Thermal constants in solar system

Thermal constants in solar system

This graphic shows the mean temperatures of various destinations in our solar system. (Planets not to scale.) In general, the surface temperatures of planets decrease with increasing distance from the Sun. Venus is an exception because its dense atmosphere acts as a greenhouse and heats the surface to above the melting point of lead.

Let"s look at the mean temperature of the Sun, and the planets in our solar system. The mean temperature is the average temperature over the surface of the rocky planets: Mercury, Venus, Earth, and Mars. Dwarf planet Pluto also has a solid surface.

Venus is the hottest planet in our solar system, with an average surface temperature of around 900 degrees Fahrenheit (475 degrees Celsius). This is hotter than the surface of Mercury, despite Venus being further away from the Sun. The extreme heat is constant, with very little variation between day and night temperatures.

Simplifying assumptions: Low altitude, circular orbit -- restricts planet viewing to local regions with similar illumination conditions; Constant albedo factor. planet-wide -- uniform albedo. factor, with diffuse reflection, is the easiest to model.

Planetary Physical Parameters. The following tables contain selected physical characteristics of the planets and dwarf planets, respectively. Table column headings are described below. Planet. Equatorial. Radius. Mean. Radius. Mass.

The distance of a planet from the Sun is one of the most straightforward factors affecting its temperature. Generally, the closer a planet is to the Sun, the hotter it tends to be. However, this is not a hard and fast rule, as other factors like atmosphere and axial tilt can significantly influence a planet’s temperature. For example, despite being the closest planet to the Sun, Mercury is not the hottest planet in our solar system.

A planet’s atmosphere plays a critical role in determining its temperature. The gases that make up the atmosphere can trap heat, leading to a greenhouse effect. This is why Venus, despite being the second planet from the Sun, is the hottest, with an atmosphere primarily composed of carbon dioxide. On the other hand, planets like Mars have thin atmospheres, which are less effective at trapping heat, making them much colder.

Mercury, the closest planet to the Sun, has an average temperature of about 800 degrees Fahrenheit (427 degrees Celsius) during the day. However, this is misleading, as the planet experiences extreme temperature variations. The side facing the Sun gets incredibly hot, while the side in the shadow can be extremely cold, dropping to temperatures as low as -330 degrees Fahrenheit (-201 degrees Celsius).

The extreme temperature variations on Mercury are primarily due to its lack of a significant atmosphere. An

atmosphere acts as a blanket, distributing heat and making the temperature more uniform. Mercury’s temperature can swing wildly between its day and night sides without such an atmospheric buffer. This makes Mercury a planet of extremes, where the conditions can be harsh and bleak.

Venus’s high temperature is its thick atmosphere, composed mainly of carbon dioxide and sulfuric acid clouds. This creates a strong greenhouse effect, trapping heat effectively. Additionally, Venus has significant volcanic activity, which releases more heat-trapping gases into the atmosphere. The combination of these factors makes Venus the hottest planet and an exemplary example of a runaway greenhouse effect.

Earth enjoys a moderate average global temperature of around 59 degrees Fahrenheit (15 degrees Celsius). This temperature is neither too hot nor too cold, making Earth the only planet in our solar system capable of supporting life as we know it. The moderate temperatures result from a combination of factors, including Earth’s distance from the Sun and its atmospheric composition.

Earth’s atmosphere, primarily composed of nitrogen and oxygen with trace amounts of carbon dioxide and other gases, is vital in maintaining its moderate temperatures. The presence of large bodies of water also helps regulate temperature, acting as heat sinks that absorb and release heat slowly. Earth’s axial tilt and rotation period also contribute to seasonal variations but maintain a relatively stable average temperature, making it a hospitable environment for a diverse range of life forms.