



OASIS@Berkeley

ORGANIZING TO ADVANCE SOLUTIONS IN THE SAHEL

Bixby Center
for Population, Health & Sustainability

COLLEGE OF
Natural Resources



AFIDEP
African Institute for
Development Policy



OASIS@Berkeley
ORGANIZING TO ADVANCE SOLUTIONS IN THE SAHEL



Climate Change in the Sahel

Michael Wehner, PhD

Lawrence Berkeley National Laboratory

September 21, 2012

The Sahel: a semi-arid transition zone



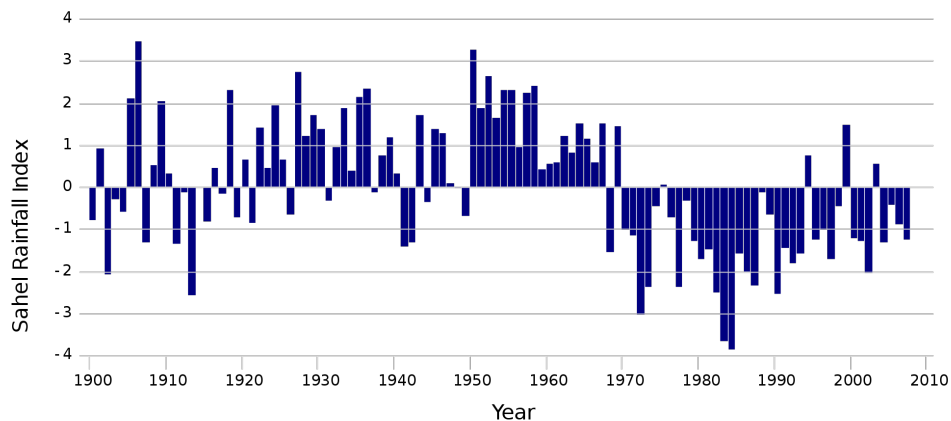
Hot and dry

Rainy season:

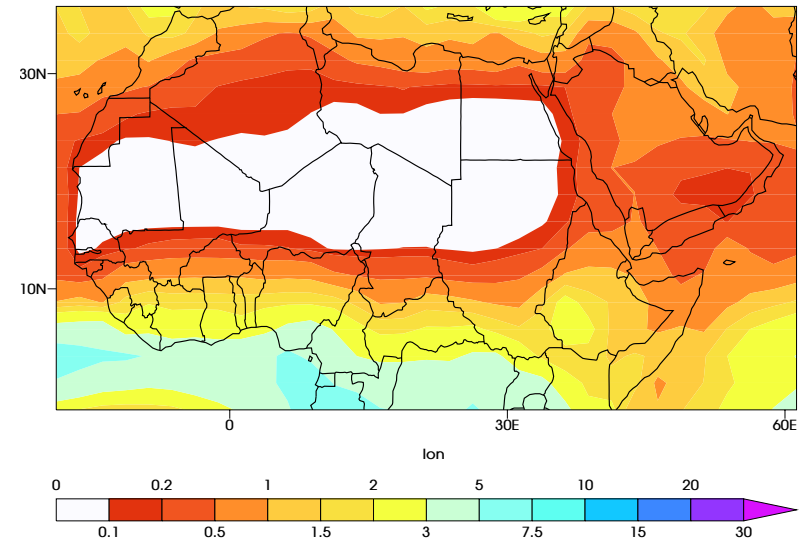
- May to September
 - Technically a “monsoon”, a seasonal expansion of tropical moisture into the region

A regime shift into severe drought conditions around 1970

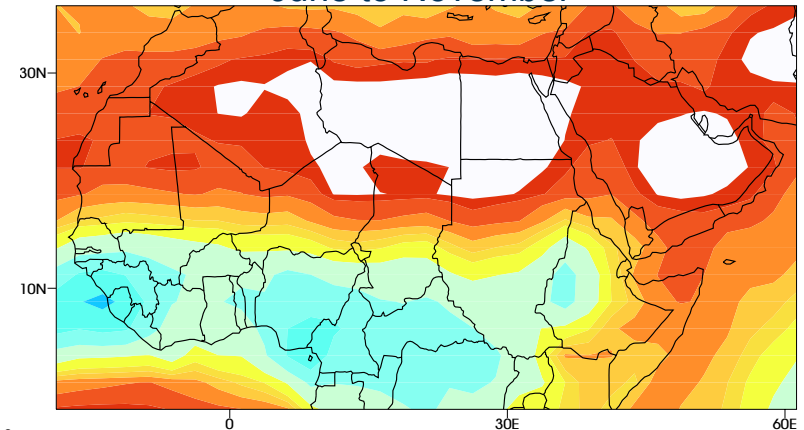
- Likely due to post WW2 US consumption of high sulfur coal.



