

APPENDIX A

Often Asked Questions

Solar observers attract a lot of attention, whether at a club event, astronomical convention, or from neighbors when you are observing in the backyard. This is a natural consequence of the state of affairs: solar observers enjoy their hobby when the majority of the non-viewing public is out and about. Observers of galaxies and nebulae often keep late night hours when few, if any of the community are available.

At astronomy events solar observers are many times busy demonstrating their wares to fellow astronomy enthusiasts, some who are barely mindful that the Sun can be observed safely. It's not unusual for a veteran amateur astronomer to get his first glimpse of a prominence at one of these get-togethers. Then his interest is piqued, a flood of questions emerges and a new solar observer is born.

Some questions posed to the experienced solar observer seem elementary, others are highly technical, but all are legitimate inquiries. Remember when you were just developing an interest in Sun watching? You may have had those same wonderings. Following are ten questions that have been asked of experienced solarphiles, and answers that delighted the inquiring new observer.

What's the Difference Between a Surge and a Spray Prominence?

The surge and spray are both prominence ejection events. A surge will often burst outward at any angle from vertical to horizontal, attaining a

possible elevation of several 100,000 km, lose inertia and then fall back onto itself with a great splashing effect. The velocity of a typical surge is less than 200 km/s, less than the escape velocity of the Sun, which at the photosphere is about 600 km/s.

Two categories of spray are recognized: the *flare spray*, resulting in the expulsion of plasma due to the violent effect of a flare and the *prominence spray*, which is the eruption of an overlying filament above a neutral line. The prominence spray is the less energetic of the two events. The velocities of many sprays exceed 200 km/s and have been known to go beyond 2,000 km/s, easily attaining escape velocity from the Sun's gravity.

The difference between a surge and a spray in a nutshell is this: A surge is *controlled* or *collimated*, a relatively continuous expulsion of material, blown away by an underlying low-level compact, or simple-loop solar flare. A surge is collimated because it is bound by the magnetic field of the AR's primary sunspot. While a surge is a continuous burst of collimated material following the primary spot's magnetic field lines, the spray is a single ejection of filament material in an *uncontrolled* pattern, with matter going in various directions. Again a solar flare is the progenitor, but in this case the flare is much larger and within a less commanding magnetic field. The surge can be compared to a "bottle rocket" and the spray to an exploding "aerial bomb."

Do Sunspots Disappear Completely During Sunspot Minimum? How Many Are Visible at Maximum?

Disappearing sunspots? Sometimes it appears so, but not often. The observing circumstance and instrument employed play a big role into the number of spots visible. For example, compare the results of an Earth bound observer using a 50 mm aperture telescope versus a space based solar observatory telescope. Maybe the Earth observer can see 15 sunspots while the orbiting telescope spots 50. Which data is correct for a sunspot count? The point is that there may be days when the Earth bound observer cannot seem to locate a sunspot simply because it is beyond his ability to do so.

Solar Cycle 23 had a solar minimum that included some of the blankest appearing solar discs in the last fifty years. It was reported that during this

cycle over 800 days had a spotless Sun. The years 1645–1715 are called the Maunder Minimum because it was a period when very few sunspots were observed. While activity on the Sun was indeed low, it didn't come to an abrupt end – even during the Maunder Minimum, a number of days had sunspots however few they were.

During solar maximum, sunspot production can be difficult to predict. Solar Cycle 23 while notorious for its low output had a smoothed maximum sunspot number in excess of 120. A typical solar cycle can easily be twice that amount.

Why do You Observe the Sun?

That is a question that has been asked *many* times, and everyone has a different personal response. Some individuals speak of Sun observing as being a humbling and relaxing experience. One observer has quipped humorously that the Sun is easy to find in the sky (true!). Another said it is just fun to share with the public. Fun and fascination of examining a star close up and in intimate detail is a common theme among die-hard solar observers. Another reason the Sun is a favorite is its shear dynamics. There is *always* something happening on the Sun. And many of these events are truly awe-inspiring to witness.

In what other astronomical pursuit can such an abundance of spectacular activity occur in so short a time span? It is for these reasons, and others that many amateur astronomers study the Sun.

How Come Prominences and Flares Are Not Visible in My Telescope?

Depends on your telescope and the accessories it uses, most likely you are referring to a telescope used primarily for sunspot observing. Features such as prominences shine brightest in wavelengths in which they emit light (called emission). While these features can become bright enough to be visible in “white light”, they normally fail to achieve anywhere near that intensity level.

The real problem is that the photosphere, where sunspots develop, is so much brighter than the chromosphere where prominences occur, that the chromosphere becomes dominated by the overwhelming brightness of the photosphere. This is a lot like trying to see a burning match placed before the concentrated beam of a high-powered searchlight. The beam from the searchlight dwarfs the tiny flame unmercifully, just as does the photosphere when we attempt to see the much weaker chromosphere. What is needed is a way to effectively *turn off* the photosphere. While there is no light switch to accomplish that, what we can do is to block its excess light, and in that way isolate the chromospheric light.

Modern solar observers accomplish this by viewing the Sun through a special narrowband filter. Excess light originating in the photosphere is filtered out, leaving only the light of the chromosphere to dominate the view. Such a view is called monochromatic, because that view is of only one color.

What's Best for Observing Sunspots, a Projection Screen or an Objective Filter?

If your goal is producing a whole disc drawing of sunspots or determining heliographic coordinates of a white light feature, then a solar projection screen is the way to proceed. Drawing sunspots (tracing or transferring them from a grid) with a projection screen is far more accurate than free-hand drawing a filtered view seen through an eyepiece. A projection device, though deemed the safest observing technique, however has its drawbacks in that ambient light falling on the viewing surface washes out some detail that could otherwise be visible.

Objective filters when attached securely to the telescope will provide a safe and superior view of sunspot detail. Supplementary filters also can be combined with the direct observing package to enhance a view of specific features. If imaging the photosphere interests you then an objective filter will be inescapable.

To briefly summarize, positional studies are best done by projection, morphological studies by direct viewing, sunspot counting can be done either way, and the safety differences between the two techniques are essentially nil.

Why Do H-alpha Filters Have to Cost So Much?

Find solace in the fact that such devices cost far less now than they did in the past. Market forces and competition make products available to many more observers than would have been possible otherwise.

In reference to the question, manufacturing procedures probably contribute more than anything to the cost. A filter has to be very precisely coated and manufactured to extreme tolerances to pass only very narrow wavelengths of light. The filters only operate properly within specific temperature ranges, necessitating the creation of a controlled environment, another costly factor.

Technology necessitates the cost, and when all things are considered the price for your safety, and the view it provides make such an appliance affordable.

When Is the Best Time to Observe the Sun?

"Whenever it is above the horizon!" is the often-quoted answer, but the most wanted response is usually related to seeing conditions and the Sun. The Holy Grail of solar observing is this, "Seeing is everything!"

Astronomical seeing is defined as the quality of the atmosphere between the observer and what is being observed. It is the state of the medium the waves of light must transverse to reach your eyes. Daytime seeing creates situations where the Sun may appear perfectly still and richly detailed or all awash, smeared to a point where only large sunspot umbra is discernible. As you can therefore imagine seeing conditions are very important to solar observing.

A few "urban legends" exist pertaining to daytime seeing. One is that the very best time to observe the Sun is in the early morning, before the surroundings have had an opportunity to heat up and disturb the local air. This can be true, for some locations, but not always. The reality is that superior seeing conditions, day or night, vary from location to location and often hourly within individual locales. Some observers experience superior daytime seeing when the Sun is high in the sky, when light from the Sun

has less disruptive atmosphere to pass through. The direction and strength of the wind has an influence on seeing conditions, as does the temperature gradient. The closer together the daytime and nighttime air temperature is, the less turbulent the seeing at times appears. And yes, occasionally early morning solar observing *is* preferred.

To discover how local seeing conditions are affected study your local seeing conditions and weather patterns, then note when prime solar observing occurs for you. Is the air steadier after a cold or warm front has passed? Is there a part of the day when the Sun appears less turbulent? There is no rule of thumb for the time of day that is always best for solar observing. What is true is that daytime seeing varies with the conditions present at any given site. Study those conditions during superior seeing, and when they repeat, take advantage of the opportunity.

Are Prominences Really Reddish-pink at a Total Solar Eclipse?

Yes, they truly are. In fact prominences appear that color because they are in emission and glow brightest at 656.3 nm in the solar spectrum, the location of the reddish-pink H-alpha line. The color of the chromosphere is owed to the dominance of the H-alpha line and its location in the red part of the spectrum.

Prominences also emit light at other wavelengths, such as in Calcium in the blue part of the spectrum at 393.3 nm. This emission is much weaker and contributes feebly to a prom's visual color at an eclipse.

Are You Sure that East on the Sun Is Toward the Left, Geographic Maps Always Have West on the Left and East on the Right?

Directions on the Sun are defined by the celestial directions of N-S-E-W, which are extensions of the Earth's equator and axis of rotation. Photos are usually created with east to the left, roughly matching the northern hemisphere's appearance of the Sun on the meridian.

The simplest way to determine celestial directions is to center the Sun in the telescope's field of view and nudge the telescope toward the north celestial pole; the Sun's northern limb will begin to move toward the center of the field. East and west are determined by allowing the Sun to drift across the field of view. Turn off the telescope's driving mechanism and watch the Sun drift slowly out of the eyepiece. The first limb to exit is the preceding limb, this locates west, and the east limb follows, leaving the view last.

How Can I Get into Observing the Sun?

Do some research and understand what solar safety is about. *Never attempt to view the Sun through any optical instrument that has not been properly fitted with safe solar observing appliances.*

Start off with white light observing, the photosphere offers numerous opportunities for discovering how the Sun works, and helps you develop the skills necessary for increasingly difficult observations. The least expensive and perhaps the safest method of observing the Sun in white light is the projection method. A refractor or Newtonian reflecting telescope is suitable for solar projection. Sunspot counting is how many solar observers begin; give it a try, and then graduate to drawing or imaging active regions. After having learned the basics, move on to monochromatic observing in Ca-K or H-alpha and explore the solar chromosphere.

Locate and establish contact with other solar observers through organizations like the AAVSO, ALPO, or BAA. Locally, many clubs these days have at least a few members who enjoy solar observing, seek them out for advice and guidance. This also gives you the opportunity to evaluate equipment and accessories before making a purchase of your own.

The Sun provides an alternative to sleepless nights, cold numb fingers, and straining your eyes to glimpse an inert faint fuzzy. The fact remains that all events on the Sun are unique, never to be exactly repeated, and because of this your observations have a special value. So, investigate the Sun, give it the respect it's owed, and enjoy one of nature's most magnificent spectacles from your own backyard.

APPENDIX B

Amateur Observing Organizations

Association of Lunar and Planetary Observers Solar Section

www.alpo-astronomy.org/solarblog/

American Association of Variable Star Observers Solar Section

www.aavso.org/solar

British Astronomical Association Solar Section

britastro.org/baa

Belgian Solar Observer

www.bso.vvs.be/index_en.php

Solar Database

basealpha.ift.fr/

Useful Personal Solar Websites

Peter Meadows provides a websites with information pertaining to daily sunspot drawings and freeware solar software, including Stonyhurst Discs.

www.petermeadows.com/indexsolar.html

Art Whipple produces a site featuring superb sunspot imaging and information on his techniques.

home.comcast.net/~jim6/sunspots.htm

Jim Ferreira has a website containing spectacular videos and picture-series that illustrate the dynamics of H-alpha observing.

www.lafterhall.com/astro.html

Christian Viladrich images the Sun in Ca-K and white light and posts top notch samples on his web pages.

christian.viladrich.perso.neuf.fr/index.html

Harry Roberts has an informative blog page that contains observational drawings made by Harry of the latest solar events.

www.harryrobertsastronomy.com/

Spaceweather details daily solar activity and provides a daily image with AR numbers superimposed.

www.spaceweather.com

SOHO is the Solar and Heliospheric Observatory, a spacecraft designed to study the Sun from its deep core to the outer corona and the solar wind. Up to date images are provided in various wavelengths.

sohowww.nascom.nasa.gov/

Mees Solar Observatory supplies daily active region maps.

www.solar.ifa.hawaii.edu/ARMaps/index.shtml

Mt. Wilson Solar Observatory publishes a daily sunspot drawing from the 150-ft. tower telescope.

obs.astro.ucla.edu/cur_drw.html

APPENDIX C

Glossary of Solar Terms

Absolute zero The coldest temperature, zero degrees Kelvin.

Absorption lines The dark lines crossing a spectrum caused by the absorbing of photons as electrons jump to a higher energy level.

Active Region Filament (ARF) A filament/prominence in close proximity to an active region, often magnetically associated with that region.

Active region Location in the photosphere in which the formation of sunspots, faculae, etc. arise over time.

Angstrom Unit of measure for the expression of the wavelength of light equal to 0.1 nm or one ten-millionth of a millimeter.

Annular eclipse An eclipse of the Sun that at maximum phase produces a ring of sunlight.

Aperture The diameter of the objective of a telescope.

Arc second Angular measurement whereas 60 arc sec equal 1 arc min. Sixty arc minutes are equal to 1 arc degree or roughly twice the diameter of the Sun or Moon.

Arcade A series of magnetic loops found on the Sun.

Aurora Glowing gases in the Earth's upper atmosphere, excited by solar particles originating in the Sun and carried to Earth by the solar wind.

Baily's beads An effect occurring just before and after a total eclipse of the Sun, as sunlight passes between mountain peaks found on the lunar limb.

Balmer series A pattern of spectral lines in the visible spectrum produced by the jumping of electrons from one energy level to another in hydrogen.

Bandpass Measurement between the lower and upper cut off frequency of an optical filter, usually measured at the full-width half-maximum point.

Bandwidth See bandpass.

Bipolar sunspot Two concentrations of umbral spots or sunspots having a positive and negative magnetic polarity with a minimum separation of three heliographic degrees.

Bo A parameter for the calculation of heliographic coordinates representing the nod or changing latitude at the center of the solar disc.

Bow shock The Sun facing edge of the Earth's magnetosphere.

Bright points Miniscule features that result from intensive, but small flux tubes (300 km) poking through the photosphere allowing an inspection of the solar interior. A group of bright points, forming a string or chain upon the intergranular wall, are known as filigree, observable in the solar continuum, but more frequently at the G-band (430.5 nm)

Broadband Term for a filter transmitting a wide bandwidth (i.e. 100 Å or more).

Buoyancy The upward force that arises from an increase in fluid force at a greater depth.

Bush A cluster of spicules seen in absorption on the solar disc.

Butterfly diagram The graphical representation depicting the latitude of emerging sunspots verses the time progression of a solar cycle.

Calcium-H and K The spectral lines located at 396.8 nm (H) and 393.3 nm (K), also known collectively as Ca-II.

Carrington Rotation The number of rotations of the Sun as seen from Earth since 9 November 1853.

Celestial directions Cardinal directions N, S, E, and W projected on the celestial sphere that coincide with the Earth's equator and axis of rotation.

Center Wavelength (CWL) The wavelength found at the midpoint of the full-width half-maximum.

Central Meridian (CM) An imaginary line drawn from the north to the south pole of the Sun.

Chain A row or line of spicules seen in absorption on the solar disc.

Chromosphere The layer of solar atmosphere directly above the photosphere and below the corona.

Chromospheric network A web-like mesh covering almost the entire Sun and displaying a bright pattern in Ca-K and in H-alpha, a dark one.

Coelostat Two mirror system reflecting a stationary image of the Sun to a telescope. Also see heliostat.

Compact flare A flare which is closely packed yet intense.

Continuum The areas of the spectrum that are neither in emission or absorption.

Convection zone An inner layer of the Sun in which energy transfer occurs through convection.

Core (Sun) The central region of the solar interior powered by the hydrogen to helium fusion process.

Core (sunspot) The umbral area of a sunspot umbra having the greatest magnetic strength.

Corona The outer atmosphere of the Sun, beyond the chromosphere.

Coronagraph An instrument designed to permit viewing of the Sun's corona.

Coronal Mass Ejection (CME) A large eruption of particles from the Sun.

Coronal streamer A loop shaped feature of the lower corona.

Diamond ring During a total eclipse, an effect caused by a solitary shimmer of sunlight passing between mountain peaks at the lunar limb a single Baily's bead.

Differential rotation The lack of singularity in a rotation period due to the liquid-like nature of the body.

Diffraction grating A finely grooved substrate whose purpose is the dispersion of light.

Disparition brusque The sudden disappearance of a filament (prominence).

Dobsonian Solar Telescope A unique Newtonian style telescope designed for white light solar observing, the creation of sidewalk astronomer, John Dobson.

Doppler shift The stretching or compressing of spectral lines due to the approaching or receding of an object.

Double stack A method of narrowing the bandwidth of an etalon by the addition of a second etalon.

Ellerman bomb A small bright feature visible in the wings of H-alpha notably around a sunspot. Circular with a diameter less than 3 arc sec, they have a lifetime of a few minutes to several hours. They are known in some circles as moustaches.

Emerging Flux Region (EFR) An area of new magnetic flux on the Sun.

Emission lines The bright lines crossing a spectrum caused by the emitting of photons as electrons jump to a lower energy level.

End-loading A monochromatic narrowband filter which attaches at the exit of a telescope.

Energy Rejection Filter (ERF) A pre-filter that is placed over the opening of a telescope for the purpose of absorbing or reflecting UV/IR light and reducing the heat load on the interference filter.

Ephemeral region Tiny short-lived active region.

Ephemeris Tables that are published yearly listing the daily orientation of the Sun for the factors P , B_0 , and L_0 .

Eruptive prominence An active prominence being ejected from the Sun.

Etalon An optical filter that operates by the multiple-beam interference of light, reflected and transmitted by a pair of parallel flat reflecting plates.

Evershed effect Penumbra gas flow pattern.

Facula A luminous, cloud-like patch or venous streak of material seen in white light surrounding or near a sunspot.

Fibril Tiny dark appearing structure which follows a magnetic field line sometimes attached to a prominence seen on the solar disc. Analogous to a mottle longer than a few seconds of arc.

Field angle The angle of outside light rays entering a telescope. One example is illustrated by the angular size of the Sun as it appears in the sky.

Filament channel An opening of fibrils underlying a filament.

Filament In monochromatic light a prominence viewed on the disc of the Sun. In white light a structure that radiates about an umbra like fine dark threads.

Filar micrometer A tool for measuring angular displacement through an optical instrument.

Filigree Tiny bright flux tubes popped through the solar surface with a diameter of about 150 km.

Flash phase The period of rapid H-alpha brightening experienced in a solar flare.

Flux tube A strand or kink of magnetic field suspended in the convection zone.

- Foot point** The location where a magnetic loop meets the photosphere.
- Fraunhofer line** An atomic line visible in a spectrum.
- Front-loading** A monochromatic narrowband filter which attaches at the entrance of a telescope.
- Full-Width Half-Maximum (FWHM)** The measured width of the bandpass, in nanometers or angstroms, at one-half of the maximum transmission.
- G-Band** The location of several spectral lines that go into emission during a flare at about 430 nm.
- Granulation** The textured pattern found over the entire photospheric surface. See granule.
- Granule** The top of a rising column of gas, originating deep within the convection zone of the Sun.
- H and K lines** See Calcium H and K.
- Halo** The glowing effect that surrounds the Sun experienced when a CME is directed toward the Earth.
- H-alpha** The spectral line located at 656.3 nm.
- Hedgerow prominence** Quiescent form of prominence generally resembling a row of trees or haystacks.
- Heliographic coordinates** The system of latitude and longitude on the solar disc.
- Helioseismology** The study of low frequency sound waves originating in the Sun.
- Heliostat** A single or multiple mirror system reflecting an image of the Sun to an optical instrument.
- Helmet streamer** A pointed streamer formation found in the corona.
- Helmholtz contraction** The process of turning gravity's energy to heat as induced by density and pressure.
- Herschel wedge** A narrow prism used for safely observing the white light Sun when combined with suitable supplementary filters.
- Hossfield pyramid** The name given a pyramid shaped projection box for white light solar observing devised by Casper Hossfield of the AAVSO Solar Division.
- Hybrid eclipse** An eclipse of the Sun which shares characteristics of both an annular eclipse and a total solar eclipse.

Hyder flare A flare that occurs some distance from an active region, in the quiet Sun, and has a relationship to the sudden disappearance (disparition brusque) of a filament.

Hydrogen The most plentiful element in the Sun and universe, made of one proton and one electron.

Hydrostatic equilibrium The balance of outward pressure from the compressed gas of the Sun and the solar gravity without which the external layers of the Sun would collapse onto the core.

Infrared (IR) Electromagnetic radiation with a wavelength between approximately 700 and 1,400 nm.

Inner bright ring A brightening within the penumbra located between the umbra and penumbra at a rough region where penumbral filaments have the appearance of extensions of the umbra.

Instrument angle The angle of light rays converging to a focus in a telescope.

Interactive prominence A type of prominence exhibiting material flow that is nearly horizontal between individual components.

Interference filter An optical appliance with several layers of evaporated coatings on a substrate, whose spectral transmission characteristics are the result of the interference of light rather than absorption.

Intergranular wall The intergranular wall is what defines the shape of a granule.

Ion An atom having one or more electrons missing.

Ionization The stripping of electrons from an atom.

Irregular penumbra A sunspot penumbra which has been mutated by complex magnetic fields.

Isophote contour map A graphically created image that interprets the many levels of density within a photo.

Kelvin A unit of temperature in which zero Kelvin is based on -273.15°C or absolute zero.

K-grains Observed in monochromatic Ca-K or Ca-H light and have a correlation to and similar appearance to bright points.

Kirchhoff's Laws Of spectroscopy state that (1) A hot dense glowing body, produces a continuous spectrum lacking spectral lines. (2) View a continuous spectrum through a cooler, transparent gas and dark lines

called absorption lines appear. (3) Hot transparent gas before a cooler background emits the bright spectral lines we call, emission lines.

Light bridge Any material brighter than an umbra that also divides the umbra, often times dividing even a penumbra.

Limb darkening The decrease in intensity of the Sun as one approaches the solar limb.

