

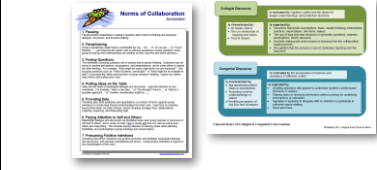






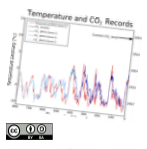
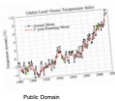



<p align="center"><b>Facilitation Guide</b></p> <p align="center"><b>Educational Service District 123 and Pacific Northwest National Laboratory</b></p> <p align="center"><b>Exploring Climate Science with Virtual Reality Follow-up #1</b></p> <p align="center">Phenomena</p> <p align="center">Attitudes about Climate Change</p> <p align="center">Argument Drive Inquiry</p>		
Slide 1	<p align="center"><b>Exploring Climate Science with Virtual Reality Follow-up #1</b></p> <p align="center"><i>Teacher/Scientist Partnership</i></p> <p align="center">PNNL Campus – Mural Room BSF/CSF October 2, 2018</p> <p align="center"><i>Georgia Boatman, Regional Science Coordinator, ESD 123</i> <i>Peggy Willcuts, Sr. STEM Education Consultant, PNNL</i></p>  	<p><b>Slide 1 Welcome and Introductions (all teachers and all facilitators)</b></p> <ul style="list-style-type: none"> <li>Restrooms / Evacuation Site / Escorted Badges</li> </ul>
Slide 2	<p align="center"><b>Refresh - Take a Quick Glance</b></p> 	<p><b>Slide 2-3 30 minutes</b></p> <p align="center"><b>Welcome to Exploring Climate Science Follow-up</b></p> <ul style="list-style-type: none"> <li>Our norms</li> <li>Just a reminder of these two documents and an invitation to revisit them as needed</li> </ul>
Slide 3	<p align="center"><b>Updates on What You are Doing</b></p> <p>Report out to the group about any Climate Science work you have done so far...</p> <ul style="list-style-type: none"> <li>Planning</li> <li>Lessons</li> <li>Research</li> <li>Etc.</li> </ul>	<p><b>Slide 2-3 30 minutes</b></p> <p><b>Report Out</b></p> <p>25 minutes</p> <ul style="list-style-type: none"> <li>Report out on what you have been doing (planning, research, teaching, use of resources)</li> </ul>
Slide 4	<p align="center"><b>Is it a Phenomena?</b></p> <ul style="list-style-type: none"> <li>Qualities of a Good Anchor Phenomena <ul style="list-style-type: none"> <li>Read through the one page document</li> <li>Discuss with a partner</li> </ul> </li> <li>Get back into the phenomena charts - go through the whole cycle</li> </ul>	<p><b>Slides 4-7</b></p> <p><b>90 min</b></p> <ul style="list-style-type: none"> <li>Grounding: Qualities of a Good Phenomena</li> <li>Hand out of one-pager of Phenomena Graphic</li> <li>To brainstorm a phenomena, read through each of the elements on the handout</li> <li>Move to your wall chart and continue brainstorming</li> </ul>
Slide 5	<p align="center"><b>Phenomena Brainstorming Tool</b></p> 	<p><b>Slides 4-7</b></p> <p><b>90 min</b></p> <ul style="list-style-type: none"> <li>Grounding: Qualities of a Good Phenomena</li> <li>Hand out of one-pager of Phenomena Graphic</li> <li>To brainstorm a phenomena, read through each of the elements on the handout</li> <li>Move to your wall chart and continue brainstorming</li> </ul>

