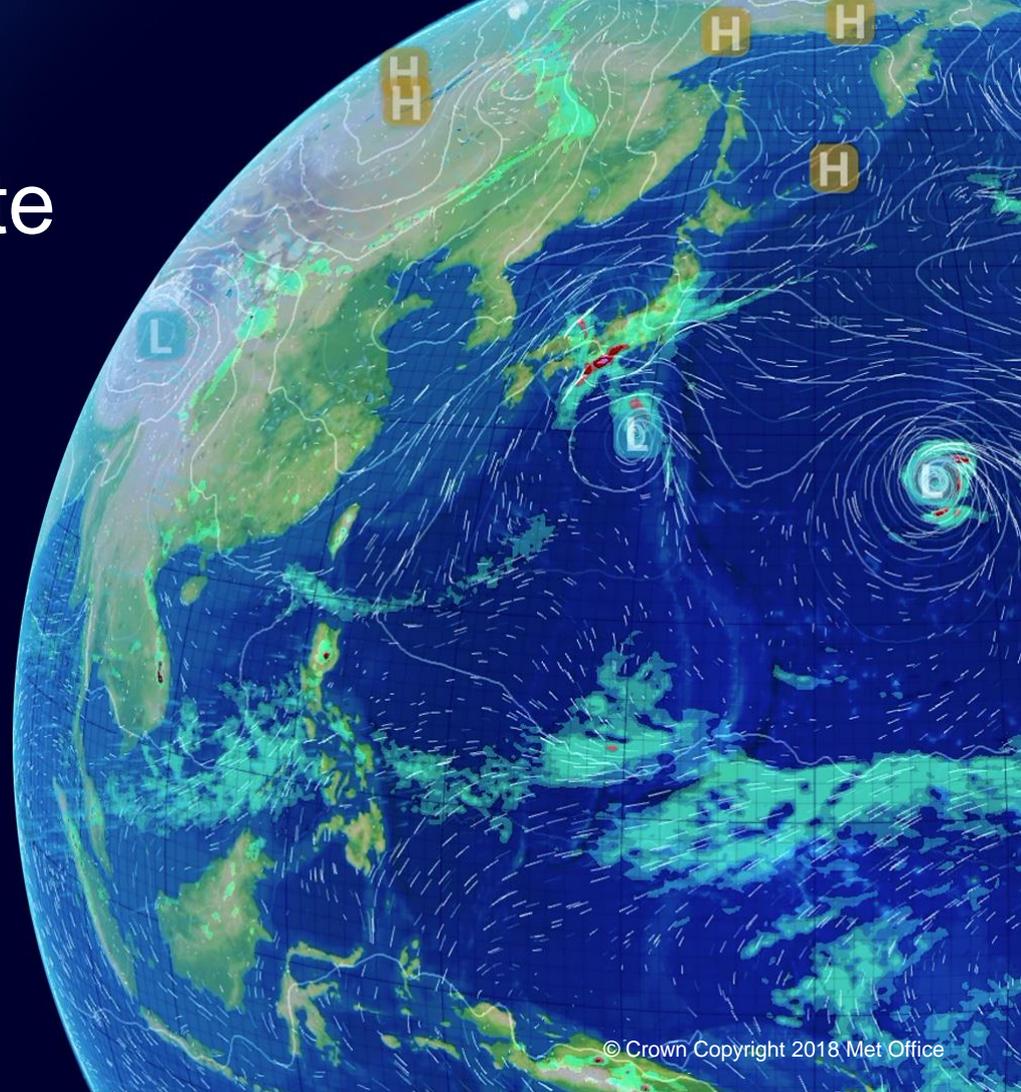


Communicating Climate Information

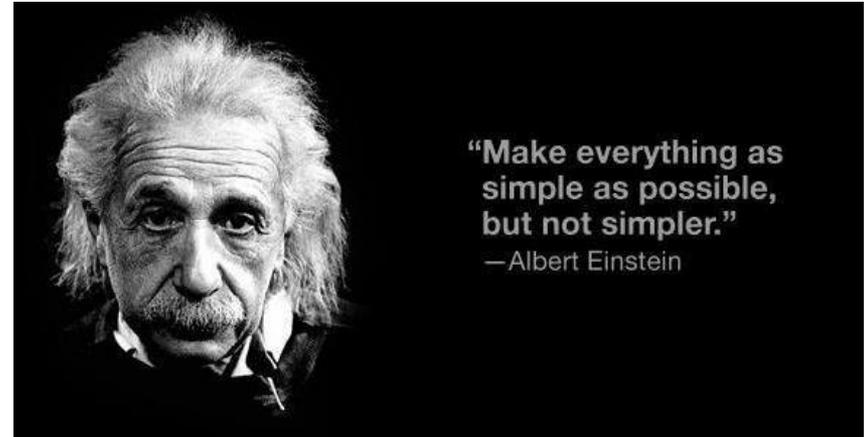
Jane Strachan

Head of International Applied Science



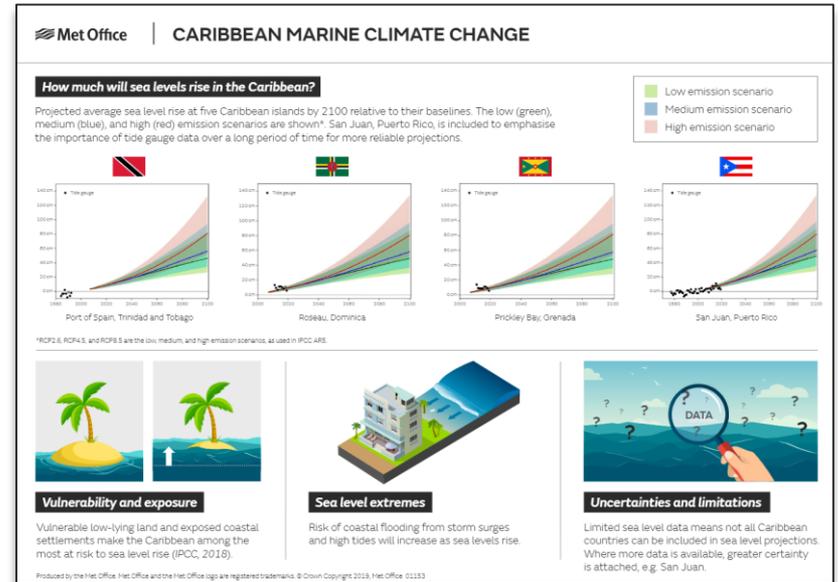
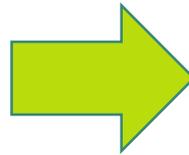
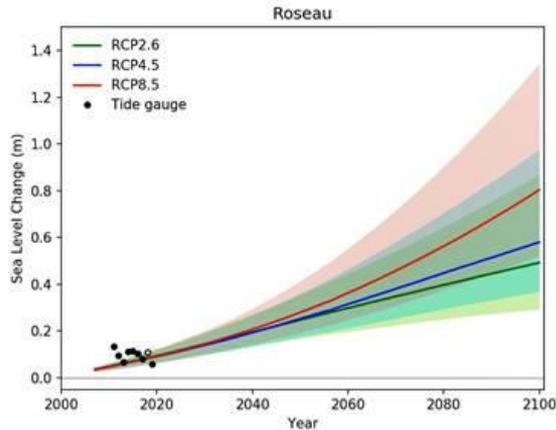
Aims for Session

- Discuss general principles and ground rules for good communication - based on practiced examples and academic research
- Explore good practice examples and discuss growing requirements of sectors and NMHSs in communicating long-term climate change information.
- Define principles of good practice for communicating long-term climate information for the Caribbean



Good communication = Making the Complex Simple

- Throughout this workshop several different examples of communication methods will be showcased