Limb flare The appearance of a solar flare and its associated events viewed in profile at the solar limb.

Lo A parameter for the calculation of heliographic coordinates representing the longitude of the Sun's central meridian. *Lo* is 0° at the beginning of each new solar rotation.

Lyot filter A monochromatic filter that produces a narrowband transmittance via the principle of birefringence.

Magnetic cycle The return of the magnetic polarity of sunspots within a given hemisphere to the polarity experienced prior to a new solar cycle, a period of approximately 22 years.

Magnetic field An area exhibiting a magnetic influence.

Magnetic reconnection The process whereby magnetic field lines break and reconnect with other field lines. Also known as re-alignment.

Magnetopause The inner borderline nearest the Earth of the magnetosheath.

Magnetosheath Location between the bow shock and the magnetopause here the bulk of the solar wind is repelled around the Earth's magnetic field

Magnetosphere The vicinity around the Earth dominated by its magnetic field.

Magnitude A measure of brightness of a celestial body.

Major flare A large flare event that involves the development of two or more ribbons of H-alpha emission.

McIntosh classification A three-digit white light sunspot classification scheme devised for flare prediction.

Mean Daily Frequency (MDF) An index of solar activity determined by the number of Active Regions visible as the average for a monthly period.

Menzel-Evans-Jones classification A prominence classification system based whether a prominence is ascending or descending in the chromo-

sphere, its relationship to any nearby sunspot, and the general appearance of the prominence.

Meridional flow A gradual looping movement of plasma in the convection zone from the equatorial to the polar region and back again.

Monochromatic One-color, as when referring to light from the H-alpha or Calcium K-line.

Moreton wave Shock wave visible in the chromosphere radiating from a large flare.

Morphology The study of the changing appearance of the Sun.

Mottle A spicule seen against the solar disc. Also see fibril.

Nanometer The nanometer (nm) is a unit measurement of wavelengths of electromagnetic radiation (light). One nanometer is equal to one billionth of a meter (1×10^{-9} m).

Narrowband Term for a filter transmitting a narrow bandwidth (i.e. less than 100 Å).

Neutral line The area where an Active Region's magnetic field reverses polarity.

Normal incidence Light rays that have a normal or parallel path.

Objective filter White light solar filter that mounts at the entrance to a telescope.

Occulting cone Polished metal cone shaped device to block the light from the solar disc in a prominence telescope.

Off-axis In solar observing the placement of a sub-diameter objective filter at the side of the optical axis of a telescope to avoid the internal optical components (secondary mirror, mounting hardware, etc.) from being within the incoming light path.

Outer bright ring The brightening and aligning of the granules encircling the outer edge of a sunspot, beyond the penumbra.

Oven An electrically controlled heating device to regulate the operating temperature of a narrowband monochromatic filter.

P Parameter for the calculation of heliographic coordinates representing the displacement the north rotational axis of the Sun relative to the rotational axis of the Earth.

Peak transmission The maximum percentage of transmission found within the bandwidth.

Penumbra The lighter, grayish outer region surrounding the umbra in a sunspot.

Penumbral filaments Structures of fine dark threads that radiate about a sunspot umbra.

Penumbral grains Bright regions located between penumbral filaments.

Photon A particle that supports electromagnetic radiation.

Photosphere The lowest layer of the Sun's atmosphere. The region contains sunspots, granulation, and faculae.

Plage A lower chromosphere feature in the habit of surrounding a sunspot as a bright cloud-like form. It marks the location of the magnetic field associated with the sunspot.

Plasma A brew of ions and electrons that react energetically with magnetic fields.

Polar crown The appearance of several filaments linking together in an east–west direction to form one long strand of filamentary material in a high solar latitude.

Polar faculae Small bits of faculae forming in high latitude regions outside the sunspot zones.

Polar plume A lesser height coronal streamer located near the north and south poles. Unlike the closed loops of the helmet streamer these structures result from open magnetic field lines.

Pore A tiny structure, with a diameter from 1 to 5 arc sec, darker than a granule but brighter than the umbra of a well-developed sunspot.

Position Angle (PA) The angular offset in degrees around the limb of the Sun defining the position of a prominence or other feature. The cardinal directions are $N = 0^\circ$, $E = 90^\circ$, $S = 180^\circ$, and $W = 270^\circ$.

Post flare loop The loop system seen typically following a two-ribbon flare.

Prominence A cloud of gas suspended above the surface of the Sun.

Proton-proton cycle The process experienced by a star equal to or less than the mass of the Sun by which it converts hydrogen to helium.

Protosun A region of greater density and pressure near the center of the solar nebula.

Puff Also called a *smokestack*, the puff is a smaller variation of the classic surge, with an appearance suggestive of its name. Visible as a blue shifted

feature with a lifetime of several minutes, they are seen in an active region as well as in an emerging flux region.

Quiescent prominence A quiet behaving prominence that changes its appearance only moderately with time.

Quiet Region Filament (QRF) A filament appearing in the quiet of the Sun, separate from an active region.

Radiative zone An inner layer of the Sun in which energy transfer occurs through radiative properties.

Relative sunspot number An index of solar activity determined by the number of sunspot groups and individual sunspots visible on the face of the Sun.

Reversing layer A layer of cooler gas near the lower chromosphere which gives rise to absorption lines in the solar spectrum.

Rosette A pattern of spicules seen in absorption on the solar disc resembling a flower with petals.

Rudimentary penumbra The beginning phase of a penumbra, forming from the intergranular material, surrounding a newly developed umbra.

Seeing conditions The quality of the atmosphere between an observer and what is being viewed.

Shadow bands Very low contrast, light and dark wavy forms that appear just prior to and following the totality phase of a solar eclipse. It is the manifestation of seeing effects within the lower atmosphere.

Shear To cause to move along the plane of contact

Sidereal period The time required for the Sun to complete one rotation, as seen from a fixed point in space.

Solar continuum Basically a view of the Sun encompassing a wide bandwidth of visible light. It would be analogous to a white light view. Also see continuum.

Solar cycle The approximate 11-year rise and fall in solar activity.

Solar flare The swift release of energy that has accumulated within the magnetic field of an Active Region.

Solar maximum The peak of solar activity during the 11-year solar cycle.

Solar minimum The time that experiences little activity during the 11-year solar cycle.

Solar nebula A vast cloud of gas and dust from which it is believed the Sun and solar system originated.

Solar projection A technique for viewing the white light Sun by projecting an enlarged image of the solar disc onto a white screen some distance from the eyepiece of a telescope.

Solar wind The constant stream of particles flowing from the Sun into outer space.

Spaceweather The status of the space environment near the Earth, as it has been affected by the release of energy and particles from the Sun.

Spectroheliograph An instrument that synthesizes a monochromatic view of the Sun.

Spectroscope An instrument for the dispersion of light.

Spectrum The result when electromagnetic energy is dispersed into its constituent rays by order of wavelength, for example, a rainbow.

Spicule A fine structure resembling a tiny gas jet at the solar limb. On the disc in H-alpha it appears dark and then is known as a mottle or fibril.

Spray The dramatic and uncontrolled eruption of a prominence into a sporadic-like form.

Star A giant sphere shaped ball of gas that through nuclear reactions releases energy in its core.

Stonyhurst disc A template or grid that shows the lines of heliographic latitude and longitude relative to a given value of B_0 .

Subflare A compact flare having an area equal to or less than 2.0 heliographic square degrees.

Sunspot A dark region on the photosphere that results from convection being stifled by magnetic fields within the region.

Sunspot drift The passage of a sunspot or sunspot group from east to west as seen in a stationary telescope, caused by the Earth's rotation.

Sunspot group A clump of sunspots.

Sunspot number An index for measuring solar activity, $R = 10 g + s$. Also known as the Wolf number from its originator, Rudolph Wolf.

Sunspot zone A region of approximately 35° on both sides of the solar equator in which sunspots form.

Supergranulation The large scale pattern in the photosphere of organized cellular structure. Each cell contains hundreds of individual granules and has a diameter around 30,000 km. The chromospheric network overlays the supergranulation pattern.

Superpenumbra An effect experienced with large sunspots caused by fibrils diverging around a spot, giving the appearance of the thickening of the penumbral region.

Surge The rapid eruption of a prominence following and constrained by a magnetic field into a jet-like form.

Synodic period The apparent rotation of the Sun, as seen from the orbiting Earth.

Tachocline The shearing region located between the radiative and convection zones of the solar interior.

Telecentric lens A supplementary lens system intended to create normal incidence light rays from the converging light rays of a telescope.

Ten-degree rule A general guideline that states: "any spot or cluster of spots that is at least 10° of heliographic latitude or longitude away from any other spot counts as one sunspot group."

Thermal equilibrium The uniform conversion of hydrogen to helium in the Sun.

Tongues The formation of a bipolar sunspot resembling the yin-yang pictogram. The cause is the rotation of the sunspot at a speed exceeding one degree an hour, wrenching the neutral line to a more east-west direction.

Tornado prominence A prominence form having a column or pillar with a stream of matter flowing from its peak. Sometimes this stream is bent over and nearly reaches back to the chromosphere. Another form has a skeletal-type columnar structure, constructed of single, helically bound streamers with no matter emerging from the top. Tornado prominences exhibit rotation.

Total eclipse A condition in which the Moon completely blocks the solar disc permitting viewing of the chromosphere and corona.

Transition zone The region between the chromosphere and the corona, where temperature makes an abrupt leap from 20,000 to 1,000,000 K.

Transparency A characteristic of sky conditions that describes the opacity of the atmosphere as influenced by water vapor, dust, smoke and other atmospheric particles.

Ultraviolet (UV) Electromagnetic radiation with a wavelength between approximately 280 and 380 nm.

Umbra dot A small dot within an umbra having a brightness between that of the umbra and nearby bright points.

Umbra spot A pore that has become larger and darker than other pores, as dark as the typical sunspot umbra.

Umbra The dark cooler region of a sunspot.

Unipolar sunspot A single concentration of umbral spots or sunspots within a three degree or less area.

Universal time Analogous to Greenwich Mean Time, a 24-h timescale.

Visible light Electromagnetic radiation with a wavelength between approximately 400 and 700 nm.

Void A circumstance where granulation is found to be missing, not to be confused with a pore.

Vortex A condition created by exceptionally large sunspot groups as the surrounding fibrils establish large radially swirled regions.

Wavefront error A distortion or aberration to the incoming rays of light caused by factors including atmospheric seeing or poorly made optics.

Wavelength The distance separating two consecutive wave peaks in a beam of electromagnetic radiation (light).

White Light Flare (WLF) A solar flare of such intensity that its light outshines the solar continuum and becomes visible without a monochromatic filter.

White light The combined result of all wavelengths of visible light.

Wien's Law The principle that the wavelength of the dominant color of a blackbody (star), multiplied by its temperature must equal a specific numerical factor.

Wilson effect The apparent concavity of a symmetrically shaped sunspot as it is near the solar limb.

Winking filament The lifting of a filament so that it oscillates several times, actually causing the filament to become Doppler shifted in and out of visibility, the result of a passing Moreton wave.

Wolf number See sunspot number.

X-ray Electromagnetic radiation with a wavelength between 10 and .01 nm.

APPENDIX D

Master Templates

The following pages contain templates that may be photo copied and enlarged if required for your personal use. The first two originals are of the front and backsides of the proposed sunspot counting card system outlined in Chap. 4 and illustrated in Fig. 4.1. Next is a 360° protractor that is used to find the position angle of prominences around the solar limb. The last eight templates are Stonyhurst Discs provided in 1° increment, positive values of *Bo* at one end and negative at the opposite.

Daily Sunspot Count	
	Date _____
	Time _____
	Rotation _____
	Seeing _____
	Transparency _____
	Aperture _____ FL _____
	Eyepiece _____
	Filtration _____

	Groups _____ Spots _____
10g + s = _____	
Notes _____	

MCINTOSH CLASS

A—Individual spot, Unipolar group, No penumbra

B—Bipolar group, No penumbra

C—Bipolar group, One spot with penumbra

D—Bipolar group, Penumbra about both spots, Length less than 10°

E—Bipolar group, Penumbra about both spots, Length 10° to 15°

F—Bipolar group, Penumbra about both spots, Length greater than 15°

H—Individual spot, Unipolar group, With penumbra

SEEING DESCRIPTIONS

< 1 arc second Granulation resolved

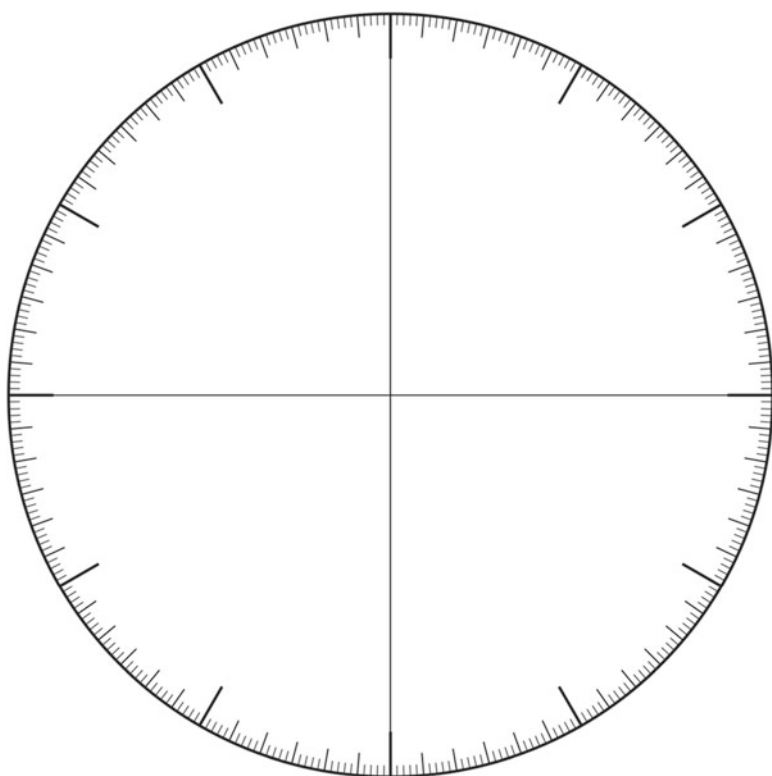
1-2 arc second Granulation blotchy

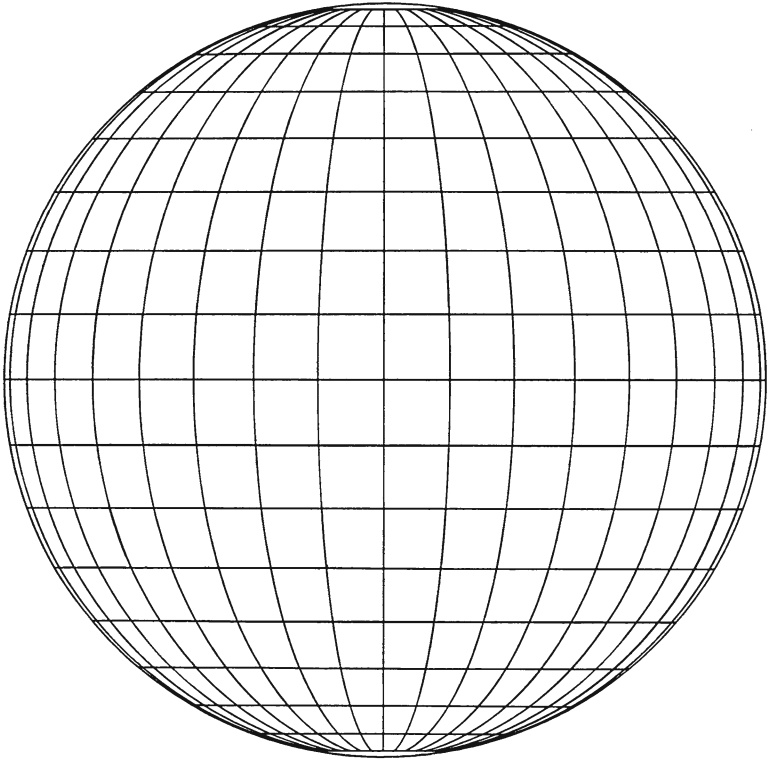
3-5 arc second Granulation/pores sometimes visible

