



Government
Office for
Science

Disaster anticipation and response: the contributing challenges of the early 21st Century

British Embassy, Tokyo, 5 October 2012

Professor Sir John Beddington
Chief Scientific Adviser to HM Government and
Head of the Government Office for Science



In key ways the next 20 years are already determined

The global community will have to contend with a number of significant challenges

Consumption will increase with prosperity

Climate change: GHG now in the atmosphere will drive changes up to 2030.

Population increase: An extra billion people by 2025

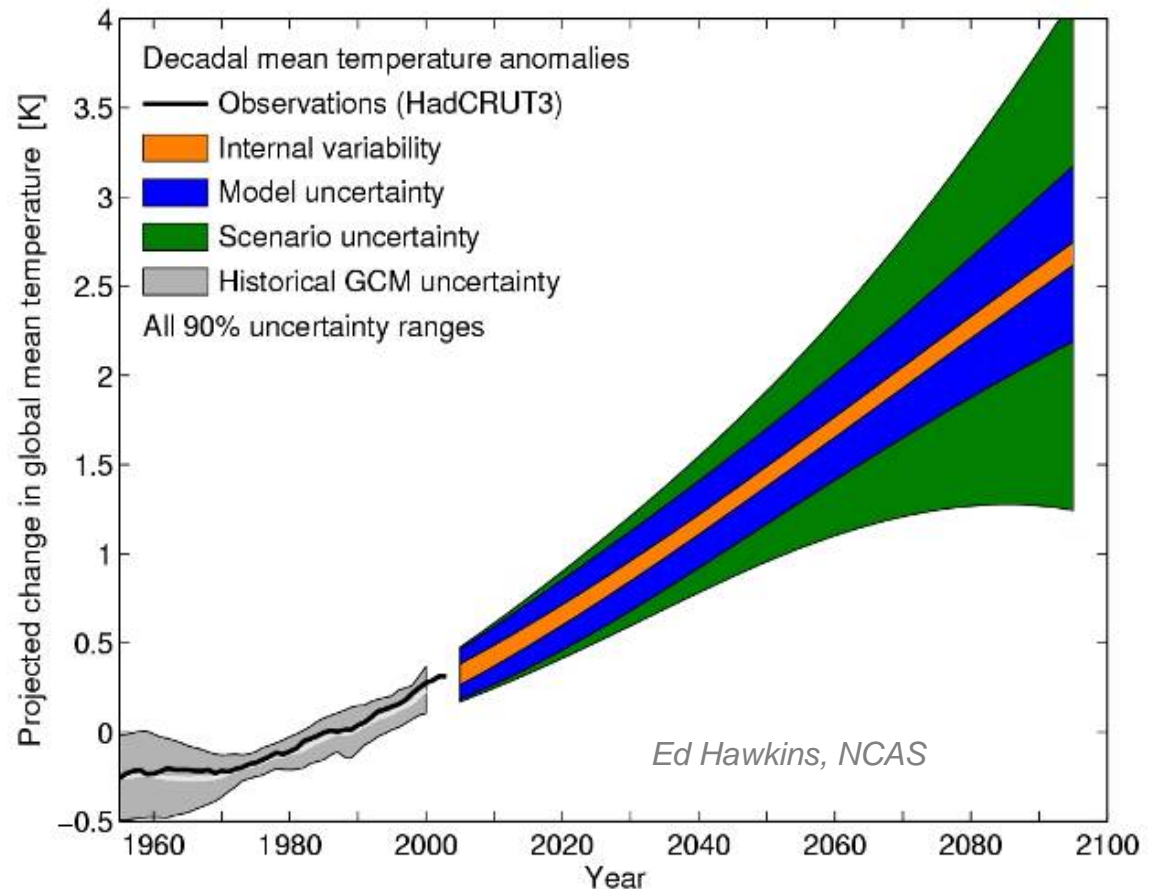
Urbanisation: 2010 first year urban population exceeded the rural population ~55% 2025





Climate change is happening

- There are uncertainties around predicting precise impacts due to difficulties of:
- **Scenario uncertainty:**
 - Setting targets
 - Achieving consensus
 - Keeping to targets
- **Model uncertainty:**
 - Knowledge limitations
 - Chaotic nature of the climate system

