




## Climate Basics

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Climate is the average of weather conditions over decades to centuries in a particular location.[1] Climate is influenced by many factors, including solar activity, ocean circulation, land cover, and greenhouse gases and aerosols in the atmosphere.[2,3,4,5] Records from Earth's geologic history show that the climate has changed both gradually and abruptly in the past, and that global temperatures and the concentrations of greenhouse gases in the atmosphere are strongly correlated[6]. Many of the concerns over human influences on climate are due to the significant emissions of greenhouse gases from human activities since the mid-19th century[2,7]. Natural processes will always have strong effects on climate, but there is evidence that these greenhouse gas

emissions, combined with other human activities such as aerosol emissions and land-use changes, are linked to the rapid warming that has been observed since the middle of the 20th century[2,3,4,7,8,9,10,11,12]. Since the start of the 20th century, average global temperatures have increased, with most of the warming occurring since the 1970s[7,8,9]. All 10 of the warmest years since records began have occurred since the early 2000s, and average global temperatures are expected to increase at least 2 °F, and perhaps by as much as 11 °F, over the next century[10,11].

## How does geoscience inform decisions about climate?

The Earth system is a complex one, and it is not always easy to predict the precise effects of geological processes or human activities, particularly on geologically short timescales of years to decades. Geoscientists use historical measurements, data from the geologic record, and real-time data to constantly improve their understanding of the Earth system and to predict future climate changes due to both natural causes and human activities.

## References

- 1What's the Difference Between Weather and Climate? *NASA*
- 2Climate Change Facts: Causes *NASA*
- 32014 National Climate Assessment: Land Use and Land Cover Change *U.S. Global Change Research Program*
- 4FAQ: How do changes in climate and land use relate to one another? *U.S. Geological Survey*
- 5Aerosols: Tiny Particles, Big Impact *NASA*
- 6Temperature change and carbon dioxide change *National Oceanic and Atmospheric Administration*
- 72014 National Climate Assessment: Future Climate Change *U.S. Global Change Research Program*
- 8Climate Change Facts: Evidence *National Oceanic and Atmospheric Administration*
- 9FAQ: Is the globe still warming today? *National Oceanic and Atmospheric Administration*
- 10Global Climate Change Indicators *National Oceanic and Atmospheric Administration*
- 11Advancing the Science of Climate Change *The National Academies*
- 122014 National Climate Assessment: Recent U.S. Temperature Trends *U.S. Global Change Research Program*

## Learn More

## Introductory Resources

- Climate Change Evidence & Causes: The Basics of Climate Change (Webpage), *The National Academy of Sciences and U.K. Royal Society*

This in-depth web resource summarizes the basic science behind climate change and accompanies a report by experts at the U.S. National Academy of Sciences and U.K. Royal Society. The report presents evidence and explanation of climate change for the general public, structured around twenty common questions.

## Resources for Educators

- Education Resources Network, *AGI's Center for Geoscience & Society*  
Search for climate resources in: Professional Resources, Organizations, Curricula & Instruction, Teaching Media, Outreach Programs
- NGSS Performance Expectations, *Next Generation Science Standards*  
K-ESS2-1, 3-ESS2-1, 3-ESS2-2, MS-ESS2-2, MS-ESS2-5, MS-ESS2-6, MS-LS2-5, HS-LS2-1, HS-LS2-7, 3-LS4-4, HS-LS4-4, HS-LS4-6
- NGSS Disciplinary Core Ideas, *Next Generation Science Standards*  
ESS2.D, LS2.A, LS2.C, LS4.C, LS4.D

## Frequently Asked Questions

What are El Niño and La Niña?

American Geosciences Institute

How is ocean acidification affecting sea life?

National Oceanic and Atmospheric Administration

What is ocean acidification?

National Oceanic and Atmospheric Administration

How does El Niño affect my area?

National Oceanic and Atmospheric Administration

What is the difference between weather and climate?

American Geosciences Institute

*Do you have a question that's not listed here? [Search all FAQs](#)*

## Maps & Visualizations



Interactive map of sea level rise impacts in Delaware

Delaware Department of Natural Resources and Environmental Control

The Delaware Sea Level Rise Inundation map shows how various extents of future sea level rise (0.5, 1.0, and 1.5 meters) would affect flooding in coastal Delaware. For each scenario, users can see the areas that would be flooded during an average higher tide (Mean Higher High Water). The map does...

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