

Climate Science & **ATMOSPHERIC CHEMISTRY**



climate kids
traveling trunk



The Climate Science & Atmospheric Chemistry Traveling Trunk contains the resources and lessons needed for educators to help students gain a better understanding of the current science behind atmospheric chemistry, the impact of aerosols on climate and public health, and how scientists are investigating the issues that we face at the intersection of these topics. The hands-on science activities, storytelling, and art materials in this trunk specifically target students from lower Elementary through High School based on Next Generation Science Standards, and can be adapted for most K-12 classroom settings and grade compositions. Using real data that is regionally-specific, the activities in this trunk will bring to life aerosols—one of the most poorly understood components of Earth’s atmosphere—and their impact on our lives and the changing climate. Most importantly, students will work to develop their own solutions to help reduce the impacts of climate change in their communities and help protect the Earth.

overview

Grade Level: Lower Elementary, Upper Elementary, Middle School, High School

Subject Areas: Science, Public Health, Fine Arts, Language Arts

Components and Duration:

- Components: Part I (Science); Part II (Storytelling); Part III (Art)
- Duration: Preparation and activity times for the Atmospheric Chemistry Module depend on chosen activities, age level, and classroom size, and can be adjusted to meet educator needs.

Setting: Classroom, Field Trip Sites (reach out to info@climatesciencealliance for our list of recommended field trips!)

Vocabulary: Aerosols, Air, Air Pollution, Air Quality, Air Quality Index, Carbon Dioxide (CO₂), Carbon Monoxide (CO), Clean Air Act, Climate Change, Fossil Fuel, Greenhouse Gas, Nitrogen, Nitrogen Oxide (NO_x), Oxygen, Ozone, Particulate Matter, Pollution, Sulfur Dioxide (SO₂), Volatile Organic Compound (VOCs), Water Vapor

Essential Question: What are aerosols and how are they impacting the climate and public health?

Objectives:

Students will:

- Understand what aerosols are and identify the sources of atmospheric aerosols- both natural and anthropogenic (human made)
- Perform a class experiment to demonstrate how atmospheric aerosols aid in the formation of clouds and precipitation
- Explain how atmospheric aerosols have both direct and indirect impacts on the Earth's climate
- Analyze air quality around their school and interpret how atmospheric aerosols impact public health
- Learn about how scientists are studying aerosols to better understand how these particles in our atmosphere impact our environment, climate change, and us!
- Develop solutions to reduce impacts of atmospheric aerosols and climate change
- Create and design community artwork to portray solutions and tell the story

what's inside

Climate Change Primer:

- Heat Trapping Blanket Demonstration
- The Incredible Carbon Cycle Game
- Greenhouse Gas Game
- Climate Kids "10 Things" Posters (English and Spanish)

Atmospheric Chemistry Module:

- Where's the Air Activity
- Let's Make a Cloud Experiment
- Incomplete Combustion Demonstration
- What is a Greenhouse Gas? Activity
- Surface Albedo and Climate Change Experiment
- Air Quality Collector Activity
- Clean Air Act Activity
- AQI Index Activity
- Purple Air Module

Science:

- Worksheets
- Atmospheric Chemistry Posters

- Safety Goggles
- Magnifying Lenses
- Molecular Model Kit
- Cloud in a Bottle
- Heat Lamp
- Thermometers

Storytelling Books:

- The Problem of the Hot World
- The Wondrous Workings of Planet Earth
- Buried Sunlight
- Climate Kids at Pacific Beach Elementary
- Here Now, Gone Tomorrow written by Climate Kids in San Diego
- Stickmen's Guide to Earth's Atmosphere
- The Air We Breath Picture Book (In Teacher Curriculum Binder)
- Threats to our Atmosphere (In Teacher Curriculum Binder)

Art Ideas:

- Craft Examples
- Climate Kids Coloring Book

Activities, Resources & Worksheets:

- Teacher Curriculum Binder
- USB with powerpoint

Regional Impacts:

- San Diego Ecosystems Assessment
- Pocket Guide
- Regional Impacts Game Cards
- 10 Things for Wildlife Poster

Beyond the Classroom Activities:

- Clear CAICE Experience
- Field Trip Opportunities
- Class Projects Ideas
- Climate Kids Ambassador Information
- Volunteer Opportunities

suggested timing

There are many tools for your use in this trunk. Our hope is that you can adapt it to your curriculum and classroom needs. Here are a few suggested pathways to cover material based on the amount of time you have.

1 Class (45 minutes - 1 hour)

- Review Atmospheric Chemistry and Climate Change PPT
- Videos: My Name is Aerosol Video, Sources of Aerosol Video, Greenhouse Gas Video
- Activities: Where is the Air?, Cloud in a Bottle, Air Quality Collectors

2 Classes (45 minutes - 1 hour ea.)

- Class 1: Review Climate Primer PPT; Activities: Heat Trapping Blanket Demo, Carbon Cycle Game, Greenhouse Gas Game
- Class 2: See outline for Atmospheric Chemistry Above

1 Week

- Class 1: Focus on Climate Primer w/Hands-on Science Activities
- Class 2: Focus on Climate Primer w/ Art and Storytelling Activities
- Class 3: Focus on Atmospheric Chemistry Module w/Hands-on Science Activities
- Class 4: Focus on Atmospheric Chemistry Module w/Storytelling and Art Activities
- Class 5: Review of What Students Have Learned

2 Week +

- Week 1: Focus on Climate Primer w/Hands-on Science, Storytelling and Art
- Week 2: Focus on Atmospheric Chemistry Module w/Hands-on Science, Storytelling, and Art
- Option: Purple Air and Clear CAICE Integration