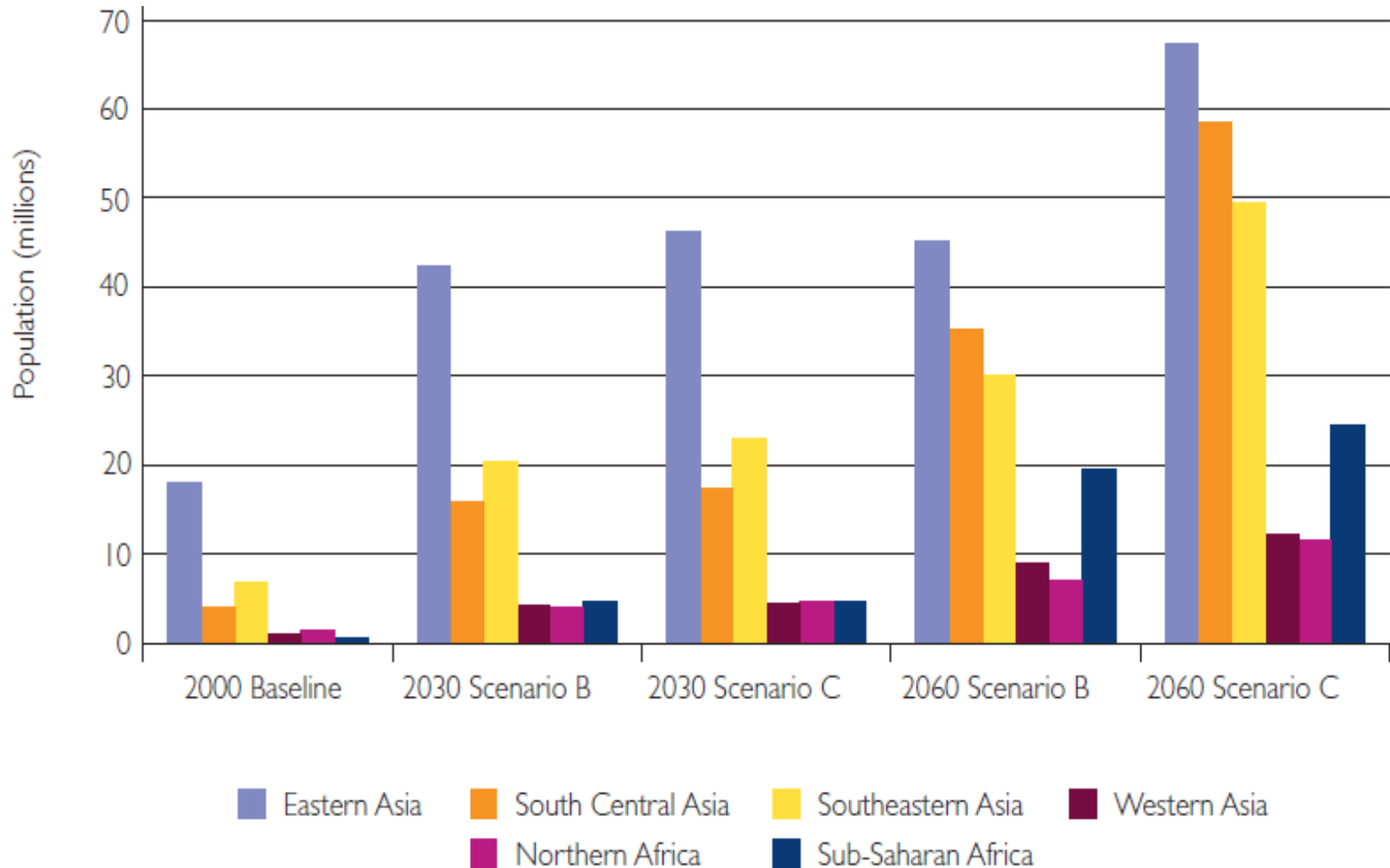


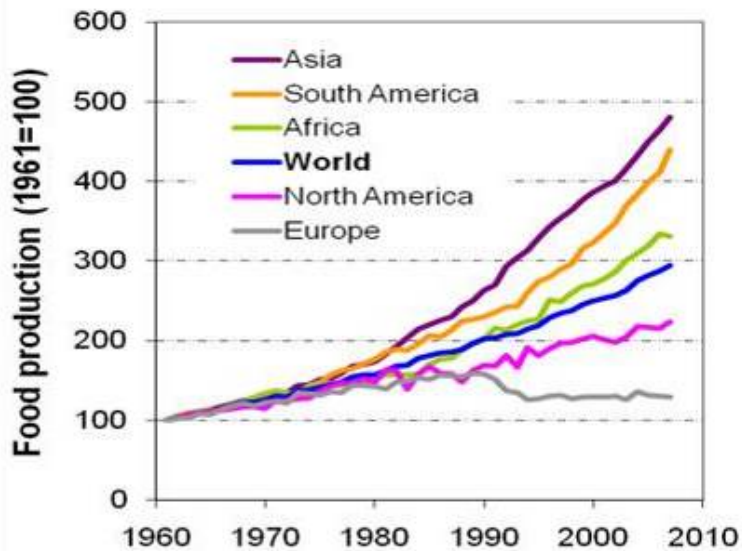
Contributions to uncertainty in decadal mean surface air temperature change estimated from the CMIP3 ensembles



Urban growth likely to occur in areas increasingly vulnerable to the environment

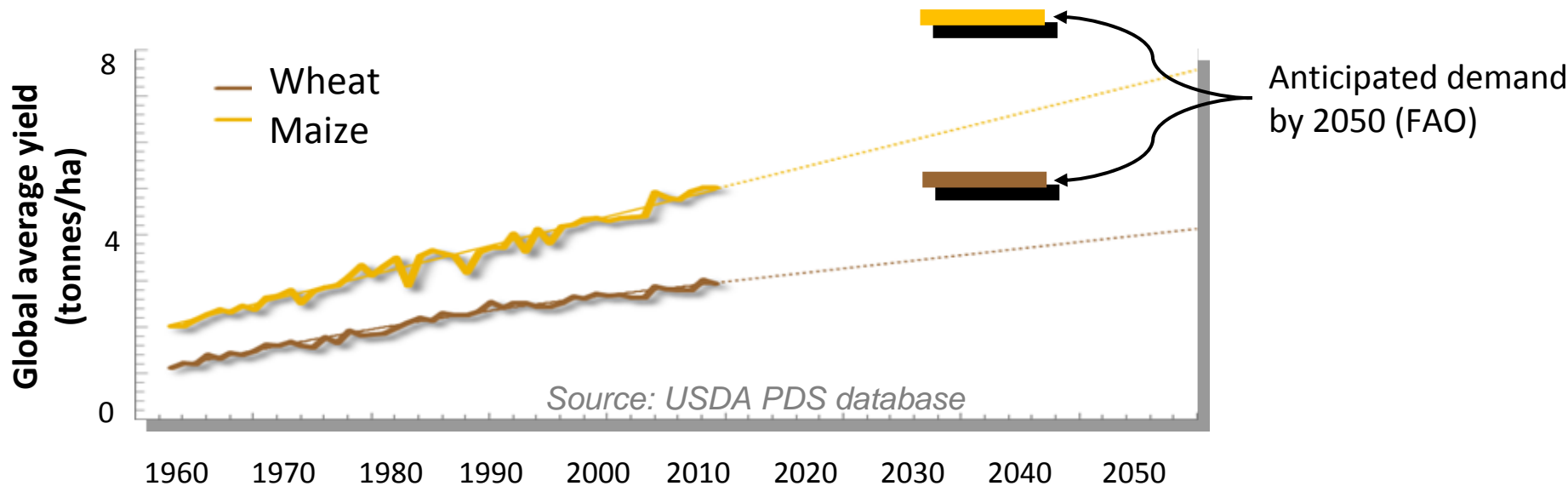
People living in urban coastal flood zones in 2060

