

What does El Niño mean for South Africa this year and what to expect?

Seminar **El Niño**

19 November 2015; Johannesburg

By

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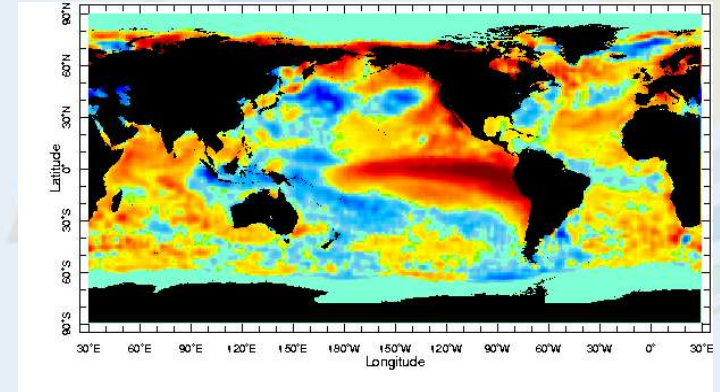
General Manager: Operations

South African Weather Service

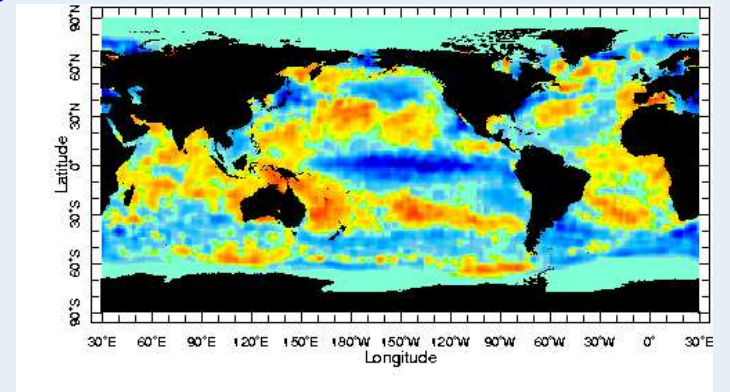
www.weathersa.co.za

Introduction

- El-Niño Southern Oscillation (ENSO) is one of the most important and universally dominant mode of climate variability.
- ENSO may lead to large-scale changes in sea-level pressures, sea-surface temperatures, precipitation and winds across many other regions of the world.



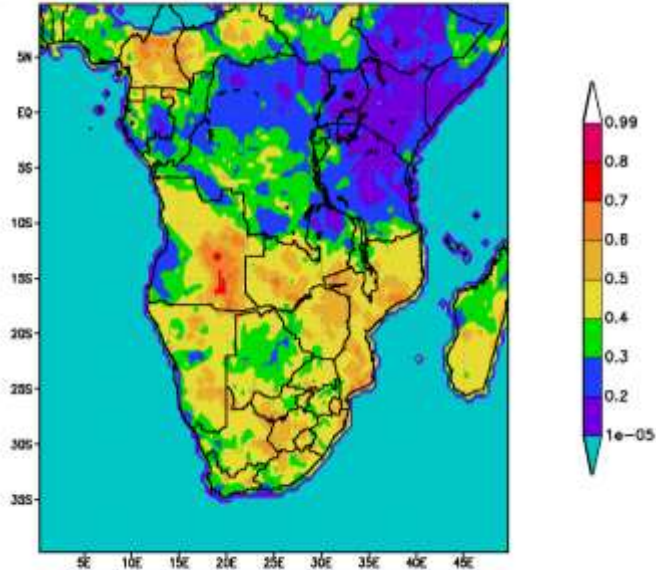
Sea-surface temperature (SST) anomalies of September 1997 (El Niño of 1997/98)



Sea-surface temperature (SST) anomalies of November 1988 (La Niña of 1988/89)

Introduction

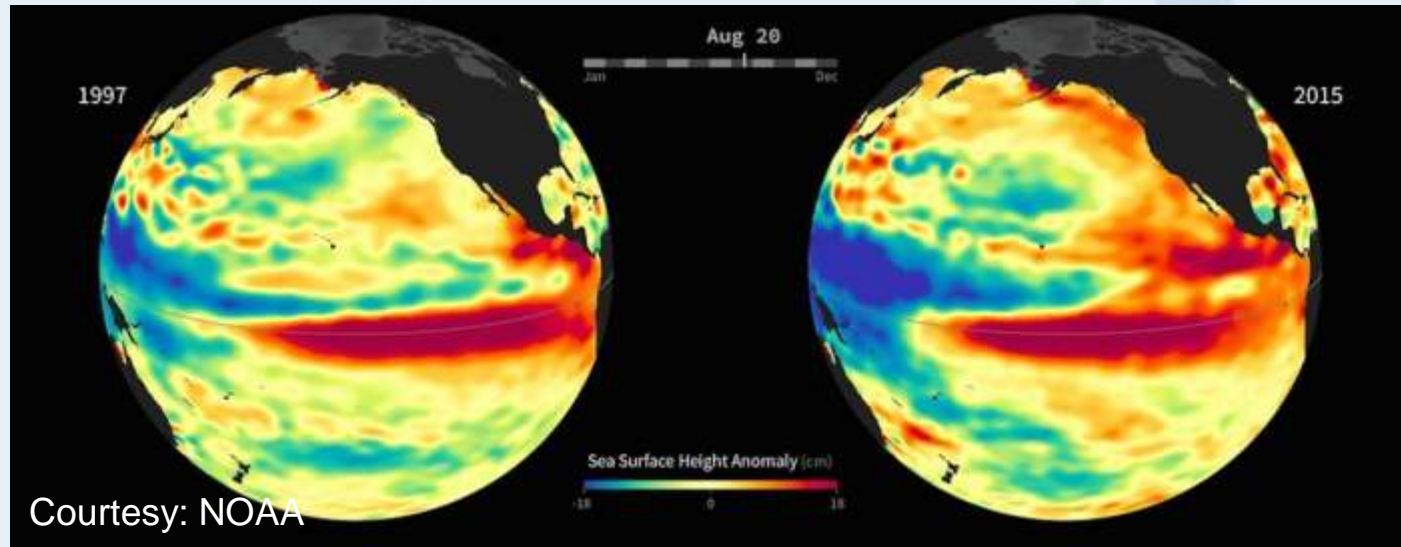
ENSO—El Niño (Below Normal Rainfall) DJF



- ENSO has long been known to have impacts on the seasonal-to-interannual rainfall variability of South Africa.
- For example, during most of the strongest El Niño events (e.g. 1982/83, 1991/92 and 2006/07) drought conditions occurred, while La Niña events caused excessive seasonal flooding (e.g. 1999/2000 and 2010/11).

