G20
SOUTH AFRICA 2025

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PROJECTIONS OF FUTURE CLIMATE CHANGE AND IMPACTS ON THE BIOECONOMY: FOCUS ON AFRICA

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G20 Initiative on Bioeconomy 1st Meeting
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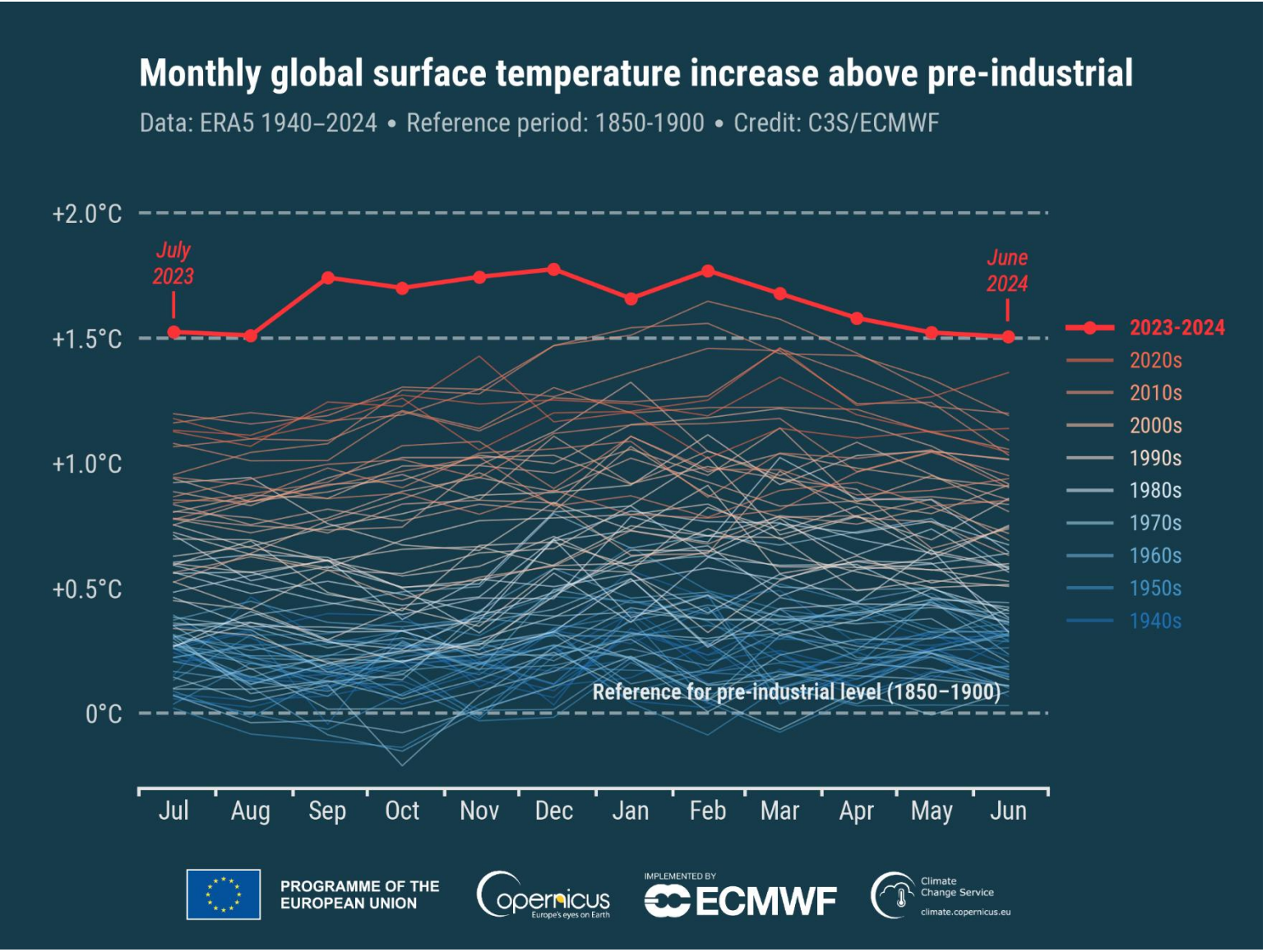

