Climate Odyssey Lesson Plans
(to pair with our interactive online map, www.climateodyssey.org/interactive-map)

Lesson Plans:
Grades K-4 Page 2
Grades 5-7 Page 3
Grades 8-10 Page 6
Grades 11-16 Page 9

Lesson Length:
45 minutes, except Grades 11-16, which is split into two 45-minute lessons, plus homework.

Overview:
Each lesson uses the interactive map, and assumes each student has their own computer or tablet to work on. The two upper-most-level lessons ask students to work in pairs. Each lesson’s objectives are cumulative, so they briefly address what the grades lower than them learned plus more advanced concepts (new concepts are bolded). We also work to tie in the personal narrative of our yearlong sailing journey into each.

Cumulative Learning Objectives:
Grades K-4:
Develop sense of place of local coastal environments for residents on/near Eastern Seaboard

Grades 5-7:
Above + Understand and differentiate impacts, adaptations, and drivers of climate change

Grades 8-10:
Above + Understand the complexity of environmental problems through exploration of this coastal, coupled natural-human system

Grades 11-16:
Above + Go beyond the interactive map to understand origins of science from data collection > to > peer-reviewed publications > to > public outreach & news articles > to > policy change.

Next-Generation Science Standards Addressed:
Grades K-4: TBA, pending beta testing
Grades 5-7: TBA, pending beta testing
Grades 8-10: TBA, pending beta testing
Grades 11-16: TBA, pending beta testing
Lesson Plan: Grades K - 4

Overview:
Each lesson uses the interactive map, and assumes each student (or student pair) has their own computer or tablet to work on. Each lesson’s objectives are cumulative, so they briefly address what the grades lower than them learned plus more advanced concepts (new concepts are bolded). We also work to tie in the personal narrative of our yearlong sailing journey into each.

Paired materials:
Student worksheet (one page PDF online). It guides the students through a “scavenger hunt” style of activity that guides them through parts of the online interactive map.

Learning Objectives:
+ Develop sense of place of local coastal environments for residents on/near Eastern Seaboard

Learning Outcomes:
Addresses Next-Generation Science Standards:
TBA, pending beta testing

Learning Activity Timeline:
45-minute lesson

0:00
Share with students this introductory information:

-Climate Odyssey is a year-long sailing trip taken by Lucy Holtsnider, an artist, and Zion Klos, a scientist. They sailed for 3,500 miles on their sailboat, the Wildcat. They made an interactive map, as well other pieces of art, out of pictures from their journey.

-Our goal for this activity is to better understand different types of coastal systems.

0:03
Have students (or pairs/groups) use an internet-ready device that is already open to the page: climateodyssey.org/interactive-map/

Students complete PDF worksheet (have them work through it themselves, or read it to them and ask them to do the things on it and reply verbally back to the class).
Lesson Plan: Grades 5 - 7

Overview:
Each lesson uses the interactive map, and assumes each student (or student pair) has their own computer or tablet to work on. The two upper-most-level lessons ask students to work in pairs. Each lesson’s objectives are cumulative, so they briefly address what the grades lower than them learned plus more advanced concepts (new concepts are bolded). We also work to tie in the personal narrative of our yearlong sailing journey into each.

Paired materials:
Unlike the above lesson, this lesson does not use a paired worksheet, but instead asks students to complete work in their own notebooks. There is, however, an accompanying .ppt for help in directing the students and discussion.

Learning Objectives:
+ Develop sense of place of local coastal environments for residents on/near Eastern Seaboard
+ Understand and differentiate impacts, adaptations, and drivers of climate change

Learning Outcomes:
Addresses Next-Generation Science Standards:
TBA, pending beta testing

Learning Activity Timeline:
45-minute lesson

0:00
Share with students this introductory information:

-Climate Odyssey is a year-long sailing trip taken by Lucy Holtsnider, an artist, and Zion Klos, a hydrologist and climate scientist. They sailed for 3,500 miles on their sailboat, the Wildcat. They made an interactive map, as well other pieces of art, out of pictures from their journey.

-Our goal for this activity is to better understand coastal systems on the US Eastern Seaboard and how they are driven, impacted, and are adapting to climate change (and what those terms mean).

