



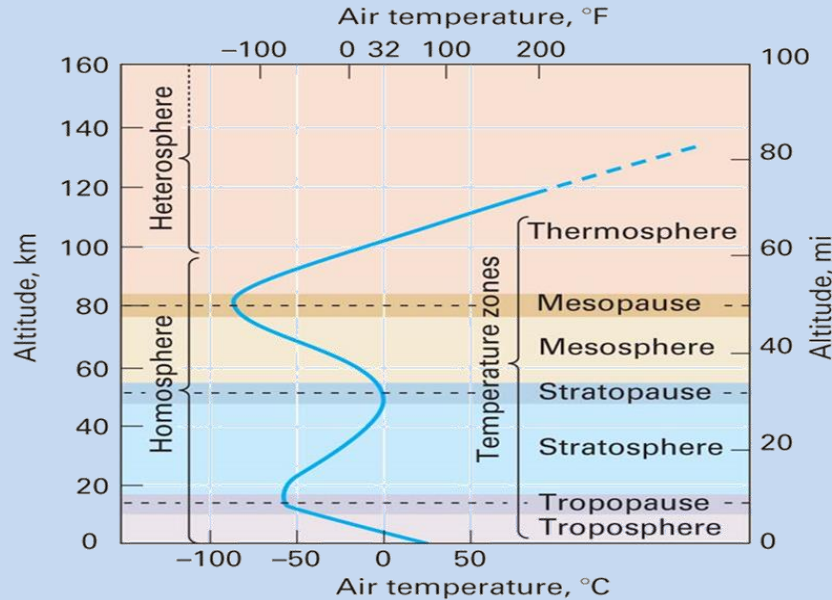
Vertical distribution Temperature of Earth atmosphere

The temperature of the Earth's atmosphere is not identical across the Earth. It differs in spatial and temporal dimensions. The temperature of a place depends largely on the insolation received by that place. The interface of insolation with the atmosphere and the earth's surface creates heat which is measured in terms of 'temperature'. Temperature differs significantly at different heights relative to the Earth's surface and this variation in temperature characterizes the four layers that exist in the atmosphere. These atmospheric layers include: the Troposphere, Stratosphere, Mesosphere, and Thermosphere.

A. Troposphere:

The lowest most atmospheric layer, of the homosphere, is the thinnest of the layers, but it contains about 80 percent of the mass of the atmosphere. The lowest most part of the troposphere is called the planetary boundary layer. Thickness of this layer is 7 to 8 kilometers in polar regions and as high as 16 to 18 kilometers in the tropics. There is also seasonal variation in the height. Where all type of climatic hazard or weathering phenomena are present e.g. fog, Clouds, dew, frost, precipitation, thunderstorm, storms, cloud-thunder, lightning, Cyclones etc.

In this layer Temperature decreases with increasing height at the rate of 6.45°C per 1000 m. or 1 Km. This decrease of temperature rate is called "normal lapse rate". Top in the layer highest temperature during January and July over the equator, 45°N and pole (North) is -70°C , 60°C and 58°C respectively. Occasionally the temperature is constant with height, or it may even increase with height in a thin layer called a 'mechanical inversion' also called "negative lapse rate". When a dry air lifted upward due to subsidence of air, turbulence, convective and frictional forces mechanism (ascent or descent of air) without mixing heat with the environment, the lapse rate is approximately 10°C per kilometer (5.5°F per 1000 feet.), this cooling rate is called 'dry adiabatic lapse rate'. On the other hand, the latent heat of condensation released after precipitation is added to the ascending winds, with the result the temperature of the ascending winds decreases at the rate of 6°C per Km. (3°F per 1000 feet) this rate is called moist or retarded adiabatic rate.



Thermal representation of the atmosphere, According to A. N. Strahler

Tropopause: The upper limit of the troposphere is called “Tropopause”, literally means “Zone or region of mixing” or ‘where the mixing stops’, which is about 1.5 km. thick. Here temperature stays in stable condition.

B. Stratosphere:

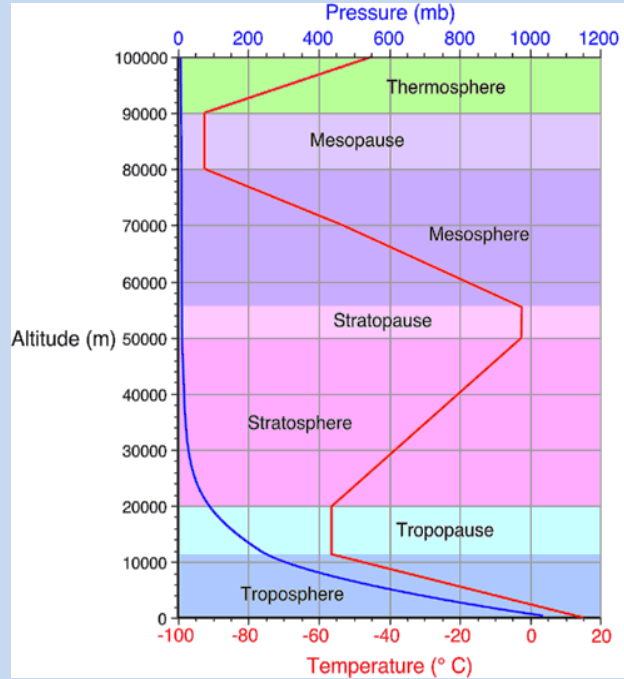
This layer just situated above the tropopause, the average height of this layer is 25-30 km. so upper limit of the layer is 50 Km. There temperature is increase with increasing height, increasing rate is 5°C per Km., the temperature gradually rises upwards as it becomes 0°C or 32°F at the height of 50 Km. Lower part of the layer having maximum concentration of ozone (O_3) is called ozonosphere (15 – 35 Km.). The ozone layer absorbs most of the ultraviolet rays (A, B etc.) radiated from the sun and the thus the temperature of this layer becomes much higher than the other layers lying above and below ozone layer, it is called thermal upper air inversion.

Stratopause: Also its nature is similar to layer of tropopause. The nature of temperature of this layer is stable.

C. Mesosphere:

This atmospheric layer extends between 50 km. to 80 Km. Temperature again decreases with increasing height. At the upper most limit of the layer temperature becomes -80°C to -100°C .

Mesopause: The upper most part of the mesosphere layer. There temperature nature is stable condition. After this thin layer temperature is continues rapidly increase with increasing height.



Thermal representation of the atmosphere, According to Bary and Chorley

D. Thermosphere:

The layer of the atmosphere beyond mesopause, wherein temperature increases rapidly with increasing height. The temperature at its upper limit (600 Km.) becomes 1700°C . After this layer temperature is continues rapidly increase with increasing height. The temperature becomes 5568°C at its outer limit (10,000 Km.) but this temperature is entirely different from the air temperature of the earth's surface as it is never felt.

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