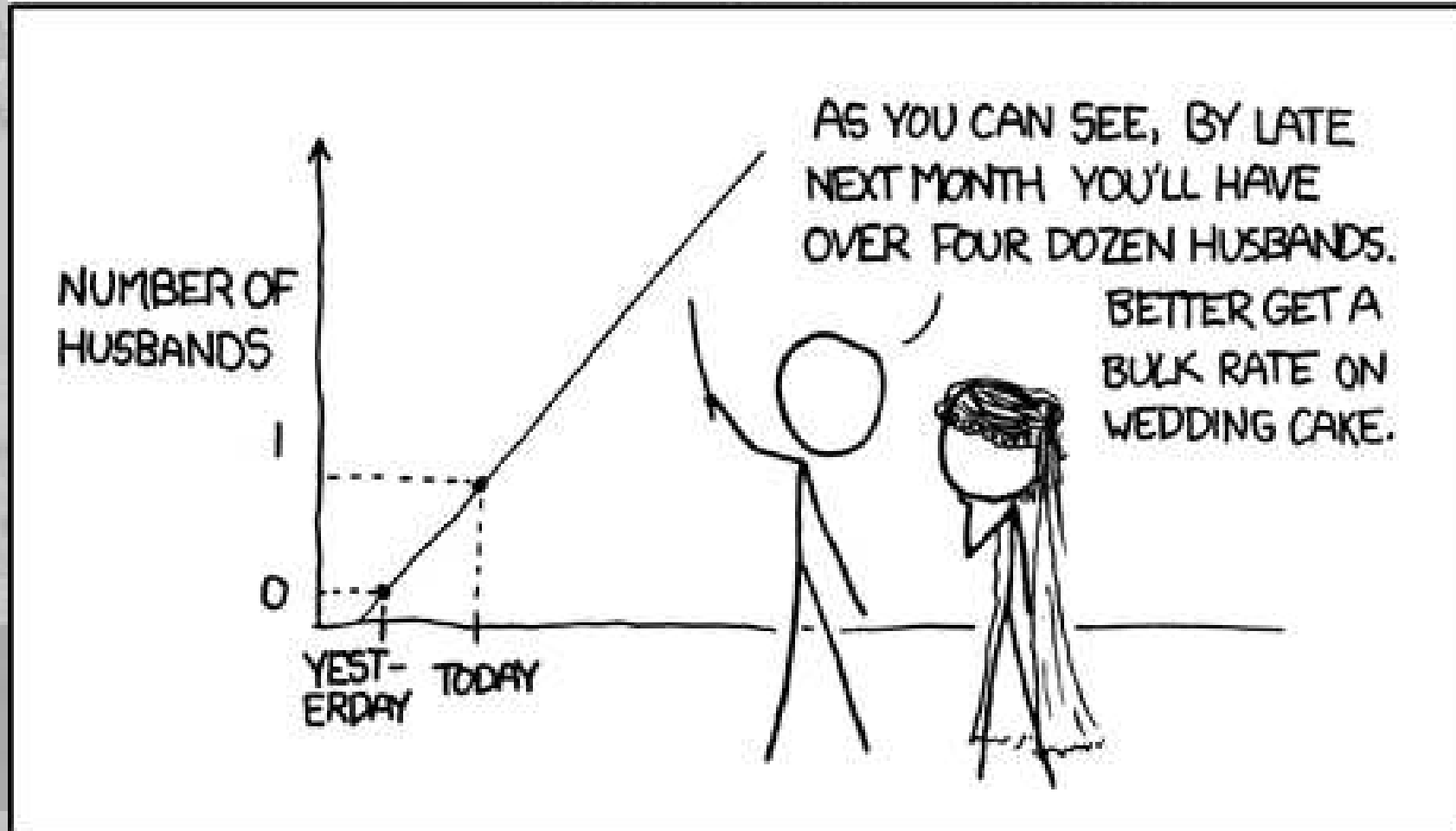


# MY HOBBY: EXTRAPOLATING



Courtesy xkcd.com

# Surface temperature and African climate

Dáithí Stone (dstone@lbl.gov)

Lawrence Berkeley National Laboratory

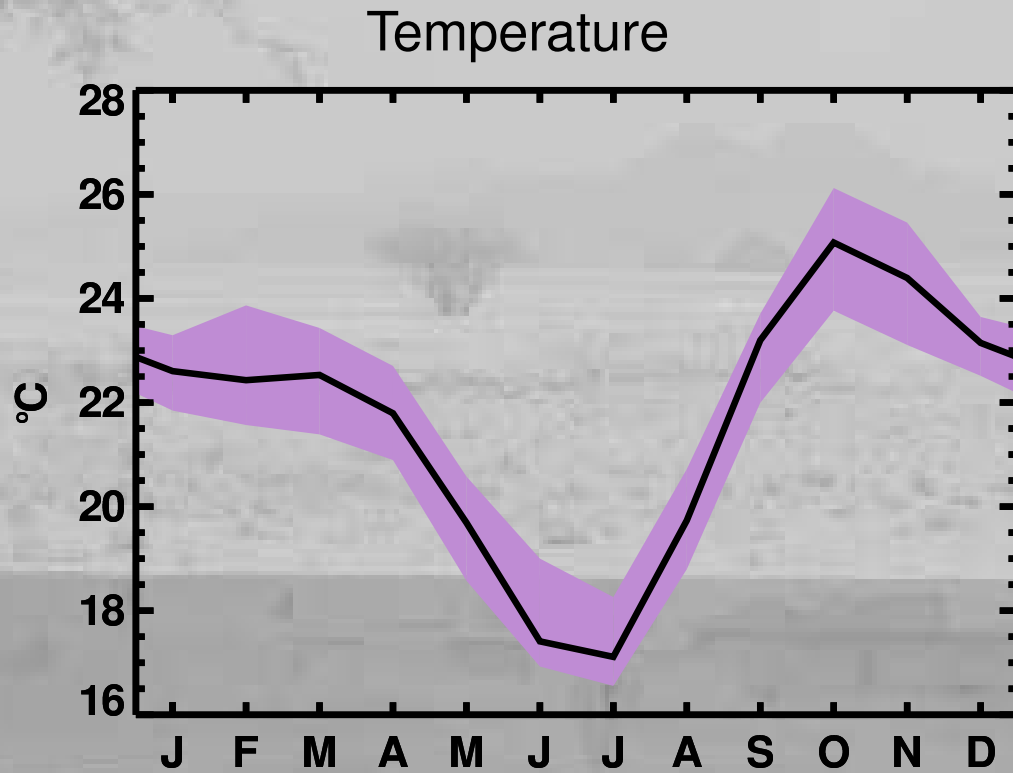
Acknowledgement to the University of Cape Town