0:02
Ask students to pair up, (use Slides 2-3 in .ppt) and inform students to:
“Navigate on your devices to www.climateodyssey.org. Click on the button for “Interactive Map.” Once the map is open, click on the “sailing blog” tag on the left side of the Interactive Map home page. Choose one highlighted tile. Click on the link to the blog post, highlighted in blue.”

0:05
Ask students to read their selected post and discuss in pairs (Display Question Set 1, Slide 4 in .ppt):
Where was the picture taken?
What is happening in the picture?
Does anything surprise you about the post?
Each student should briefly discuss their reactions amongst their pair.

0:13
The main event, definitions of key terms*:

*For this lesson, we created definitions that skirt around a discussion of greenhouse gasses and mitigation of climate change. This was in the interest of both simplicity, and to get the lessons into more classrooms, even in areas that might be resistant to a lesson focusing on anthropogenic warming.

Instructor:

Define each of the underlined terms on the chalkboard:

**Climate**: Long-term patterns in temperature and precipitation

Example:
Can explain that *weather* is how we decide what to wear every day. *Climate* is weather over time, so a person might consider the climate of a location, rather than that day’s weather, if you were thinking of what clothes to pack if you were going to go somewhere for a an extended trip.

**Climate Change**: Shifts in climate. In recent decades, climate change has been observed by scientists and is rapidly accelerating.

**Drivers of change**: Changes in nature that are caused by changes in temperature and precipitation over time.
0:20
Ask Students:
- Click around on the blue tiles until you find one that is labeled “ocean temperature”. Is ocean temperature going up or down?
  
  o Click on the “ocean temperature” label in the white oval. Choose another tile that is highlighted in bright white and read the caption. Summarize the caption in your own words.
  
  Example:
  
  Caption: The impacts upon whales and dolphins due to climate change are difficult to measure and predict, but loss of ice cover and die-offs in krill and other food species are some of the most imminent threats.
  
  Rephrased by a student: We don’t know exactly how climate change will affect whales and dolphins. Loss of ice and their sources of food are the most dangerous threats.

0:30
Instructor:
Define each of the underlined terms on the chalkboard:

- **Impacts**: Problems that affect humans and the natural environment that are caused by climate change.

- **Adaptations**: Actions humans take to help communities and ecosystems cope with climate change impacts.

Ask Students:
Return to the home page. Click on the “preserving ecosystems” tag, be sure it’s the only tag that is filled in with orange. Choose a highlighted tile from the map.

Ask students; (and have several share their answers with the class after each question – gently clarifying if they use any of the new keywords incorrectly)

- What adaptations are being taken to help the system deal with climate change?

- What impacts does the adaption address?

- What drivers of change cause these impacts?
Lesson Plan: Grades 8 - 10

Overview:
Each lesson uses the interactive map, and assumes each student (or student pair) has their own computer or tablet to work on. The two upper-most-level lessons ask students to work in pairs. Each lesson’s objectives are cumulative, so they briefly address what the grades lower than them learned plus more advanced concepts (new concepts are bolded). We also work to tie in the personal narrative of our yearlong sailing journey into each.

Paired materials:
Unlike the above lessons, this lesson does not use a paired worksheet, but instead asks students to complete work in their own notebooks or digitally for assessment. There is, however, an accompanying .ppt for help in directing the students and discussion.

Learning Objectives:
+ Develop sense of place of local coastal environments for residents on/near Eastern Seaboard
+ Understand and differentiate impacts, adaptations, and drivers of climate change
+ Understand the complexity of environmental problems through exploration of this coastal, coupled natural-human system

Learning Outcomes:
Addresses Next-Generation Science Standards:
TBA, pending beta testing

Learning Activity Timeline:
45-minute lesson

0:00
Share with students this introductory information:

-Climate Odyssey is a year-long sailing trip taken by Lucy Holtsnider, an artist, and Zion Klos, a hydrologist and climate scientist. They sailed for 3,500 miles on their sailboat, the Wildcat. They made an interactive map, as well other pieces of art, out of pictures from their journey.

-Our goal for this activity is to understand the complexity of coastal systems on the US Eastern Seaboard and how they are driven, impacted, and are adapting to climate change.

