

# Extreme events and climate change

Professor Stephen Belcher  
Met Office Hadley Centre

# AR5 update on extreme events

Phenomenon and direction of trend	Assessment that changes occurred (typically since 1950 unless otherwise indicated)	Assessment of a human contribution to observed changes	Likelihood of further changes	
			Early 21st century	Late 21st century
Warmer and/or fewer cold days and nights over most land areas	<i>Very likely</i> (2.6)	<i>Very likely</i> (10.6)	<i>Likely</i> (11.3)	<i>Virtually certain</i> (12.4)
	<i>Very likely</i> <i>Very likely</i>	<i>Likely</i> <i>Likely</i>	– –	<i>Virtually certain</i> <i>Virtually certain</i>
Warmer and/or more frequent hot days and nights over most land areas	<i>Very likely</i> (2.6)	<i>Very likely</i> (10.6)	<i>Likely</i> (11.3)	<i>Virtually certain</i> (12.4)
	<i>Very likely</i> <i>Very likely</i>	<i>Likely</i> <i>Likely (nights only)</i>	– –	<i>Virtually certain</i> <i>Virtually certain</i>
Warm spells/heat waves. Frequency and/or duration increases over most land areas	<i>Medium confidence</i> on a global scale <i>Likely</i> in large parts of Europe, Asia and Australia (2.6)	<i>Likely (a)</i> (10.6)	Not formally assessed (b) (11.3)	<i>Very likely</i> (12.4)
	<i>Medium confidence</i> in many (but not all) regions <i>Likely</i>	Not formally assessed <i>More likely than not</i>	– –	<i>Very likely</i> <i>Very likely</i>
Heavy precipitation events. Increase in the frequency, intensity, and/or amount of heavy precipitation.	<i>Likely</i> more land areas with increases than decreases (c) (2.6)	<i>Medium confidence</i> (7.6, 10.6)	<i>Likely</i> over many land areas (11.3)	<i>Very likely</i> over most of the mid-latitude land masses and over wet tropical regions (12.4)
	<i>Likely</i> more land areas with increases than decreases <i>Likely over most land areas</i>	<i>Medium confidence</i> <i>More likely than not</i>	– –	<i>Likely</i> over many areas <i>Very likely over most land areas</i>
Increases in intensity and/or duration of drought	<i>Low confidence</i> on a global scale <i>Likely</i> changes in some regions (d) (2.6)	<i>Low confidence</i> (10.6)	<i>Low confidence (g)</i> (11.3)	<i>Likely (medium confidence)</i> on a regional to global scale (h) (12.4)
	<i>Medium confidence</i> in some regions <i>Likely</i> in many regions, since 1970 (e)	<i>Medium confidence (f)</i> <i>More likely than not</i>	– –	<i>Medium confidence</i> in some regions <i>Likely (e)</i>
Increases in intense tropical cyclone activity	<i>Low confidence</i> in long term (centennial) changes <i>Virtually certain</i> in North Atlantic since 1970 (2.6)	<i>Low confidence (i)</i> (10.6)	<i>Low confidence</i> (11.3)	<i>More likely than not</i> in the Western North Pacific and North Atlantic (j) (14.6)
	<i>Low confidence</i> <i>Likely (in some regions, since 1970)</i>	<i>Low confidence</i> <i>More likely than not</i>	– –	<i>More likely than not</i> in some basins <i>Likely</i>
Increased incidence and/or magnitude of extreme high sea level	<i>Likely</i> (since 1970) (3.7)	<i>Likely (k)</i> (3.7)	<i>Likely (l)</i> (13.7)	<i>Very likely (l)</i> (13.7)
	<i>Likely</i> (late 20th century) <i>Likely</i>	<i>Likely (k)</i> <i>More likely than not (k)</i>	– –	<i>Very likely (m)</i> <i>Likely</i>

# Recent extreme summers

- Summer 2012
  - Wettest Summer since 1912
  - Wheat yields down 15% on 5-yr average
  - Cost insurers £800 million
  - Likely part of a natural ocean-atmosphere cycle
- Summer 2003
  - Hottest summer in Europe since 1540
  - 20,000+ deaths
  - Very likely that human influence at least doubled the risk of a heat wave such as 2003
  - Normal by 2040s and cool by 2080s

