

Appendix

A

Glossary

annular eclipse An eclipse of the Sun in which an annulus (a ring) of bright everyday sunlight remains visible around the Moon.

annular-total eclipse An eclipse of the Sun that is annular for the ends of its path, but total in the middle.

anomalistic month The period between perigees, 27.55 days—the closest approach of the Moon to the Earth.

antumbra The continuation of the umbral cone beyond its point.

atom The smallest building block of the chemical elements. A chemical element is one type of atom.

AURA Associated Universities for Research in Astronomy, the organization that runs the National Solar Observatory, the National Optical Astronomy Observatories, the Gemini Observatory, and the Space Telescope Science Institute.

black-drop effect The appearance of a dark band joining Venus's silhouette and the sky during transits, preventing their accurate timing.

butterfly diagram Graph that shows butterfly shapes when the latitude of sunspots is graphed over time.

carbon cycle A way to fuel stars by adding hydrogens to a carbon atom and its intermediate transformations. It operates in stars hotter than the Sun.

celestial sphere The imaginary sphere surrounding Earth, with the stars on it.

central eclipse A total or annular solar eclipse.

CFCs *See* chlorofluorocarbons.

chlorofluorocarbons (CFCs) Compounds made of chlorine, fluorine, and carbon that were thought to be stable but that actually disintegrate in the stratosphere and affect the ozone layer.

chromosphere The colorful shell around the Sun that pops into view at the beginning and the end of a total eclipse.

CME *See* coronal mass ejection.

corona The pearly white crown of light visible around the Sun at a total eclipse.

coronagraph A type of telescope that makes artificial eclipses. The term has been generalized to include mechanism on other telescopes that block bright parts of an image to allow fainter parts to be seen.

coronal hole A relatively dark region of the corona seen in x-rays or extreme ultraviolet. Coronal holes represent open regions of the coronal magnetic field, from which gas can easily escape into interplanetary space.

coronal mass ejection (CME) The eruption and departure from the Sun of a piece of the corona. These ejections, often called CMEs by professionals, have been seen to occur daily near solar maximum daily. They are a major link between the Sun and Earth.

draconic month The 27.21-day intervals between the Moon's return to the same node. Also called a nodical month.

eclipse season The time of year when Earth and the Moon are close enough to the nodes to potentially have an eclipse.

eclipse year The 346.62-day period during which Earth passes through opposite nodes.

electromagnetic radiation Waves of electricity and magnetism that travel at the speed of light. From shortest to longest wavelengths, it includes gamma rays, x-rays, ultraviolet, visible light, infrared, and radio waves.

ESA The European Space Agency.

exoplanets Planets around stars other than our Sun.

extinction How much of incoming light is absorbed before it reaches us.

extreme ultraviolet The shortest part of ultraviolet light, farthest from visible light.

filament What a prominence looks like when you look at it from above, silhouetted against the solar disk.

flare A powerful, sudden eruption on the Sun, not to be confused with a prominence.

forbidden lines Spectral lines that would occur so rarely that other circumstances in atoms, like collisions that change the condition of the atoms present, would prevent them from occurring. They appear only in gas of extremely low density.

gamma rays Electromagnetic radiation, like light but with even shorter wavelengths than x-rays.

global warming The upward trend in temperature. Most scientists have concluded that most of it comes from the greenhouse effect caused by human contributions of carbon dioxide and other gases to the Earth's atmosphere.

greenhouse effect When incoming sunlight passes through a transparent atmosphere and is transformed to infrared radiation that is partly blocked from escaping by the atmosphere.

halons Bromine-based gases that affect the ozone layer.

heliopause The upper limit of the heliosphere.

helioseismology The technique of finding out about the inside of the Sun by studying oscillations of the Sun's surface.

heliosphere The zone in which the Sun has more influence than interstellar space.

H-H objects Jets of gas given off by young stars.

ion An atom that has lost one or more of its electrons.

isotopes Forms of atoms with different numbers of neutrons, which add mass but not charge. For example, the most common isotope of hydrogen has just a proton; another isotope of hydrogen is deuterium, which has a proton plus a neutron.

LWS NASA's Living with a Star program. Its objectives are (1) to quantify the physics, dynamics, and behavior of the Sun-Earth system over the 11-year solar cycle; (2) to improve understanding of the effects of solar variability and disturbances on terrestrial climate change; (3) to provide data and scientific understanding required for advanced warning of energetic particle events that affect the safety of humans; and (4) to provide detailed characterization of radiation environments useful in the design of more reliable electronic components for air and space transportation systems.

magnetic carpet Term that shows how common and dynamic changes in the magnetic field are, with a tangled magnetic field found all over the images of the lower corona and a resulting magnetic reconnection on small scales.

magnetic field Region of influence of a source in which the direction and strength of magnetism can be determined.

magnetic reconnection The abrupt change of the arrangement of loops in a region on the solar surface, to create a lower-energy and more stable situation.

magnetohydrodynamics The study of the motion of ionized gases (plasmas) in magnetic fields.

MHD See magnetohydrodynamics.

Mira The first variable star to be discovered.

moss A thin layer marking the interface between the corona and the chromosphere; it is 500,000 to 2,000,000°C and changes with the magnetic field.