Figure: Monthly global surface air temperature anomalies (ºC) relative to 1850–1900 from January 1940 to June 2024, plotted as time series for all 12-month periods spanning July to June of the following year. The 12 months from July 2023 to June 2024 are shown with a thick red line, while all other 12-month periods are shown with thin lines shaded according to the decade, from blue (1940s) to brick red (2020s).

[Data source: ERA5. Credit: Copernicus Climate Change Service /ECMWF]

- 2024 is the first calendar year to exceed the 1.5 ºC threshold of global warming.
- Period July 2023 to June 2024 is the warmest 12-month period on record, 1.64 ºC warmer than the pre-industrial temperature.
- The Paris Agreement on Climate Change aims to keep global warming to ‘well below 2 ºC, preferably below 1.5 ºC’.
- A 1.5 ºC warmer world is a more dangerous world. Aspects of climate change may become irreversible.

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Drought in Zambia in 2023/24. Photo: World Food Programme Gabriela Vivacqua.

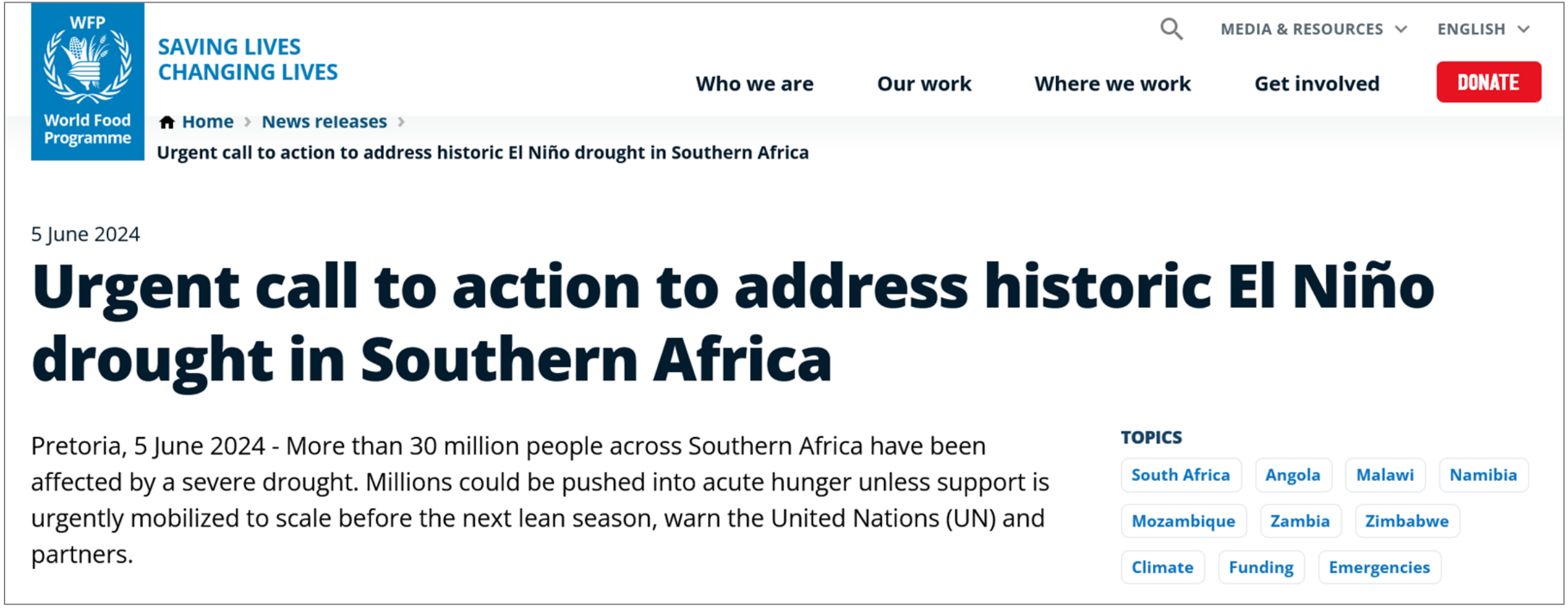
Hippos stuck in a dried-up channel in the Okavango Delta in the 2023/24 drought. https://www.voanews.com/a/southern-africa-worst-hit-by-climate-change.

