



Met Office

Health Forecasting

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Met Office

UK's National Weather Service

Leading Centre for Climate Research





Context

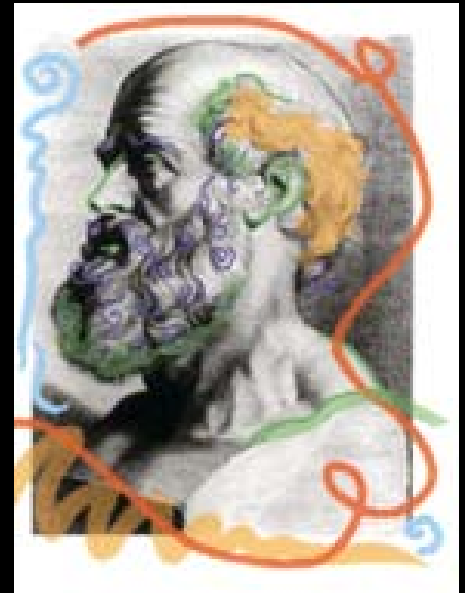
- What aspects of the British weather are important;
- What areas of illness/wellbeing are chiefly affected;
- How the health programme operates as a business: the opportunities and challenges this brings;
- Future impacts of the climate on health: what we know and what we don't know...

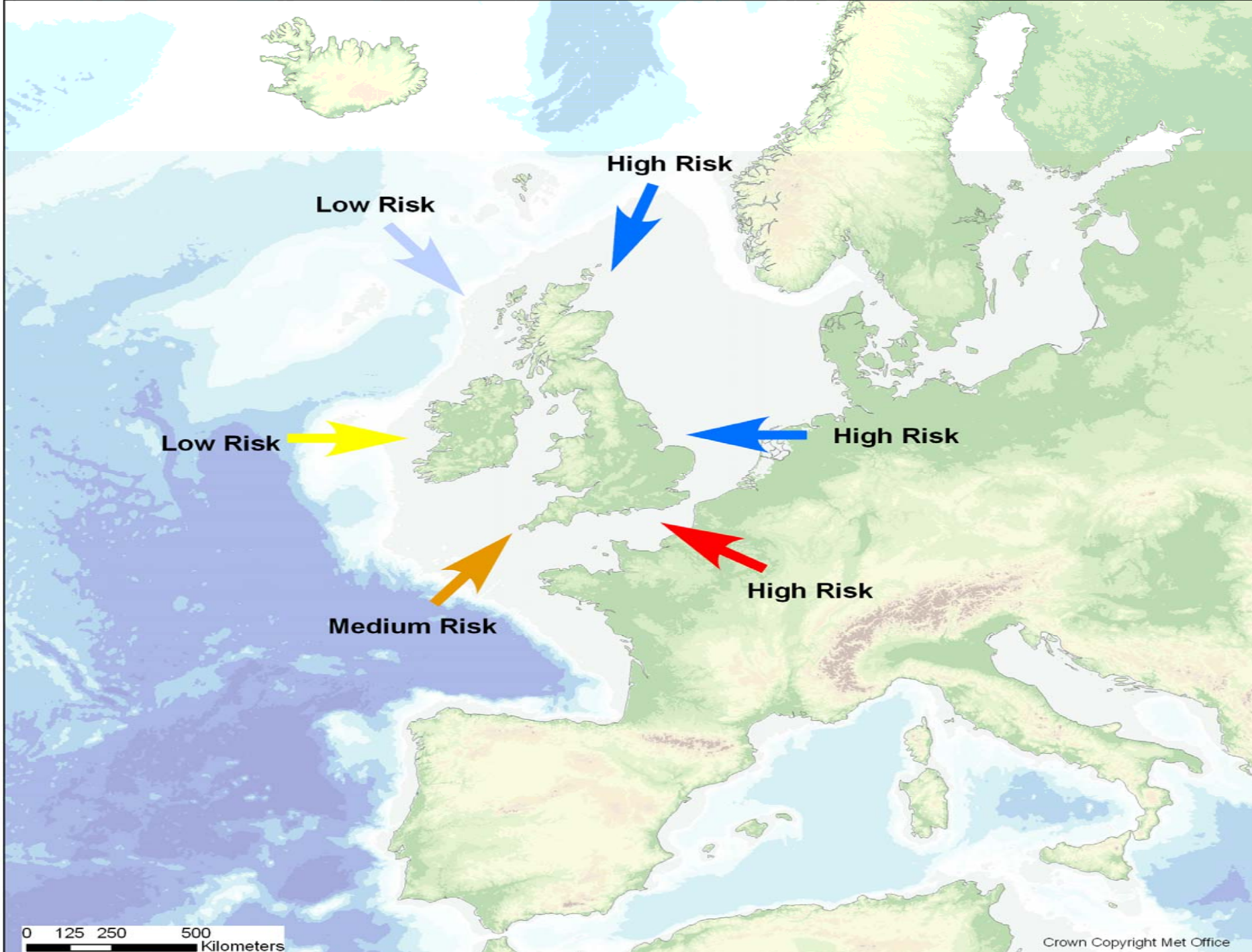


Hippocrates 400BC on airs, waters and places...