> 5 arc second Granulation/pores not visible, ill-defined sunspots

TRANSPARENCY

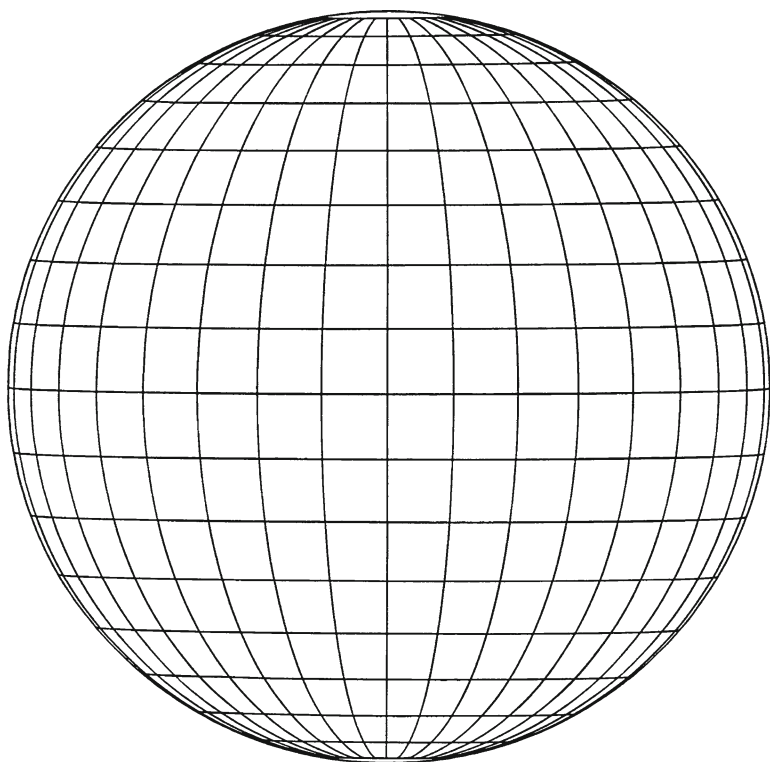
Excellent, Good, Fair, or Poor





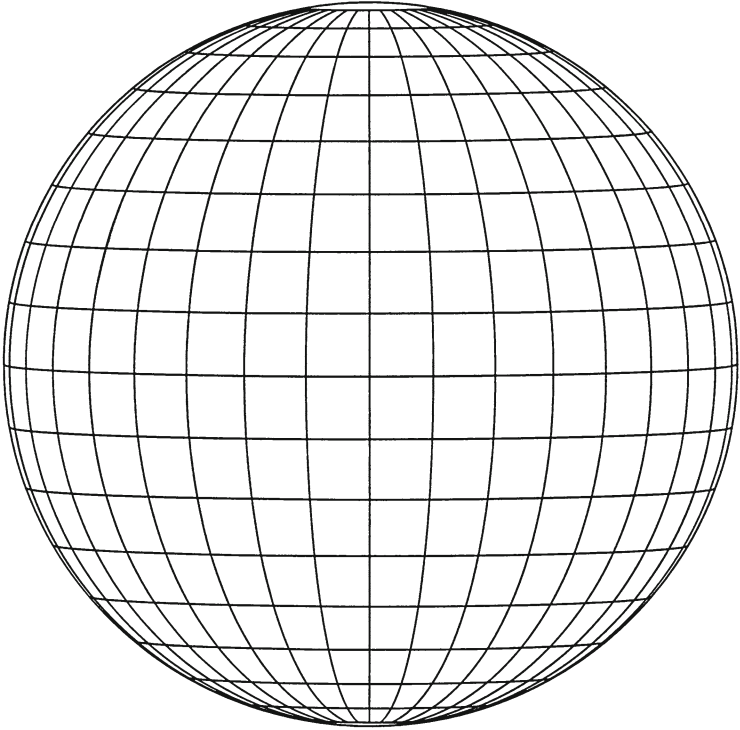
0

1-



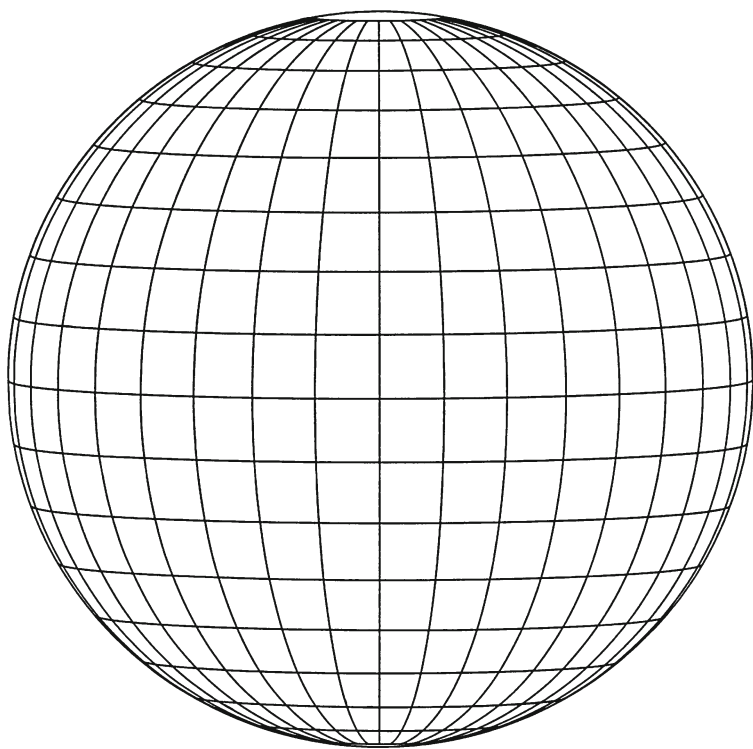
1

2-



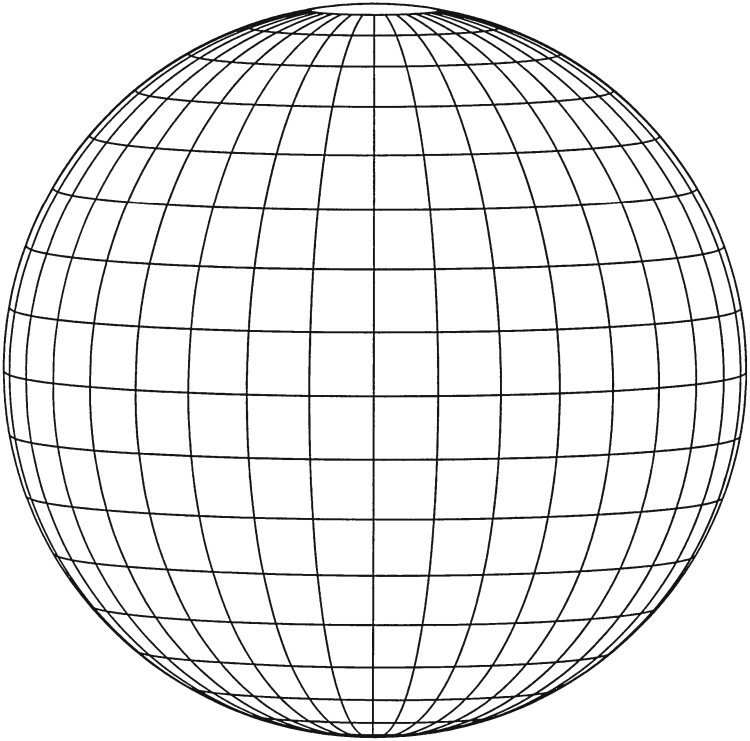
2

ε^-



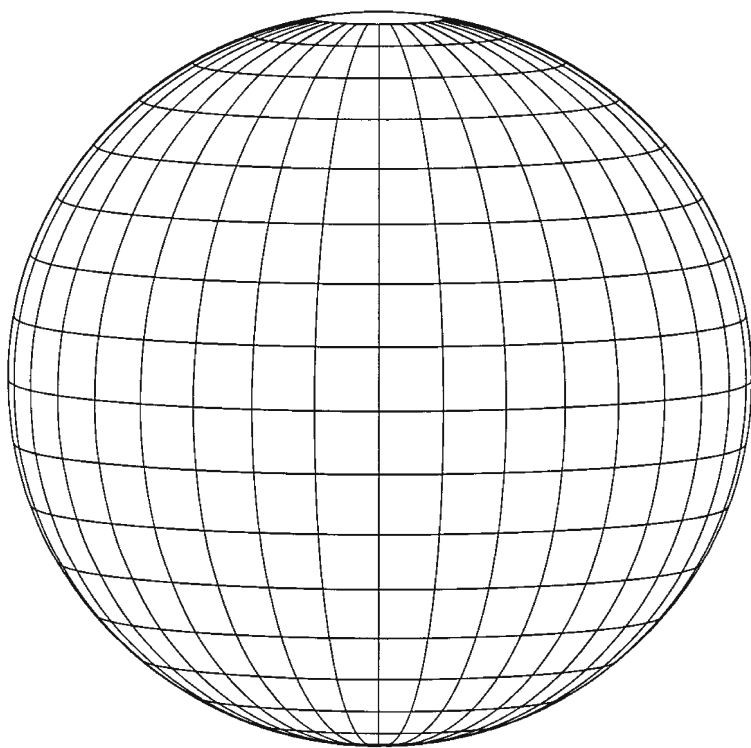
3

4-



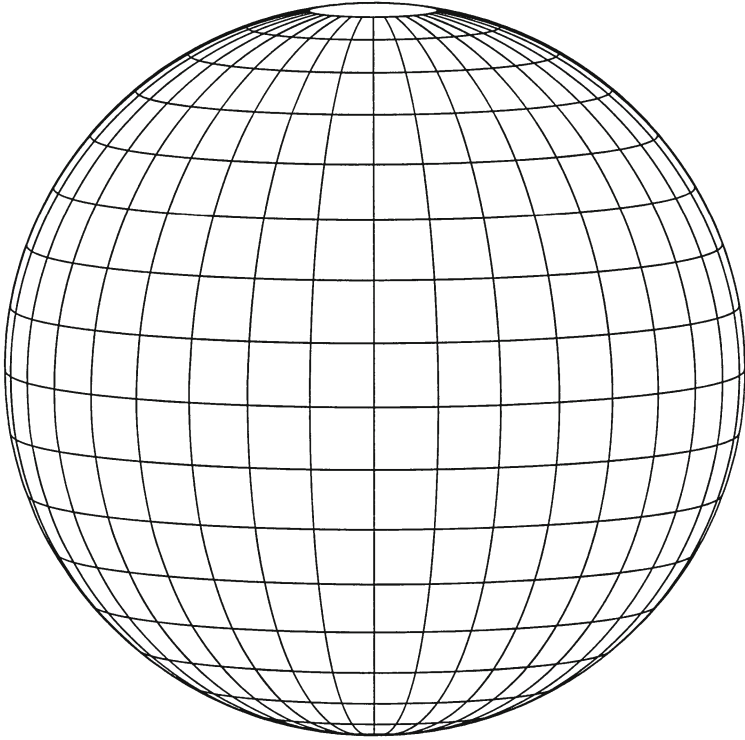
4

9-



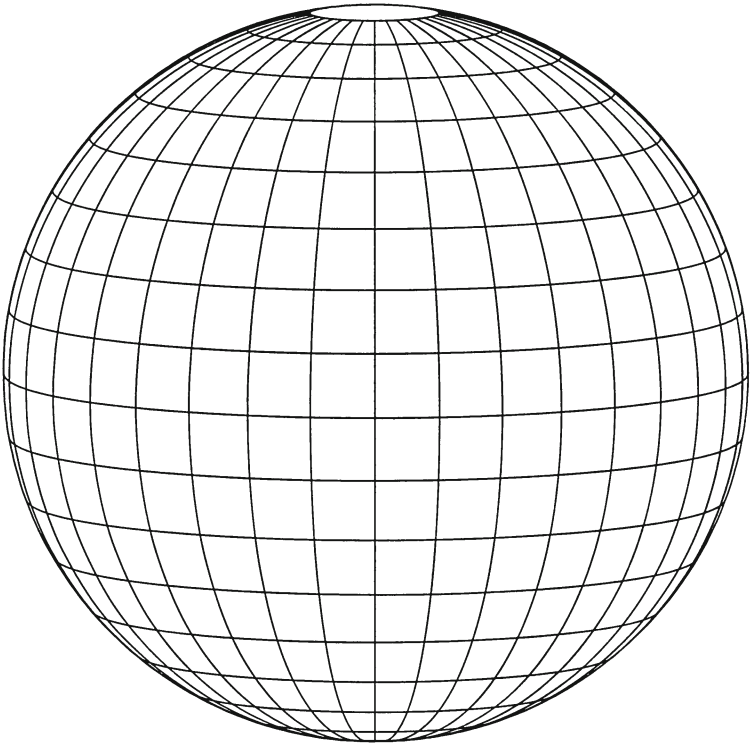
5

9-



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7

APPENDIX E

Daily Solar Ephemeris, June 2013 – December 2016

by Brad Timerson

Association of Lunar and Planetary Observers Solar Section

Calendar Date	Rotation Number	Heliographic			Diameter (arcmin)	RA (HH:MM)	Dec (deg)
		Lo	Bo	Po			
6/1/2013	2137	135.34	-0.66	-15.38	31.543	04:36.8	22.05
6/2/2013	2137	122.10	-0.54	-15.00	31.539	04:40.9	22.18
6/3/2013	2137	108.87	-0.42	-14.62	31.534	04:45.0	22.31
6/4/2013	2137	95.63	-0.30	-14.24	31.530	04:49.2	22.43
6/5/2013	2137	82.39	-0.18	-13.85	31.526	04:53.3	22.54
6/6/2013	2137	69.15	-0.06	-13.46	31.521	04:57.4	22.65
6/7/2013	2137	55.91	0.06	-13.06	31.517	05:1.5	22.75
6/8/2013	2137	42.67	0.18	-12.65	31.513	05:5.6	22.84
6/9/2013	2137	29.44	0.30	-12.25	31.510	05:9.8	22.93
6/10/2013	2137	16.20	0.42	-11.84	31.506	05:13.9	23.01
6/11/2013	2137	2.96	0.54	-11.43	31.503	05:18.1	23.08
6/12/2013	2138	349.72	0.66	-11.01	31.499	05:22.2	23.15
6/13/2013	2138	336.48	0.78	-10.59	31.496	05:26.3	23.21
6/14/2013	2138	323.24	0.90	-10.17	31.493	05:30.5	23.26
6/15/2013	2138	310.00	1.02	-9.74	31.490	05:34.6	23.31
6/16/2013	2138	296.76	1.14	-9.31	31.487	05:38.8	23.35
6/17/2013	2138	283.52	1.26	-8.88	31.485	05:43.0	23.38
6/18/2013	2138	270.28	1.38	-8.44	31.482	05:47.1	23.41
6/19/2013	2138	257.10	1.50	-8.01	31.480	05:51.3	23.43
6/20/2013	2138	243.86	1.61	-7.57	31.478	05:55.4	23.44
6/21/2013	2138	230.62	1.73	-7.13	31.475	05:59.6	23.44
6/22/2013	2138	217.37	1.85	-6.68	31.474	06:3.7	23.44
6/23/2013	2138	204.13	1.96	-6.24	31.472	06:7.9	23.43

(continued)

(continued)

Calendar Date	Rotation Number	Heliographic			Diameter (arcmin)	RA (HH:MM)	Dec (deg)
		Lo	Bo	Po			
6/24/2013	2138	190.89	2.08	-5.79	31.470	06:12.1	23.42
6/25/2013	2138	177.65	2.19	-5.35	31.469	06:16.2	23.39
6/26/2013	2138	164.41	2.31	-4.90	31.467	06:20.4	23.36
6/27/2013	2138	151.17	2.42	-4.45	31.466	06:24.5	23.33
6/28/2013	2138	137.93	2.54	-4.00	31.465	06:28.7	23.28
6/29/2013	2138	124.69	2.65	-3.54	31.464	06:32.8	23.23
6/30/2013	2138	111.45	2.76	-3.09	31.463	06:36.9	23.18
7/1/2013	2138	98.21	2.87	-2.64	31.463	06:41.1	23.11
7/2/2013	2138	84.97	2.98	-2.18	31.462	06:45.2	23.04
7/3/2013	2138	71.73	3.09	-1.73	31.462	06:49.3	22.97
7/4/2013	2138	58.49	3.20	-1.28	31.462	06:53.5	22.88
7/5/2013	2138	45.25	3.31	-0.82	31.462	06:57.6	22.79
7/6/2013	2138	32.01	3.41	-0.37	31.462	07:1.7	22.70
7/7/2013	2138	18.77	3.52	0.08	31.462	07:5.8	22.59
7/8/2013	2138	5.54	3.62	0.53	31.463	07:9.9	22.48
7/9/2013	2139	352.36	3.73	0.98	31.463	07:14.0	22.37
7/10/2013	2139	339.12	3.83	1.43	31.464	07:18.1	22.24
7/11/2013	2139	325.88	3.93	1.88	31.465	07:22.1	22.11
7/12/2013	2139	312.65	4.03	2.33	31.466	07:26.2	21.98
7/13/2013	2139	299.41	4.13	2.78	31.467	07:30.3	21.84
7/14/2013	2139	286.17	4.23	3.22	31.468	07:34.3	21.69
7/15/2013	2139	272.93	4.33	3.67	31.470	07:38.4	21.54
7/16/2013	2139	259.70	4.42	4.11	31.471	07:42.4	21.38
7/17/2013	2139	246.46	4.52	4.55	31.473	07:46.4	21.21
7/18/2013	2139	233.23	4.61	4.99	31.475	07:50.5	21.04
7/19/2013	2139	219.99	4.70	5.42	31.477	07:54.5	20.86
7/20/2013	2139	206.76	4.80	5.86	31.479	07:58.5	20.67
7/21/2013	2139	193.52	4.89	6.29	31.482	08:2.5	20.48
7/22/2013	2139	180.29	4.97	6.72	31.484	08:6.5	20.29
7/23/2013	2139	167.05	5.06	7.14	31.487	08:10.4	20.09
7/24/2013	2139	153.82	5.15	7.57	31.489	08:14.4	19.88
7/25/2013	2139	140.59	5.23	7.99	31.492	08:18.4	19.67
7/26/2013	2139	127.36	5.31	8.41	31.495	08:22.3	19.45
7/27/2013	2139	114.12	5.40	8.82	31.499	08:26.2	19.23
7/28/2013	2139	100.89	5.48	9.23	31.502	08:30.2	19.00
7/29/2013	2139	87.72	5.55	9.64	31.505	08:34.1	18.77
7/30/2013	2139	74.49	5.63	10.05	31.509	08:38.0	18.53
7/31/2013	2139	61.26	5.71	10.45	31.513	08:41.9	18.28

(continued)

(continued)

Calendar Date	Rotation Number	Heliographic			Diameter (arcmin)	RA (HH:MM)	Dec (deg)
		Lo	Bo	Po			
8/1/2013	2139	48.03	5.78	10.85	31.517	08:45.8	18.04
8/2/2013	2139	34.81	5.85	11.24	31.521	08:49.7	17.78
8/3/2013	2139	21.58	5.92	11.63	31.525	08:53.5	17.52
8/4/2013	2139	8.35	5.99	12.02	31.529	08:57.4	17.26
8/5/2013	2140	355.12	6.06	12.41	31.533	09:1.2	16.99
8/6/2013	2140	341.90	6.13	12.79	31.538	09:5.1	16.72
8/7/2013	2140	328.67	6.19	13.16	31.542	09:8.9	16.44
8/8/2013	2140	315.44	6.25	13.53	31.547	09:12.7	16.16
8/9/2013	2140	302.22	6.31	13.90	31.552	09:16.5	15.87
8/10/2013	2140	288.99	6.37	14.27	31.557	09:20.3	15.59
8/11/2013	2140	275.77	6.43	14.63	31.562	09:24.1	15.29
8/12/2013	2140	262.54	6.48	14.98	31.568	09:27.9	14.99
8/13/2013	2140	249.32	6.54	15.33	31.573	09:31.6	14.69
8/14/2013	2140	236.10	6.59	15.68	31.579	09:35.4	14.38
8/15/2013	2140	222.88	6.64	16.02	31.584	09:39.2	14.07
8/16/2013	2140	209.66	6.69	16.36	31.590	09:42.9	13.76
8/17/2013	2140	196.44	6.73	16.69	31.596	09:46.6	13.44
8/18/2013	2140	183.28	6.78	17.02	31.602	09:50.4	13.12
8/19/2013	2140	170.06	6.82	17.34	31.608	09:54.1	12.80
8/20/2013	2140	156.84	6.86	17.66	31.614	09:57.8	12.47
8/21/2013	2140	143.62	6.90	17.97	31.621	10:1.5	12.14
8/22/2013	2140	130.40	6.94	18.28	31.627	10:5.2	11.81
8/23/2013	2140	117.19	6.97	18.58	31.634	10:8.9	11.47
8/24/2013	2140	103.97	7.00	18.88	31.640	10:12.5	11.13
8/25/2013	2140	90.75	7.03	19.18	31.647	10:16.2	10.78
8/26/2013	2140	77.54	7.06	19.46	31.654	10:19.9	10.44
8/27/2013	2140	64.32	7.09	19.75	31.661	10:23.5	10.09
8/28/2013	2140	51.11	7.11	20.02	31.668	10:27.2	9.74
8/29/2013	2140	37.89	7.14	20.30	31.675	10:30.8	9.38
8/30/2013	2140	24.68	7.16	20.56	31.682	10:34.5	9.03
8/31/2013	2140	11.47	7.18	20.82	31.690	10:38.1	8.67
9/1/2013	2141	358.26	7.19	21.08	31.697	10:41.8	8.31
9/2/2013	2141	345.04	7.21	21.33	31.705	10:45.4	7.94
9/3/2013	2141	331.83	7.22	21.57	31.712	10:49.0	7.58
9/4/2013	2141	318.62	7.23	21.81	31.720	10:52.6	7.21
9/5/2013	2141	305.41	7.24	22.05	31.728	10:56.2	6.84
9/6/2013	2141	292.20	7.24	22.28	31.736	10:59.8	6.47
9/7/2013	2141	279.05	7.25	22.50	31.744	11:3.4	6.09

(continued)

(continued)

Calendar Date	Rotation Number	Heliographic			Diameter (arcmin)	RA (HH:MM)	Dec (deg)
		Lo	Bo	Po			
9/8/2013	2141	265.85	7.25	22.71	31.752	11:7.0	5.72
9/9/2013	2141	252.64	7.25	22.92	31.760	11:10.6	5.34
9/10/2013	2141	239.43	7.25	23.13	31.768	11:14.2	4.96
9/11/2013	2141	226.22	7.24	23.33	31.776	11:17.8	4.58
9/12/2013	2141	213.02	7.24	23.52	31.784	11:21.4	4.20
9/13/2013	2141	199.81	7.23	23.71	31.793	11:25.0	3.82
9/14/2013	2141	186.61	7.22	23.89	31.801	11:28.6	3.44
9/15/2013	2141	173.40	7.21	24.06	31.810	11:32.2	3.05
9/16/2013	2141	160.20	7.19	24.23	31.818	11:35.8	2.67
9/17/2013	2141	146.99	7.17	24.39	31.827	11:39.4	2.28
9/18/2013	2141	133.79	7.15	24.54	31.836	11:43.0	1.89
9/19/2013	2141	120.59	7.13	24.69	31.844	11:46.6	1.51
9/20/2013	2141	107.38	7.11	24.84	31.853	11:50.1	1.12
9/21/2013	2141	94.18	7.09	24.97	31.862	11:53.7	0.73
9/22/2013	2141	80.98	7.06	25.10	31.871	11:57.3	0.34
9/23/2013	2141	67.78	7.03	25.23	31.880	12:0.9	-0.05
9/24/2013	2141	54.58	7.00	25.34	31.889	12:4.5	-0.44
9/25/2013	2141	41.38	6.96	25.45	31.898	12:8.1	-0.83
9/26/2013	2141	28.18	6.93	25.56	31.907	12:11.7	-1.22
9/27/2013	2141	14.98	6.89	25.65	31.916	12:15.3	-1.61
9/28/2013	2141	1.84	6.85	25.74	31.925	12:18.9	-2.00
9/29/2013	2142	348.64	6.81	25.82	31.934	12:22.5	-2.39
9/30/2013	2142	335.44	6.76	25.90	31.943	12:26.1	-2.78
10/1/2013	2142	322.25	6.72	25.97	31.952	12:29.8	-3.17
10/2/2013	2142	309.05	6.67	26.03	31.961	12:33.4	-3.55
10/3/2013	2142	295.85	6.62	26.09	31.970	12:37.0	-3.94
10/4/2013	2142	282.65	6.57	26.14	31.980	12:40.7	-4.33
10/5/2013	2142	269.46	6.51	26.18	31.989	12:44.3	-4.71
10/6/2013	2142	256.26	6.46	26.21	31.998	12:47.9	-5.10
10/7/2013	2142	243.06	6.40	26.24	32.007	12:51.6	-5.48
10/8/2013	2142	229.87	6.34	26.26	32.016	12:55.3	-5.86
10/9/2013	2142	216.67	6.28	26.27	32.026	12:58.9	-6.25
10/10/2013	2142	203.48	6.22	26.27	32.035	13:2.6	-6.63
10/11/2013	2142	190.28	6.15	26.27	32.044	13:6.3	-7.00
10/12/2013	2142	177.09	6.08	26.26	32.053	13:10.0	-7.38
10/13/2013	2142	163.90	6.01	26.25	32.062	13:13.7	-7.76
10/14/2013	2142	150.70	5.94	26.22	32.072	13:17.4	-8.13
10/15/2013	2142	137.51	5.87	26.19	32.081	13:21.1	-8.50

(continued)

(continued)

Calendar Date	Rotation Number	Heliographic			Diameter (arcmin)	RA (HH:MM)	Dec (deg)
		<i>Lo</i>	<i>Bo</i>	<i>Po</i>			
10/16/2013	2142	124.32	5.80	26.15	32.090	13:24.8	-8.87
10/17/2013	2142	111.12	5.72	26.10	32.099	13:28.6	-9.24
10/18/2013	2142	97.99	5.64	26.05	32.108	13:32.3	-9.60
10/19/2013	2142	84.80	5.56	25.99	32.117	13:36.1	-9.97
10/20/2013	2142	71.61	5.48	25.92	32.126	13:39.8	-10.33
10/21/2013	2142	58.42	5.40	25.84	32.135	13:43.6	-10.68
10/22/2013	2142	45.23	5.31	25.75	32.144	13:47.4	-11.04
10/23/2013	2142	32.03	5.23	25.66	32.153	13:51.2	-11.39
10/24/2013	2142	18.84	5.14	25.56	32.162	13:55.0	-11.74
10/25/2013	2142	5.65	5.05	25.45	32.171	13:58.8	-12.09
10/26/2013	2143	352.46	4.96	25.33	32.179	14:2.7	-12.43
10/27/2013	2143	339.27	4.86	25.21	32.188	14:6.5	-12.77
10/28/2013	2143	326.08	4.77	25.08	32.197	14:10.4	-13.11
10/29/2013	2143	312.89	4.67	24.94	32.205	14:14.2	-13.44
10/30/2013	2143	299.70	4.58	24.79	32.214	14:18.1	-13.77
10/31/2013	2143	286.52	4.48	24.63	32.222	14:22.0	-14.10
11/1/2013	2143	273.33	4.38	24.47	32.231	14:25.9	-14.42
11/2/2013	2143	260.14	4.28	24.30	32.239	14:29.8	-14.74
11/3/2013	2143	246.95	4.17	24.12	32.248	14:33.8	-15.05
11/4/2013	2143	233.76	4.07	23.93	32.256	14:37.7	-15.36
11/5/2013	2143	220.57	3.96	23.74	32.264	14:41.7	-15.67
11/6/2013	2143	207.39	3.86	23.53	32.272	14:45.7	-15.97
11/7/2013	2143	194.26	3.75	23.32	32.280	14:49.7	-16.27
11/8/2013	2143	181.07	3.64	23.10	32.288	14:53.7	-16.56
11/9/2013	2143	167.89	3.53	22.88	32.296	14:57.7	-16.85
11/10/2013	2143	154.70	3.42	22.64	32.303	15:1.7	-17.13
11/11/2013	2143	141.51	3.30	22.40	32.311	15:5.8	-17.41
11/12/2013	2143	128.33	3.19	22.15	32.319	15:9.8	-17.69
11/13/2013	2143	115.14	3.08	21.89	32.326	15:13.9	-17.96
11/14/2013	2143	101.95	2.96	21.63	32.333	15:18.0	-18.22
11/15/2013	2143	88.77	2.84	21.36	32.341	15:22.1	-18.48
11/16/2013	2143	75.58	2.73	21.08	32.348	15:26.2	-18.73
11/17/2013	2143	62.40	2.61	20.79	32.355	15:30.3	-18.98
11/18/2013	2143	49.21	2.49	20.50	32.362	15:34.5	-19.22
11/19/2013	2143	36.03	2.37	20.19	32.369	15:38.6	-19.45
11/20/2013	2143	22.84	2.25	19.89	32.375	15:42.8	-19.68
11/21/2013	2143	9.66	2.13	19.57	32.382	15:47.0	-19.91
11/22/2013	2144	356.47	2.00	19.25	32.388	15:51.2	-20.13

