



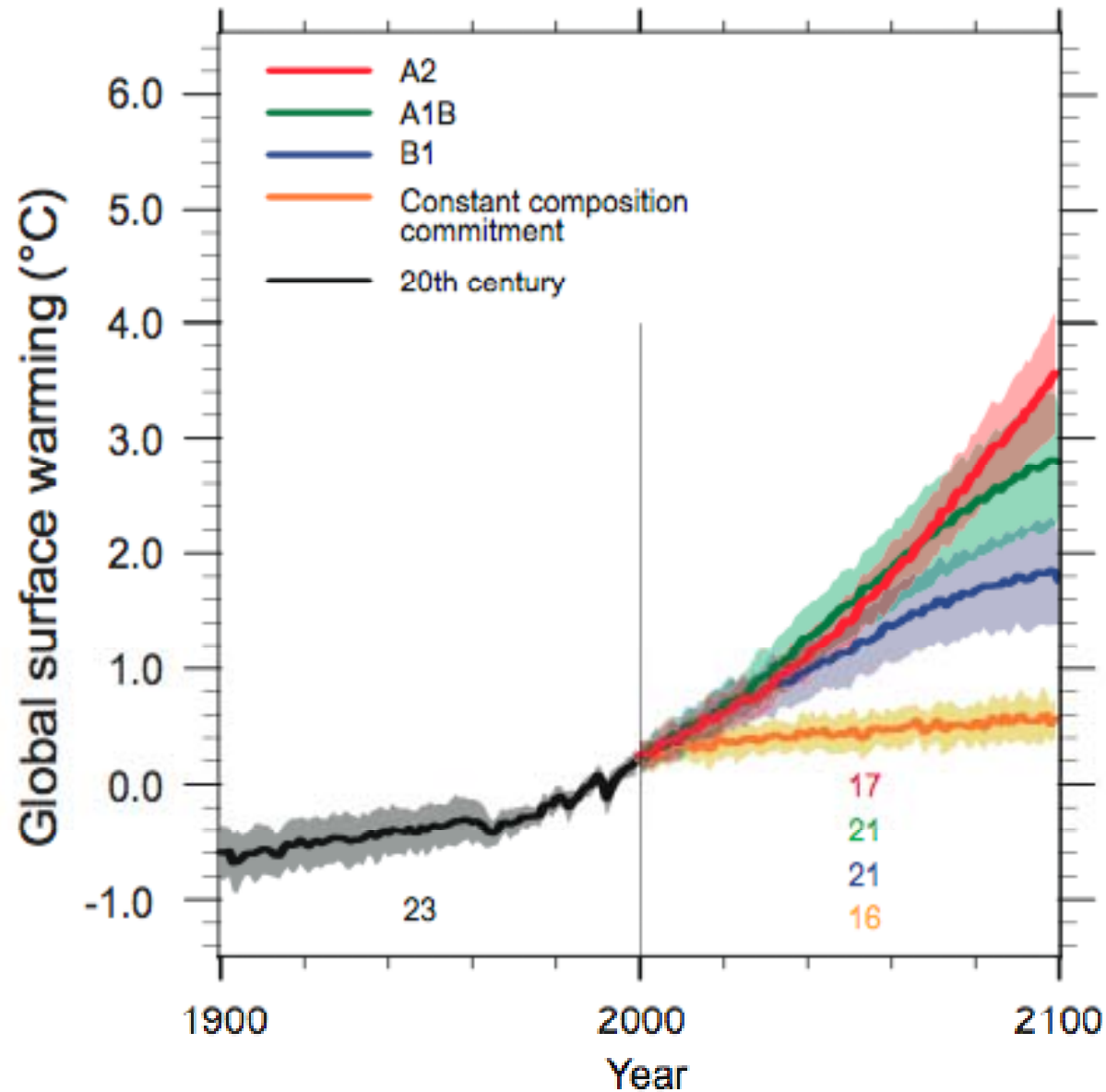
# Warming and Crop Production in the US and Beyond

David B. Lobell  
Food Security and Environment  
Program, Stanford University  
dlobell@stanford.edu