- **Making the Complex Simple is key!**



General principles and good practice

Communicating climate information

Communicating future climate information to non-experts has particular challenges.

Maintaining scientific credibility

Translating information for decision-makers

Communicating a range of possibilities

Understanding and dealing with uncertainties

Providing sector relevant information

Understanding different climate risk thresholds for different sectors

Communicating to non-experts

Dealing with different scenarios

Translating information into what that means in terms of climate risk

Met Office Three-dimensional communication

Robustness

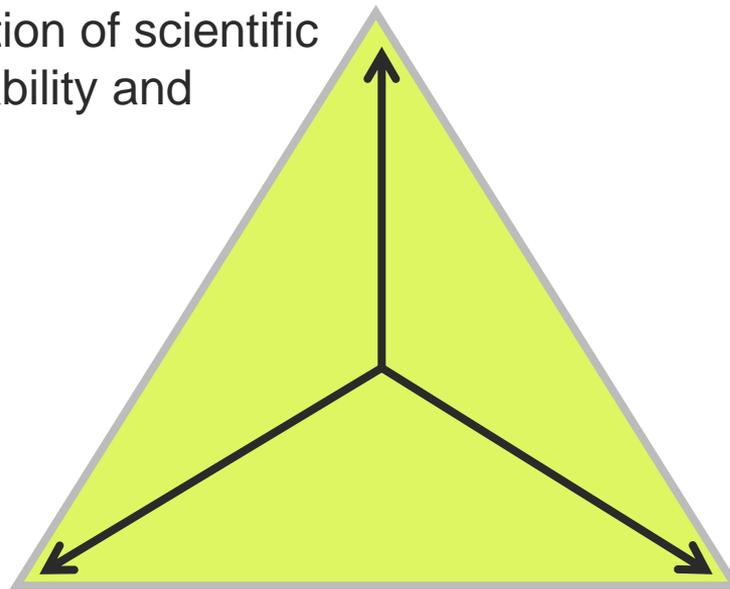
Appropriate reflection of scientific confidence or reliability and uncertainties.

