
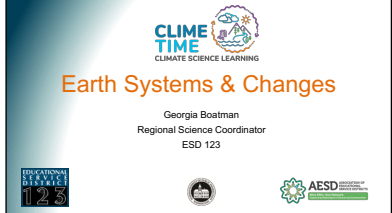
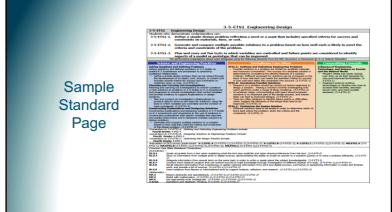
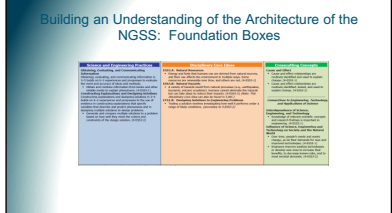


Facilitation Guide
Educational Service District 123
Earth Systems and Changes Session 1:
 Arguing from Evidence Using Geology
 Understanding Standards and Phenomena

<p style="text-align: center;">Activator</p> <p>Complete the Concept Map with your thinking about the natural events or Earth processes that can change Earth Systems.</p> <ul style="list-style-type: none"> • Don't stop with just the open ovals....continue to web out ideas • Find a partner • Discuss something on your map and why you think it is a change to the Earth. 	<p>Complete the Concept Map with your thinking about the natural events or Earth processes that can change Earth Systems.</p> <ul style="list-style-type: none"> • Don't stop with just the open ovals....continue to web out ideas • Find a partner • Discuss something on your map and why you think it is a change to the Earth. <p><i>ES&C Document #1: Concept Map</i></p>
 <p style="text-align: center;">Georgia Boatman Regional Science Coordinator ESD 123</p>	<p>Earth Systems and Changes</p>
<p style="text-align: center;">Sample Standard Page</p> 	<p>Let's do a quick walk through quick the layout of the standards page.</p>
<p style="text-align: center;">Building an Understanding of the Architecture of the NGSS: Foundation Boxes</p> 	<p>These are the three dimensions that we have already seen a bit of in the K-12 Framework: Science and Engineering Practices, Disciplinary Core Ideas and Crosscutting Concepts. They are seen as the Foundational pillars of the standard. Disciplinary Core Ideas (DCIs). The orange box in the middle includes statements that are taken from the Framework about the most essential ideas in the major science disciplines that all students should understand during 13 years of school. Including these detailed statements was very helpful to the NGSS writing team as they analyzed and “unpacked” the disciplinary core ideas and sub-ideas to reach a level that is helpful in describing what each student should understand about each sub-idea at the end of grades</p>



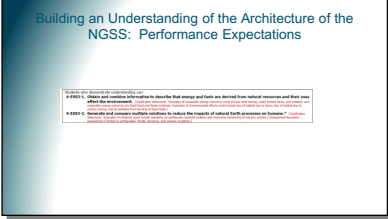
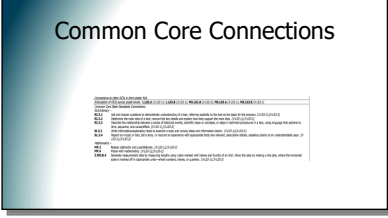
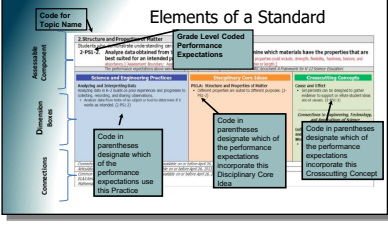
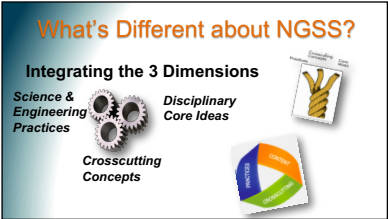
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	<p>2, 5, 8, and 12. Although they appear in paragraph form in the Framework, here they are bulleted to be certain that each statement is distinct.</p> <p>Science and Engineering Practices. The blue box on the left includes just the science and engineering practices used to construct the performance expectations in the box above. These statements are derived from and grouped by the eight categories detailed in the Framework to further explain the science and engineering practices important to emphasize in each grade band. Most sets of performance expectations emphasize only a few of the practice categories; however, all practices are emphasized within a grade band. Teachers should be encouraged to utilize several practices in any instruction, and need not be limited by the performance expectation, which is only intended to guide assessment.</p> <p>Crosscutting Concepts. The green box on the right includes statements derived from the Framework’s list of crosscutting concepts, which apply to one or more of the performance expectations in the box above. Most sets of PEs limit the number of crosscutting concepts so as focus on those that are readily apparent when considering the DCIs. However all are emphasized within a grade band. Again, the list is not exhaustive nor is it intended to limit instruction. Aspects of the Nature of Science relevant to the standard are also listed in this box, as are the interdependence of science and engineering, and the influence of engineering, technology, and science on society and the natural world. Although these are not crosscutting concepts in the same sense as the others, they are best taught and assessed in the context of specific science ideas, so they are also listed in this box. When we see these on each standard page we should think about the fact that the Science and Engineering Practices and Crosscutting Concepts are a well integrated part of every standard and not an isolated 2 week “practices” unit. The Practices and Crosscutting Concepts support learning of the Disciplinary Core Idea.</p>
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	<p>Let's add in the performance expectations. These are the assessable components of the standards. On-line you will be able to see them written in black and white or you can see them offered with color imbedded in the text to show the connections in the Performance Expectation to the foundation box. The colors in the Performance Expectations directly correlates to the colors of the three dimensions. You will also see assessment boundaries and clarification statements to define the PE for grade levels.</p>
	<p>The next section of the standard is the Common Core Connections. Here you will find some of the most high yield English Language Arts and Mathematics connections that make the most sense with each particular standard.</p>
	<p>How to Read the Next Generation Science Standards PDF document</p> <p>Understanding the Standards webpage</p>
	<p>Integrating the dimensions is what we are after. They work together...students do science/STEM to learn science/STEM and develop ways of thinking in the process that helps them apply those Crosscutting Concepts or big ideas to other sciences and subjects.</p>