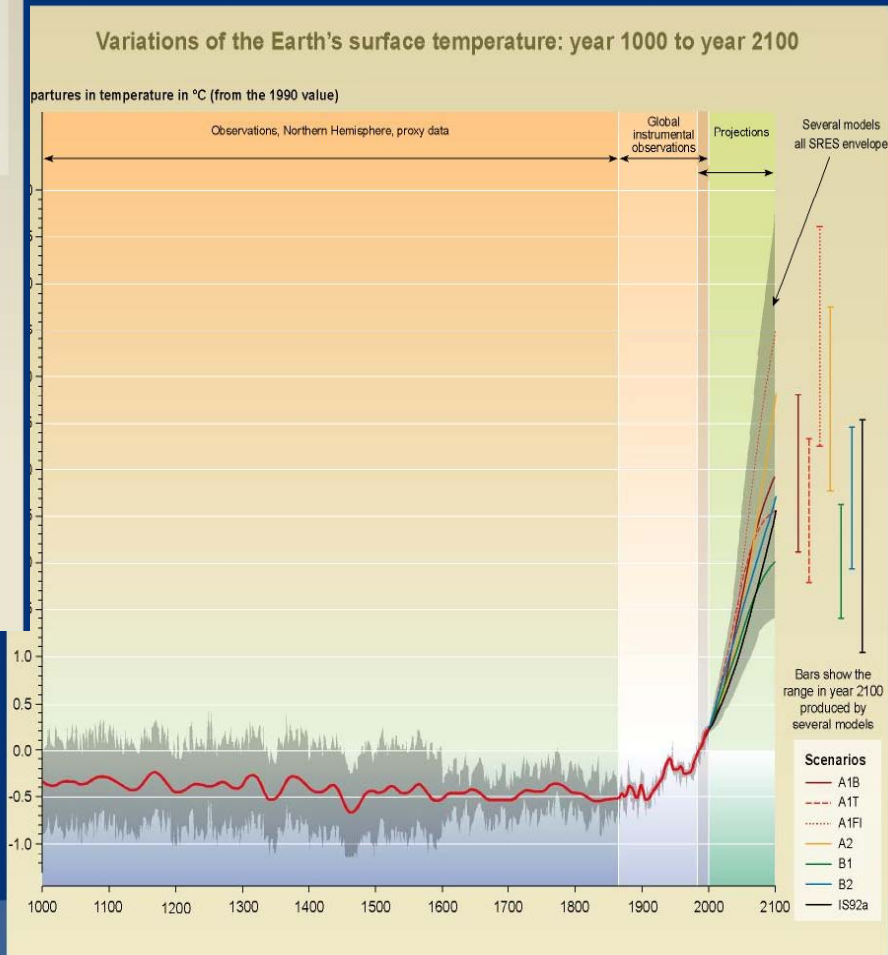
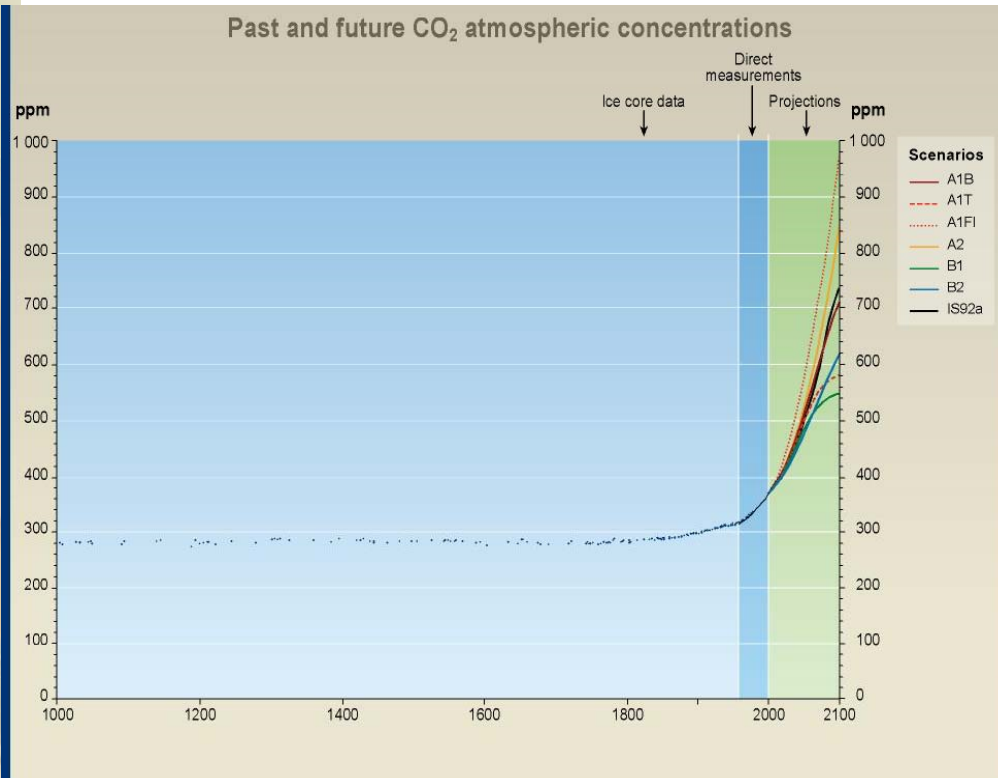
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1) Warming for the next 30-40 years will be independent of emissions