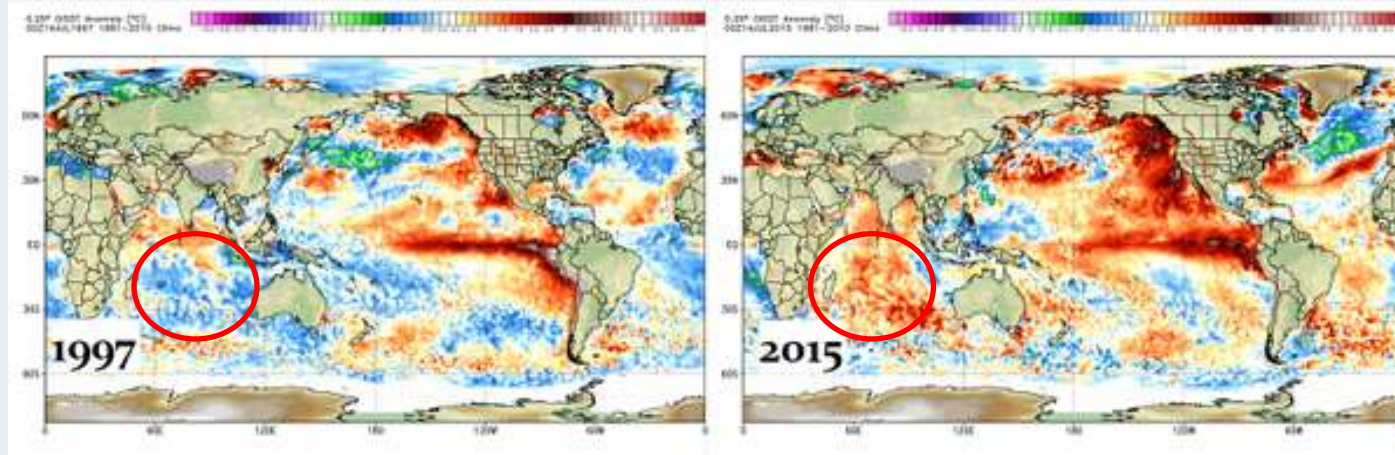
About 50%-60% of the time most part of South Africa receives below-normal rainfall during El Niño (based on historical observed analysis)

El Niño 2015 vs 1997?



- These two El Niño episodes are among the strongest in historical record (in the last 50yrs) in their ocean heat content
- Most drought in SA generally associated with El Niño episodes
- However, South Africa never experienced drought in 1997/98 as severe as in 2015/16 (i.e., not all droughts or Floods necessary explained by ENSO)
- Other modes of climate variability may also explain SA climate system such as the Southern Annular mode (SAM), India Ocean Dipole (IOD) which tend to reinforce or counteract the impact of El Niño on South Africa

El-Niño 2015 vs 1997?



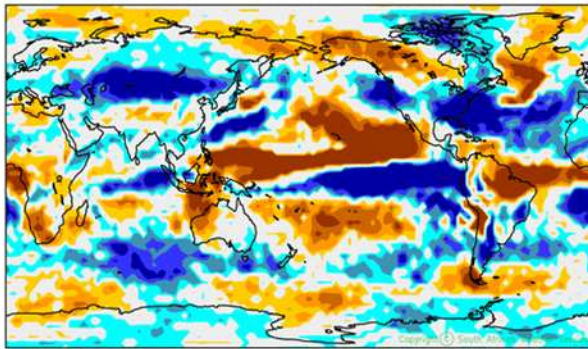
- However, in 1997/98 ocean-wide cooling while in 2015/16 ocean-wide warming over the Indian Ocean
- Warming of the ocean enhance convection rainfall over the ocean and subsidence over the sub-continent

Seasonal outlook 2015/16

SAWS OPERATIONAL ENSEMBLE PREDICTION SYSTEM

SCM Seasonal Forecasts
Most likely Category of Rainfall
Forecast Period: Dec 2015 – Feb 2016

No Significance Test Applied
Ensemble size 40
Last Updated: 20 Oct 2015

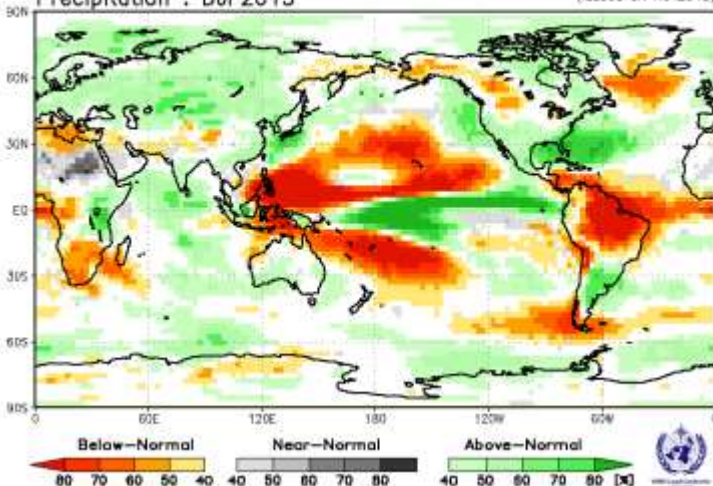


Probabilistic Multi-Model Ensemble Forecast

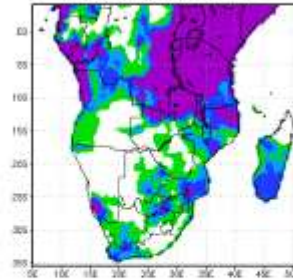
/GPC_seoul/GPC_washington/GPC_exeter/GPC_montreal_concm3/GPC_montreal_concm4/GPC_melbourne
/GPC_cptec/GPC_pretoria/GPC_melbourne

Precipitation : DJF2015

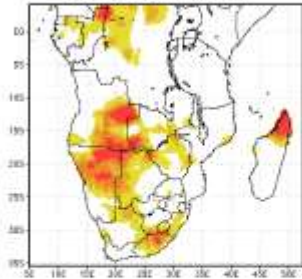
(issued on Nov2015)



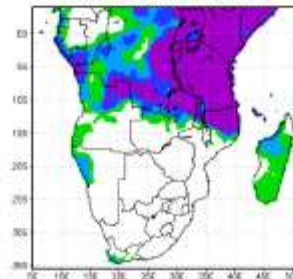
NOVEMBER-DECEMBER-JANUARY Above-Normal Rainfall



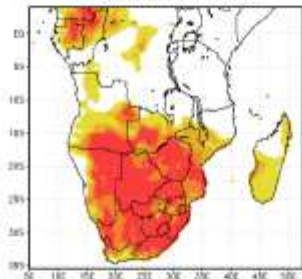
NOVEMBER-DECEMBER-JANUARY Below-Normal Rainfall



