The Eyepiece

NEVILLE PUBLIC MUSEUM ASTRONOMICAL SOCIETY

Volume 22, Issue 7 **July 2010**

NPMAS Summer Picnic

By Shawn Beauparlent

This year's club summer picnic will be held at Bay Beach, in Green Bay on July 10th. We've rented shelter #4, which is on the left side, West of the main pavilion. The festivities will start around 3:00pm and we will eat around 5:00pm. We will be observing at Parmentier Observatory that evening if the skies are clear.

You should bring food for the grill, drinks, and something to share. The left-over snacks and munchies go with us to the observing site for midnight snacking! The club will provide paper plates, napkins, utensils, condiments and garbage bags.

The shelter is near a playground, kids rides, volleyball court and the pavilion. The park is open so people can come early and enjoy the rides! If you have any questions, email picnic coordinator Shawn Beauparlant at: labspb@yahoo.com. ❑

July Monthly Meeting

Please join us for the July monthly meeting. This month, we will be having a guest speaker. Alan Peche, Director of the Barlow Planetarium will be giving a talk about the future direction of NASA.

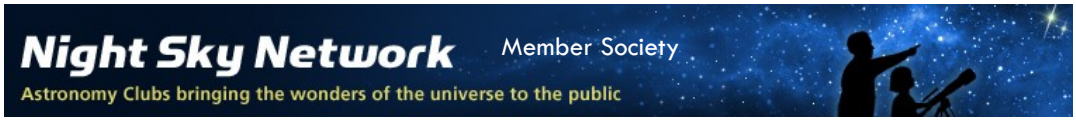
The meeting will be held from 7:00pm until 9:00pm, July 14th at the Neville Public Museum, 210 Museum Place, Green Bay, WI 54303.

And as always, we will be heading to Happy Joe's for pizza after the meeting. Hope you can join us. ❑

Board Meeting

The next NPMAS Board Meeting will be held on Wednesday, July 21st at 7:00pm. It will be held at Wayne Kuhn's place of business: Commercial Laundry Sales, 1130 Elizabeth Street, Green Bay WI.

All club members are welcome to attend. ❑



Upcoming Events

POW
- July 9 and 10—Parmentier Observatory

Club Picnic
- July 10—Bay Beach, Green Bay

Monthly Meeting
- July 14—Topic?

NCRAL 2011 Meeting
- July 20—DeWitt Residence

Board Meeting
- July 21—Wayne Kuhn Business

Inside this issue:

Eye in the Sky

July 2010	
6	The Earth is at Aphelion
8-11	Wisconsin Observers Weekend
11	New Moon—Total Solar Eclipse for the Pacific
25	Full Moon
28	Southern Delta Aquarid Meteor Shower Peaks

August 2010	
6	Mercury is at Greatest Eastern Elongation, 27°
9	New Moon
12	Perseid Meteor Shower Peaks
13-15	Northwoods Starfest
19	Venus is at Greatest Eastern Elongation, 46°
20	Neptune is at Opposition
24	Full Moon

Parmentier Observing Weekend

This month's Parmentier Observing Weekend will be held on July 9th and 10th. All club members are welcome to come out and observe through the observatory's 30" Classical Cassegrain telescope and/or 6" Astrophysics Refractor. You can also set up your own telescope in the observing field below the observatory or just come out and be a part of the group.

This is another chance to complete observations for the Ron Parmentier Observing Program (RPOP). Some of the objects selected for July are: the Draco trio, NGC 5981/5982/5985; double star Xi Scorpii and Struve 1999; and globular cluster, M4. You are welcome to observe whether or not you are participating in RPOP.

RPOP is an observing program exclusively for NPMAS members. RPOP was created to generate more interest within the club to observe at Parmentier Observatory, help members improve their observing skills, allow member to compare objects through two different type and sized telescopes and observe in a fun, group atmosphere as well as to honor Ron Parmentier, a founding member of the NPMAS

If you would like to participate in the program, booklets can be purchased for $10.00. Please come out and observe with us! ❑

NCRAL 2011 Planning Meeting

NPMAS will be hosting the 2011 North Central Region of the Astronomical League (NCRAL) Convention on April 29th through May 1st, 2011. This date is quickly approaching.

Our next planning meeting will be held July 20th at the home of Don and Katrina DeWitt, 1081 Raleigh Street, Green Bay.

