



Climate change and regional tipping points in southern Africa

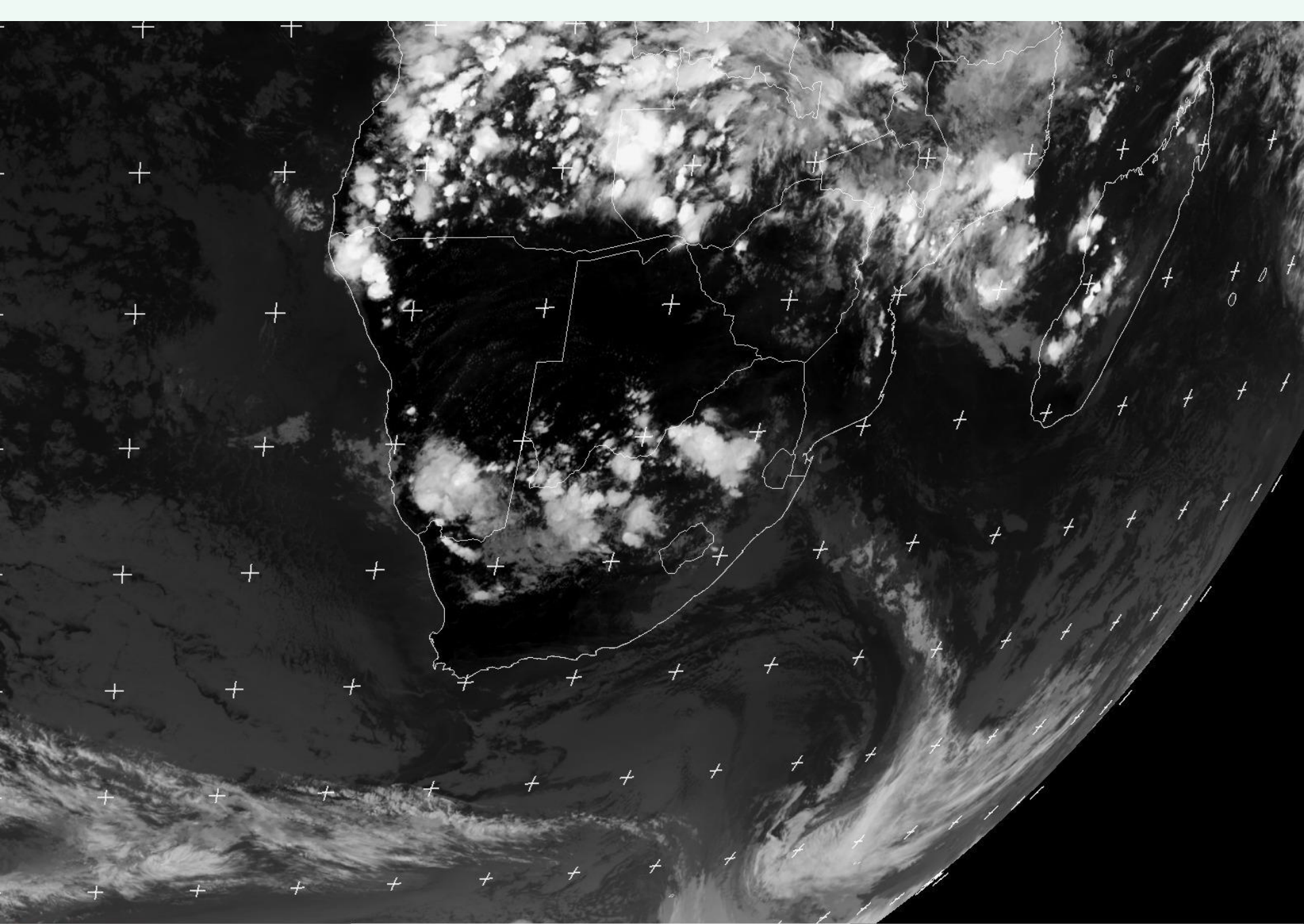
Francois Engelbrecht

Director and Professor of Climatology

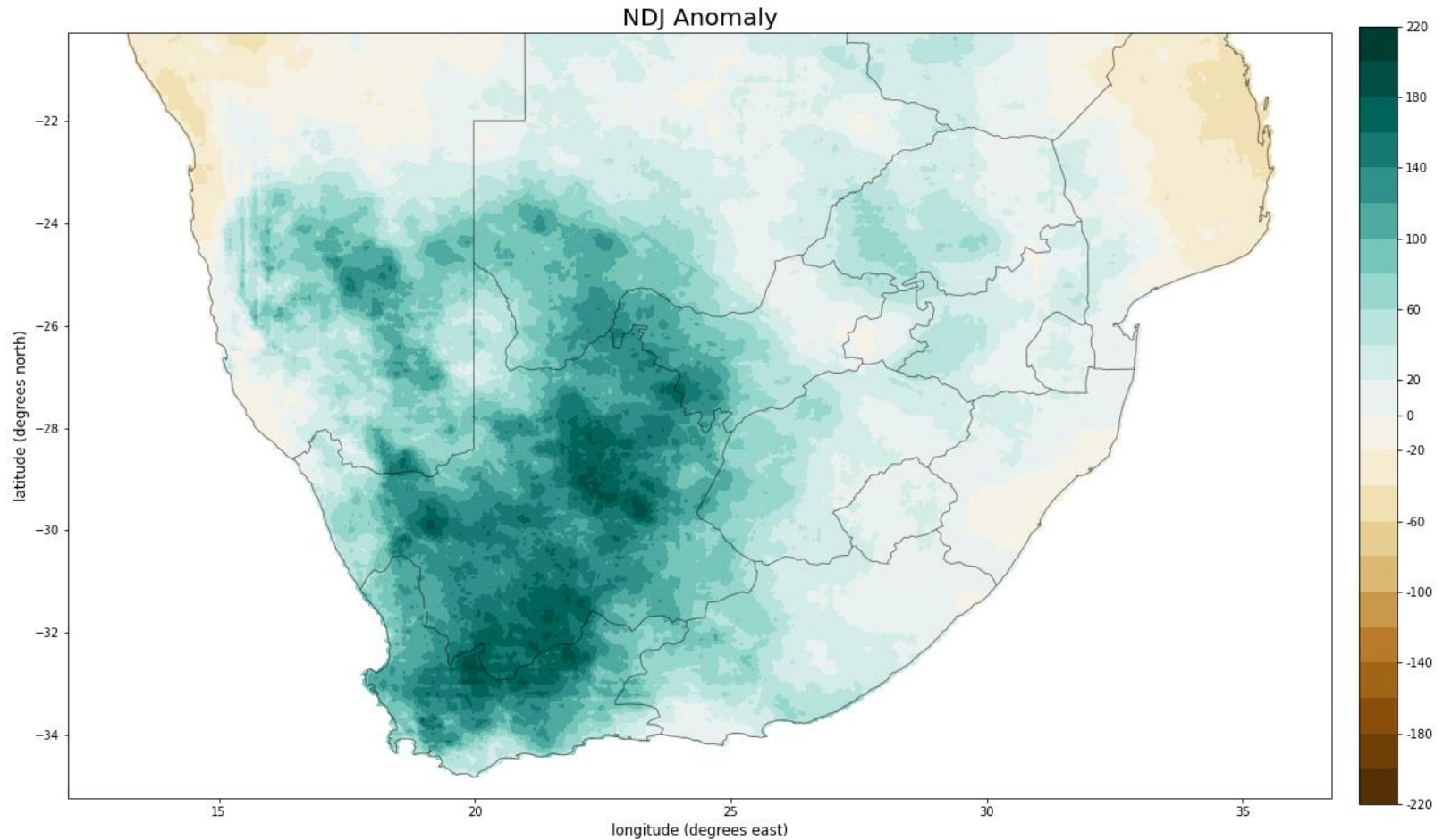
Global Change Institute

University of the Witwatersrand

Lead Author: IPCC AR6 WGI Report; IPCC SR1.5



South Africa's wet summer of 2021/2022



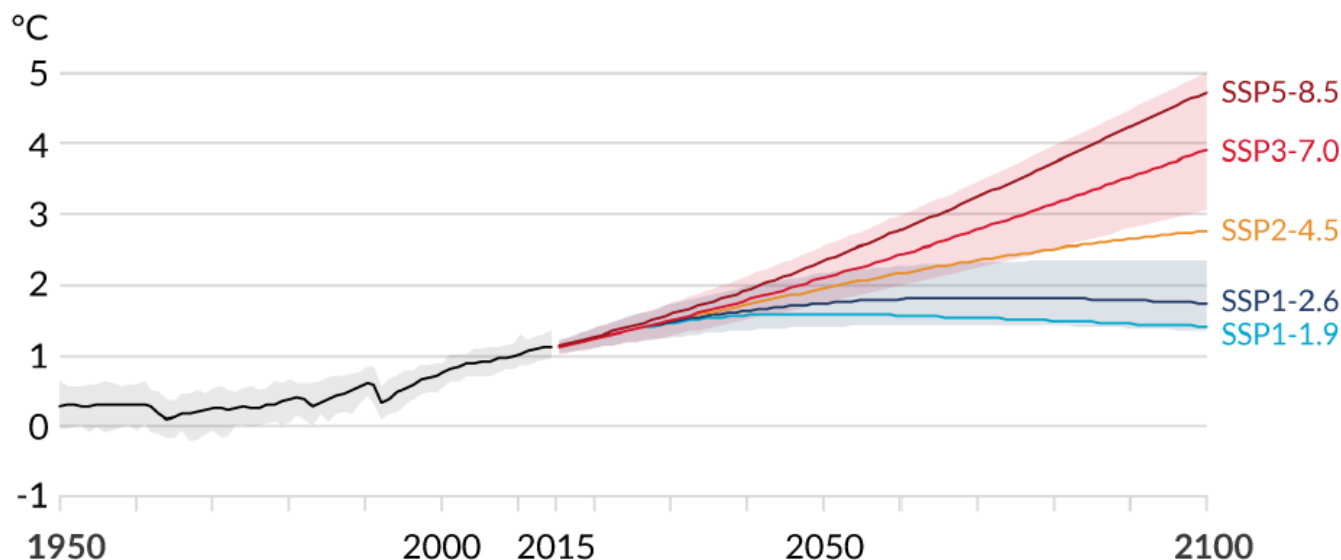