Whoever wishes to investigate medicine properly,
should proceed thus:

- In the first place to consider the seasons of the year, and what effects each of them produces for they are not at all alike, but differ much from themselves in regard to their changes.
- Secondly he must study the warm and the cold winds, both those which are common to every country and those peculiar to a particular locality





0 125 250 500 Kilometers

Crown Copyright Met Office



Met Office Health Forecasting

Design and delivery of the following services:

Public Health Services

- National Heatwave Services
- National Cold Weather Plans
- National UV service

Bespoke / tailored services

- *Healthy Outlook*[®]
(Respiratory disease)
- *Brighter Outlook*[™]
(Mental health)
- Climate Services for Health

Excess winter mortality

The UK is high up the European league for additional winter mortality

Country	Approx. % increase in premature deaths	Number of premature winter deaths
Portugal	28%	8 800
Ireland	21%	2 000
Spain	21%	19 000
United Kingdom	18%	37 000
Greece	18%	5 700
Italy	16%	27 000
Finland	10%	3 500

Chronic Obstructive Pulmonary Disease (COPD) - a major burden on health resources

UK

- 30,000 deaths each year
- 1 million in-patient bed days
- 1.4 million GP consultations
- costs to the NHS of £800 million, with a likely increase in burden over the next decade

US

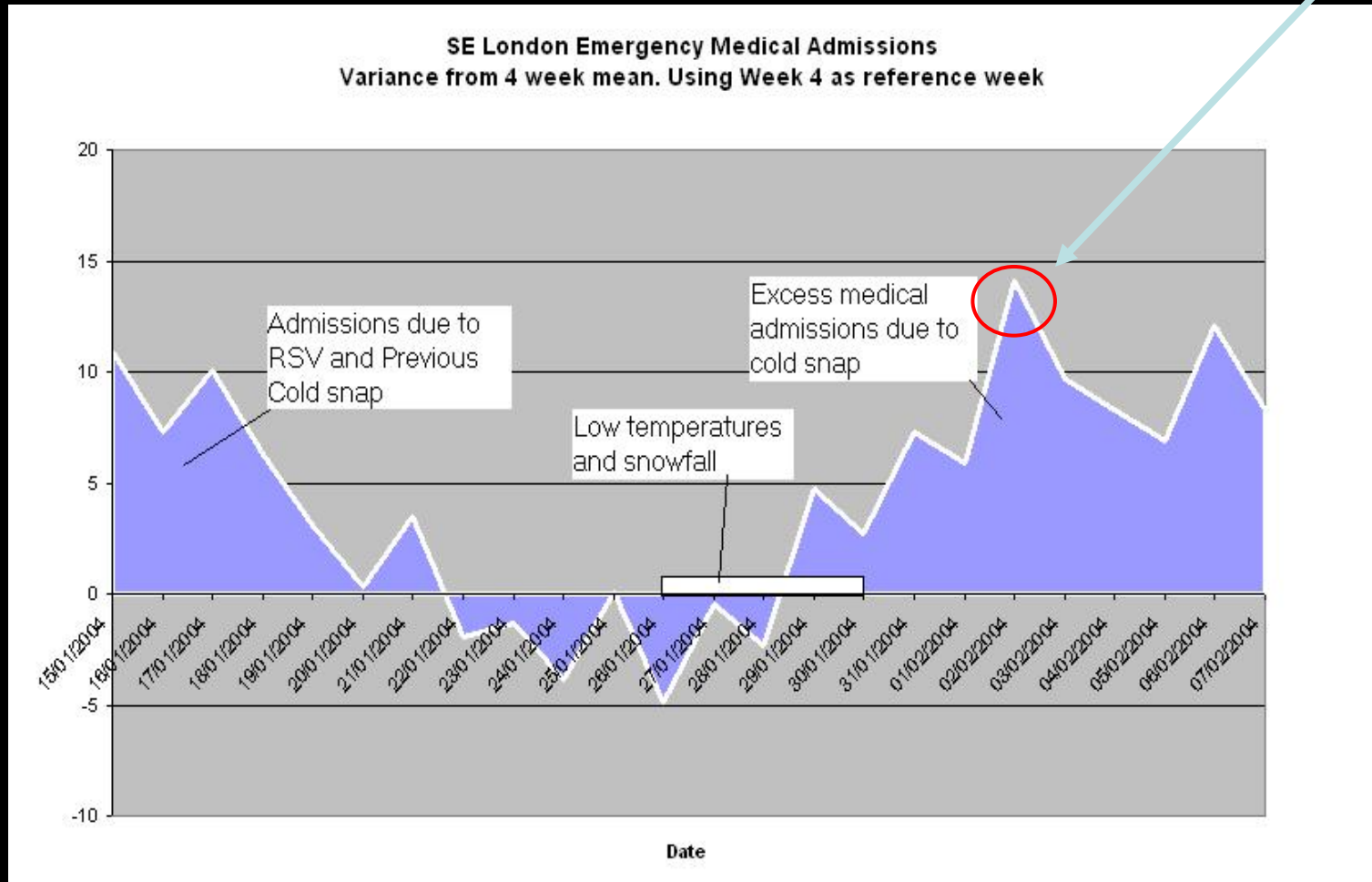
- Estimated 24m people with the condition
- 8m GP visits each year
- 1.5m emergency dept visits
- 726,000 admissions
- >100,000 deaths

