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| Extreme weather in the UK |

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| * **Lesson three** |

*How did the eruption of the Indonesian volcano Tambora in 1815 affect the UK? This lesson investigates weather data from that time to find out if there were any impacts and if so, what were they and how serious.*

**Key Questions**

* Where and what is Tambora?
* What is a stratovolcano?
* What happens when a stratovolcano erupts?
* How might this affect global weather patterns?
* How did the eruption from Tambora affect the UK?
* What was the effect on people’s everyday lives?

**Key ideas**

Stratovolcanoes can produce powerful eruptions with an associated range of devastating impacts for people living nearby and far away. When Tambora erupted in 1815, NASA reports that it put enough ash into the atmosphere to reduce incident sunlight on the Earth’s surface, causing global cooling.

This event, then resulted in what became termed ‘The Year without a Summer’, when much hardship was reported across the UK as cold and rain ruined crops and left many hungry.

Extreme weather is when a weather event is significantly different from the average or usual weather pattern. This may take place over one day or a period of time. Extreme weather can have impacts on people and environments

The Tempest database has documented accounts of extreme weather going back over hundreds of years from a rich variety of diverse sources that include: newspaper reports; diaries, letters and postcards, as well as official meteorological records. This data base can be searched using dates, types of weather and impacts as queries and the results mapped.

You can listen to an interview with Professor Georgina Endfield about the data base here <https://soundcloud.com/rgsibg/weather-extremes-with-professor-georgina-endfield>

**Subject Content Areas**

Geography, Links to History, English

**Downloads**

Tempest\_Lesson\_Three Slideshow

Tempest\_3\_Impacts\_Tambora\_worksheet

Tempest\_3\_weatherdata\_1816\_worksheet

**Additional resources**

* World maps / atlases
* Internet
* Digital mapping software access

**Web links:**

ArcGIS [www.arcgis.com](http://www.arcgis.com)

Digimap for Schools [www.digimapforschools.edina.ac.uk](http://www.digimapforschools.edina.ac.uk)

Royal Meteorological Society <https://www.rmets.org/weather-and-climate/weather/how-can-volcanoes-affect-weather>

Tempest <https://www.nottingham.ac.uk/geography/extreme-weather/search/>

**Learning objective:**

*To know that volcanic eruptions can affect weather patterns in other parts of the world and have an impact on people’s lives.*

**Starter**

Ask the class to work in pairs with an atlas and find Tambora. Give them a few minutes to locate it and to find out what it is.

They should be able to report back and say whereabouts it is using specific language such as on the island of Sumbawa, Indonesia and be able to say that it is a volcano. Share comments which go beyond this using more precise geographical language.

If you have already been learning about volcanoes, this would be a good opportunity to ask the class what the characteristics of a stratovolcano are.

Pose the big question: how did this volcano have a devastating effect on the British summer in 1816? Take ideas and suggestions from the class, keeping the discussion open.

**Main teaching**

Use the Slideshow:

* Slide 2. Recap the location of Tambora.
* Slide 3. Read some of the accounts of the eruption in 1815. Refer back to the class comments about how the volcano might have affected the British summer in 1816 and open up a brief discussion posing questions.
* Why would ash in the atmosphere cause global cooling?
* What might the effect be in the UK?
* Why did it take nearly a year for the effect to be fully felt?
* How can we find evidence using a database of extreme weather events such as Tempest?
* Slide 4. Show the kind of information that can be found on the website. Discuss the most useful kind of search and what the key search terms would be. For example, in order to investigate the summer of 1816 the dates should probably be set to 1st June – 31st August 1816 as this relates to meteorological summer. All other fields could be left blank. This will produce about 29 results, not all of which are mapped. This could be a reasonable sample size to work with.

Ask the class if they agree or if they have other ideas.

Model using the Tempest website how to search for information and explore using some different parameters, reading out some of the information that can be found.

**Main activity**

Explain that the class will be working in pairs or small groups to search for and gather information and evidence that helps explain some of the impacts due to extreme weather events.

The class will use the Tempest website to gather information

Tempest\_3\_Impacts\_Tambora\_worksheet

*This worksheet uses selected information from the website, cut and pasted into a grid. This worksheet could be used*:

* by children to create their own maps, using Digimap for Schools for example to add key text and dates to locations;
* to help children write an account of impacts of extreme weather on everyday lives or to write a diary as though they were living through it;
* as a model to show more able pupils how to gather their own data: a group could then fill in their own blank grid;
* To begin to make a case for a link between the Tambora eruption and the dismal summer.

Tempest\_3\_weatherdata\_1816\_worksheet

*This workshop contains data mined from the Tempest website and is one person’s weather diary for most of the month of July 1816. This worksheet could be used:*

* to augment the work above;
* on its own to design a graph or infographic that could accompany a map.

**Plenary**

Work together to summarise the extreme weather events and the impacts as discovered by the class.

* What kind of weather was recorded for summer 1816?
* What were the main impacts?
* What was the geographical extent indicated by the records?
* How accurate do we think the information is and why / why not?
* What about the regions not showing up in the data? Does this mean that parts of the UK had a normal summer that year? Can we explain why / why not?
* What kind of evidence supports the idea that the volcanic eruption caused the absence of a summer in 1816?

**Further study**

* Explore using a range of search terms to gain information about the weather in 1816. For example, by looking at all impacts on people, searching for specific types of weather or by focusing on particular areas. Spring was also said to be unusually cold that year so a search using the dates for meteorological Spring 1st March – 31st May 1816.
* Compile a similar fact file by investigating the summer months of 1815 and use the information to draw a comparison with the summer of 1816. Or use recent meteorological data for the comparison.
* to investigate other volcanic eruptions and investigate
* Invite in a local farmer to talk about the problems they face in dealing with the weather each year.
* Arrange a fieldtrip to visit a local farm and interview a farmer at first hand.
* Investigate more recent volcanic eruptions and the impacts they have had beyond their immediate geographical location for example, the 2010 eruptions of Eyjafjallajökull. See the Royal Meterological Society website (link above).