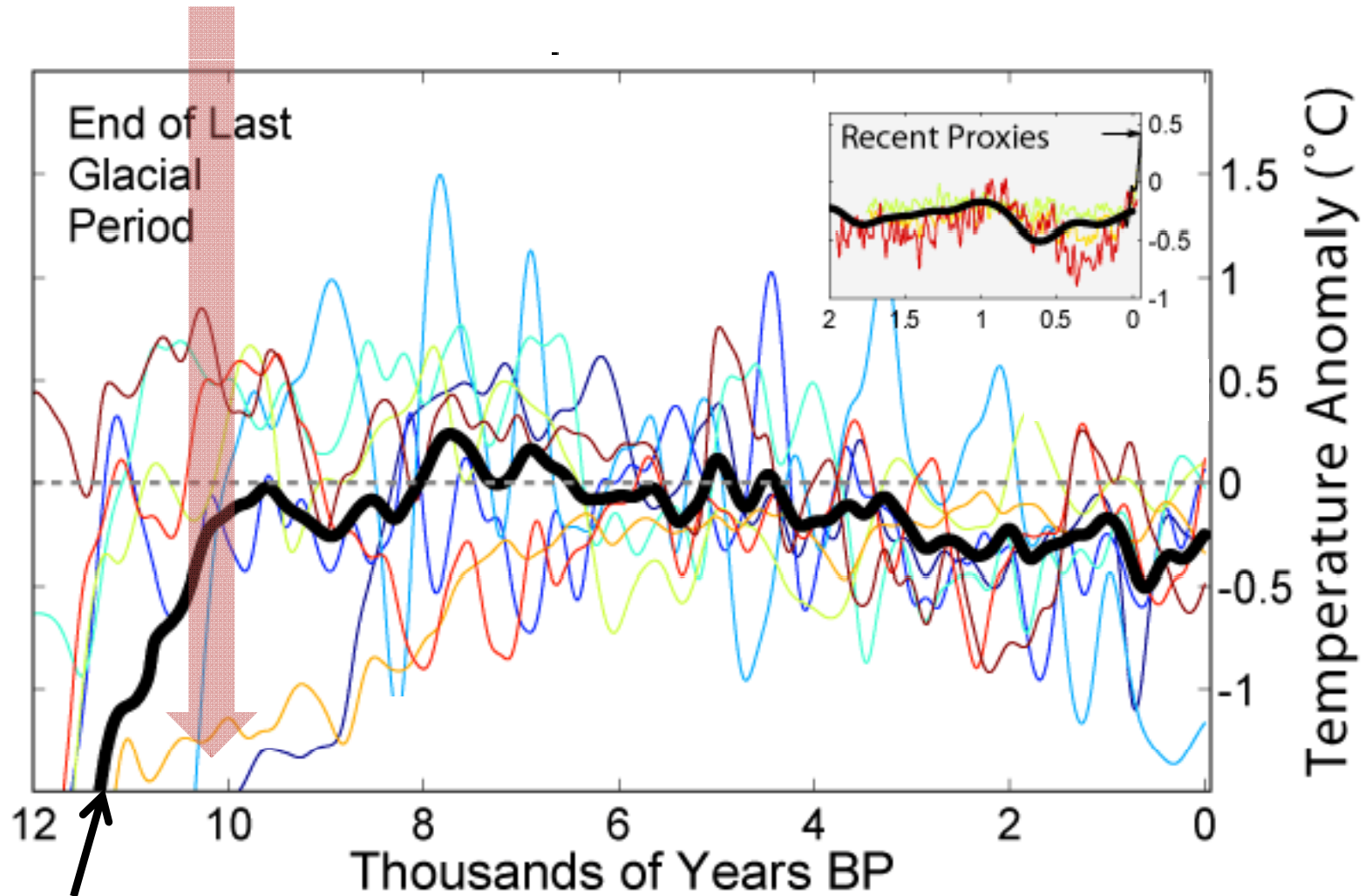


## 2) Temperatures and CO<sub>2</sub> levels are unprecedented in the history of agriculture



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Beginning of agriculture



