

NASA's Earth Minute: Gas Problem

<https://www.youtube.com/watch?v=K9kga9c0u2I>

## Supported NGSS Performance Expectations

- *4-ESS2-2: Analyze and interpret data from maps to describe patterns of Earth's features.*
- *5-ESS2-1: Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.*
- *MS-ESS3-4: Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.*

## NGSS Disciplinary Core Ideas

- *ESS2A: Earth Materials and Systems*
- *ESS3C: Human Impacts on Earth Systems*

## NGSS Science and Engineering Practices

- *Analyzing and Interpreting Data*
- *Engaging in Argument from Evidence*

## NGSS Crosscutting Concepts

- *Cause and Effect*
- *Stability and Change*

**Lesson Title:** *Give your lesson a name*

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SCED 547

**Topic:** *Potential effects of human activity and the troposphere.*

**Targeted Grade Level:** Grade 4

**Time Needed:** *List the time needed for the lesson.*

**Subject Integration:** *For the purposes of this assignment, choose at least **TWO** of the following subject areas- Science, Technology, Engineering, or Math to address. Along with those subjects, please choose **at least one** other subject to integrate (any of the S-T-E -M- subjects, Art, Literacy, Social Studies, P.E., Music, etc.), for a total of **at least three different subject areas**. Please list them here.*

**Justification:**

Science: Student discover about the environment they live in, the human and nature impacts on it and how that effects quality of life.

Mathematics: Using data collection and pattern recognition to make judgments about real life issues.

**Enduring Understandings**

- Waste comes from many sources, and we can't always see it with our eyes.
- Air pollution results from the waste products of energy production, industrial processes, daily activities such as driving a car, and even from nature.
- Some pollutants found in the air are toxic to humans and the environment.
- Air quality can impact our health. We can measure and monitor pollutant levels to help keep ourselves safe.
- We can all take steps to help keep our air clean and prevent it from becoming polluted.

**Prior Knowledge** Students should be able to identify natural processes and human technology that produce waste. They should understand that materials are recycled through the environment over and over again. Students should identify clean air as a necessity of life for humans, plants, and animals.

**Standards:** *NGSS, Common Core, or related State standards. Write out (or copy and paste) standards completely. Please identify the point when each standard is addressed in the 5E template below. Each standard should be explicitly addressed within the lesson if it is to be included. Example: Reading aloud a non-fiction text does not solely qualify for ELA integration. Making a graph does not solely qualify for math integration. What concept is explicitly being taught?*

<b>NGSS Performance Expectations</b> <i>If you state does not use NGSS, use your state standards. Identify the state and link to the standards page. You are encouraged to list both the NGSS and your state standards.</i>		
Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts:
Obtain and combine information from books and/or other reliable media to explain phenomena or solutions to a design problem.	Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air, and even outer space. But individuals and communities are doing things to help protect Earth's resources and environments.	A system can be described in terms of its components and their interactions.  Science findings are limited to questions that can be answered with empirical evidence.

**Common Core State Standards:** *Use your state standards if Common Core is not applicable in your state. You are encouraged to list the CCSS and your state standards.*

Math: *If applicable*

ELA: *If applicable*

**ITEEA Standards** *(If applicable)*

**Other Standards** *(as needed)*

**Measurable Student Learning Objectives:** *Write the learning objectives as “students will be able to” statements. Be sure that your objectives are measurable and connect to the standards listed above.*

*You are encouraged to use Webb’s Depth of Knowledge to create action oriented objectives.*

**Nature of STEM:** *Summarize how your lesson addresses the “nature of” science, technology, engineering, math, etc. as discussed in the Methods of STEM course.*

**Engaging Context/Phenomena:** *How thick is our troposphere*

**Data Integration:** *What data is being used in this lesson? Are students analyzing or collecting data? What are they doing with the data? This would be a great place to include all the different NASA data made available to you. If NASA data is not appropriate for your lesson, speak to your course instructor to identify another source of data that is appropriate. It may be publicly available, collected by students, or accessible to you with permission through other projects.*

**Differentiation of Instruction:** *How can you adjust this lesson to meet the unique needs of students in your classes? What needs should be addressed? Think about and make these modifications PRIOR to the lesson so all students have the greatest ability to participate.*