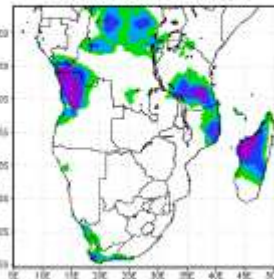
DECEMBER-JANUARY-FEBRUARY Above-Normal Rainfall



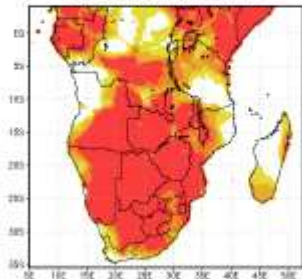
DECEMBER-JANUARY-FEBRUARY Below-Normal Rainfall



JANUARY-FEBRUARY-MARCH Above-Normal Rainfall



JANUARY-FEBRUARY-MARCH Below-Normal Rainfall



Climate Watch Advisory

<http://www.weathersa.co.za/media/data/longrange/gfcsa/scw.pdf>



Seasonal Climate Watch September 2015 to January 2016

Date: Aug 21, 2015

1. Advisory

Most models are showing the strengthening of an El-Niño episode towards the spring season with the expectation to continue throughout the summer season. The forecasting system indicates enhanced probabilities for well above normal rainfall conditions over the north-eastern parts of the country during spring. **However, going towards the summer season there are certain indicators which may promote chances for extreme dry conditions over most parts of the country. The likelihood of extreme warmer temperatures over most of South Africa is high.** Other international forecasting systems also indicate a tendency of drier and warmer conditions for South Africa toward the summer season.

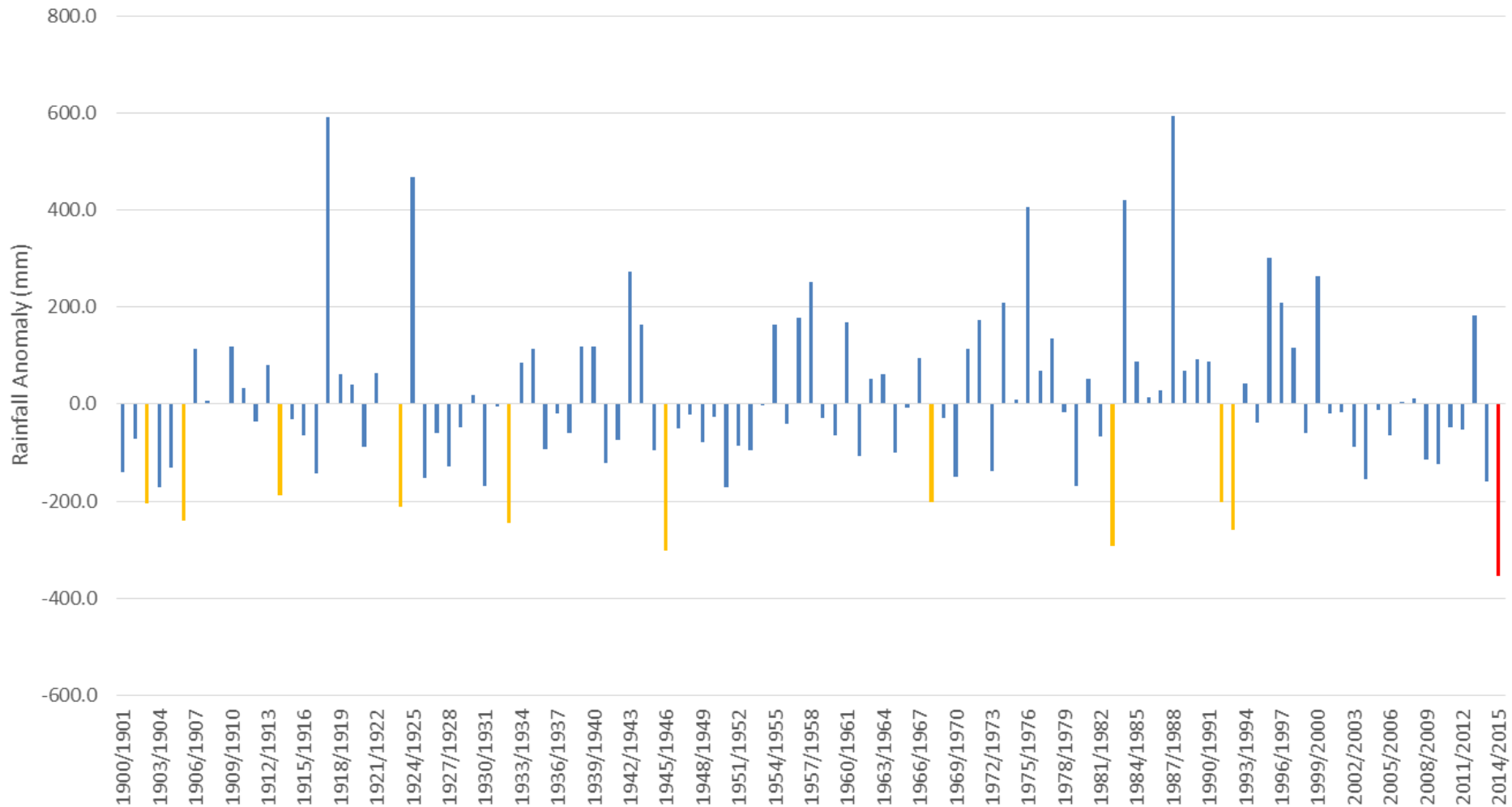
2. Recommendation

The likelihood of the country experiencing drier and warmer conditions toward the summer season is cautiously high. **The condition may promote a regional or localized drought.** It is highly recommended that medium- and shorter-range weather forecasts be monitored for



Mean seasonal rainfall anomaly (mm) for KwaZulu-Natal (Jul 1900 - Jun 2015)