0:02
Ask students to pair up, (use Slides 2-3 in .ppt) and inform students to:
“Navigate on your devices to www.climateodyssey.org. Click on the button for “Interactive Map.” Once the map is open, click on the “sailing blog” tag on the left side of the Interactive Map home page. Choose one highlighted tile. Click on the link to the blog post, highlighted in blue.”

**0:05**
Ask students to read their selected post and discuss in pairs (Display Question Set 1, Slide 4 in .ppt):
Where was the picture taken?
What is happening in the picture?
Does anything surprise you about the post?
Each student should briefly discuss their reactions amongst their pair.

**0:13**
Review definitions with students using interactive map; have them write these definitions in notebook (if they are unfamiliar):

- **Climate**: Long-term patterns in temperature and precipitation

- **Climate Change**: Shifts in climate. In recent decades, climate change has been observed by scientists and is rapidly accelerating.

- **Drivers of change**: Changes in nature that are caused by changes in temperature and precipitation over time.
  
  *Ask students*: In “Climate related drivers of change” in the map’s “Home” page (Slide 5). Choose a driver, and explore one example highlighted on the map related to that driver.
  
  *Call on a couple students*: What is the driver you chose, and what is one example highlighted on the map related to that driver?

- **Impacts**: Problems that affect humans and the natural environment that are caused by climate change.
  
  *Ask students*: In “Impacts” in the map’s “Home” page (Slide 6). Choose an impact, and explore one example highlighted on the map related to that impact.
  
  *Call on a couple students*: What is the impact you chose, and what is one example highlighted on the map related to that impact?

- **Adaptations**: Actions humans take to help communities and ecosystems cope with climate change impacts.
  
  *Ask students*: In “Adaptations” in the map’s “Home” page (Slide 7). Choose an impact, and explore one example highlighted on the map related to that adaptation.
  
  *Call on a couple students*: What is the adaptation you chose, and what is one example of that adaptation highlighted on the map related to that adaptation?
0:30
Make conceptual map as a class (drawn on the board by instructor)

Tell students: Return to the home page. Click on the “coastal erosion” tag, ask students to read several tiles on the map, and then as a class talk through a conceptual model (like below) that discusses drivers, impacts, and adaptations as a connected system. Use these prompts to help students direct you as to how the conceptual model show be made:

What drivers of change cause coastal erosion?

How does costal erosion impact people and ecosystems?

What are some adaption people are doing to combat coastal erosion?
Lesson Plan: Grades 11 - 16:

Overview:
Each lesson uses the interactive map, and assumes each student (or student pair) has their own computer or tablet to work on. The two upper-most-level lessons ask students to work in pairs. Each lesson’s objectives are cumulative, so they briefly address what the grades lower than them learned plus more advanced concepts (new concepts are bolded). We also work to tie in the personal narrative of our yearlong sailing journey into each.

Paired materials:
Unlike the above lessons, this lesson does not use a paired worksheet, but instead asks students to complete work in their own notebooks or digitally for assessment. There is, however, an accompanying .ppt for help in directing the students and discussion.

Learning Objectives:
+ Develop sense of place of local coastal environments for residents on/near Eastern Seaboard
+ Understand and differentiate impacts, adaptations, and drivers of climate change
+ Understand the complexity of environmental problems through exploration of this coastal, coupled natural-human system
+ Go beyond the interactive map to understand origins of science from data collection > to > peer-reviewed publications > to > public outreach & news articles > to > policy change.

Learning Outcomes:
Addresses Next-Generation Science Standards:
TBA, pending beta testing

Learning Activity Timeline:
Two paired 45-minute lessons, with~30 minute homework in between (or one 2 hour lesson)

Day 1, 0:00:
Share with students this introductory information:
-Climate Odyssey is a year-long sailing trip taken by Lucy Holtsnider, an artist, and Zion Klos, a hydrologist and climate scientist. They sailed for 3,500 miles on their sailboat, the Wildcat. They made an interactive map, as well other pieces of art, out of pictures from their journey.
-Our goal for this activity is to understand the complexity of coastal systems on the US Eastern Seaboard and how they are driven, impacted, and are adapting to climate change. We also are going to learn how scientific information is created and how it ultimately can be used in policy and decision-making.
Day 1, 0:02
Ask students to pair up, (use Slides 2-3 in .ppt) and inform students to:
“Navigate on your devices to www.climateodyssey.org Click on the button for “Interactive Map” Once the map is open, click on the “sailing blog” tag on the left side of the Interactive Map home page. Choose one highlighted tile. Click on the link to the blog post, highlighted in blue.”

