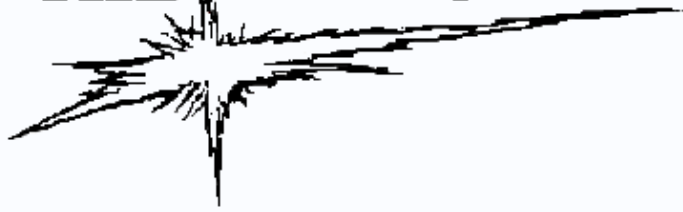


# THE METEORITE



## *Messier-2 ( NGC 7089 )*

*Globular Cluster in Aquarius*



Credit: HST image.

Newsletter of the Mahoning Valley Astronomical Society, Inc.

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**AUGUST 2013**

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Meteorite Editor: Phil Plante  
1982 Mathews Rd. #2  
Youngstown OH 44514



AUGUST 2013

NEWS NOTES

Copy Comet? In 1680, Kirch's comet lit up the nighttime skies, and was even briefly visible in broad daylight. With a remarkably similar orbit to that of Comet ISON, can we expect a similar show come November? Discovered in 1680 (hence the C/1680 designation), comet C/1680 V1 (Kirch), was first spotted by German astronomer Gottfried Kirch in early November, 1680, and holds the honor of being the first comet to be discovered with a telescope. It also holds the accolade as one of the most noted comets in history, going also by the names of "The Great Comet of 1680", "Kirch's Comet", and "Newton's Comet". Newton played no part in the discovery, but he did use its orbit to demonstrate his new laws of orbital mechanics

Just a couple of weeks following discovery, C/1680 V1 passed about 39-million miles from Earth, and just a couple of weeks after that, on Dec 18, 1680, grazed a mere 550,000miles from the Sun. Reportedly, it was visible during broad daylight. As it raced away from the Sun, it peaked in brightness by the end of the year with a spectacularly long and thin arcing tail that spanned much of the nighttime skies before finally receding from view in early 1681. If we take a glance at the orbital elements for both Comets ISON and Kirch, we see startling similarities. Both comets approach to within ~0.4AU of Earth, and the perihelion distance (closest approach to the Sun) is 0.006AU for Comet Kirch versus 0.012AU for Comet ISON. The so-called "longitude of the ascending node" is 277-degrees for Kirch and 295-degrees for ISON

Almost immediately, it was thought that perhaps the two comets were related. It was known they are not the same comet, because Kirch's Comet is periodic, with an orbital period of around ten-thousand years. But the possibility existed that the two objects were once part of the same object that fragmented into small pieces some time in the very distant past. But now with enough observational data, it has been determined that Comet ISON is in fact a new comet, fresh in from the Oort Cloud. Comet Kirch followed a remarkably similar orbit through space at a remarkably similar time of the year, albeit 333-years before ISON, and approached a remarkably similar distance to Earth and a roughly similar distance from the Sun at perihelion (they were both Sungrazers). So for comparison, if Comet Kirch is anything to go by, we still may have a good show at the end of the year. Recently ISON has faded, but has the wild-card factor being fresh from the Oort Cloud. -from SpaceDaily

Too hot to handle. Astronomers use the "habitable zone" to distinguish between two types of exoplanets. Super Venuses and Super Earths. They're similar to Venus and Earth, but larger in mass. A Super Venus would most likely be a dry, toxic wasteland while a Super Earth might host oceans. The habitable zone is the region around a star where liquid water (supporting life) can pool on the surface. Earth lies within the habitable zone around the Sun A recent study looked at the planet Kepler-69c, discovered by NASA's Kepler mission and originally thought to lie in its star's habitable zone. The planet is 1.7 times the size of Earth and lies 2,700 light-years away. The analysis showed that this planet lies just outside the inner edge of the zone, making it more of a Super Venus than a Super Earth. That means the planet is more likely scorching hot, with volcanic eruptions. The search for habital zone planets as small as Earth, is ongoing. -from NASA/JPL-Caltech/Ames.

Newsletter of the Mahoning Valley Astronomical Society, Inc.

MVAS CALENDAR

- AUG 10 MVAS-OTAA meeting at the MVCO, 5:00 PM.
AUG 31 Business meeting at the MVCO 8:00 PM
SEP 14 Astro-Ham & Public Night at Scenic Vista. Ham radio at noon. Star gaze at 8:00 PM.
SEP 28 Business meeting at the MVCO. 8:00 PM

NATIONAL & REGIONAL EVENTS

- SEP 5 - 8 Great Lakes Star Gaze. at River Valley RV Park, Gladwin, MI. Admission fees: \$45 to \$80 depending on family, number of nights, lodging.
SEP6-10 Almost Heaven Star Party. Mountain Institute near Spruce Knob, Circleville, WV.
SEP 14 ScopeOut Astronomy Fare. At the Cincinnati Observatory Center, Cincinnati, OH.

