Uncovering our Animated Earth

Driving Question

How can we analyse the sources and consequences of geological change on a global and a local scale?

By the end of this workshop you will:

- *Collect information from various sources to determine how and why the Earth is kinetic*
- *Analyse and creatively demonstrate some ways that geological formations can be generated and secondarily altered*
- *Contemplate the crucial role the Mi'kmaq perspective and Traditional Ecological Knowledge has on global and local understanding of geology*
- *Consider the long-term impacts of geological change on the landscape*
- *Identify and summarize relevant information and observations; use this information as a guide to identify real world examples of geological patterns, particularly in Nova Scotia*

Challenge 1 *Let's frame the bigger picture! To answer the following questions, you can watch the Video 1 – Introduction of Driving Discovery's Animated Earth, review your textbook, and/or have a discussion as a class.*

What is geology? What are some of the branches of geology?

How was the Earth formed? What is the Earth's structure? What are the three layers of the Earth? *Check out the "Layers of the Earth Research Card" for a view of the Earth's layers!

What is heat convection? How do heat convection patterns impact the Earth's mantle and crust? Draw a diagram to support your responses

Give one example of how the Earth has changed since its formation. How do we know? What is some evidence we can find in Nova Scotia to support your example?

Challenge 1 *(continued)*

Setting some Boundaries

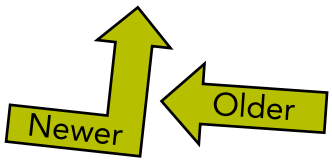
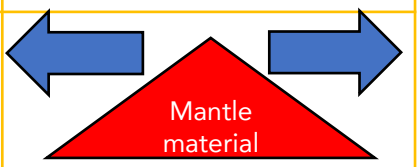
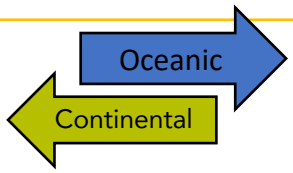
Earth's crust is made up of thin, dense oceanic plates and thicker, less dense continental ones all floating on the fluid mantle. The movement of these plates and their interactions with one another help to shape our world.

Using the materials available to you, let's explore those interactions (or "boundaries")

Some suggested materials

- **Oceanic plates** Cardstock or stiff plastic sheet
- **Continental plates** Foam or cardboard
- Or simply use your hands!

- Take some time to predict the interactions and one major consequence that occur at each type of plate boundary by completing the following table. When you're ready, check the accuracy of your hypothesis by either watching Video 2 of Driving Discovery's Animated Earth, by reviewing your textbook, or by discussing your predictions with your peers.

	Continental | Continental	**Continental | Oceanic**	**Oceanic | Oceanic**
Convergent *Moving together*	 Orogeny (mountain building)		
Divergent *Moving apart*			 Mid-ocean ridge (sea floor spreading, new oceanic crust)
Transform *Moving side by side*		 Friction build-up, pressure release (earthquakes)	

How accurate were your predictions? What other information would have been useful to know?

What is the importance of "relativeness" when considering plate interactions?

Can you think of any Nova Scotian examples of the geological events resulting from plate boundaries? What about elsewhere in the world?

What was the hold up? The Theory of Plate Tectonics was not widely accepted until decades after it was first proposed. Why do you think it took so long for it to be accepted? Why was it accepted in the end?

Challenge 2:
Dirt Detectives

Plate tectonics are an example of change resulting from the **GEOSPHERE** and, important though it is, Plate Tectonics are by no means the only agent of geological change. In fact, evidence of other means of change are all around us! Let's take some time to consider changes resulting from the other spheres of the Earth: the **HYDROSPHERE** and

Exploring Agents of Change

- Complete the table below to get a sense of the agents of change that impact the world around us. You can watch Driving Discovery's Animated Earth Video 3 for some inspiration, have a discussion with your peers, or dive right in!
- What agents of change can you find in your home, classroom, school, and community?
- *Quick tip: These agents don't have to be acting on rocks and landscapes; check out the ice in your freezer or the paint on a fence*

	Location **Where can you observe it?**	**What's happening?** **Draw or describe what you observe**	**Is the change happening right now or has it already occurred?** **How can you measure the change?**
_____sphere ***Soil, rocks, lava, magma***			
_____sphere **and** **_____sphere** ***Water and Ice***			
_____sphere ***Biological Activity***			
_____sphere ***Wind***			

Did you notice any overlap between spheres? Explain your reasoning. What might this imply at the larger scale?

Check in with your class! Did anyone find evidence for an agent you struggled with? Did you disagree with any the evidence your classmates provided? What is the benefit of sharing your thoughts with others?

Challenge 3:
What-dunit?

- Choose a set of Research Cards to explore. Circle your culprit number:

  Culprit #1 Culprit #2 Culprit #3

- Summarize the most important and relevant information from your chosen research cards in the following table. Use these notes to determine the most likely culprit behind your landforms.

- What features do your landforms have in common? What are different?
- Is it possible to have more than one culprit active on your landforms?

My most likely culprit is:

Challenge 4:
Make Your Case (Literally)

- You've made detailed observations and now it's time to present your argument!
- Using the materials and supplies available to you, get creative and model your culprit using an experiment, physical representation, or detailed description of the culprit you believe is responsible for your landforms
- Plan out your model and how you will present it below. Consider what information and features you want to highlight and why those details are important. Once you're satisfied, bring it to life!

What is the ultimate goal for your model?

Key features and information

Materials needed

Draw, describe, or outline your model's design and how you will present it

- What considerations can you make for the size of the landforms you reviewed and the timescale of their formation? Can you think of any modern examples at a similar scale in and outside of Nova Scotia where this culprit is active? Will the inclusion of this information reinforce or weaken your case?
- As you design your model, do you notice anything that makes you reconsider your culprit's identity?

Time to
State Your Case

- To complete your final challenge, observe your classmates' models, record the elements of their design that you like
    - Did anyone present the same culprit as you? How did each person's perspective affect their choice of model?
    - What would you change about your own model having seen your classmates'?
- Share your own design and record your classmates' feedback
    - Make your argument as to why you believe your culprit is the most likely
    - Explain why you chose this type of model to present your argument

Record your observations

Suggest one modification to your model

Reconsider Did your classmates' presentations or comments change your conclusion as to your most likely culprit? Why or why not?
How could you modify your model to reflect the activities of more than one culprit?
Was your model accessible to everyone? What adjustments could you make to ensure everyone could experience your argument?