Historical drought in Zambia and northern Namibia in the late summer of 2023/24

- Severe impacts on agriculture, affecting the growing seasons and leading to acute food insecurity.
- More than 70% of the maize crop lost in Zambia and Zimbabwe.
- Severe impacts on livestock and wildlife.
- States of disaster declared in Zambia, Malawi and Zimbabwe.
- Drought characterised by severe heat-waves intensified by climate change.

SADC countries appeal for help

- Appeal for **$5.5 billion of support** to provide urgent **lifesaving assistance**, to help with recovery and long-term climate resilience



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5 June 2024

Urgent call to action to address historic El Niño drought in Southern Africa

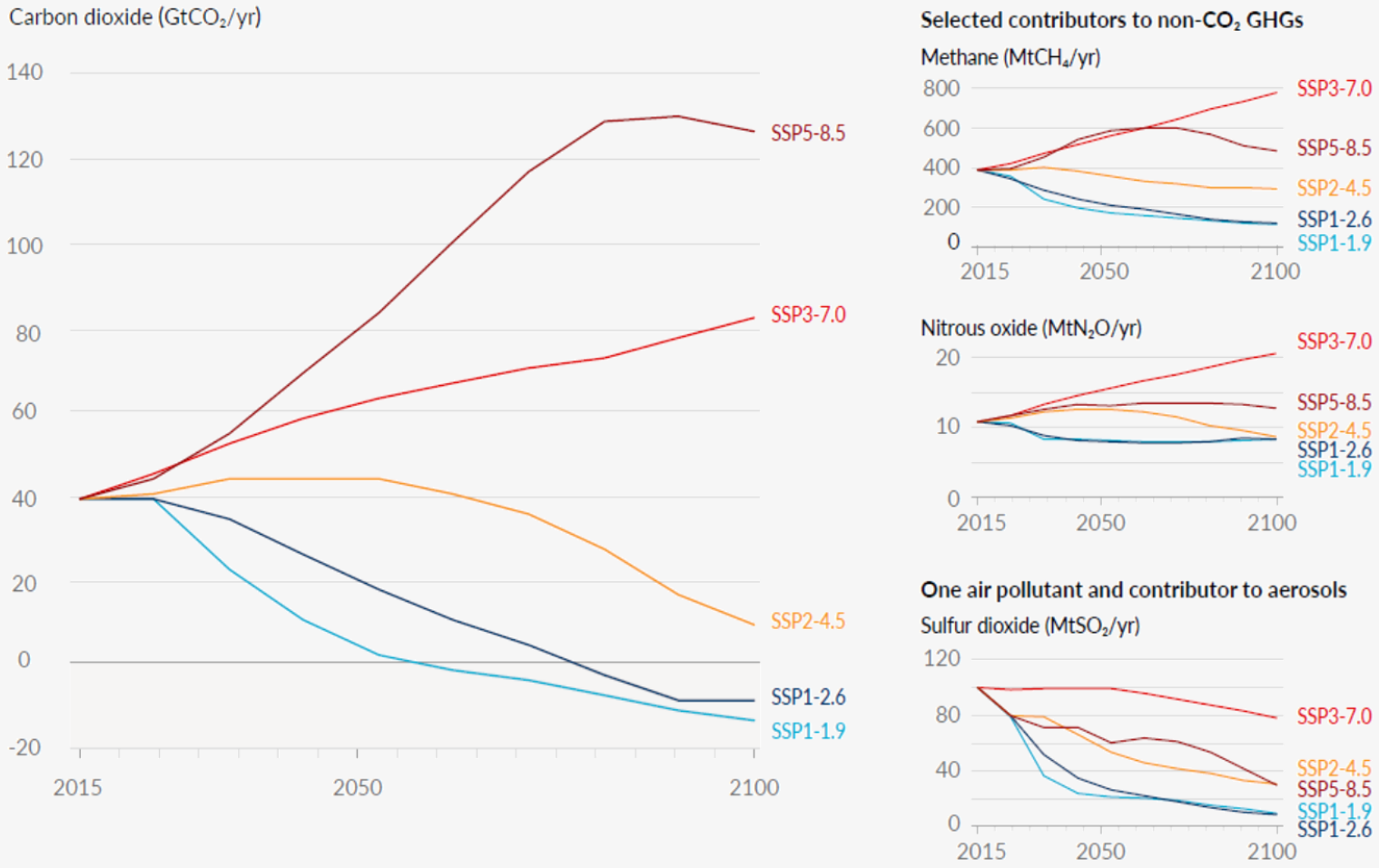
Pretoria, 5 June 2024 - More than 30 million people across Southern Africa have been affected by a severe drought. Millions could be pushed into acute hunger unless support is urgently mobilized to scale before the next lean season, warn the United Nations (UN) and partners.