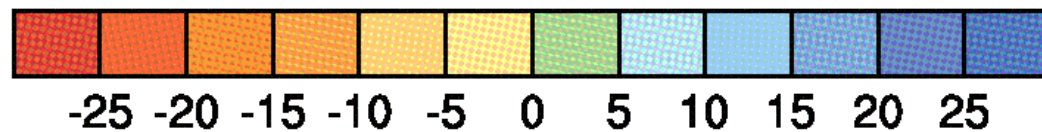
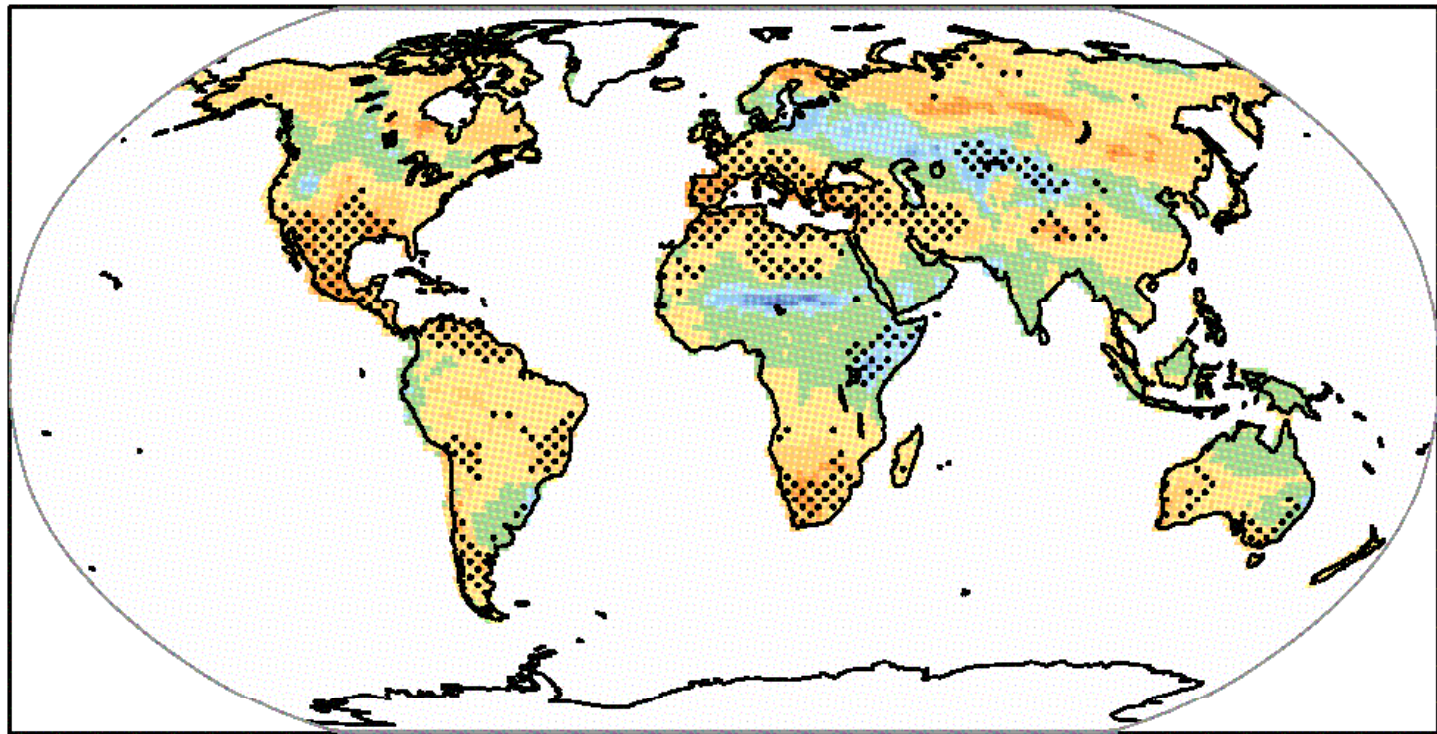
Average Global  
Temperature

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3) Rainfall changes are less certain, but a pattern of sub-tropical drying seems likely.

