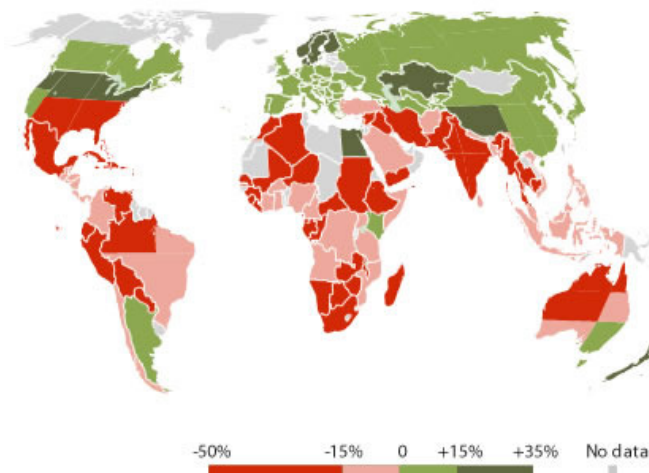


**Achieving food security in the face of climate change**  
**The Commission on Sustainable Agriculture and Climate Change**

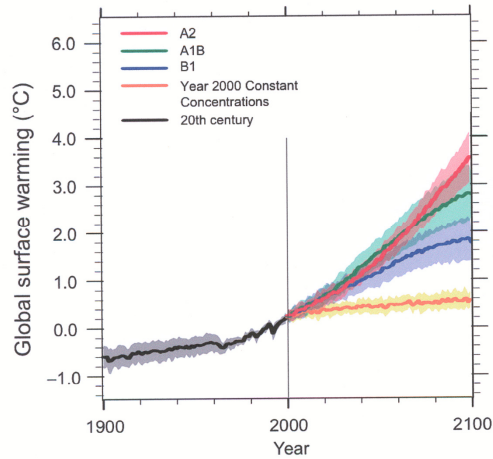
Professor Tim Wheeler  
Deputy Chief Scientific Adviser



- Imperfect knowledge and uncertainty
- What works and what does not
- Information systems and data
- Some final thoughts



Cline 2007



IPCC WG1 Summary Report, 2007

## Climate change impacts on crop productivity in Africa and South Asia

### A systematic review

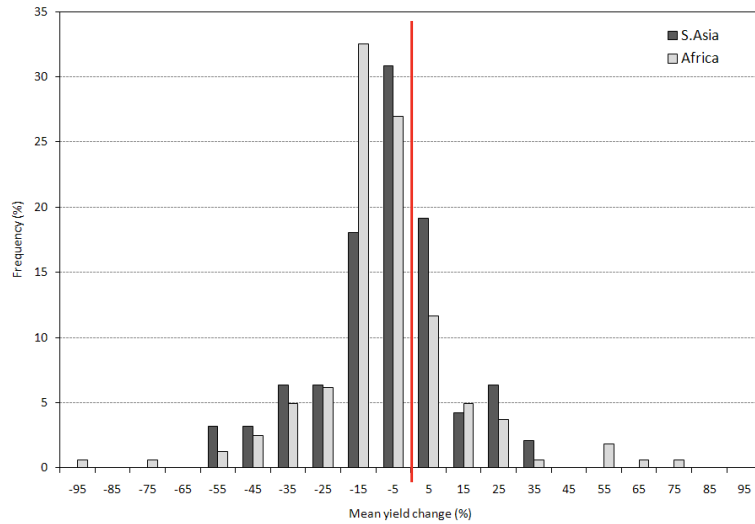
**Across Africa**

- 17% wheat
- 5% maize
- 15% sorghum
- 10% millet

**Across South Asia**

- 16% maize
- 11% sorghum

No change in yield was detected for rice



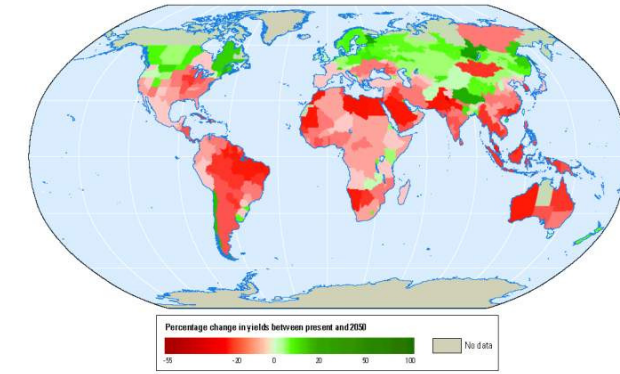
Frequency distribution for projected mean yield change (%) for all crops (n = 257)