TOPICS

South Africa Angola Malawi Namibia Mozambique Zambia Zimbabwe Climate Funding Emergencies

Future emissions cause future additional warming, with total warming dominated by past and future CO_2 emissions

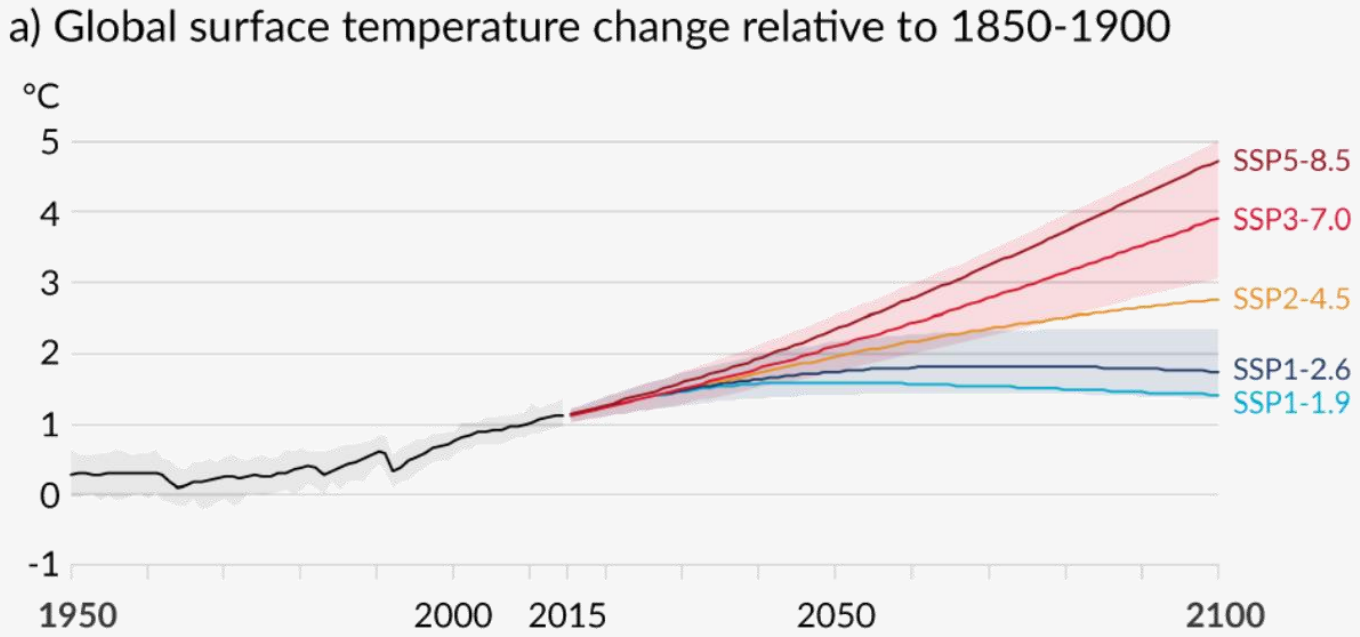
a) Future annual emissions of CO_2 (left) and of a subset of key non-CO_2 drivers (right), across five illustrative scenarios