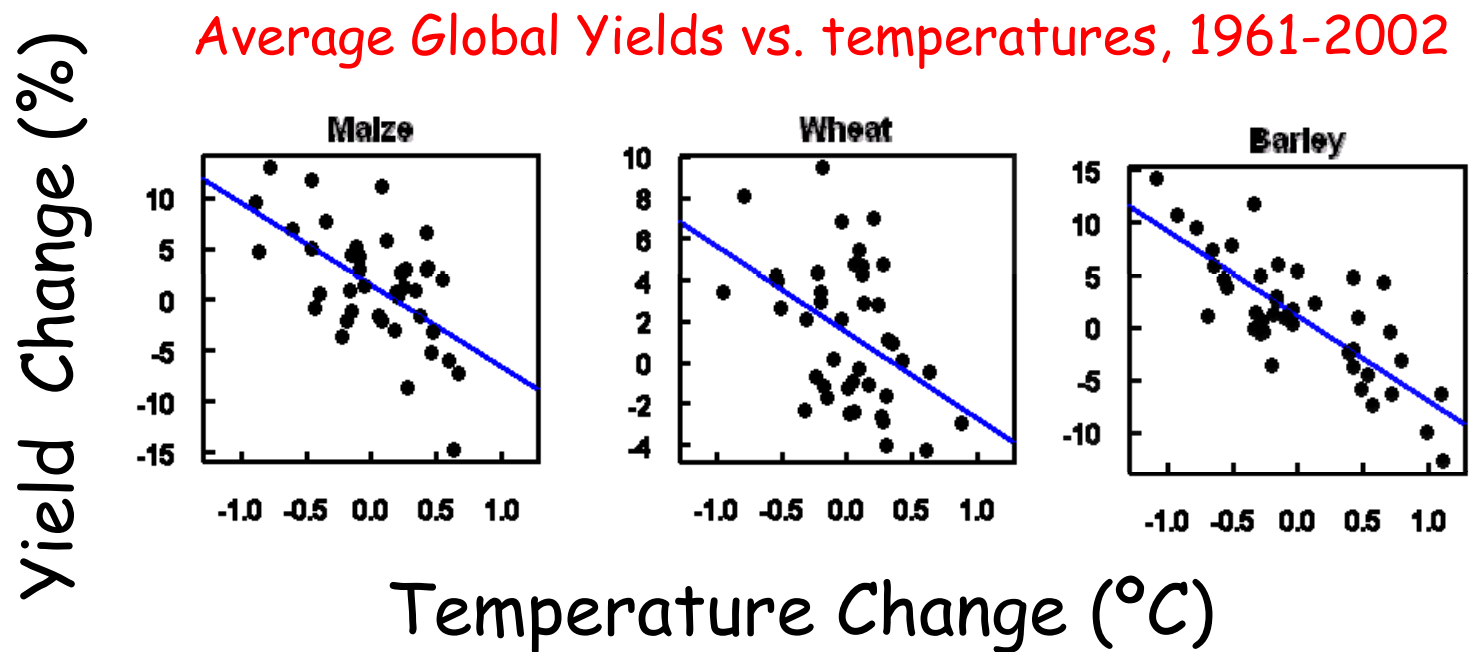
Average climate model projections of soil moisture change by 2080



(%)