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Calendar Date	Rotation Number	Heliographic			Diameter (arcmin)	RA (HH:MM)	Dec (deg)
		Lo	Bo	Po			
11/23/2013	2144	343.29	1.88	18.92	32.395	15:55.4	-20.34
11/24/2013	2144	330.11	1.76	18.58	32.401	15:59.6	-20.54
11/25/2013	2144	316.92	1.63	18.24	32.407	16:3.9	-20.74
11/26/2013	2144	303.74	1.51	17.88	32.413	16:8.1	-20.94
11/27/2013	2144	290.62	1.38	17.53	32.419	16:12.4	-21.12
11/28/2013	2144	277.44	1.26	17.16	32.425	16:16.7	-21.30
11/29/2013	2144	264.25	1.13	16.79	32.430	16:21.0	-21.47
11/30/2013	2144	251.07	1.01	16.42	32.436	16:25.3	-21.64
12/1/2013	2144	237.89	0.88	16.04	32.441	16:29.6	-21.80
12/2/2013	2144	224.71	0.75	15.65	32.446	16:33.9	-21.95
12/3/2013	2144	211.53	0.62	15.25	32.451	16:38.2	-22.10
12/4/2013	2144	198.34	0.50	14.86	32.456	16:42.5	-22.23
12/5/2013	2144	185.16	0.37	14.45	32.461	16:46.9	-22.37
12/6/2013	2144	171.98	0.24	14.04	32.466	16:51.3	-22.49
12/7/2013	2144	158.80	0.11	13.62	32.470	16:55.6	-22.61
12/8/2013	2144	145.62	-0.02	13.20	32.474	16:60.0	-22.71
12/9/2013	2144	132.44	-0.14	12.78	32.479	17:4.4	-22.82
12/10/2013	2144	119.26	-0.27	12.35	32.483	17:8.8	-22.91
12/11/2013	2144	106.08	-0.40	11.91	32.487	17:13.2	-23.00
12/12/2013	2144	92.90	-0.53	11.47	32.490	17:17.6	-23.08
12/13/2013	2144	79.72	-0.66	11.03	32.494	17:22.0	-23.15
12/14/2013	2144	66.54	-0.78	10.58	32.497	17:26.4	-23.21
12/15/2013	2144	53.36	-0.91	10.13	32.500	17:30.8	-23.27
12/16/2013	2144	40.19	-1.04	9.68	32.504	17:35.2	-23.32
12/17/2013	2144	27.07	-1.16	9.22	32.507	17:39.7	-23.36
12/18/2013	2144	13.89	-1.29	8.76	32.509	17:44.1	-23.39
12/19/2013	2144	0.71	-1.42	8.30	32.512	17:48.5	-23.41
12/20/2013	2145	347.54	-1.54	7.83	32.514	17:53.0	-23.43
12/21/2013	2145	334.36	-1.67	7.36	32.517	17:57.4	-23.44
12/22/2013	2145	321.18	-1.79	6.89	32.519	18:1.8	-23.44
12/23/2013	2145	308.01	-1.92	6.41	32.521	18:6.3	-23.44
12/24/2013	2145	294.83	-2.04	5.94	32.523	18:10.7	-23.42
12/25/2013	2145	281.65	-2.16	5.46	32.524	18:15.1	-23.40
12/26/2013	2145	268.48	-2.29	4.98	32.526	18:19.6	-23.37
12/27/2013	2145	255.30	-2.41	4.50	32.527	18:24.0	-23.33
12/28/2013	2145	242.13	-2.53	4.02	32.528	18:28.4	-23.29
12/29/2013	2145	228.95	-2.65	3.54	32.529	18:32.9	-23.23
12/30/2013	2145	215.78	-2.77	3.05	32.530	18:37.3	-23.17

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Calendar Date	Rotation Number	Heliographic			Diameter (arcmin)	RA (HH:MM)	Dec (deg)
		<i>Lo</i>	<i>Bo</i>	<i>Po</i>			
12/31/2013	2145	202.60	-2.89	2.57	32.530	18:41.7	-23.10
1/1/2014	2145	189.43	-3.00	2.08	32.531	18:46.1	-23.03
1/2/2014	2145	176.25	-3.12	1.60	32.531	18:50.5	-22.94
1/3/2014	2145	163.08	-3.24	1.11	32.531	18:54.9	-22.85
1/4/2014	2145	149.90	-3.35	0.63	32.531	18:59.3	-22.75
1/5/2014	2145	136.73	-3.46	0.15	32.531	19:3.7	-22.64
1/6/2014	2145	123.62	-3.58	-0.34	32.531	19:8.1	-22.53
1/7/2014	2145	110.45	-3.69	-0.82	32.530	19:12.5	-22.41
1/8/2014	2145	97.28	-3.80	-1.30	32.529	19:16.9	-22.28
1/9/2014	2145	84.10	-3.91	-1.78	32.529	19:21.2	-22.14
1/10/2014	2145	70.93	-4.02	-2.26	32.528	19:25.6	-22.00
1/11/2014	2145	57.76	-4.12	-2.74	32.526	19:29.9	-21.85
1/12/2014	2145	44.59	-4.23	-3.21	32.525	19:34.3	-21.69
1/13/2014	2145	31.41	-4.33	-3.69	32.523	19:38.6	-21.53
1/14/2014	2145	18.24	-4.43	-4.16	32.522	19:42.9	-21.36
1/15/2014	2145	5.07	-4.54	-4.63	32.520	19:47.2	-21.18
1/16/2014	2146	351.90	-4.63	-5.10	32.518	19:51.5	-20.99
1/17/2014	2146	338.73	-4.73	-5.56	32.515	19:55.8	-20.80
1/18/2014	2146	325.56	-4.83	-6.02	32.513	19:60.0	-20.60
1/19/2014	2146	312.39	-4.92	-6.48	32.511	20:4.3	-20.40
1/20/2014	2146	299.22	-5.02	-6.94	32.508	20:8.5	-20.19
1/21/2014	2146	286.05	-5.11	-7.39	32.505	20:12.8	-19.97
1/22/2014	2146	272.87	-5.20	-7.84	32.502	20:17.0	-19.74
1/23/2014	2146	259.70	-5.29	-8.29	32.499	20:21.2	-19.51
1/24/2014	2146	246.53	-5.38	-8.73	32.495	20:25.4	-19.28
1/25/2014	2146	233.36	-5.46	-9.17	32.492	20:29.6	-19.04
1/26/2014	2146	220.26	-5.55	-9.60	32.488	20:33.7	-18.79
1/27/2014	2146	207.09	-5.63	-10.04	32.484	20:37.9	-18.53
1/28/2014	2146	193.92	-5.71	-10.46	32.480	20:42.0	-18.28
1/29/2014	2146	180.75	-5.79	-10.89	32.476	20:46.2	-18.01
1/30/2014	2146	167.58	-5.86	-11.30	32.472	20:50.3	-17.74
1/31/2014	2146	154.41	-5.94	-11.72	32.468	20:54.4	-17.47
2/1/2014	2146	141.24	-6.01	-12.13	32.463	20:58.5	-17.18
2/2/2014	2146	128.07	-6.08	-12.54	32.458	21:2.5	-16.90
2/3/2014	2146	114.90	-6.15	-12.94	32.454	21:6.6	-16.61
2/4/2014	2146	101.73	-6.22	-13.33	32.449	21:10.6	-16.31
2/5/2014	2146	88.56	-6.28	-13.72	32.443	21:14.7	-16.01
2/6/2014	2146	75.39	-6.35	-14.11	32.438	21:18.7	-15.71

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Calendar Date	Rotation Number	Heliographic			Diameter (arcmin)	RA (HH:MM)	Dec (deg)
		Lo	Bo	Po			
2/7/2014	2146	62.22	-6.41	-14.49	32.433	21:22.7	-15.40
2/8/2014	2146	49.05	-6.47	-14.87	32.427	21:26.7	-15.09
2/9/2014	2146	35.88	-6.52	-15.24	32.422	21:30.7	-14.77
2/10/2014	2146	22.71	-6.58	-15.61	32.416	21:34.6	-14.45
2/11/2014	2146	9.54	-6.63	-15.97	32.410	21:38.6	-14.12
2/12/2014	2147	356.36	-6.68	-16.32	32.404	21:42.5	-13.79
2/13/2014	2147	343.19	-6.73	-16.67	32.398	21:46.4	-13.46
2/14/2014	2147	330.02	-6.78	-17.02	32.391	21:50.4	-13.12
2/15/2014	2147	316.85	-6.82	-17.36	32.385	21:54.3	-12.78
2/16/2014	2147	303.74	-6.86	-17.69	32.378	21:58.2	-12.44
2/17/2014	2147	290.57	-6.90	-18.02	32.372	22:2.0	-12.09
2/18/2014	2147	277.40	-6.94	-18.34	32.365	22:5.9	-11.74
2/19/2014	2147	264.23	-6.98	-18.66	32.358	22:9.8	-11.39
2/20/2014	2147	251.06	-7.01	-18.97	32.351	22:13.6	-11.03
2/21/2014	2147	237.88	-7.04	-19.27	32.344	22:17.4	-10.67
2/22/2014	2147	224.71	-7.07	-19.57	32.337	22:21.3	-10.31
2/23/2014	2147	211.54	-7.10	-19.86	32.329	22:25.1	-9.94
2/24/2014	2147	198.36	-7.12	-20.15	32.322	22:28.9	-9.57
2/25/2014	2147	185.19	-7.15	-20.43	32.315	22:32.7	-9.20
2/26/2014	2147	172.02	-7.17	-20.70	32.307	22:36.5	-8.83
2/27/2014	2147	158.84	-7.18	-20.97	32.299	22:40.2	-8.46
2/28/2014	2147	145.67	-7.20	-21.23	32.291	22:44.0	-8.08
3/1/2014	2147	132.49	-7.21	-21.49	32.284	22:47.8	-7.70
3/2/2014	2147	119.32	-7.23	-21.74	32.276	22:51.5	-7.32
3/3/2014	2147	106.14	-7.24	-21.98	32.268	22:55.2	-6.94
3/4/2014	2147	92.96	-7.24	-22.22	32.259	22:59.0	-6.56
3/5/2014	2147	79.79	-7.25	-22.45	32.251	23:2.7	-6.17
3/6/2014	2147	66.61	-7.25	-22.68	32.243	23:6.4	-5.78
3/7/2014	2147	53.43	-7.25	-22.89	32.235	23:10.1	-5.39
3/8/2014	2147	40.31	-7.25	-23.10	32.226	23:13.8	-5.01
3/9/2014	2147	27.14	-7.24	-23.31	32.218	23:17.5	-4.61
3/10/2014	2147	13.96	-7.24	-23.51	32.209	23:21.2	-4.22
3/11/2014	2148	0.77	-7.23	-23.70	32.201	23:24.9	-3.83
3/12/2014	2148	347.59	-7.22	-23.88	32.192	23:28.6	-3.44
3/13/2014	2148	334.41	-7.21	-24.06	32.183	23:32.3	-3.04
3/14/2014	2148	321.23	-7.19	-24.23	32.175	23:35.9	-2.65
3/15/2014	2148	308.05	-7.17	-24.40	32.166	23:39.6	-2.26
3/16/2014	2148	294.87	-7.15	-24.56	32.157	23:43.3	-1.86

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Calendar Date	Rotation Number	Heliographic			Diameter (arcmin)	RA (HH:MM)	Dec (deg)
		Lo	Bo	Po			
3/17/2014	2148	281.68	-7.13	-24.71	32.148	23:46.9	-1.46
3/18/2014	2148	268.50	-7.11	-24.85	32.139	23:50.6	-1.07
3/19/2014	2148	255.31	-7.08	-24.99	32.130	23:54.2	-0.67
3/20/2014	2148	242.13	-7.05	-25.12	32.121	23:57.9	-0.28
3/21/2014	2148	228.94	-7.02	-25.25	32.112	00:1.5	0.12
3/22/2014	2148	215.75	-6.99	-25.36	32.103	00:5.2	0.51
3/23/2014	2148	202.57	-6.96	-25.47	32.094	00:8.8	0.91
3/24/2014	2148	189.38	-6.92	-25.58	32.085	00:12.5	1.30
3/25/2014	2148	176.19	-6.88	-25.67	32.076	00:16.1	1.70
3/26/2014	2148	163.00	-6.84	-25.76	32.067	00:19.8	2.09
3/27/2014	2148	149.81	-6.80	-25.84	32.057	00:23.4	2.48
3/28/2014	2148	136.68	-6.75	-25.92	32.048	00:27.0	2.87
3/29/2014	2148	123.49	-6.71	-25.99	32.039	00:30.7	3.26
3/30/2014	2148	110.29	-6.66	-26.05	32.030	00:34.3	3.65
3/31/2014	2148	97.10	-6.61	-26.10	32.021	00:38.0	4.04
4/1/2014	2148	83.91	-6.56	-26.15	32.011	00:41.6	4.43
4/2/2014	2148	70.71	-6.50	-26.19	32.002	00:45.3	4.82
4/3/2014	2148	57.51	-6.44	-26.22	31.993	00:48.9	5.20
4/4/2014	2148	44.32	-6.39	-26.24	31.984	00:52.6	5.58
4/5/2014	2148	31.12	-6.33	-26.26	31.974	00:56.2	5.96
4/6/2014	2148	17.92	-6.26	-26.27	31.965	00:59.9	6.34
4/7/2014	2148	4.72	-6.20	-26.27	31.956	01:3.5	6.72
4/8/2014	2149	351.52	-6.14	-26.27	31.947	01:7.2	7.10
4/9/2014	2149	338.32	-6.07	-26.26	31.938	01:10.9	7.47
4/10/2014	2149	325.12	-6.00	-26.24	31.929	01:14.5	7.84
4/11/2014	2149	311.92	-5.93	-26.21	31.920	01:18.2	8.21
4/12/2014	2149	298.71	-5.86	-26.18	31.911	01:21.9	8.58
4/13/2014	2149	285.51	-5.78	-26.14	31.902	01:25.6	8.94
4/14/2014	2149	272.30	-5.71	-26.09	31.893	01:29.3	9.31
4/15/2014	2149	259.10	-5.63	-26.04	31.884	01:33.0	9.67
4/16/2014	2149	245.89	-5.55	-25.97	31.875	01:36.7	10.02
4/17/2014	2149	232.75	-5.47	-25.90	31.866	01:40.4	10.38
4/18/2014	2149	219.54	-5.39	-25.83	31.857	01:44.1	10.73
4/19/2014	2149	206.33	-5.30	-25.74	31.848	01:47.8	11.08
4/20/2014	2149	193.12	-5.22	-25.65	31.839	01:51.5	11.42
4/21/2014	2149	179.91	-5.13	-25.55	31.831	01:55.3	11.77
4/22/2014	2149	166.70	-5.04	-25.44	31.822	01:59.0	12.10
4/23/2014	2149	153.49	-4.95	-25.33	31.814	02:2.8	12.44

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Calendar Date	Rotation Number	Heliographic			Diameter (arcmin)	RA (HH:MM)	Dec (deg)
		Lo	Bo	Po			
4/24/2014	2149	140.27	-4.86	-25.21	31.805	02:6.5	12.77
4/25/2014	2149	127.06	-4.77	-25.08	31.797	02:10.3	13.10
4/26/2014	2149	113.84	-4.68	-24.94	31.788	02:14.1	13.43
4/27/2014	2149	100.63	-4.58	-24.80	31.780	02:17.9	13.75
4/28/2014	2149	87.41	-4.49	-24.65	31.772	02:21.6	14.07
4/29/2014	2149	74.19	-4.39	-24.49	31.763	02:25.4	14.38
4/30/2014	2149	60.98	-4.29	-24.32	31.755	02:29.2	14.69
5/1/2014	2149	47.76	-4.19	-24.15	31.747	02:33.1	15.00
5/2/2014	2149	34.54	-4.09	-23.97	31.739	02:36.9	15.30
5/3/2014	2149	21.32	-3.99	-23.78	31.731	02:40.7	15.59
5/4/2014	2149	8.10	-3.89	-23.59	31.723	02:44.6	15.89
5/5/2014	2150	354.88	-3.78	-23.39	31.716	02:48.4	16.18
5/6/2014	2150	341.65	-3.68	-23.18	31.708	02:52.3	16.46
5/7/2014	2150	328.49	-3.57	-22.96	31.701	02:56.1	16.74
5/8/2014	2150	315.27	-3.46	-22.74	31.693	02:60.0	17.02
5/9/2014	2150	302.05	-3.36	-22.51	31.686	03:3.9	17.29
5/10/2014	2150	288.82	-3.25	-22.28	31.678	03:7.8	17.55
5/11/2014	2150	275.60	-3.14	-22.03	31.671	03:11.7	17.81
5/12/2014	2150	262.37	-3.03	-21.78	31.664	03:15.6	18.07
5/13/2014	2150	249.14	-2.92	-21.53	31.657	03:19.6	18.32
5/14/2014	2150	235.91	-2.80	-21.26	31.650	03:23.5	18.56
5/15/2014	2150	222.69	-2.69	-20.99	31.643	03:27.4	18.80
5/16/2014	2150	209.46	-2.58	-20.72	31.637	03:31.4	19.04
5/17/2014	2150	196.23	-2.46	-20.43	31.630	03:35.4	19.27
5/18/2014	2150	183.00	-2.35	-20.14	31.624	03:39.3	19.49
5/19/2014	2150	169.77	-2.23	-19.85	31.617	03:43.3	19.71
5/20/2014	2150	156.54	-2.12	-19.55	31.611	03:47.3	19.92
5/21/2014	2150	143.30	-2.00	-19.24	31.605	03:51.3	20.13
5/22/2014	2150	130.07	-1.88	-18.92	31.599	03:55.3	20.33
5/23/2014	2150	116.84	-1.77	-18.60	31.593	03:59.3	20.53
5/24/2014	2150	103.61	-1.65	-18.28	31.587	04:3.4	20.72
5/25/2014	2150	90.37	-1.53	-17.95	31.581	04:7.4	20.90
5/26/2014	2150	77.14	-1.41	-17.61	31.576	04:11.4	21.08
5/27/2014	2150	63.97	-1.29	-17.26	31.570	04:15.5	21.25
5/28/2014	2150	50.73	-1.17	-16.92	31.565	04:19.5	21.42
5/29/2014	2150	37.49	-1.05	-16.56	31.560	04:23.6	21.58
5/30/2014	2150	24.26	-0.93	-16.20	31.554	04:27.7	21.73
5/31/2014	2150	11.02	-0.81	-15.84	31.549	04:31.8	21.88

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Calendar Date	Rotation Number	Heliographic			Diameter (arcmin)	RA (HH:MM)	Dec (deg)
		<i>Lo</i>	<i>Bo</i>	<i>Po</i>			
6/1/2014	2151	357.78	-0.69	-15.47	31.545	04:35.9	22.02
6/2/2014	2151	344.55	-0.57	-15.09	31.540	04:40.0	22.15
6/3/2014	2151	331.31	-0.45	-14.72	31.535	04:44.1	22.28
6/4/2014	2151	318.07	-0.33	-14.33	31.531	04:48.2	22.40
6/5/2014	2151	304.83	-0.21	-13.94	31.527	04:52.3	22.52
6/6/2014	2151	291.60	-0.09	-13.55	31.522	04:56.4	22.63
6/7/2014	2151	278.36	0.03	-13.15	31.518	05:0.5	22.73
6/8/2014	2151	265.12	0.15	-12.75	31.514	05:4.6	22.82
6/9/2014	2151	251.88	0.27	-12.35	31.511	05:8.8	22.91
6/10/2014	2151	238.64	0.39	-11.94	31.507	05:12.9	22.99
6/11/2014	2151	225.40	0.51	-11.53	31.503	05:17.0	23.07
6/12/2014	2151	212.16	0.63	-11.11	31.500	05:21.2	23.14
6/13/2014	2151	198.92	0.75	-10.69	31.497	05:25.3	23.20
6/14/2014	2151	185.68	0.87	-10.27	31.494	05:29.5	23.25
6/15/2014	2151	172.44	0.99	-9.84	31.491	05:33.6	23.30
6/16/2014	2151	159.26	1.11	-9.41	31.488	05:37.8	23.34
6/17/2014	2151	146.02	1.23	-8.98	31.485	05:42.0	23.37
6/18/2014	2151	132.78	1.35	-8.55	31.483	05:46.1	23.40
6/19/2014	2151	119.54	1.47	-8.11	31.480	05:50.3	23.42
6/20/2014	2151	106.30	1.58	-7.68	31.478	05:54.4	23.43
6/21/2014	2151	93.06	1.70	-7.23	31.476	05:58.6	23.44
6/22/2014	2151	79.82	1.82	-6.79	31.474	06:2.7	23.44
6/23/2014	2151	66.58	1.93	-6.35	31.472	06:6.9	23.43
6/24/2014	2151	53.34	2.05	-5.90	31.471	06:11.0	23.42
6/25/2014	2151	40.10	2.16	-5.45	31.469	06:15.2	23.40
6/26/2014	2151	26.86	2.28	-5.01	31.468	06:19.4	23.37
6/27/2014	2151	13.62	2.39	-4.56	31.466	06:23.5	23.34
6/28/2014	2151	0.38	2.51	-4.11	31.465	06:27.7	23.29
6/29/2014	2152	347.14	2.62	-3.65	31.464	06:31.8	23.25
6/30/2014	2152	333.89	2.73	-3.20	31.464	06:35.9	23.19
7/1/2014	2152	320.65	2.84	-2.75	31.463	06:40.1	23.13
7/2/2014	2152	307.42	2.95	-2.30	31.462	06:44.2	23.06
7/3/2014	2152	294.18	3.06	-1.84	31.462	06:48.3	22.99
7/4/2014	2152	280.94	3.17	-1.39	31.462	06:52.5	22.90
7/5/2014	2152	267.70	3.28	-0.94	31.462	06:56.6	22.82
7/6/2014	2152	254.46	3.39	-0.48	31.462	07:0.7	22.72
7/7/2014	2152	241.28	3.49	-0.03	31.462	07:4.8	22.62
7/8/2014	2152	228.04	3.60	0.42	31.463	07:8.9	22.51

