List of solar constants

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Astronomical terms and constants Units of length 1 AU ? 1.5×1013cm = one astronomical unit, i.e. the earth-sun distance. 1 pc = 2.06×105AU = 3.1×1018cm = one parsec, i.e. a distance to a star with a parallax equal to one second of arc. A parallax is an angle at which the radius of earth"s orbit around the sun is seen from a distance of ...

The solar constant includes all wavelengths of solar electromagnetic radiation, not just the visible light (see Electromagnetic spectrum). It is positively correlated with the apparent magnitude of the Sun which is -26.8. The solar constant and the magnitude of the Sun are two methods of describing the apparent brightness of the Sun, though ...

Selected Astronomical Constants. The Defining Constants (1) and Current Best Estimates (2) were adopted by the IAU 2009 GA, while the planetary equatorial radii (3), are taken from the report of the IAU WG on Cartographic Coordinates and Rotational Elements. For each quantity the list tabulates its description, symbol and value, and to the ...

The solar constant (GSC) measures the amount of energy received by a given area one astronomical unit away from the Sun. More specifically, it is a flux density measuring mean solar electromagnetic radiation (total solar irradiance) per unit area. It is measured on a surface perpendicular to the rays, one astronomical unit (au) from the Sun (roughly the distance from the Sun to the Earth).

The solar constant includes radiation over the entire electromagnetic spectrum. It is measured by satellite as being 1.361 kilowatts per square meter (kW/m2) at solar minimum (the time in the 11-year solar cycle when the number of sunspots is minimal) and approximately 0.1% greater (roughly 1.362 kW/m2) at solar maximum.[1]

The solar "constant" is not a physical constant in the modern CODATA scientific sense; that is, it is not like the Planck constant or the speed of light which are absolutely constant in physics. The solar constant is an average of a varying value. In the past 400 years it has varied less than 0.2 percent.[2] Billions of years ago, it was significantly lower.

Solar output is nearly, but not quite, constant. Variations in total solar irradiance (TSI) were small and difficult to detect accurately with technology available before the satellite era (?2% in 1954). Total solar output is now measured as varying (over the last three 11-year sunspot cycles) by approximately 0.1%;[5] see solar variation for details.

In 1838, Claude Pouillet made the first estimate of the solar constant. Using a very simple pyrheliometer he developed, he obtained a value of 1.228 kW/m2,[6] close to the current estimate.

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In 1884, Samuel Pierpont Langley attempted to estimate the solar constant from Mount Whitney in California. By taking readings at different times of day, he tried to correct for effects due to atmospheric absorption. However, the final value he proposed, 2.903 kW/m2, was much too large.

Between 1902 and 1957, measurements by Charles Greeley Abbot and others at various high-altitude sites found values between 1.322 and 1.465 kW/m2. Abbot showed that one of Langley''s corrections was erroneously applied. Abbot''s results varied between 1.89 and 2.22 calories (1.318 to 1.548 kW/m2), a variation that appeared to be due to the Sun and not the Earth''s atmosphere.[7]

The solar constant includes all wavelengths of solar electromagnetic radiation, not just the visible light (see Electromagnetic spectrum). It is positively correlated with the apparent magnitude of the Sun which is -26.8. The solar constant and the magnitude of the Sun are two methods of describing the apparent brightness of the Sun, though the magnitude is based on the Sun''s visual output only.

The angular diameter of the Earth as seen from the Sun is approximately 1/11,700 radians (about 18 arcseconds), meaning the solid angle of the Earth as seen from the Sun is approximately 1/175,000,000 of a steradian. Thus the Sun emits about 2.2 billion times the amount of radiation that is caught by Earth, in other words about 3.846x1026 watts.

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