## Africa from space



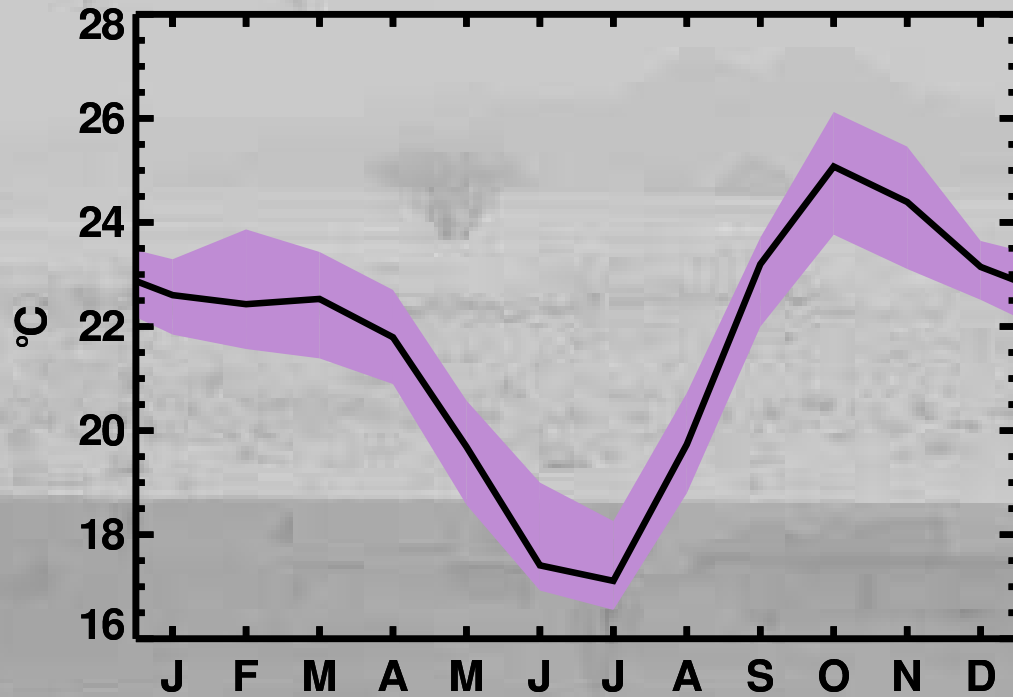
Courtesy NASA Blue Marble

## Annual cycle (Zambia)

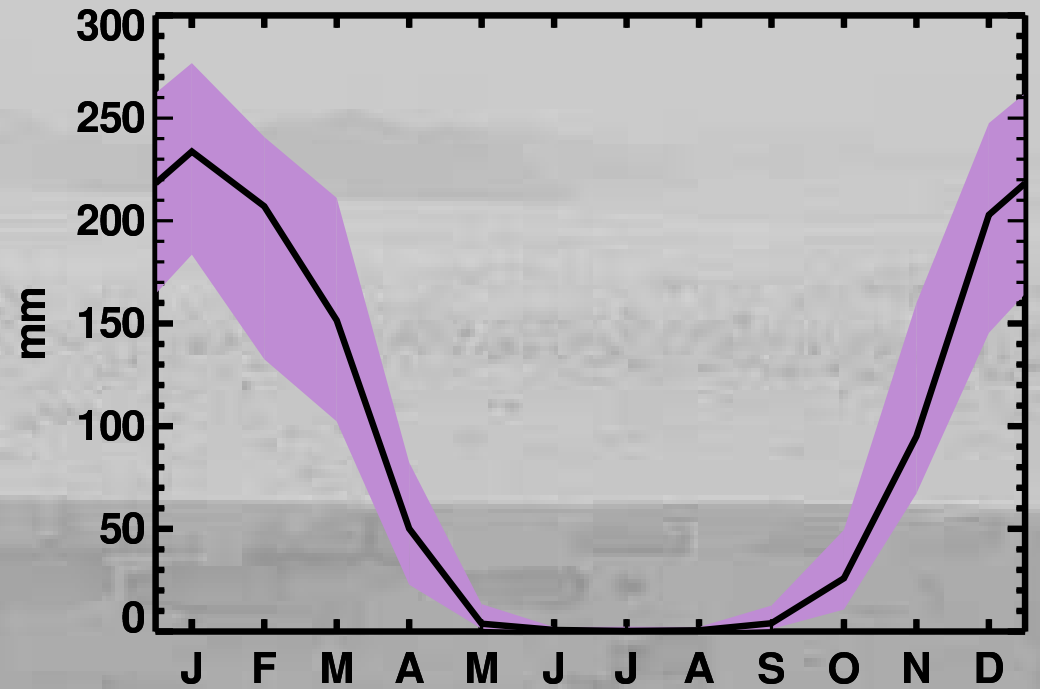


