



The Air Up There

Earth is covered with a thin 'shell' of gas called atmosphere. If you reduced Earth to the size of a grapefruit (13 centimetres across), the atmosphere would only be 2 millimetres thick. The Earth is really about 12 000 kilometres in diameter and the atmosphere extends about 500 kilometres from the Earth's surface. Without the atmosphere, Life would not exist on Earth.

Each layer of atmosphere varies in temperature, thickness and the gases it contains. There is a kind transition zone between the layers where one layer 'blends' into the next.

The layer closest to Earth's surface is called the troposphere. Most weather patterns occur in this layer, which is only about 12 kilometres high. Mount Everest, which is about 8 kilometres high, is still located in this layer.

The next layer—the stratosphere—is important for keeping the troposphere warm. It also contains ozone gas which absorbs ultraviolet (UV) radiation, preventing too much UV from reaching the Earth's surface. The stratosphere also contains dust from volcanic activity and human pollution. This dust can change the temperature on Earth's surface slightly.

There's plenty of colourful action in the upper layers! Layers above the stratosphere (mesosphere and thermosphere) have ionised or charged gases and are called the ionosphere. The ionised gases allow spectacular natural events such as sprites to flash across the sky. When ionised or charged gases collide, they release brilliant flashes of red or blue light.

Auroras (also known as the northern and southern lights) are other colourful displays of light, which shift in sheets across the skies. Scientists are unsure why auroras occur, but it may be due to an interaction between the Earth's magnetic field and solar winds (from our Sun).

| Name of atmospheric layer | Size of atmospheric layer | Human-built aircraft found in this layer | Natural features found in this layer |
|----------------------------------|----------------------------------|---|--|
| Troposphere | 12 kilometres thick | Commercial aircraft | Clouds and most weather occur here. Contains 85% of the atmosphere's mass. |
| Stratosphere | 38 kilometres thick | Concorde Weather balloons | Ozone prevents most Ultraviolet (UV) radiation from reaching Earth's surface. |
| Mesosphere | 30 kilometres thick | | Sprites (a type of lightning) occur here. Meteors ('shooting stars') burn up when entering this layer. |
| Thermosphere | 420 kilometres thick | International Space Station | Auroras occur in this layer. |
| Exosphere | Blends into space | Space Shuttle | |

More Information

Earth's Atmosphere (NASA) <http://liftoff.msfc.nasa.gov/academy/space/atmosphere.html>

Scientific American News 14 March 2002.

Blue Jets May Link Thunderstorms to the Ionosphere

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Gigantic Jets Connect Thunderclouds to the Ionosphere

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Why do aeroplanes fly higher than Mount Everest even where there are no mountains?

<http://www.newscientist.com/lastword/article.jsp?id=lw741>

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Light show <http://archive.newscientist.com/secure/article/article.jsp?rp=1&id=mg17123077.700>

Questions and Answers about Aurora (NASA) <http://image.gsfc.nasa.gov/poetry/ask/aurora.htm>

Sprite Chasing from the Back Porch <http://www.fma-research.com/Papers&presentations/spr-view-1.html>

New Scientist Inside Science No. 86, 9 December 1995

Structure of the Earth's atmosphere