**‘As a policymaker, as a business leader, as a citizen, would you make decisions on the basis of these models?’**

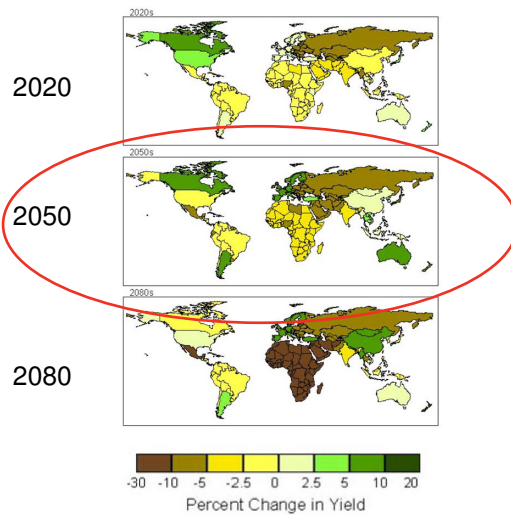
*Richard Black on climate model predictions*

## Forecasts of crop productivity 2050

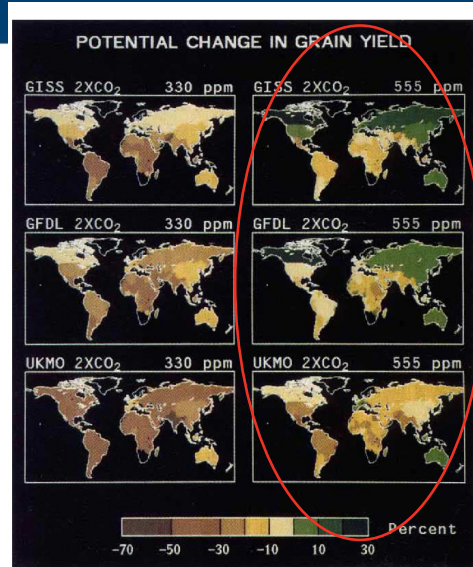
Map 1 Climate change will depress agricultural yields in most countries in 2050, given current agricultural practices and crop varieties



World Bank Development Review 2010



A1 scenario. wheat, rice, maize. Parry et al., 2004



Rosenzweig and Parry, 1994

- Sound policy-making is about risk management
- 'progress on ... ambiguity can be of significant value to policy-makers'
- 'the case against action has to argue that the risks are small, not that outcomes are uncertain'

Smith LA and Stern N (2011).  
Uncertainty in science and its role in climate policy.  
Phil Trans Royal Soc A, 369, 4818-4841

## Scuba Rice

- Paddy loss due to flooding in Bangladesh and India amounts to an estimated 4m tons of rice p/year - enough to feed 30m people
- In the Philippines, 2006, 50 provinces were affected by devastating typhoons and floods which cost the rice industry US\$65m.
- Research led by IRRI has developed a flood-tolerant local rice variety to isolate the gene responsible for flood resistance.
- The flood tolerant “scuba” versions of rice varieties can withstand 17 days of complete water submergence
- Six Sub1 “mega varieties” of rice have been produced



Submergence rice varieties at a test site in Bangladesh

"I gave up hope of getting any yield from my land as paddy seedlings remained submerged for 17 days. But to my surprise the seedlings grew green again after the flood. Still I can't believe I have got 18 maunds (672 kg) of paddy from there." **Biplob Sarker, farmer, Bangladesh**

## Effectiveness of agricultural interventions that aim to improve nutritional status of children

### What this study adds

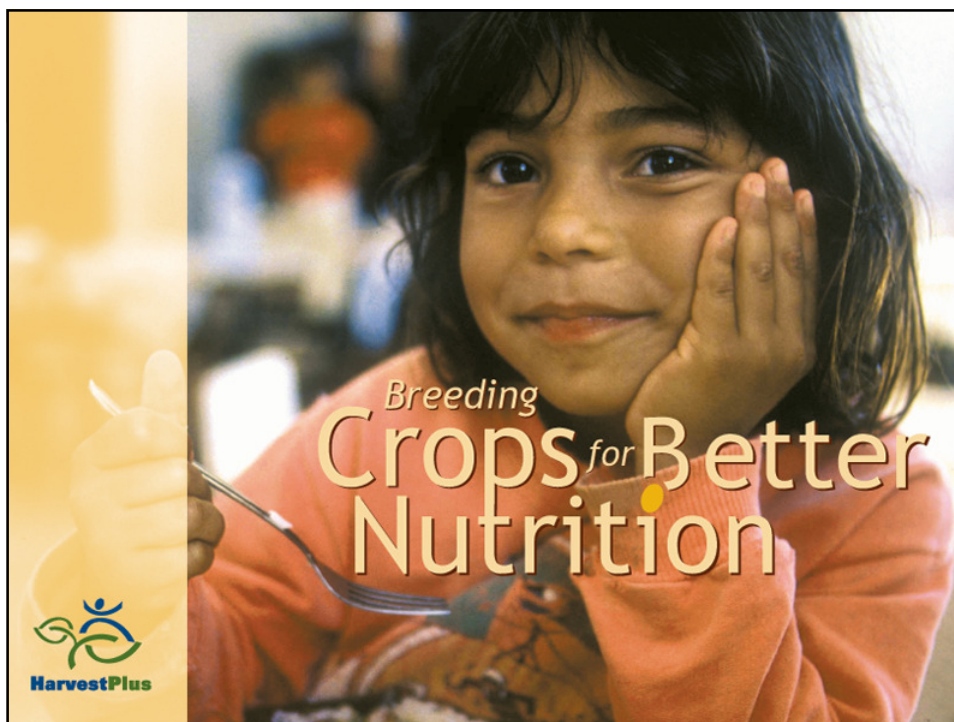
Food based agricultural interventions effectively increase the production and consumption of the food promoted, and some evidence suggests that this leads to higher vitamin A intake