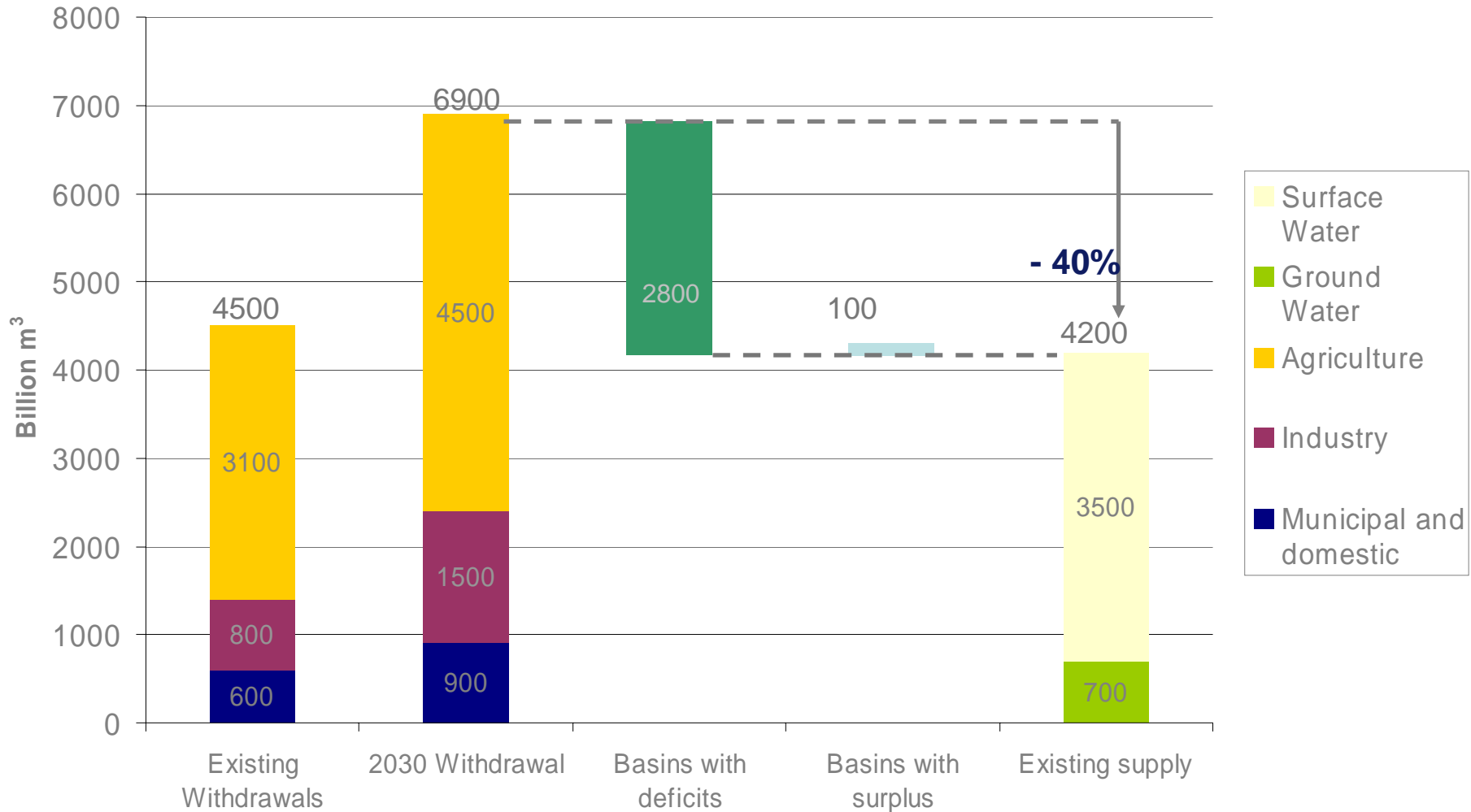




Food production

- **Issue:** It is predicted the global population will increase by 1 billion by 2030
- **Question:** How to meet the growing demand for food.
- **Action:** To meet demand we need to increase yield





Source: Water 2030 Global Water Supply and Demand model; agricultural production based on IFPRI IMPACT- WATER base case



Food security:

- 925 million people go hungry
- Around 1 billion people suffer from the 'hidden hunger'
- World population is increasing by 6 million per month
- An extra billion tonnes of cereals will be needed by 2030 (FAO)



Water security:

- 1.2 billion people live in areas affected by physical water scarcity
- 1.6 billion people live in areas affected by economic water scarcity
- 884 million people lack access to clean water
- Poor quality water in Middle East and North Africa costs from 0.5% to 2.5% of GDP.