MVAS BOARD OF TRUSTEES

Table listing board members: President Lou DiNardo, Vice President Rich Mattuissi, Treasurer Steve Bartos, Secretary Phil Plante, Appointed Trustee (2013 & 2014) Bob Danko, Appointed Trustee (2012 & 2013) Rosemary Chomos, Elected Trustee (2013) Dave Ruck

OBSERVATORY STAFF

Table listing staff: Observatory Director Larry Plante, Assistant Director Dave Ruck, Assistant Observatory Staff Chuck Olesen, Librarian Rosemary Chomos

PUBLICATIONS STAFF

Table listing publication staff: Meteorite Editor Phil Plante, Production / Editor Steve Bartos, MVAS Webmaster Sam DiRocco, MVAS Webmaster Harry Harker

MVAS, P.O. BOX 564 NEWTON FALLS, OH 44444-9998
MVAS Homepage- http://mvobservatory.com

## MINUTES OF THE JULY MEETING

JULY 27, 2013 at the MVCO

The meeting came to order at 8:01 PM. President Lou DiNardo presided. All officers were present. Roll Call was answered by 15 members, a quorum thus formed. Four guests attended: Virginia and Steven Bartos, Dominic and Nicolas Mattuissi. A Call for the Reading of the Minutes was made. Greg Higgins moved to suspend the reading. Sam DiRocco seconded the motion. With no further discussion, the Minutes were accepted as published by a unanimous voice vote.

**TREASURER'S REPORT:** The Report was read by Steve Bartos. Sam DiRocco inquired about the higher key expense. Steve replied that the cost of key blanks has risen from \$10 to \$15 each. Consequently anyone qualifying for an MVCO key will pay \$15 for their deposit. This covers the price increase. These are security keys that can't be copied by local hardware stores. A locksmith must make the copies.

### General Fund 6/1 thru 6/30 2013

OPENING BALANCE:	\$	8,752.06
CLOSING BALANCE:	\$	8,660.40
AVAILABLE FUNDS (NON-RESERVED):	\$	4,476.28
ACCOUNT NET GAIN/LOSS FOR THIS PERIOD:	\$	-91.66

#### INCOME:

DONATION (ALLEN & BETTE HEASLEY)	\$	100.00
DUES		40.00
INTEREST		0.13
<b>TOTAL INCOME</b>	\$	<b>140.13</b>

#### EXPENSES:

CK# 2791 NEW GRILL	\$	157.99
2792 GARDEN HOSE		28.80
2793 THREE NEW KEYS FOR THE MVCO	\$	45.00
<b>TOTAL EXPENSES</b>	\$	<b>231.79</b>

### Reserved Funds

KEY DEPOSITS (MVCO)	\$	270.00
CASH FROM ORIGINAL OAD FUND (FOR LAND)		3,914.12
<b>TOTAL RESERVED FUNDS</b>	\$	<b>4,184.12</b>

DUES PAYMENT FOR 2013: J. BURDETTE

**CORRESPONDENCE:** Bob Danko has made the rental payment for the Post Office Box. No mail has been received.

**COMMITTEE/OFFICER REPORTS: IMAGING COMMITTEE:** Lou DiNardo has been able to image M-27 and M-51 with his new Canon 60Da. No other reports available. **VISUAL COMMITTEE:** No reports to collect. **LIBRARIAN:** Nothing new to report. [Addendum: one book case has been moved to the door, right side. Tentatively designated as an "observer's center" that will hold various charts and books that might be needed during observing sessions at the MVCO.]

**OBSERVATORY DIRECTOR'S REPORT:** Larry Plante pointed out the paint job and other changes inside this meeting room. He reported that Mike Sprague will installing a new internet antenna during the work session Aug. 3rd. It will have a much stronger signal towards the MVCO. He will need help putting it up. Mike is also OK with putting a new roof on the 16" building. There were no leaks in the roof, even after recent heavy rains. No Homework was collected.

**OLD BUSINESS:** Regarding the upcoming OTAA meeting: Steve will order the tables, chairs and tents. He will use last year's invoice as a guide for quantities. Sam believed it was 8

tables and 80 chairs. On a motion by Greg Higgins, seconded by Sam DiRocco, the membership approved of this expenditure by voice vote. Lou reported on the Trustee meeting held the night before. The Trustees voted 5 for, 1 against and one abstaining to have the MVAS members construct a pitched roof on top of the current flat roof. This would be headed by Larry Plante (OD) rather than hire a contractor. Cost savings was a major factor. This action needed approval by the general membership. A materials price list was passed around. Estimated costs was about \$1100. With that, Lou moved to adopt this proposal in that Larry and other members would do the construction, rather than a contractor. Discussion followed.

Sam noted that professional contractors said it couldn't be done. Larry said that the contractor that patched the roof this past April said that they could put any roof on we wanted. Rosemary raised her concern about how water would drain from a new roof, flowing around the dome. She suggested we have several contractors inspect the situation in getting "price quotes" and glean ideas from them. Rosemary was also concerned about the deteriorated condition of the soffits/eaves. Larry said they could be done at the same time but would add to the costs. With no second to Lou's motion, Rosemary moved to have a contractor do it. Greg seconded the motion. Lou amended to motion have a vote: MVAS or contractor. Two attempts to vote by hand count failed to get consistent results. Larry then moved to have a contractor do the job. Bob Danko seconded this motion. By voice vote, all were in favor. The motion was adopted. Previous motions were retracted.

