Introduction to Earth's Dynamically Changing Climate

Objectives:

- Examine evidence of climate change from different parts of Earth's system and consider what it means to live on a planet with a dynamically changing climate.
- Analyze diverse kinds of data around the world that document a warming planet.
- Analyze graphical representations and scientific visualizations of data exhibiting climate change.

Background Information

The first satellite images of Earth, taken more than 50 years ago, revolutionized our understanding of the world we live in. From our first glimpse of a storm thousands of miles across, a storm that seemed impossibly large at the time, scientists began to realize that the Earth's atmosphere, hydrosphere, lithosphere, and biosphere all interact with each other to generate our weather systems, and ultimately, our global climate. How is the Earth's climate changing? Within the mainstream scientific community the fundamentals of global warming and climate change are no longer in question and increasing evidence shows that human activities, such as the burning of fossil fuels, deforestation and land degradation, cattle ranching, and rice farming, play a significant part in contributing to this change.

I. Introduction via videos

1. go to https://climate.nasa.gov/resources/education/pbs_modules/lesson1Engage/
2. Fill in the table as you watch some of the videos: **YOU WILL NEED YOUR OWN SHEET OF PAPER BC THESE WILL BE TOO SMALL!!!! YES, COMPLETE SENTENCES/TITLES ☺**

Watch the "Earth as a System" video	Think about interactions between the air, land, water, and life that transfer energy in and around the globe and contribute to our climate. Jot down thoughts in box to the right ------→→	
watch the "A Subsistence Culture Impacted by Climate Change," video,	Jot down all the ways that the changing climate is impacting the biosphere (plants and animals).	
Watch "Samoa Under Threat" Identify one climate change related challenge local communities in the tropics face	Identify one climate change related challenge local communities in the tropics face	
View the video, "Witnessing Environmental Changes"	Why might there be less media coverage on change occurring in temperate regions?	
read about the eight different changes in the Earth's surface discussed in "Climate Change - How Do We Know?" which provides compelling evidence that the Earth's climate is changing.	How do you weigh these changes to be evidence of climate change?	

II. Examining the Vital Signs

Background information: Science works by demanding evidence and logical arguments to support claims; and by continually searching for more accurate theories. Evidence helps in interpreting and evaluating accounts of climate change in the media and elsewhere and helps to distinguish scientific fact from opinion. **What kind of evidence exists that helps us determine how climate has changed over time and how it might change in the future?**

1. Travel through Earth's recent climate history with the "Climate Time Machine" interactive. Carefully examine the changes over time in sea ice, sea level, carbon emissions, and average global temperature. Reflect on the key changes in the four variables shown in the interactive by thinking about the following questions:

	When did the key changes occur for this variable?	Can you hypothesize as to why these key changes occurred when they did?	How does this information compare with what you have heard in the media?	Is any of this data surprising or new to you?
Sea Ice				
Sea Level				
Carbon Emissions				
Average Global Temperature				

2. Next, view the interactive data for indicators of climate change on NASA's Global Climate Changewebsite to give you a sense of the scale of change we have seen in our climate system.

3. Look at graphical and pictorial representations of data that show trends up to the present for Sea Level, Carbon Dioxide Concentration, Global Surface Temperature, Arctic Sea Ice, and Land Ice. Go to NASA's Vital Signsand for each of these indicators, consider the data source for the information, the length of time the data covers, what

	Land Ice	Sea Level	Carbon Dioxide Concentration	Global Surface Temperature	Arctic Sea Ice
Data source of information					
Length of time the data covers					
What is being measured?					
What causes the changes?					
Do you prefer the graph or the visualization?					

Vital Signs Conclusion Questions:

1. Why should we be concerned about these specific indicators?

2. What impact do these trends have on our Earth?

3. What is your new understanding of the data sources you explored from NASA's Key Indicators?

III. Solidify what you have learned in this section by watching the "Warming World" video. After watching the video, return to your summary of your understanding of the data sources you explored from NASA's Key Indicators (Question 3). Are there any changes or updates you would like to make to your notes after watching this video?