Day 1, 0:05
Ask students to read their selected post and discuss in pairs (Display Question Set 1, Slide 4 in .ppt):
Where was the picture taken? What is happening in the picture? Does anything surprise you about the post? Each student should briefly discuss their reactions amongst their pair.

Day 1, 0:13
Review definitions with students using interactive map; have them write these definitions in notebook (if they are unfamiliar):

**Climate**: Long-term patterns in temperature and precipitation

**Climate Change**: Shifts in climate. In recent decades, climate change has been observed by scientists and is rapidly accelerating.

**Drivers of change**: Changes in nature that are caused by changes in temperature and precipitation over time.

*Ask students*: In “Climate related drivers of change” in the map’s “Home” page (Slide 5). Choose a driver, and explore one example highlighted on the map related to that driver.

*Call on a couple students*: What is the driver you chose, and what is one example highlighted on the map related to that driver?

**Impacts**: Problems that affect humans and the natural environment that are caused by climate change.

*Ask students*: In “Impacts” in the map’s “Home” page (Slide 6). Choose an impact, and explore one example highlighted on the map related to that impact.

*Call on a couple students*: What is the impact you chose, and what is one example highlighted on the map related to that impact?

**Adaptations**: Actions humans take to help communities and ecosystems cope with climate change impacts.

*Ask students*: In “Adaptations” in the map’s “Home” page (Slide 7). Choose an impact, and explore one example highlighted on the map related to that adaptation.

*Call on a couple students*: What is the adaptation you chose, and what is one example of that adaptation highlighted on the map related to that adaptation?
**Day 1, 0:30**
Introduction to conceptual map and homework:

*Tell students:* (working with their partners) Return to the home page. Click on the “preserving ecosystems” tag (*Slide 8 in .ppt*), be sure it’s the only tag that is filled in with orange. Choose a highlighted tile from the map, read the caption and the accompanying article. Explore these prompts (*Question Set 2, Slide 9, in .ppt*):

- What action is being taken?
- What impact or driver of change does the action address?
- What is the goal of the action?

They may need to look at a few different tiles to find one that can answer these questions.

*Homework:* Each student individually draws a conceptual model that shows how the tile/example they chose under “preserving ecosystems” relates eventually to climatic changes in temperature and/or precipitation.

Below is an example diagram, draw this on the board (or display (use *Slide 10 in .ppt*)) for students to see what is meant (they can’t use the same example for their homework):
Day 1, 0:45
End Day 1

Day 2, 0:00
Ask students to share their conceptual models (homework) with a partner. In the pair, ask them choose to their favorite of the two. Ask 3 pairs to volunteer and draw their model on the board (or the whole class if there is space for each pair). Ask 3 student pairs to share their model (critique, if needed, for inaccuracies in the conceptual components).
Day 2, 0:15
Ask student pairs to add “how was this information created” to their conceptual model by looking “under the hood” in the interactive map (i.e. following the linked news articles, and their linked scientific articles within the news/public resources linked in the map).

In pairs, ask them to research the answers to these questions (Display Question Set 3, Slide 12 in .ppt):

1. What scientific data was used to create the resource? (you may have to follow a few different links to find this information)

2. What is the specialty of the scientists involved? What institution do they work for? Example, based on the same article, additions in red (below diagram, Slide 13 in .ppt).

3. Who funded this research? (hint – if you can find a scientific article in a journal, look in the acknowledgements section at the end. NASA, NSF) (They can the news/public article, or scientific sources cited in the news/public article, to answer this question)

4. Do some quick research online about the funding entities you find and describe who they are?

5. Do you feel these funding sources works in the public interest? Or do they have a special interest in mind?

6. When decision makers are incorporating scientific data into their policy choices, do you think the funding source for that data is significant? Why or why not?
Day 2, 0:30
Ask students to sharing the answers they discussed in pairs. Lead a 15-minute class discussion talking over students’ answers to these questions.

Day 2, 0:45
End Day 2