



# Climate change and plant genetic resources for food and agriculture: Risks and opportunities

Discussion Opener

Andy Jarvis, Julian Ramirez, Jean Hansen and Christoph Leibling

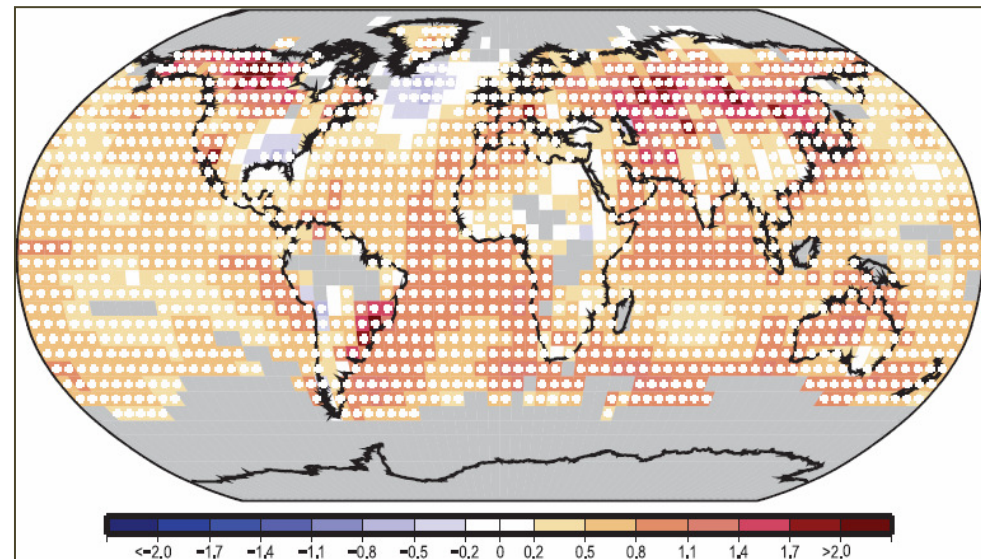
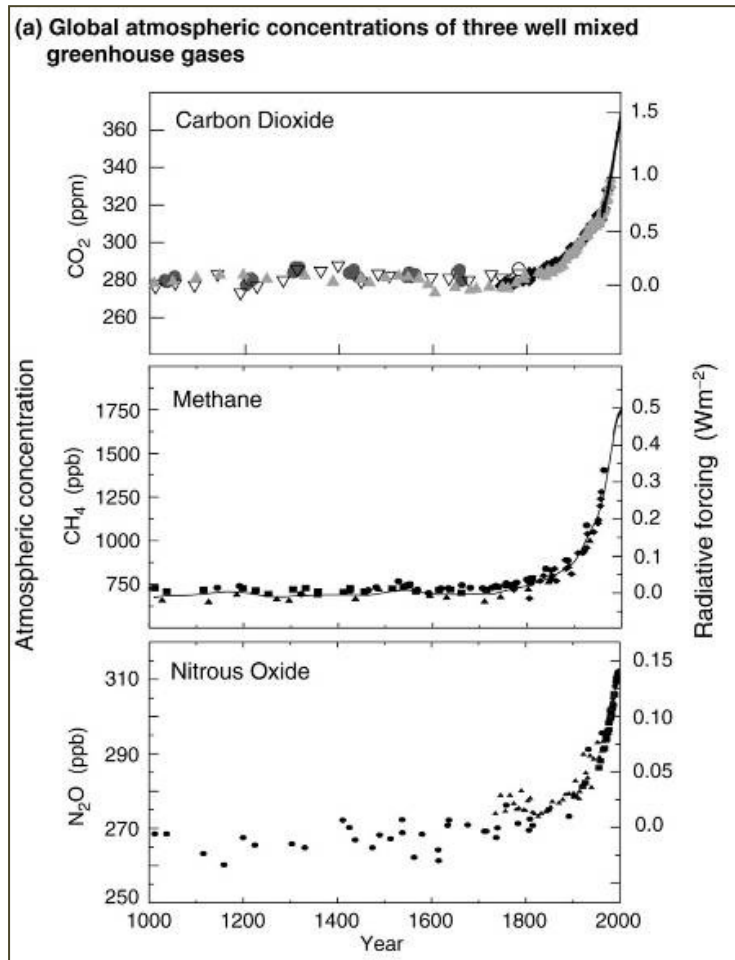
# Risks