Analysis of CHIRPS satellite data, J. Steinkopf, Wits GCI



Human activities affect all the major climate system components, with some responding over decades and others over centuries

Figure SPM.8

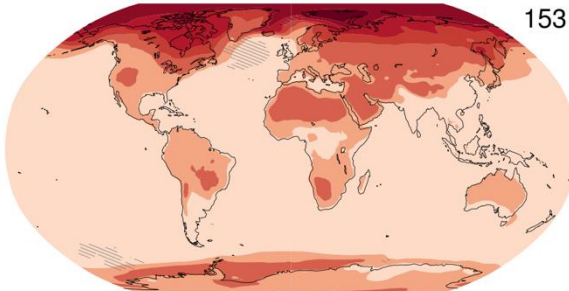
a) Global surface temperature change relative to 1850-1900



Under the five illustrative scenarios, in the near term (2021-2040), the 1.5° C global warming level is *very likely* to be exceeded under the very high GHG emissions scenario (SSP5-8.5), *likely* to be exceeded under the intermediate and high GHG emissions scenarios (SSP2-4.5 and SSP3-7.0), *more likely than not* to be exceeded under the low GHG emissions scenario (SSP1-2.6) and *more likely than not* to be reached under the very low GHG emissions scenario (SSP1-1.9).