**Real-life Connection:** *Is there a real-life connection to this lesson? If so, what is it? How have you considered culturally responsive teaching practices? How will students connect to the lesson in their everyday lives?*

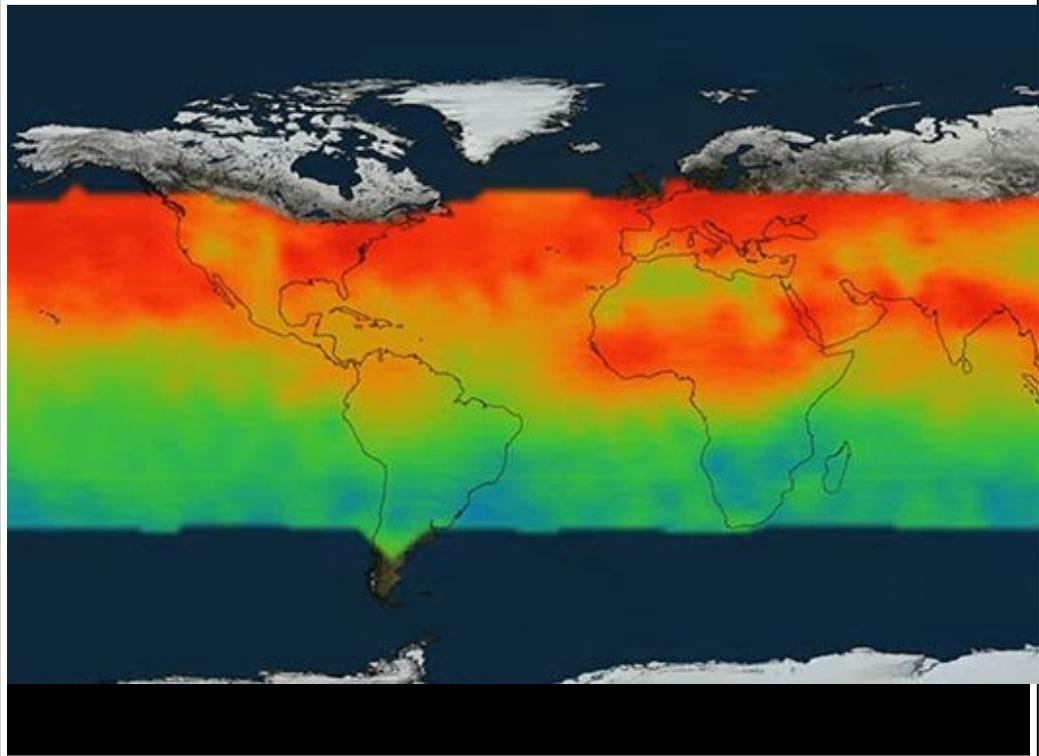
**Possible Misconceptions:** *Are there any previous ideas or thoughts you anticipate students having about this concept? List them here as it will help you consider ideas to include in your lesson.*

**Lesson Procedure:**

5E Model	5E Objectives
<p><b>Engage</b></p> <p>How thick is our troposphere activity.</p>	<p><b>Procedure: Post Covid this will be an activity but do to Covid restriction use as a demonstration.</b></p> <p>What makes up our atmosphere? Is the atmosphere the same all the way through or does it change? <a href="https://spaceplace.nasa.gov/atmosphere/en/">https://spaceplace.nasa.gov/atmosphere/en/</a></p> <p>How thick is our troposphere? Troposphere activity <a href="https://scied.ucar.edu/activity/12559/print-all">https://scied.ucar.edu/activity/12559/print-all</a></p> <p><b>Modifications</b> None required</p> <p><b>Standards Addressed</b> <i>(Which standards are being explicitly taught in this section?)</i></p> <p><b>Formative/Summative Assessments</b></p> <p>Students understand that the atmosphere is made of several layers and that the innermost layer, troposphere, is very thin.</p> <p><b>Resources</b></p> <p><a href="https://spaceplace.nasa.gov/atmosphere/en/">https://spaceplace.nasa.gov/atmosphere/en/</a></p> <p><a href="https://scied.ucar.edu/activity/12559/print-all">https://scied.ucar.edu/activity/12559/print-all</a></p>
<p><b>Explore</b></p>	<p><b>Procedure:</b></p> <p>Look at images and videos of the earth surface to compare carbon dioxide levels, vegetation levels and perhaps industrialization numbers and large scale changes such as deforestation of the amazon. Compare of the Earth's Vegetation index between 1999 and 2008 see resource page Compare Amazon forest 2000 and 2008 see resource page Comparing carbon Dioxide levels at Mauna Loa and Vegetation on the Earth's surface March 2000 - August 2020</p> <p>Students will make a list of what they have discovered when they did</p>