<p>Slide 6</p>	<p><b>Transitioning to Classroom Implementation</b></p> <ul style="list-style-type: none"> <li>● Finish thinking on Phenomena Development Chart</li> <li>● Think about lessons/units that you teach or may teach where this phenomena would be employed</li> <li>● Continue to develop a classroom experience around this phenomena and the ecology and human impact learning</li> <li>● Be ready to share to the group</li> </ul>	<p><b>Slides 4-7</b> <b>90 min</b></p> <ul style="list-style-type: none"> <li>● Grounding: Qualities of a Good Phenomena</li> <li>● Hand out of one-pager of Phenomena Graphic</li> <li>● To brainstorm a phenomena, read through each of the elements on the handout</li> <li>● Move to your wall chart and continue brainstorming</li> </ul>
<p>Slide 7</p>	<p><b>Share Out Your Ideas</b></p> <p>Share out your initial thinking about a phenomena</p> <ul style="list-style-type: none"> <li>● What is the phenomena?</li> <li>● How do you think you would introduce it?</li> <li>● Any thoughts on lessons to illuminate the phenomena?</li> </ul>	<p><b>Slides 4-7</b> <b>90 minutes</b></p> <ul style="list-style-type: none"> <li>● Share out of initial thinking: choice of phenomena <ul style="list-style-type: none"> <li>○ How to introduce it to your students</li> <li>○ Activities you might do with students</li> </ul> </li> </ul>
<p>Slide 8</p>	<p><b>Probing For Understanding</b></p> <p>Parts Per Million Card Sort:</p> <ul style="list-style-type: none"> <li>● First Sort: signs of global warming and not clear signs of global warming</li> <li>● Second Sort: Direct measurement of global warming of the earth and inferences from data</li> </ul>	<p><b>Slide 8</b> <b>. Page Keeley Card Sort “What are the Signs of Global Warming?”</b> <b>30 minutes</b></p> <ul style="list-style-type: none"> <li>● Regroup and hand out card sets</li> <li>● The purpose of this assessment probe, made into a card sort, is to elicit students’ ideas about the signs of global warming.</li> <li>● The probe is designed to determine whether students think a statement is: <ul style="list-style-type: none"> <li>○ Accurate or complete enough to see direct patterns or draw inferences from data that can be used to support the claim that our planet is warming, Or</li> <li>○ Whether more long-term data is needed to decide whether the effect is a sign of global warming.</li> </ul> </li> <li>● First sort: Using the above criteria, sort the cards into those that could be considered signs of global warming and those that are not clear signs of global warming</li> <li>● Second sort: Sort the cards into direct measurement of global warming of the earth and inferences from data (over long period of time, types of data)</li> <li>● Debrief the facilitation: Supportive of English Language Learners? How would you facilitate this with your students?</li> <li>● Share NOAA’s Ten Signs of a Warming World</li> </ul>

<p>Slide 9</p>	<p><b>Probing For Understanding Yale Map</b> 2018 Map from Yale <a href="https://bit.ly/2GFDUii">https://bit.ly/2GFDUii</a> This is two years ago.</p> <ul style="list-style-type: none"> <li>Individually, squirrel down as many rabbit holes as you can.</li> <li>What do you predict the situation would look like now?</li> </ul> 	<p><b>Slides 9-11</b> <b>Probing for Understanding Part 2 (Peggy)</b> <b>45 minutes</b></p> <ul style="list-style-type: none"> <li>Show map from Yale with 2016 data. This is the situation two years ago,</li> <li>Individually squirrel down as many rabbit holes as you can.</li> <li>What do you predict things would look like now?</li> </ul>
<p>Slide 10</p>	<p><b>Probing For Understanding Controversial Topics</b> How should you engage students in controversial topics?  Read article.  How might you use this to engage students in discourse around this topic?</p>	<p><b>Slides 9-11</b> <b>Probing for Understanding Part 2 (Peggy)</b> <b>45 minutes</b></p> <ul style="list-style-type: none"> <li>Handout article: How to engage students in controversial topics.</li> <li>Read and React to Four Tips to Teaching Climate Science</li> <li>How would you use this to engage in student discourse?</li> <li>Get up, find someone in the room you do not work with. Share out your answer to this question.</li> </ul>
<p>Slide 11</p>	<p><b>Probing For Understanding Share Ideas</b>  Stand up.  Find someone in the room you do not work with.  Share your thinking on how you would use this to engage students in discourse?</p>	<p><b>Slides 9-11</b> <b>Probing for Understanding Part 2 (Peggy)</b> <b>45 minutes</b></p> <ul style="list-style-type: none"> <li>Handout article: How to engage students in controversial topics.</li> <li>Read and React to Four Tips to Teaching Climate Science</li> <li>How would you use this to engage in student discourse?</li> <li>Get up, find someone in the room you do not work with. Share out your answer to this question.</li> </ul>
<p>Slide 12</p>	<p><b>Carbon Dioxide Levels in the Atmosphere Resource</b>  Arguing from Evidence  <i>Argument-Driven Inquiry in Earth and Space Science: Lab Investigations for Grades 6–10</i> --Victor Sampson Resource</p> 	<p><b>Slides 12-22 Claims, Evidence, and Reasoning – Argument Driven Inquiry Resource</b> <b>75 minutes</b></p> <ul style="list-style-type: none"> <li>We will be engaging in an activity from a Victor Sampson resource called Argument - Driven Inquiry in Earth and Space Science.</li> <li>I am choosing to share one on Carbon Dioxide Levels in the Atmosphere as it directly ties to our Climate Science work.</li> </ul>