## Annual cycle (Zambia)

Temperature

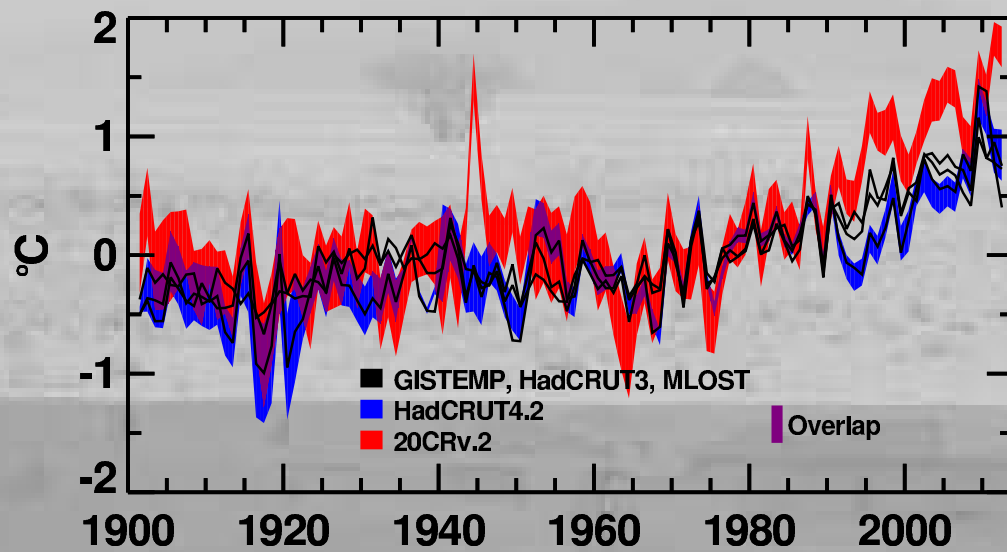


Precipitation



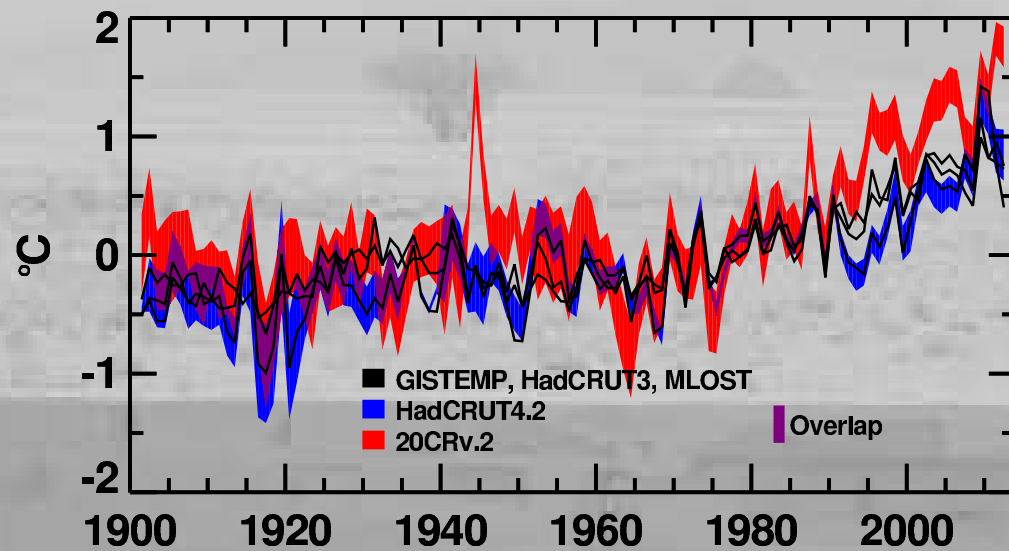
## Interannual variability (Ethiopia)

