LAYERS OF THE ATMOSPHERE

The Earth's atmosphere covers the planet, keeps us warm, provides oxygen to breathe, and is where all weather occurs. Earth's atmosphere has five major layers. Click on each layer name to get more information.

Troposphere

Earth's atmosphere consists of five layers with the troposphere being the closest to the Earth's surface. The troposphere extends from the Earth's surface to about 12 kilometers (7.5 miles) into the atmosphere, with it being lower near the poles and higher at the equator. The troposphere holds all the air plants need for photosynthesis and animals need to breathe. The troposphere contains 99% of all water vapor and aerosols (minute solid and liquid particles that suspend in the atmosphere). "Tropo" means change which reflects what happens within the troposphere. Most weather changes on Earth are generated in this atmospheric layer with all clouds formed there too. When you see a kite in the sky, a bird flying about, or even an airplane zooming by you are witnessing the troposphere.

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Stratosphere

The next level of the atmosphere is the stratosphere, about 12 to 50 km (7.5 to 31 miles) above the Earth's surface. "Strat" means layer which is fitting for the stratosphere as it has its own layers within its boundaries. Unlike the troposphere, the stratosphere has cold, heavy air at the bottom and warm, light air at the top. This layer is also where you will find the ozone layer, which helps protect from the sun's ultraviolet radiation. The stratosphere is nearly cloud and weather-free, aside from a few polar stratospheric clouds that are present at the lower, colder altitudes. It is also the highest layer of the atmosphere that jet airplanes can reach.

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Mesosphere

The mesosphere is located between 50 to 80 km (31 to 50 miles) above the Earth's surface between the stratosphere and thermosphere layers. "Meso" means middle, so when you think of this layer think of it as being in the middle of the atmosphere. This is the highest atmosphere layer in which gases are all mixed up unlike layers in the stratosphere. In this layer there is little to no air, so it becomes progressively colder as the altitude rises. Since there is scarce water vapor present at the top of the mesosphere, noctilucent clouds form, which are the highest clouds that can form in the Earth's atmosphere. Many meteors that come into Earth's atmosphere burn up in this layer due to the air that is present causing friction and creating heat. Rockets and rocket-powered aircraft can reach this layer of the atmosphere.

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Thermosphere

Above the mesosphere is the thermosphere, about 80 to 700 km (50 to 440 miles) above Earth's surface. "Thermo" means heat and that is what you will encounter at this altitude. The temperature increases with altitude due to the extremely low density of molecules found in this layer. Temperatures here can reach up to 4,500° Fahrenheit, however due to the low gas molecules heat cannot be transferred. The small number of gas molecules also means that sound waves cannot travel through this layer. This is a cloud and water vapor- free layer, although you can sometimes see the aurora borealis and aurora australis lights. This is also where the International Space Station orbits in the atmosphere.

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Exosphere

The outermost part of the Earth's atmosphere is called the exosphere and is between 700 and 10,000 km (440 and 6,200 miles) above the Earth's surface. "Exo" means outside and at its highest point the exosphere will merge with solar winds. Helium and hydrogen can be found in this layer, however there is lots of space between them and most molecules here have low density, so this layer does not behave like gas. Many of its particles will escape into the vastness of space. This atmospheric layer is very cold and has no air to breathe. At the lowest part of the exosphere the aurora borealis and aurora australis can sometimes be seen. This is often the layer where Earth's satellites orbit.

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