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METR112

Chapter 4 Homework

**Earth’s Greenhouse Gas Effect versus other nearby Planets**

1. For each planet below, fill out the chart. (15 points)

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Venus** | **Earth** | **Mars** |
| **CO2 %** | 96.5 | 0.04 | 95.9 |
| **Water vapor %**  **(H2O is gaseous state)** | 0.05 | 1 | 0.10 |
| **Average Surface Temperature (°F)** | 863.33 | 60.53 | -51.07 |
| **\*Average Surface Air Pressure (bars)** | 89.63 | 0.999 | 0.00599 |

\*surface air pressure is a direct indication for how much and how thick a planet’s atmosphere is.

1. **Based upon your answers to the Table in Q1, (a) compare each Planet’s surface temperature, CO2 percentage, and surface air pressure. (b) Explain why a certain planet has the highest surface temperature and why a certain planet has the lowest surface temperature out of those. (c) Why are carbon dioxide and water vapor relevant? (10 points)**

Ans:



|  |  |  |  |
| --- | --- | --- | --- |
|  | **Venus** | **Earth** | **Mars** |
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Table shows that Venus has more CO2%,average surface temperature and Average Surface Air Pressure than earth and mars.

(b)

A planet requires number of layers to satisfy energy balance. The number of layers is equivalent to the amount of greenhouse gases in the atmosphere. Therefore, an increase in greenhouse gases in the atmosphere corresponds to an increase in the number of layers and a warming climate. For example, Venus has 82 layer, whereas Earth has 0.65, and Mars has 0.22.

(c) Water vapor is blocking more energy than carbon dioxide today. But, carbon dioxide is much more important for changing the climate than is water vapor. The water vapor causes more Greenhouse effect than carbon dioxide but the water vapor is continuously cycle through the ocean and rain. However carbon dioxide stay in the atmosphere for years. So there is an additive greenhouse effect with increase CO2 emission.

1. **One argument you hear against mainstream climate science is that adding greenhouse gases to the atmosphere is like painting a window. Eventually, the window is opaque so that adding another coat of paint does nothing. Is this a good analogy? Is there a point where adding greenhouse gases to the atmosphere does not lead to increases in the planet’s temperature? (10 points)**

Ans : It is not good analogy that if we would add more gasses into greenhouses then temperature would not increase. For example, it’s a proven fact that human are responsible for increased CO2 in atmosphere with big fossil fuel factories which caused increased Earth's temperature. By adding more into the atmosphere, eventually it will affect the Earth’s atmosphere. For example if we look at Venus and Earth data if CO2 keep increasing then Earth might reach surface temperature similar to Venus. Also we don't have evidence for a calculated max temperature.