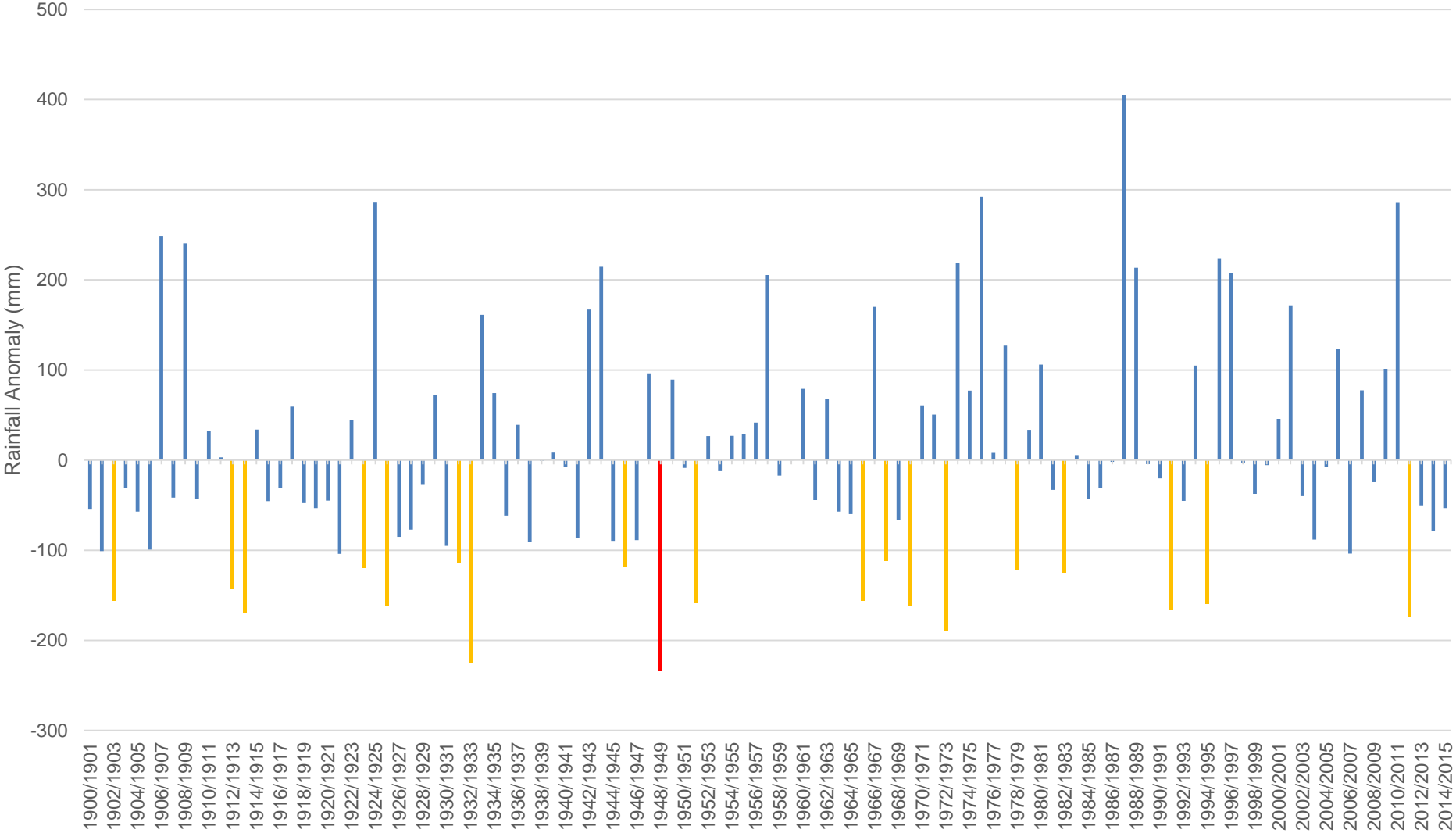
[Drought years (<80% of normal) are indicated in orange]



Mean seasonal rainfall anomaly (mm) for the Free State

(Jul 1900 - Jun 2015)

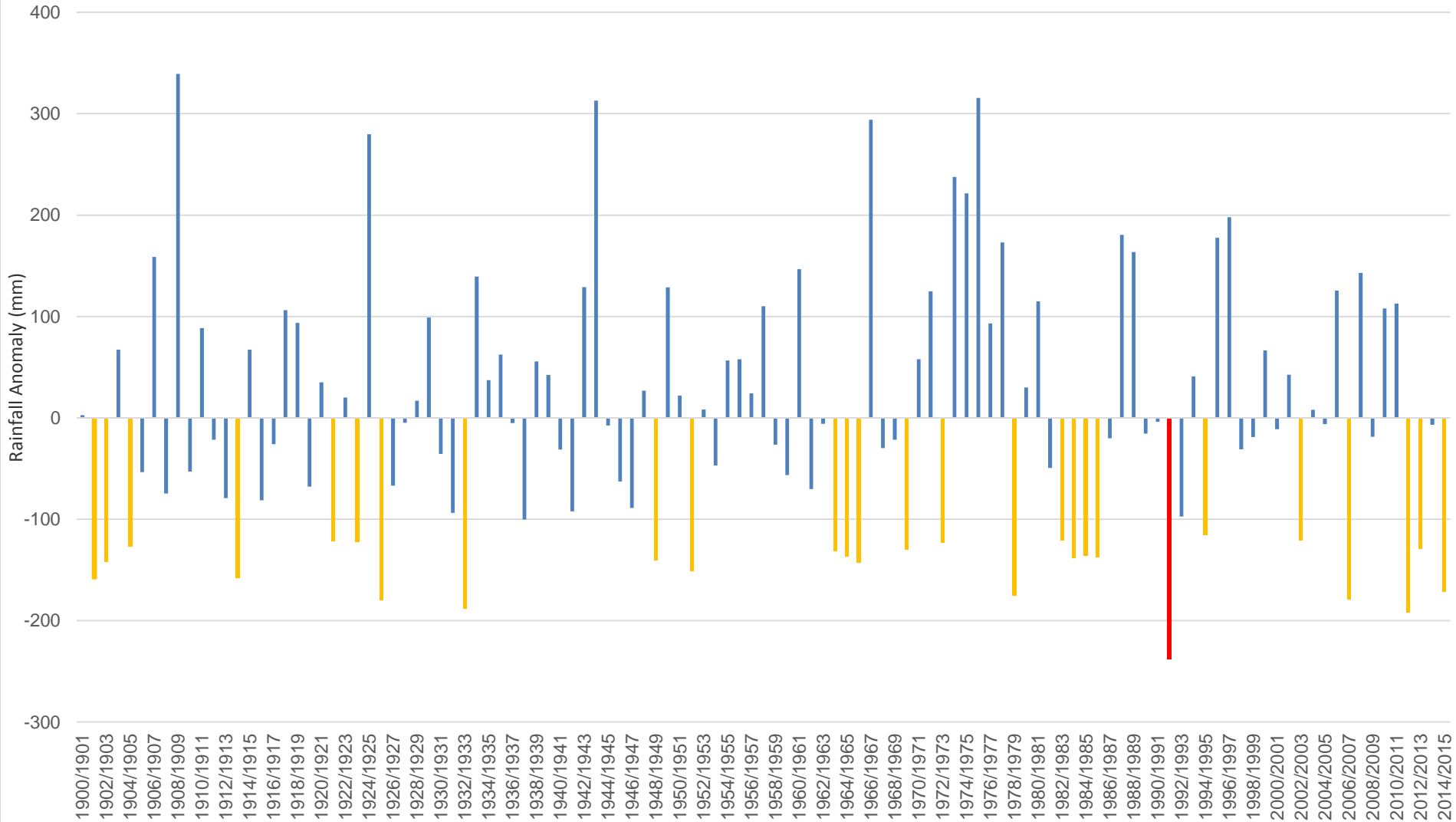
[Drought years (<80% of normal) are indicated in orange]