1985-2004 Avg rainfall (mm/day) Dec to May



June to November

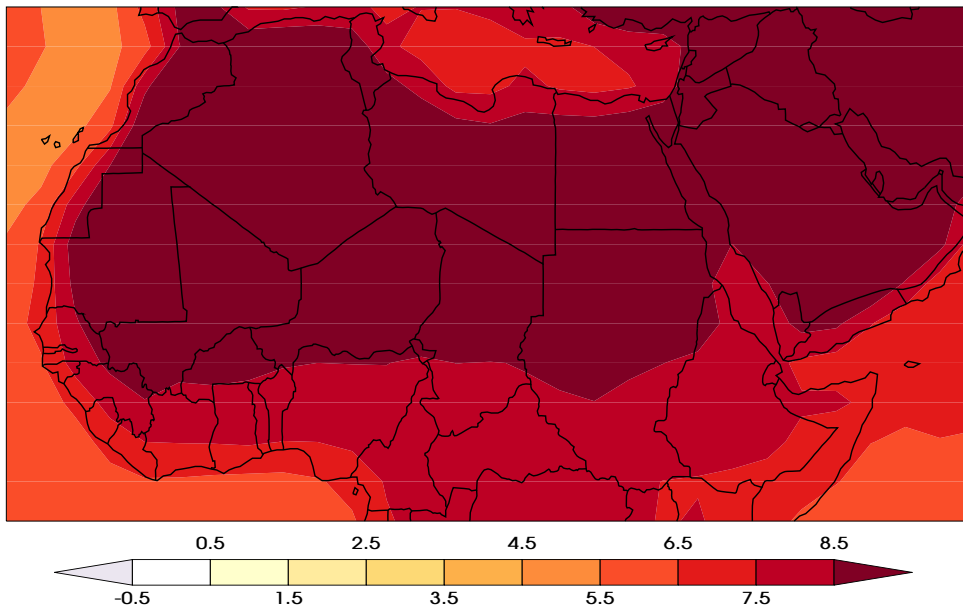


Global warming & the Sahel

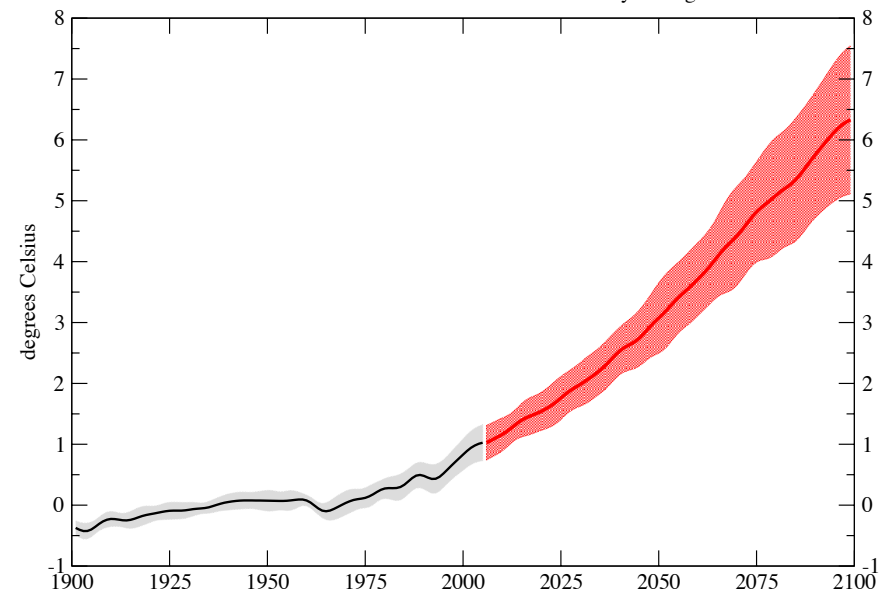


Under “business-as-usual” emissions scenarios, **average** temperatures at 2100 are projected to be 5-8°C warmer than now.