Temperature

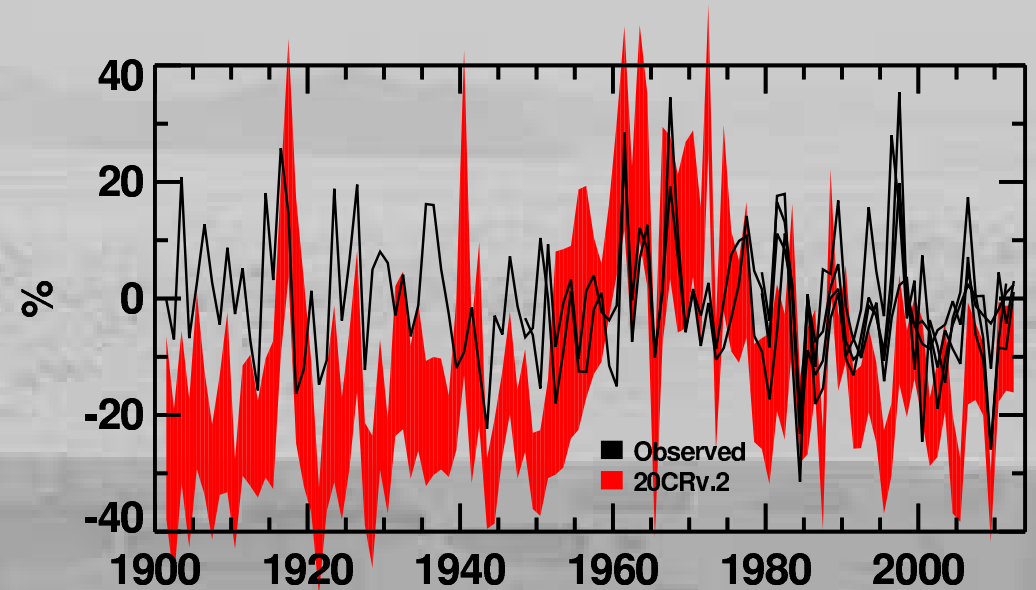


## Interannual variability (Ethiopia)

Temperature



Precipitation



## **African systems are controlled by rainfall**

- Meridional profile is dictated by rainfall
- Annual cycle is dictated by rainfall
- Interannual variability is dictated by rainfall

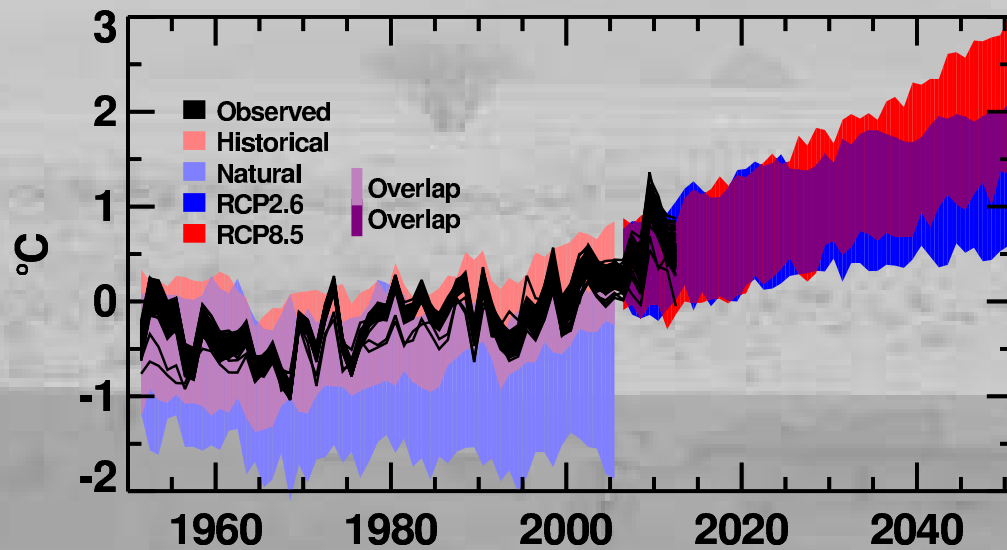


A grayscale photograph of a savanna landscape. In the foreground, there is a low, dark wall or fence. The middle ground shows a flat, open plain with sparse vegetation and a few trees. In the background, there are several rounded hills or mountains under a clear sky. The text "So you can go home." is overlaid in the center of the image in a bold, red font.

**So you can go home.**

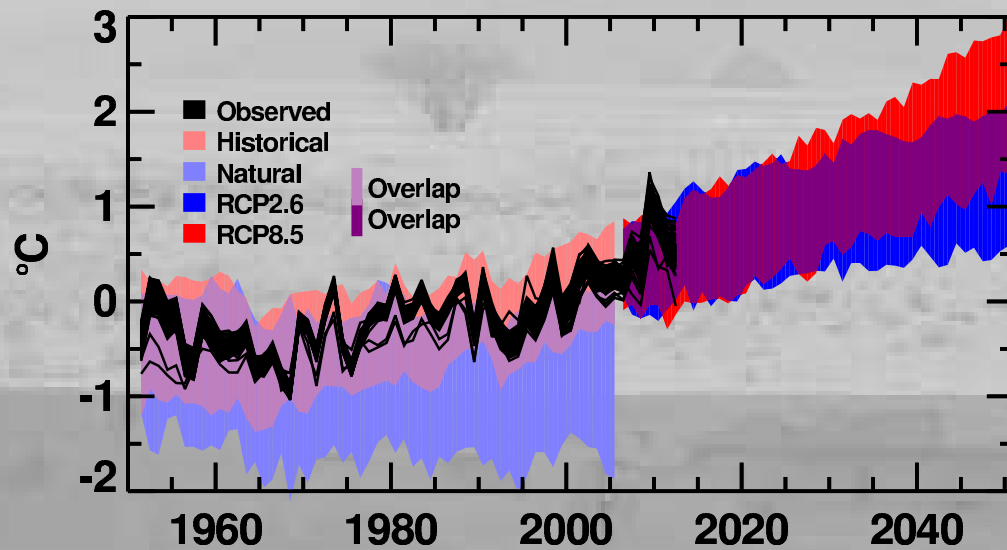
## Long-term trends in Ethiopian climate