Ease of which information can be applied and understood.

Saliency

Greater detail of information communicated.

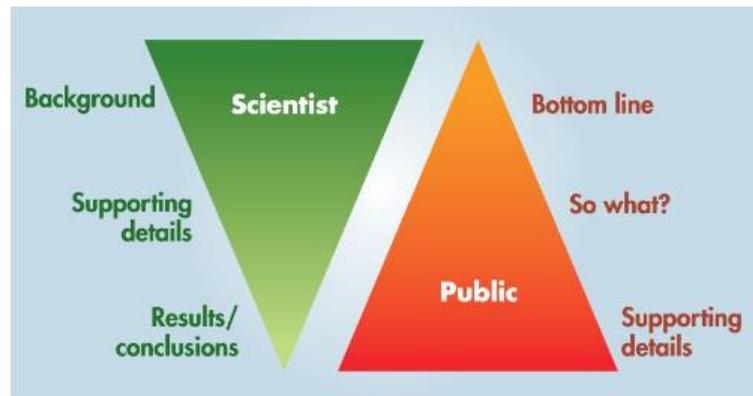
Richness



Communicating climate information

- Social scientists have shown that more science does not necessarily lead to better decision making (Corner & van Eck, 2014).
- Scientists simply present the facts through traditional academic routes, is not fit for the purpose of informing policy or effectively communicating science (Bowater & Yeoman, 2013).
- Scientists need to actively engage in the process of communicating their science through dialogue with their various audiences.
- We need to listen and understand those who can use our research (Reed, 2016).
- This takes time and requires developing sustainable concrete relationships and committing to a continual process of meaningful dialogue.

Inverting the traditional approach - focussing on the key messages and the 'so what'



Adapted from Somerville & Hassol, 2011

Terms that have different meanings for scientists and the public		
Scientific Term	Public meaning	Better Choice
Enhance	Improve	Intensify, increase
Aerosol	Spray can	Tiny atmospheric particle
Positive trend	Good trend	Upward trend
Positive feedback	Good response, praise	Vicious cycle, self reinforcing cycle
Theory	Hunch, speculation	Scientific understanding
Uncertainty	Ignorance	Range
Error	Mistake, wrong, incorrect	Difference from exact true number
Bias	Distortion, political motive	Offset from an observation
Sign	Indication, astrological sign	Plus or minus sign
Values	Ethics, monetary value	Numbers, quantity
Manipulation	Illicit tampering	Scientific data processing
Scheme	Devious plot	Systematic plan
Anomaly	Abnormal occurrence	Change from long-term average

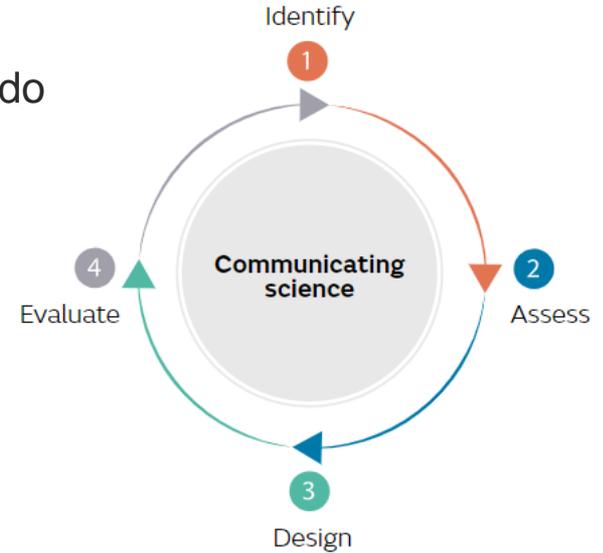
Communicating climate information

Effective science communication benefits from being clear and concise and focusing on what we do know rather than what we do not know (Fischhoff, 2013).

0. Listening to the audience to identify the decisions they face
1. Identify the science that is most relevant to those decisions
2. Find out what people already know
3. Design communications to fill the critical gaps
4. Evaluate the adequacy of those communications (repeat if necessary)

The essence of good communication could simply be seen as saying the same thing in as many different ways as possible so that as many different people as possible have the opportunity to learn and absorb what is relevant for them (Bowater & Yeoman, 2013).