Club members are welcome to attend. We are always interested in your ideas or suggestions. This will be a big event and we will need a lot of help from the club. Please participate and share you ideas! ❑

Northwoods Starfest

From www.cvastro.org

Join us at the 22nd annual Northwoods Starfest, August 13th through 15th, 2010, at Hobbs Observatory near Fall Creek, Wisconsin.

Hobbs Observatory has two domes, one with a 24-inch f/5 reflector and the other with a 14-inch Schmidt-Cassegrain. There is a large meeting area where some talks and presentations take place. There is a large auditorium located south of the highway at the Nature Center. There is a large field in front of the observatory to set up for observing. The skies are quite dark.

C.V.A.S. has reserved the Youth Camp for Starfest use. The camp has five cabins and the Cedar Lodge. The cabins sleep 20; the lodge, up to 40. Cabins have bunk style beds and mattresses. You will need to bring sleeping bags and pillows. Showers are available for all guests, but bring your own towels. Tenting and camper spaces are also available.

There will be a several talks and a swap fest. Bring whatever astronomical goodies you want to get rid of. The cost is $55.00 per person. Please visit www.cvastro.org for more information. ❑

ITS ASTRONOMICAL!

PLANETS

8

THE NUMBER OF PLANETS IN OUR SOLAR SYSTEM: MERCURY, VENUS, EARTH, MARS, JUPITER, SATURN, URANUS, AND NEPTUNE.

5

THE NUMBER OF PLANETS AROUND 55 CANCRI, THE MOST POPULOUS SOLAR SYSTEM OUTSIDE OF OUR SOLAR SYSTEM.

464

THE TOTAL NUMBER OF EXTRA-SOLAR PLANETS DISCOVERED AS OF JUNE 29TH, 2010.

10.5 LY

THE DISTANCE TO EPSILON ERIDANI, THE CLOSEST KNOWN SOLAR SYSTEM TO OUR OWN. IT IS THOUGHT TO CONTAIN ONE PLANET AND TWO ASTEROID BELTS.

1.9

THE MINIMUM MASS, IN EARTH MASSES, OF GLIESE 581 E, THE SMALLEST EXTRA SOLAR PLANET DISCOVERED TO DATE. GLIESE 581 E'S SISTER PLANET, GLIESE 581 D, IS BELIEVED TO ORBIT WITHIN THEIR PARENT STAR'S HABITABLE ZONE

SAROS

By Barlow Bob

SAROS was the email address of the late Joe Pesselli, an amateur solar astronomer with a passion for observing solar eclipses. I asked Joe to explain this strange new word. He said that this was a solar eclipse term. Amateur solar astronomy has its own unique language of strange terms. Another amateur solar astronomer gave me a book *Totality Eclipses of the Sun*. This book contained information about the saros.

In 29.53 days, the Moon goes from new moon through full moon returning to new moon. This period is called a lunar month, a lunation. Solar eclipses can take place only at new moon, when the Moon is between the Sun and Earth.

The saros cycle is 18 years 11 1/3 days. During this time, the Earth has rotated for a further eight hours. Each following eclipse takes place about one-third of the way around the Earth westward from the previous one.

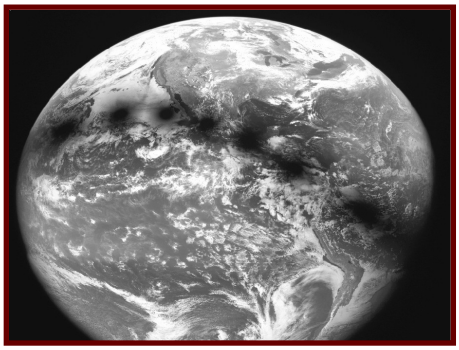
A beautiful picture of the July 11, 1991 saros 136 total solar eclipse in Mexico, appeared in several Tele Vue advertisements. This picture was taken by Joe Folmer, through his Tele Vue Genesis refractor. Joe is a member of the Rockland Astronomy Club. He observed and photographed this eclipse with a group of people, including RAC member Al Nagler. Joe gave me a print of his 1991 picture. His picture was of special interest to me, since I bought one of the first TV Genesis telescopes.

The *Totality* book contained an image of the path of the Moon's shadow on the Earth during this same 1991 saros 136 eclipse. This picture is a composite of 8 NASA GOES-7 weather satellite images. I obtained a copy of this picture courtesy of William Emery and Chuck Fowler at the University of Colorado. I am delighted to be one of the very few amateur solar astronomers who has a once in a lifetime picture and image of the same total solar eclipse, taken from the surface of the Earth and from space.