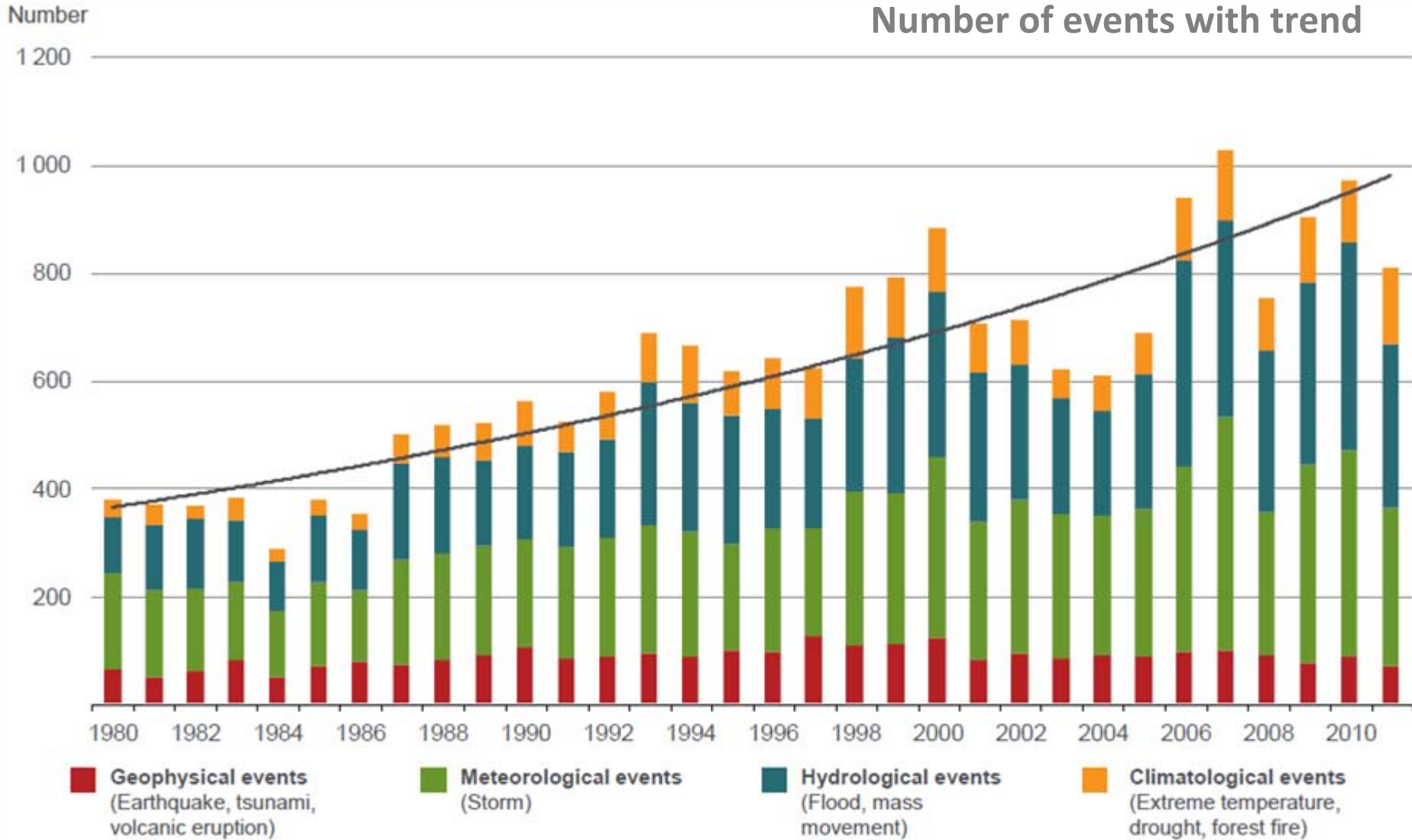
Energy security:

- Currently, 1.4bn people do not have sufficient electricity.
- It is estimated that in 2030 1.2bn people will still lack access to electricity