People have many different learning styles so it is important to create opportunities for knowledge exchange with everyone.



The science communication process, adapted from Fischhoff, 2013

- Move from presenting the scientific facts towards telling relevant narratives and human stories.
- Communicating science accurately is essential, the key messages can be delivered in the context of a wider narrative of relevance to the audience
- Strong visuals, case studies and personal narratives can be useful tools for effective communication (Corner, Lewandowsky, Phillips, & Roberts, 2015).
- Evoking emotion can improve rational decision making (Neeley, 2015).
- Showcase the people behind the science, bring forward their personal stories and experience of their work is a way to bring narrative into science.



Climate Stories

*Red Bell
The red bell curve
As it's pulled along
Louder, deeper, hotter
The sound all wrong*



A recent report on the Intergovernmental Panel on Climate Change (IPCC) process identified 7 key recommendations to improve the translation of climate science into policy (Corner & van Eck, 2014).

1. **Invest in communications:** use the scientists as the communicators by offering support, training and encouragement
2. Embrace **video** content and **social media**
3. **Show the human face:** tell the personal stories of the scientists and their own passion for their work
4. Work with a **diverse range of partners:** who can lend cultural credibility to the science
5. **Tell human stories about climate change:** through partners such as NGOs and social scientists, show the impacts of climate change on people
6. **Test everything:** continually test your communication strategy with different audiences
7. No more assessment reports: deliver **science to order**

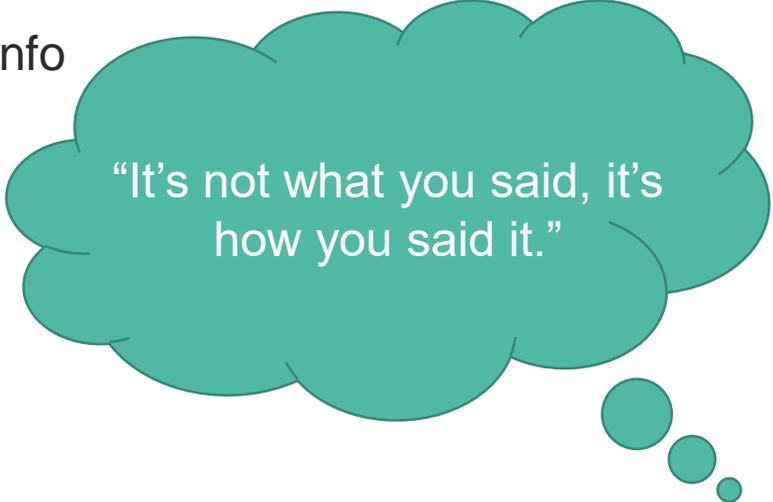
1. **Choice of wording:** Use a gain frame to describe climate change information and motivate behaviour.
2. **Verbally described probabilistic estimates:** Communicate lower and upper numerical bounds with verbally described probabilistic ranges
3. **Conflicting information:** Add content information about how uncertain findings relate to previous research from field
4. **Perceptions of underlying distributions:** Add a central estimate or a graph showing the underlying distribution of a range.
5. **Perception of climate science uncertainty:** Describe uncertain climate science by using analogies.
6. **Communicating change graphically:** Where possible, display individual model estimates with mean/median estimates.
7. **Differences between people:** Empirically test whether low-numerate audiences understand statistical information.

Key principles of communication

Education, Engagement, Enact Change

Key Principles:

- Timescales – timely communication
- Relevance to audience – tailoring and co-production
- Transparency and trust
- Accuracy of scientific data and statistical info
- Communicate uncertainty
- Inspire and empower
- Making complex simple
- Use a range of communication tools
- Respect values, ethics and diversity
- Don't assume



“It’s not what you said, it’s
how you said it.”

Met Office Climate Communication Examples

Met Office Hadley Centre Climate Programme 2018-2021

World-class research to answer fundamental questions about current and future climate risk

1 What are the current weather and climate risks in the UK and globally?

Heat extremes

Droughts

Storms

Extreme rainfall

2 What are the future risks we face from weather and climate under a range of possible scenarios?

Lower emissions

Higher emissions

3 How can we avoid the most dangerous impacts of climate change?

How much CO₂ can we emit and when do emissions need to reach net-zero?

2000 2100

Negative emissions

What strategies to remove CO₂ from the atmosphere are viable?

Methane (CH₄)

Nitrous Oxide (N₂O)

Ozone (O₃)

What other emission cuts would limit warming?

4 What are the impacts and opportunities of limiting warming to different temperature targets?

Graph shows the **global temperature** record since 1850

2°C Paris pledge
1.5°C Paris aspiration
1°C today

What are the co-benefits and trade-offs of mitigation and adaptation?

