

| Topic/Objective: | Atmospheric Structure | Name: Hannah Daley    |
|------------------|-----------------------|-----------------------|
|                  |                       | Class/Period: AOSC200 |
|                  |                       | Date: 9/12/19         |
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**Essential Question:** What is the structure of the atmosphere and why? What is latent heat and how does it impact the temperature profile of the tropsphere?

| <b>Questions:</b><br>Review the CO2 cycle and why<br>it is increasing over time | <ul> <li>Notes:</li> <li>Sources are things that create or release a gas</li> <li>Sinks are things that absorb or uptake the gas</li> <li>When sources=sinks we call this "steady state" or "equilibrium"</li> <li>Since CO2 sources &gt; CO2 sinks, we have seen an increase in CO2 over the last century</li> </ul>   |
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| <image/>  | <ul> <li>The atmosphere is defined by "temperature" or how the temperature changes in height</li> <li>Troposphere         <ul> <li>This is the layer that we live in. (0 to ~12km from ground)</li> <li>This layer is heighted from the ground up from the Earth emitting energy as thermal radiation</li> <li>Temperature decreases with height. Since the heat source is from the surface this is why higher elevations are colder. Also because the atmosphere is less dense.</li> </ul> </li> <li>Tropopause: between troposphere and stratosphere</li> <li>Stratosphere         <ul> <li>The second layer. (~12 km to ~50km from ground)</li> <li>The heat source in this layer is the ozone layer that absorbs UV radiation</li> <li>Temperature Increases with height, which is the definition of a temperature inversion</li> </ul> </li> <li>Stratosphere         <ul> <li>The heat source in this layer is the ozone layer that absorbs UV radiation</li> <li>Temperature Increases with height, which is the definition of a temperature inversion</li> </ul> </li> <li>Stratopause: between stratosphere and mesosphere</li> <li>Mesosphere         <ul> <li>The third layer (~50km to ~85 km from ground)</li> <li>Cools as it gets farther away from a heat source (the surface of the Earth or the ozone layer)</li> <li>Temperature decreases with height</li> </ul> </li> <li>Mesosphere/         <ul> <li>The mosphere/lonosphere</li> <li>The fourth and last layer (~85km to ~120 km from ground)</li> <li>No atmosphere above it to protect it from the suns heat so it is heated rapidly by the sun</li> <li>Temperature Increases with height, which is the definition of a temperature inversion</li> </ul> </li> </ul> |



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| What is the temperature Lapse rate and what does it mean? | <ul> <li>The temperature lapse rate is the amount that temperature decreases over height. It can be thought of as the negative slope of the temperature profile</li> <li>The environmental lapse rate, which is the amount that temperature decreases with height under environmental conditions is roughly 6.5 C/km</li> <li>The dry adiabatic lapse rate, is the amount that temperature decreases with height under ideal, dry condition is roughly 10 C/km</li> <li>The lapse rate is different in the environment because the environment has moisture which releases ~3.5 C/km of latent heat</li> </ul>  |
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| What is Latent heat and why does water release it?        | <ul> <li>Whenever there is a phase change (solid &lt;-&gt;liquid &lt;-&gt;gas) heat is used or released to chemically change their state.</li> <li>If a solid melts or a liquid evaporates: Heat is taken from the environment for the phase shift         <ul> <li>We say Latent Heat is lost</li> <li>Or the environment is cooling because heat is taken out of the environment to change the phase</li> </ul> </li> <li>If a gas condenses or liquid freezes: Heat is released into the environment or the environment is neated because heat is added to the environment to change the phase</li> <li>Or the Environment is heated because heat is added to the environment to change the phase</li> </ul> |

## Summary:

There are four layers of the atmosphere: Troposphere, Stratosphere, Mesosphere, and Thermosphere. The layers are defined by temperature, but more specifically if temperature is increasing or decreasing with height. Students should no sources of heat to the atmosphere (surface of the Earth, Stratospheric Ozone, and the sun). The environmental lapse rate is less than the dry lapse rate because moisture releases latent heat into the atmosphere as it is lifted.