(Source NCHS 71-2000)



The Effect of Cold on Hospital Admissions

COPD admissions 10 -12 day lag





Healthy Outlook Model

We forecast periods of elevated risk to the health of people with COPD, enabling them to apply clinically accepted interventions to keep themselves well....

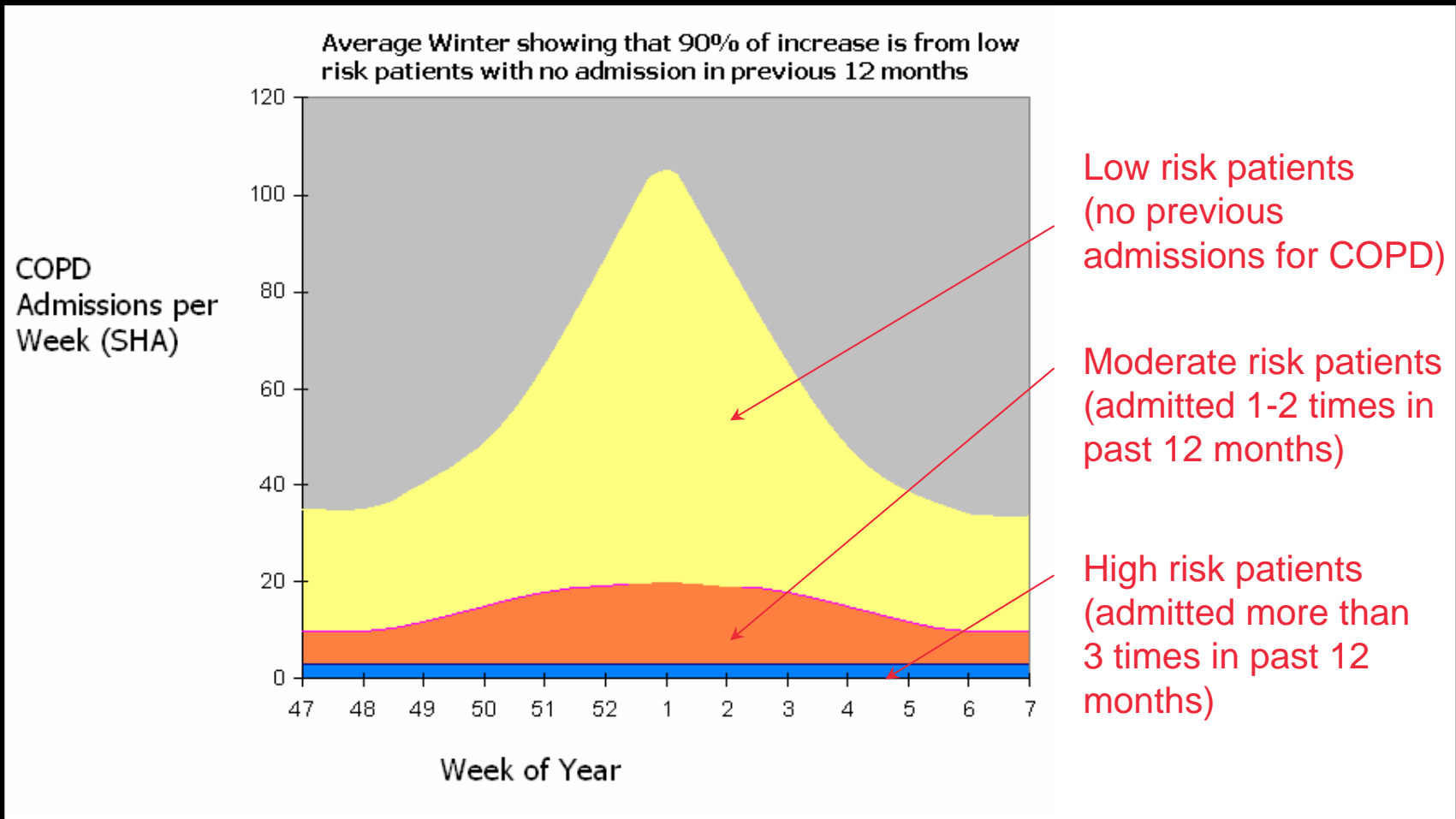
Components:

- Cold Weather (low temperatures, speed of onset, how cold for how long...)
- Humidity
- Circulatory Respiratory Infections



Identifying who is at risk...

