Annotated Script: The Climate-Ocean Connection

Show	Say	Notes and Rationale
Slide 1  Blue Marble	Welcome to Science On a Sphere – would you like to explore this with me? The image you are looking at is just one way to look at our planet but there are also many other ways.	Before launching the prepared interpretation, allow time for visitors to understand and inquire about the information shown with this image. Point out where you live to orient the audience. The visual helps to establish the interpretation as a matter of global scale and importance.
	The earth is made up of several systems that work together as one– like the human body.	By drawing the connection between our bodies and Earth systems, this opening foreshadows the Climate's Heart metaphor that is a centerpiece of this narrative. It is important, however, not to extend this metaphor too far. The anthropomorphic concept of "Mother Earth" has important limitations, such as making it easy for the public to assume that Earth can heal herself.
	The ocean is a key part of the system that makes Earth habitable, meaning a good place for living things, including you and me.	Note singular on 'ocean.' Ocean Literacy Principle 1: The Earth has one big ocean with many features. (Ocean Literacy Principles, http://oceanliteracy.wp2.coexploration.org/)
	We, at (Institution), hope to help you see yourselves as part of the larger story of our planet and our ocean.	By being upfront about our goals, we invite our visitors to participate, and demonstrate that this topic is one of our values as an institution.
	Over the next 5-10 minutes, we'll consider some ways the ocean is changing, relate that to human systems, and give examples of ways we can all get involved. We'll be talking about our shared responsibility to protect both people and places from harm, by safeguarding against disruptions.	The talking point here cues the Value of Protection, which research has shown to be an effective way of productively orienting people to ocean conservation as a social issue.

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Slide 2  Ocean Circulation (Still)	Now I am going to change one thing about this map. (*Add still of Ocean Circulation.*) Notice the bands of color in this image. The colors represent temperature. Reds indicate warm, blue indicates cold. This shows us that the ocean absorbs the energy of the sun, particularly near the equator.	Offering explicit cues to orient to new images helps visitors track the narrative more effectively. Give plenty of time for interpreting this image. While this map may be very clear to scientists and science educators, the rainbow color scheme for color is not always clear to the public. Starting with the still image allows visitors to interpret the colors and basic information before they have to also grapple with what the movement means.
Slide 3  Ocean Circulation (Animated)	Now that the image is moving, think about how the ocean is like the climate's heart and circulatory system. Like our heart pumps blood, heat, and nutrients around our bodies, the ocean pumps water, heat, and nutrients, even living things, all around the world.	This "beat" in the narrative introduces the key concept for the interpretation. The talking point here draws on the tested Explanatory Metaphor *Climate's Heart*, which research has shown to be an effective way of helping people make sense of the role the ocean plays in regulating the climate system.
	What are you noticing from the movement of the ocean currents? Currents like the Gulf Stream in the Atlantic (or the Kuroshio in the Pacific) carry warmth from the tropics to higher latitudes, giving places like England and Washington State more moderate climates than you might expect given how far north they are.	By asking specific, inquiry-driven questions, you are more likely to elicit good responses from your audience. If you have time, you may wish to add this example: "England is at the same latitude as Newfoundland, but there are palm trees in Corwall in southern England. This is due to the warm air brought along the Gulf Stream and across the Atlantic."
	This is one example of how ocean circulation helps to regulate the climate and stabilize Earth's temperatures.	This "beat" reinforces the importance of the connection between the ocean and the rest of the planet.

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Slide 4  Anthropocene Transportation	Now I'm going to show you a different map of our planet. Do you think the colors now represent a natural or human-made system? [Pause.] That's right. This image shows us human transportation routes. Blue represents shipping. Red represents air travel. Yellow shows highway traffic.	Allow time for the audience to understand and inquire about the information shown with this image. IMAGE: Relays a full year's worth of data on human transportation. Blue is shipping, red is air traffic, and yellow highway traffic.
	This is another way to see our world – systems that we humans have built. We design systems for food, clean water, transportation; buildings to live, work, learn, and play.	"We humans" is key – it evokes a sense of shared responsibility for these systems, rather than assigning control to a nebulous 'they.'
	Where do we get the energy for these systems? We power these systems mostly by burning fossil fuels, which is disrupting Earth's climate system.	Note present tense. Often times, climate change is discussed as a problem for the future, but climate change has been happening and is happening now. While the burning of fossil fuels is not the only source of carbon dioxide (or heat trapping gases) in the modern world, it is the most important, and it is a key message we want visitors to take away.
	Each year, we burn huge amounts of fossil fuel (coal, oil, gasoline, and natural gas). Currently, we burn fossil fuels to provide energy for vehicles, buildings, manufacturing and almost everything that requires electricity or power.	Though it may seem redundant, it is important to list what we mean by fossil fuel – especially natural gas, which is sometimes confused with biogas or other non-fossil fuels. By using the word 'currently,' we imply that there are other solutions to our energy needs.
	Burning releases carbon dioxide into air. The carbon dioxide builds up in the atmosphere where it acts like a heat-trapping blanket.	The tested Explanatory Metaphor of Heat Trapping Blanket focuses the public on the key characteristic of carbon dioxide: it traps heat. Use a hand gesture to mimic the blanket covering the globe when you introduce this analogy.

