

THE STANDARD

Changing Global Temperatures

Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century.

DCI

DISCIPLINARY
CORE IDEA

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.

Earth's average surface temperature has risen about 1.3°C since 1880. The evidence comes from many independent sources: weather stations, satellites, ocean buoys, ice cores, tree rings. Human activities, especially burning coal, oil, and natural gas, have raised atmospheric CO₂ from about 280 ppm before 1850 to over 430 ppm today. More greenhouse gases trap more heat. **That is the major driver of the current warming.**

SEP

SCIENCE &
ENGINEERING
PRACTICE

Asking Questions and Defining Problems

Ask questions to identify and clarify evidence of an argument.

Students aren't memorizing climate facts. They're asking questions about the evidence: where did this data come from, what does it actually show, how do we know one cause from another. A good question is a thinking tool. **It separates what the data tells us from what we assume.**

CCC

CROSSCUTTING
CONCEPT

Stability and Change

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

Earth's climate has been relatively stable for thousands of years. That stability is being disturbed. The change isn't sudden like a volcano. It's a gradual accumulation across a century that adds up to something the geological record hasn't shown at this rate before. **Stability and change is the frame for reading the graphs.**