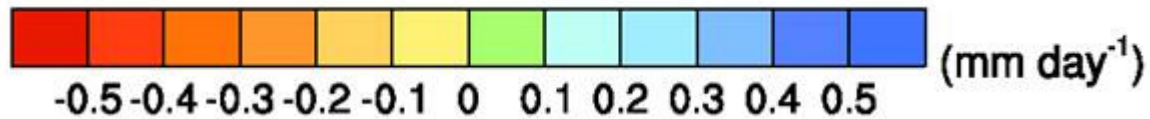
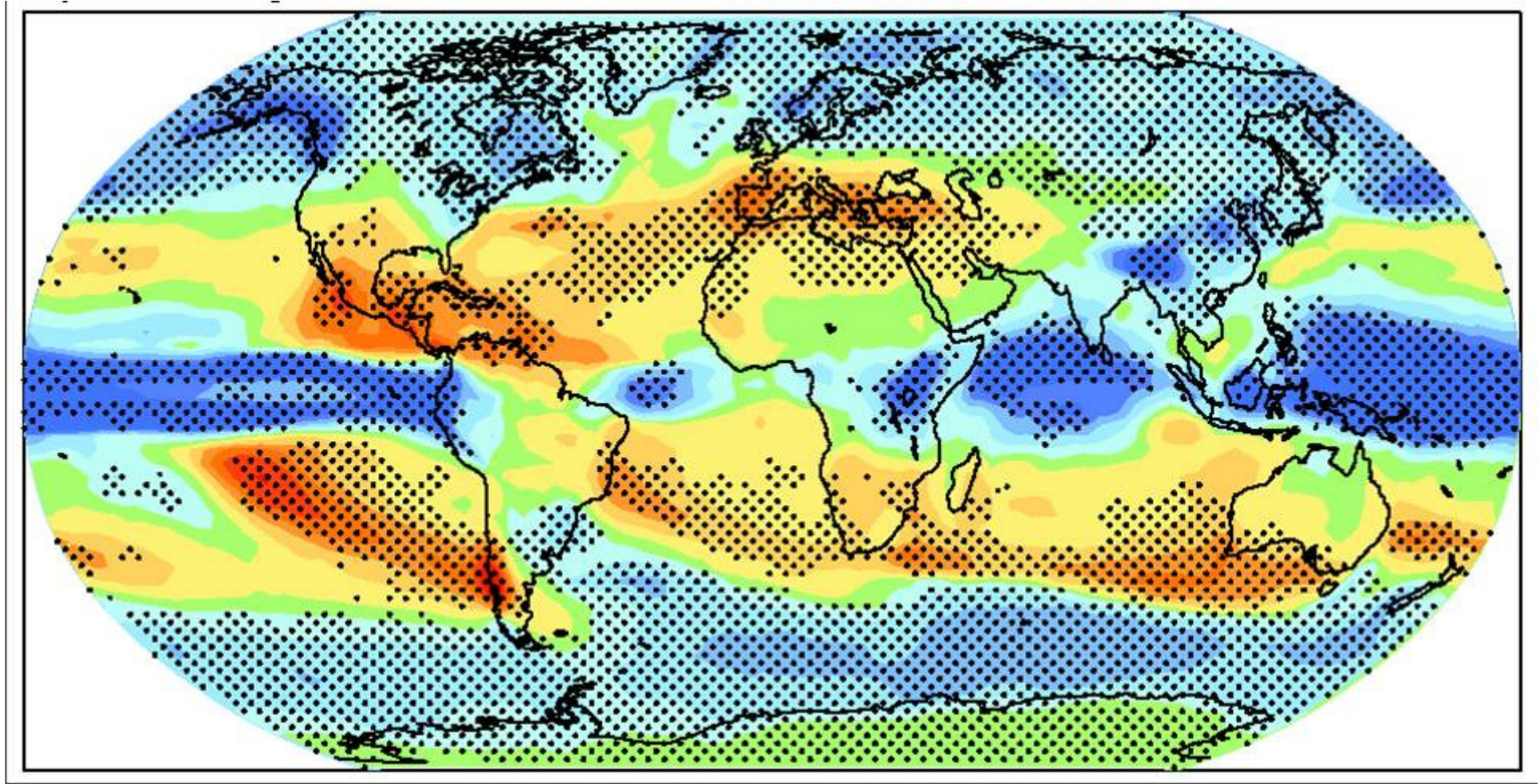
The concentration of GHGs is rising



