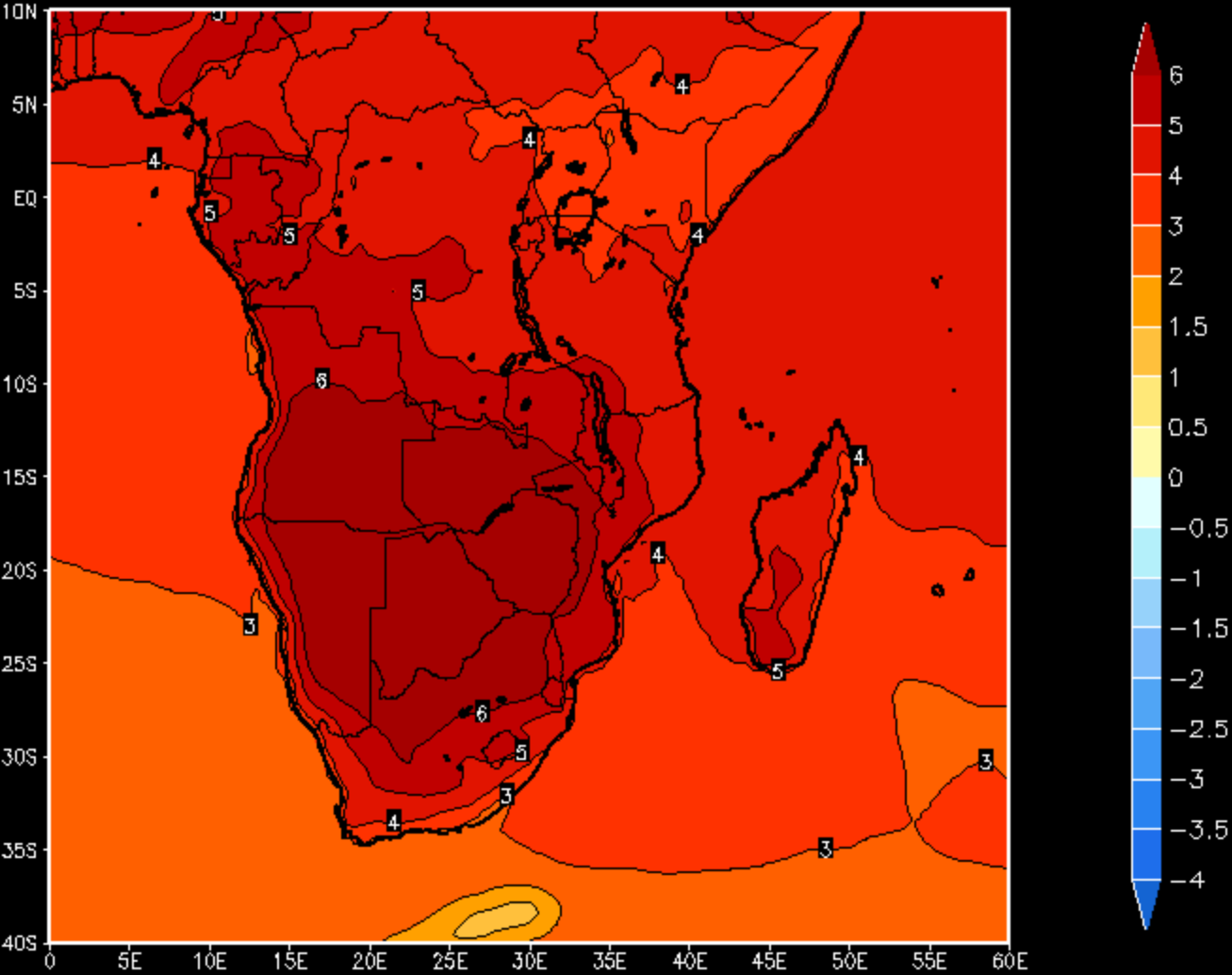


# Temp anomaly 2096

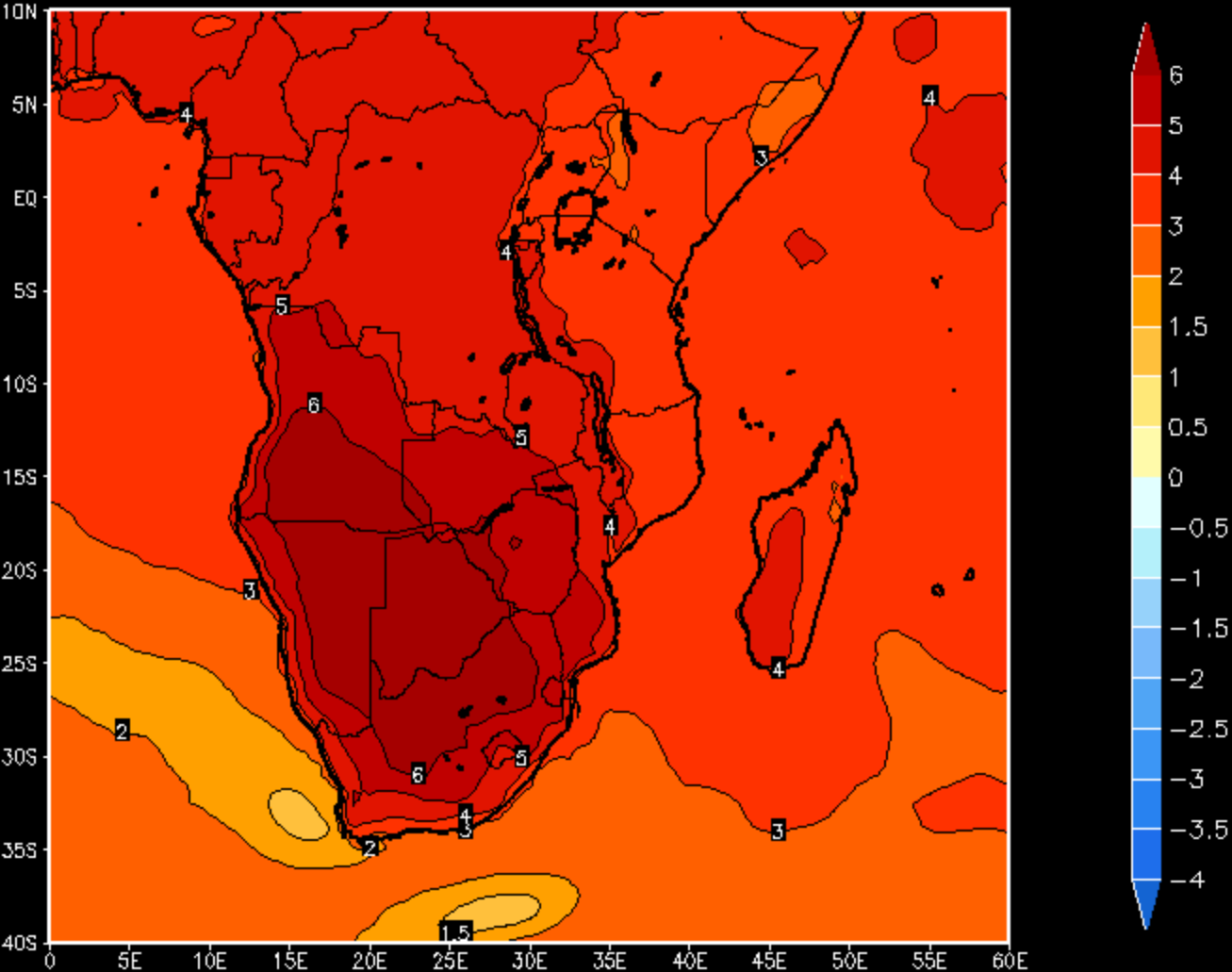




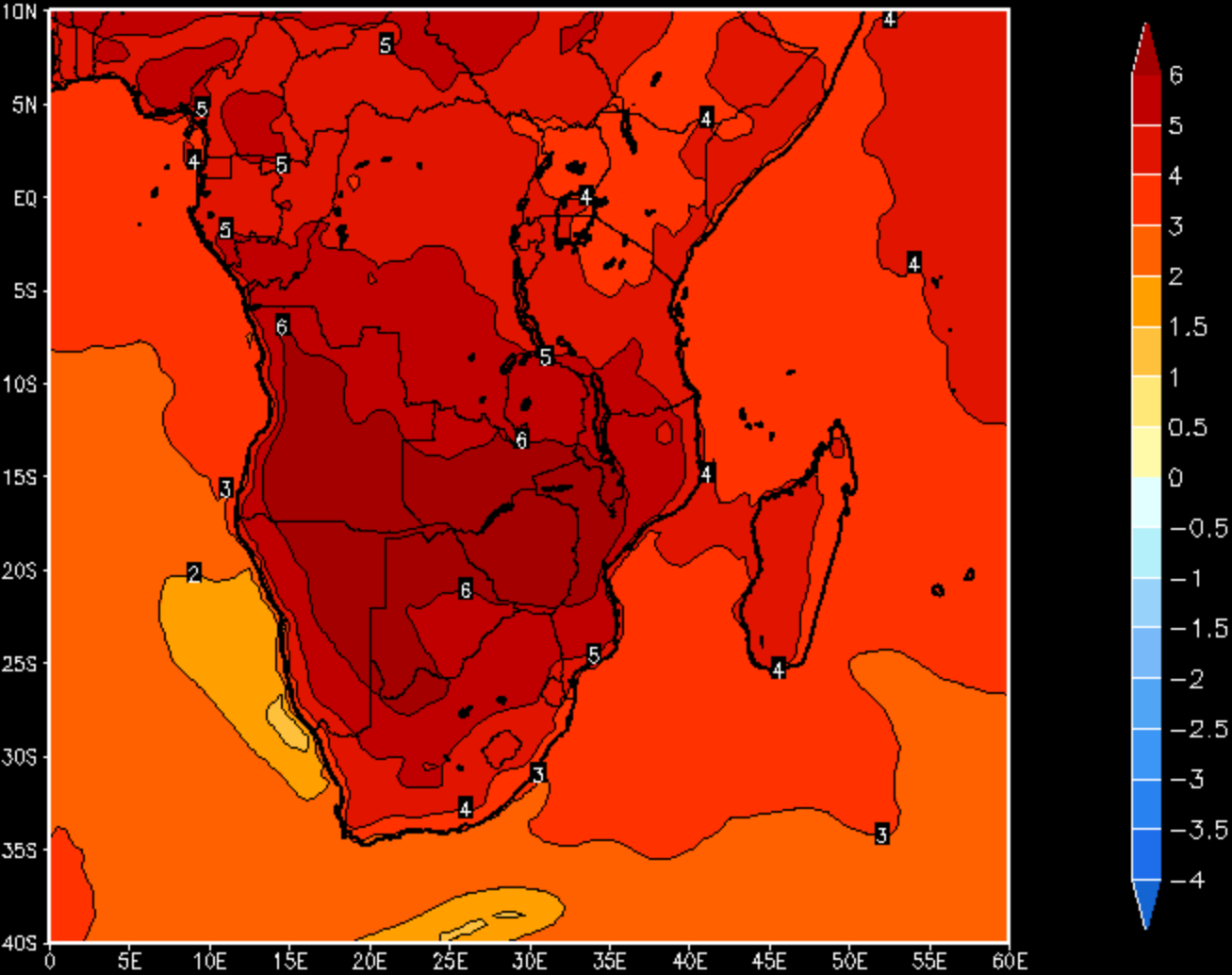
# Temp anomaly 2098



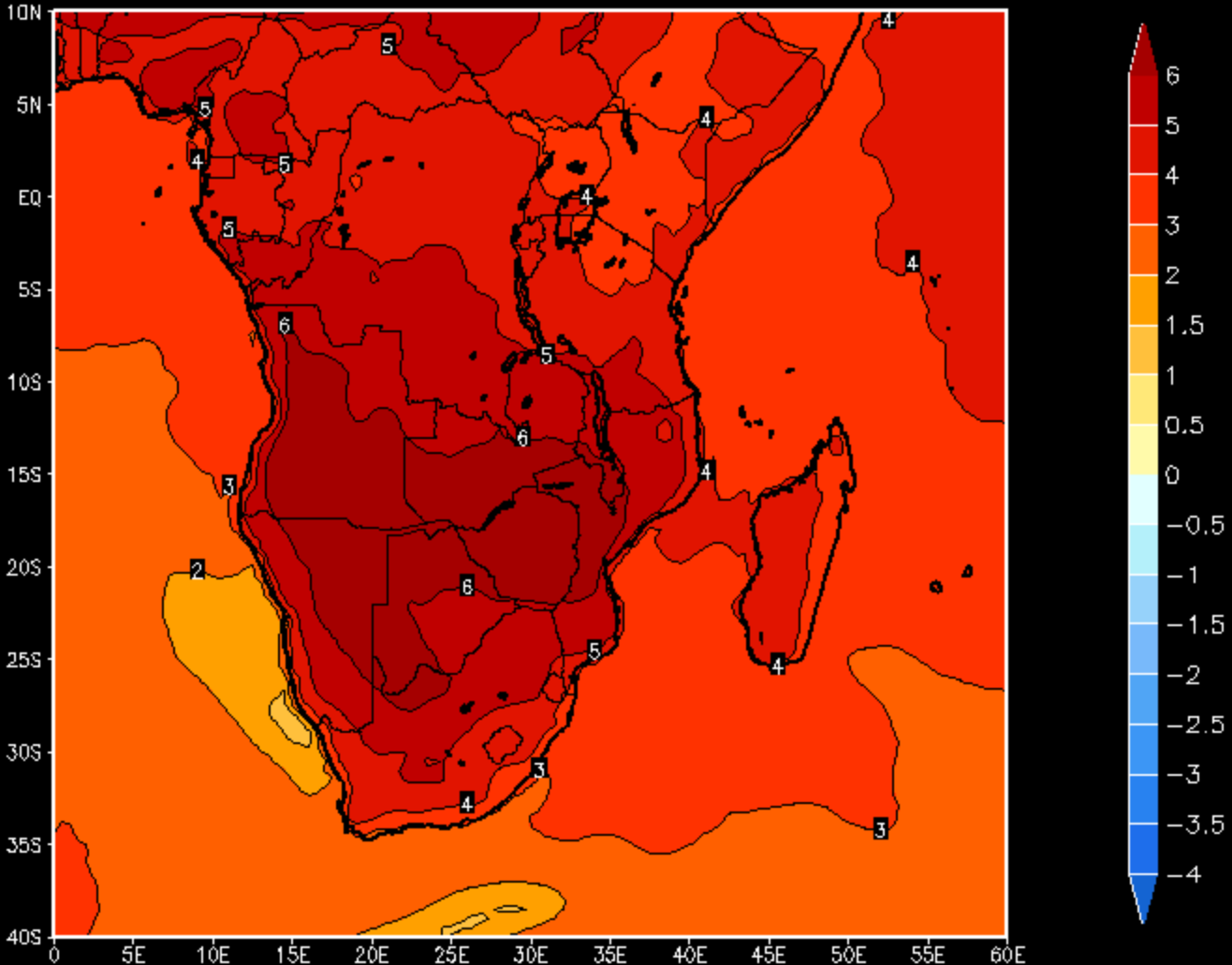
# Temp anomaly 2099



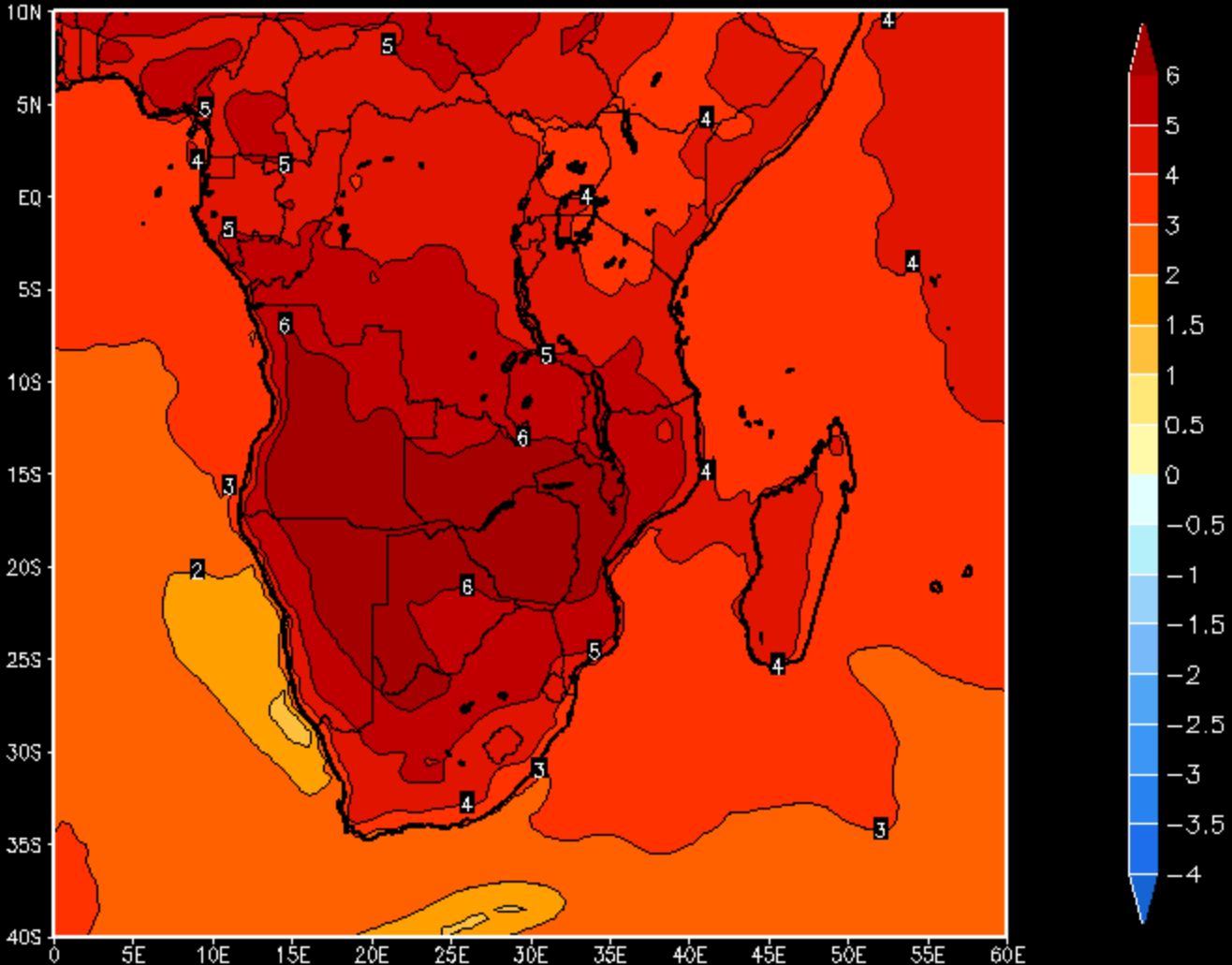
# Temp anomaly 2100



# Temp anomaly 2100



# Temp anomaly 2100



What does this all mean for southern Africa?



# What does this all mean for southern Africa?

- Biggest direct economic effects – roads!
- Livelihoods effects – local food security (dryland agriculture); human settlements
- Weather disasters – floods, drought, heat
- Water security, except in South Africa
- International land grabs for food security
- Health, pests and diseases?
- Ecosystems? Wildfire, bush encroachment, rivers and wetlands, human demands
- Coastal impacts – sea level, marine fisheries

# What does this all mean for southern Africa?

- Southern Africa needs development
- Southern African emissions tiny (excl. SA)
- High global emissions have adverse impacts
- SA – peak, plateau, decline, give us time
- Adaptation and development opportunities
- Mitigation and development opportunities
- Does climate change finally move us onto a sustainable development path?