Bob Danko took the floor to express his sentiments on the situation. He considers the MVCO as our "home" and would like to see us stay there. He understands and supports the idea of a second site, but we may need to cut into the OAD (land) funds to fix the roof. It is hard enough to get help to care for the MVCO let alone a second place. The only other option, as he sees it, is that if we can't handle the roof repair or take care of the MVCO first, the MVAS would ultimately need to disband. All agreed that the MVCO is our home.

Phil then looked up and reported that we currently had \$4,567.00 available for operating expenses. [in addition, the general Fund has \$3,914.12 reserved as OAD Funds] Phil also pointed out our current annual operating expenses of \$500 (rent), \$300 (insurance) and about \$200 (Meteorite postage, printing). This puts fixed expenses at around \$1,000 per year before other expense such as repairs and new toys. Dues Income from paying members is currently around \$1,600 to \$2,000 per year, depending on the roster count. Phil said we need to get pricing quotes on the roof before we go into panic mode or disband. He also pointed out that the plan for second site did not include moving MVCO equipment there. It was to initially provide a darker, private site where members could set up personal equipment. No buildings needed.

The out house will be pumped out before the OTAA. There is a work session the weekend before the OTAA that will start at noon. It includes general cleaning of the MVCO; Check emails. Sealing the 12" deck needs be done. Bob Danko informed us that he could not guarantee he'd be able to serve as emcee at the OTAA and stepped down. This was due to an event being held for his wife. Phil suggested that Rich be the emcee. Before Rich could respond, Rich was appointed this duty by a unanimous vote.

**NEW BUSINESS:** Phil had some non-critical Constitutional work that needed to be discussed. This was work was proposed by the Trustees in 2007, but was never addressed or ratified.

Once again it will be delayed until the roof situation is resolved. Rich noted that it was still pending on whether the Cub Scouts would attend the September 14th Scenic Vista Astro-Ham. Sam said he thought the ham radio guys would set up around noon.

**GOOD OF THE SOCIETY:** Sam had a mirror grinding machine that was donated to the MVAS (via YSU). He also had a 60mm Tasco refractor from the 1960's era. In great condition. Complete with EQ mount, tripod and wooden case. This was donated to the MVAS. Greg suggested we raffle the scope at the next Scouting event. Bob moved that we put it up for sale at the OTAA. Sam suggested a current e-bay price of \$90 or best offer. Karin DiNardo seconded the motion. All were in favor. If the scope didn't sell at the OTAA, MVAS would put it on e-bay.

**VISUAL REPORTS:** Bob used the 8" a few nights ago and also observed at Grand River. His observations included Saturn, Venus, M81/82, M51 and several doubles. Rich showed the Moon to the scouts. Phil got 3 vsos and observed the Moon through green filters. (See Observer's Notes).

**ADJOURNMENT:** Adjournment came at 8:56 PM with a motion to adjourn from Sam and a second from Bob. We thank our hosts Greg Higgins for the pizza, Rosemary Chomos for the desserts and Rich Mattuissi for the drinks. The next meeting will be at the MVCO on August 31, 2013. Meeting begins at 8:00 PM. Scheduled hosts are Jodi and Roy McCullough, Rich Mattuissi brings drinks. **PASSWORD:** name a solar feature such as sunspot, Coronal Mass Ejection, *-minutes by Phil Plante*

### MVAS REMINDERS

**MVAS-OTAA.** Hopefully you'll get this in time. Our meeting is **Saturday August 10th**. The event officially begins at 5:00 PM with registration. We'll need folks there to set up tables and chairs and organize things, before registration opens. Usually set-up begins shortly after noon so plan to be there early if you can. Remember to bring the traditional covered dish or desserts to share. Parking is in the lower level. Park with headlights facing away from the buildings. Bring your scopes too!

**Homework.** Please remember to try some homework. Print out the PDF homework page or photocopy that page from the paper edition. This serves as a good foundation for your observing sessions. I try to keep things for Homework in the same constellation of the month. Consequently, your searching and star hopping is greatly reduced. In the long run you will get to know each constellation. And most of the starry sky. For sure, it's a structured way to have fun, but it's still fun.

**Donors.** Everyone contributes to our door prize list. We thank all of you. You are very generous in what you can give. I know many would like to give more. But it should be duly noted that Tony Mehle has exceeded all expectations with his door prize donations. In addition, he has made a significant donation with the Astro Physics binoculars for a main prize. It is a bit embarrassing to say "me too" but your scribe has also chipped in with the Explore Scientific 100° eyepiece. Neither of us seek glory, but it would be nice for you to privately thank Tony at least. You could thank me with an article for Observer's Notes. (yea right). For next year, a few of you might want to plan on sharing the cost of a major prize next year. Ya got's time to figure this out!

### MVAS ACTIVITIES

**SFA.** Jodi and Roy McCullough conducted solar observing sessions for the public during the YSU Festival of Arts. They worked both days (July 13 and 14th). Several folks expressed interest in the MVAS and were invited to the July meeting. They should be commended for their enthusiasm and dedication. We thank them for covering the MVAS at this event. We need to do better next year with volunteers. We may be doing this as our own event in conjunction with the planetarium.

