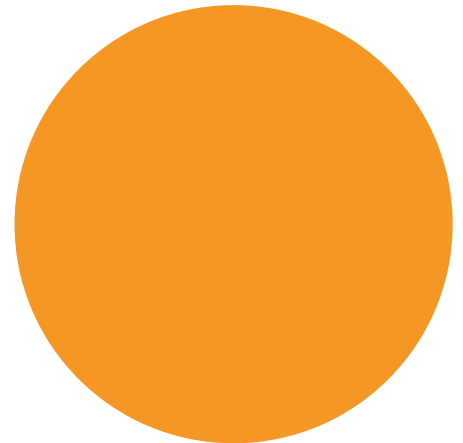
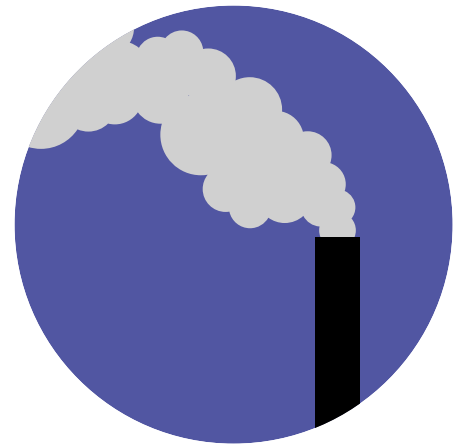




DO IT
FOR YOUR
PLANET

HOW IS OUR CLIMATE CHANGING?



KS3 LESSON 1 - TEACHER GUIDE

HOW IS OUR CLIMATE CHANGING?

Learning objective:

To understand, through the use of detailed place-based exemplars at a variety of scales, the key processes in: weather and climate, including the change in climate from the Ice Age to the present.

Curriculum links:

Geography

This resource supports students to undertake a geographical enquiry into climate change to investigate key processes in weather and climate and to identify key changes that have occurred since the Ice Age.



SLIDE 1

CLIMATE CHANGE IS HAPPENING RIGHT NOW!



Using the student worksheet to structure their note taking, students watch the Met Office video (7.18 minutes) which explores climate change and its impact both direct and indirect.

<https://www.youtube.com/watch?v=JPnO3PENbuo>

The Met Office is the UK's weather service and they provide information about weather and climate.

SLIDES 2-4

WHAT IS CLIMATE CHANGE?

WEATHER

CLIMATE

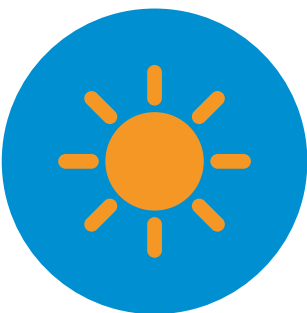
This slide provides students with a definition of climate and weather and provides them with a short visualisation showing the rise in global temperatures over the last 150 years.

Recap with students what makes up the weather, and the difference between climate and weather, before moving on to climate change.

Discuss the visualisation and elicit possible causes for the changes shown from the students.

SLIDES 5-6

FACTORS AFFECTING CLIMATE



Explore the natural factors which affect climate eliciting and suggesting examples for each influence as appropriate, use maps and secondary sources of information where required:

Latitude; e.g. the Amazon and the Arctic – in general, the further an area is away from the equator, the lower the average temperature due to the shape of the Earth. At the poles, not only does sunlight have a larger area of atmosphere to pass through, but the sun is also at a lower angle resulting in the sun's heat being spread over greater surface areas of the Earth's surface. This means temperatures are cooler.

Location, relative to continents and oceans; water has a moderating effect on temperature (for a really simple experiment to demonstrate this see KS2 Lesson 1 resources). Although it takes longer to heat up than the land, water stays warmer for longer, keeping coastal areas cool in summer and mild in winter.

Situation in relation to large-scale atmospheric circulation patterns; see <http://www.metoffice.gov.uk/learning/learn-about-the-weather/how-weather-works/global-circulation-patterns>

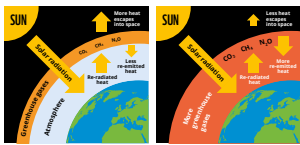
Altitude; the measure of the height of the land in relation to sea level. The higher the altitude the lower the temperature, which is why most mountain ranges are topped with snow. A higher altitude also means a greater moisture content in the atmosphere, leading to increased precipitation, often as snow.

Local geographical features; e.g. proximity to rivers, lakes and oceans, and elevation, the rain shadow effect of mountains.

These influences can either amplify or reduce the direct impact of climate change depending on where you live.

SLIDE 7

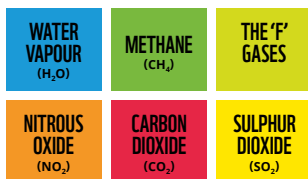
THE GREENHOUSE EFFECT



Use the diagram to explain the greenhouse effect. Discuss human activity e.g. burning fossil fuels, and its impact, referring back to the visualisation on slide 2 where appropriate. NB. slide 5 looks at individual gases and their causes.