Mean seasonal rainfall anomaly (mm) for North West

(Jul 1900 - Jun 2015)

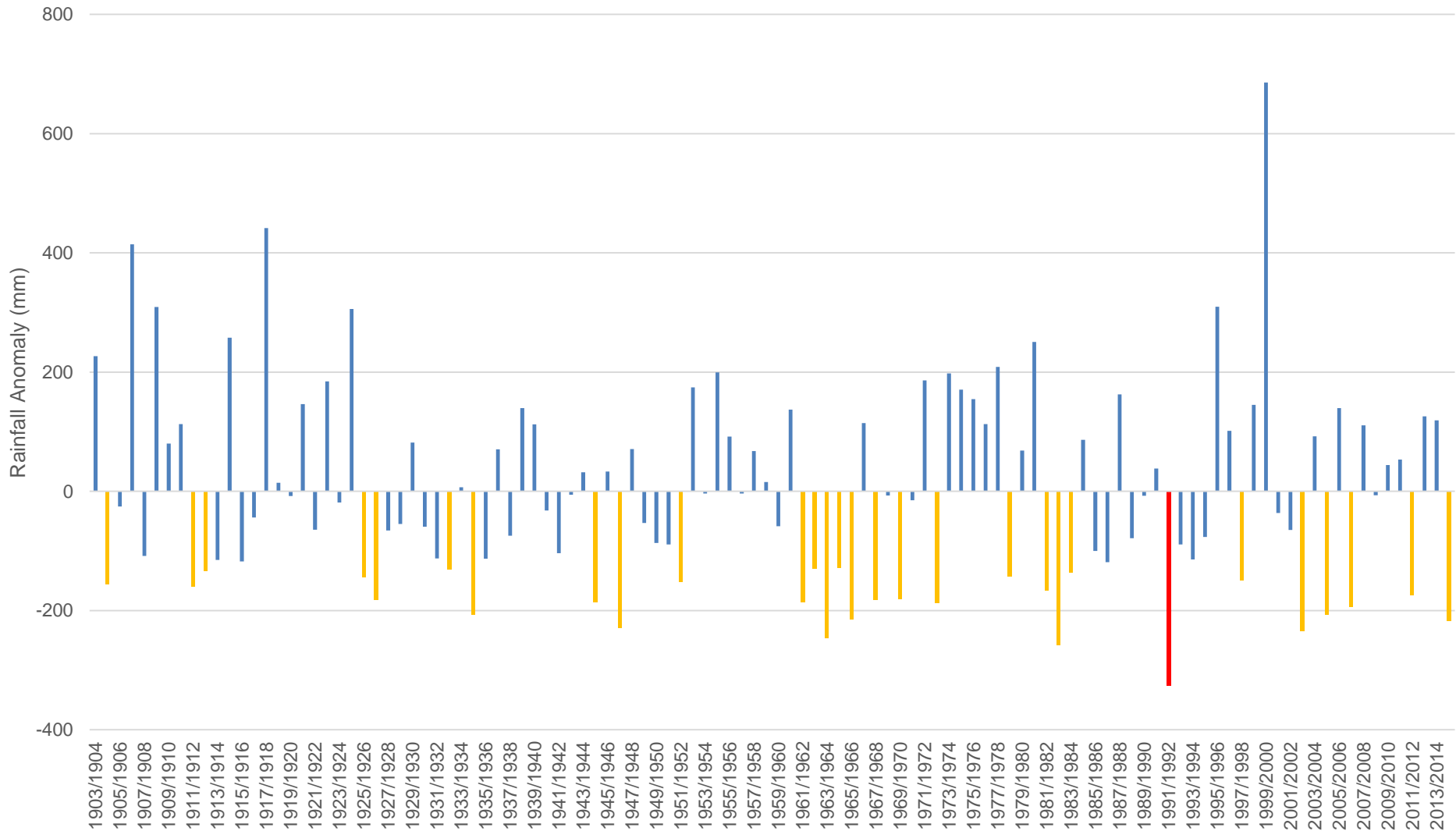
[Drought years (<80% of normal) are indicated in orange]



Mean seasonal rainfall anomaly (mm) for the Limpopo Province

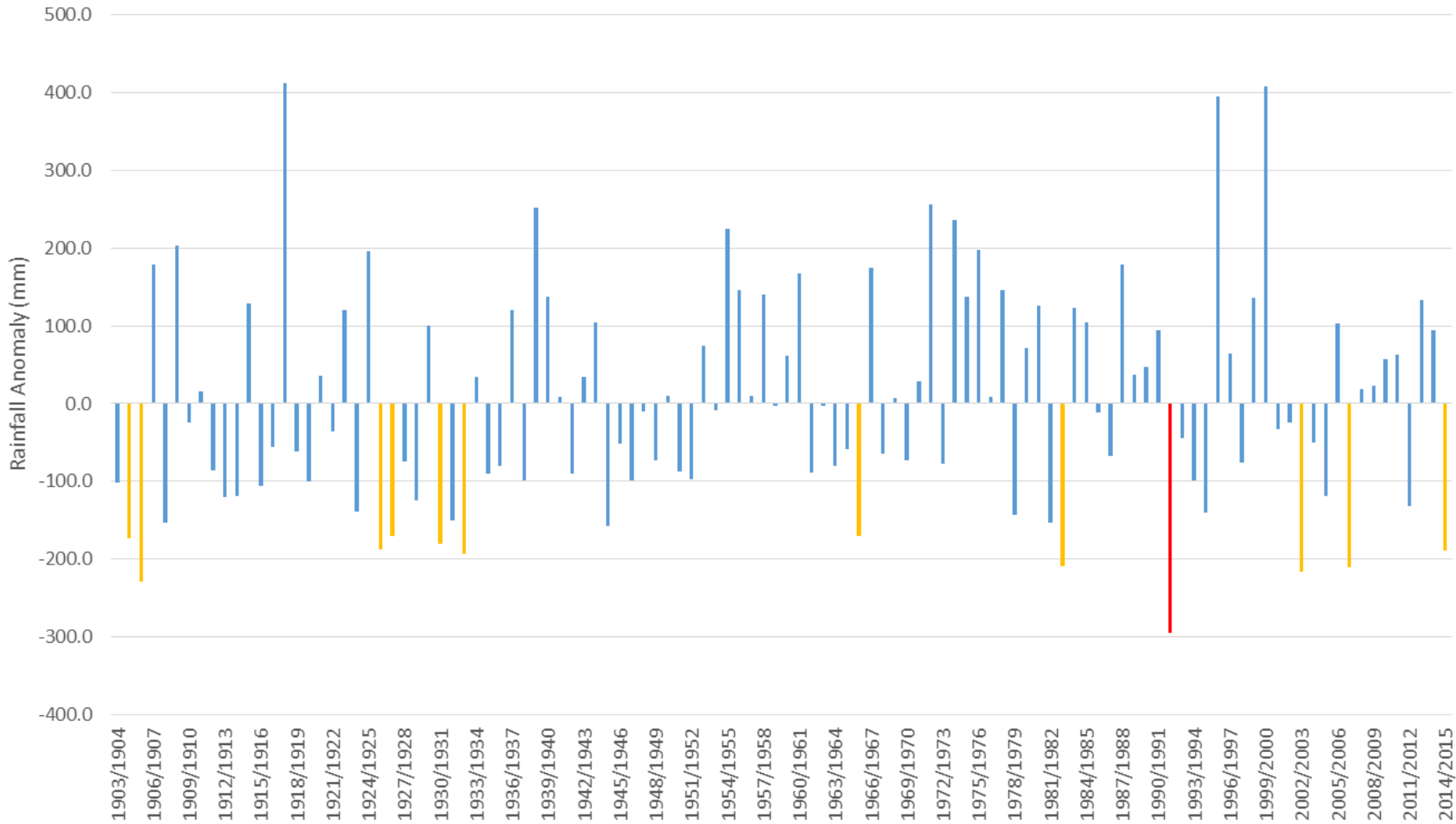
(Jul 1903 - Jun 2014)