Long-term implications for the climate and for crop suitability

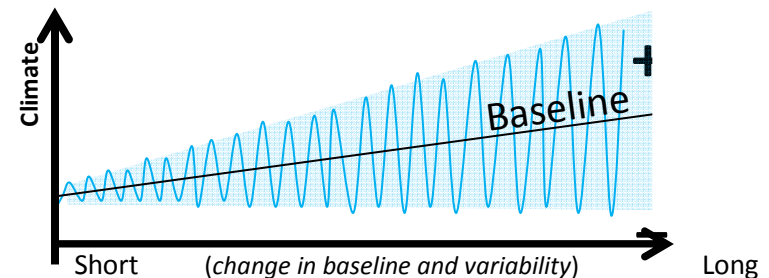


# Climatic changes differ geographically



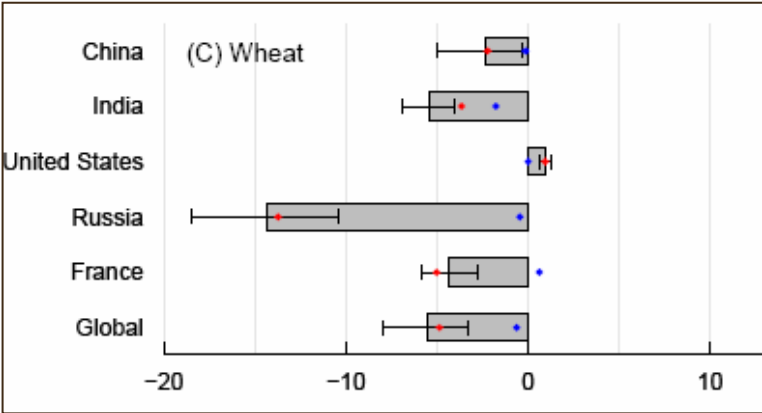
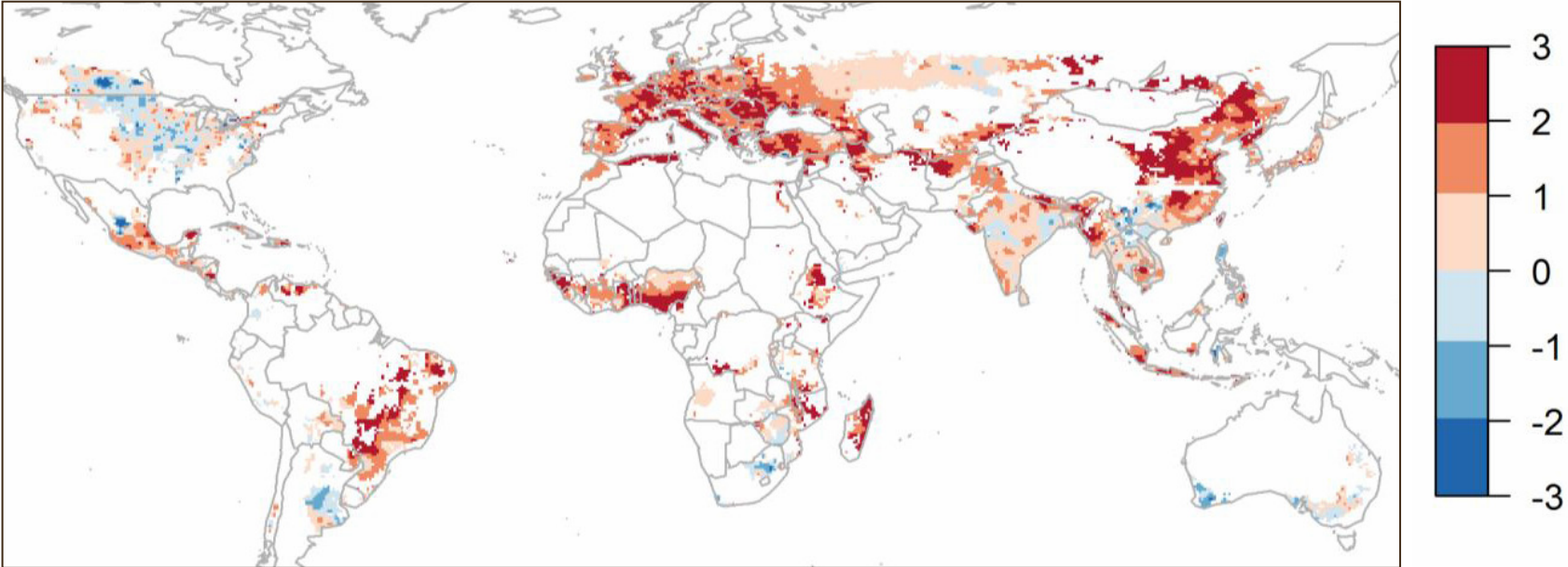
# Principal climatic risks