NASA The National Aeronautics and Space Agency, the United States space and aeronautics agency.

negative hydrogen ion A hydrogen atom with a second electron, either loosely bound or merely affected by the hydrogen atom. The radiation from the Sun in the visible and infrared comes primarily from the negative hydrogen atom.

neutrino A subatomic particle with very tiny mass and no electric charge that travels at almost the speed of light and interacts very poorly with other matter.

NOAO The National Optical Astronomy Observatory, based in Tucson, Arizona, with its main observing station on nearby Kitt Peak. It is supported by the National Science Foundation.

node A place where two curves cross or a wave doesn't change over time. Between two orbits, it is the pair of locations where the two orbits cross.

nodical months The 27.21-day intervals between the Moon's return to the same node. Also called draconic months.

NRL The U.S. Naval Research Laboratory, based in Washington, D.C.

NSF The National Science Foundation, which funds most ground-based astronomy in the United States.

NSO The National Solar Observatory, with stations on Sacramento Peak in New Mexico and Kitt Peak in Arizona. It is supported by the National Science Foundation.

opacity A measure of how opaque, not transparent, a gas is.

ozone hole A thinning of the ozone seen in the Antarctic region each southern-hemisphere spring. It results from the breakdown of ozone molecules by chlorofluorocarbons and halons.

penumbra At an eclipse, the set of places that are only partially shadowed. Also, for a sunspot, the filamentary, less-dark region surrounding the umbra.

permitted lines Spectral lines that are common (we say “allowed”) from transitions between two energy levels of atoms.

photosphere The surface that we see in visible light.

plasma A gas composed entirely of ions and the electrons that balance the charge.

prominences Structures held in space above the Sun by the Sun’s magnetic field and seen when they are on the edge of the Sun.

proton-proton chain The series of nuclear reactions that fuels the Sun.

quiet Sun The everyday, unchanging background Sun.

revolving Orbiting another body.

rotating Spinning on its axis.

saros The interval of 18 years 11 $\frac{1}{3}$ days (plus or minus a day on the calendar, depending on leap years) over which eclipses repeat.

SDO NASA’s planned Solar Dynamics Observatory.

SEC NASA’s Sun-Earth Connection program.

seeing The quality that describes how steady images are.

seismic waves Vibrations that travel through Earth.

seismology The study of seismic waves, usually on Earth.

seismometers Devices on the Earth or the Moon, and potentially on other planets or moons with solid surfaces, used to measure seismic waves.

SOHO NASA and ESA’s Solar and Heliospheric Observatory, launched in 1995.

solar-activity cycle The sunspot cycle matched in other solar phenomena.

Solar-B Japan’s next solar spacecraft, which has major U.S. and U.K. participation. Its launch is planned for 2007.

solar constant The amount of energy that reaches a square meter of the top of Earth’s atmosphere each second.

solar flare An abrupt brightening of part of the Sun within seconds, including the release of electromagnetic radiation and particles. It is a powerful and sudden eruption, releasing energy stored in the magnetic field.

Solar Orbiter An ESA spacecraft planned for 2010.

Solar Polar Imager A wished-for NASA spacecraft, for the distant future.

Solar Probe A wished-for NASA spacecraft, now in abeyance.

solar wind The corona expanding into space.

SOLIS Synoptic Optical Long-term Investigations of the Sun, an American long-term program based at the National Solar Observatory, with a new telescope on Kitt Peak.

space weather Earth's environment in space as the result of emissions of particles and electromagnetic radiation from the Sun.

spectrograph A device that records the spectrum on film or otherwise, currently onto digital media.

spectroscope A device that you can look through to see the spectrum.

STEREO NASA's planned Solar-Terrestrial Relations Observatory.

sunspot cycle The approximately 11-year up-and-down in the number of sunspots.

Sun-synchronous orbit An orbit in which the spacecraft goes around Earth every two hours or so, keeping its orbital plane perpendicular to the direction toward the Sun. This puts the spacecraft in continuous view of the Sun for most of each year.

syzygy A lineup of three astronomical bodies.

TRACE NASA's Transition Region And Coronal Explorer, launched in 1999.

transit The passage of one celestial body in front of another. A total eclipse is a transit of the Moon in front of the Sun.

transition region The location between the chromosphere and the corona. Solar gas rises in temperature from about 18,000°F to 1,800,000°F (10,000°C to 1,000,000°C) there.

transparency How clear the atmosphere is.

T Tauri stars Young stars that are still unsteady in brightness, resembling the early years of the Sun's life.

total eclipse When the Moon entirely hides the Sun from a part of Earth.

ultraviolet Electromagnetic radiation just shorter than visible light.

umbra At an eclipse, the completely dark part of a shadow. For a sunspot, the dark central region with the strongest magnetic field.

x-rays High-energy electromagnetic radiation, like light, but hundreds or thousands of times shorter in wavelength.

Yohkoh Japan's Solar-A spacecraft, which observed x-rays from 1990 for almost 10 years.

zenith The point in the sky directly over your head.

Online Solar Glossaries

www.sunspot.noao.edu/PR/zoo.html

web.ngdc.noaa.gov/stp/GLOSSARY/glossary.html

www.hao.ucar.edu/public/education/glossary.html

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vestige.lmsal.com/TRACE/Science/ScientificResults/trace_cdrom/html/glossary.html