Natural catastrophes worldwide 1980 – 2011

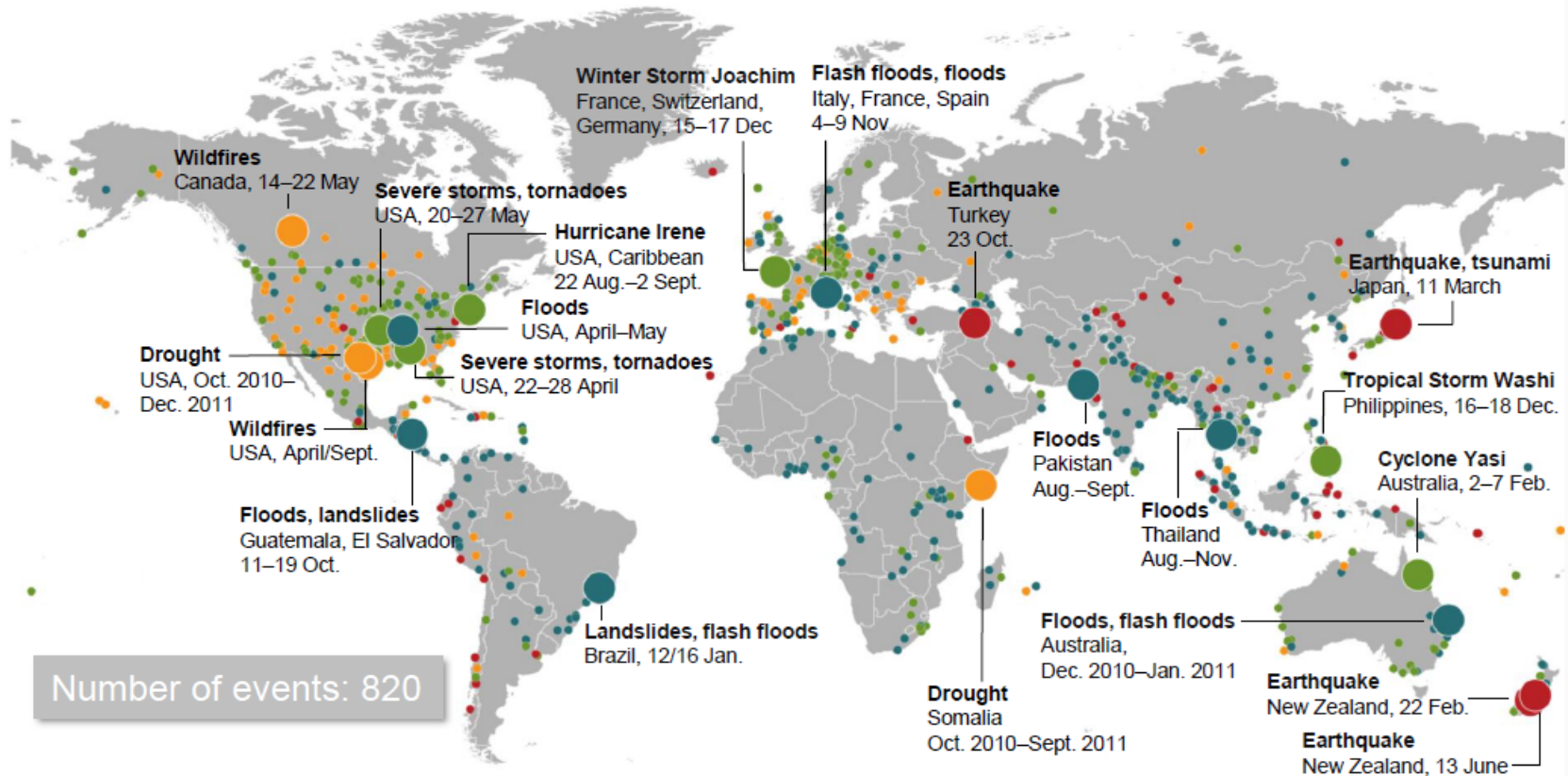




NatCatSERVICE

Natural Catastrophes 2011

World map

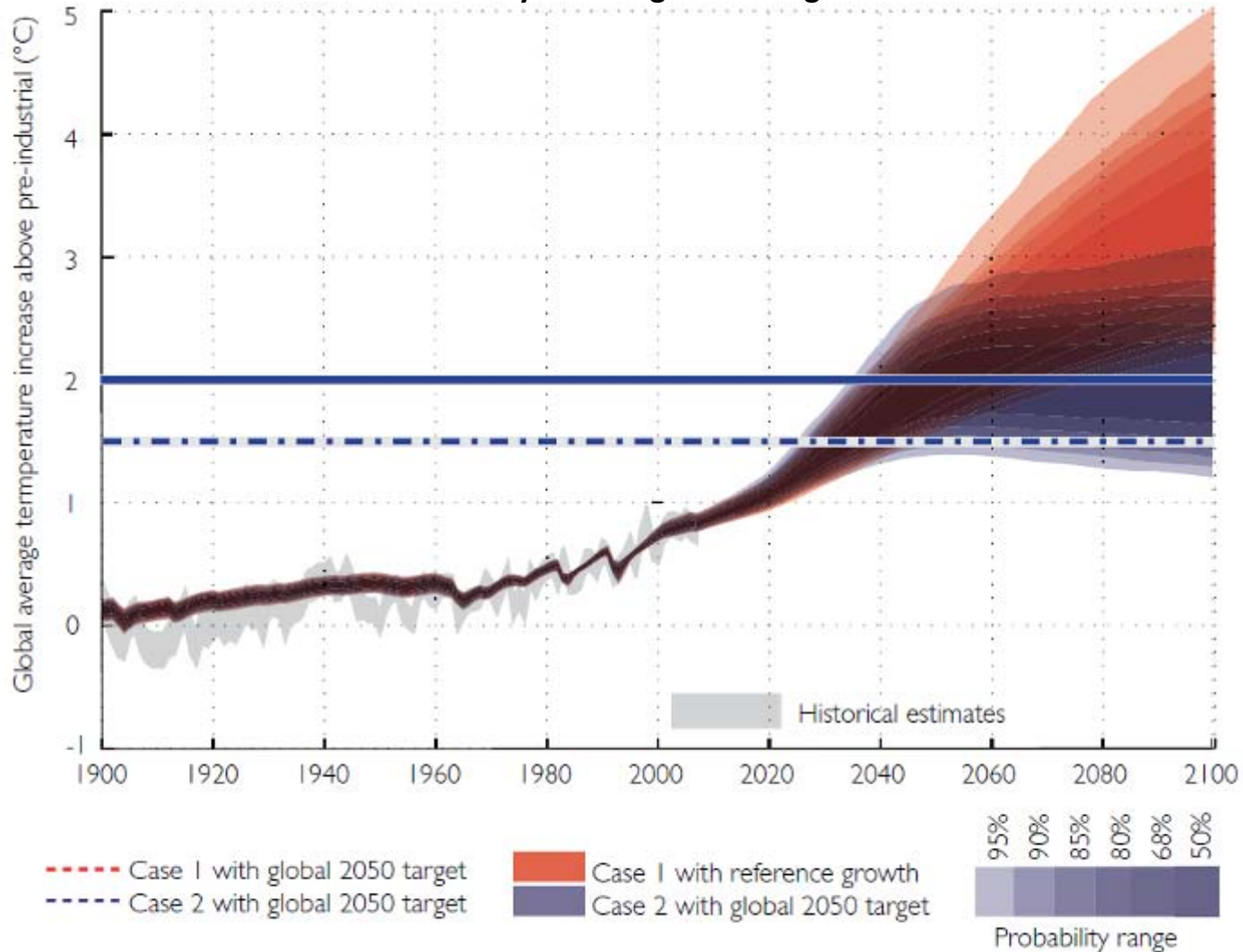


Number of events: 820

○ Natural catastrophes	● Geophysical events (earthquake, tsunami, volcanic activity)	● Hydrological events (flood, mass movement)
○ Selection of significant loss events	● Meteorological events (storm)	● Climatological events (extreme temperature, drought, wildfire)