**Refurbish.** Thanks is sent to Chris Stephan and his work crew of Jodi, Roy, Larry Plante, Steve and Virginia Bartos and Phil Plante. With Chris spearheading the effort, the interior of the 16" building has been painted. The stage and 16" Cassegrain pier have been painted as well. Some furniture has been moved around providing more space in the meeting area. Officers will sit on the stage to conduct meetings. Bulletin board changes were made and storage of the chairs and ice/chip bin in front of the chalk board open up more space in the room. The water cooler is still located next to the sign-in desk. A "Wall of Fame" is also to the right of the sign-in desk. It holds all the various plaques that have hung on the walls. All of the magazines have been thrown away. Most were mildewed and not very useable. A DVD set S&T is in the works.

One book case has been moved to the right side of the main entrance door. It will be an observer's center. It will have various star atlases, handbooks and reference ephemerides. It's at a central location for observers to seek out help while observing at the MVCO. It's near the door and there should be no need to scour the library for instant data. It is hoped that the 16" stage will stop being used as a storage shed and that the 16" scope will start to be used. Collimation is in the works and the secondary baffle will be replaced. The file cabinet has been moved back to the left side of the door. As in the past, insect repellent and hand cleaners will be stored on top of it for easy access at the door. Place looks good.

**Award.** It has come to attention of the editor that on June 22, 2013, Tony's daughter Nikki Mehle received an award at the 31st Women's Artist: A Celebration! Art Show held at the YWCA in Youngstown. She was one of ten winners. Congratulations to Nikki and the entire Mehle family.

### Observer's Notes

#### A Green Cheese Moon

There exists a family of stories in the mythology of diverse countries that relate to a simpleton or animal that sees a reflection of the Moon in water and mistakes it for a round of cheese (looking for dinner). Folklore fables of Serbian, Zulu, Turkish, Scotch and French origins used this metaphor. "The Moon is made of green cheese" was one of the most popular proverbs in 16th and 17th century English literature. The phrase "green cheese" in these proverbs simply refers to a young cheese (indeed, sometimes "cream cheese" is used), though modern people usually interpret the color reference literally. There was never an actual historical belief that the Moon is made of green cheese. Having heard this phrase in youth, as far back as when I first became aware of the Moon, I recently wondered what a green moon would actually look like.

In 2012 I purchased a Baader Solar Continuum filter for use in imaging the various solar events of that year. It is a narrow bandpass filter of 10nm width, centered on the 540nm spectral



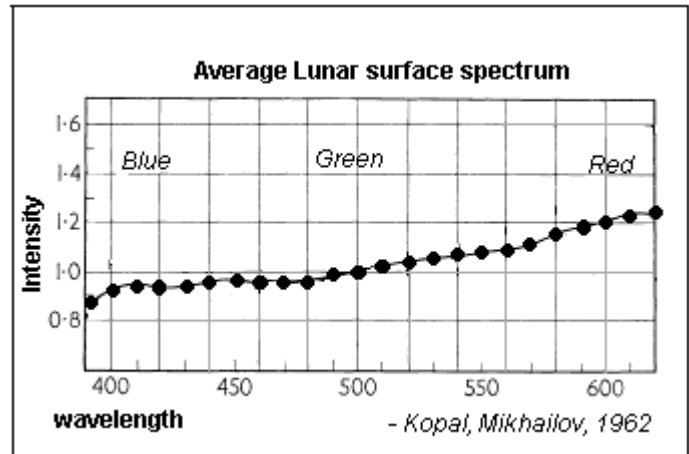
line (green light). It worked very well. One night with a nearly Full Moon up, I tried this filter on the Moon; as an experiment. As expected the tint of the moon turned green, like the filter. But I was surprised at what I saw. The contrast between the lunar highlands and mare was enhanced. Ray systems from Tycho, Copernicus, Kepler, etc. were enhanced. Closer inspection showed the mare flood plains were mottled. You could see varying albedo intensities across the plains. There was even a difference between the large impact basins. Example: Mare Imbrium vs Mare Serenitatis. It seemed like the mineral and/or age differences of the lunar surface was revealed. The lunar face became very interesting.

Fast forward one year. A nearly Full Moon was due to rise about an hour after I set up. Instead of getting some variable star work done, I had to spend that time collimating my scope. With the Moon now rising, I decided to skip variables and try several "green" filters on the Moon. The Continuum filter was hiding with my eclipse equipment and was not used. My scope was a homemade 6" F/4.1 Newtonian (excellent optics). I used a Televue 6mm Radian eyepiece yielding 106x. The field was about 34 arcminutes wide so the entire Moon fit in the field with room to spare. I started with a traditional Wratten 56 green filter. It had the widest bandpass of the filters I tried. The contrast was slightly increased but in general the lunar surface was not much different than in integrated light (white light, no filter). The "seeing" turbulence was nearly as bad as integrated light views. A general slow waving of the whole image was evident with a jittery limb on closer inspection. Three rounded dark patches lunar east of Copernicus were noticed.