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Calendar Date	Rotation Number	Heliographic			Diameter (arcmin)	RA (HH:MM)	Dec (deg)
		Lo	Bo	Po			
7/9/2014	2152	214.80	3.70	0.87	31.463	07:13.0	22.40
7/10/2014	2152	201.56	3.80	1.32	31.464	07:17.1	22.27
7/11/2014	2152	188.33	3.91	1.77	31.465	07:21.2	22.15
7/12/2014	2152	175.09	4.01	2.22	31.466	07:25.2	22.01
7/13/2014	2152	161.85	4.11	2.67	31.467	07:29.3	21.87
7/14/2014	2152	148.61	4.20	3.11	31.468	07:33.3	21.73
7/15/2014	2152	135.38	4.30	3.56	31.469	07:37.4	21.57
7/16/2014	2152	122.14	4.40	4.00	31.471	07:41.4	21.41
7/17/2014	2152	108.90	4.49	4.44	31.473	07:45.5	21.25
7/18/2014	2152	95.67	4.59	4.88	31.475	07:49.5	21.08
7/19/2014	2152	82.43	4.68	5.32	31.477	07:53.5	20.90
7/20/2014	2152	69.20	4.77	5.75	31.479	07:57.5	20.72
7/21/2014	2152	55.96	4.86	6.18	31.481	08:1.5	20.53
7/22/2014	2152	42.73	4.95	6.61	31.483	08:5.5	20.34
7/23/2014	2152	29.50	5.04	7.04	31.486	08:9.5	20.14
7/24/2014	2152	16.26	5.12	7.46	31.489	08:13.4	19.93
7/25/2014	2152	3.03	5.21	7.88	31.492	08:17.4	19.72
7/26/2014	2153	349.80	5.29	8.30	31.495	08:21.4	19.50
7/27/2014	2153	336.63	5.37	8.72	31.498	08:25.3	19.28
7/28/2014	2153	323.40	5.45	9.13	31.501	08:29.2	19.06
7/29/2014	2153	310.17	5.53	9.54	31.504	08:33.1	18.82
7/30/2014	2153	296.94	5.61	9.95	31.508	08:37.0	18.59
7/31/2014	2153	283.70	5.69	10.35	31.512	08:40.9	18.34
8/1/2014	2153	270.48	5.76	10.75	31.516	08:44.8	18.10
8/2/2014	2153	257.25	5.83	11.15	31.520	08:48.7	17.84
8/3/2014	2153	244.02	5.91	11.54	31.524	08:52.6	17.59
8/4/2014	2153	230.79	5.97	11.93	31.528	08:56.4	17.32
8/5/2014	2153	217.56	6.04	12.31	31.532	08:60.3	17.06
8/6/2014	2153	204.34	6.11	12.69	31.537	09:4.1	16.79
8/7/2014	2153	191.11	6.17	13.07	31.541	09:8.0	16.51
8/8/2014	2153	177.88	6.24	13.44	31.546	09:11.8	16.23
8/9/2014	2153	164.66	6.30	13.81	31.551	09:15.6	15.94
8/10/2014	2153	151.43	6.36	14.18	31.556	09:19.4	15.66
8/11/2014	2153	138.21	6.41	14.54	31.561	09:23.2	15.36
8/12/2014	2153	124.99	6.47	14.89	31.566	09:27.0	15.07
8/13/2014	2153	111.76	6.52	15.25	31.572	09:30.7	14.76
8/14/2014	2153	98.54	6.58	15.59	31.577	09:34.5	14.46
8/15/2014	2153	85.32	6.63	15.94	31.583	09:38.2	14.15

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Calendar Date	Rotation Number	Heliographic			Diameter (arcmin)	RA (HH:MM)	Dec (deg)
		<i>Lo</i>	<i>Bo</i>	<i>Po</i>			
8/16/2014	2153	72.16	6.67	16.27	31.589	09:42.0	13.84
8/17/2014	2153	58.94	6.72	16.61	31.594	09:45.7	13.52
8/18/2014	2153	45.72	6.77	16.94	31.600	09:49.5	13.20
8/19/2014	2153	32.50	6.81	17.26	31.607	09:53.2	12.88
8/20/2014	2153	19.28	6.85	17.58	31.613	09:56.9	12.55
8/21/2014	2153	6.06	6.89	17.89	31.619	10:0.6	12.22
8/22/2014	2154	352.84	6.93	18.20	31.625	10:4.3	11.89
8/23/2014	2154	339.62	6.96	18.51	31.632	10:8.0	11.55
8/24/2014	2154	326.41	6.99	18.81	31.639	10:11.7	11.21
8/25/2014	2154	313.19	7.03	19.10	31.645	10:15.3	10.87
8/26/2014	2154	299.97	7.05	19.39	31.652	10:19.0	10.52
8/27/2014	2154	286.76	7.08	19.68	31.659	10:22.7	10.17
8/28/2014	2154	273.55	7.11	19.95	31.666	10:26.3	9.82
8/29/2014	2154	260.33	7.13	20.23	31.673	10:30.0	9.47
8/30/2014	2154	247.12	7.15	20.50	31.681	10:33.6	9.11
8/31/2014	2154	233.91	7.17	20.76	31.688	10:37.2	8.75
9/1/2014	2154	220.69	7.19	21.02	31.695	10:40.9	8.39
9/2/2014	2154	207.48	7.20	21.27	31.703	10:44.5	8.03
9/3/2014	2154	194.27	7.22	21.51	31.710	10:48.1	7.66
9/4/2014	2154	181.06	7.23	21.75	31.718	10:51.7	7.30
9/5/2014	2154	167.91	7.24	21.99	31.726	10:55.4	6.93
9/6/2014	2154	154.70	7.24	22.22	31.734	10:59.0	6.56
9/7/2014	2154	141.49	7.25	22.44	31.742	11:2.6	6.18
9/8/2014	2154	128.28	7.25	22.66	31.750	11:6.2	5.81
9/9/2014	2154	115.07	7.25	22.87	31.758	11:9.8	5.43
9/10/2014	2154	101.87	7.25	23.08	31.766	11:13.4	5.05
9/11/2014	2154	88.66	7.24	23.28	31.774	11:17.0	4.68
9/12/2014	2154	75.45	7.24	23.47	31.782	11:20.6	4.29
9/13/2014	2154	62.25	7.23	23.66	31.791	11:24.2	3.91
9/14/2014	2154	49.04	7.22	23.84	31.799	11:27.7	3.53
9/15/2014	2154	35.84	7.21	24.02	31.808	11:31.3	3.15
9/16/2014	2154	22.63	7.19	24.19	31.816	11:34.9	2.76
9/17/2014	2154	9.43	7.18	24.35	31.825	11:38.5	2.37
9/18/2014	2155	356.22	7.16	24.51	31.833	11:42.1	1.99
9/19/2014	2155	343.02	7.14	24.66	31.842	11:45.7	1.60
9/20/2014	2155	329.82	7.12	24.80	31.851	11:49.3	1.21
9/21/2014	2155	316.62	7.09	24.94	31.860	11:52.9	0.82
9/22/2014	2155	303.41	7.06	25.07	31.869	11:56.5	0.43

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Calendar Date	Rotation Number	Heliographic			Diameter (arcmin)	RA (HH:MM)	Dec (deg)
		Lo	Bo	Po			
9/23/2014	2155	290.21	7.04	25.19	31.877	11:60.0	0.04
9/24/2014	2155	277.01	7.01	25.31	31.886	12:3.6	-0.35
9/25/2014	2155	263.87	6.97	25.42	31.895	12:7.2	-0.74
9/26/2014	2155	250.67	6.94	25.53	31.904	12:10.8	-1.13
9/27/2014	2155	237.47	6.90	25.63	31.913	12:14.4	-1.52
9/28/2014	2155	224.27	6.86	25.72	31.922	12:18.0	-1.91
9/29/2014	2155	211.08	6.82	25.80	31.932	12:21.7	-2.29
9/30/2014	2155	197.88	6.78	25.88	31.941	12:25.3	-2.68
10/1/2014	2155	184.68	6.73	25.95	31.950	12:28.9	-3.07
10/2/2014	2155	171.48	6.68	26.02	31.959	12:32.5	-3.46
10/3/2014	2155	158.28	6.63	26.07	31.968	12:36.1	-3.85
10/4/2014	2155	145.09	6.58	26.12	31.977	12:39.8	-4.23
10/5/2014	2155	131.89	6.53	26.17	31.986	12:43.4	-4.62
10/6/2014	2155	118.69	6.47	26.20	31.996	12:47.1	-5.01
10/7/2014	2155	105.50	6.42	26.23	32.005	12:50.7	-5.39
10/8/2014	2155	92.30	6.36	26.25	32.014	12:54.4	-5.77
10/9/2014	2155	79.11	6.30	26.27	32.023	12:58.0	-6.15
10/10/2014	2155	65.91	6.23	26.27	32.033	13:1.7	-6.53
10/11/2014	2155	52.72	6.17	26.27	32.042	13:5.4	-6.91
10/12/2014	2155	39.52	6.10	26.26	32.051	13:9.1	-7.29
10/13/2014	2155	26.33	6.03	26.25	32.060	13:12.8	-7.67
10/14/2014	2155	13.14	5.96	26.23	32.069	13:16.5	-8.04
10/15/2014	2155	0.00	5.89	26.20	32.078	13:20.2	-8.41
10/16/2014	2156	346.81	5.82	26.16	32.088	13:23.9	-8.78
10/17/2014	2156	333.62	5.74	26.11	32.097	13:27.7	-9.15
10/18/2014	2156	320.43	5.66	26.06	32.106	13:31.4	-9.51
10/19/2014	2156	307.23	5.58	26.00	32.115	13:35.2	-9.88
10/20/2014	2156	294.04	5.50	25.93	32.124	13:38.9	-10.24
10/21/2014	2156	280.85	5.42	25.86	32.133	13:42.7	-10.60
10/22/2014	2156	267.66	5.33	25.77	32.142	13:46.5	-10.95
10/23/2014	2156	254.47	5.25	25.68	32.151	13:50.3	-11.31
10/24/2014	2156	241.28	5.16	25.58	32.160	13:54.1	-11.66
10/25/2014	2156	228.09	5.07	25.48	32.168	13:57.9	-12.00
10/26/2014	2156	214.90	4.98	25.36	32.177	14:1.7	-12.35
10/27/2014	2156	201.71	4.89	25.24	32.186	14:5.6	-12.69
10/28/2014	2156	188.52	4.79	25.11	32.195	14:9.4	-13.03
10/29/2014	2156	175.33	4.70	24.97	32.203	14:13.3	-13.36
10/30/2014	2156	162.14	4.60	24.82	32.212	14:17.2	-13.69

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Calendar Date	Rotation Number	Heliographic			Diameter (arcmin)	RA (HH:MM)	Dec (deg)
		<i>Lo</i>	<i>Bo</i>	<i>Po</i>			
10/31/2014	2156	148.95	4.50	24.67	32.220	14:21.1	-14.02
11/1/2014	2156	135.76	4.40	24.51	32.229	14:25.0	-14.34
11/2/2014	2156	122.57	4.30	24.34	32.237	14:28.9	-14.66
11/3/2014	2156	109.38	4.20	24.16	32.246	14:32.8	-14.98
11/4/2014	2156	96.25	4.09	23.98	32.254	14:36.8	-15.29
11/5/2014	2156	83.07	3.99	23.78	32.262	14:40.7	-15.60
11/6/2014	2156	69.88	3.88	23.58	32.270	14:44.7	-15.90
11/7/2014	2156	56.69	3.78	23.37	32.278	14:48.7	-16.20
11/8/2014	2156	43.50	3.67	23.16	32.286	14:52.7	-16.49
11/9/2014	2156	30.32	3.56	22.93	32.294	14:56.7	-16.78
11/10/2014	2156	17.13	3.45	22.70	32.302	15:0.7	-17.07
11/11/2014	2156	3.94	3.33	22.46	32.309	15:4.8	-17.35
11/12/2014	2157	350.76	3.22	22.21	32.317	15:8.8	-17.62
11/13/2014	2157	337.57	3.11	21.96	32.324	15:12.9	-17.89
11/14/2014	2157	324.38	2.99	21.69	32.332	15:17.0	-18.16
11/15/2014	2157	311.20	2.87	21.42	32.339	15:21.1	-18.42
11/16/2014	2157	298.01	2.76	21.15	32.346	15:25.2	-18.67
11/17/2014	2157	284.83	2.64	20.86	32.353	15:29.3	-18.92
11/18/2014	2157	271.64	2.52	20.57	32.360	15:33.5	-19.16
11/19/2014	2157	258.46	2.40	20.27	32.367	15:37.6	-19.40
11/20/2014	2157	245.27	2.28	19.96	32.374	15:41.8	-19.63
11/21/2014	2157	232.09	2.16	19.65	32.380	15:46.0	-19.85
11/22/2014	2157	218.90	2.04	19.32	32.387	15:50.2	-20.07
11/23/2014	2157	205.72	1.91	19.00	32.393	15:54.4	-20.29
11/24/2014	2157	192.54	1.79	18.66	32.399	15:58.6	-20.49
11/25/2014	2157	179.42	1.67	18.32	32.406	16:2.9	-20.69
11/26/2014	2157	166.23	1.54	17.97	32.412	16:7.1	-20.89
11/27/2014	2157	153.05	1.42	17.61	32.418	16:11.4	-21.08
11/28/2014	2157	139.87	1.29	17.25	32.423	16:15.6	-21.26
11/29/2014	2157	126.68	1.16	16.88	32.429	16:19.9	-21.43
11/30/2014	2157	113.50	1.04	16.51	32.434	16:24.2	-21.60
12/1/2014	2157	100.32	0.91	16.13	32.440	16:28.5	-21.76
12/2/2014	2157	87.14	0.78	15.74	32.445	16:32.8	-21.92
12/3/2014	2157	73.95	0.66	15.35	32.450	16:37.2	-22.06
12/4/2014	2157	60.77	0.53	14.95	32.455	16:41.5	-22.20
12/5/2014	2157	47.59	0.40	14.55	32.460	16:45.8	-22.33
12/6/2014	2157	34.41	0.27	14.14	32.465	16:50.2	-22.46
12/7/2014	2157	21.23	0.15	13.73	32.469	16:54.6	-22.58

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Calendar Date	Rotation Number	Heliographic			Diameter (arcmin)	RA (HH:MM)	Dec (deg)
		Lo	Bo	Po			
12/8/2014	2157	8.05	0.02	13.31	32.473	16:58.9	-22.69
12/9/2014	2158	354.87	-0.11	12.88	32.478	17:3.3	-22.79
12/10/2014	2158	341.69	-0.24	12.45	32.482	17:7.7	-22.89
12/11/2014	2158	328.51	-0.37	12.02	32.486	17:12.1	-22.98
12/12/2014	2158	315.33	-0.49	11.58	32.489	17:16.5	-23.06
12/13/2014	2158	302.15	-0.62	11.14	32.493	17:20.9	-23.13
12/14/2014	2158	288.97	-0.75	10.69	32.496	17:25.3	-23.20
12/15/2014	2158	275.86	-0.88	10.24	32.500	17:29.7	-23.25
12/16/2014	2158	262.68	-1.01	9.79	32.503	17:34.2	-23.30
12/17/2014	2158	249.50	-1.13	9.33	32.506	17:38.6	-23.35
12/18/2014	2158	236.32	-1.26	8.87	32.509	17:43.0	-23.38
12/19/2014	2158	223.14	-1.38	8.41	32.511	17:47.5	-23.41
12/20/2014	2158	209.97	-1.51	7.94	32.514	17:51.9	-23.43
12/21/2014	2158	196.79	-1.64	7.47	32.516	17:56.3	-23.44
12/22/2014	2158	183.61	-1.76	7.00	32.518	18:0.8	-23.44
12/23/2014	2158	170.43	-1.89	6.53	32.520	18:5.2	-23.44
12/24/2014	2158	157.26	-2.01	6.05	32.522	18:9.6	-23.43
12/25/2014	2158	144.08	-2.13	5.58	32.524	18:14.1	-23.40
12/26/2014	2158	130.91	-2.25	5.10	32.525	18:18.5	-23.38
12/27/2014	2158	117.73	-2.38	4.62	32.527	18:22.9	-23.34
12/28/2014	2158	104.55	-2.50	4.14	32.528	18:27.4	-23.30
12/29/2014	2158	91.38	-2.62	3.65	32.529	18:31.8	-23.25
12/30/2014	2158	78.20	-2.74	3.17	32.530	18:36.2	-23.19
12/31/2014	2158	65.03	-2.86	2.69	32.530	18:40.6	-23.12
1/1/2015	2158	51.86	-2.97	2.20	32.531	18:45.1	-23.05
1/2/2015	2158	38.68	-3.09	1.72	32.531	18:49.5	-22.96
1/3/2015	2158	25.51	-3.21	1.23	32.531	18:53.9	-22.87
1/4/2015	2158	12.40	-3.32	0.75	32.531	18:58.3	-22.78
1/5/2015	2159	359.22	-3.44	0.26	32.531	19:2.7	-22.67
1/6/2015	2159	346.05	-3.55	-0.22	32.531	19:7.1	-22.56
1/7/2015	2159	332.88	-3.66	-0.70	32.530	19:11.4	-22.44
1/8/2015	2159	319.70	-3.77	-1.18	32.530	19:15.8	-22.31
1/9/2015	2159	306.53	-3.88	-1.67	32.529	19:20.2	-22.18
1/10/2015	2159	293.36	-3.99	-2.14	32.528	19:24.5	-22.04
1/11/2015	2159	280.18	-4.10	-2.62	32.527	19:28.9	-21.89
1/12/2015	2159	267.01	-4.20	-3.10	32.525	19:33.2	-21.73
1/13/2015	2159	253.84	-4.30	-3.57	32.524	19:37.5	-21.57
1/14/2015	2159	240.67	-4.41	-4.05	32.522	19:41.9	-21.40

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Calendar Date	Rotation Number	Heliographic			Diameter (arcmin)	RA (HH:MM)	Dec (deg)
		<i>Lo</i>	<i>Bo</i>	<i>Po</i>			
1/15/2015	2159	227.50	-4.51	-4.51	32.520	19:46.2	-21.22
1/16/2015	2159	214.33	-4.61	-4.98	32.518	19:50.5	-21.04
1/17/2015	2159	201.16	-4.71	-5.45	32.516	19:54.7	-20.85
1/18/2015	2159	187.98	-4.81	-5.91	32.514	19:59.0	-20.65
1/19/2015	2159	174.81	-4.90	-6.37	32.511	20:3.3	-20.45
1/20/2015	2159	161.64	-4.99	-6.83	32.508	20:7.5	-20.24
1/21/2015	2159	148.47	-5.09	-7.28	32.506	20:11.7	-20.02
1/22/2015	2159	135.30	-5.18	-7.73	32.503	20:16.0	-19.80
1/23/2015	2159	122.13	-5.27	-8.18	32.500	20:20.2	-19.57
1/24/2015	2159	109.02	-5.35	-8.62	32.496	20:24.4	-19.34
1/25/2015	2159	95.85	-5.44	-9.06	32.493	20:28.6	-19.09
1/26/2015	2159	82.68	-5.53	-9.50	32.489	20:32.7	-18.85
1/27/2015	2159	69.51	-5.61	-9.93	32.485	20:36.9	-18.60
1/28/2015	2159	56.34	-5.69	-10.36	32.481	20:41.0	-18.34
1/29/2015	2159	43.17	-5.77	-10.78	32.477	20:45.2	-18.08
1/30/2015	2159	30.00	-5.84	-11.20	32.473	20:49.3	-17.81
1/31/2015	2159	16.83	-5.92	-11.62	32.469	20:53.4	-17.53
2/1/2015	2159	3.66	-5.99	-12.03	32.464	20:57.5	-17.25
2/2/2015	2160	350.49	-6.06	-12.44	32.460	21:1.5	-16.97
2/3/2015	2160	337.32	-6.13	-12.84	32.455	21:5.6	-16.68
2/4/2015	2160	324.15	-6.20	-13.24	32.450	21:9.7	-16.39
2/5/2015	2160	310.98	-6.27	-13.63	32.445	21:13.7	-16.09
2/6/2015	2160	297.81	-6.33	-14.02	32.439	21:17.7	-15.78
2/7/2015	2160	284.64	-6.39	-14.40	32.434	21:21.7	-15.48
2/8/2015	2160	271.47	-6.45	-14.78	32.429	21:25.7	-15.16
2/9/2015	2160	258.30	-6.51	-15.15	32.423	21:29.7	-14.85
2/10/2015	2160	245.13	-6.56	-15.52	32.417	21:33.7	-14.53
2/11/2015	2160	231.96	-6.62	-15.88	32.411	21:37.6	-14.20
2/12/2015	2160	218.79	-6.67	-16.24	32.405	21:41.6	-13.87
2/13/2015	2160	205.68	-6.72	-16.59	32.399	21:45.5	-13.54
2/14/2015	2160	192.51	-6.77	-16.93	32.393	21:49.4	-13.20
2/15/2015	2160	179.34	-6.81	-17.27	32.386	21:53.3	-12.86
2/16/2015	2160	166.17	-6.85	-17.61	32.380	21:57.2	-12.52
2/17/2015	2160	153.00	-6.89	-17.94	32.373	22:1.1	-12.17
2/18/2015	2160	139.83	-6.93	-18.26	32.367	22:5.0	-11.82
2/19/2015	2160	126.66	-6.97	-18.58	32.360	22:8.8	-11.47
2/20/2015	2160	113.48	-7.00	-18.89	32.353	22:12.7	-11.12
2/21/2015	2160	100.31	-7.03	-19.20	32.346	22:16.5	-10.76