'Low risk' patients make up 80% of admissions during winter peaks





Health data →



← Weather data

Health forecaster

NHS Network



GP practice

Call logs
Patient name and tel no, changes to patient status



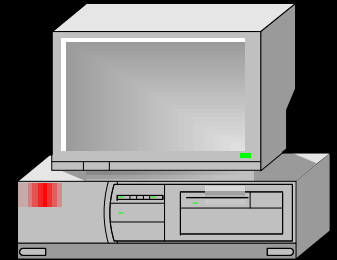
Medicine software on NHS Server

Telephone numbers

Patient responses

Health Forecasts

Monitoring



Medicine administrator



Person with COPD



Automated delivery

Patient response



Delivery technology e.g SMS, telephone, email or letter.



Patient advice

Nationally recognised interventions:

- Early reporting of symptoms
- Available medication
- Keep the house warm
- Avoid low outdoor temperatures
- Keep physically active
- Try to avoid / reduce anxiety and depression



Met Office Health Programme

Research activity	Translational activity	Business activity
<p>Pure research</p> <p>Exploring links between weather (environment) and health</p> <p>Outputs are:</p> <ul style="list-style-type: none">• papers etc.• science group• broad links across research community	<p>Applied research / development</p> <p>Exploiting links between weather (environment) and health</p> <p>Outputs are:</p> <ul style="list-style-type: none">• feasibility studies / pilots• outputs feed into business activity	<p>Product development</p> <p>Sales and marketing</p> <p>Delivery of services</p> <p>Outputs are:</p> <ul style="list-style-type: none">• products and services• profit/revenue driven



Health Forecasting

Key issues

- Understanding the relationships between weather and health
- Understanding 'at risk' groups of the population
- Developing the tools for effective communication to elicit behavioural change

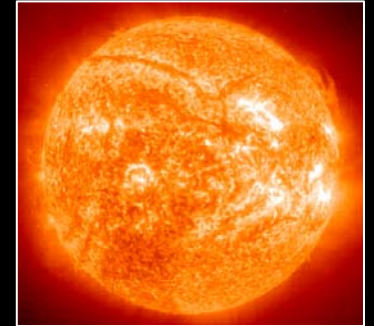


Our Changing Climate

Possible causes of climate change




- Long term changes in Earth's orbit
- Variations in solar output
- Changes in volcanic activity
- Human (anthropogenic) factors



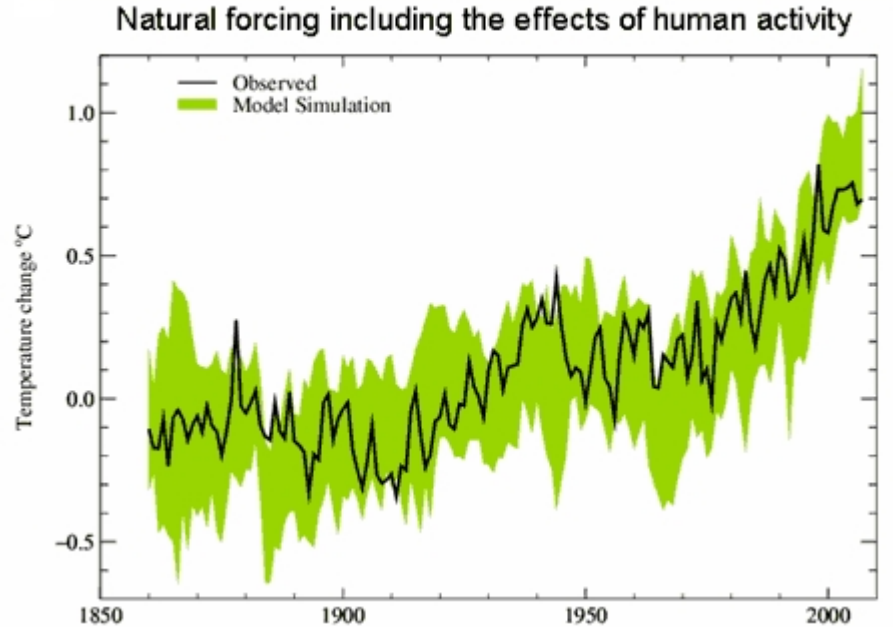
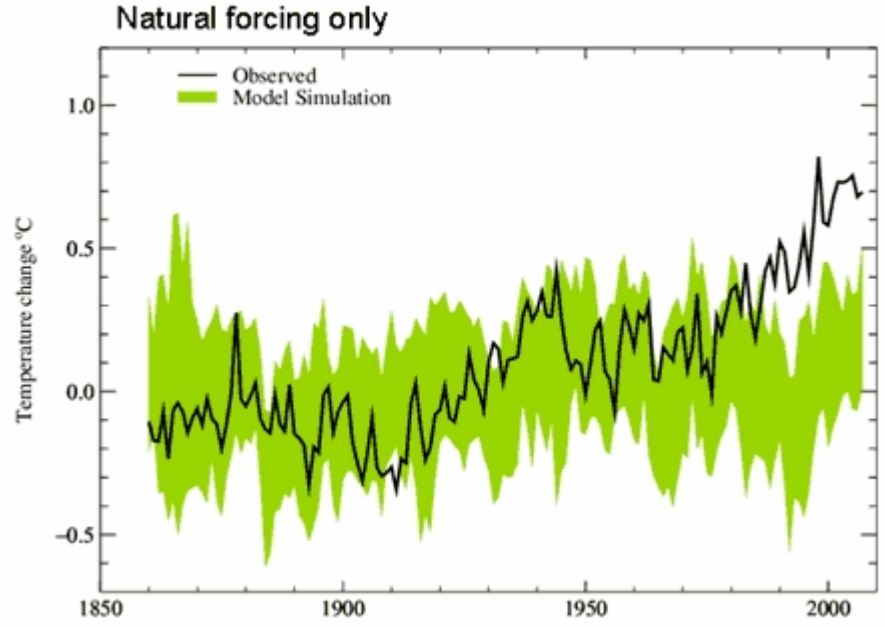