- It is now *likely* that the 1.5 °C level of global warming will be permanently exceeded.
- Keeping global warming to well below 2 °C will require drastic mitigation internationally in the next years.
- If the global climate change mitigation effort fails, the countries that did mitigate strongly will not benefit from a climate change impacts perspective from their own energy transition.

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

Figure SPM.8



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).

- Since the IPCC AR6 WG1 report in 2021, it became clear that the era of a 1.5 °C warmer world is dawning; by the end of 2024 it seemrf unlikely that it can still be avoided.
- Climate change adaptation to prepare for a world with global warming level greater than 1.5 ºC is now critical.
- Still a very good chance to avoid 2 °C of warming if mitigation is strong.

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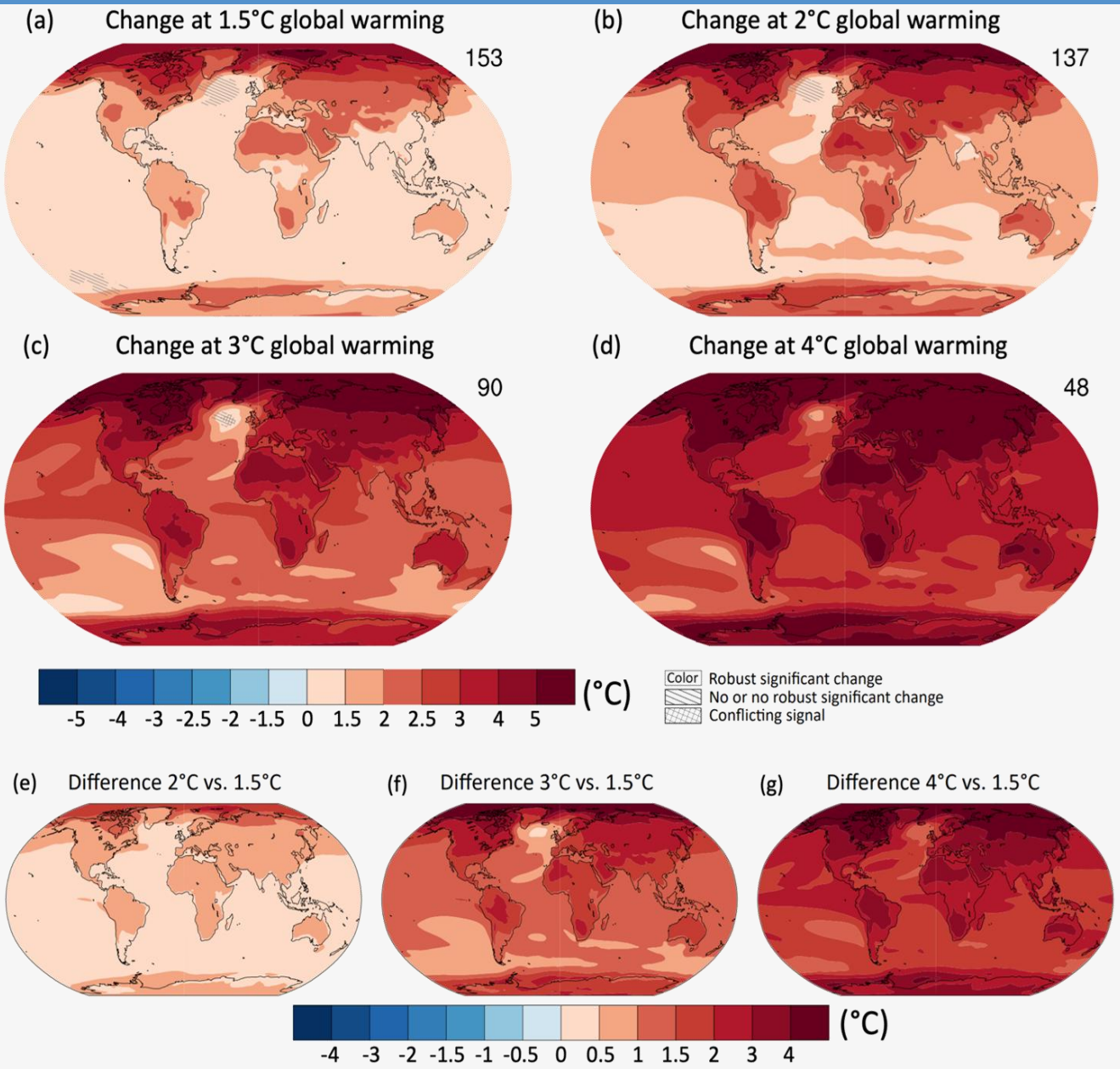
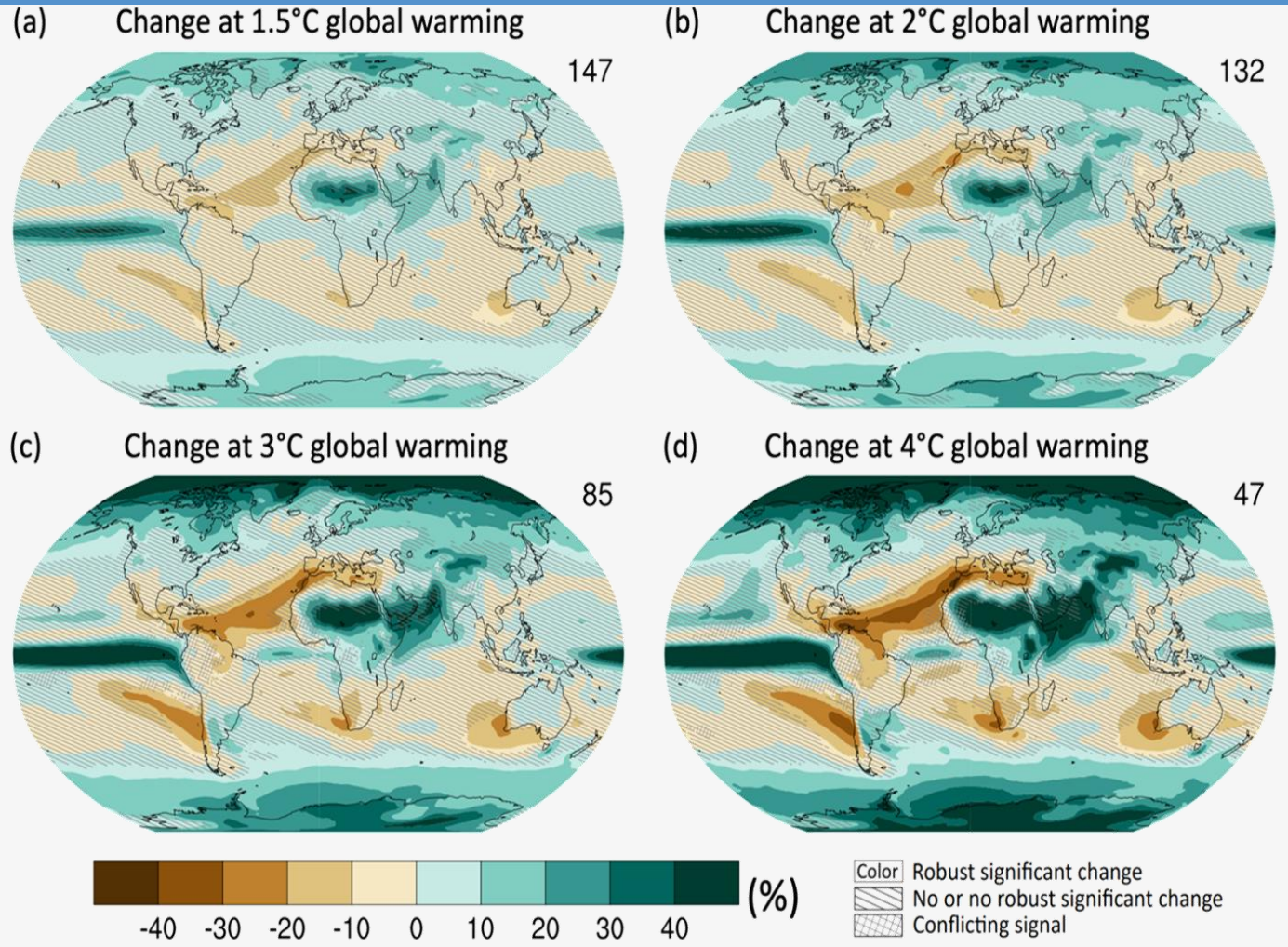


