

MS-ESS3-5 Earth and Human Activity

Students who demonstrate understanding can:

MS-ESS3-5. Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century. [Clarification Statement: Examples of factors include human activities (such as fossil fuel combustion, cement production, and agricultural activity) and natural processes (such as changes in incoming solar radiation or volcanic activity). Examples of evidence can include tables, graphs, and maps of global and regional temperatures, atmospheric levels of gases such as carbon dioxide and methane, and the rates of human activities. Emphasis is on the major role that human activities play in causing the rise in global temperatures.]

The performance expectation above was developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices

Asking Questions and Defining Problems

Asking questions and defining problems in grades 6–8 builds on grades K–5 experiences and progresses to specifying relationships between variables, and clarifying arguments and models.

- Ask questions to identify and clarify evidence of an argument.

Disciplinary Core Ideas

ESS3.D: Global Climate Change

- Human activities, such as the release of greenhouse gases from burning fossil fuels, are major factors in the current rise in Earth’s mean surface temperature (global warming). Reducing the level of climate change and reducing human vulnerability to whatever climate changes do occur depend on the understanding of climate science, engineering capabilities, and other kinds of knowledge, such as understanding of human behavior and on applying that knowledge wisely in decisions and activities.

Crosscutting Concepts

Stability and Change

- Stability might be disturbed either by sudden events or gradual changes that accumulate over time.

Observable features of the student performance by the end of the course:

1	Addressing phenomena of the natural world
a	Students examine a given claim and the given supporting evidence as a basis for formulating questions. Students ask questions that would identify and clarify the evidence, including:
i.	The relevant ways in which natural processes and/or human activities may have affected the patterns of change in global temperatures over the past century.
ii.	The influence of natural processes and/or human activities on a gradual or sudden change in global temperatures in natural systems (e.g., glaciers and arctic ice, and plant and animal seasonal movements and life cycle activities).
iii.	The influence of natural processes and/or human activities on changes in the concentration of carbon dioxide and other greenhouse gases in the atmosphere over the past century.
2	Identifying the scientific nature of the question
a	Students questions can be answered by examining evidence for:
i.	Patterns in data that connect natural processes and human activities to changes in global temperatures over the past century.
ii.	Patterns in data that connect the changes in natural processes and/or human activities related to greenhouse gas production to changes in the concentrations of carbon dioxide and other greenhouse gases in the atmosphere.