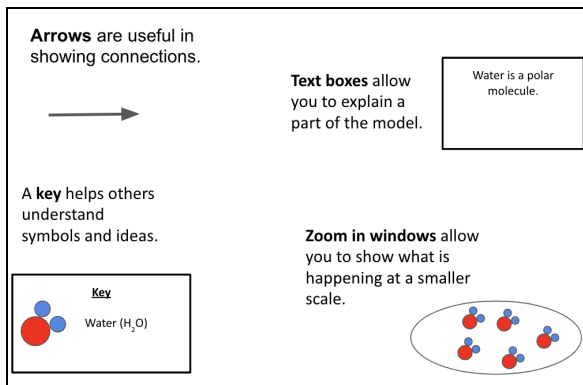


Model Revision - Teacher Guide

Setting the Stage

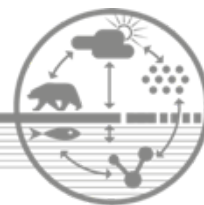
Scientists gather evidence and develop models to represent phenomena. As new evidence is acquired, models are revised, an iterative process that goes on indefinitely. In this lesson, students draw on concepts and evidence acquired during the unit to revise their initial models, constructing a new model for the unit driving question, “Why might the Arctic be warming four times as fast as the rest of the world?”



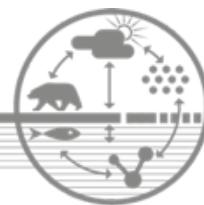
Lesson Overview

- *Part 1 – (40 minutes) Model Revisions*
Students reflect on previous lessons and incorporate new evidence to construct revised models to explain the unit driving question, “Why might the Arctic be warming four times as fast as the rest of the world?”
- *Part 2 – (20 minutes) Model Sharing*
Students share their revised models with the class.

The materials were developed by CIRES Education and Outreach at CU Boulder with support from AGS 1554659 and OPP 1839104.



Instructional Overview	
Grade Level	Middle/High School
Instructional Time	60 minutes
Standards Alignment	NGSS Disciplinary Core Idea: • ESS2.D: Weather and Climate NGSS Science and Engineering Practices: • Developing and Using Models • Constructing Explanations NGSS Crosscutting Concepts: • Systems and System Models
Unit Driving Question	• Why might the Arctic be warming four times as fast as the rest of the world?
Driving Question For This Lesson	• Why do scientists continue to gather evidence and revise models of phenomena?
Learning Goals	• Reflect on learning by applying evidence gathered from previous lessons to revise initial models/explanations.
Materials	☐ Model Revision PPT ☐ Model Revision Student Worksheet ☐ Colored pencils, markers, crayons ☐ Rulers ☐ Sticky notes ☐ Summary Table ☐ Initial Ideas Public Record
Material Preparation	☐ Cue and test web links ☐ Print student worksheets ☐ Review presenter notes in the Model Revision PPT ☐ Display summary table and initial ideas public record.
Vocabulary	• No new vocabulary



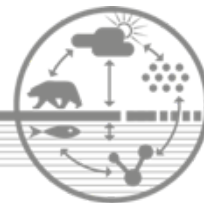
Part 1 - Model Revisions (40 minutes)

Refer to Part 1 slides included in the [Model Revision PPT](#). See PPT presenter notes for additional information.

1. Review the purpose of scientific models and summarize the “Arctic Feedbacks” unit up to this point by reviewing the summary table.
 - a. Reflect on learning by referencing the Initial Ideas public record.
2. Instruct students to review their initial models and discuss the following questions:
 - a. How does what you learned from each lesson relate to the unit driving question? (see summary table).
 - b. What do you want to keep? What should be changed? What needs to be added?
 - c. Can you use data to support your thinking?
3. As a whole class, create a student-generated list of all relevant parts and data/evidence that should be included in revised descriptive models representing the unit driving question. Students should record this list of ideas on their “Model Construction Worksheet”.

Teacher Tip:

- Record student ideas on a “[Model Construction Worksheet](#)” under a document camera. Students can then copy this same list down on their own worksheet.
4. Use the [Model Revision PPT](#) to review signs and symbols that can be helpful in connecting different parts of a descriptive model.
 5. Students reflect on lessons #1-4 and incorporate new evidence to construct revised models to explain the driving question, “Why might the Arctic be warming four times as fast as the rest of the world?”
 - a. Students should refer to their initial models and all other relevant classwork when constructing their revised models.



Part 2 - Model Sharing (20 minutes)

Refer to Part 2 slides included in the [Model Revision PPT](#). See PPT presenter notes for additional information.

1. Students share their models with the class. Sharing can be done through gallery walks, presentations, etc. One option is to have student groups swap revised models. Student groups then use sticky notes to provide feedback for their peers.
 - a. Regardless of the model sharing approach, the teacher should be prepared to:
 - i. Prompt each group to describe how and why they changed the model.
 - ii. Ask probing questions
 - iii. Compare and contrast ideas across groups
 - b. If time allows, give students an opportunity to modify their “Revised Models” to incorporate feedback from their peers.