

Readme: Photosphere

Photosphere

The photosphere is the layer of the sun that is typically observed in solar white light imagery. The Free Dictionary describes the photosphere as, in general, the "lowest visible layer of a star, lying beneath the chromosphere and the corona. Stars are made entirely of gas and thus have no surface per se, but the gas beneath the photosphere is opaque, so the photosphere acts as their effective visible surface; it is also the boundary from which the sun's diameter is measured. The sun's photosphere is a very thin layer made up of numerous granules (transient convective cells) where hot gases rise and give off light and heat. The photosphere of the Sun has a temperature of around 6,000°K and is the region in which sunspot activity is located." The most striking feature of the photosphere is the presence of sunspots which appear dark against the surface of the sun due to their lower temperatures (~3,500°K). Sunspots are solar active regions having strong magnetic fields and propensity for erupting in the form of solar flares. Sunspots typically form near the solar equator, appearing over a period of days and lasting up to several weeks. Sunspots typically appear in pairs having, respectively, positive (north) magnetic field and negative (south) magnetic field. The darker (cooler) central portion of a solar flare is called the umbra whereas the lighter outer area is called the penumbra. Sunspots often occur in complex bipolar groups of typically 10 sunspots or less. The number of sunspots varies over the 11-year solar cycle peaking in number at solar maximum.

AVAILABLE DATASETS

Dataset: Solar Imagery – Photosphere – White Light (1957-present)

Description: Collection consists of white-light, full-disk images of the sun provided from various observatories and institutions. Ground-based solar observatories contributing to this collection are the NOAA Boulder Solar Observatory (1973-1974), the National Solar Observatory – [Sacramento Peak](#) (2003-2012), [Debrecen Heliophysical Observatory](#) (1986-1999), [U.S. Naval Observatory](#) (1946-1951) and the [Astronomical Observatory Belgrade](#) (1957-1959). The Debrecen dataset is comprised of selected daily white-light solar images of the sun assembled by the Debrecen Heliophysical Observatory from solar telescopes at **Debrecen** Observatory (Hungary), the **Gyula** Observing Station (Hungary), the **Kislovodsk** (Russia) [Solar Mountain Astronomical Station](#) of the Pulkovo Observatory (Russia), [Kanzelhöhe Observatory](#) for Solar and Environmental Research, (Austria), and **Tashkent** Astronomical Observatory (Russia; now the [Ulugh Beg Astronomical Institute](#) plus images from the NASA [Solar & Heliospheric Observatory](#) (SOHO).

Dataset Status: Active.

Dataset: Solar Imagery – Photosphere – Sunspot Drawings (1859 - present)

Description: This collection consists of sunspot drawings provided by the [Haynald Observatory](#) [Kalocsa, Hungary] (1880-1919), National Solar Observatory – [Sacramento Peak](#) (1947-2004), NOAA Boulder Solar Observatory (1966-1992) and the USAF [Solar Observing Optical Network](#) (1979-present). Historical sunspot drawings from the collections of Charles Anthony Schott (1859-1860) while with the U.S. Coast Survey (predecessor to NOAA) are also included in this collection.

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Dataset Status: Active.

References:

Eddy, J.A. (2009), The Sun, The Earth, and Near-Earth Space, ISBN 978-0-168-083808-8, 301 pp., NASA

Tóth, L., G. Mezõ and O. Gerlei, (2002), Haynald Observatory Photosphere Observations 1880-1919, Journal for the History of Astronomy (ISSN 0021-8286), Vol. 33, Part 3, No. 112, p. 278