[Drought years (<80% of normal) are indicated in orange]



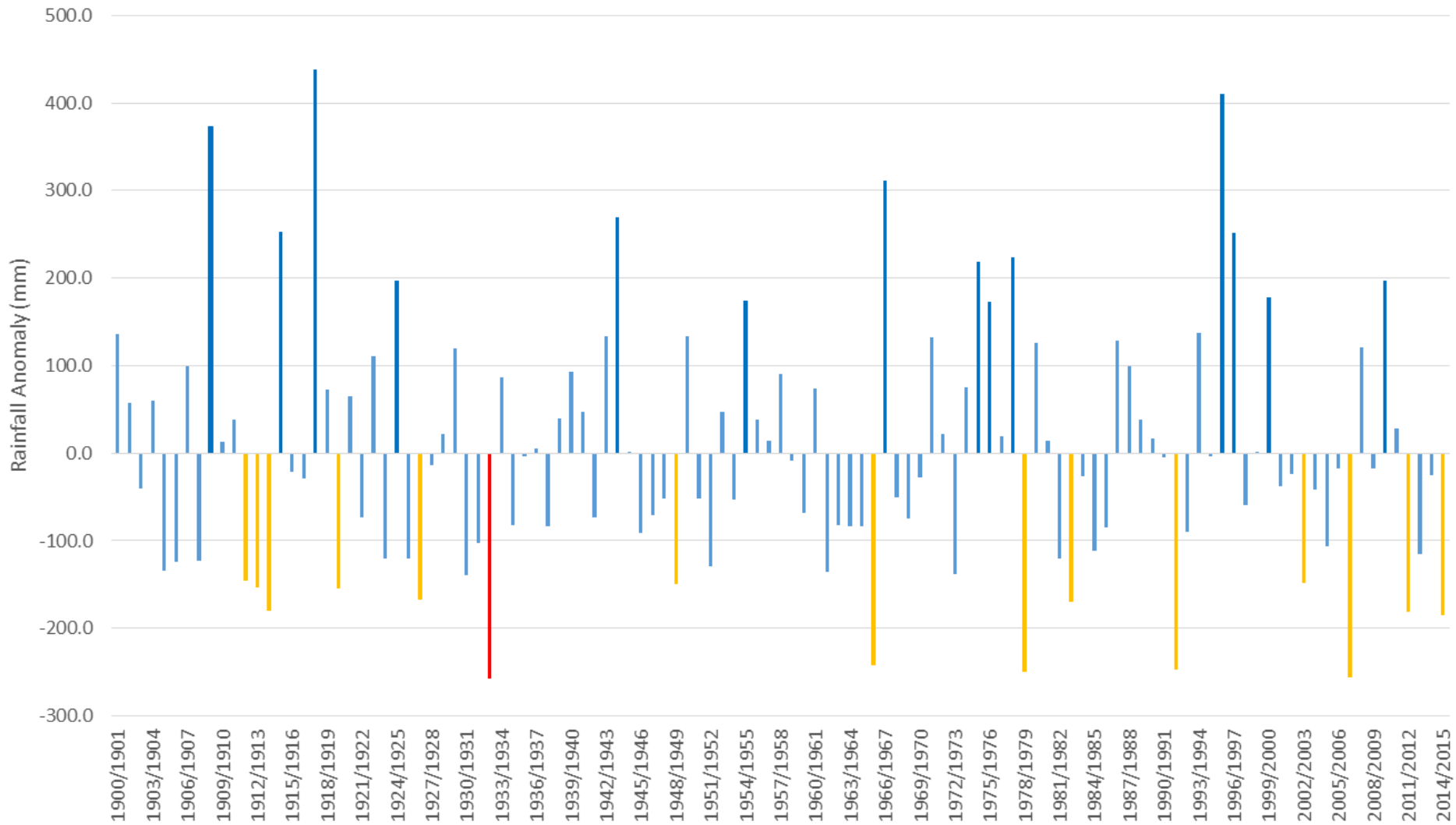
Mean seasonal rainfall anomaly (mm) for Mpumalanga (Jul 1903 - Jun 2015)

[Drought years (<80% of normal) are indicated in orange]