Air quality

Land available for crops

More resilient communities

Our science informs services to help the UK Government and policy decision-makers globally to prepare for and adapt to our changing climate.

Risk assessment

Mitigation advice

Food security

Environment

City planning

Energy

Health

International development

Work with stakeholders to establish key themes for the general underpinning science.

Maximising the impact and value of Met Office Hadley Centre science and research



Met Office approach - Internal communications & planning

OPEN **Changes in extreme temperature over China when global warming stabilized at 1.5°C and 2.0°C**

SCIENTIFIC REPORTS
nature research

Climate Science Journal Reviews
19 October 2019
Please find below a summary of climate science related articles from the following journals published online within the last week. The titles of papers where one or more of the authors are MHC scientists are highlighted in red.

OPEN **Changes in extreme temperature over China when global warming stabilized at 1.5°C and 2.0°C**
Caojie Sun¹, Zhihang Jiang¹, Wei Li¹, Qiyao Mao¹ & Laurent Li¹

The 1.5°C global warming target proposed by the Paris Agreement has raised worldwide attention and inspired numerous studies to representatively investigate climate changes for different regions of the world. We assessed the response of extreme temperature changes in China with simulations from different models established at 1.5°C and 2.0°C. When global warming stabilizes from 1.5°C to 2.0°C, the extreme temperature for whole China increases by about 0.5°C. When global warming stabilizes from 2.0°C to 1.5°C, the extreme temperature for whole China decreases by about 0.5°C. The extreme temperature for whole China increases by about 0.5°C. The extreme temperature for whole China decreases by about 0.5°C. The extreme temperature for whole China increases by about 0.5°C. The extreme temperature for whole China decreases by about 0.5°C.

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Met Office Science
@MetOffice_Sci

Official Met Office Science - sharing insights into our weather & climate science, technology and STEM. Contact for customer services: @metoffice

365 Following 5,484 Followers

Tweets Tweets & replies Media Likes

Met Office Science @MetOffice_Sci · 1h
We're working in partnership with China to understand if extreme weather events in China are becoming more likely or more intense due to climate change. More info: bit.ly/2M8UjUg #CSSPCChina @NewtonFund

Visual Aids

The one-stop shop for all climate-related **infographics, animations and slidesets** produced by, or for the KI Team, plus a selection of stock **images** which are available to use in presentations and educational materials.

Infographics
Met Office - State of the Climate 2018

Animations
The month less Antarctica was an ice-free land since 1937

Slidesets
Global mean temperature anomaly 1850-2018

Images
Global mean temperature anomaly 1850-2018

For any enquiries regarding the visual aids available here, or to add to the library, please contact knowledge.integration@metoffice.gov.uk
If you have produced an infographic, animation, slideset or image, we'd love to hear from you!

Climate Editorial

Climate Science PR Comms

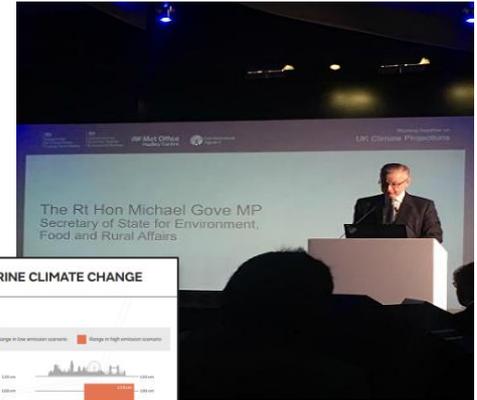
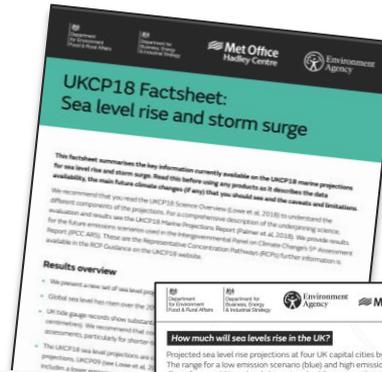
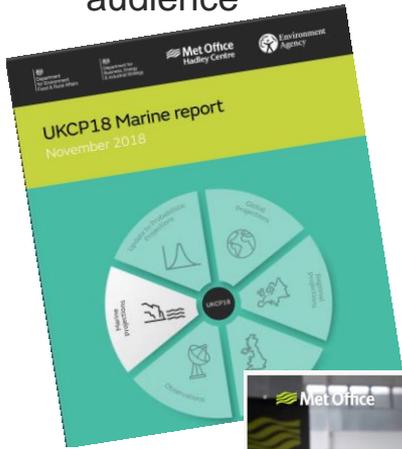
Science Comms