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Calendar Date	Rotation Number	Heliographic			Diameter (arcmin)	RA (HH:MM)	Dec (deg)
		Lo	Bo	Po			
2/22/2015	2160	87.14	-7.06	-19.50	32.338	22:20.3	-10.39
2/23/2015	2160	73.96	-7.09	-19.79	32.331	22:24.2	-10.03
2/24/2015	2160	60.79	-7.12	-20.08	32.324	22:28.0	-9.66
2/25/2015	2160	47.62	-7.14	-20.36	32.316	22:31.8	-9.29
2/26/2015	2160	34.44	-7.16	-20.64	32.309	22:35.5	-8.92
2/27/2015	2160	21.27	-7.18	-20.91	32.301	22:39.3	-8.55
2/28/2015	2160	8.10	-7.20	-21.17	32.293	22:43.1	-8.17
3/1/2015	2161	354.92	-7.21	-21.43	32.285	22:46.9	-7.79
3/2/2015	2161	341.74	-7.22	-21.68	32.278	22:50.6	-7.41
3/3/2015	2161	328.57	-7.23	-21.92	32.270	22:54.3	-7.03
3/4/2015	2161	315.39	-7.24	-22.16	32.261	22:58.1	-6.65
3/5/2015	2161	302.28	-7.25	-22.39	32.253	23:1.8	-6.26
3/6/2015	2161	289.10	-7.25	-22.62	32.245	23:5.5	-5.88
3/7/2015	2161	275.92	-7.25	-22.84	32.237	23:9.2	-5.49
3/8/2015	2161	262.74	-7.25	-23.05	32.228	23:12.9	-5.10
3/9/2015	2161	249.56	-7.25	-23.26	32.220	23:16.6	-4.71
3/10/2015	2161	236.38	-7.24	-23.46	32.211	23:20.3	-4.32
3/11/2015	2161	223.20	-7.23	-23.65	32.203	23:24.0	-3.93
3/12/2015	2161	210.02	-7.22	-23.84	32.194	23:27.7	-3.53
3/13/2015	2161	196.84	-7.21	-24.02	32.185	23:31.4	-3.14
3/14/2015	2161	183.66	-7.19	-24.19	32.177	23:35.0	-2.75
3/15/2015	2161	170.48	-7.18	-24.36	32.168	23:38.7	-2.35
3/16/2015	2161	157.30	-7.16	-24.52	32.159	23:42.4	-1.96
3/17/2015	2161	144.11	-7.14	-24.67	32.150	23:46.0	-1.56
3/18/2015	2161	130.93	-7.11	-24.82	32.141	23:49.7	-1.17
3/19/2015	2161	117.74	-7.09	-24.96	32.132	23:53.3	-0.77
3/20/2015	2161	104.56	-7.06	-25.09	32.123	23:57.0	-0.37
3/21/2015	2161	91.37	-7.03	-25.21	32.114	00:0.7	0.02
3/22/2015	2161	78.18	-7.00	-25.33	32.105	00:4.3	0.42
3/23/2015	2161	65.00	-6.97	-25.44	32.096	00:7.9	0.81
3/24/2015	2161	51.81	-6.93	-25.55	32.087	00:11.6	1.21
3/25/2015	2161	38.68	-6.89	-25.65	32.078	00:15.2	1.60
3/26/2015	2161	25.49	-6.85	-25.74	32.069	00:18.9	1.99
3/27/2015	2161	12.30	-6.81	-25.82	32.060	00:22.5	2.39
3/28/2015	2162	359.11	-6.77	-25.90	32.050	00:26.2	2.78
3/29/2015	2162	345.92	-6.72	-25.97	32.041	00:29.8	3.17
3/30/2015	2162	332.73	-6.67	-26.03	32.032	00:33.4	3.56
3/31/2015	2162	319.53	-6.62	-26.09	32.023	00:37.1	3.95

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Calendar Date	Rotation Number	Heliographic			Diameter (arcmin)	RA (HH:MM)	Dec (deg)
		<i>Lo</i>	<i>Bo</i>	<i>Po</i>			
4/1/2015	2162	306.34	-6.57	-26.13	32.014	00:40.7	4.34
4/2/2015	2162	293.14	-6.52	-26.18	32.004	00:44.4	4.72
4/3/2015	2162	279.95	-6.46	-26.21	31.995	00:48.0	5.11
4/4/2015	2162	266.75	-6.40	-26.24	31.986	00:51.7	5.49
4/5/2015	2162	253.55	-6.34	-26.26	31.977	00:55.3	5.87
4/6/2015	2162	240.36	-6.28	-26.27	31.968	00:59.0	6.25
4/7/2015	2162	227.16	-6.22	-26.27	31.958	01:2.6	6.63
4/8/2015	2162	213.96	-6.15	-26.27	31.949	01:6.3	7.01
4/9/2015	2162	200.76	-6.09	-26.26	31.940	01:10.0	7.38
4/10/2015	2162	187.55	-6.02	-26.24	31.931	01:13.6	7.75
4/11/2015	2162	174.35	-5.95	-26.22	31.922	01:17.3	8.12
4/12/2015	2162	161.15	-5.87	-26.19	31.913	01:21.0	8.49
4/13/2015	2162	147.94	-5.80	-26.15	31.904	01:24.7	8.86
4/14/2015	2162	134.74	-5.73	-26.10	31.895	01:28.4	9.22
4/15/2015	2162	121.60	-5.65	-26.05	31.886	01:32.1	9.58
4/16/2015	2162	108.39	-5.57	-25.99	31.877	01:35.8	9.94
4/17/2015	2162	95.18	-5.49	-25.92	31.868	01:39.5	10.29
4/18/2015	2162	81.97	-5.41	-25.84	31.859	01:43.2	10.64
4/19/2015	2162	68.77	-5.32	-25.76	31.850	01:46.9	10.99
4/20/2015	2162	55.56	-5.24	-25.67	31.842	01:50.6	11.34
4/21/2015	2162	42.35	-5.15	-25.57	31.833	01:54.4	11.68
4/22/2015	2162	29.14	-5.07	-25.47	31.824	01:58.1	12.02
4/23/2015	2162	15.92	-4.98	-25.36	31.816	02:1.9	12.36
4/24/2015	2162	2.71	-4.89	-25.24	31.807	02:5.6	12.69
4/25/2015	2163	349.50	-4.80	-25.11	31.799	02:9.4	13.02
4/26/2015	2163	336.28	-4.70	-24.97	31.790	02:13.2	13.35
4/27/2015	2163	323.07	-4.61	-24.83	31.782	02:16.9	13.67
4/28/2015	2163	309.85	-4.51	-24.68	31.774	02:20.7	13.99
4/29/2015	2163	296.63	-4.41	-24.53	31.765	02:24.5	14.30
4/30/2015	2163	283.42	-4.32	-24.36	31.757	02:28.3	14.61
5/1/2015	2163	270.20	-4.22	-24.19	31.749	02:32.1	14.92
5/2/2015	2163	256.98	-4.12	-24.01	31.741	02:36.0	15.22
5/3/2015	2163	243.76	-4.02	-23.83	31.733	02:39.8	15.52
5/4/2015	2163	230.54	-3.91	-23.64	31.725	02:43.6	15.82
5/5/2015	2163	217.38	-3.81	-23.44	31.718	02:47.5	16.11
5/6/2015	2163	204.16	-3.70	-23.23	31.710	02:51.3	16.39
5/7/2015	2163	190.93	-3.60	-23.02	31.702	02:55.2	16.67
5/8/2015	2163	177.71	-3.49	-22.80	31.695	02:59.1	16.95

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Calendar Date	Rotation Number	Heliographic			Diameter (arcmin)	RA (HH:MM)	Dec (deg)
		Lo	Bo	Po			
5/9/2015	2163	164.49	-3.38	-22.57	31.687	03:3.0	17.22
5/10/2015	2163	151.26	-3.28	-22.33	31.680	03:6.9	17.49
5/11/2015	2163	138.04	-3.17	-22.09	31.673	03:10.8	17.75
5/12/2015	2163	124.81	-3.06	-21.84	31.666	03:14.7	18.01
5/13/2015	2163	111.58	-2.95	-21.59	31.659	03:18.6	18.26
5/14/2015	2163	98.35	-2.83	-21.33	31.652	03:22.5	18.50
5/15/2015	2163	85.13	-2.72	-21.06	31.645	03:26.5	18.75
5/16/2015	2163	71.90	-2.61	-20.78	31.638	03:30.4	18.98
5/17/2015	2163	58.67	-2.49	-20.50	31.632	03:34.4	19.21
5/18/2015	2163	45.44	-2.38	-20.21	31.625	03:38.4	19.44
5/19/2015	2163	32.21	-2.26	-19.92	31.619	03:42.3	19.66
5/20/2015	2163	18.98	-2.15	-19.62	31.612	03:46.3	19.87
5/21/2015	2163	5.75	-2.03	-19.31	31.606	03:50.3	20.08
5/22/2015	2164	352.51	-1.91	-19.00	31.600	03:54.3	20.28
5/23/2015	2164	339.28	-1.80	-18.68	31.594	03:58.4	20.48
5/24/2015	2164	326.05	-1.68	-18.36	31.588	04:2.4	20.67
5/25/2015	2164	312.88	-1.56	-18.03	31.583	04:6.4	20.86
5/26/2015	2164	299.64	-1.44	-17.69	31.577	04:10.5	21.04
5/27/2015	2164	286.41	-1.32	-17.35	31.571	04:14.5	21.21
5/28/2015	2164	273.17	-1.20	-17.00	31.566	04:18.6	21.38
5/29/2015	2164	259.94	-1.09	-16.65	31.561	04:22.6	21.54
5/30/2015	2164	246.70	-0.97	-16.29	31.556	04:26.7	21.69
5/31/2015	2164	233.46	-0.85	-15.93	31.551	04:30.8	21.84
6/1/2015	2164	220.23	-0.73	-15.56	31.546	04:34.9	21.99
6/2/2015	2164	206.99	-0.60	-15.19	31.541	04:39.0	22.12
6/3/2015	2164	193.75	-0.48	-14.81	31.536	04:43.1	22.25
6/4/2015	2164	180.52	-0.36	-14.42	31.532	04:47.2	22.37
6/5/2015	2164	167.28	-0.24	-14.04	31.528	04:51.3	22.49
6/6/2015	2164	154.04	-0.12	-13.65	31.523	04:55.4	22.60
6/7/2015	2164	140.80	-0.00	-13.25	31.519	04:59.5	22.70
6/8/2015	2164	127.56	0.12	-12.85	31.515	05:3.6	22.80
6/9/2015	2164	114.32	0.24	-12.45	31.512	05:7.8	22.89
6/10/2015	2164	101.08	0.36	-12.04	31.508	05:11.9	22.97
6/11/2015	2164	87.84	0.48	-11.63	31.504	05:16.0	23.05
6/12/2015	2164	74.60	0.60	-11.21	31.501	05:20.2	23.12
6/13/2015	2164	61.36	0.72	-10.79	31.498	05:24.3	23.18
6/14/2015	2164	48.19	0.84	-10.37	31.494	05:28.5	23.24
6/15/2015	2164	34.95	0.96	-9.95	31.491	05:32.6	23.29

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Calendar Date	Rotation Number	Heliographic			Diameter (arcmin)	RA (HH:MM)	Dec (deg)
		<i>Lo</i>	<i>Bo</i>	<i>Po</i>			
6/16/2015	2164	21.71	1.08	-9.52	31.489	05:36.8	23.33
6/17/2015	2164	8.47	1.20	-9.09	31.486	05:40.9	23.37
6/18/2015	2165	355.23	1.32	-8.66	31.483	05:45.1	23.39
6/19/2015	2165	341.99	1.44	-8.22	31.481	05:49.3	23.42
6/20/2015	2165	328.75	1.55	-7.78	31.479	05:53.4	23.43
6/21/2015	2165	315.50	1.67	-7.34	31.476	05:57.6	23.44
6/22/2015	2165	302.26	1.79	-6.90	31.474	06:1.7	23.44
6/23/2015	2165	289.02	1.90	-6.46	31.473	06:5.9	23.44
6/24/2015	2165	275.78	2.02	-6.01	31.471	06:10.0	23.42
6/25/2015	2165	262.54	2.14	-5.56	31.469	06:14.2	23.40
6/26/2015	2165	249.30	2.25	-5.12	31.468	06:18.3	23.38
6/27/2015	2165	236.06	2.36	-4.67	31.467	06:22.5	23.35
6/28/2015	2165	222.82	2.48	-4.21	31.466	06:26.6	23.31
6/29/2015	2165	209.58	2.59	-3.76	31.465	06:30.8	23.26
6/30/2015	2165	196.34	2.70	-3.31	31.464	06:34.9	23.21
7/1/2015	2165	183.10	2.81	-2.86	31.463	06:39.1	23.14
7/2/2015	2165	169.86	2.92	-2.41	31.463	06:43.2	23.08
7/3/2015	2165	156.62	3.03	-1.95	31.462	06:47.3	23.00
7/4/2015	2165	143.44	3.14	-1.50	31.462	06:51.5	22.92
7/5/2015	2165	130.20	3.25	-1.05	31.462	06:55.6	22.84
7/6/2015	2165	116.96	3.36	-0.59	31.462	06:59.7	22.74
7/7/2015	2165	103.72	3.46	-0.14	31.462	07:3.8	22.64
7/8/2015	2165	90.49	3.57	0.31	31.462	07:7.9	22.54
7/9/2015	2165	77.25	3.67	0.76	31.463	07:12.0	22.42
7/10/2015	2165	64.01	3.78	1.21	31.464	07:16.1	22.30
7/11/2015	2165	50.77	3.88	1.66	31.464	07:20.2	22.18
7/12/2015	2165	37.53	3.98	2.11	31.465	07:24.2	22.05
7/13/2015	2165	24.29	4.08	2.56	31.466	07:28.3	21.91
7/14/2015	2165	11.06	4.18	3.01	31.468	07:32.4	21.76
7/15/2015	2166	357.82	4.28	3.45	31.469	07:36.4	21.61
7/16/2015	2166	344.58	4.37	3.89	31.471	07:40.5	21.45
7/17/2015	2166	331.35	4.47	4.33	31.472	07:44.5	21.29
7/18/2015	2166	318.11	4.56	4.77	31.474	07:48.5	21.12
7/19/2015	2166	304.88	4.66	5.21	31.476	07:52.5	20.95
7/20/2015	2166	291.64	4.75	5.64	31.478	07:56.5	20.76
7/21/2015	2166	278.41	4.84	6.08	31.480	08:0.5	20.58
7/22/2015	2166	265.17	4.93	6.51	31.483	08:4.5	20.38
7/23/2015	2166	251.94	5.02	6.93	31.485	08:8.5	20.19

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Calendar Date	Rotation Number	Heliographic			Diameter (arcmin)	RA (HH:MM)	Dec (deg)
		Lo	Bo	Po			
7/24/2015	2166	238.77	5.10	7.36	31.488	08:12.5	19.98
7/25/2015	2166	225.53	5.19	7.78	31.491	08:16.4	19.77
7/26/2015	2166	212.30	5.27	8.20	31.494	08:20.4	19.56
7/27/2015	2166	199.07	5.35	8.62	31.497	08:24.3	19.34
7/28/2015	2166	185.84	5.43	9.03	31.500	08:28.3	19.11
7/29/2015	2166	172.61	5.51	9.44	31.504	08:32.2	18.88
7/30/2015	2166	159.38	5.59	9.85	31.507	08:36.1	18.64
7/31/2015	2166	146.15	5.67	10.25	31.511	08:40.0	18.40
8/1/2015	2166	132.92	5.74	10.65	31.515	08:43.9	18.16
8/2/2015	2166	119.69	5.82	11.05	31.519	08:47.8	17.90
8/3/2015	2166	106.46	5.89	11.44	31.523	08:51.6	17.65
8/4/2015	2166	93.23	5.96	11.83	31.527	08:55.5	17.39
8/5/2015	2166	80.00	6.03	12.22	31.531	08:59.4	17.12
8/6/2015	2166	66.78	6.09	12.60	31.536	09:3.2	16.85
8/7/2015	2166	53.55	6.16	12.98	31.540	09:7.0	16.58
8/8/2015	2166	40.32	6.22	13.35	31.545	09:10.9	16.30
8/9/2015	2166	27.10	6.28	13.72	31.550	09:14.7	16.01
8/10/2015	2166	13.87	6.34	14.09	31.555	09:18.5	15.73
8/11/2015	2166	0.65	6.40	14.45	31.560	09:22.3	15.43
8/12/2015	2167	347.43	6.46	14.81	31.565	09:26.0	15.14
8/13/2015	2167	334.26	6.51	15.16	31.570	09:29.8	14.84
8/14/2015	2167	321.04	6.56	15.51	31.576	09:33.6	14.53
8/15/2015	2167	307.82	6.61	15.85	31.582	09:37.3	14.23
8/16/2015	2167	294.60	6.66	16.19	31.587	09:41.1	13.91
8/17/2015	2167	281.38	6.71	16.53	31.593	09:44.8	13.60
8/18/2015	2167	268.16	6.75	16.86	31.599	09:48.6	13.28
8/19/2015	2167	254.94	6.80	17.18	31.605	09:52.3	12.96
8/20/2015	2167	241.72	6.84	17.50	31.611	09:56.0	12.63
8/21/2015	2167	228.50	6.88	17.82	31.618	09:59.7	12.30
8/22/2015	2167	215.28	6.92	18.13	31.624	10:3.4	11.97
8/23/2015	2167	202.06	6.95	18.43	31.630	10:7.1	11.63
8/24/2015	2167	188.85	6.99	18.73	31.637	10:10.8	11.29
8/25/2015	2167	175.63	7.02	19.03	31.644	10:14.4	10.95
8/26/2015	2167	162.41	7.05	19.32	31.651	10:18.1	10.61
8/27/2015	2167	149.20	7.08	19.61	31.657	10:21.8	10.26
8/28/2015	2167	135.98	7.10	19.89	31.664	10:25.4	9.91
8/29/2015	2167	122.77	7.12	20.16	31.672	10:29.1	9.55
8/30/2015	2167	109.56	7.15	20.43	31.679	10:32.7	9.20

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Calendar Date	Rotation Number	Heliographic			Diameter (arcmin)	RA (HH:MM)	Dec (deg)
		<i>Lo</i>	<i>Bo</i>	<i>Po</i>			
8/31/2015	2167	96.34	7.17	20.69	31.686	10:36.4	8.84
9/1/2015	2167	83.13	7.18	20.95	31.694	10:40.0	8.48
9/2/2015	2167	69.92	7.20	21.21	31.701	10:43.6	8.12
9/3/2015	2167	56.77	7.21	21.45	31.709	10:47.2	7.75
9/4/2015	2167	43.56	7.22	21.70	31.716	10:50.9	7.39
9/5/2015	2167	30.35	7.23	21.93	31.724	10:54.5	7.02
9/6/2015	2167	17.14	7.24	22.16	31.732	10:58.1	6.65
9/7/2015	2167	3.93	7.25	22.39	31.740	11:1.7	6.27
9/8/2015	2168	350.72	7.25	22.61	31.748	11:5.3	5.90
9/9/2015	2168	337.51	7.25	22.82	31.756	11:8.9	5.52
9/10/2015	2168	324.30	7.25	23.03	31.764	11:12.5	5.15
9/11/2015	2168	311.10	7.25	23.23	31.772	11:16.1	4.77
9/12/2015	2168	297.89	7.24	23.42	31.780	11:19.7	4.39
9/13/2015	2168	284.68	7.23	23.61	31.789	11:23.3	4.01
9/14/2015	2168	271.48	7.22	23.80	31.797	11:26.9	3.62
9/15/2015	2168	258.27	7.21	23.97	31.806	11:30.5	3.24
9/16/2015	2168	245.07	7.20	24.14	31.814	11:34.0	2.85
9/17/2015	2168	231.86	7.18	24.31	31.823	11:37.6	2.47
9/18/2015	2168	218.66	7.16	24.47	31.831	11:41.2	2.08
9/19/2015	2168	205.46	7.14	24.62	31.840	11:44.8	1.69
9/20/2015	2168	192.25	7.12	24.76	31.849	11:48.4	1.31
9/21/2015	2168	179.05	7.10	24.90	31.858	11:52.0	0.92
9/22/2015	2168	165.85	7.07	25.04	31.866	11:55.6	0.53
9/23/2015	2168	152.71	7.04	25.16	31.875	11:59.2	0.14
9/24/2015	2168	139.51	7.01	25.28	31.884	12:2.8	-0.25
9/25/2015	2168	126.31	6.98	25.40	31.893	12:6.4	-0.64
9/26/2015	2168	113.11	6.95	25.50	31.902	12:10.0	-1.03
9/27/2015	2168	99.91	6.91	25.60	31.911	12:13.6	-1.42
9/28/2015	2168	86.71	6.87	25.70	31.920	12:17.2	-1.81
9/29/2015	2168	73.51	6.83	25.78	31.929	12:20.8	-2.20
9/30/2015	2168	60.31	6.79	25.86	31.938	12:24.4	-2.59
10/1/2015	2168	47.11	6.74	25.93	31.948	12:28.0	-2.98
10/2/2015	2168	33.91	6.70	26.00	31.957	12:31.6	-3.37
10/3/2015	2168	20.72	6.65	26.06	31.966	12:35.3	-3.75
10/4/2015	2168	7.52	6.60	26.11	31.975	12:38.9	-4.14
10/5/2015	2169	354.32	6.54	26.15	31.984	12:42.5	-4.53
10/6/2015	2169	341.13	6.49	26.19	31.993	12:46.2	-4.91
10/7/2015	2169	327.93	6.43	26.22	32.003	12:49.8	-5.30