Are humans contributing to climate change?

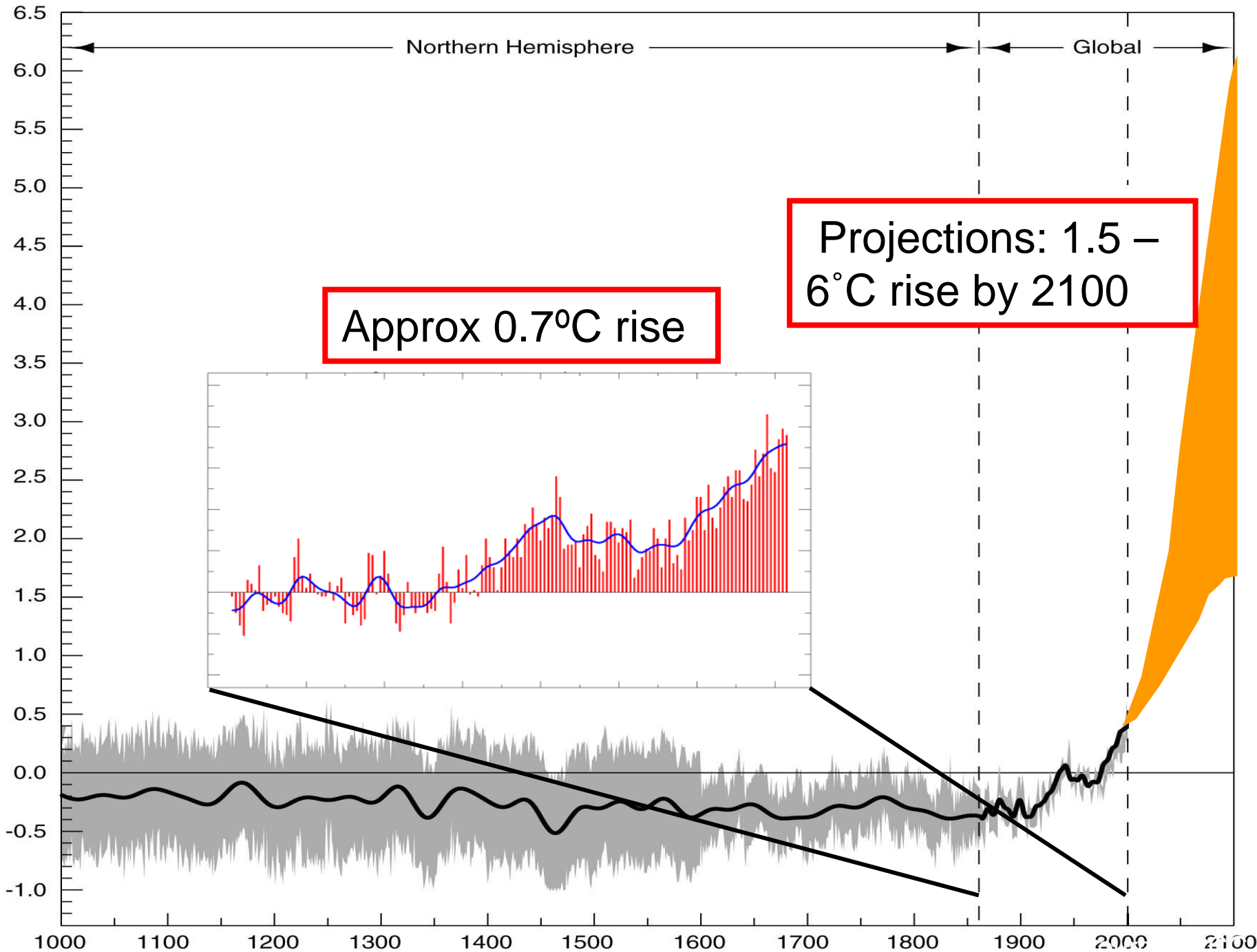


Temperature change, 1850-2007 

Temperature change, 1850-2007 



Departures in temperatures (°C) from the 1961–1990 average



Approx 0.7°C rise

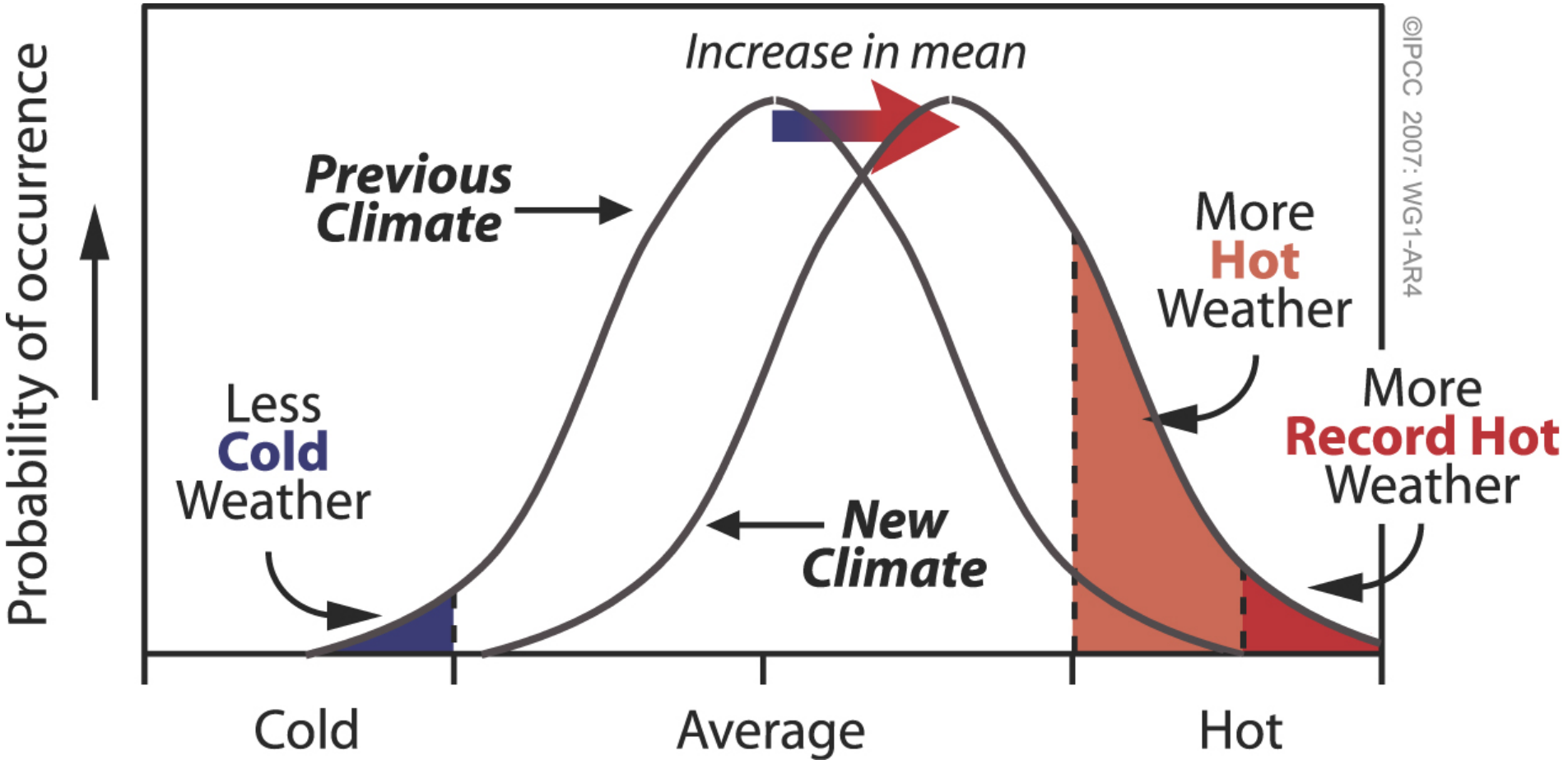
