

Atmospheric physics

with Dr Naruki Hiranuma

Talking points

Knowledge

1. What is an aerosol? List some examples of natural and human-made aerosols.
2. What is Arctic amplification?

Comprehension

3. What role do ice-nucleating particles (INPs) play in cloud formation?
4. What is cloud seeding, and why is it important?

Analysis

5. How do cattle ranches contribute to hailstorms in Texas?
6. What will happen to the amount of INPs in the Arctic as the Arctic warms up? And what will be the consequences of this?

Evaluation

7. Naruki's work involves collecting aerosol samples in the Arctic and at cattle ranches in Texas and analysing data in the lab. Which aspects of this work do you think you would most enjoy, and why?
8. How have Naruki's students benefited from their involvement in his research projects? What do you think you would gain if you could participate in similar opportunities?
9. What skills do you think you would learn from studying atmospheric physics, and what career would you like to apply them in?

Activities

1. Make your own cloud!

Conduct a simple experiment to create a cloud in a bottle. You will need:

- A clear glass jar
- Warm water
- A spoon or stirrer
- A match
- An icepack or metal tray filled with ice

Step 1: Fill your jar with ~5 cm of warm water and stir (to produce water vapour).

Step 2: Add smoke particles (aerosols) to the jar by lighting a match (with adult supervision), blowing it out and immediately dropping it into the jar.

Step 3: Quickly place the metal tray or icepack on top of the jar.

Step 4: Look inside the jar. You should see a cloud start to appear near the top.

Why does this happen? What role do water vapour, smoke particles (aerosols) and condensation play in this process? How does this experiment mimic the formation of clouds in the atmosphere?

2. Have a go at climate science outreach

"Physics can seem pretty overwhelming to students, but it's something that is really important to teach in a developmentally appropriate way," says Naruki.

Design a lesson to teach a group of 11-year-olds about one of the concepts within Naruki's research. How will you explain the science in a clear and understandable way? How will you make your lesson interesting and engaging for your young audience?

More resources

- The following federal agencies employ atmospheric physicists and climate scientists and provide a wealth of educational and careers resources for students:
 - NASA: nasa.gov/learning-resources
 - NOAA: noaa.gov/education
 - National Weather Service: weather.gov/education