I next tried a set of imaging filters; RGB. These have a much narrower band pass closely resembling the Johnson photometric filters (BVR). The blue filter presented an image comparable to non-filtered views. The green filter showed improved contrast of the features stated above. Ray systems seemed to stand out much easier. The red filter had the most contrast. Those three dark patches were very dark. The dark halo around Tycho was prominent. The seeing effects were much more muted. This supports what has been stated in the literature over the years. Red filters help reduce the effects of poor seeing. Longer wavelengths are less affected by atmospheric turbulence. The red Moon image was darkest.

Next up was a Baader OIII filter. This had a 10nm bandpass around 501nm, and is similar to the Solar Continuum filter. This filter provided the best contrast between the various features I've mentioned. The combined light spectrum reflected from all lunar features is a close match to the solar spectrum. But light from a Full Moon is perceived by the eye as being much bluer which overwhelms other colors. This effect seems to derive from the eye's poorer red response. Thus, green and red filters reduce the blue light content. Features with high blue reflectivity appear darker. A red filter had the best contrast but it was a dimmer image. The green filters offered the best compromise. Green filters should make exploring or imaging a green moon a rewarding effort. Maybe even an eye opening experience.

A regular Moon Filter is not the best thing to use. It just darkens everything. No contrast increase. Contrary to common practice, you can observe a Full Moon! Deep sky observers and imagers can use their dark sky filters on a Full Moon. And as we all know, the sky is usually clear on Full Moon nights. Just seems to always work out this way. Take advantage. Instead of being frustrated, take out your scope and your filters and have some fun observing a green moon. And the only cheese that will be involved will be on that pizza you'll grab later. -P. Plante



**MVAS Homework: M-2**

This globular cluster was discovered by the French astronomer Jean-Dominique Maraldi on September 11, 1746 while observing a comet with Jacques Cassini. Charles Messier rediscovered it in 1760 but thought it was a nebula without any stars associated with it. William Herschel was the first to resolve individual stars in the cluster, in 1783. Under extremely good skies (6.5 magnitude naked eye), it can be just visible to the naked eye. Binoculars or small telescopes will show the cluster as being a non-stellar, fuzzy patch. Switching to a really large telescope should resolve individual stars. However the brightest stars are around 13.1 magnitude. M2 contains about 150,000 stars. Its brightest stars are red and yellow giants which include 21 known variable stars. Most of them are RR Lyrae variables, with short periods of less than a day and three are Cepheids variables M2 is about 37,500 light years away from Earth. At 175 light-years in diameter, it is one of the larger globular clusters known.

Visually it is of apparent magnitude 6.5 and about 6 to 8 minutes of arc in diameter, with a bright, compressed central region of about 5'. M2's central part is pretty compressed: The dense central core is only 0.34 arc minutes or about 20 arc seconds in diameter, corresponding to a diameter of 3.7 light years. Its half-mass radius is 0.93 arc minutes (56 arc seconds, or 10 light years linearly). On the other hand, its tidal radius is large: 21.45 minutes of arc, corresponding to a radius of 233 light years; beyond this member stars would escape because of gravitational forces from the Milky Way Galaxy.

On typical photographs it can be traced to about 12.9 arc minutes, and deep photos reveal that it extends out to a diameter of 16.0 arc minutes. A peculiar dark lane crosses the north-east edge of the cluster, which are just visible in images made with larger telescopes (16-inch up). The cluster is rich, compact, and significantly elliptical. It is estimated to be about 13 billion years old and one of the older globular clusters attending the Milky way galaxy. M2 is approaching us at the low velocity of 5.3 km/sec.

M2 is found rather easily from Alpha and Beta Aquarii, as well as Epsilon Pegasi. It is 5 degrees north of Beta Aquarii, at the same declination as Alpha Aquarii.

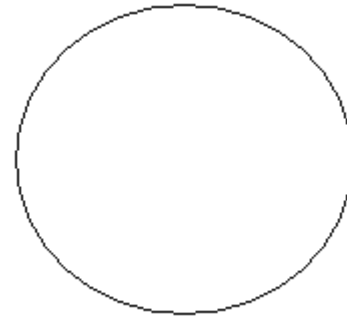
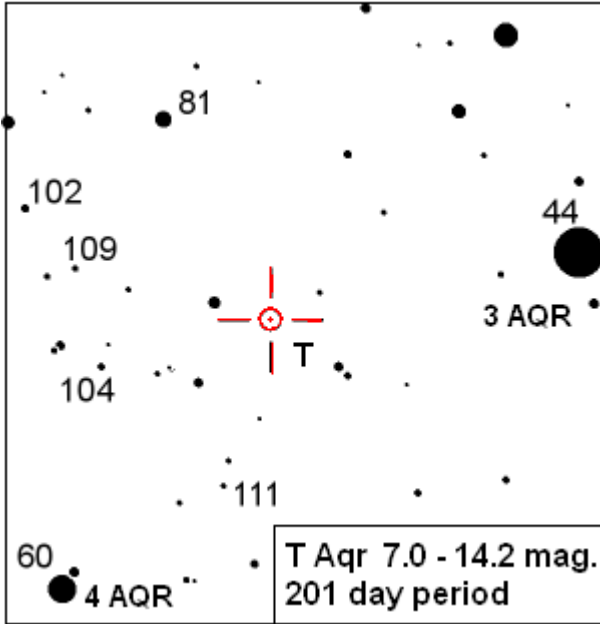
**MVAS OBSERVER CHARTS**