Projected patterns of regional warming

- Land masses are projected to warm faster than the oceans
- The Arctic is warming faster than any other region on Earth
- In the Southern Hemisphere, the highest rate of warming is in Botswana

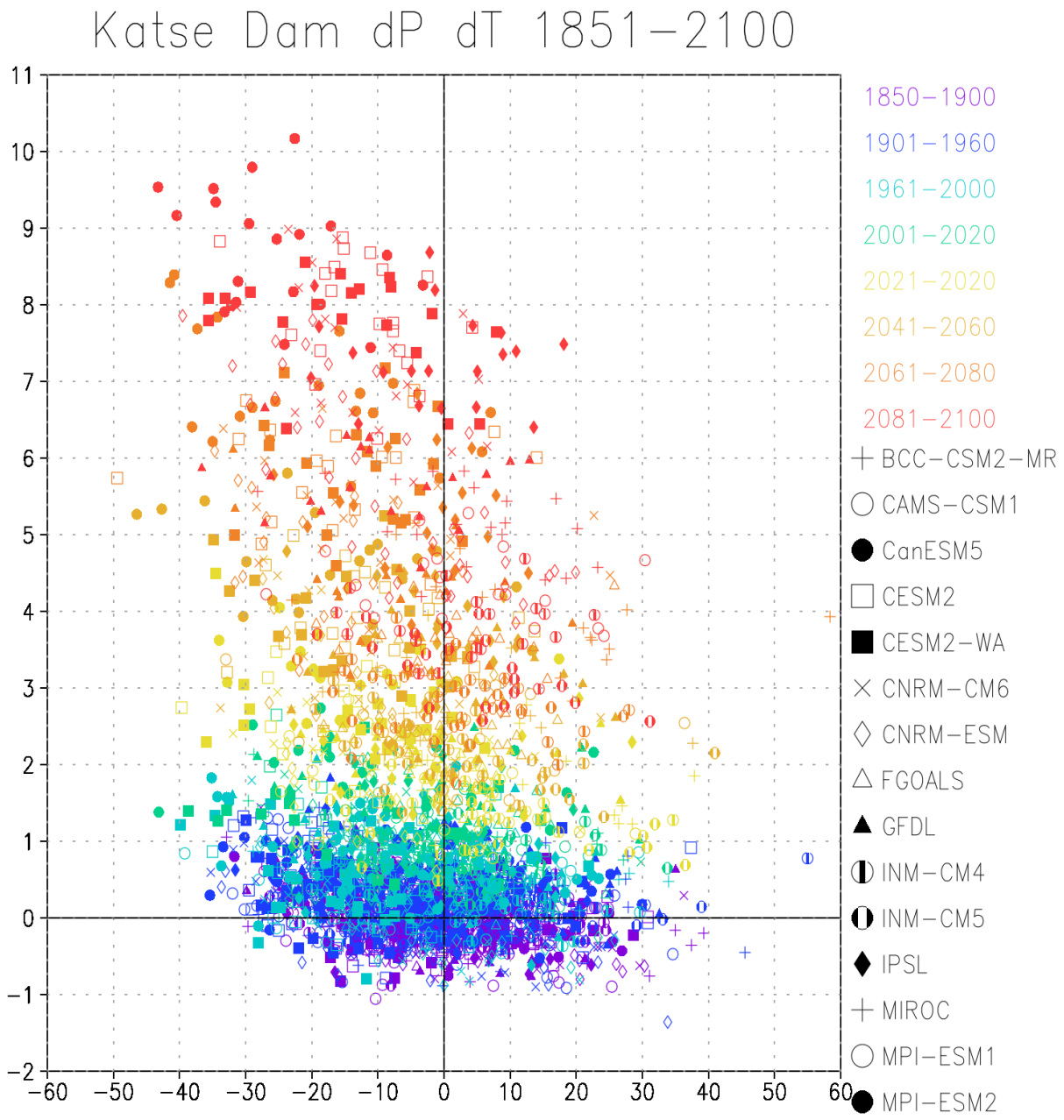
Figure: Projected spatial patterns of change in annual average near-surface temperature (°C) at different levels of global warming (Figure 4.31, Chapter 4, AR6).