Slide 13	<p><b>Carbon Dioxide Levels in the Atmosphere</b></p>  <p>Question: <i>How has the concentration of atmospheric carbon dioxide changed over time?</i></p> <ul style="list-style-type: none"> <li>Quick write your first thinking</li> <li>Share with a neighbor</li> </ul>	<p><b>Slides 12-22 Claims, Evidence, and Reasoning – Argument Driven Inquiry Resource</b></p> <p><b>75 minutes</b></p> <ul style="list-style-type: none"> <li>How has the concentration of atmospheric carbon dioxide changed over time?</li> <li>Quick write your initial thinking</li> <li>Share with a neighbor</li> </ul>
Slide 14	<p><b>Obtaining Information</b></p>  <ul style="list-style-type: none"> <li>Note the text features</li> <li>Predict what you think the text will be about</li> <li>With a partner read through the Introduction and Getting Started page 439-top part of 440</li> </ul>	<p><b>Slides 12-22 Claims, Evidence, and Reasoning – Argument Driven Inquiry Resource</b></p> <p><b>75 minutes</b></p> <ul style="list-style-type: none"> <li>Examine the handout. Note the text features</li> <li>Predict what you think the text will be about</li> <li>Read pages 439-440 with a partner - the Introduction and Getting Started</li> </ul>
Slide 15	<p><b>Analyze and Interpret the Data-1</b></p>  <p>Strategy to look at data... Highlights, Comments, and Captions</p> <p><u>Highlight</u> what I see:</p> <ul style="list-style-type: none"> <li>Look for changes, trends, or differences.</li> <li>Write what you see. A different description for each observation.</li> <li>Be concise - write only the essence, or highlights, of what you see.</li> </ul>	<p><b>Slides 12-22 Claims, Evidence, and Reasoning – Argument Driven Inquiry Resource</b></p> <p><b>75 minutes</b></p> <ul style="list-style-type: none"> <li>Let's engage in a strategy to look at data</li> <li>Highlights, Comments, and Captions</li> <li>HIGHLIGHT: what I see <ul style="list-style-type: none"> <li>Look for changes, trends or differences</li> <li>Write what you see - a different description for each observation</li> <li>Be concise - write on the essence, or highlights of what you see</li> </ul> </li> </ul>
Slide 16	<p><b>Analyze and Interpret the Data-2</b></p>  <p>Strategy to look at data... Highlights, Comments and Captions</p> <p>Comment on what it means: Interpret what you see. Write what each observation means. Don't tackle all of the data at once, just one observation at a time</p>	<p><b>Slides 12-22 Claims, Evidence, and Reasoning – Argument Driven Inquiry Resource</b></p> <p><b>75 minutes</b></p> <ul style="list-style-type: none"> <li>For Comments: comment on what it means</li> <li>Interpret what you see.</li> <li>Write what each observation means.</li> <li>Don't tackle all the data at once - just one observation at a time.</li> </ul>