- 30% novel climates (Williams et al. 2007) – combinations of climatic factors never before experienced on earth
- Changes in averages, and increases in variability



- Increased maximum temperatures above and beyond what experienced today (Battista and Naylor)

# Historical impacts on food security

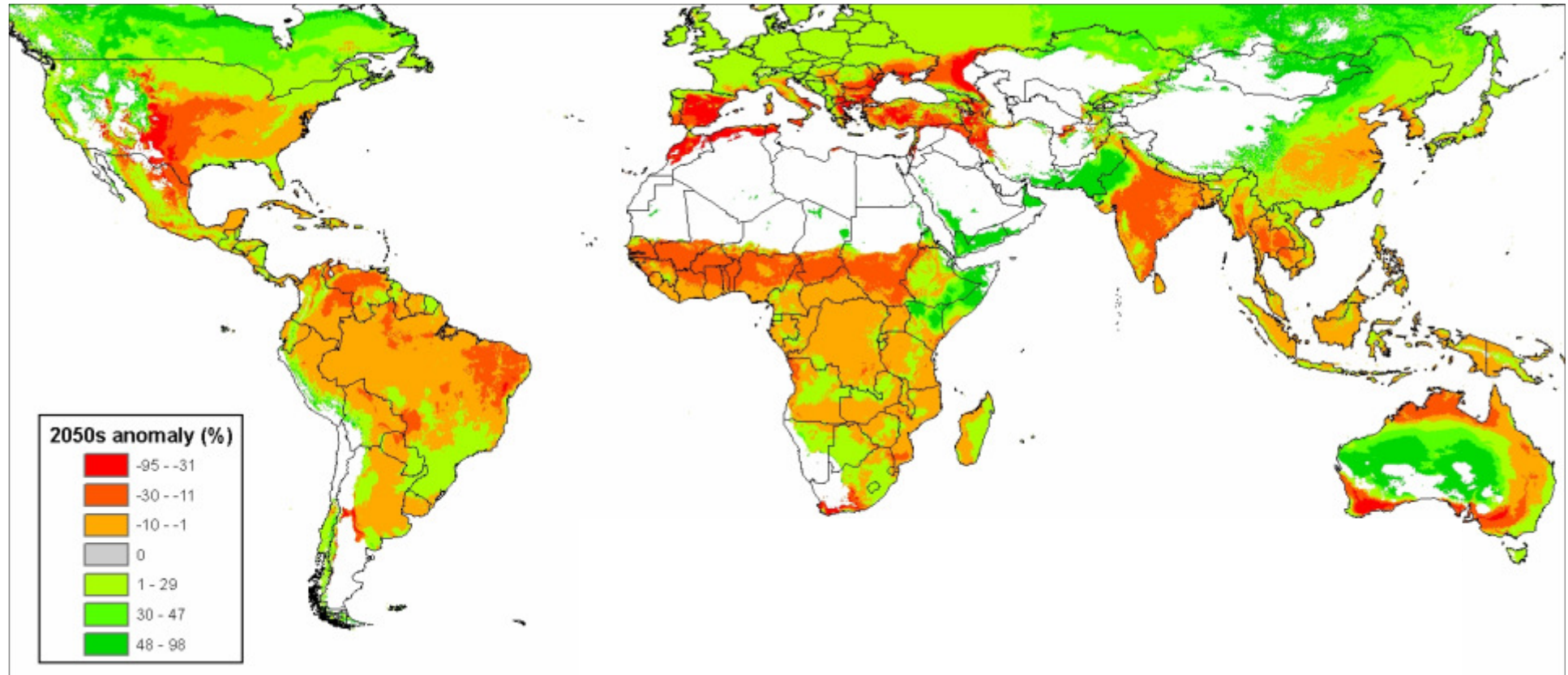


↑  
**Observed changes in growing season temperature for crop growing regions, 1980-2008.**