Temperature

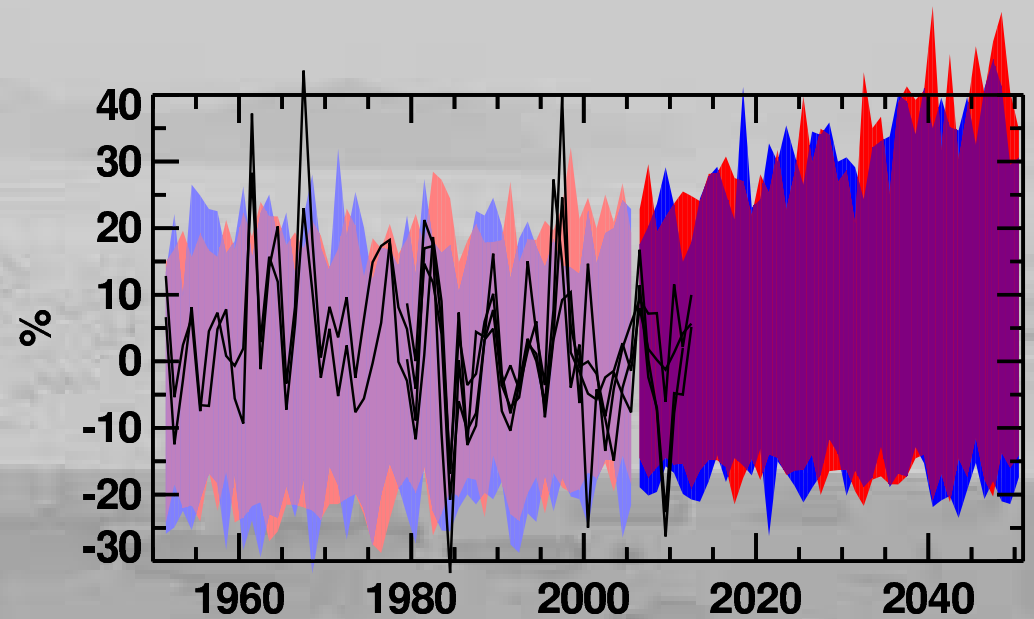


## Long-term trends in Ethiopian climate

Temperature



Precipitation





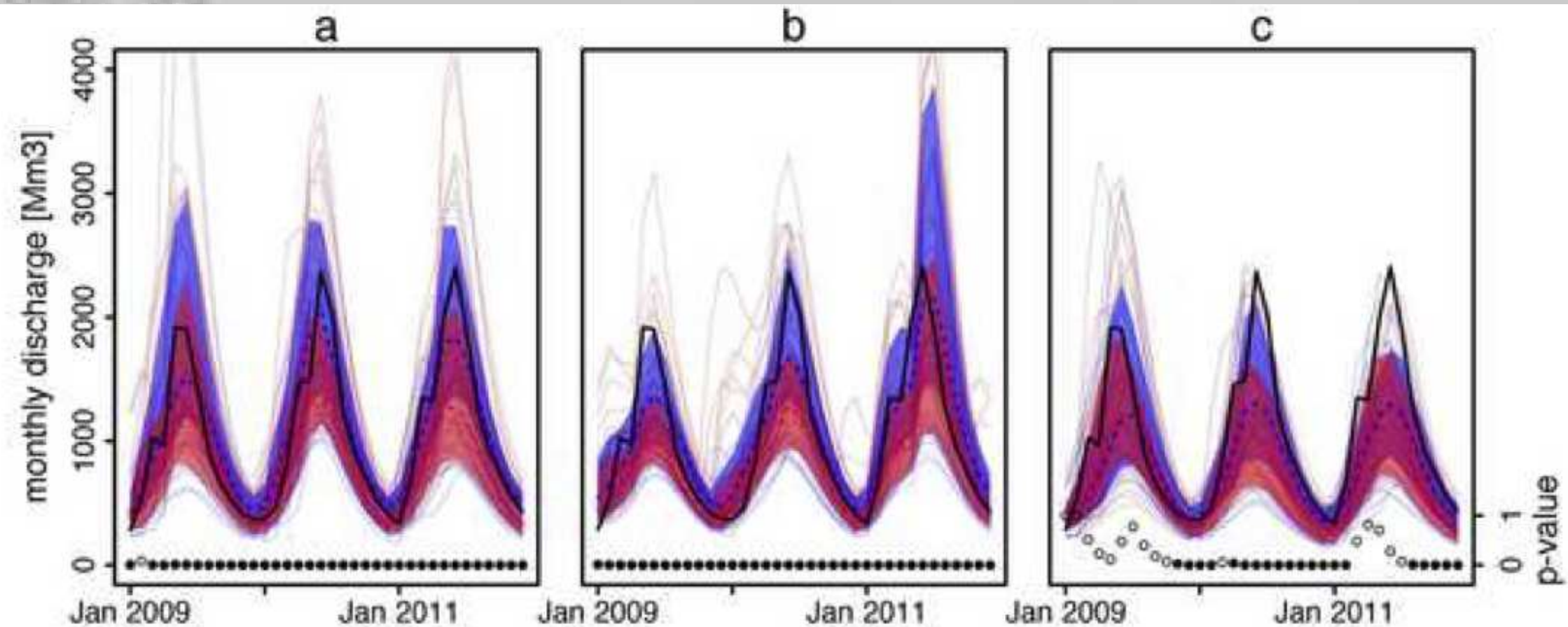
**So what is the sensitivity of African systems to warming?**

