

Investigating air quality

Overview:

See how much our air quality has changed over the last 200 years.

Enter the Operation Earth air sampling laboratory and see how many air particles you can collect. Then compare your sample to our records from 200 years ago. Has the carbon dioxide level stayed the same? What are the black particles in your sample? What do you think has changed in 200 years?

Main story:

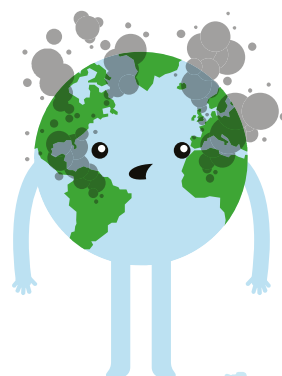
Understanding what's in the air that we breathe is a key focus area for Environmental Scientists, with poor air quality being regarded as both a global health and environmental issue. Poor air quality is associated with thousands of premature deaths each year and costs the UK economy billions of pounds in healthcare costs and environmental damages.

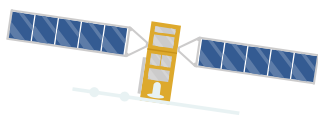
Investigating air pollution is about exploring what's in the air that can be harmful to life on Earth. Air pollution has always been a problem on Earth, and can be caused both naturally (through events such as volcanic eruptions, forest fires and dust from hot deserts) as well as through human activities. Human beings have polluted the air we breathe throughout our history, with some of the most significant air pollution throughout the UK occurring throughout the industrial revolution. However, air pollution continues as a contemporary environmental issue today, with much human activity responsible for emitting harmful gases and particulate matter (tiny particles) into the atmosphere.

The air we breathe is constantly being monitored by a network of equipment



throughout the UK capable of sensing different pollutants in the ambient air. There are over 300 air quality monitoring sites throughout the UK, varying in size, specialism and scale. These sites help us gather and record data on air quality and monitor our performance against government targets and legislation to protect our health and wellbeing. Local authorities are responsible for managing air quality in towns and cities throughout the UK, and are required to take action to clean up air that fails to meet air quality standards set out by government at local sites.





Equipment:

- Pop up poly cage.
- Attachable graphics for the poly cage.
- Tissue paper particles (blue (nitrogen), white (oxygen), red (other harmful gases) and black (particulate matter)).
- Leaf blower.
- Eye goggles.
- Face mask.
- Net.
- Mock up sample from 200 years ago showing the same white and blue particles, less red and more black particles.

How it works?

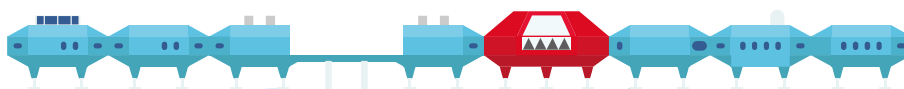
In this demonstration, a volunteer is selected from the audience to act as an air quality sensor. They're going to be collecting a sample of ambient air containing a high volume of pollutants in the form of PM2.5, one of the main pollutants of UK air.

Before the show:

1. Pop up the poly cage and attach the graphics using the velcro provided.
2. Set up the poly cage on the stage with the air sample across the floor. Attach the leaf blower to the back of the poly cage in preparation for the demonstration.

During the show:

1. Invite a volunteer down to the stage and give them a pair of safety goggles, dust mask and a net.
2. Explain to them and the audience that they are going to be acting as a sensor capable of detecting tiny particles in the air around us and that we need to capture a sample of air to compare to a sample from 200 years ago.
3. Get the volunteer to stand inside the poly cage and close the door.
4. Let them know they have 15 seconds to capture as many particles as possible.
5. Count down from 3 with the audience and then turn on the leaf blower and angle it to get maximum particle flight!
6. Encourage participant to collect as much sample material as possible within a time frame and get the audience to count down (15 seconds or so).
7. Ask the child to leave the poly cage with their sample. Empty the net into a container/sample bag.
8. Compare to another sample from 200 years ago and ask the audience what they notice.
9. Play the environmental scientist video.
10. Thank the volunteer and ask them to return to their seat.





Key take home messages:

- We use sensors to monitor the quality of the air, by measuring the pollutants present.
- Different sensors are capable of detecting different air pollutants.
- Sensors help us gather data we use to evidence policy/decision making.
- Air pollution varies across space and time.
- We can all play a part in reducing local air pollution, especially in busy city environments.

Applications:

Air quality, the importance of data, evidence based decision making, local and global, challenges and solutions.

Health and safety ⚠️

Activity - Child volunteer capturing floating plastic flower petals/paper disks in an enclosed environment, moving air provided through a leaf blower.

Hazard | Precaution

Faulty Electrical Equipment - New electrical equipment is purchased conforming to EU standards. Centre staff visually inspect all electrical equipment prior to use. Faulty equipment is not used and faults reported to line managers.

Eye Irritation - Goggles used as appropriate PPE to protect volunteer from air and flying materials.

Fumes blown into tent - Do not operate the tent or leaf blower near exhaust fumes or dangerous gases.

Risk - Low.