Projections: 1.5 – 6°C rise by 2100

Northern Hemisphere

Global

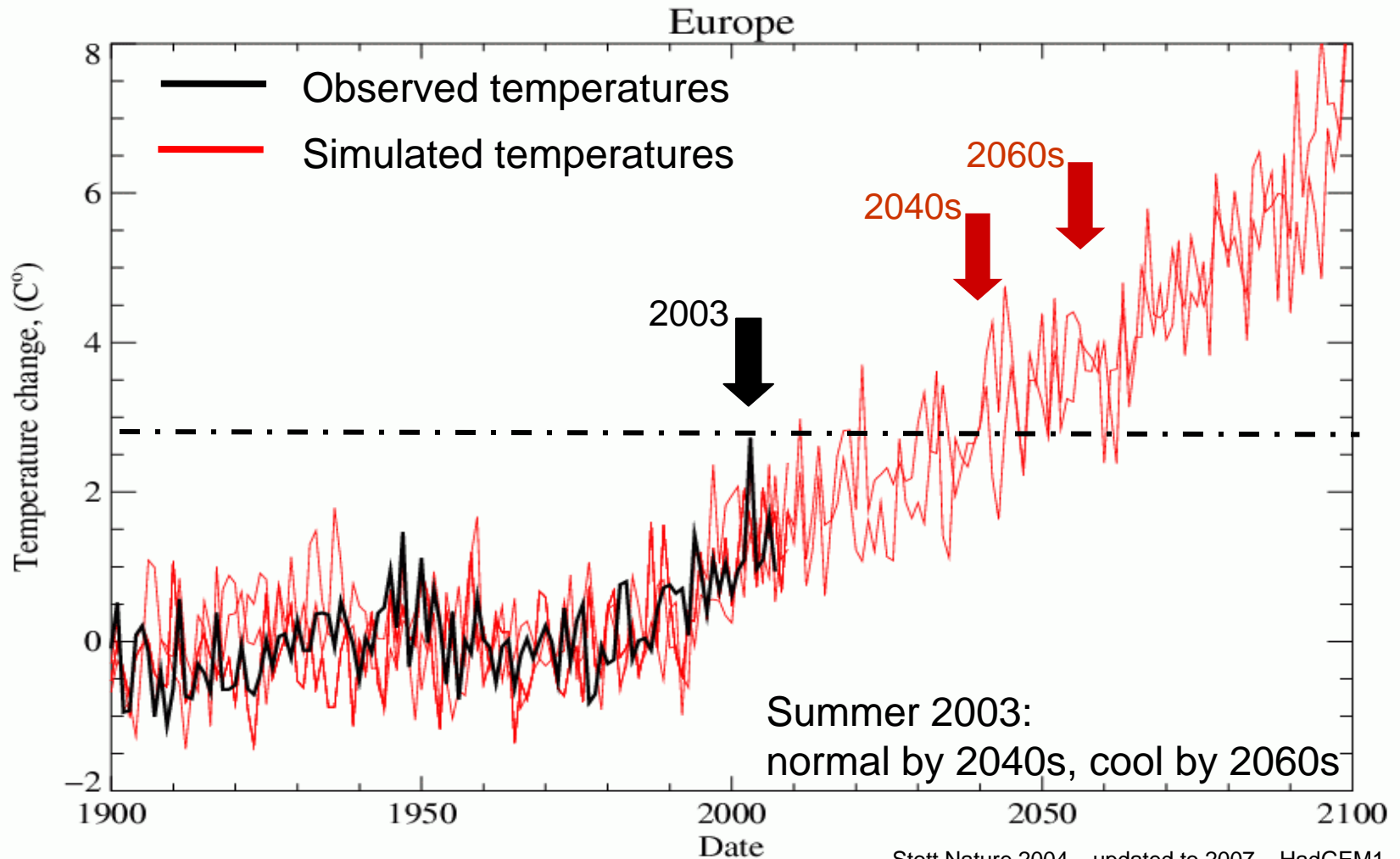
1000 1100 1200 1300 1400 1500 1600 1700 1800 1900 2000 2100

Increase in Extremes



©IPCC 2007: WG1-AR4

European Summer Temperatures



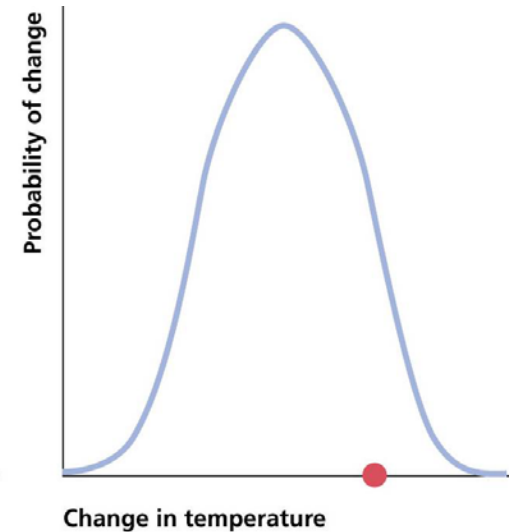
Moving from uncertainty to probability



UKCIP02 gave a single estimate of changes



Using many models in IPCC AR4 gave a range of estimated changes

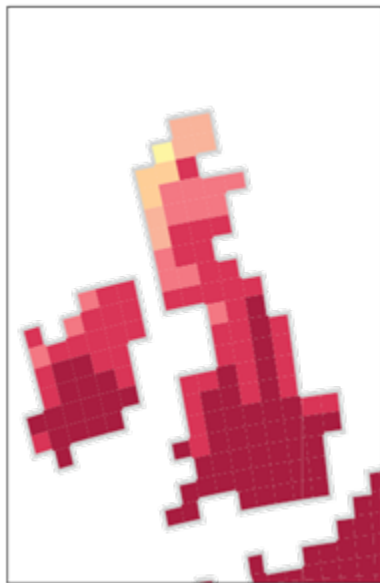


UKCP09 uses over 400 model projections to give the probability of estimated changes