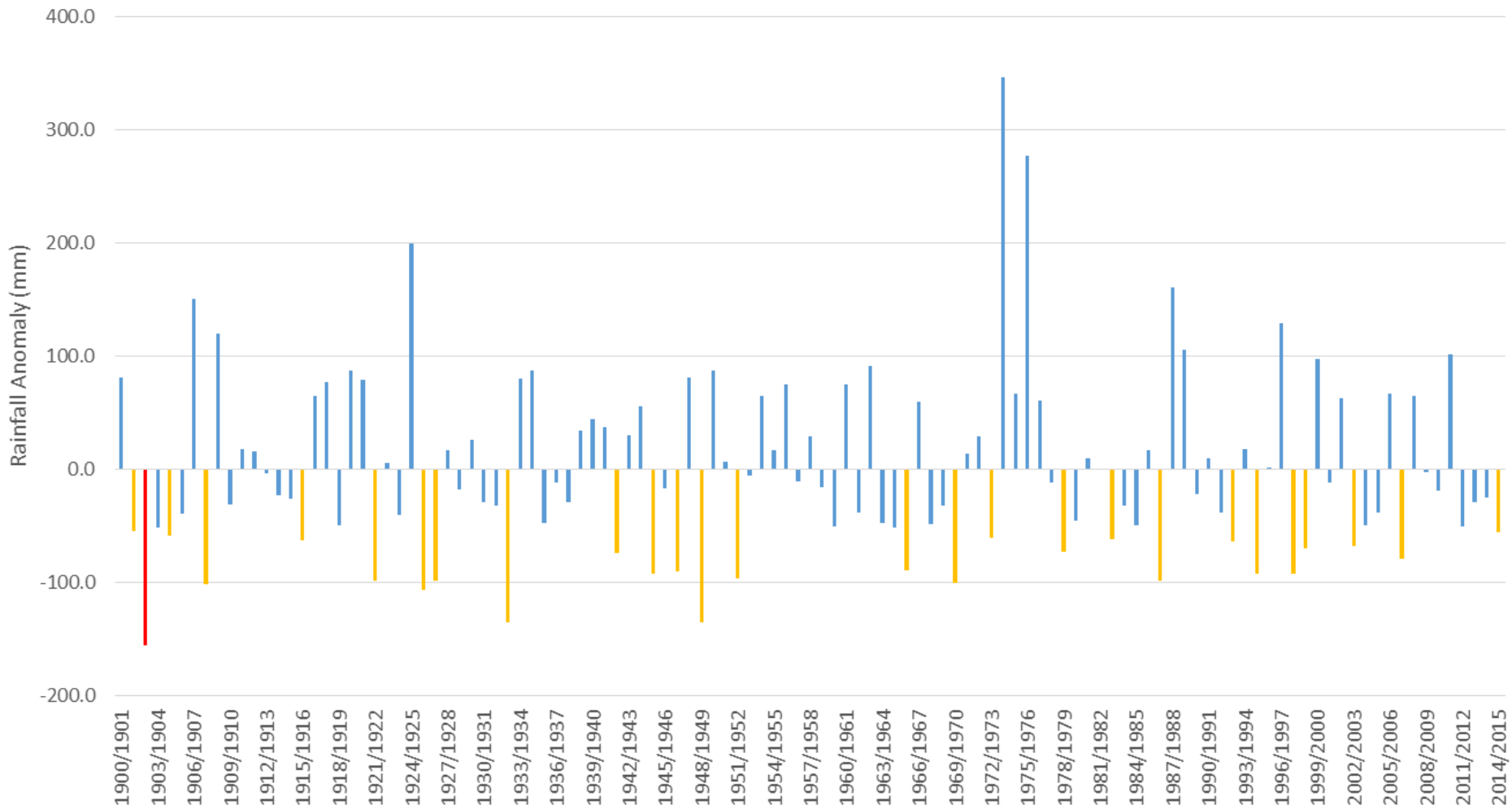
Mean seasonal rainfall anomaly (mm) for Gauteng (Jul 1900 - Jun 2015)

[Drought years (<80% of normal) are indicated in orange]



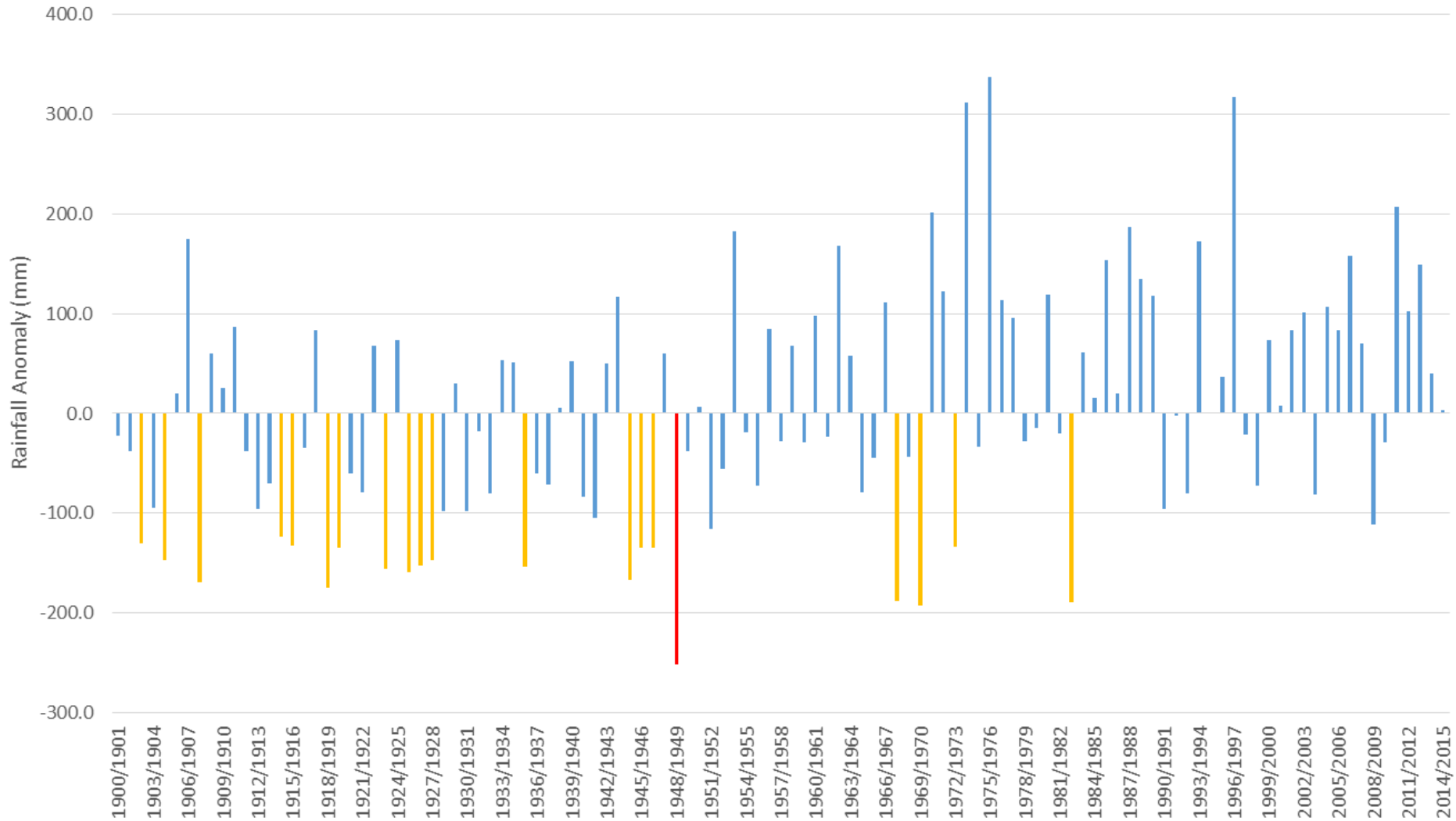
Mean seasonal rainfall anomaly (mm) for the Northern Cape (Jul 1900 - Jun 2015)