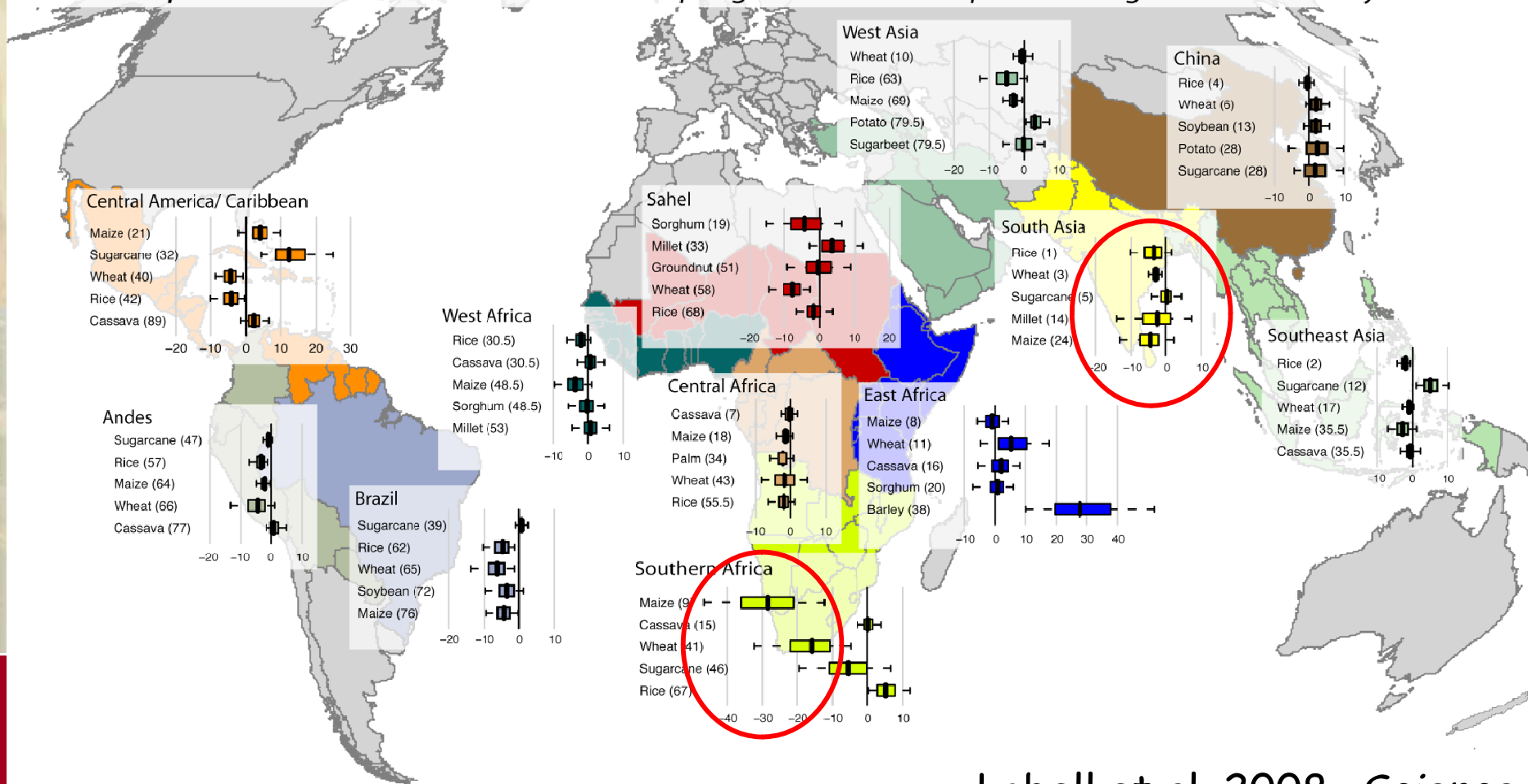
IPCC, 2007

- 4) Most crops in most regions prefer cooler temperatures. In many areas, climate effects will outweigh the positive effects of  $CO_2$  even in the short-term.



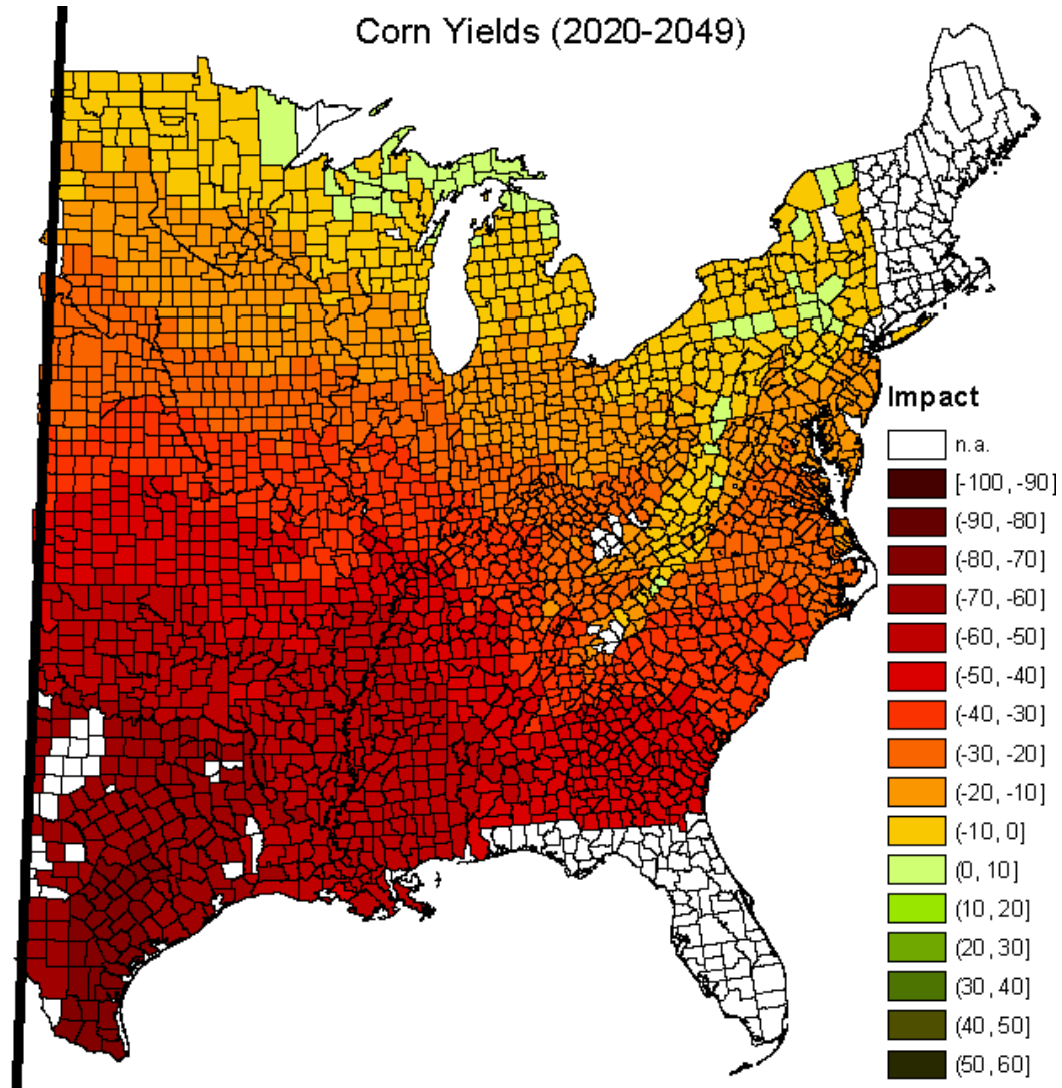
# 4) Most crops in most regions prefer cooler temperatures. In many areas, climate effects will outweigh the positive effects of CO<sub>2</sub> even in the short-term.