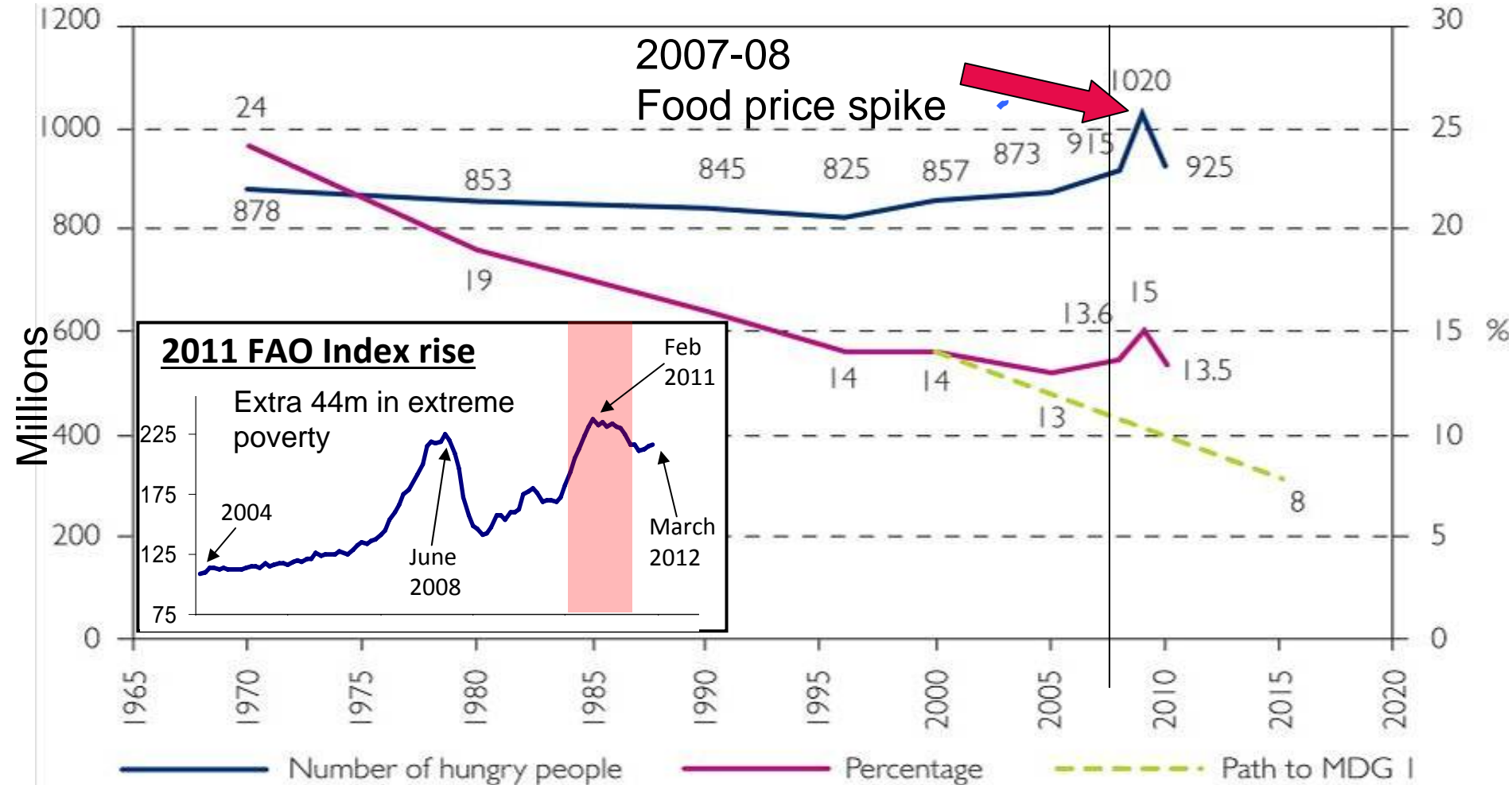


Effect of the Copenhagen Accord on global average temperature through the 21st century, essentially no change following Durban