Twitter

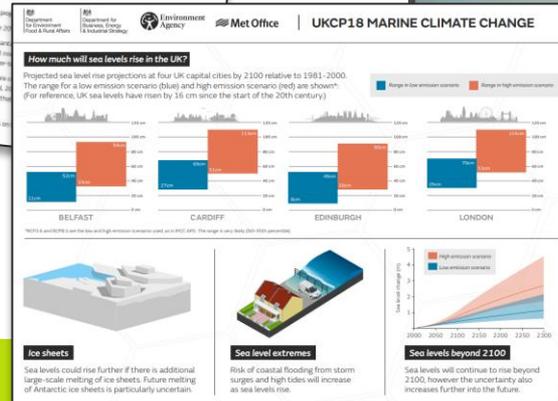
Recommendations for improving the delivery of our science

1. **Relationships and dialogue** – moving towards a continual dialogue between scientists and policy-makers to ensure that we provide robust science that is relevant and useful to inform evidence based policy
2. **Tiered delivery, recognising the need for varying levels of detail** – a dynamic responsive delivery approach that allows us to deliver policy relevant science in an accessible and timely fashion
3. **Web-based delivery** – enhancing our website to enable the most effective and accessible delivery of our world class science
4. **Increased Hadley Centre based visualisation capability** – ensuring that the people who know our science best have the time, support and appropriate resources to visualise and translate our science
5. **Recognition of the increasing need for communication on behalf of policy-makers** – rather than primarily communicating our science to our government funders, a move towards us communicating to a wider audience as needed

- Worked directly with a user group throughout the project from inception to delivery.
- User group determined specific research questions, scope of work, delivery timeline and methods of delivery.
- A wide variety of communications activities were planned throughout the process for different types of audience



So, UKCP18 differs from UKCP09 in several different ways.



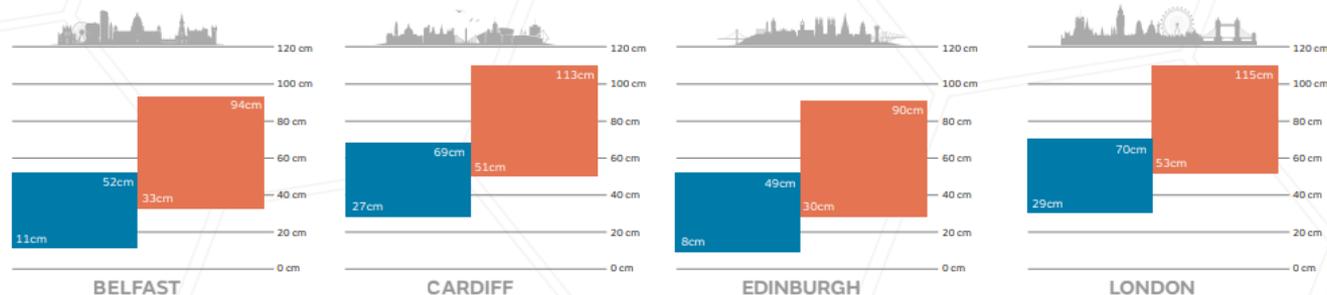
Joint Project Team



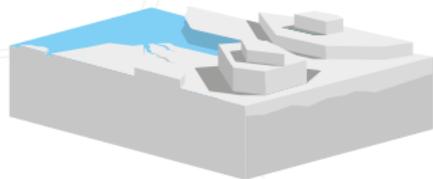
State of the UK Climate 2018

How much will sea levels rise in the UK?

Projected sea level rise projections at four UK capital cities by 2100 relative to 1981-2000. The range for a low emission scenario (blue) and high emission scenario (red) are shown*. (For reference, UK sea levels have risen by 16 cm since the start of the 20th century)



*RCP2.6 and RCP8.5 are the low and high emission scenarios used, as in IPCC AR5. The range is very likely (5th-95th percentile).



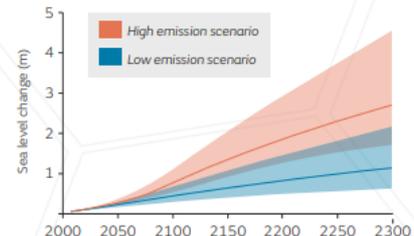
Ice sheets

Sea levels could rise further if there is additional large-scale melting of ice sheets. Future melting of Antarctic ice sheets is particularly uncertain.



Sea level extremes

Risk of coastal flooding from storm surges and high tides will increase as sea levels rise.



Sea levels beyond 2100

Sea levels will continue to rise beyond 2100, however the uncertainty also increases further into the future.

Co-production of communication with national partners



Met Office

ARCTIC AMPLIFICATION

The Arctic is warming at roughly twice the rate of the global average. This phenomenon, known as 'Arctic amplification', is caused by several physical mechanisms.