Moving from uncertainty to probability

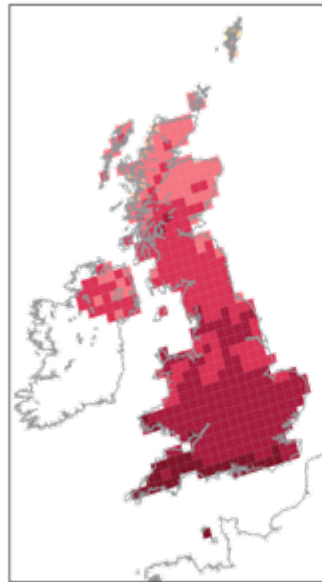
UKCIP02

Single projection



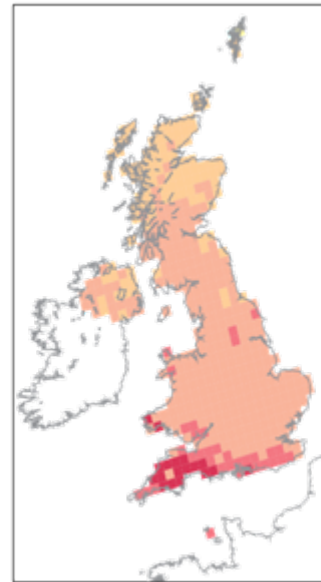
Summer Rainfall 2080's

Very unlikely to be less than (10%)

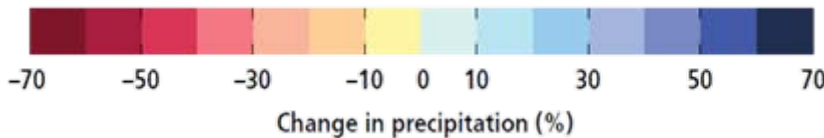


UKCP09

Central estimate (50%)



Very unlikely to be more than (90%)





Adapting to climate change – Present day to years ahead





Climate Change – a UK perspective

Key weather events that affect health

- Cold
- Heat
- Flooding

There are compounding factors or multipliers that make certain situations more serious:

- Episodes of poor air quality
- Economic factors (e.g. high energy prices)
- Underlying health/social factors (flu/poverty/poor education)



Vulnerabilities in the NHS

- Staff
 - Well-being
 - Ability to get to work during extreme events
 - Ability to 'perform'
- Infrastructure / supply chains
 - Pressure on individual locations
 - Pressure on supply chains
 - Pressure on costs of health resources (drugs, equipment, energy...)
- Demand on services
 - Increased demand at short notice
 - Long-term changes in demand

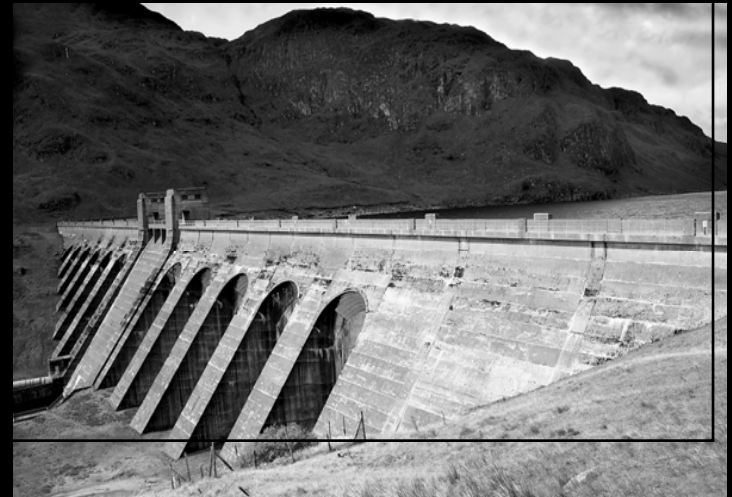
How can we prepare?

Adaptation and planning

- **Good quality information**
 - Risks of climate change
 - Impacts
 - Quantified Risk Assessment
- **Timescales**
 - Seasons, decades, centuries
- **Space scales**
 - Global, continental, local (UKCIP08)

Examples

- Extreme events
- Water availability
- Floods
- Heat stress





Summary

- Climate is warming and will continue to do so with major impacts – mean and extremes
- Adaptation
 - Adaptation to inevitable change required
 - Past no longer a guide for the future
 - Resilience to extremes
- Need increasingly reliable predictions systems (days to decades)
 - Greater emphasis on medium range to a decade ahead
 - UKCP09



Challenges / points for discussion

- International cooperation
- Role of National and Local government
- Appropriate planning and action
- Individuals role in understanding the issue
- Mitigation / adaptation

The role of public opinion...



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