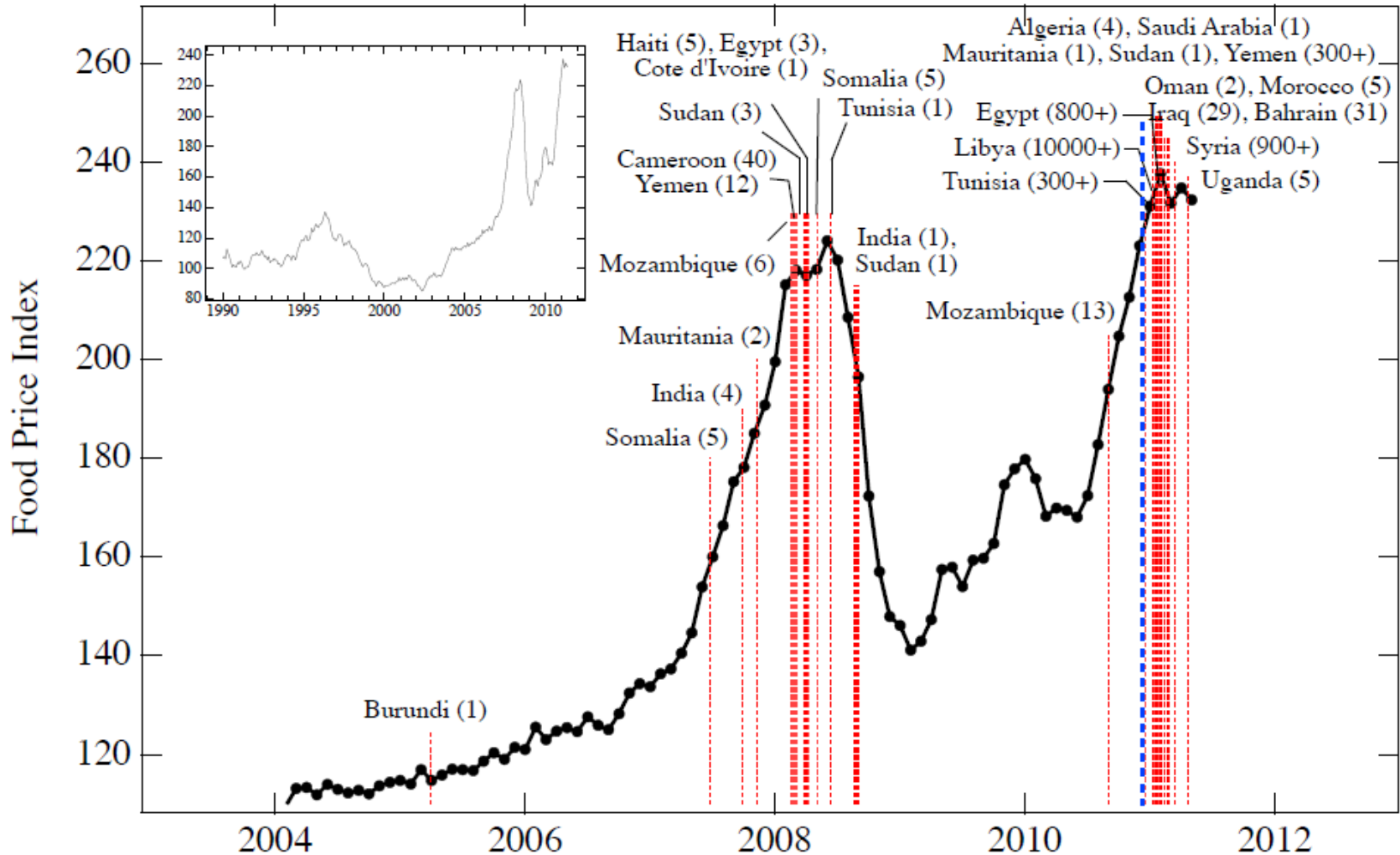


Undernourishment data versus the MDG target





Knock on effect: Political instability?





UK National Risk Register

Figure 1: Risks of terrorist and other malicious attacks

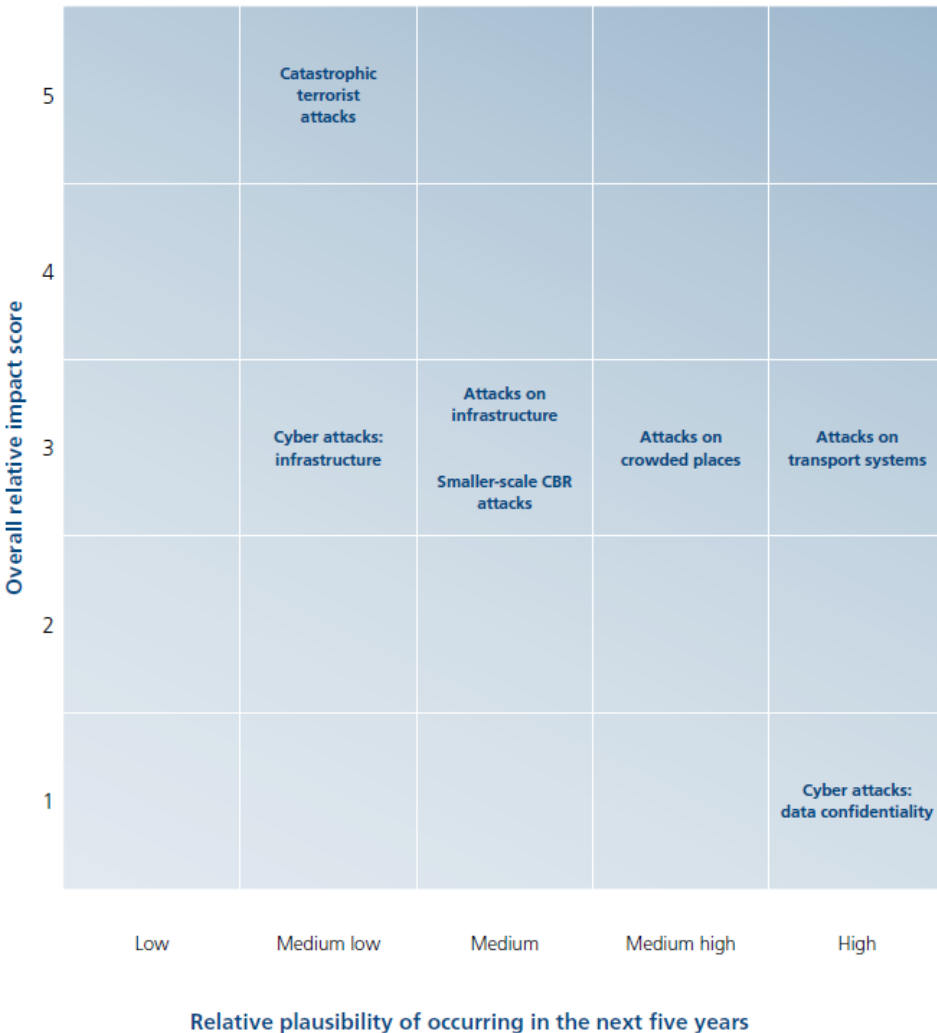


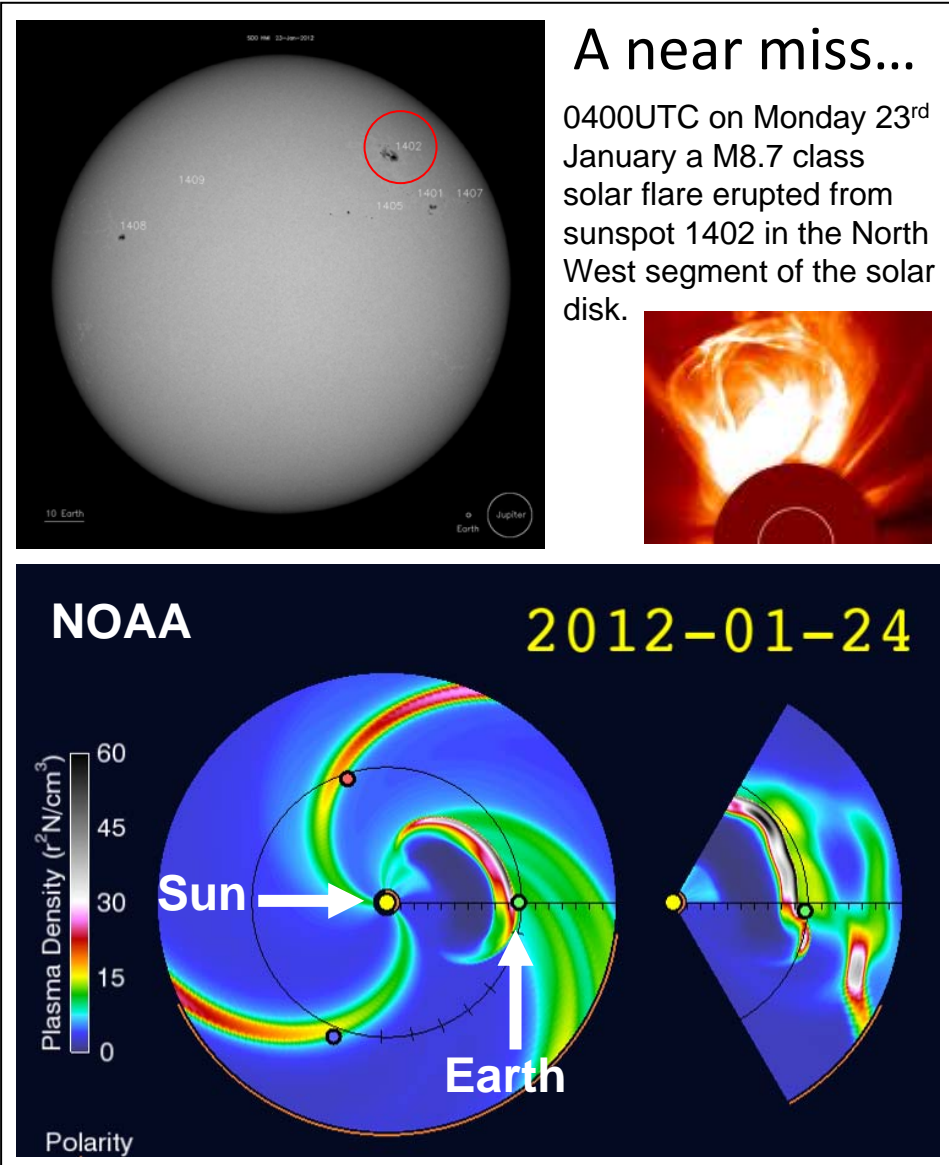
Figure 2: Risks of natural hazards and major accidents