The available evidence shows no effect of these interventions on nutritional status of children, but methodological weaknesses of the studies reviewed cast serious doubts on the validity of these results

Agreed standards and guidelines for rigorous evaluation of the effect of agricultural interventions are needed

Masset E et al. (2012).  
Effectiveness of agricultural interventions that aim to improve nutritional status of children: systematic review.  
BMJ 2012;344:d8222 (Published 17 January 2012)





## Micronutrient-Rich Crops for Africa



**Cassava**  
Provitamin A  
DR Congo, Nigeria



**Beans**  
Iron (Zinc)  
DR Congo, Rwanda

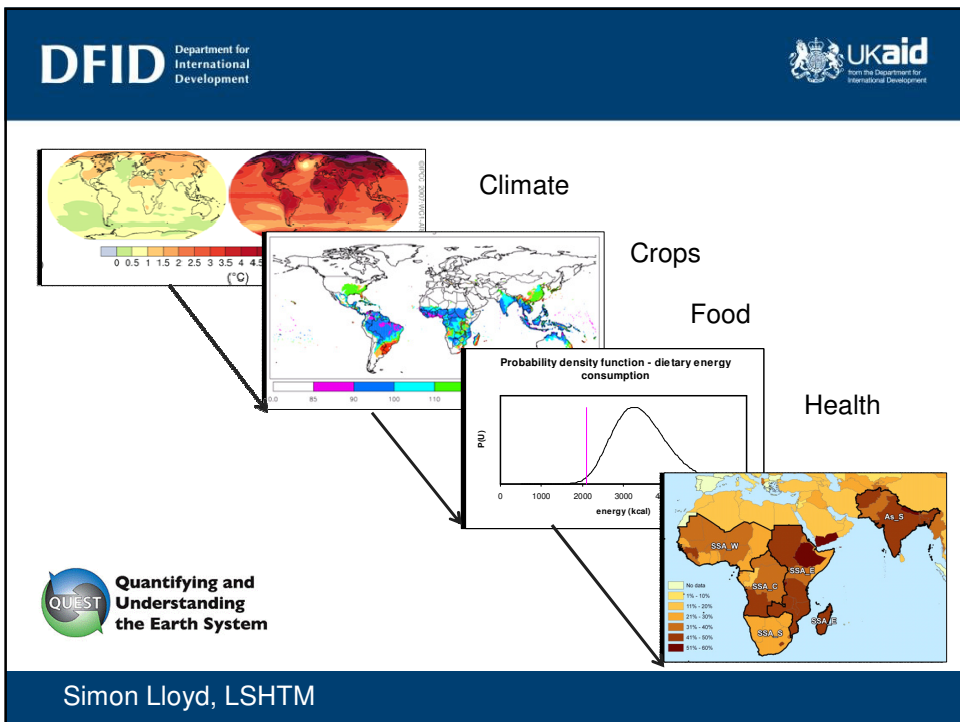


**Maize**  
Provitamin A  
Zambia

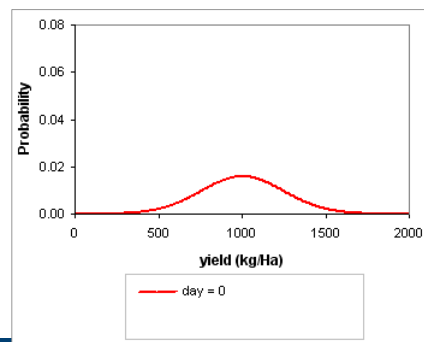
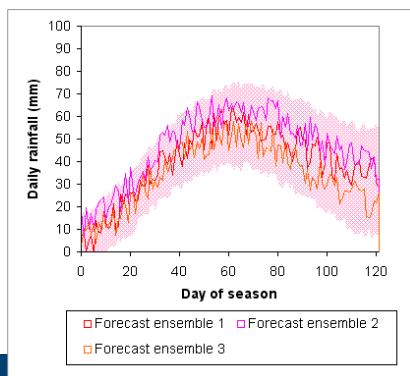