**MVAS OBSERVATIONS - DUE SEPTEMBER 2013**

**Variable star of the month: T Aquarii** (*abbrev: T Aqr*). This variable lies in a binocular field with two other variables. Check out the constellation of the month chart. T Aqr came to maximum light in early July 2013. It will be fading as you begin to follow it. It should stay above 11th magnitude until October 3rd when it's predicted to bottom out. It will begin to get brighter again, reaching maximum brightness on New Year's Eve. Aquarius sets about 4 hrs. after sunset at that time.

OBSERVER \_\_\_\_\_

**Featured object: M-2**. Please try a sketch. Use the usual methods of plotting stars first then a faint outline to place and size the main glow of M-2. Smudge pencil shadings to fill-in the trace. Try to capture the fading glow from M-2's center. Do you see it? Draw what you see, not what you think you're supposed to see. Everyone see differently and draws differently.



**M-2 Observation:**

Date: \_\_\_\_\_ Time(EDT) \_\_\_\_\_ Scope \_\_\_\_\_

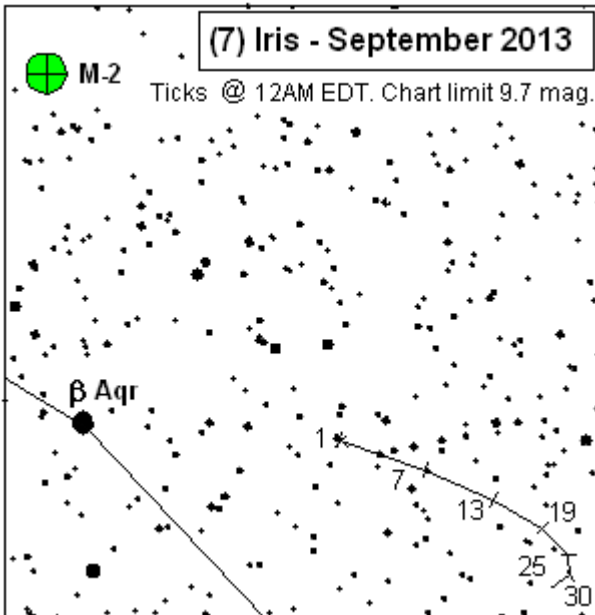
**T Aqr magnitude estimates:**

Date:	Time:	estimate:	Instrument:
_____	_____	_____	_____
_____	_____	_____	_____

**Asteroid of the month: (7) Iris**. Come the beginning of September we'll hop down SW of M-2 to track asteroid Iris. It drops 0.2 magnitude during the month. From magnitude 8.5 down to 8.7. About the normal change in brightness visual observers can detect. Iris should be visible in larger binoculars. Iris will lie at least 4.6 degrees west of B Aqr. at the beginning of September. Give it a shot! Then try for M-2. That's easy!

**(7) Iris Observations:**

Date:	Time:	Instrument:	magnification:
_____	_____	_____	_____
_____	_____	_____	_____



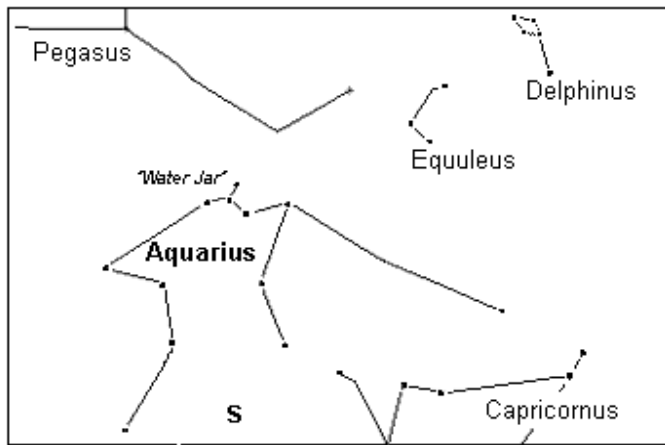
**Other Objects in Aquarius to observe**

D. Sky	Date	Scope	Dbl.	Date	Scope	SEP	MAG	SPLIT?
M- 72	_____	_____	12 Aqr	_____	_____	2.4"	5.5 - 7.3	Y / N
N- 7009	_____	_____	41 Aqr	_____	_____	50.0"	5.7 - 7.2	Y / N
N- 7293	_____	_____	94 Aqr	_____	_____	13.3"	5.2 - 7.5	Y / N

**Lunar Occultations (see Sky Almanac):**

Star	(UT) Date	Time	Scope	magx.	Event(circle)
_____	_____	_____	_____	_____x	R D
_____	_____	_____	_____	_____x	R D
_____	_____	_____	_____	_____x	R D