- Heat waves will be deadly.
- Large decreases in soil moisture.



Niger: Surface Air Temperature Change
RCP 8.5 emissions scenario w.r.t. 20th century average

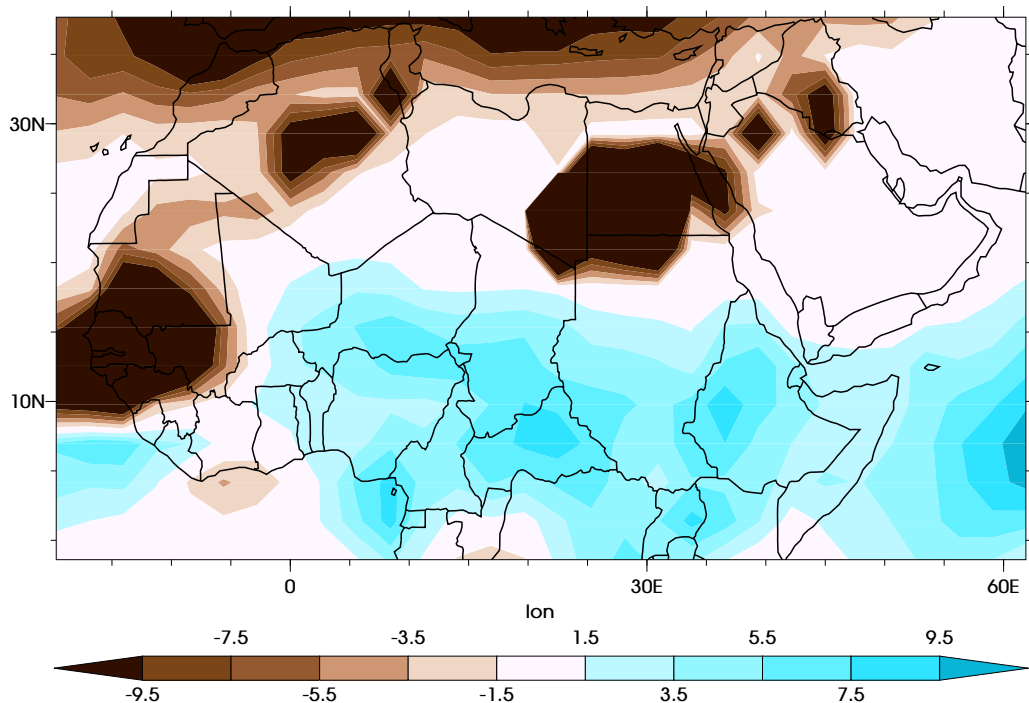


Dangerous climate change will be realized by 2050 regardless of emissions scenarios

Precipitation and soil moisture is key!



June to Dec precipitation change (cm)
2100 “business as usual” emissions



Understanding projected changes in the moisture budget is far more difficult than for temperature.

Uncertainty in projected precipitation changes is high but two factors are robust:

- 1) *Available soil moisture will likely decrease due to increased evaporation despite a small increase in precipitation.*
- 2) *Later rains will delay the growing season.*

Sahelian climate change: Status of our knowledge



What do we know well?

- It will get hotter. Probably a lot. As a result:
 - Soils will likely get drier due to increased evaporation.
 - There will be direct human health impacts of the heat and resulting behavioral changes.

What do we not know well?

- Details of future seasonal precipitation changes, including magnitude and timings.
- How dry will the soil get?
- In situ temperature and precipitation observations are sparse or non-existent.

Sahelian climate change: Critical research



What do climate scientists need to do better?

Precipitation:

- Which of the 40+ global climate models are “fit to task” for projecting precipitation change in the Sahel?
 - The answer to this question will rely on satellite and proxy observations.

Soil Moisture

- Defensible studies of projected soil moisture changes are required.
 - State of the art land surface models driven by the subset of “fit to task” climate models.



Thank you!
mfwehner@lbl.gov