[Drought years (<80% of normal) are indicated in orange]



Mean seasonal rainfall anomaly (mm) for the Eastern Cape (Jul 1900 - Jun 2015)

[Drought years (<80% of normal) are indicated in orange]

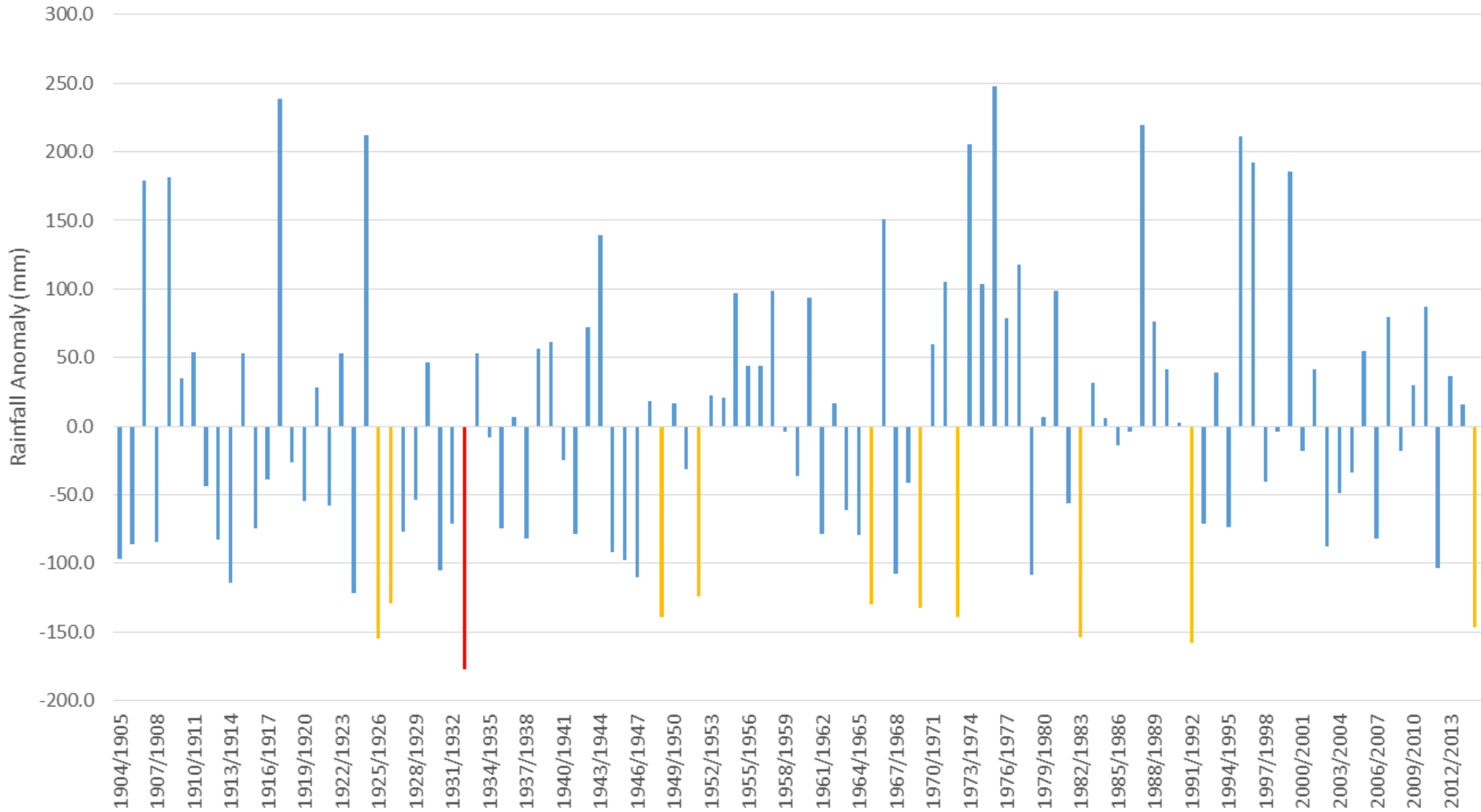


Mean seasonal rainfall anomaly for South Africa

Jul 1904/Jun 1905 to Jul 2014/Jun 2015

(based on South African provincial rainfall data)

[Drought years (<80% of normal) are indicated in orange]



What to Expect in South Africa and Southern Africa...

Ruacana-Namibia



Victoria falls-Zimbabwe



What to Expect in South Africa...

- **Below normal rainfall is predicted.**
 - **Above normal temperatures predicted**
- **Most Severe drought, which is already being experienced is during this El Nino Episode of 2015**
- **Possible Socio Economic impacts**

Direct drought induced socio-economic 'losses' include the following:

- Reduced crop, ranch land, and forest productivity,
- Increased fire hazards,
- Reduced dam water levels and therefore water shortages (water rationing/ cuts)
- Increased livestock, wildlife and fishery mortality rates,
- Power challenges in heavy industry sector,
- Increased insect infestations and plant diseases,
- Decline in agricultural yield and agro-dependent industries,
- Increased unemployment in the agricultural sector and all drought- affected industries,
- Strain on financial institutions (capital shortfalls, credit risks, lesser agricultural sector loans and repayment challenges),
- Loss of revenue to the state and local governments (from reduced tax base),
- Increase in basic commodity and food prices
- Lowered living standards especially for subsistence farming communities

Who is most likely to suffer the most?

Drought effects will be felt by:

- Municipalities, Business Community, Agricultural enterprises,
- Households and Individuals,
- Government (at National, Regional and Local level).
- Everyone.....(you and me)

In South Africa, worst affected regions are:

- KwaZulu-Natal, the Free State, Limpopo, North West and the Northern Cape, where farmers growing white and yellow maize, soya beans and sunflower have already incurred major losses. We have already observed impacted livestock farming.

A report released by the UN's food and nutrition working group in September month found this drought – the country's worst since 1992 – had caused a decline in maize production that had already led to an increase in food prices of 6.4%.

Concluding Remarks

- El Niño 2015 and 1997 are strikingly similar
- The atmospheric response difference (**2015 being most severe drought**) in Southern Africa may be more explained by differences over the Indian Ocean.
- Prediction of the 2015 El Niño impact on our region is so far successful and is noted quite ahead of time (since August 2015).



Thank you !