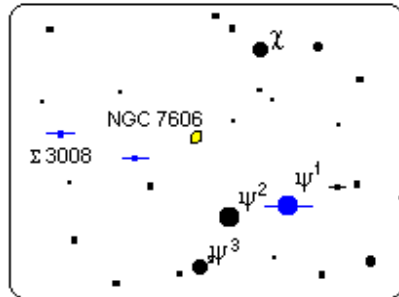
# Constellation of the Month — Aquarius



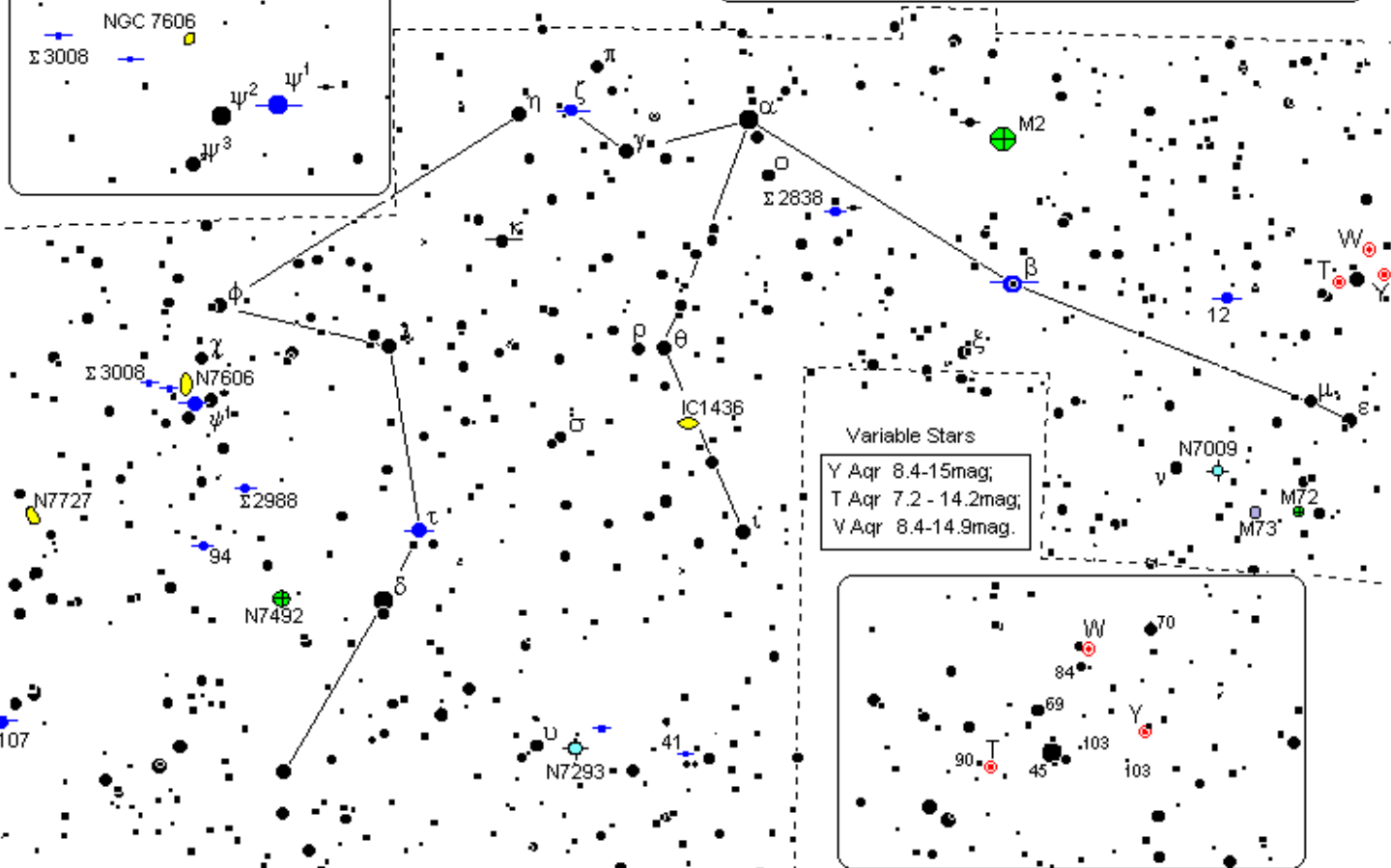
Beneath Pegasus and also riding just east of summer's fanfare of audacious constellations is the quiet fall constellation of Aquarius. Its brightest stars are difficult to see from the city but a trip to a dark sky site lets you use them to star hop to many wonderful objects. With the naked eye you can find the "Water Jar" asterism. Binoculars reveal many close pairings of stars, giving a "double star appearance". The most famous nebula in Aquarius could well be the Helix Nebula. It is the closest planetary nebula by most accounts. But it is also very faint and large. A 6" RFT can capture its ghost-like disk but large binoculars may sweep it up with even greater ease. What do you find? The Saturn Nebula is another planetary nebula. Usually a larger scope of 8" or more will be needed to pick out the "ring ansae". Nearby is M72, a globular cluster. M2 is a fine globular to hunt down. Of course there are real double stars to enjoy with a telescope and moderate power. We feature three variables that lie near each other. Which one is brightest tonight? The transit times below will give you an idea of when to see Aquarius due south and at its best.

