Topic/Objective: Earth's formation and atmospheric composition	Name: Hannah Daley
	Class/Period: AOSC200
	Date: 9/10/19

Essential Question:
What can I learn from IR and water vapour imagery? What is in the atmosphere? How was Earth's atmosphere formed in a way that lets us live? What are sources and sinks of trace gases?

<table>
<tr><td>Questions:

What can be learned from IR imagery?</td><td>Notes:

The lighter the color the colder the temperature. Because the temperature decreases with height in the troposphere, the brighter the color is the higher up in the atmosphere a cloud is
Advantage: Tells cloud toup temp, cloud top height, and can be used 24/7
Disadvantage: Can not say how thin/thick the clouds are</td></tr>
<tr><td>What can be learned from Water vapour imagery?</td><td>Where water is and how it is transported</td></tr>
<tr><td>What is the Atmospheric composition? What are the differences between: Permanent gases, variables= gases, and trace gases?</td><td>
<table>
<tr><th>Chemical</th><th>Type of gas</th><th>% in the Atmosphere</th></tr>
<tr><td>Nitrogen (N2)</td><td>Permanent gases (do not change from day to day)</td><td>78%</td></tr>
<tr><td>Oxygen (O2)</td><td>Permanent gases (do not change from day to day)</td><td>21%</td></tr>
<tr><td>Argon, Neon, Hydrogen</td><td>-Permanent gases (do not change from day to day)
-Nobel gases (unreactive)</td><td><1%</td></tr>
<tr><td>Water</td><td>-Variable gases(fluxuates in concentration)</td><td>0 to 4 %</td></tr>
<tr><td>CO2</td><td>-Variable gases(fluxuates in concentration)
-Trace gases (very small %)</td><td>410 ppm and growing</td></tr>
<tr><td>Methane, ozone, nitrous oxide</td><td>-Variable gases(fluxuates in concentration)</td><td><<1%</td></tr>
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<tr><td></td><td><table><tr><td></td><td>-Trace gases (very small %)</td><td></td></tr></table></td></tr>
<tr><td>What was the Early Earth’s atmosphere like and how has the atmosphere changed?</td><td>The early Earth was hot and toxic to us
1. Water formed on Earth
a. Which is caused from Comets crashing into the surface
2. The atmosphere became oxygenated
a. CO2 was absorbed into the water
b. Organisms used the CO2 to make energy and released oxygen (photosynthesis)
c. This lead to the “Oxygen Catastrophe”
3. Life can live on the Earth
a. The oxygen lead to the formation of stratospheric ozone which protects life from harmful UV radiation</td></tr>
<tr><td>What are they key components of the Carbon Dioxide Cycle?</td><td>- CO2 is produced naturally and anthropogenically (by humans). Some of this emitted CO2 is absorbed by the oceans (about half) and soil, while the rest stays in the atmosphere.
- The CO2 absorbed in the ocean leads to “Ocean Acidification” which is bad was sea creatures and their habitat
- CO2 is increasing because there are more sources of CO2 (like burning of fossil fuels) than there are sink (photosynthesis, soil, ocean)
- CO2 has been much higher in the past then it is right now, but what is concerning is the rate in which we are increasing that is concerning</td></tr>
<tr><td>List sources and sinks of gases trace gases and aerosols</td><td><table><tr><th>Gas</th><th>Sources</th><th>Sinks</th></tr><tr><td>Carbon Dioxide CO2</td><td>Burning of fossil fuels, oceans,Respiration</td><td>Ocean, Soil, photosynthesis</td></tr><tr><td>Methane</td><td>Termites, Ruminants, wetlands, natural gas production, coal mining,rice paddies</td><td>Chemical reactions in the atmosphere Methane reacts with oxygen to form CO2</td></tr><tr><td>Nitrous Oxide (N2O)</td><td>Soil, ocean, cattle, industry, biomass burning, chemical reactions in the atmosphere</td><td>Chemical reactions in the atmosphere</td></tr><tr><td>Aerosols (NOT a gas but is a solid or liquid particle)</td><td>Sea salt, volcanoes, erosion, fires</td><td>Clouds are formed from aerosols that form water on them. When it rains or snows than the aerosols are</td></tr></table></td></tr>
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	<table><tr><td></td><td></td><td>flushed out of the atmosphere</td></tr></table>
When is ozone good and when is ozone bad?	Ozone in the stratosphere is good because it blocks us from UV radiation Ozone is bad in the troposphere because if inhaled it is toxic

Summary:
IR is used to assess cloud top temperatures and thus cloud top height. Water Vapour uses microwave channels to detect where water is and how it is moving. There are sources and sinks for trace/ variable gases in the atmosphere. When there are more sources then sinks we see a rise in that gases. This is why we have seen a rise in CO2 over the last century. Ozone in the troposphere is bad and ozone in the stratosphere is good for life on Earth