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Calendar Date	Rotation Number	Heliographic			Diameter (arcmin)	RA (HH:MM)	Dec (deg)
		Lo	Bo	Po			
10/8/2015	2169	314.74	6.37	26.25	32.012	12:53.5	-5.68
10/9/2015	2169	301.54	6.31	26.26	32.021	12:57.2	-6.06
10/10/2015	2169	288.34	6.25	26.27	32.030	13:0.8	-6.44
10/11/2015	2169	275.15	6.18	26.27	32.040	13:4.5	-6.82
10/12/2015	2169	261.96	6.12	26.27	32.049	13:8.2	-7.20
10/13/2015	2169	248.82	6.05	26.25	32.058	13:11.9	-7.57
10/14/2015	2169	235.63	5.98	26.23	32.067	13:15.6	-7.95
10/15/2015	2169	222.44	5.91	26.20	32.076	13:19.3	-8.32
10/16/2015	2169	209.24	5.83	26.17	32.085	13:23.0	-8.69
10/17/2015	2169	196.05	5.76	26.12	32.095	13:26.8	-9.06
10/18/2015	2169	182.86	5.68	26.07	32.104	13:30.5	-9.43
10/19/2015	2169	169.67	5.60	26.01	32.113	13:34.2	-9.79
10/20/2015	2169	156.47	5.52	25.95	32.122	13:38.0	-10.15
10/21/2015	2169	143.28	5.44	25.87	32.131	13:41.8	-10.51
10/22/2015	2169	130.09	5.36	25.79	32.140	13:45.6	-10.87
10/23/2015	2169	116.90	5.27	25.70	32.149	13:49.4	-11.22
10/24/2015	2169	103.71	5.18	25.61	32.158	13:53.2	-11.57
10/25/2015	2169	90.52	5.09	25.50	32.166	13:57.0	-11.92
10/26/2015	2169	77.33	5.00	25.39	32.175	14:0.8	-12.26
10/27/2015	2169	64.14	4.91	25.27	32.184	14:4.6	-12.61
10/28/2015	2169	50.95	4.82	25.14	32.193	14:8.5	-12.94
10/29/2015	2169	37.76	4.72	25.00	32.201	14:12.4	-13.28
10/30/2015	2169	24.57	4.63	24.86	32.210	14:16.2	-13.61
10/31/2015	2169	11.38	4.53	24.71	32.218	14:20.1	-13.94
11/1/2015	2170	358.19	4.43	24.55	32.227	14:24.0	-14.26
11/2/2015	2170	345.06	4.33	24.38	32.235	14:27.9	-14.58
11/3/2015	2170	331.88	4.22	24.20	32.244	14:31.9	-14.90
11/4/2015	2170	318.69	4.12	24.02	32.252	14:35.8	-15.21
11/5/2015	2170	305.50	4.02	23.83	32.260	14:39.8	-15.52
11/6/2015	2170	292.31	3.91	23.63	32.268	14:43.7	-15.83
11/7/2015	2170	279.12	3.80	23.42	32.276	14:47.7	-16.13
11/8/2015	2170	265.94	3.69	23.21	32.284	14:51.7	-16.42
11/9/2015	2170	252.75	3.58	22.99	32.292	14:55.7	-16.71
11/10/2015	2170	239.56	3.47	22.76	32.300	14:59.8	-17.00
11/11/2015	2170	226.37	3.36	22.52	32.307	15:3.8	-17.28
11/12/2015	2170	213.19	3.25	22.27	32.315	15:7.9	-17.56
11/13/2015	2170	200.00	3.13	22.02	32.322	15:11.9	-17.83
11/14/2015	2170	186.82	3.02	21.76	32.330	15:16.0	-18.09

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Calendar Date	Rotation Number	Heliographic			Diameter (arcmin)	RA (HH:MM)	Dec (deg)
		<i>Lo</i>	<i>Bo</i>	<i>Po</i>			
11/15/2015	2170	173.63	2.90	21.49	32.337	15:20.1	-18.35
11/16/2015	2170	160.44	2.79	21.21	32.344	15:24.2	-18.61
11/17/2015	2170	147.26	2.67	20.93	32.351	15:28.3	-18.86
11/18/2015	2170	134.07	2.55	20.64	32.358	15:32.5	-19.10
11/19/2015	2170	120.89	2.43	20.34	32.365	15:36.6	-19.34
11/20/2015	2170	107.70	2.31	20.03	32.372	15:40.8	-19.57
11/21/2015	2170	94.52	2.19	19.72	32.379	15:45.0	-19.80
11/22/2015	2170	81.40	2.07	19.40	32.385	15:49.2	-20.02
11/23/2015	2170	68.21	1.94	19.08	32.392	15:53.4	-20.24
11/24/2015	2170	55.03	1.82	18.74	32.398	15:57.6	-20.44
11/25/2015	2170	41.85	1.70	18.40	32.404	16:1.8	-20.65
11/26/2015	2170	28.66	1.57	18.05	32.410	16:6.1	-20.84
11/27/2015	2170	15.48	1.45	17.70	32.416	16:10.3	-21.03
11/28/2015	2170	2.30	1.32	17.34	32.422	16:14.6	-21.21
11/29/2015	2171	349.11	1.20	16.97	32.428	16:18.9	-21.39
11/30/2015	2171	335.93	1.07	16.60	32.433	16:23.2	-21.56
12/1/2015	2171	322.75	0.94	16.22	32.439	16:27.5	-21.72
12/2/2015	2171	309.57	0.82	15.84	32.444	16:31.8	-21.88
12/3/2015	2171	296.39	0.69	15.45	32.449	16:36.1	-22.03
12/4/2015	2171	283.20	0.56	15.05	32.454	16:40.4	-22.17
12/5/2015	2171	270.02	0.43	14.65	32.459	16:44.8	-22.30
12/6/2015	2171	256.84	0.31	14.24	32.463	16:49.1	-22.43
12/7/2015	2171	243.66	0.18	13.83	32.468	16:53.5	-22.55
12/8/2015	2171	230.48	0.05	13.41	32.472	16:57.9	-22.66
12/9/2015	2171	217.30	-0.08	12.98	32.477	17:2.3	-22.77
12/10/2015	2171	204.12	-0.21	12.56	32.481	17:6.6	-22.87
12/11/2015	2171	190.94	-0.33	12.13	32.485	17:11.0	-22.96
12/12/2015	2171	177.82	-0.46	11.69	32.488	17:15.4	-23.04
12/13/2015	2171	164.64	-0.59	11.25	32.492	17:19.8	-23.11
12/14/2015	2171	151.46	-0.72	10.80	32.496	17:24.3	-23.18
12/15/2015	2171	138.28	-0.85	10.35	32.499	17:28.7	-23.24
12/16/2015	2171	125.11	-0.97	9.90	32.502	17:33.1	-23.29
12/17/2015	2171	111.93	-1.10	9.44	32.505	17:37.5	-23.34
12/18/2015	2171	98.75	-1.23	8.98	32.508	17:41.9	-23.37
12/19/2015	2171	85.57	-1.35	8.52	32.511	17:46.4	-23.40
12/20/2015	2171	72.39	-1.48	8.06	32.513	17:50.8	-23.42
12/21/2015	2171	59.22	-1.60	7.59	32.516	17:55.2	-23.44
12/22/2015	2171	46.04	-1.73	7.12	32.518	17:59.7	-23.44

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Calendar Date	Rotation Number	Heliographic			Diameter (arcmin)	RA (HH:MM)	Dec (deg)
		Lo	Bo	Po			
12/23/2015	2171	32.86	-1.85	6.65	32.520	18:4.1	-23.44
12/24/2015	2171	19.69	-1.98	6.17	32.522	18:8.6	-23.43
12/25/2015	2171	6.51	-2.10	5.69	32.523	18:13.0	-23.41
12/26/2015	2172	353.33	-2.22	5.21	32.525	18:17.4	-23.38
12/27/2015	2172	340.16	-2.35	4.73	32.526	18:21.9	-23.35
12/28/2015	2172	326.98	-2.47	4.25	32.528	18:26.3	-23.31
12/29/2015	2172	313.81	-2.59	3.77	32.529	18:30.7	-23.26
12/30/2015	2172	300.63	-2.71	3.29	32.530	18:35.2	-23.20
12/31/2015	2172	287.46	-2.83	2.80	32.530	18:39.6	-23.14
1/1/2016	2172	274.28	-2.94	2.32	32.531	18:44.0	-23.06
1/2/2016	2172	261.17	-3.06	1.83	32.531	18:48.4	-22.98
1/3/2016	2172	248.00	-3.18	1.35	32.531	18:52.8	-22.90
1/4/2016	2172	234.82	-3.29	0.87	32.531	18:57.2	-22.80
1/5/2016	2172	221.65	-3.41	0.38	32.531	19:1.6	-22.70
1/6/2016	2172	208.48	-3.52	-0.10	32.531	19:6.0	-22.59
1/7/2016	2172	195.30	-3.63	-0.59	32.530	19:10.4	-22.47
1/8/2016	2172	182.13	-3.74	-1.07	32.530	19:14.8	-22.34
1/9/2016	2172	168.96	-3.85	-1.55	32.529	19:19.1	-22.21
1/10/2016	2172	155.78	-3.96	-2.03	32.528	19:23.5	-22.07
1/11/2016	2172	142.61	-4.07	-2.51	32.527	19:27.8	-21.92
1/12/2016	2172	129.44	-4.17	-2.98	32.526	19:32.2	-21.77
1/13/2016	2172	116.27	-4.28	-3.46	32.524	19:36.5	-21.61
1/14/2016	2172	103.10	-4.38	-3.93	32.522	19:40.8	-21.44
1/15/2016	2172	89.93	-4.48	-4.40	32.521	19:45.1	-21.26
1/16/2016	2172	76.75	-4.58	-4.87	32.519	19:49.4	-21.08
1/17/2016	2172	63.58	-4.68	-5.33	32.517	19:53.7	-20.89
1/18/2016	2172	50.41	-4.78	-5.80	32.514	19:58.0	-20.70
1/19/2016	2172	37.24	-4.88	-6.26	32.512	20:2.2	-20.50
1/20/2016	2172	24.07	-4.97	-6.72	32.509	20:6.5	-20.29
1/21/2016	2172	10.90	-5.06	-7.17	32.506	20:10.7	-20.07
1/22/2016	2173	357.79	-5.16	-7.62	32.503	20:14.9	-19.85
1/23/2016	2173	344.62	-5.24	-8.07	32.500	20:19.2	-19.63
1/24/2016	2173	331.45	-5.33	-8.51	32.497	20:23.4	-19.39
1/25/2016	2173	318.28	-5.42	-8.95	32.494	20:27.5	-19.15
1/26/2016	2173	305.11	-5.50	-9.39	32.490	20:31.7	-18.91
1/27/2016	2173	291.94	-5.59	-9.82	32.486	20:35.9	-18.66
1/28/2016	2173	278.77	-5.67	-10.25	32.482	20:40.0	-18.40
1/29/2016	2173	265.60	-5.75	-10.68	32.478	20:44.2	-18.14

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Calendar Date	Rotation Number	Heliographic			Diameter (arcmin)	RA (HH:MM)	Dec (deg)
		Lo	Bo	Po			
1/30/2016	2173	252.43	-5.82	-11.10	32.474	20:48.3	-17.87
1/31/2016	2173	239.26	-5.90	-11.52	32.470	20:52.4	-17.60
2/1/2016	2173	226.09	-5.97	-11.93	32.465	20:56.5	-17.32
2/2/2016	2173	212.92	-6.05	-12.34	32.461	21:0.6	-17.04
2/3/2016	2173	199.75	-6.12	-12.74	32.456	21:4.6	-16.75
2/4/2016	2173	186.58	-6.18	-13.14	32.451	21:8.7	-16.46
2/5/2016	2173	173.41	-6.25	-13.53	32.446	21:12.7	-16.16
2/6/2016	2173	160.24	-6.31	-13.92	32.441	21:16.7	-15.86
2/7/2016	2173	147.07	-6.38	-14.30	32.435	21:20.8	-15.55
2/8/2016	2173	133.90	-6.44	-14.68	32.430	21:24.7	-15.24
2/9/2016	2173	120.73	-6.49	-15.06	32.424	21:28.7	-14.92
2/10/2016	2173	107.56	-6.55	-15.43	32.419	21:32.7	-14.60
2/11/2016	2173	94.45	-6.60	-15.79	32.413	21:36.7	-14.28
2/12/2016	2173	81.28	-6.66	-16.15	32.407	21:40.6	-13.95
2/13/2016	2173	68.11	-6.71	-16.50	32.401	21:44.6	-13.62
2/14/2016	2173	54.94	-6.75	-16.85	32.394	21:48.5	-13.29
2/15/2016	2173	41.77	-6.80	-17.19	32.388	21:52.4	-12.95
2/16/2016	2173	28.60	-6.84	-17.53	32.382	21:56.3	-12.60
2/17/2016	2173	15.43	-6.88	-17.86	32.375	21:60.2	-12.26
2/18/2016	2173	2.25	-6.92	-18.18	32.368	22:4.0	-11.91
2/19/2016	2174	349.08	-6.96	-18.50	32.361	22:7.9	-11.56
2/20/2016	2174	335.91	-6.99	-18.81	32.354	22:11.8	-11.20
2/21/2016	2174	322.74	-7.03	-19.12	32.347	22:15.6	-10.84
2/22/2016	2174	309.57	-7.06	-19.42	32.340	22:19.4	-10.48
2/23/2016	2174	296.39	-7.09	-19.72	32.333	22:23.2	-10.12
2/24/2016	2174	283.22	-7.11	-20.01	32.326	22:27.0	-9.75
2/25/2016	2174	270.05	-7.14	-20.29	32.318	22:30.8	-9.38
2/26/2016	2174	256.87	-7.16	-20.57	32.311	22:34.6	-9.01
2/27/2016	2174	243.70	-7.18	-20.84	32.303	22:38.4	-8.64
2/28/2016	2174	230.52	-7.19	-21.11	32.295	22:42.2	-8.26
2/29/2016	2174	217.35	-7.21	-21.36	32.287	22:45.9	-7.89
3/1/2016	2174	204.17	-7.22	-21.62	32.279	22:49.7	-7.51
3/2/2016	2174	191.06	-7.23	-21.86	32.272	22:53.4	-7.12
3/3/2016	2174	177.88	-7.24	-22.10	32.263	22:57.2	-6.74
3/4/2016	2174	164.71	-7.24	-22.34	32.255	23:0.9	-6.36
3/5/2016	2174	151.53	-7.25	-22.56	32.247	23:4.6	-5.97
3/6/2016	2174	138.35	-7.25	-22.79	32.239	23:8.3	-5.58
3/7/2016	2174	125.17	-7.25	-23.00	32.230	23:12.0	-5.19

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Calendar Date	Rotation Number	Heliographic			Diameter (arcmin)	RA (HH:MM)	Dec (deg)
		Lo	Bo	Po			
3/8/2016	2174	111.99	-7.25	-23.21	32.222	23:15.7	-4.80
3/9/2016	2174	98.81	-7.24	-23.41	32.213	23:19.4	-4.41
3/10/2016	2174	85.63	-7.23	-23.60	32.205	23:23.1	-4.02
3/11/2016	2174	72.45	-7.22	-23.79	32.196	23:26.8	-3.63
3/12/2016	2174	59.27	-7.21	-23.97	32.188	23:30.5	-3.24
3/13/2016	2174	46.09	-7.20	-24.15	32.179	23:34.2	-2.84
3/14/2016	2174	32.91	-7.18	-24.32	32.170	23:37.8	-2.45
3/15/2016	2174	19.73	-7.16	-24.48	32.161	23:41.5	-2.05
3/16/2016	2174	6.54	-7.14	-24.63	32.152	23:45.2	-1.66
3/17/2016	2175	353.36	-7.12	-24.78	32.143	23:48.8	-1.26
3/18/2016	2175	340.17	-7.10	-24.92	32.135	23:52.5	-0.87
3/19/2016	2175	326.99	-7.07	-25.06	32.126	23:56.1	-0.47
3/20/2016	2175	313.80	-7.04	-25.18	32.116	23:59.8	-0.07
3/21/2016	2175	300.62	-7.01	-25.30	32.107	00:3.4	0.32
3/22/2016	2175	287.49	-6.97	-25.42	32.098	00:7.1	0.72
3/23/2016	2175	274.30	-6.94	-25.52	32.089	00:10.7	1.11
3/24/2016	2175	261.11	-6.90	-25.62	32.080	00:14.3	1.51
3/25/2016	2175	247.92	-6.86	-25.71	32.071	00:18.0	1.90
3/26/2016	2175	234.73	-6.82	-25.80	32.062	00:21.6	2.29
3/27/2016	2175	221.54	-6.78	-25.88	32.053	00:25.3	2.68
3/28/2016	2175	208.35	-6.73	-25.95	32.043	00:28.9	3.07
3/29/2016	2175	195.16	-6.68	-26.01	32.034	00:32.6	3.46
3/30/2016	2175	181.97	-6.63	-26.07	32.025	00:36.2	3.85
3/31/2016	2175	168.77	-6.58	-26.12	32.016	00:39.8	4.24
4/1/2016	2175	155.58	-6.53	-26.16	32.007	00:43.5	4.63
4/2/2016	2175	142.38	-6.47	-26.20	31.997	00:47.1	5.01
4/3/2016	2175	129.18	-6.42	-26.23	31.988	00:50.8	5.40
4/4/2016	2175	115.99	-6.36	-26.25	31.979	00:54.4	5.78
4/5/2016	2175	102.79	-6.30	-26.26	31.970	00:58.1	6.16
4/6/2016	2175	89.59	-6.23	-26.27	31.961	01:1.8	6.54
4/7/2016	2175	76.39	-6.17	-26.27	31.951	01:5.4	6.92
4/8/2016	2175	63.19	-6.10	-26.26	31.942	01:9.1	7.29
4/9/2016	2175	49.99	-6.03	-26.25	31.933	01:12.8	7.66
4/10/2016	2175	36.79	-5.96	-26.22	31.924	01:16.4	8.03
4/11/2016	2175	23.65	-5.89	-26.19	31.915	01:20.1	8.40
4/12/2016	2175	10.44	-5.82	-26.16	31.906	01:23.8	8.77
4/13/2016	2176	357.24	-5.74	-26.11	31.897	01:27.5	9.13
4/14/2016	2176	344.03	-5.67	-26.06	31.888	01:31.2	9.49

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Calendar Date	Rotation Number	Heliographic			Diameter (arcmin)	RA (HH:MM)	Dec (deg)
		<i>Lo</i>	<i>Bo</i>	<i>Po</i>			
4/15/2016	2176	330.83	-5.59	-26.00	31.879	01:34.9	9.85
4/16/2016	2176	317.62	-5.51	-25.94	31.870	01:38.6	10.21
4/17/2016	2176	304.41	-5.43	-25.86	31.861	01:42.3	10.56
4/18/2016	2176	291.20	-5.35	-25.78	31.852	01:46.0	10.91
4/19/2016	2176	277.99	-5.26	-25.69	31.844	01:49.7	11.26
4/20/2016	2176	264.78	-5.18	-25.60	31.835	01:53.5	11.60
4/21/2016	2176	251.57	-5.09	-25.49	31.826	01:57.2	11.94
4/22/2016	2176	238.36	-5.00	-25.38	31.818	02:1.0	12.28
4/23/2016	2176	225.15	-4.91	-25.26	31.809	02:4.7	12.61
4/24/2016	2176	211.93	-4.82	-25.14	31.801	02:8.5	12.94
4/25/2016	2176	198.72	-4.73	-25.01	31.792	02:12.2	13.27
4/26/2016	2176	185.50	-4.63	-24.87	31.784	02:16.0	13.59
4/27/2016	2176	172.29	-4.54	-24.72	31.776	02:19.8	13.91
4/28/2016	2176	159.07	-4.44	-24.56	31.767	02:23.6	14.23
4/29/2016	2176	145.85	-4.34	-24.40	31.759	02:27.4	14.54
4/30/2016	2176	132.64	-4.24	-24.23	31.751	02:31.2	14.85
5/1/2016	2176	119.48	-4.14	-24.06	31.743	02:35.0	15.15
5/2/2016	2176	106.26	-4.04	-23.87	31.735	02:38.9	15.45
5/3/2016	2176	93.04	-3.94	-23.68	31.727	02:42.7	15.75
5/4/2016	2176	79.82	-3.84	-23.48	31.719	02:46.5	16.04
5/5/2016	2176	66.60	-3.73	-23.28	31.712	02:50.4	16.32
5/6/2016	2176	53.37	-3.63	-23.07	31.704	02:54.3	16.61
5/7/2016	2176	40.15	-3.52	-22.85	31.697	02:58.1	16.88
5/8/2016	2176	26.93	-3.41	-22.62	31.689	03:2.0	17.16
5/9/2016	2176	13.70	-3.30	-22.39	31.682	03:5.9	17.42
5/10/2016	2177	0.48	-3.19	-22.15	31.675	03:9.8	17.69
5/11/2016	2177	347.25	-3.08	-21.90	31.667	03:13.7	17.94
5/12/2016	2177	334.02	-2.97	-21.65	31.660	03:17.7	18.20
5/13/2016	2177	320.80	-2.86	-21.39	31.653	03:21.6	18.45
5/14/2016	2177	307.57	-2.75	-21.12	31.647	03:25.5	18.69
5/15/2016	2177	294.34	-2.64	-20.85	31.640	03:29.5	18.93
5/16/2016	2177	281.11	-2.52	-20.57	31.633	03:33.4	19.16
5/17/2016	2177	267.88	-2.41	-20.28	31.627	03:37.4	19.38
5/18/2016	2177	254.65	-2.29	-19.99	31.620	03:41.4	19.61
5/19/2016	2177	241.42	-2.18	-19.69	31.614	03:45.4	19.82
5/20/2016	2177	228.19	-2.06	-19.39	31.608	03:49.4	20.03
5/21/2016	2177	214.96	-1.94	-19.08	31.602	03:53.4	20.24
5/22/2016	2177	201.79	-1.83	-18.76	31.596	03:57.4	20.43