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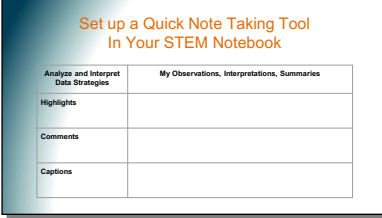
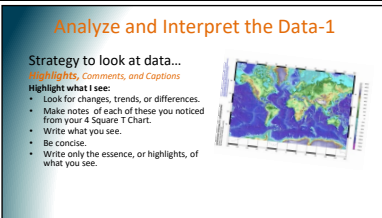
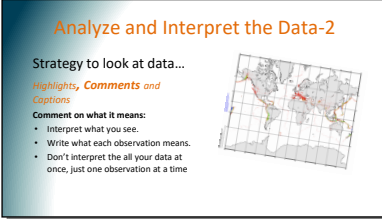
<p>Finding the Dimensions in a Performance Expectation</p> <p>In this Performance Expectation Highlight:</p> <ul style="list-style-type: none"> • Blue- the words/phrases that directly correspond to an associated Science and Engineering Practice • Green- the words/phrases that correspond to an associated Crosscutting Concept • Orange- the words/phrases that directly correspond to an associated Disciplinary Core Idea 	<p>Performance Expectations –dispelling the mystery of 3-D teaching</p> <p>How do we take these three parts and make them 3 dimensional teaching</p> <p>Examine performance expectations that seem to pertain to the unit</p> <p>Highlight a performance expectation with colored pencil for this unit with the foundational pieces</p> <p>ES&C Sample PE Document #2</p>				
<p>What do Earth patterns tell us about Earth systems and the changes that can happen to the Earth?</p>  <p>https://www.youtube.com/watch?v=cy8yS2mUEpA</p> <p>https://www.youtube.com/watch?v=d8-3RcS0RaE</p>	<p>Two brief examples of Earth Changes</p> <p>Plays two you tube videos: 1) a tsunami, 2) a volcanic eruption</p> <p>https://www.youtube.com/watch?v=cy8yS2mUEpA</p> <p>https://www.youtube.com/watch?v=d8-3RcS0RaE</p>				
<p>Chart Visitation (find dot on Your Name Tag)</p> <ul style="list-style-type: none"> ● Volcanology ● Geochronology – Sea Floor Age ● Elevation/Geography ● Earthquakes/Seismology 	<p>Circulate to each map based on the dot on your name tag.</p> <p>Use maps from this Rice University Resource</p> <p>For maps for plate boundaries http://plateboundary.rice.edu/home.html</p>				
<p>Observation of Earth Features</p> <p>Make observations about the significant features shown on each of the 4 geologic maps and record your data in a 4 Square-Chart:</p> <table border="1"> <tr> <td>Elevation/Geography</td> <td>Ocean Floor Age/Geochronology</td> </tr> <tr> <td>Active Volcanoes</td> <td>Earthquakes/Seismology</td> </tr> </table>	Elevation/Geography	Ocean Floor Age/Geochronology	Active Volcanoes	Earthquakes/Seismology	<p>In a moment you will use a 4 square note taking process to record observations from each map.</p>
Elevation/Geography	Ocean Floor Age/Geochronology				
Active Volcanoes	Earthquakes/Seismology				
<p>Observation vs Inference</p>  <p>http://www.flickr.com/photos/118102872@N01/118102872/</p> <p>http://118102872@N01/118102872/</p>	<p>First think about observation vs. inference. When you look at the two pictures of cats, one looking at a goldfish in a bowl, and one sitting beside an empty bowl what do you observe?</p> <p>It is easy to infer that the cats may have had a tasty goldfish snack but have we really observed that?</p>				