# Effect of GHG emissions on Okavango discharge

HadAM3P-N96

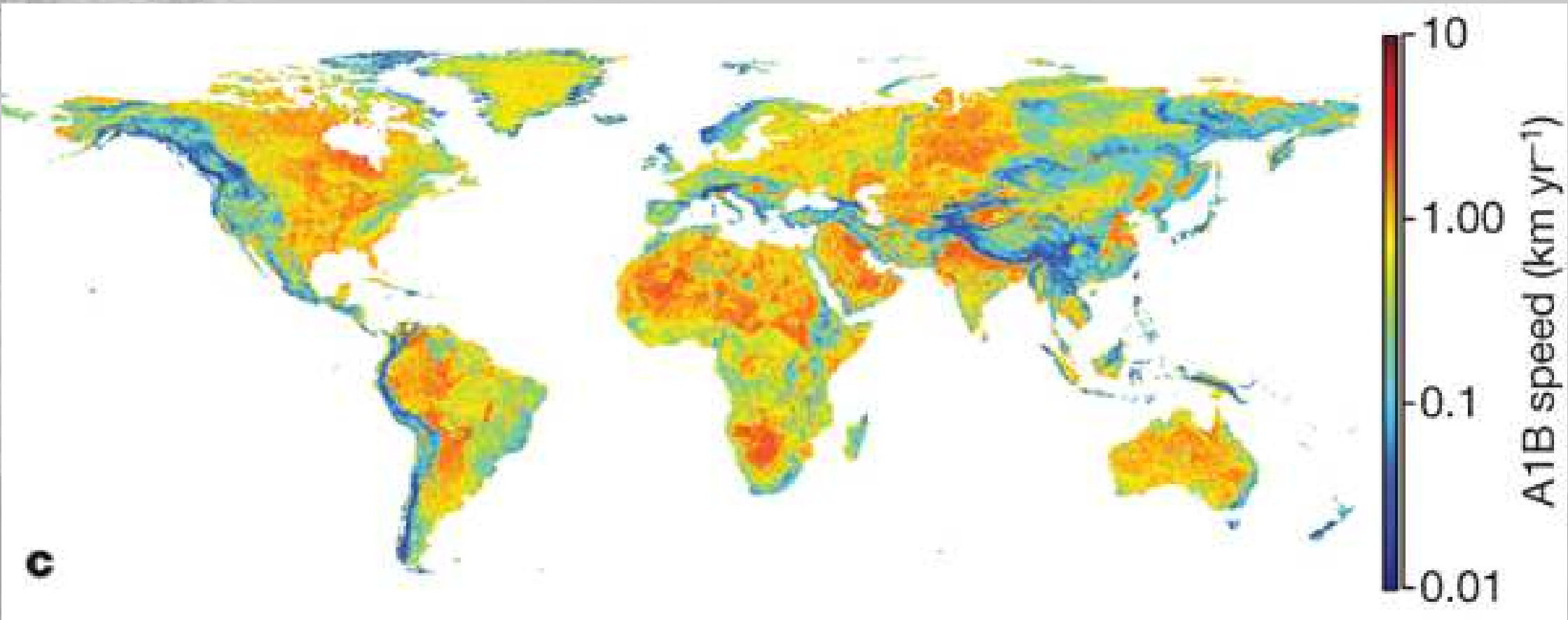
Downscaled HadAM3P-N96

CAM5.1-2degree