SURFACE ALBEDO FEEDBACK

One of the best understood physical mechanisms is the 'surface albedo feedback', which is characterized by the melting of highly reflective ice and snow surfaces, causing an increase in the absorption of solar radiation that acts to further amplify the warming.

The northern polar jet stream is a fast-flowing current of air high up in the atmosphere that travels around the globe from west to east. The jet stream is a major driver for the climate of the Northern Hemisphere and can influence extreme weather events. The jet stream is partly driven by the temperature contrast between cold Arctic air masses in the northerly high latitudes, and milder air further south in the mid and tropical latitudes.

Arctic amplification is reducing the temperature difference between the equator and the North Pole, and this has the potential to change the behaviour of the jet stream, which could have consequences for weather and climate at lower latitudes. The extent to which Arctic temperature changes – both past and future – can cause changes in the jet stream and mid-latitude weather and climate is not yet fully understood.

This topic is currently an active area of research and is the subject of an international initiative being led by the Met Office through the EU-APPLICATE project and the World Climate Research Programme's Polar Amplification Model Inter-comparison Project (PAMIP).

GREENLAND ICE SHEET LOSS

3250Gt^a to 4050Gt^a of ice lost between 1992 and 2014 = approx. **10mm** rise in global **sea level**

Land ice, such as glaciers and ice sheets, are stores of ice located on land that were formed, over many centuries, by the weight of accumulated snow in areas of year-round snow cover. Temperatures in the Arctic are rising, at more than twice the global average, which is causing land ice to melt. Freshwater from melting ice sheets and glaciers runs into the oceans where it raises the global sea level.

^a Gt = gigan tonnes, or 1 billion metric tons

Roughly 80% of Greenland's 1.7 million km² land surface is covered by a large, continuous body of ice known as the Greenland ice sheet. If all the ice were to melt there would be enough water to raise the global sea level by 7 metres!

WHAT HAPPENS IN THE ARCTIC DOESN'T STAY IN THE ARCTIC

Various future climate scenarios, outlined by the IPCC as "Representative Concentration Pathways" (RCPs), are used by scientists to predict how the climate may respond to potential changes in emissions and temperature. The two RCPs in focus here are thought to represent an approximate rise in the global temperature in response to increased emissions, of 1.9°C (RCP2.6) and 4.3°C (RCP8.5) by 2100.

All scenarios, or RCPs, indicate that as a result of a warming climate, Greenland ice sheet melting is projected to raise the average sea level by the end of this century, with estimates ranging from 0.07m (RCP2.6) to 0.28m (RCP8.5).

Longer-range projections which have been performed as part of the UK Climate Projections 2018 project (UKCP18), suggest the global sea level will continue to rise in response to Greenland melting, potentially by as much as 1.6m by 2300.

The Bulletin of the American Meteorological Society (BAMS) State of the Climate

BAMS State of the Climate in 2018

Global temperature: So far, the past 4 years have been the warmest on record.*

2018 2017 2015 2016

HOTTEST →

*Based on land & ocean temperatures from four independent datasets (HadCRUT5, NOAA, ERA-Interim, JRA55) from 1950 to 2018. NOAA dataset from 1980 to 2018. NOAA dataset from 1950 to 2018. NOAA dataset from 1950 to 2018.

GLOBAL TEMPERATURE

2016 2015 2017 2018

GREENHOUSE GASES

GLACIERS

1980s 1990s 2000s 2010s

EXTREME EVENTS

COLD CHILLY MILD WARM HOTTER

BAMS State of the Climate in 2018

Global temperature

So far, the past 4 years have been the warmest on record.*

2018 2017 2016 2015 2014 2013

2012 2011 2010 2009 2008 2007

*Based on land & ocean temperatures from four independent datasets (HadCRUT5, NOAA, ERA-Interim, JRA55) from 1950 to 2018. NOAA dataset from 1980 to 2018. NOAA dataset from 1950 to 2018. NOAA dataset from 1950 to 2018.

Greenhouse gases

Atmospheric greenhouse gas concentrations continued to rise, reaching record levels in 2018.

- Methane (CH₄): +8.9ppb
- Carbon dioxide (CO₂): +2.5ppm
- Nitrous oxide (N₂O): +1.3ppb

Glaciers

Since the 1980s, glaciers have lost more mass than they have accumulated. In fact, the amount is equivalent to slicing 24 metres off the average glacier.

~15 metres (1980s)

~4 metres (1990s)

~24 metres (2000s)

~15 metres (2010-2018)

Extreme events

There were more warm and fewer cold temperature extremes in 2018.*

Phenology

Differences in temperature correlated with changes in the onset of the growing season in 2018.