SLIDE 8

GREENHOUSE GASES AND THEIR ORIGINS



Click on each of the buttons on the slide to find out about natural and manmade causes of each gas. Identify the human activities which have the biggest impact. Students can use the worksheet to note down their findings.

Summarise with a discussion on the human activities which result in climate change e.g. burning fossil fuels for electricity, transport and industry.

SLIDES 9-12

MEASURING CLIMATE CHANGE



The main records of global temperature at the Earth's surface:

- The UK Met Office <http://www.metoffice.gov.uk/research>
- UEA Climatic Research Unit (CRU) record <http://www.cru.uea.ac.uk/>
- A record produced by NASA's Goddard Institute for Space Studies <http://www.giss.nasa.gov/>
- A record produced by the US National Oceanic and Atmospheric Administration (NOAA) <http://www.noaa.gov/climate>



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Temperature data from across the globe is combined in order to monitor climate change and trends

- global average surface temperature is calculated by comparing measurements taken at over 5,000 land-based weather stations, over 1,200 free-floating buoys, as well as from ships.
- Satellites also measure temperature changes in the lower atmosphere (troposphere).

Other measures of climate change include:

- sea level rises
- retreat of Arctic sea ice
- shifts in rainfall patterns consistent with those expected in a warming world
- increases in atmospheric humidity in the lower atmosphere
- increases in the number of incidences of extreme weather, such as heavy rainstorms and heatwaves.

SLIDE 13

BE A CLIMATE CHANGE EXPLORER

Divide students into mixed ability groups to undertake a geographical enquiry to evidence climate change from the Ice Age to the present day. Using the sources provided (see the background information and resources section) students collect and collate evidence of climate change which they can add to a class timeline from the Ice Age to the present day. Students can make a note of their findings on their worksheet.

Finding out about climate history helps us to understand the potential future impact of climate change.

There are two possible ways to complete this activity:

- a. Dividing students into mixed ability groups to research specific anomalies such as extreme wind events, tidal waves and floods, melting icecaps and sea level rises, heat waves and drought.

OR

- b. Dividing students into mixed ability groups and providing each group with a country or place of significant interest e.g. the Amazon, Sahara Desert, Andes mountain range.

SLIDE 14

CLIMATE CHANGE AFFECTS US ALL



Discuss and share what the class have discovered about the evidence of climate change. Collate this evidence into a shared timeline of change from the Ice Age to the present day. If possible, keep the timeline on display in the classroom/in school, as this will be returned to in the next session when pupils use what they have learned about historical climate changes to predict future ones.

End the session by showing the clip on the slide which shows ordinary people sharing the things they love most and how these could be influenced by climate change https://www.youtube.com/watch?v=ka_kQUvojeI

Use the film clip to relate climate change back to our lives and its effect on what we love. This will also be returned to in future lessons.

BACKGROUND INFORMATION AND RESOURCES

- There is a wealth of accessible information about climate change and its impacts on our website
http://www.wwf.org.uk/what_we_do/tackling_climate_change
- Here you can find the latest on UK climate extremes from the Met Office
<http://www.metoffice.gov.uk/public/weather/climate-extremes/#?tab=climateExtremes>
- More information about climate science and monitoring can be found here
<http://www.metoffice.gov.uk/climate>
- <http://www.nature.com/scitable/knowledge/library/introduction-to-the-basic-drivers-of-climate-13368032> provides a basic overview of key drivers with clear diagrams
- Useful research news articles and images
<http://environment.nationalgeographic.com/environment/global-warming/>
- <http://www.nationalgeographic.com/climate-change/special-issue/>

WWF'S DEDICATED CLIMATE CHANGE PAGES:

- http://www.wwf.org.uk/what_we_do/tackling_climate_change/
 - <http://www.wwf.org.uk/updates/effects-climate-change>
-

THE MET OFFICE CURRENT CLIMATE NEWS AND DATA SOURCES:

- http://www.metoffice.gov.uk/media/pdf/4/b/Our_changing_climate_-_the_current_science.pdf
 - <http://www.metoffice.gov.uk/research/climate>
 - <http://www.metoffice.gov.uk/barometer/>
 - <http://uk.reuters.com/subjects/AlertNet> humanitarian news service covering human crisis worldwide
 - <http://torro.org.uk/investigation.php> TORRO TORnado and storm Research Organisation – click the research tab for records of various extreme weather events in the UK and across Europe
 - The Intergovernmental Panel On Climate Change (IPCC) FAQs
http://www.climatechange2013.org/images/report/WG1AR5_FAQbrochure_FINAL.pdf
-

OTHER LINKS:

- <http://science.nationalgeographic.com/science/prehistoric-world/quaternary/>
- http://www.bbc.co.uk/science/earth/earth_timeline/quaternary_ice_age
- <https://www.theccc.org.uk/faqs/>
- <http://climate.nasa.gov/>
- <http://climate.nasa.gov/evidence/>