Projected impacts of climate change by 2030, for top 5 most important crops in each region. Boxes represent 25th-75th percentile of model projections, whiskers 5th-95th, and dark line the median projection. Number in parentheses is the overall rank of the crop/region in terms of importance to global food security.



Lobell et al. 2008, *Science*


# Warming effects on U.S. corn yields (%) *assuming current varieties*



Area-weighted Average Loss  $\approx$  30%

slide from Wolfram Schlenker, Columbia Univ.



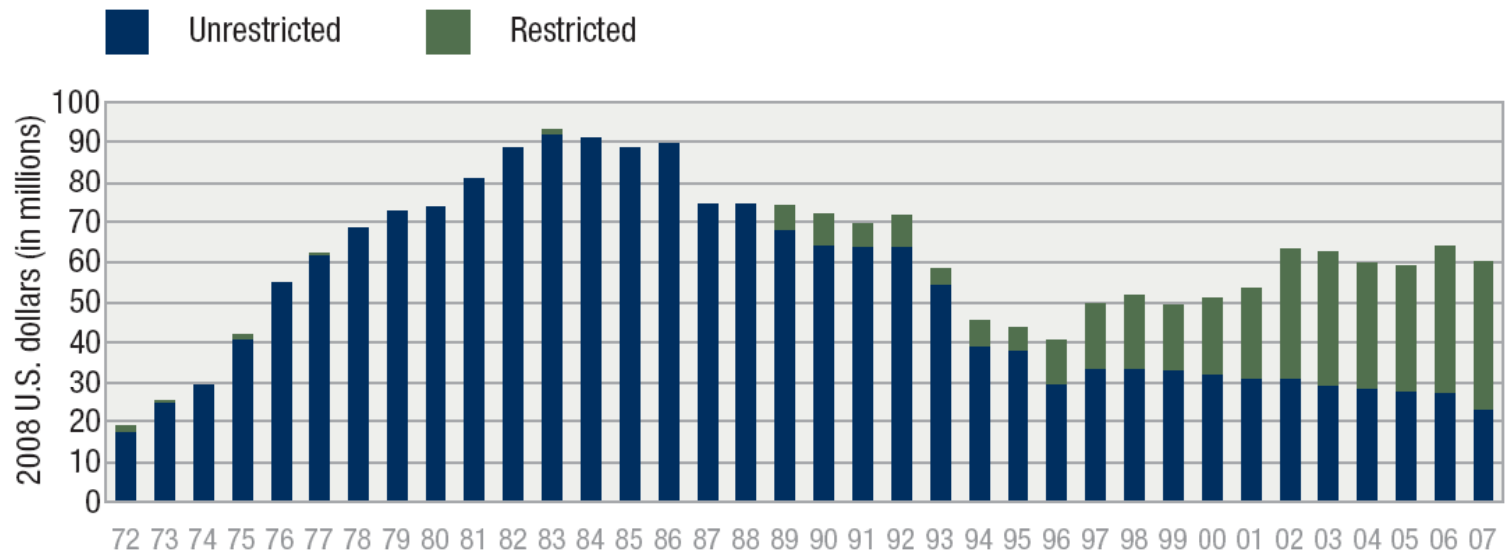


5) A lot can be done to adapt to higher temperatures and potentially to higher  $\text{CO}_2$ , but current investment is relatively low.

- Shift to longer maturing varieties
- Planting date shifts
- New crop varieties
- Better and expanded irrigation
- Rainwater harvesting and conservation tillage

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Figure 8 - U.S. Government Support to the Consultative Group on International Agricultural Research (1972-2007)



**Unrestricted funding** supports long-term and ongoing strategic research programs. The majority of USAID funding is to this stream. **Restricted funding** supports short-term, development-oriented projects.

Source: Personal communication.

**Source: "Renewing American Leadership in the Fight Against Global Hunger and Poverty The Chicago Initiative on Global Agricultural Development"**  
Report Issued by an Independent Leaders Group on Global Agricultural Development **Chicago Council on Global Affairs, 2009**

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Economist.com

WORLD  
INTERNATIONAL

### Climate change and the poor

## Adapt or die

Sep 11th 2008

From The Economist print edition

Environmentalists have long said the world should concentrate on preventing climate change, not adapting to it. That is changing

Panos



**\$50 billion, or thereabouts**

Estimated costs of adapting to climate change

To begin with, the money involved is just a puff of smoke. Back-of-the-envelope calculations suggest the cost of coping with climate change is in the tens of billions a year for poor countries (see table). The total pledged to date (cumulatively, not per year) is \$300m, of which just 10% has actually been spent. China says rich countries should allocate 0.5% of their national incomes in official aid to help developing countries adapt. But most rich countries are failing to fulfil earlier promises to increase aid for other reasons, so that looks like a non-starter.