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.

Projected patterns of regional precipitation changes

- A warmer world is a wetter world (in general)
- Subtropical southern Africa is projected to become generally drier with more frequently occurring multi-year droughts.
- In combination with drastic warming in southern Africa, that means limited options for adaptation.



Climate change is projected to result in climate regime-shifts under low mitigation

- In about 50% of global climate model simulations, the eastern escarpment climate system is projected to drift into a temperature-rainfall climate regime never observed in recorded history: drastically warmer and substantially direr.
- There is a clear risk for more frequent multi-year droughts in the mega-dam region, and consequent ‘day-zero droughts’ in Gauteng.
- Figure shows the projected annual temperature (ºC) and rainfall (mm) anomalies for CMIP6 GCMs (1850-1900 baseline).

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Observed and projected climate change in Africa (messages from the IPCC AR6)

Southern Africa

- Observed decreases in mean precipitation.
- Observed and projected increase in aridity, agricultural and ecological droughts.
- Observed increase in meteorological drought, projected increase in meteorological droughts from 1.5 ºC.

West Africa

- Observed increase in drying and agricultural and ecological droughts.
- Projected increase in meteorological droughts.

East Africa

- Projected increases in frequency and/or the intensity of heavy precipitation and pluvial flooding

Impacts on the bioeconomy and tipping points: insights from the IPCC's AR6

- Climate change has reduced economic growth across Africa, increasing income inequality between African countries and those in temperate northern hemisphere climates.

- Climate change is reducing crop yields and productivity in Africa.
- Future warming will negatively affect food systems in Africa by shortening growing seasons and increasing water stress.
- Climate change threatens livestock production across Africa.

- Tipping points where the maize crop and cattle industry collapse under higher levels of global warming.

- Across nearly all African countries, GDP per capita is projected to be at least 5% higher by 2050 and 10–20% higher by 2100 if global warming is held to 1.5 ºC compared with 2 ºC.

Climate science and climate action: reasons for hope

With strong climate change mitigation, the 2 ºC threshold of global warming and related impacts can still be avoided.

Climate change will bring unprecedented changes, also in terms of the bioeconomy, but these should not be unforeseen: climate change science should help to adapt and prepare (noting that there are also limits to adaptation).

The UNFCCC and G20 are critical towards the uptake of climate science in policy and actions.