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	The ocean is holding most of the trapped heat, so it is getting warmer. As the ocean warms, that means that the heart - the circulatory system - of the Earth is being stressed. Changes in the ocean circulation lead to disruptions for many species of ocean animals and ecosystems.	The ocean stores much more heat than does the atmosphere. About 18 times more heat has been stored in the ocean since the mid 1950s due to global warming than has been stored in the atmosphere. See Science Summary for effects on ocean currents and research on species disruptions.
	By moving away from using fossil fuels to power human systems, we can help to protect the ocean as our climate's heart and safeguard the health of Earth's systems.	This beat introduces the frame element of Solutions – focusing on "energy shift" - and adds cues for Protection to connect this idea to one of the public's deeply held Values.
	Many people from all walks of life - from business leaders, to faith groups, to school students – are leading or participating in efforts to protect the ocean by moving away from fossil fuels. The potential is great. Let's consider the global potential for wind and solar energy to help build new systems for people to use.	The focus on alternative energy as the "meta-Solution" is an important part of the Visualizing Change strategy for educating the public on the implications of climate science. Pilot testing revealed the need to restate key concepts multiple times, to make allowances for visitor distractions and the like. Here, the overall goal of 'moving away from fossil fuels' is repeated.
Slide 5  Global Wind Resources	In this map you see the wind energy potential around the world. Wind is a bountiful resource all over, especially in coastal areas, where a lot of people live.	IMAGE: Wind power class is rated on a 1-7 scale, with darker colors representing more energy. A class of 1 is defined as average wind speeds less than 12.5 mph at 50 meters above the land. A class of 7 is average wind speeds above 19.7mph at 50 meters. Offshore wind power is still in its infancy in the US, and is controversial in many places, including among leading environmental organizations. However, as part of a diversified portfolio of renewable energy sources, it is an important idea to discuss.

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Slide 6  Global Solar Resources	In this map you see the solar power potential around the world. Each day, enough solar energy hits the earth to power all of our electricity needs for a year. Think about that for a moment! One day of sunlight equals a full year's worth of energy.	There is a general assumption among the public that solar is not sufficient to our energy needs, but there is abundant evidence to the contrary. This visual and talking point helps to counteract this misconception. In pilot testing, the "social math" statistic proved especially interesting and memorable for visitors. The wording here repeats it, to allow it to have its full impact. IMAGE: The solar power map shows solar potential in kWh per square meter per day (actual numbers of kWh of energy hitting the Earth), with darker colors representing more energy. This particular map is averaged over a year, so it includes winter/summer oscillation. You may wish to point out that much of the developing world is in high-solar areas, which gives an opportunity for those countries to leapfrog over the fossil fuel stage and go right to renewables – similar to how they have skipped landline phones and gone right to cellular.
Slide 7  Solarize Massachusetts Graph (as PIP on Blue Marble or to the side on a separate screen)	In many places in the country, people are working to take advantage of that tremendous solar potential. In Massachusetts, citizens and leaders at the Massachusetts Clean Energy Center developed a bulk-buying initiative called the "Solarize Massachusetts" program. The idea is that solar power installations are less expensive when lots of people get together to purchase or lease systems for their rooftops. Since the program started in 2011, all of the participating communities have greatly increased the number of households with solar power.	In the Solarize Massachusetts initiative, "each participating community selects a designated solar installation company, which offers five tiers of pricing with the savings increasing as more contracts are signed." In other words, it is similar to buying in bulk at a co-op or member-based store (Costco, BJ's, etc.). Solar installations are more affordable for teams of households than they would be for individual households. You can learn more at http://www.masscec.com/solarizemass, or you can search for community solar programs in your area to substitute a local example. But don't be afraid to use this example if you don't live in Massachusetts. Pilot testing showed that visitors found examples from other regions interesting and inspirational.

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Slide 8  Solar Installation in Seattle Movie (as PIP on Blue Marble or to the side on a separate screen)	Seattle, Washington in the northwestern US is famously grey and rainy all the time. However, our partners at Seattle Aquarium have a solar array on their roof that is part of another type of Community Solar program. Their program allows people to buy into large solar arrays on someone else's roof, much like a community garden system. Across the US are many similar stories. In sunnier climates, there is even more solar power than in MA or in WA.	In Seattle, Community Solar allows people to buy into large solar arrays in public spaces, much like a community garden system. This means that renters and apartment-dwellers can still participate in a solar project. You can learn more and track current power production of the Seattle Aquarium array on their website. http://www.seattleaquarium.org/community-solar http://www.seattle.gov/light/solarenergy/commsolar.asp
Slide 9  Blue Marble	As you continue to explore the Aquarium, I encourage you to talk with your family or friends about opportunities you can find to join with groups of people or programs working to reduce fossil fuel use and to help protect the climate's heart and circulatory system – the ocean.	Ending with a challenge renews the visitors' sense that there is a connection between the conversation you've been having and their visit to your institution, and expressly states that we hope they will discuss these issues further. Encouraging people to find organizations or groups implies that a) such groups exist, b) individuals that are concerned about these issues are not alone. In addition, to create the scale of change that is required to address the global scale challenges before us, it's important to orient thinking toward larger scales of interventions and change than individuals can handle on their own.