Assessment by	Annual cost \$bn	In
UNDP (2007)	86	2015
UNFCCC (2007)	28-67	2030
World Bank (2006)	9-41	2008
Oxfam (2007)	>50	2008
Stern Review (2006)	4-37	2008

"I USED to think adaptation subtracted from our efforts on prevention. E

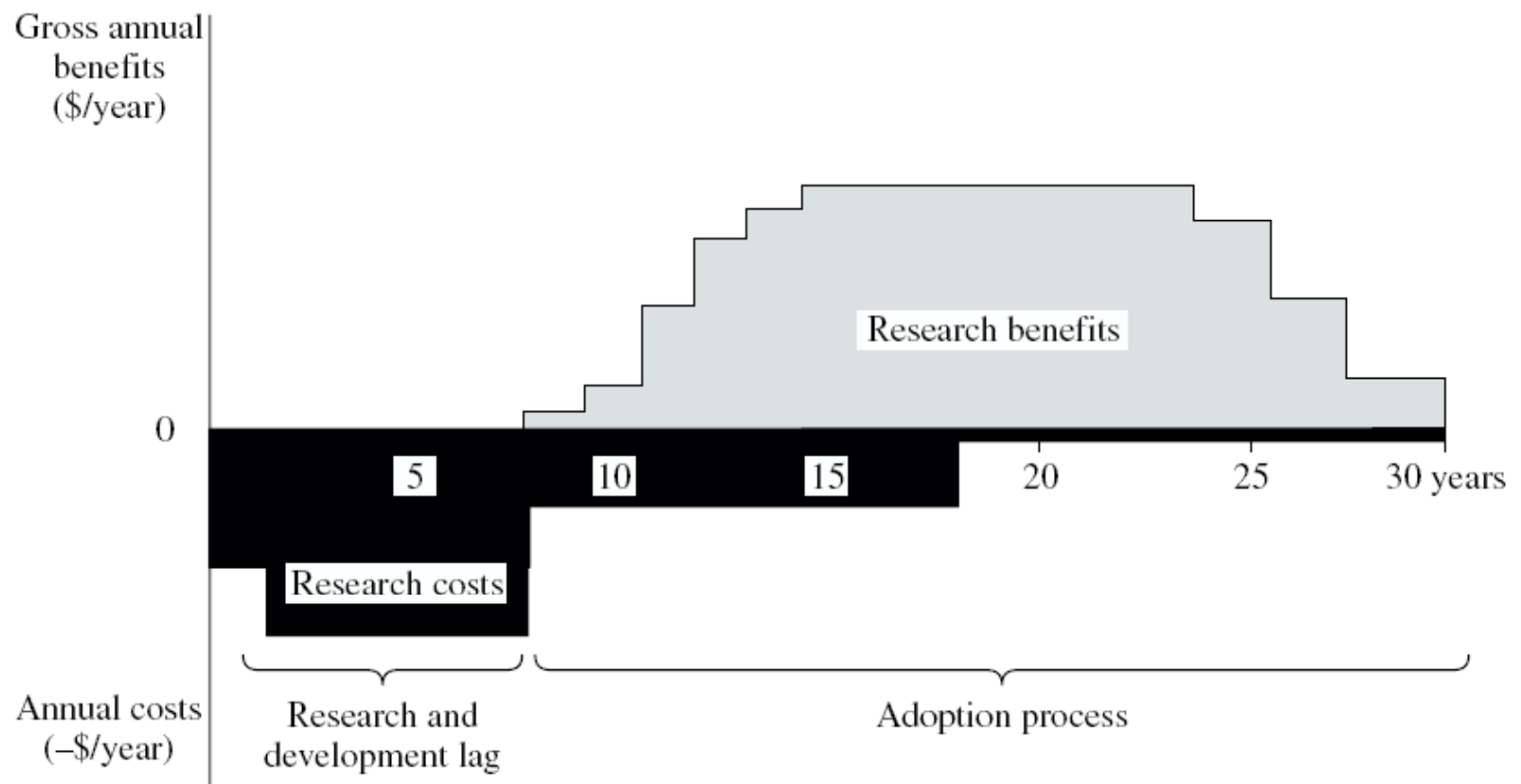
Source: World Resources Institute

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Figure 1—Flows of resources, benefits, and costs



Source: Alston, Norton, and Pardey 1995.



For more information:  
<http://fse.stanford.edu>  
[dlobell@stanford.edu](mailto:dlobell@stanford.edu)

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