**Sweet Potato**  
Provitamin A  
Mozambique,  
Uganda

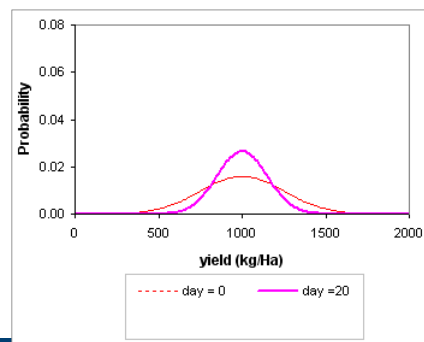
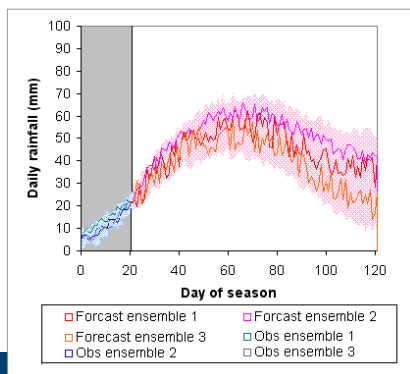




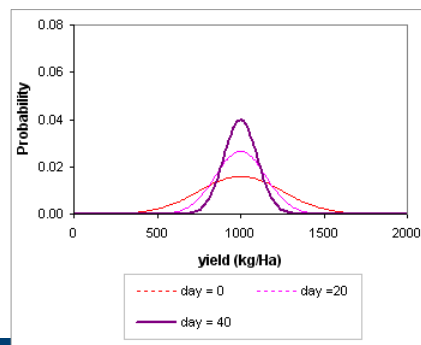
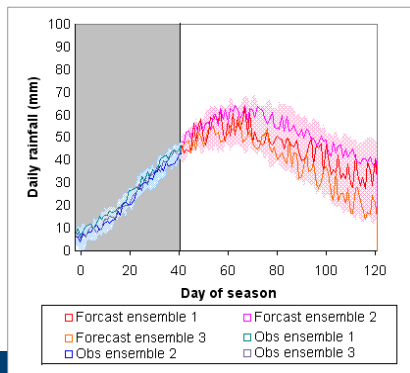
**1. Start with ensemble based on seasonal forecast to give likely yield range**



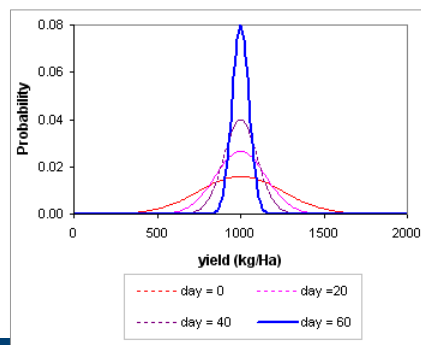
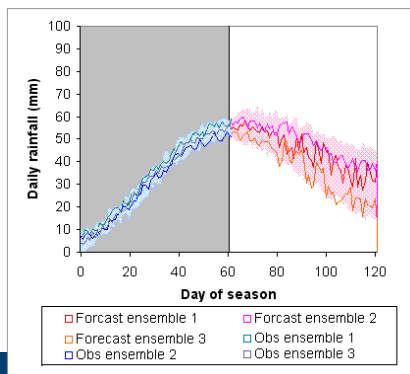
- 1. Start with ensemble based on seasonal forecast to give likely yield range.**
- 2. As season progresses, substitute ensemble from satellite estimates**



1. Start with ensemble based on seasonal forecast to give likely yield range
2. As season progresses, substitute ensemble from satellite estimates



1. Start with ensemble based on seasonal forecast to give likely yield range
2. As season progresses, substitute ensemble from satellite estimates



Main rains now start earlier ...	by one month on average	✗
... and end earlier	by one month on average	✗
Rainfall within the season is now more variable	More dry days	✗
Total rainfall is has declined	All farmers agreed	✗
It is now warmer	80% perceived this	✓

**Sarah Cooper, University of Reading**

Survey of 141 famers in Nyanja and Rukindo parishes in 2009

Met data from Mbarara 1960-2009

Perceptions of climate change by farmers in Uganda

### Some final thoughts

- Priorities
- Trade offs  
(next slide)
- Building capacity – individual, institutional, organisational
- Agriculture and food systems will change
- Implementation and delivery

