

## Climate Change Comic Strips—A Tool to Understand the Basic Science

This plan was developed by Liese Murphree and SOCAN's Climate in the Classroom Project for SOREEL's August Institute 2016. (40min for the workshop). Can be adapted for Middle School and High School students.

**Overview:** Participants will work in mixed grade-level teams to tell the story of climate change . They will discuss and assemble a series of figures into a comic strip. They will attach these images to a large piece of paper. A brief caption is added to each image identifying what its message is. Participants will view all of the created comic strips in a gallery walk and leave questions and comments. We will end with a discussion to answer any questions that have developed as a result of the activity.

**Objective:** To increase understanding of the basic science of global warming.

**Grade Level:** Teacher education. Possibly adaptable for MS or HS.

### Standards:

Science and Engineering Practices

Analyzing and Interpreting Data

Constructing Explanations and Designing Solutions

Crosscutting Concepts

Patterns

Scale Proportion and Quantity

MS-ESS2-2 Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales.

MS-ESS3-5 Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century.

**Materials:** (For each group) Large paper to assemble comic strips, set of figures, glue stick.

(For the whole workshop) Tape to post comic strips. Markers/Pen to leave comments during Gallery Walk.

### Science Terms

- Temperature Anomaly = How much a measured property (such as temperature) differs from a long term average.
- Global Warming Potential = The contribution a greenhouse gas makes on a Kilogram for Kilogram basis to global warming based on the ability of the gas to absorb IR. GWP values are set against carbon dioxide, defined as unity (i.e. = 1).
- Parts per million (PPM) = a concentration measurement =  $1\text{g}/10^6\text{ g}$  or mg/Kg.
- Ultraviolet (UV), visible (Vis), infrared (IR) = different frequencies/energies/wavelengths of light on the electromagnetic spectrum.
- Shortwave radiation = UV
- Longwave radiation = IR = heat
- Carbon sink = a place where carbon is stored for a relatively long time (e.g. the ocean)
- Carbon source = a net producer of carbon dioxide (e.g. forest fires)

- Positive feedback loop = a process that leads conditions further and further away from their previous state. In global warming, for example: when ice packs melt, the dark ground or ocean that is exposed reflects less of the sun's energy than the ice sheet. So more of the sun's energy is absorbed and converted to IR (heat) thus warming the system and causing further ice loss.
- Negative feedback loop = a process that leads conditions to return to their previous state. In global warming, for example, atmospheric warming can increase evaporation creating more clouds. More clouds will reflect more of the sun's energy back into space allowing less to reach the Earth's surface. Thus less heat radiates back outwards from the surface cooling the atmosphere.)

### Activity

- Analyzing and Interpreting the Figures – 5min
  - Working in mixed grade-level teams of 4, discuss what the figures tell us in each of the figures, identify questions you have.
- Questions and Discussion on the Figures—8min
- Making the Comic Strips—8min
  - Assemble the figures into a comic strip that tells a useful story about how global warming works. You can put them in any order. You may use all or only some of them. It may not tell the whole story of global warming, but just a useful part of the story.
  - Write a brief caption under each figure in your comic strip.
- Gallery Walk—10min
  - Leave comments and questions on the sheet below the comic strip
  - Do you see similarities in the stories? Does seeing other stories bring up any new questions for you?
- Discussion—9min