	<p>their comparisons</p> <p><b>Modifications</b> <i>use text and talk programs to record findings.</i></p> <p><b>Standards Addressed</b> <i>(Which standards are being explicitly taught in this section?)</i></p> <p><b>Formative/Summative Assessments</b></p> <p><b>Resources</b>  <a href="https://earthobservatory.nasa.gov/world-of-change/Biosphere">https://earthobservatory.nasa.gov/world-of-change/Biosphere</a>  <a href="https://earthobservatory.nasa.gov/world-of-change/Deforestation">https://earthobservatory.nasa.gov/world-of-change/Deforestation</a>  <a href="https://earthobservatory.nasa.gov/blogs/earthmatters/tag/carbon-dioxide/">https://earthobservatory.nasa.gov/blogs/earthmatters/tag/carbon-dioxide/</a>  <a href="https://earthobservatory.nasa.gov/global-maps/MOD_NDVI_M">https://earthobservatory.nasa.gov/global-maps/MOD_NDVI_M</a></p>
<p><b>Explain</b></p> <p><i>Facilitate opportunities for students to explain their understanding of concepts and processes and make sense of new concepts.</i></p>	<p><b>Procedure:</b> Using data and observations of the students, allow students to to make potential links between the data. Make groups of 2 students to share their findings and discuss possible correlations. Have students trade partners and have them reshare their ideas two more times.</p> <p>After pair discussions have a class discussion to ensure students have made some potential connections between vegetation and carbon dioxide levels.</p> <p><b>Modifications</b> pairing up students to gather much information and</p> <p><b>Standards Addressed</b> <i>(Which standards are being explicitly taught in this section?)</i></p> <p><b>Formative/Summative Assessments</b> Check for the following understandings</p> <p>Vegetation decreased between 1999 and 2008. Major deforestation in the Amazon Rainforest. Carbon dioxide increases and decreases with the vegetation levels in the Northern Hemisphere</p> <p><b>Resources</b></p>
<p><b>Elaborate</b></p> <p><i>Provide applications of concepts</i></p>	<p><b>Procedure:</b></p> <p><b>Modifications</b> <i>(What student needs must be addressed? How can you</i></p>

<p><i>and opportunities to challenge and deep ideas; build on or extend understanding and skills.</i></p>	<p><i>make each experience accessible for ALL learners?)</i></p> <p><b>Standards Addressed</b> <i>(Which standards are being explicitly taught in this section?)</i></p> <p><b>Formative/Summative Assessments</b> <i>(How will you assess in each phase?)</i></p> <p><b>Resources</b> <i>(List all resources and materials used in this part of the lesson.)</i></p>
<p><b>Evaluate</b></p> <p><i>Assess students knowledge, skills and abilities.</i></p>	<p><b>Procedure:</b> <i>(What happens during this phase? What is the teacher doing? What is the student doing?)</i></p> <p><b>Modifications</b> <i>(What student needs must be addressed? How can you make each experience accessible for ALL learners?)</i></p> <p><b>Standards Addressed</b> <i>(Which standards are being explicitly taught in this section?)</i></p> <p><b>Formative/Summative Assessments</b> <i>(How will you assess in each phase?)</i></p> <p><b>Resources</b></p> <p>Final video of what NASA is doing to continue to collect data</p> <p><b>VIDEOS   APRIL 2, 2019 NASA's OCO-3: A New View of Carbon</b></p> 



<https://www.jpl.nasa.gov/video/details.php?id=1573>

**Teacher Background:** *What background information does the teacher need to effectively teach this lesson? If you can provide links to resources, please do so.*

How thick is our troposphere activity