Spring temperature difference (°C)

EURASIA NORTH AMERICA

Difference in start of growing season (days)

AFFILIATIONS: Business Affairs, National Centers for Environmental Information, North Carolina

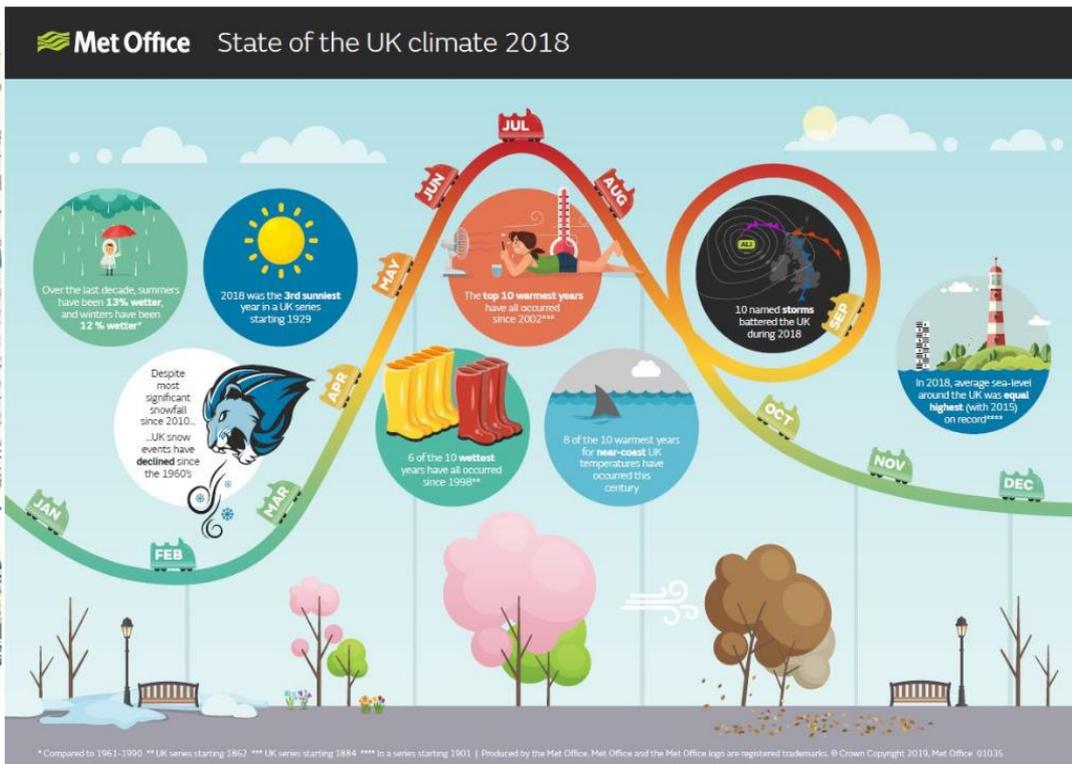
CORRESPONDING AUTHOR: Jessica Blunden, jessica.blunden@noaa.gov

DOI:10.1175/BAMS-D-19-0193.1

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SEPTEMBER 2019 BAMS | 1527

State of the UK Climate 2018



Met Office

Annual **growing days** increased by an average of 15%* in the most recent decade (2009 – 2018)

* The average 10%
STATE OF THE UK CLIMATE 2018



Met Office

The top 10 **warmest** years have all occurred since 2002*
Overall, the 21st century has so far been warmer than the previous 3 centuries**

* Based on 1951-2020
** Based on the 21st century of the 1000-year period 1000-2000

STATE OF THE UK CLIMATE 2018



Met Office

Despite most significant snowfall since 2010...
...UK snow events have **declined** since the 1960s

STATE OF THE UK CLIMATE 2018



Break-out group exercise

- 1) **What are your organisation's requirements/challenges for communicating long term climate information** - draw on examples from information providers (NMHSs, regional bodies), and climate information users (sector representatives, ministry representatives)
- 2) **Principles of good practice for communicating long-term climate information for the Caribbean** - list 6 key principles after group discussion, rank them if you feel there are priorities
- 3) **Examples of good communication methods/approaches that have worked well in the Caribbean** - please draw broadly from what has worked well in seasonal comms, from other disciplines, sectors and wider initiatives. **Consider whether they could be adapted/extended for climate communication**

Things to bear in mind...

- What may seem obvious to you may not seem obvious to a decision-makers
- Put yourself in the position of those receiving the information (or better still, co-produce with those receiving the information)
- Different sectors have different thresholds of climate risk
- Communicate uncertainties and limitations as clearly as possible
- Draw from a variety of different communication approaches. Different people take in information in different ways.
- Make the complex simple! “Make every thing as simple as possible but not simpler”