*Lobell et al (2011)*

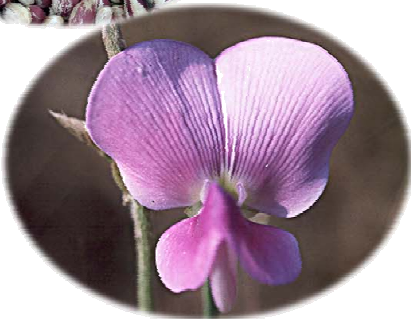
←  
**% Yield impact for wheat**

# Crop suitability is changing



Average projected % change in suitability for 50 crops, to 2050

# Impacts on wild PGRFA

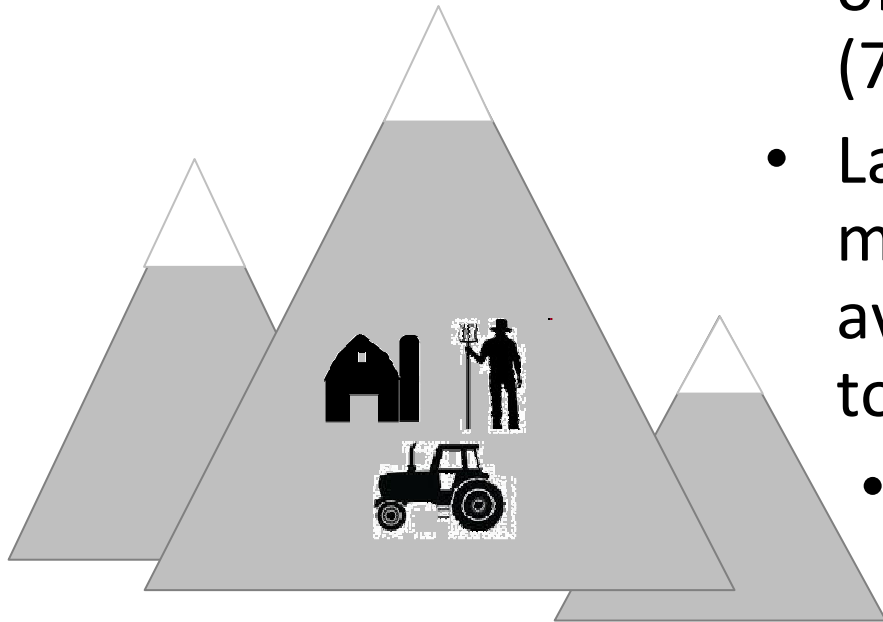


- 16-22% (depending on migration scenario) of these species predicted to go extinct (Jarvis et al. 2008)
- Wild peanuts were the most affected group, with 24 to 31 of 51 species projected to go extinct
- For wild potato, 7 to 13 of 108 species were predicted to go extinct
- *Vigna* was the least affected of the three groups, losing 0 to 2 of the 48 species in the genus