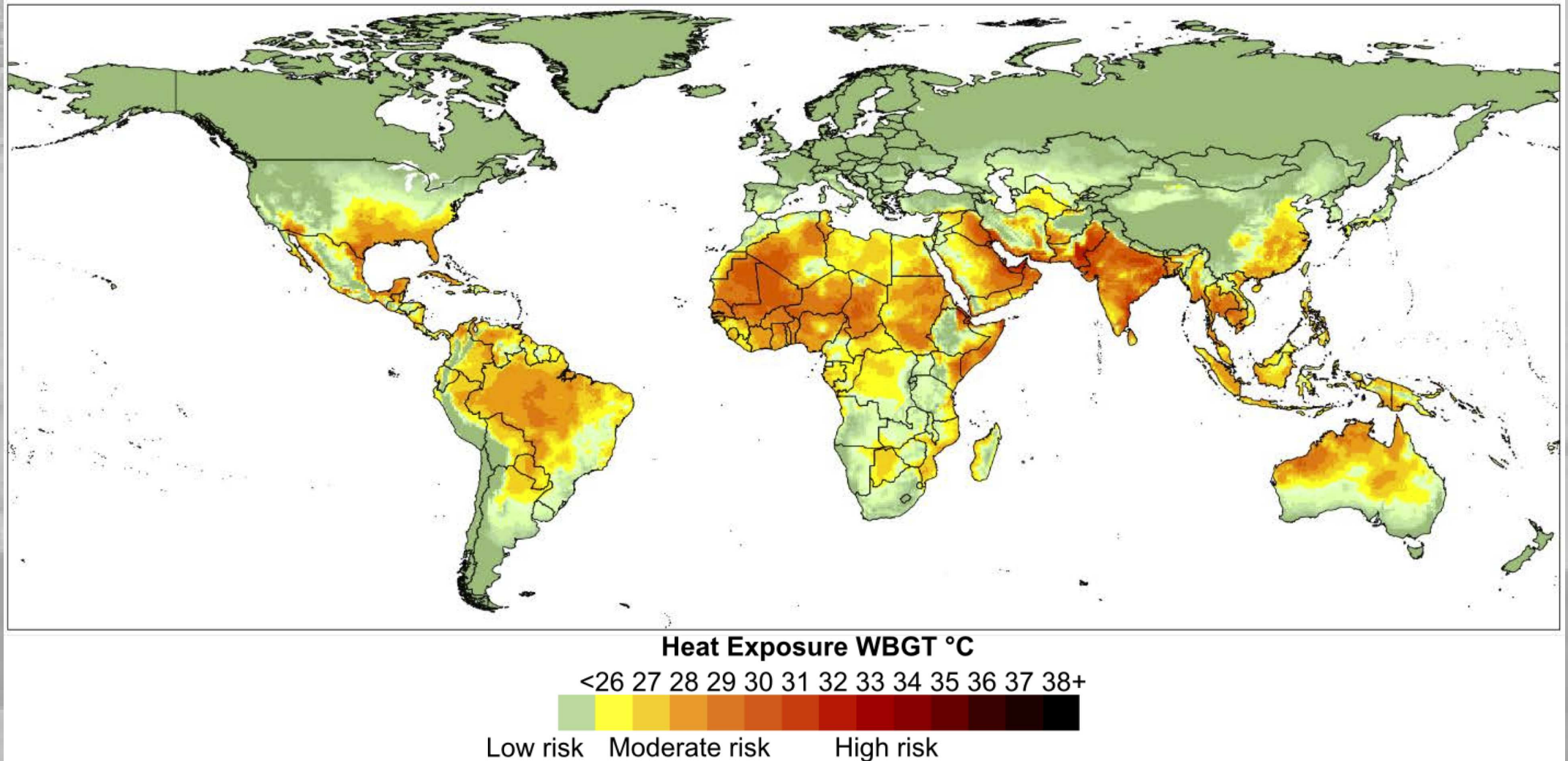
c/o Piotr Wolski

## The velocity of climate change



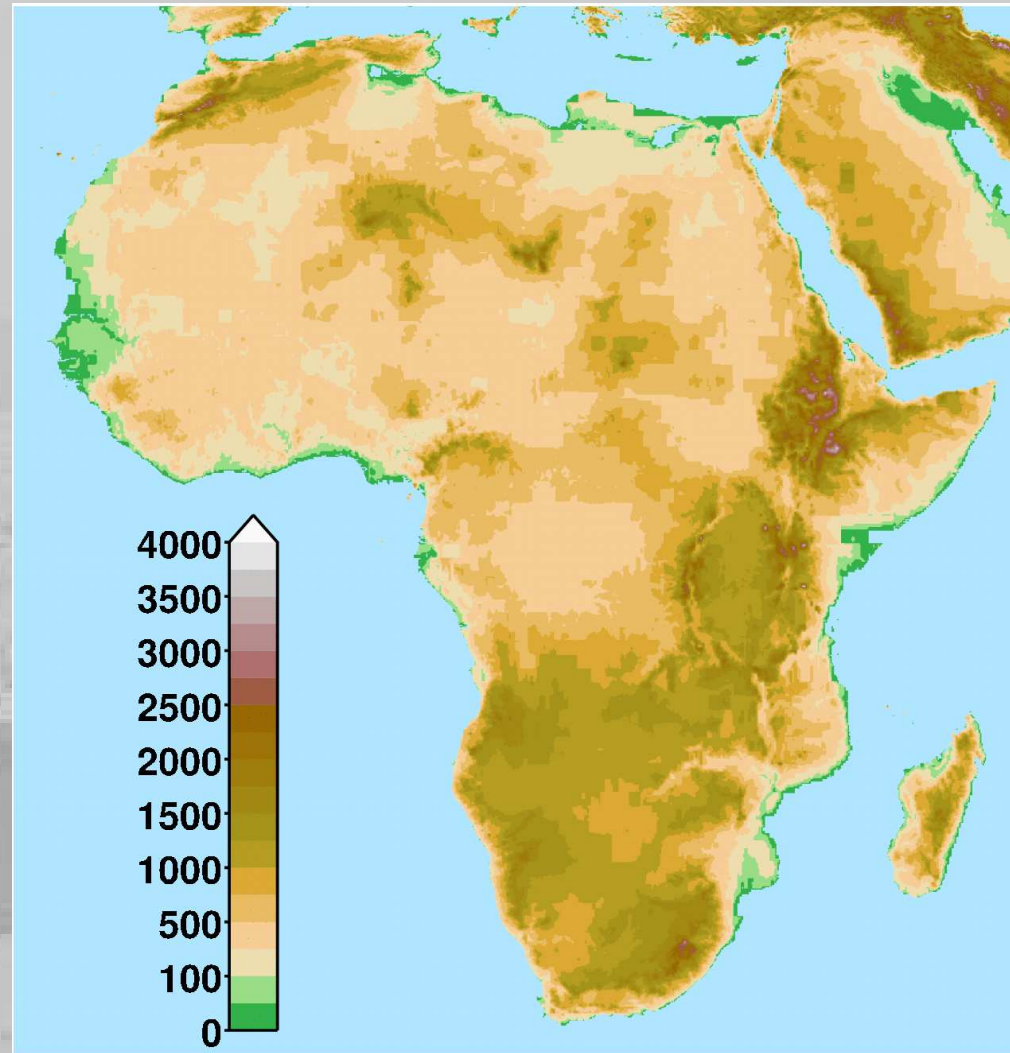
Courtesy Loarie et alii (2009)