If the Moon were 169 miles smaller than it is, or if it were farther away so that it appeared smaller, people on Earth would never see a total eclipse.

The Sun is not always exactly the same angular size in the sky. The Earth's orbit is elliptical instead of circular. The distance between the Earth and Sun changes constantly. In early January, when the Earth is closest to the Sun, the Sun's disc is slightly larger than in angular diameter. At this time it is harder for the Moon to cover the Sun to create a total solar eclipse.

The Moon also has an elliptical orbit around the Earth. When the Moon is at its average distance from the Earth or farther, its disc is too small to occult the Sun completely. At this time, the Moon appears a black disc surrounded by a ring like appearance of the bright outer edges of the Sun. This is an annular eclipse, from the Latin annulus, meaning ring.



The path of the Moon's shadow on the Earth crossing Mexico during the total solar eclipse of July 11, 1991, captured by a composite of 8 NASA GOES-7 weather satellite images. (Courtesy of William Emery and Chuck Fowler, University of Colorado.)

Annular eclipses are more frequent than total eclipses, since the angular diameter of the Moon is smaller than the angular diameter of the Sun on average.

As the Moon is constantly in motion as

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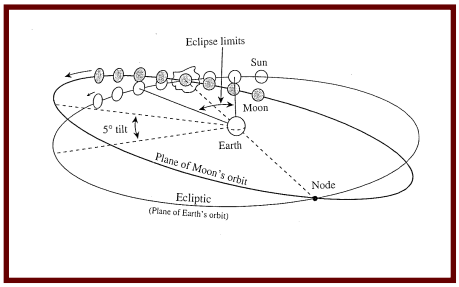
SAROS, continued

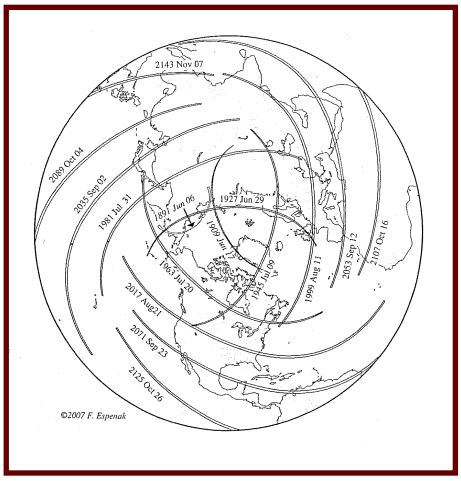
(Continued from page 3)

it orbits the Earth about once a month, a period of time derived from this movement of the Moon. The Moon completes this cycle in 29.53 days, called a synodic month, after the Greek synodos "meeting"- meeting of the Sun and the Moon. 223 synodic monthly cycle of the phases of the Moon Lunations at 29.5306 each equal 6,585.32 days.

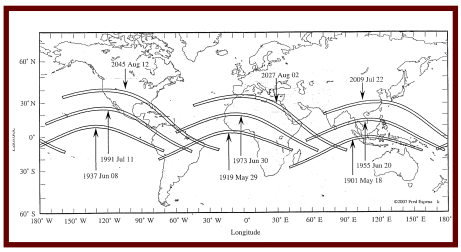
The Moon's tilted orbit crosses the Earth's orbit at two places. Those intersections are called nodes. Node is from the Latin word meaning knot, like weaving, where two threads are tied together. The point at which the Moon crosses the plane of the Earth's orbit going northward is the ascending node. Going south, the Moon crosses the plane of the Earth's orbit at the descending node. A solar eclipse can occur only when the Sun is near one of these nodes as the Moon passes.



Eclipse node illustration—used with permission [1]



Saros 145—Map and eclipse calculations by Fred Espenak—used with permission.[1]



Saros 136 Map—Map and eclipse calculations by Fred Espenak used with permission.[1]

ECLIPSE NODE

The paths of the Sun and Moon illustrate why eclipses occur only when the Sun is near the intersection (node) where the Moon crosses the ecliptic. The plane of the Moon's orbit is tilted approximately five degrees to the ecliptic plane.

SAROS 145

These are the first 15 central eclipses of saros 145. The tracks shift west and south with each succeeding eclipse. The first eclipse (1891) is annular; the second (1909) is hybrid. All the rest from 1927 to 2143 are total eclipses. Saros 145 brings the 2017 eclipse across the United States and provided the 1999 eclipse across Europe and southwestern Asia.

