



Glacial environments

Lesson 2: Why are our glaciers shrinking?

Key questions:

- What is happening to the world's ice?
- How does ice tell us the secret of why it is melting?

Starter activity:

Who is the 'Iceman' and why was he murdered?

Introduce the students to the 'Iceman' whose body was found in an Austrian snowfield in 1991, having been frozen in ice for 5000 years. A PowerPoint slide of the body is provided.

Students can speculate as to who they think he was, how he was murdered, and how his body came to be found so long after his death.

Main activity:

Who killed the 'Iceman'?

The class read through a case study of the 'Iceman' ('Iceman murder mystery' Word document) and find out what happened to him, concluding that his body was revealed due to the melting of the ice around it.

The rest of the lesson is spent studying the melting of the world's ice, and considering the stories, like this one, that the ice has to tell. Students need to be aware that the world's glacial environments are changing, and after identifying climate change as the cause of the melting, examine the evidence from the ice itself (ice cores) that supports the climate change hypothesis.

What is happening to the world's ice – why is it melting?

Students may already be familiar with the global warming / climate change thesis from other units or subjects. However, it is suggested that a few minutes are spent reminding (or introducing) students to the basics. Links to two excellent third party online resources to assist with this are given in the module plan.

Students can then explore evidence of melting – again through web-based research. They can use a mixture of online resources - including photographic evidence and resources from the RGS-IBG's own *Discovering Antarctica* web-site (www.discoveringantarctica.org.uk) - to chart the decline of the world's ice.

If time allows, students could practise their graphical skills by drawing a sketch map to illustrate the retreat of the ice front of one named major valley glacier. For instance, the film of *An Inconvenient Truth* (a copy of which was provided to all schools by DCFS in 2007) can be paused at 00:16:29 for students to sketch the retreat of the Columbia glacier.

How does ice tell us the secret of why it is melting?

This final part of the activity gives students the opportunity to gain insight into the scientific methods used by professional scientists to carry out an important geographical enquiry. The Word document 'Ice Cores' provides background information and also a dataset which students should then plot as a graph to show the changing CO₂ content of ice cores from 1800 to 2008.

Plenary

Do your bit today!

To summarise the lesson: the Iceman murder mystery seems to have been solved by scientists, and students have also learned that the discovery of the body may be due to the climate change – caused by increasing carbon dioxide emissions. By way of a plenary, students can be asked what we can all do to try to help glaciers survive and stop more ice from melting, resulting in a checklist reminder for students about ways to try and live more **sustainably** (turning lights off, recycling, etc.). The PowerPoint presentation 'Help save the ice' provides some pointers. Students will leave the lesson appreciating that small contributions can be made by each of us as citizens to help to protect the world's glaciers, by attempting to reduce our own **carbon footprint**.

Further research

Online pictures and interactive 'iceman' at:

<http://www7.nationalgeographic.com/ngm/0707/feature2/multimedia.html>

Images of glacial retreat:

- DEFRA have a short film where schoolchildren mark the retreat of Gurschen at: <http://www.climatechallenge.gov.uk/multimedia/film1.html>
- National Geographic: <http://www7.nationalgeographic.com/ngm/0706/feature2/gallery1.html>
- SwissEduc website: http://www.swisseduc.ch/glaciers/big_melt/index-en.html
- Play the film *An Inconvenient Truth*, Scene 07: *Glaciers recede* (2:00) (also note Scene 08, which shows ice core analysis)

Global warming films:

- National Geographic: <http://green.nationalgeographic.com/environment/global-warming/gw-overview-interactive.html>
- BBC: http://news.bbc.co.uk/1/hi/english/static/in_depth/sci_tech/2000/climate_change/greenhouse/default.stm

The film *An Inconvenient Truth* Scenes 03 & 04 (3:00 total) explain the greenhouse effect, while Scene 11 (4:00) shows the temperature and CO₂ data.