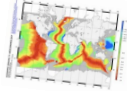


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	<p>Set up a quick table to record Highlights, comments and captions. You could set it up with 2 columns. Column one could be for each of those three categories and column two could be for recording your observations for each category.</p>
	<p>This process is from Victor Sampson’s Argument Driven Inquiry as a vehicle to think about Arguing from Evidence/Explanations, Analyzing and Interpreting Data, Obtain, evaluate and communicate information, Cause and Effect, Patterns</p> <ul style="list-style-type: none"> • Reading Strategy for data table: look at highlights, make comments, captions • Call out those people from Transitioning workshop as “experts” that can help you navigate • Create a CER on chart paper • Gallery walk and share <ol style="list-style-type: none"> 1. What science and engineering practices did you see us engage in while involved in the activity? 2. Which Crosscutting Concepts did you focus on during this activity?
	<p>This process is from Victor Sampson’s Argument Driven Inquiry as a vehicle to think about Arguing from Evidence/Explanations, Analyzing and Interpreting Data, Obtain, evaluate and communicate information, Cause and Effect, Patterns</p> <ul style="list-style-type: none"> • Reading Strategy for data table: look at highlights, make comments, captions • Call out those people from Transitioning workshop as “experts” that can help you navigate • Create a CER on chart paper • Gallery walk and share <ol style="list-style-type: none"> 1. What science and engineering practices did you see us engage in while involved in the activity? 2. Which Crosscutting Concepts did you focus on during this activity?



<p>Constructing Explanations from Evidence</p> <p>Strategy to look at data... Highlights, Comments and Captions</p> <p>Create a Caption:</p> <ul style="list-style-type: none"> • 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>This process is from Victor Sampson's Argument Driven Inquiry as a vehicle to think about Arguing from Evidence/Explanations, Analyzing and Interpreting Data, Obtain, evaluate and communicate information, Cause and Effect, Patterns</p> <ul style="list-style-type: none"> • Reading Strategy for data table: look at highlights, make comments, captions • Call out those people from Transitioning workshop as "experts" that can help you navigate • Create a CER on chart paper • Gallery walk and share <p>1. What science and engineering practices did you see us engage in while involved in the activity?</p> <p>2. Which Crosscutting Concepts did you focus on during this activity?</p>
<p>Take a Break!</p> <p>Be back in 10 minutes!</p>	<p>Take a break</p>
<p>The Theory of Plate Tectonics</p> <ul style="list-style-type: none"> • The layer of the Earth we live on is broken into a dozen or so rigid slab, called tectonic plates by geologists • These plates have boundaries where they meet • They are moving relative to one another as they ride atop hotter, more mobile material 	<ul style="list-style-type: none"> • The layer of the Earth we live on is broken into a dozen or so rigid slab, called tectonic plates by geologists • These plates have boundaries where they meet • They are moving relative to one another as they ride atop hotter, more mobile material
<p>Obtaining and Evaluating Information</p> <p>Skim this...</p> 	<p>Obtaining and Evaluating Information</p> <p>hand out the brief article about Plate Tectonics and the map for plate tectonics</p> <p>Read the Article: Earth's Moving Plates: A Look Back <i>from STC/MS Catastrophic Events</i></p> <p>Or</p> <p>Plate Tectonics Historical Perspective <i>from USGS This Dynamic Earth the Story of Plate Tectonics</i></p> <p>https://pubs.usgs.gov/gip/dynamic/historical.html</p>