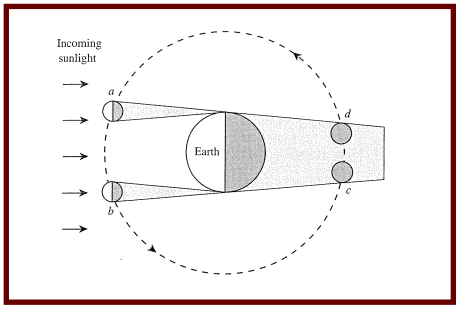
SAROS 136 MAP

These are the paths of totality for six past and three future eclipses of saros 136. Successive eclipses shift westward and northward. For odd-numbered saros, eclipses shift westward and southward.

ECLIPSE LIMIT

The Moon will be totally eclipsed whenever it passes into the shadow of the Earth – between c and d on the diagram. At the Moon's average distance from Earth, the shadow is about 2.7 times the Moon's diameter. But there will be an eclipse of the Sun whenever the Moon passes between the Earth and the Sun – between points a and b. The distance between a and b is longer than between c and d, so total solar eclipses must occur slightly more often.

Why does a total solar eclipse occur? How large (angular size) is the Moon in the sky? Extend your arm fully away from your body. Using your index finger and thumb, imagine that you are trying to pluck the Moon out of the sky. Squeeze these fingers together, until you are just touching the top and bottom of the Moon. How big is the space between your fingers? I s it the same size as a penny, dime, nickel, or quarter coin? It is the size of a pea.



Eclipse illustration used with permission[1]

- The Moon's diameter is 1/400 of the Sun's.
- The Moon's mean distance is 1/389 of the Sun's.
- The Moon and Sun are nearly the same size as seen from Earth.[1]

On the average, the Moon's shadow is too short to reach the Earth. Therefore, total solar eclipses happen less often then annular solar eclipses[1].

The Moon's angular diameter can exceed the Sun's angular diameter by as much as 6.6% (2.1 arc minutes), producing a total eclipse of the Sun[1].

The Sun's angular diameter can exceed the Moon's angular diameter by as much as 10.7% (3.1 arc minutes), producing an annular eclipse of the Sun[1].

On the average, the Moon's angular diameter is smaller than the Sun's angular diameter. Therefore, total solar

(Continued on page 5)

SAROS, continued

(Continued from page 4)

eclipses occur less often than annular solar eclipses[1].

A saros is an eclipse cycle of 6,585.32 days (18 years 11 1/3 days or 18 years 10 1/3 days if five leap years occur in the interval) in which an eclipse will occur which is very similar to the one that preceded it. The saros results from the near equivalence of 223 synodic months in 18.6 years.

A Saros Cycle is a royal family of related solar eclipses, similar to the English royal family. Beginning with a small partial solar eclipse near the North Pole, thirty seven Saros 136 eclipses have occurred from 1360 to 2009. Saros 136 will produce 33 more, ending 1,262 years later in 2622, with a final small partial solar eclipse near the South Pole.

The first Saros 136 partial eclipse in 1360 occurred, during the reign of King Edward III, under a Feudal System in the Middle Ages. This saros continued through the reign of 32 English monarchs up to 2009, during the reign of Queen Elizabeth II, under a Constitutional Monarchy. These eclipses stretched over many periods of English history, including: the Hundred Years War with France, Wars of the Roses, Tudor Period, English Reformation, union of the crowns of England and Scotland, expansion into America, Wars in America and France, Victorian Age, imperial expansion into Africa, World War I, World War II, industrial unrest and the United Kingdom within the European Union.

To date, Saros 136 has produced partial, annular, hybrid and some of the longest total eclipses. Four Saros 136 eclipses happened during the 64 year reign of Queen Victoria and 3 during the 58 year reign of Queen Elizabeth II. Most saros 136 King Edward III type of partial eclipses will pass unnoticed in the far northern and southern latitudes. However, some of the longest Queen Elizabeth II type of total eclipses will be magnificent.

The eclipse family known as saros 136 began on June 14, 1360 in the farthest area of the southern hemisphere, over Antarctica and the Southern Indian Ocean. At this time the Moon was located at the descending node, crossing the Sun's path heading south. At this time, the Sun was near that node. The Moon covered the southeastern edge of the Sun. This eclipse passed unnoticed, since there was no one in this southern area and this event could only have been observed using a solar filter. The firstborn of every saros family is always a tiny partial eclipse that brushes the Earth at one of the poles.