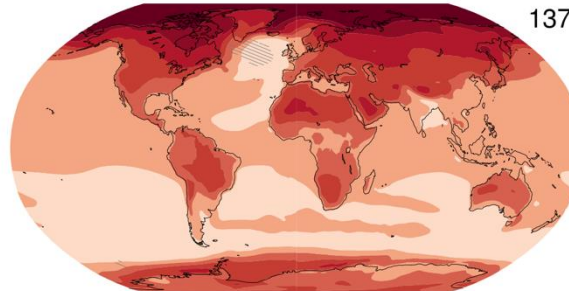


(a) Change at 1.5°C global warming



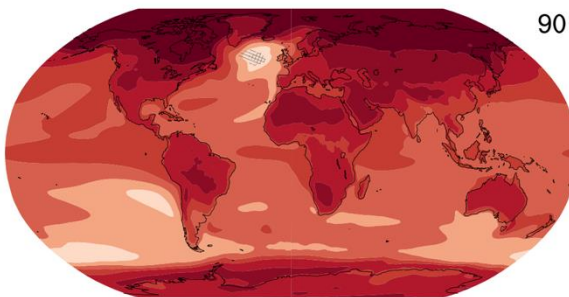
153

(b) Change at 2°C global warming



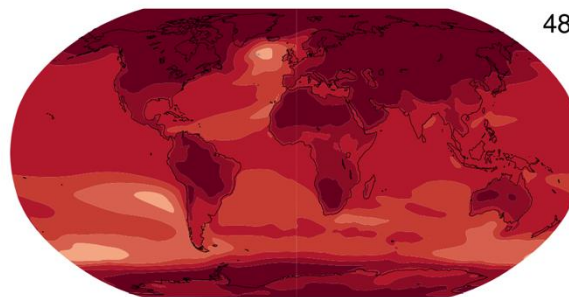
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(c) Change at 3°C global warming

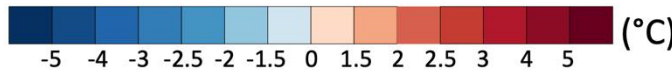


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(d) Change at 4°C global warming

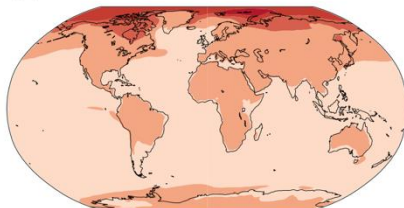


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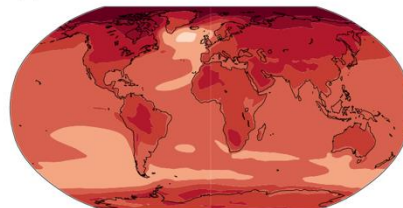


Color Robust significant change
 No or no robust significant change
 Conflicting signal