## Current heat stress



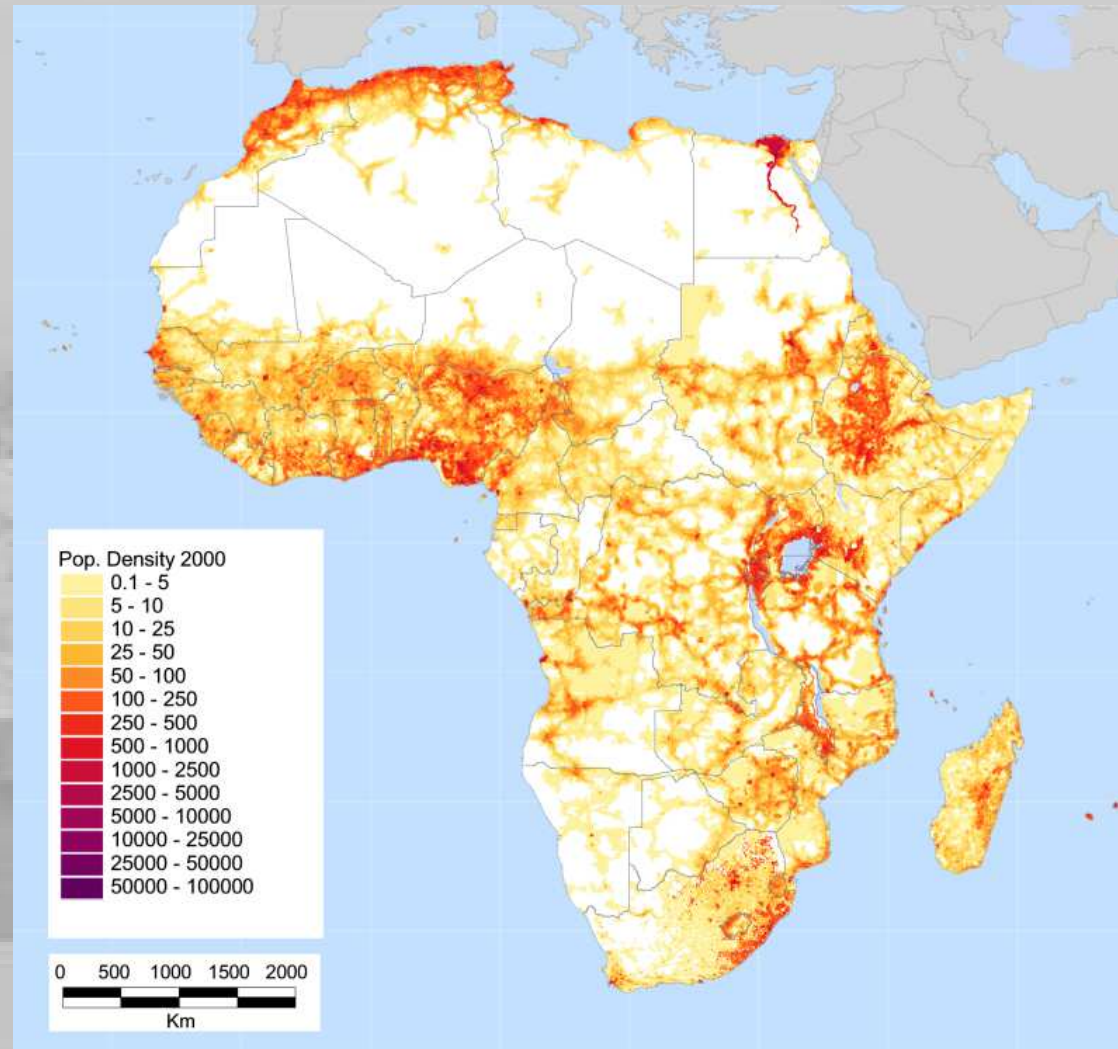
Courtesy Lemke and Kjellstrom (2012)

## Topography





## Population density



For 2000. Courtesy UNEP.

## **A priority: attribution**

Identified science challenges from ACC2013:

*Have concluded that further assessment and refinement of methodologies for assessing the attribution of climate events of the past and future is needed to provide timely analysis to governments and/or decision makers, in particular with respect to loss and damage issues*



**So what is required of  
surface temperature measurement?**

## **So what is required of surface temperature measurement?**

1. Long-term monitoring
  - Incentives for monitoring and sharing of data
  - Digitisation of archival measurements

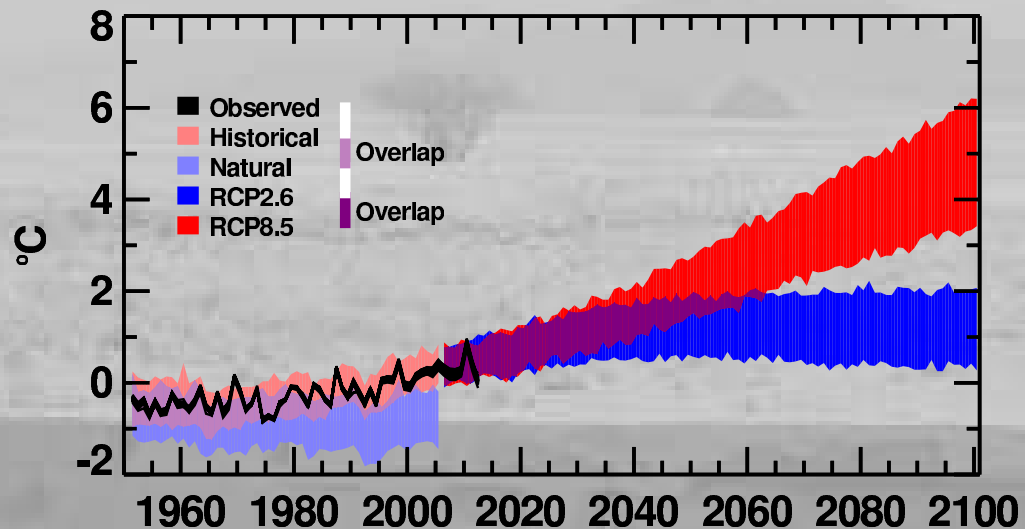
## So what is required of surface temperature measurement?

1. Long-term monitoring
  - Incentives for monitoring and sharing of data
  - Digitisation of archival measurements
2. Interpolation of absolute temperatures
  - e.g. topography, reanalyses, satellite
  - Need methods for testing



## Long-term trends in ECOWAS climate

Temperature



Precipitation