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<p>Argue from Evidence</p> <p>Using evidence, talk through your best argument for answering the question: What do Earth patterns tell us about Earth systems and changes that can happen quickly to the Earth?</p> <p>Be sure to:</p> <ul style="list-style-type: none"> -state the claim you are trying to support -include genuine evidence (data+analysis+interpretation) -provide a justification of your evidence that explains why the evidence is relevant and why it supports the claim -organize your argument in a way that enhances listener understanding -use a broad range of words including science vocabulary you have learned 	<p>Claims, Evidence, and Reasoning - Victor Sampson</p> <ul style="list-style-type: none"> Using evidence, talk through your best argument for answering the question: How has the concentration of Atmospheric carbon dioxide changed over time? Be sure to: <ul style="list-style-type: none"> State the claim you are trying to support Include genuine evidence (data + analysis + interpretation) Provide a justification of your evidence that explains why the evidence is relevant and why it supports the claim Organize your argument in a way that enhances listener understanding Use a broad range of words including science vocabulary you have now learned. 						
<p>Construct an Explanation-Prepare to Argue from your Evidence</p> <p>What do Earth patterns tell us about Earth systems and changes that can happen quickly to the Earth?</p> <p>Summarize your evidence to construct an explanation</p> <ul style="list-style-type: none"> Analyze the evidence from the maps Think about the patterns you see in the data Look for causes and effects Record your Claim, Evidence and Explanation/Justification to answer the question <p>Argument presentation on a whiteboard</p> <table border="1"> <tr> <td colspan="2">The Guiding Question:</td> </tr> <tr> <td colspan="2">Our Claim:</td> </tr> <tr> <td>Our Evidence:</td> <td>Our Justification of the Evidence:</td> </tr> </table>	The Guiding Question:		Our Claim:		Our Evidence:	Our Justification of the Evidence:	<p>activity from Victor Sampson as a vehicle to think about Arguing from Evidence/Explanations, Analyzing and Interpreting Data, Obtain, evaluate and communicate information, Cause and Effect, Patterns</p> <p>Create a CER on chart paper</p> <p>CER chart could look like:</p> <ul style="list-style-type: none"> Guiding question at the top Our Claim in a second row Our Evidence next Our Justification of the Evidence
The Guiding Question:							
Our Claim:							
Our Evidence:	Our Justification of the Evidence:						
<p>Argue from Evidence</p> <ul style="list-style-type: none"> Think of a question you might ask to clarify a team's CER Visit other groups. Use the Gallery Walk Interview Questions to guide your discourse. Give feedback and be ready to take back ideas to your group. 	<p>activity from Victor Sampson as a vehicle to think about Arguing from Evidence/Explanations, Analyzing and Interpreting Data, Obtain, evaluate and communicate information, Cause and Effect, Patterns</p> <ul style="list-style-type: none"> Gallery walk and share with one team member left behind at chart to explain their claim and the evidence and justification or reasoning for why the evidence supports the claim. 						
<p>Think and Ink</p> <ul style="list-style-type: none"> What are your key takeaways from the Earth Systems map activity? How might you use this type of process/activity in your context? 	<p>Think and Ink</p> <p>What are your key takeaways from the Earth Systems map activity?</p> <p>How might you use this type of process/activity in your context?</p>						



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<p>Identifying Academically Productive Phenomena-1</p> <ul style="list-style-type: none"> • Read <i>Using Phenomena in NGSS Lessons</i> • With a partner discuss key ideas and/or questions whenever you see this signal: STOP and Discuss 	<p>Reminder of what this week is all about - cognitively dissonant adult learning experience. Thinking about academically productive phenomena may push on our typical thinking about how we start a science experience</p> <ul style="list-style-type: none"> • Read <i>Using Phenomena in NGSS Lessons</i> • With a partner discuss key ideas and/or questions whenever you see this signal: STOP and Discuss <p>ES&C Using Phenomena in NGSS Lessons from Achieve Document #3</p>
<p>Identifying Academically Productive Phenomena-2</p> <ul style="list-style-type: none"> • Read <i>Qualities of a Good Anchor Phenomena</i> • Star each item that squares with what you have read or heard today about phenomena 	<ul style="list-style-type: none"> • Read <i>Qualities of a Good Anchor Phenomena</i> • Star each item that squares with what you have read or heard today about phenomena <p>ES&C Qualities of a Good Anchor Phenomena Document #4</p>
<p>"Phenomenal" Brainstorming</p>  <ul style="list-style-type: none"> • Think about current science units/lessons you do or will do that involve Earth Science and Human Impacts or Life Science • Find the relevant Standard(s) • Brainstorm or identify a possible phenomena that could "anchor" this unit or some of its lessons • Share the unit context and your brainstorm ideas with tablemates 	<p>11:50 - 12:30 p.m. Working Lunch (Georgia)</p> <ul style="list-style-type: none"> • Think about current science units/lessons you do or will do that involve Earth Science and Human Impacts or Life Science • Find the relevant Standard(s) • Brainstorm or identify a possible phenomena that could "anchor" this unit or some of its lessons • Share the unit context and your brainstorm ideas with tablemates
<p>Questions I Still Have</p> <p>Was there anything you made note of in your observations that does not "fit" with other data you collected?</p> <p>Be sure and note questions about any inconsistent information in your science notebook.</p>	<p>Sensemaking and reflection</p> <p>Was there anything you made note of in your observations that does not "fit" with other data you collected?</p> <p>Be sure and note questions about any inconsistent information in your science notebook.</p>
<p>Sense-Making</p> <ul style="list-style-type: none"> • Think about our question <ul style="list-style-type: none"> • What do you know now about tectonic plates and their boundaries? • How was your thinking reinforced or changed from your initial ideas to this point? • What did you do that reinforced, clarified or changed 	



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