<p>Slide 17</p>	<p><b>Analyze and Interpret the Data-3</b></p>  <p>Strategy to look at data... Highlights, Comments and Captions</p> <p>Create a Caption: Think of the caption as a summary. Begin your caption with a topic sentence describing the overview of the figure. Join each "What I see" to its "What it means" to form a sentence. Build a coherent description in 2 to 3 sentences.</p>	<p><b>Slides 12-22 Claims, Evidence, and Reasoning – Argument Driven Inquiry Resource</b></p> <p><b>75 minutes</b></p> <ul style="list-style-type: none"> <li>● For Create a Caption:</li> <li>● Think of the caption as a summary.</li> <li>● Begin your caption with a topic sentence describing the overview of the figure.</li> <li>● Join each "What I see" to its "What it means" to form a sentence.</li> <li>● Build a coherent description in 2-3 sentences.</li> </ul>
<p>Slide 18</p>	<p><b>Argue from Evidence</b></p> <p>Using evidence, talk through your best argument for answering the question: <i>How has the concentration of atmospheric carbon dioxide changed over time?</i></p> <p>Be sure to:</p> <ul style="list-style-type: none"> <li>-state the claim you are trying to support</li> <li>-include genuine evidence (data+analysis+interpretation)</li> <li>-provide a justification of your evidence that explains why the evidence is relevant and why it supports the claim</li> <li>-organize your argument in a way that enhances listener understanding</li> <li>-use a broad range of words including science vocabulary you have learned</li> </ul>	<p><b>Slides 12-22 Claims, Evidence, and Reasoning – Argument Driven Inquiry Resource</b></p> <p><b>75 minutes</b></p> <ul style="list-style-type: none"> <li>● Using evidence, talk through your best argument for answering the question: How has the concentration of Atmospheric carbon dioxide changed over time?</li> <li>● Be sure to: <ul style="list-style-type: none"> <li>○ State the claim you are trying to support</li> <li>○ Include genuine evidence (data + analysis + interpretation)</li> <li>○ Provide a justification of your evidence that explains why the evidence is relevant and why it supports the claim</li> <li>○ Organize your argument in a way that enhances listener understanding</li> <li>○ Use a broad range of words including science vocabulary you have now learned.</li> </ul> </li> </ul>
<p>Slide 19</p>	<p><b>Construct an Explanation-Prepare to Argue from your Evidence: How has the concentration of Atmospheric carbon dioxide changed over time?</b></p> <ul style="list-style-type: none"> <li>• Summarize your evidence to construct an explanation</li> <li>• Analyze the evidence</li> <li>• Look for trends and patterns.</li> <li>• Think about your oral arguments.</li> </ul> <p>Record your Claim, Evidence and Explanation/Justification to answer the question (see template on page 442).</p>	<p><b>Slides 12-22 Claims, Evidence, and Reasoning – Argument Driven Inquiry Resource</b></p> <p><b>75 minutes</b></p> <ul style="list-style-type: none"> <li>● Construct an Explanation - Prepare to Argue from Your Evidence</li> <li>● How has the concentration of atmospheric carbon dioxide changed over time?</li> <li>● Summarize your evidence to construct an explanation</li> <li>● Analyze the evidence</li> <li>● Look for trends and patterns</li> <li>● Think about your oral arguments.</li> <li>● Record your Claim, Evidence and Explanation/Justification to answer the question (see template on page 442)</li> </ul>

<p>Slide 20</p>	<p><b>Argue from Evidence Report Out</b></p> <p>Report Out</p> <ul style="list-style-type: none"> <li>What question were you trying to answer and why?</li> <li>What did you do to answer your question and why?</li> <li>What is your argument? Your report should answer these questions in two pages or less.</li> </ul>	<p><b>Slides 12-22 Claims, Evidence, and Reasoning – Argument Driven Inquiry Resource</b></p> <p><b>75 minutes</b></p> <ul style="list-style-type: none"> <li>Report Out: <ul style="list-style-type: none"> <li>What question were you trying to answer and why?</li> <li>What did you do to answer your question and why?</li> <li>What is your argument?</li> <li>Your report should answer these questions in two pages or less.</li> </ul> </li> </ul>
<p>Slide 21</p>	<p><b>Argue from Evidence Gallery Walk</b></p> <ul style="list-style-type: none"> <li>Visit each team as a group.</li> <li>Listen to their argument.</li> <li>Give feedback and be ready to take back ideas to discuss with your group.</li> </ul>	<p><b>Slides 12-22 Claims, Evidence, and Reasoning – Argument Driven Inquiry Resource</b></p> <p><b>75 minutes</b></p> <ul style="list-style-type: none"> <li>Visit each team as a group.</li> <li>Listen to their argument.</li> <li>Give feedback and be ready to take back ideas to discuss with your group.</li> </ul>
<p>Slide 22</p>	<p><b>Be Ready to Report</b></p> <ol style="list-style-type: none"> <li>What question were you trying to answer and why?</li> <li>What did you do to answer your question and why?</li> <li>What is your argument?</li> </ol>	<p><b>Slides 12-22 Claims, Evidence, and Reasoning – Argument Driven Inquiry Resource</b></p> <p><b>75 minutes</b></p> <ul style="list-style-type: none"> <li>What question were you trying to answer and why?</li> <li>What did you do to answer your question and why?</li> <li>What is your argument?</li> </ul>
<p>Slide 23</p>	<p><b>Return to Phenomena Chart</b></p> <p>Return to Phenomena Chart</p> <ul style="list-style-type: none"> <li>How might your thinking change in light of the Argument from Evidence work?</li> <li>Continue your planning with the chart</li> </ul>	<p><b>Slide 27</b></p> <p><b>. Return to Phenomena Chart</b></p> <p><b>30 minutes</b></p>
<p>Slide 24</p>	<p>Creative Commons Licensing</p>  <p>License: <a href="#">Creative Commons Attribution 4.0</a> Georgia Bodman Regional Science Coordinator Educational Service District 123</p> <p>Peggy Wilcups Senior STEM Consultant Pacific Northwest National Laboratory</p>	<ul style="list-style-type: none"> <li>Creative Commons Licensing information</li> </ul>