

Analyzing Greenhouse Gasses Over Time

Summary

Students will create graphs on the concentrations of various greenhouse gases in Earth's atmosphere in recent history. They will look for trends in the data.

Time Frame

1 class periods of 60 minutes each

Group Size

Small Groups

Materials

Raw Data (provided as part of the student worksheet):

Carbon Dioxide Concentrations, Mauna Loa, Hawaii in parts per million by volume (ppmv)

Methane Gas Concentration in parts per million by volume (ppmv)

CFC (chlorofluorocarbon) Production

Nitrous Oxide in parts per billion by volume (ppbv)

World temperatures (degrees C)

Computer lab with Excel program (to create graphs)

- [Student worksheet](#)
(attached)

Background for Teachers

The graphs indicate the rising trend of several greenhouse gases, which may or may not contribute to current global warming, but which probably will if increases continue. Note however the decrease in production of CFCs because of an international agreement to reduce their production. CFCs not only are a greenhouse gas, but more significantly damage the earth's ozone layer which protects us from the Sun's harmful ultraviolet light.

Instructional Procedures

Inform the students that they have been assigned a position in a research institute dealing with global climate issues. A research scientist has just given them some "raw" data regarding greenhouse gases in Earth's atmosphere. Within a week there will be a major international conference on global change. The data needs to be presented and organized in a meaningful and useful way.

Greenhouse gases allow the Sun's light to pass through them to the surface of Earth, but they also absorb some of the infrared radiation from Earth's surface. This creates an effect similar to that in a greenhouse. Gases, like glass in a greenhouse, help trap heat and keep it from escaping. There is concern over whether increases in these gases are contributing to global warming. The first step in investigating this is to determine whether amounts of greenhouse gases in the atmosphere have been increasing.

Discuss where data comes from, types of graphs available, what a trend is, and how to project a trend.

Each group should create 2 graphs in Excel, using the 2 of the raw data tables provided below. There are four different graphs, so make sure that all four are assigned so that each can be discussed.

Upon completion of the graphs have the students project the trend of the curve for another 50 years.

Have each group develop a conclusion for their particular chart. All graphs should be printed and then posted in the room like an art gallery. Students should be allowed to wander the room and compare graphs for accuracy and conclusions.

Ask for a spokesperson for each group to report a majority view and a minority view (if one exists) for the data and projected trends.

Discuss the role of data analysis in scientific research. How do choices in displaying data, for example as tables of data or as graphs, affect communication?

Can graphs be misleading by changing the x-axis and y-axis number increments?

Discuss with your students the types of changes that can be made to reduce CO₂ emissions. What is their county, state, or country doing (if anything) to help? Have the students ask older family members or friends about the impact that reducing CFCs has had on their daily lives. Do they feel changing their lifestyle or spending habits to help reduce CO₂ is worthwhile?

Bibliography

Lesson Design by Jordan School District Teachers and Staff.

Authors

[Utah LessonPlans](#)