# Opportunities

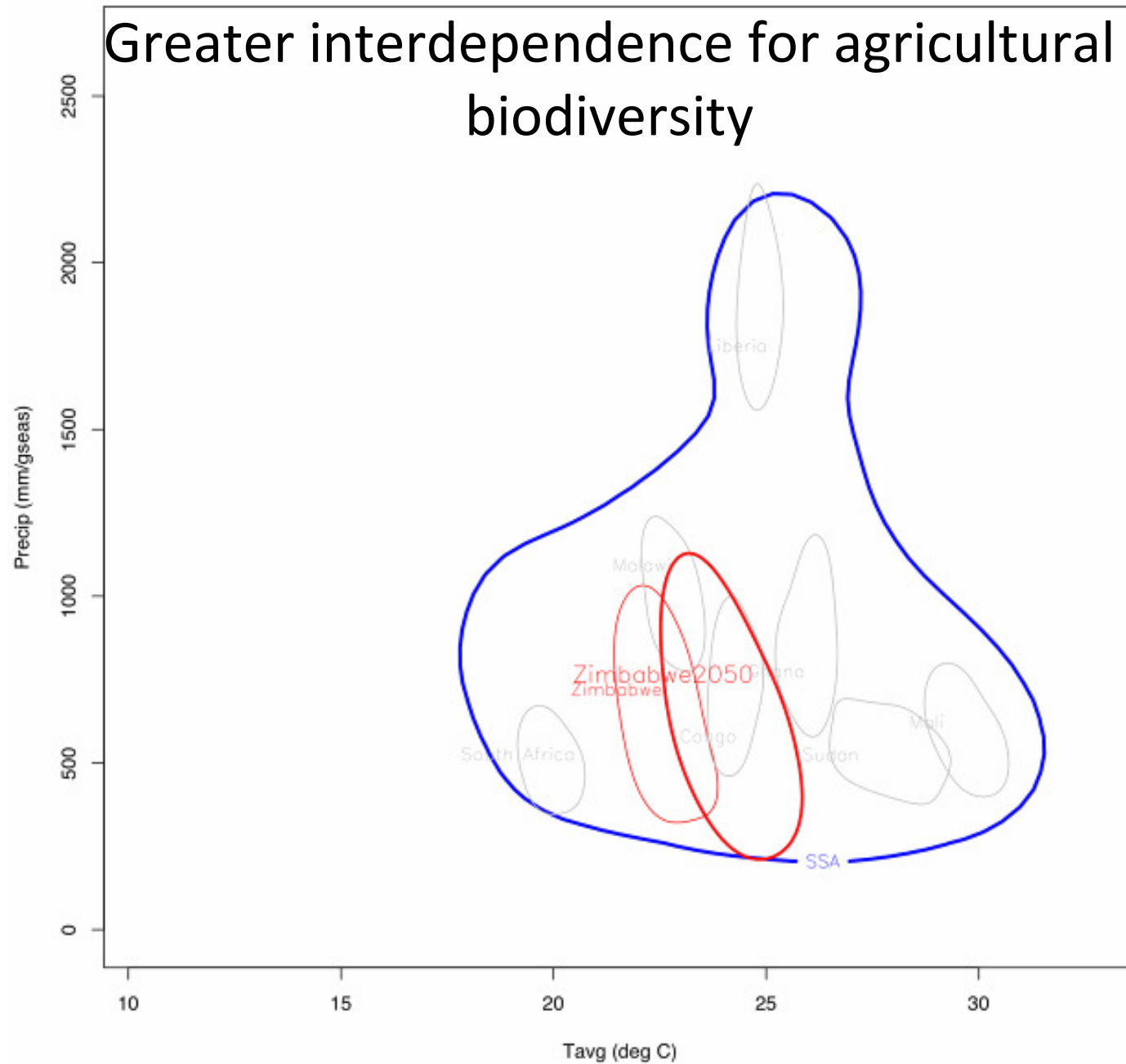


# Geographic transferral of agricultural practices and technologies



- Whilst some novel climate, majority of future climates are not novel (70%)
- Large pool of PGRFA and associated management practices already available to adapt. They just need to move geographically:
  - Locally (e.g. technologies and practices move up a mountain)
  - Regionally
  - Globally

SSA 1961–2002 gseas countrywide avgs, with 2050 zimbabwe data



Courtesy:  
Burke and  
Lobell

# Increased climatic interdependence in 2050: our numerical study

- 98% of countries more similar to others in 2050 than they currently are
- 30% increase in climatic interdependence between countries
- Greatest increases for bananas, barley, beans, coffee, groundnuts, maize, millets, potatoes, rice, sorghum and wheat, least for cassava
- Asia and Africa experience greatest increases in climatic interdependence

# Conclusions

- Climate change threatening centuries of site-specific agricultural development
- Hotter (everywhere), changed rainfall patterns (most places), and novel (30%) climates to be experienced
- Climate projections indicate *increased* climatic interdependence between countries and regions
- Many adaptation options, many coming from PGRFA
- Resulting in likely increase in PGRFA demand, and increased genetic resource interdependence