As time passed, forty-one other solar eclipses occurred over various areas of the Earth. However, these eclipses were members of other saros families. After 5,585 days, the Moon had completed 223 lunations and the Sun had passed by the descending node of the Moon 19 times. At this time the two cycles matched almost exactly and the conditions were in place for the second saros 136 eclipse to occur in 1378 during the reign of King Richard II.

The cycle of repeated eclipses was discovered in the second Babylonian empire, the Chaladean Empire. However, there is no evidence that the Babylonians ever applied saros to this 18-year eclipse cycle. By 449 BCE, the originally ethnic term Chaladean had been specialized to mean a wise man and, and in this century an astronomer in particular[2].

The Chaladean were nomadic Semites, who recorded their astronomy observations on clay tablets in their cuneiform writing. The Chaladean Empire, with its capital at Babylon lasted under King Nebuchadnezzar II and his successors until 539 BCE. Democritus of Abdera, the first Greek scientist, was known to have visited Babylonia in person[2].

The use of the word saros to mean a 223-lunar month eclipse cycle, was erroneously introduced in 1691 by Edmond Halley, when he applied it to the Babylonian eclipse cycle on the basis of the manuscript by the Roman naturalist Pliny. The Babylonian sign SAR has meaning, as both a word and number[1].

Home work assignment: Take the date of any solar or lunar eclipse and add 6,585.32 days to it and you will accurately predict a future eclipse of the same kind that will closely resemble the one 18 years earlier. Take the date of every solar and lunar eclipse and continue to adding 6,585.32 days to it and you will have, with few exceptions, a dependable list of future eclipses. 223 synodic monthly cycle of the phases of the Moon Lunations at 29.5306 each equal 6,585.32 days.

Since 1990, I have observed the Sun with attitude, (neafsolar.com) through every type of safe commercial solar filter and solar spectroscope. I have also observed several annular solar eclipses. However, I have never observed a total solar eclipse.

After reading *Totality Eclipses of the Sun*, I now have a reason to live until August 21, 2017. This is the date of the All-American total eclipse of 2017. This eclipse is a member of saros 145. It will move diagonally across the United States, with eclipse maximum in Kentucky at latitude 37 degrees north. I have to live anyway until 2012, to observe the extremely rare second Transit of Venus of 2012. ❑

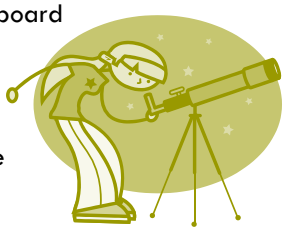
This article is dedicated to the memory of Joe "Saros" Pesselli (19xx – 2004).

1. Totality Eclipses of the Sun
Littmann, Espenak, Willcox
Oxford University Press
ISBN 978-0-19-956552
2. History of the Persian Empire
A.T. Ollmstead

Club Member Services

LOANER TELESCOPES

NPMAS members are welcome to use, free of charge for a one month period, one of the five club telescopes available. Please contact one of the board members to make arrangements. The five telescope available are:



- 10 inch Dobsonian Telescope
- 60 mm Bushnell Voyager
- 8 inch Triple Axis Newtonian Telescope
- 13 inch f/4.5 Dobsonian Telescope
- Meade ETX125 Cassegrain Telescope with Auto Star

Club Library

NPMAS has a collection of astronomy related books and videos covering a wide variety of topics including observing, the solar system, stars and more. Items can be checked out at monthly club meeting or by contacting Tom Cashman at 920-432-2261.

NPMAS OBSERVING SITES

NPMAS members have access to three observing sites located on private land and belonging to members of our club.

Parmentier Observatory

Parmentier Observatory is home to a 30 inch classical Cassegrain telescope, the largest private observatory in Wisconsin. Members may view through the 30 inch or set up their own telescopes in the adjoining field.

Observatory Contact
George McCourt—920-468-9296

Crivitz Observing

This is the private residence of Dave Jorgenson and Carol Eggleston. Located in the north woods of Wisconsin on 100 acres of land, this site offers some of the darkest skies around. The field is equipped with electricity and the far cabin is available for use. Please call ahead to make arrangements.

Dave Jorgenson and Carol Eggleston Home—715-757-3296

Cedar Drive Observing

This is the private residence of Tony and Tara Kroes, located Southwest of Pulaski on 10 acres of land. Members are welcome anytime but please call ahead to make arrangements.

Tony Kroes Home—920-822-4959.

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