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Calendar Date	Rotation Number	Heliographic			Diameter (arcmin)	RA (HH:MM)	Dec (deg)
		Lo	Bo	Po			
5/23/2016	2177	188.55	-1.71	-18.44	31.590	04:1.4	20.63
5/24/2016	2177	175.32	-1.59	-18.11	31.584	04:5.4	20.81
5/25/2016	2177	162.08	-1.47	-17.77	31.578	04:9.5	20.99
5/26/2016	2177	148.85	-1.35	-17.43	31.573	04:13.5	21.17
5/27/2016	2177	135.62	-1.24	-17.09	31.567	04:17.6	21.34
5/28/2016	2177	122.38	-1.12	-16.73	31.562	04:21.6	21.50
5/29/2016	2177	109.14	-1.00	-16.38	31.557	04:25.7	21.66
5/30/2016	2177	95.91	-0.88	-16.02	31.552	04:29.8	21.81
5/31/2016	2177	82.67	-0.76	-15.65	31.547	04:33.9	21.95
6/1/2016	2177	69.44	-0.64	-15.28	31.542	04:38.0	22.09
6/2/2016	2177	56.20	-0.52	-14.90	31.538	04:42.1	22.22
6/3/2016	2177	42.96	-0.39	-14.52	31.533	04:46.2	22.34
6/4/2016	2177	29.72	-0.27	-14.13	31.529	04:50.3	22.46
6/5/2016	2177	16.48	-0.15	-13.74	31.524	04:54.4	22.57
6/6/2016	2177	3.25	-0.03	-13.35	31.520	04:58.5	22.68
6/7/2016	2178	350.01	0.09	-12.95	31.516	05:2.6	22.78
6/8/2016	2178	336.77	0.21	-12.54	31.512	05:6.8	22.87
6/9/2016	2178	323.53	0.33	-12.14	31.509	05:10.9	22.95
6/10/2016	2178	310.29	0.45	-11.73	31.505	05:15.0	23.03
6/11/2016	2178	297.11	0.57	-11.31	31.502	05:19.2	23.10
6/12/2016	2178	283.87	0.69	-10.90	31.498	05:23.3	23.17
6/13/2016	2178	270.63	0.81	-10.47	31.495	05:27.5	23.23
6/14/2016	2178	257.39	0.93	-10.05	31.492	05:31.6	23.28
6/15/2016	2178	244.15	1.05	-9.62	31.489	05:35.8	23.32
6/16/2016	2178	230.91	1.17	-9.19	31.487	05:39.9	23.36
6/17/2016	2178	217.67	1.29	-8.76	31.484	05:44.1	23.39
6/18/2016	2178	204.43	1.41	-8.33	31.481	05:48.3	23.41
6/19/2016	2178	191.19	1.52	-7.89	31.479	05:52.4	23.43
6/20/2016	2178	177.95	1.64	-7.45	31.477	05:56.6	23.44
6/21/2016	2178	164.71	1.76	-7.01	31.475	06:0.7	23.44
6/22/2016	2178	151.47	1.87	-6.56	31.473	06:4.9	23.44
6/23/2016	2178	138.23	1.99	-6.12	31.471	06:9.0	23.43
6/24/2016	2178	124.99	2.11	-5.67	31.470	06:13.2	23.41
6/25/2016	2178	111.75	2.22	-5.22	31.468	06:17.3	23.39
6/26/2016	2178	98.50	2.33	-4.78	31.467	06:21.5	23.35
6/27/2016	2178	85.26	2.45	-4.32	31.466	06:25.6	23.32
6/28/2016	2178	72.02	2.56	-3.87	31.465	06:29.8	23.27
6/29/2016	2178	58.78	2.67	-3.42	31.464	06:33.9	23.22

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Calendar Date	Rotation Number	Heliographic			Diameter (arcmin)	RA (HH:MM)	Dec (deg)
		<i>Lo</i>	<i>Bo</i>	<i>Po</i>			
6/30/2016	2178	45.54	2.78	-2.97	31.463	06:38.1	23.16
7/1/2016	2178	32.37	2.90	-2.52	31.463	06:42.2	23.09
7/2/2016	2178	19.13	3.01	-2.06	31.462	06:46.3	23.02
7/3/2016	2178	5.89	3.11	-1.61	31.462	06:50.5	22.94
7/4/2016	2179	352.65	3.22	-1.16	31.462	06:54.6	22.86
7/5/2016	2179	339.41	3.33	-0.70	31.462	06:58.7	22.77
7/6/2016	2179	326.17	3.44	-0.25	31.462	07:2.8	22.67
7/7/2016	2179	312.93	3.54	0.20	31.462	07:6.9	22.56
7/8/2016	2179	299.69	3.65	0.65	31.463	07:11.0	22.45
7/9/2016	2179	286.45	3.75	1.10	31.463	07:15.1	22.33
7/10/2016	2179	273.21	3.85	1.55	31.464	07:19.2	22.21
7/11/2016	2179	259.98	3.95	2.00	31.465	07:23.3	22.08
7/12/2016	2179	246.74	4.05	2.45	31.466	07:27.3	21.94
7/13/2016	2179	233.50	4.15	2.90	31.467	07:31.4	21.80
7/14/2016	2179	220.26	4.25	3.34	31.469	07:35.4	21.65
7/15/2016	2179	207.03	4.35	3.78	31.470	07:39.5	21.49
7/16/2016	2179	193.79	4.45	4.23	31.472	07:43.5	21.33
7/17/2016	2179	180.56	4.54	4.67	31.474	07:47.5	21.16
7/18/2016	2179	167.32	4.63	5.10	31.476	07:51.6	20.99
7/19/2016	2179	154.08	4.73	5.54	31.478	07:55.6	20.81
7/20/2016	2179	140.85	4.82	5.97	31.480	07:59.6	20.62
7/21/2016	2179	127.68	4.91	6.40	31.482	08:3.6	20.43
7/22/2016	2179	114.44	4.99	6.83	31.485	08:7.5	20.23
7/23/2016	2179	101.21	5.08	7.26	31.487	08:11.5	20.03
7/24/2016	2179	87.98	5.17	7.68	31.490	08:15.5	19.82
7/25/2016	2179	74.74	5.25	8.10	31.493	08:19.4	19.61
7/26/2016	2179	61.51	5.33	8.52	31.496	08:23.4	19.39
7/27/2016	2179	48.28	5.41	8.93	31.499	08:27.3	19.17
7/28/2016	2179	35.05	5.49	9.34	31.503	08:31.2	18.94
7/29/2016	2179	21.82	5.57	9.75	31.506	08:35.2	18.70
7/30/2016	2179	8.59	5.65	10.15	31.510	08:39.1	18.46
7/31/2016	2180	355.36	5.72	10.55	31.514	08:43.0	18.22
8/1/2016	2180	342.13	5.80	10.95	31.518	08:46.8	17.97
8/2/2016	2180	328.90	5.87	11.35	31.522	08:50.7	17.71
8/3/2016	2180	315.67	5.94	11.74	31.526	08:54.6	17.45
8/4/2016	2180	302.44	6.01	12.12	31.530	08:58.4	17.19
8/5/2016	2180	289.22	6.07	12.51	31.535	09:2.3	16.92
8/6/2016	2180	275.99	6.14	12.89	31.539	09:6.1	16.64

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Calendar Date	Rotation Number	Heliographic			Diameter (arcmin)	RA (HH:MM)	Dec (deg)
		Lo	Bo	Po			
8/7/2016	2180	262.76	6.20	13.26	31.544	09:9.9	16.37
8/8/2016	2180	249.54	6.27	13.63	31.549	09:13.7	16.08
8/9/2016	2180	236.31	6.33	14.00	31.554	09:17.6	15.80
8/10/2016	2180	223.15	6.38	14.36	31.559	09:21.3	15.51
8/11/2016	2180	209.93	6.44	14.72	31.564	09:25.1	15.21
8/12/2016	2180	196.70	6.50	15.07	31.569	09:28.9	14.91
8/13/2016	2180	183.48	6.55	15.42	31.575	09:32.7	14.61
8/14/2016	2180	170.26	6.60	15.77	31.580	09:36.4	14.30
8/15/2016	2180	157.04	6.65	16.11	31.586	09:40.2	13.99
8/16/2016	2180	143.82	6.70	16.44	31.592	09:43.9	13.67
8/17/2016	2180	130.60	6.74	16.77	31.598	09:47.7	13.36
8/18/2016	2180	117.38	6.79	17.10	31.604	09:51.4	13.03
8/19/2016	2180	104.16	6.83	17.42	31.610	09:55.1	12.71
8/20/2016	2180	90.94	6.87	17.74	31.616	09:58.8	12.38
8/21/2016	2180	77.72	6.91	18.05	31.622	10:2.5	12.05
8/22/2016	2180	64.50	6.94	18.36	31.629	10:6.2	11.71
8/23/2016	2180	51.28	6.98	18.66	31.635	10:9.9	11.37
8/24/2016	2180	38.07	7.01	18.96	31.642	10:13.6	11.03
8/25/2016	2180	24.85	7.04	19.25	31.649	10:17.2	10.69
8/26/2016	2180	11.64	7.07	19.54	31.656	10:20.9	10.34
8/27/2016	2180	358.42	7.09	19.82	31.663	10:24.5	9.99
8/28/2016	2181	345.21	7.12	20.09	31.670	10:28.2	9.64
8/29/2016	2181	331.99	7.14	20.36	31.677	10:31.8	9.29
8/30/2016	2181	318.84	7.16	20.63	31.684	10:35.5	8.93
8/31/2016	2181	305.63	7.18	20.89	31.692	10:39.1	8.57
9/1/2016	2181	292.42	7.20	21.14	31.699	10:42.7	8.21
9/2/2016	2181	279.21	7.21	21.39	31.707	10:46.4	7.84
9/3/2016	2181	265.99	7.22	21.64	31.714	10:50.0	7.48
9/4/2016	2181	252.78	7.23	21.87	31.722	10:53.6	7.11
9/5/2016	2181	239.57	7.24	22.11	31.730	10:57.2	6.74
9/6/2016	2181	226.36	7.24	22.33	31.738	11:0.8	6.36
9/7/2016	2181	213.16	7.25	22.55	31.746	11:4.4	5.99
9/8/2016	2181	199.95	7.25	22.77	31.754	11:8.0	5.61
9/9/2016	2181	186.74	7.25	22.97	31.762	11:11.6	5.24
9/10/2016	2181	173.53	7.25	23.18	31.770	11:15.2	4.86
9/11/2016	2181	160.33	7.24	23.37	31.778	11:18.8	4.48
9/12/2016	2181	147.12	7.24	23.57	31.787	11:22.4	4.10
9/13/2016	2181	133.91	7.23	23.75	31.795	11:26.0	3.72

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Calendar Date	Rotation Number	Heliographic			Diameter (arcmin)	RA (HH:MM)	Dec (deg)
		<i>Lo</i>	<i>Bo</i>	<i>Po</i>			
9/14/2016	2181	120.71	7.22	23.93	31.804	11:29.6	3.33
9/15/2016	2181	107.50	7.20	24.10	31.812	11:33.2	2.95
9/16/2016	2181	94.30	7.19	24.27	31.821	11:36.8	2.56
9/17/2016	2181	81.09	7.17	24.43	31.829	11:40.4	2.17
9/18/2016	2181	67.89	7.15	24.58	31.838	11:43.9	1.79
9/19/2016	2181	54.75	7.13	24.73	31.847	11:47.5	1.40
9/20/2016	2181	41.55	7.10	24.87	31.855	11:51.1	1.01
9/21/2016	2181	28.35	7.08	25.00	31.864	11:54.7	0.62
9/22/2016	2181	15.14	7.05	25.13	31.873	11:58.3	0.23
9/23/2016	2181	1.94	7.02	25.25	31.882	12:1.9	-0.16
9/24/2016	2182	348.74	6.99	25.37	31.891	12:5.5	-0.55
9/25/2016	2182	335.54	6.96	25.48	31.900	12:9.1	-0.94
9/26/2016	2182	322.34	6.92	25.58	31.909	12:12.7	-1.33
9/27/2016	2182	309.14	6.88	25.67	31.918	12:16.3	-1.72
9/28/2016	2182	295.94	6.84	25.76	31.927	12:19.9	-2.11
9/29/2016	2182	282.74	6.80	25.84	31.936	12:23.5	-2.50
9/30/2016	2182	269.55	6.75	25.92	31.945	12:27.1	-2.88
10/1/2016	2182	256.35	6.71	25.98	31.954	12:30.8	-3.27
10/2/2016	2182	243.15	6.66	26.04	31.964	12:34.4	-3.66
10/3/2016	2182	229.95	6.61	26.10	31.973	12:38.0	-4.05
10/4/2016	2182	216.76	6.56	26.14	31.982	12:41.7	-4.43
10/5/2016	2182	203.56	6.50	26.18	31.991	12:45.3	-4.82
10/6/2016	2182	190.36	6.45	26.21	32.000	12:48.9	-5.20
10/7/2016	2182	177.17	6.39	26.24	32.010	12:52.6	-5.59
10/8/2016	2182	163.97	6.33	26.26	32.019	12:56.3	-5.97
10/9/2016	2182	150.78	6.27	26.27	32.028	12:59.9	-6.35
10/10/2016	2182	137.65	6.20	26.27	32.037	13:3.6	-6.73
10/11/2016	2182	124.45	6.14	26.27	32.047	13:7.3	-7.11
10/12/2016	2182	111.26	6.07	26.25	32.056	13:11.0	-7.48
10/13/2016	2182	98.06	6.00	26.24	32.065	13:14.7	-7.86
10/14/2016	2182	84.87	5.93	26.21	32.074	13:18.4	-8.23
10/15/2016	2182	71.68	5.85	26.17	32.083	13:22.1	-8.60
10/16/2016	2182	58.48	5.78	26.13	32.092	13:25.8	-8.97
10/17/2016	2182	45.29	5.70	26.08	32.101	13:29.6	-9.34
10/18/2016	2182	32.10	5.62	26.03	32.110	13:33.3	-9.70
10/19/2016	2182	18.91	5.54	25.96	32.120	13:37.1	-10.06
10/20/2016	2182	5.71	5.46	25.89	32.129	13:40.9	-10.42
10/21/2016	2183	352.52	5.38	25.81	32.138	13:44.6	-10.78

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Calendar	Rotation	Heliographic			Diameter	RA	Dec
Date	Number	Lo	Bo	Po	(arcmin)	(HH:MM)	(deg)
10/22/2016	2183	339.33	5.29	25.72	32.146	13:48.4	-11.13
10/23/2016	2183	326.14	5.21	25.63	32.155	13:52.2	-11.49
10/24/2016	2183	312.95	5.12	25.53	32.164	13:56.1	-11.84
10/25/2016	2183	299.76	5.03	25.41	32.173	13:59.9	-12.18
10/26/2016	2183	286.57	4.93	25.30	32.182	14:3.7	-12.52
10/27/2016	2183	273.38	4.84	25.17	32.191	14:7.6	-12.86
10/28/2016	2183	260.19	4.75	25.03	32.199	14:11.4	-13.20
10/29/2016	2183	247.00	4.65	24.89	32.208	14:15.3	-13.53
10/30/2016	2183	233.87	4.55	24.74	32.216	14:19.2	-13.86
10/31/2016	2183	220.68	4.45	24.58	32.225	14:23.1	-14.19
11/1/2016	2183	207.50	4.35	24.42	32.233	14:27.0	-14.51
11/2/2016	2183	194.31	4.25	24.25	32.242	14:30.9	-14.82
11/3/2016	2183	181.12	4.15	24.06	32.250	14:34.9	-15.14
11/4/2016	2183	167.93	4.04	23.87	32.258	14:38.8	-15.45
11/5/2016	2183	154.74	3.94	23.68	32.266	14:42.8	-15.75
11/6/2016	2183	141.55	3.83	23.47	32.274	14:46.8	-16.05
11/7/2016	2183	128.37	3.72	23.26	32.282	14:50.8	-16.35
11/8/2016	2183	115.18	3.61	23.04	32.290	14:54.8	-16.64
11/9/2016	2183	101.99	3.50	22.81	32.298	14:58.8	-16.93
11/10/2016	2183	88.81	3.39	22.57	32.306	15:2.8	-17.21
11/11/2016	2183	75.62	3.28	22.33	32.313	15:6.9	-17.49
11/12/2016	2183	62.43	3.16	22.08	32.321	15:10.9	-17.76
11/13/2016	2183	49.25	3.05	21.82	32.328	15:15.0	-18.03
11/14/2016	2183	36.06	2.93	21.55	32.335	15:19.1	-18.29
11/15/2016	2183	22.88	2.82	21.28	32.343	15:23.2	-18.55
11/16/2016	2183	9.69	2.70	21.00	32.350	15:27.3	-18.80
11/17/2016	2184	356.50	2.58	20.71	32.357	15:31.5	-19.04
11/18/2016	2184	343.32	2.46	20.41	32.364	15:35.6	-19.28
11/19/2016	2184	330.20	2.34	20.11	32.370	15:39.8	-19.52
11/20/2016	2184	317.01	2.22	19.80	32.377	15:44.0	-19.75
11/21/2016	2184	303.83	2.10	19.48	32.384	15:48.2	-19.97
11/22/2016	2184	290.64	1.98	19.16	32.390	15:52.4	-20.18
11/23/2016	2184	277.46	1.85	18.82	32.396	15:56.6	-20.39
11/24/2016	2184	264.28	1.73	18.48	32.403	16:0.8	-20.60
11/25/2016	2184	251.09	1.60	18.14	32.409	16:5.0	-20.80
11/26/2016	2184	237.91	1.48	17.79	32.415	16:9.3	-20.99
11/27/2016	2184	224.73	1.35	17.43	32.421	16:13.6	-21.17
11/28/2016	2184	211.54	1.23	17.06	32.426	16:17.8	-21.35

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Calendar Date	Rotation Number	Heliographic			Diameter (arcmin)	RA (HH:MM)	Dec (deg)
		<i>Lo</i>	<i>Bo</i>	<i>Po</i>			
11/29/2016	2184	198.36	1.10	16.69	32.432	16:22.1	-21.52
11/30/2016	2184	185.18	0.98	16.31	32.437	16:26.4	-21.68
12/1/2016	2184	172.00	0.85	15.93	32.443	16:30.7	-21.84
12/2/2016	2184	158.81	0.72	15.54	32.448	16:35.1	-21.99
12/3/2016	2184	145.63	0.59	15.15	32.453	16:39.4	-22.13
12/4/2016	2184	132.45	0.47	14.74	32.458	16:43.7	-22.27
12/5/2016	2184	119.27	0.34	14.34	32.462	16:48.1	-22.40
12/6/2016	2184	106.09	0.21	13.93	32.467	16:52.4	-22.52
12/7/2016	2184	92.91	0.08	13.51	32.471	16:56.8	-22.64
12/8/2016	2184	79.73	-0.05	13.09	32.476	17:1.2	-22.74
12/9/2016	2184	66.61	-0.17	12.66	32.480	17:5.6	-22.84
12/10/2016	2184	53.43	-0.30	12.23	32.484	17:10.0	-22.93
12/11/2016	2184	40.25	-0.43	11.79	32.488	17:14.4	-23.02
12/12/2016	2184	27.07	-0.56	11.35	32.491	17:18.8	-23.10
12/13/2016	2184	13.89	-0.69	10.91	32.495	17:23.2	-23.17
12/14/2016	2184	0.71	-0.81	10.46	32.498	17:27.6	-23.23
12/15/2016	2185	347.54	-0.94	10.01	32.501	17:32.0	-23.28
12/16/2016	2185	334.36	-1.07	9.56	32.504	17:36.4	-23.33
12/17/2016	2185	321.18	-1.19	9.10	32.507	17:40.9	-23.37
12/18/2016	2185	308.00	-1.32	8.63	32.510	17:45.3	-23.40
12/19/2016	2185	294.82	-1.45	8.17	32.513	17:49.7	-23.42
12/20/2016	2185	281.65	-1.57	7.70	32.515	17:54.2	-23.43
12/21/2016	2185	268.47	-1.70	7.23	32.517	17:58.6	-23.44
12/22/2016	2185	255.29	-1.82	6.76	32.519	18:3.0	-23.44
12/23/2016	2185	242.12	-1.95	6.29	32.521	18:7.5	-23.43
12/24/2016	2185	228.94	-2.07	5.81	32.523	18:11.9	-23.42
12/25/2016	2185	215.76	-2.19	5.33	32.525	18:16.4	-23.39
12/26/2016	2185	202.59	-2.31	4.85	32.526	18:20.8	-23.36
12/27/2016	2185	189.41	-2.44	4.37	32.527	18:25.	2-23.32
12/28/2016	2185	176.24	-2.56	3.89	32.528	18:29.7	-23.27
12/29/2016	2185	163.12	-2.68	3.41	32.529	18:34.1	-23.22
12/30/2016	2185	149.95	-2.80	2.92	32.530	18:38.5	-23.15
12/31/2016	2185	136.77	-2.91	2.44	32.531	18:42.9	-23.08

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