The risk of a space weather event

- **What:** Disturbances that occur in near-Earth space, which can disrupt modern technologies
- **Previous events:** Carrington Event - Disruption of telegraph operations all around the world in 1859
- **When:** Solar maximum follows a roughly 11-year cycle. Next solar maximum is expected 2012/13
- **Action:** Space weather highlighted on National Risk Assessment
- A more vulnerable infrastructure





Government
Office for

Science

The domestic response to crises have been important internationally

COBR(A)

**Scientific Advisory Group for
Emergencies
(SAGE)**

Government
Scientists

Non-Governmental
Organisations

Industry

Academia

e.g.

- Health Protection Agency
- Met Office
- British Geological Survey

- Operational response
- Impact management
- Recovery
- Public Information

- 2009 – Pandemic Flu
- 2010 – Volcanic Ash
- 2011 – Fukushima
- **2012 - ?**



Source: Cabinet Office



Establish an external risk expert group to advise of emerging international risks

Made up of individuals within and outside of Government (CSAs and others)

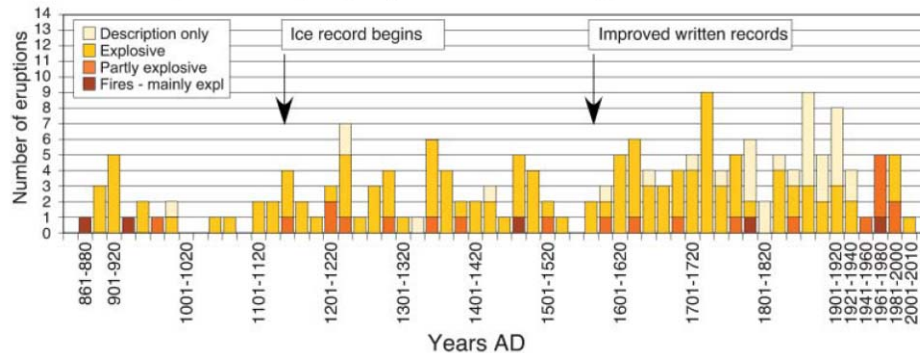
Provide advice on emerging international risks....

Group to meet quarterly (at first...)

Provide reports as risks emerge...



Santorini - NASA



Frequency - Icelandic eruptions

Thordarson and Larsen 2007



Horn of Africa - NASA



Science in Humanitarian Emergencies and Disasters report: Advice during a specific emergency

Establish Procedures for a Humanitarian Emergencies Expert Group

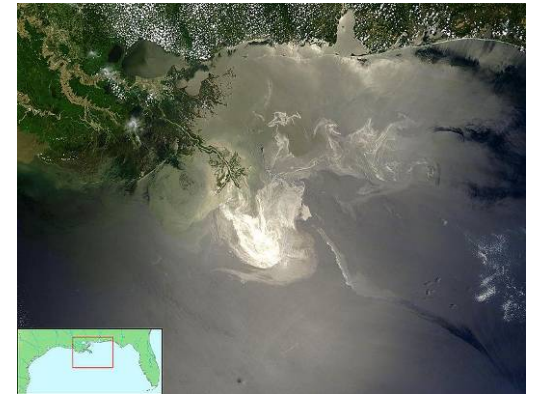
- Ad-hoc and convened in a specific emergency
- Mobilises a network of appropriate experts
- Provide advice and help to Government departments to inform their response

Questions for this Expert Group

- What?
- Why?
- The science?
- What could happen: Reasonable worst case scenario?
- Do we need more detailed information?
- Can this be obtained quickly?
- More detailed work needed?



2004: Indian Ocean
Tsunami



2010: Deepwater Horizon
oil spill



A more vulnerable world

Challenges

- Population – 1 billion more people
- Urbanisation – population increase concentrated in cities
- A more prosperous world, but also a further strain on resources
- Complex demographic trends
- Migration to vulnerable areas
- Climate change will be happening – a risk multiplier



Overall: an increased vulnerability to shocks and pressures

	2030	Source
Food	+38%	FAO (TOWARDS 2030/2050)
Water	40% gap in supply/demand	
Energy	+54%	OECD Environmental Outlook to 2030
Emissions (GHG)	+37%	OECD Environmental Outlook to 2030