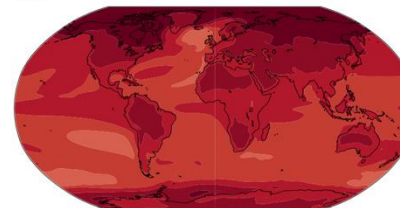
(e) Difference 2°C vs. 1.5°C



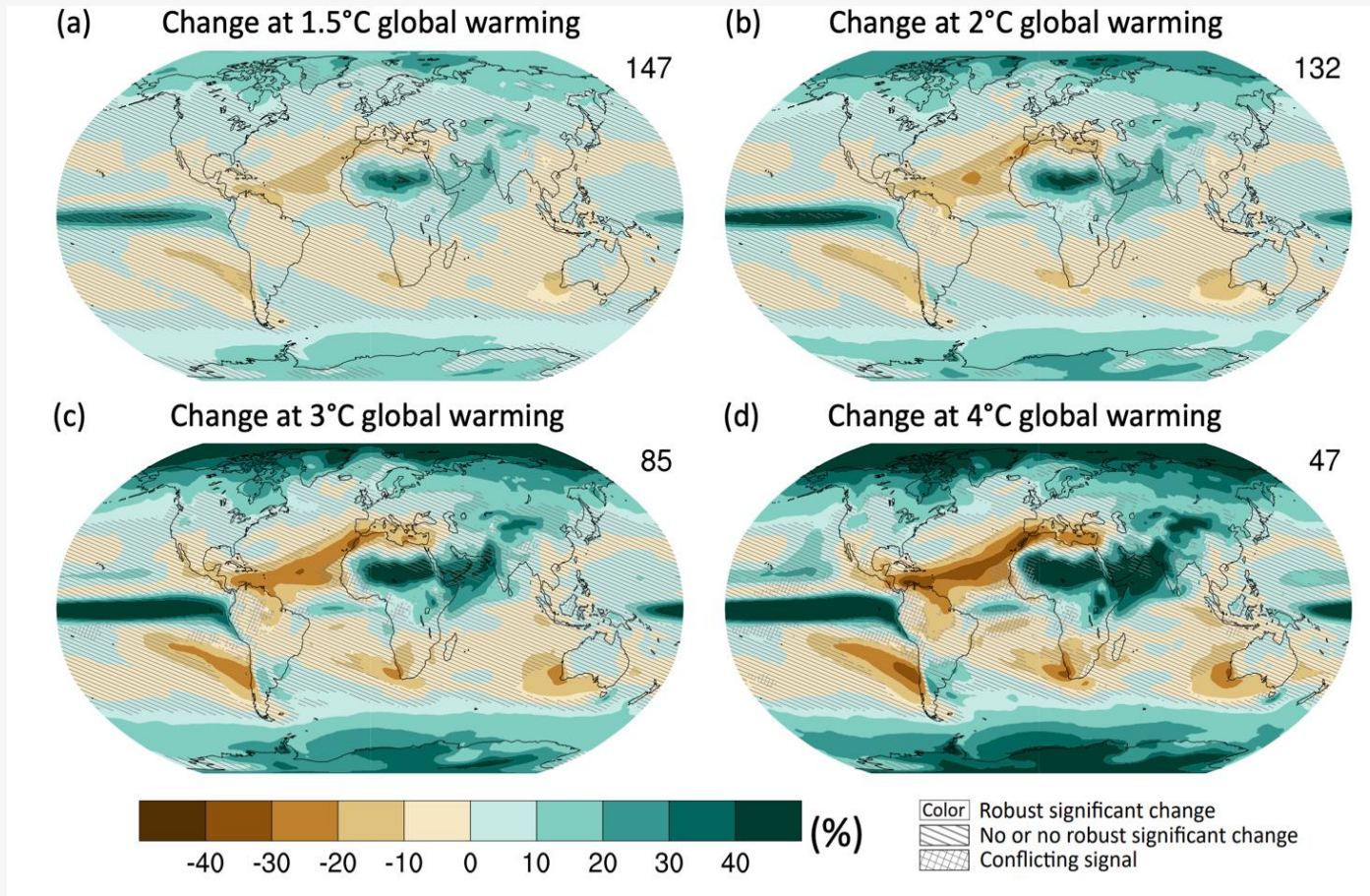
(f) Difference 3°C vs. 1.5°C



(g) Difference 4°C vs. 1.5°C



Projected spatial patterns of change in annual average near-surface temperature (°C) at different levels of global warming (Figure 4.31, Chapter 4, AR6).



Projected spatial patterns of change in annual average precipitation (expressed as a percentage change) at different levels of global warming (Figure 4.32. Chapter 4, AR6 WGI report.

Climate change in southern Africa: key messages from the IPCC AR6

- Southern Africa is certain to become drastically warmer.
- Southern Africa is likely to become generally drier.
- More extreme rainfall events are projected for the eastern parts of southern Africa
- The El Niño – La Niña cycle of droughts and floods is expected to intensify.
- **GCI summary**

“A hot and dry region, already water-stressed, is projected to become generally drier and drastically warmer (under low mitigation). This implies that options for adaptation are limited. In the east, there is the additional risk of more frequent heavy precipitation events”.

Regional tipping points in southern Africa – do they exist, and ‘where’?

- A Gauteng day-zero drought – our biggest climate change risk in the near-term?
- More frequent and intense multi-year droughts and heat-waves impacting on the maize crop and cattle industry – is there a point of collapse?
- More frequent and intense heat-waves impacting on human health and mortality.
- Can an intense tropical cyclone (category 4/5 hurricane) reach Maputo or Richardsbay, or move down into the Limpopo River valley?

Every bit of warming matters: we need immediate action in both climate change mitigation and adaptation