### M2 Transit Times

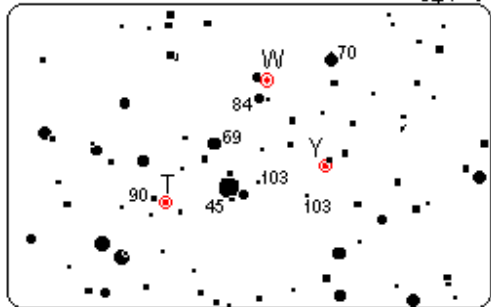
JUL 15	3:25 AM	SEP 15	11:25 PM	NOV 15	6:17 PM
AUG 15	1:27 AM	OCT 15	9:27 PM	DEC 15	4:19 PM



Faintest magnitude shown below is around 7.5



Variable Stars  
 Y Aqr 8.4-15mag,  
 T Aqr 7.2 - 14.2mag,  
 V Aqr 8.4-14.9mag.



DOUBLE STARS:		DEEP SKY				Check list		Instruments used:		
magnitudes	sep.	" colors"	type	mag	size	notes				
12 Aqr	5.5 - 7.3	2.4"					<input type="checkbox"/>	12 Aqr	_____ on _____	
Σ2838	6.2 - 9.1	16.0"					<input type="checkbox"/>	Σ2838	_____ on _____	
41 Aqr	5.7 - 7.2	50.0"					<input type="checkbox"/>	41 Aqr	_____ on _____	
ζ	4.4 - 4.6	2.0"					<input type="checkbox"/>	ζ	_____ on _____	
τ <sup>1</sup>	5.7 - 9.6	26.0"					<input type="checkbox"/>	τ <sup>1</sup>	_____ on _____	
Σ2988	7.8 - 7.8	3.5"					<input type="checkbox"/>	Σ2988	_____ on _____	
ψ <sup>1</sup>	4.2 - 9.2	49.0"					<input type="checkbox"/>	ψ <sup>1</sup>	_____ on _____	
94 Aqr	5.2 - 7.5	13.3"					<input type="checkbox"/>	94 Aqr	_____ on _____	
Σ3008	7.1 - 7.9	5.0"					<input type="checkbox"/>	Σ3008	W AQR was _____ mag. on ____/____/____	
107 Aqr	5.7 - 6.5	6.8"					<input type="checkbox"/>	107 Aqr	T AQR was _____ mag. on ____/____/____	
M72	GC	9.2	6.0'				<input type="checkbox"/>	M72	_____ on _____	
M73	OC	8.9	2.8'			4 stars	<input type="checkbox"/>	M73	_____ on _____	
N7009	PN	8.3	28"			"Saturn Neb."	<input type="checkbox"/>	N7009	_____ on _____	
M2	GC	6.6	16'				<input type="checkbox"/>	M2	_____ on _____	
N7293	PN	7.5	16.3'			"Helix Neb."	<input type="checkbox"/>	N7293	_____ on _____	
N7727	Gal	11.5	4' x 3'				<input type="checkbox"/>	N7727	_____ on _____	

**Solar and Lunar (EDT).**

Date	Sunset	Moonrise	Moonset
1	7 : 57	03 : 10a	— : —
5	7 : 51	— : —	7 : 40p
9	7 : 44	— : —	09 : 55p
13	7 : 37	— : —	12 : 27a
17	7 : 30	— : —	5 : 00a
21	7 : 23	08 : 31p	— : —
25	7 : 17	11 : 17p	— : —
29	7 : 10	01 : 56a	— : —

**PLANET WATCH**

Pluto Sets	Uranus Transits	Jupiter Rises
2:09a	3:26a	2:14a
1:53a	3:10a	2:01a
1:37a	2:53a	1:48a
1:21a	2:37a	1:36a
1:06a	2:21a	1:23a
12:50a	2:05a	1:10a
12:34a	1:48a	12:56a
12:18a	1:32a	12:43a

**September 2013**

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

**Asteroid for September 2013 (7) Iris**

Date	Transits	RA		Dec.		Alt.	Azm	Magnitude
		hr.	min	deg.	deg.			
1	12 : 00 am	topocentric		21 : 18.2	-05.7	43°	180°	8.5
7	11 : 27 pm	21 : 13.5	-06.2	42	189	8.3		
13	11 : 00 pm	21 : 09.8	-06.6	41	198	8.4		
19	10 : 34 pm	21 : 07.2	-06.9	38	206	8.5		
25	10 : 09 pm	21 : 05.8	-07.3	36	213	8.6		
31	9 : 46 pm	21 : 05.6	-07.6	33	219	8.7		

**Celestial Highlights**

5	11	<b>NEW MOON</b>
8	21	Venus 0.4° N. of moon
8	22	Mars in front of M-44
12	17	<b>FIRST QUARTER MOON</b>
12	00	R Lep at max. 6.8 mag.
13	00	Bamberga at opposition
19	11	<b>FULL MOON</b>
25	00	Julia at opposition. 9.2m.
27	04	<b>LAST QUARTER MOON</b>
29	00	R Cas at max. 7.0 mag.

**Variable Star of the Month: T Aqr 7.0- 14.2 201 days**

**LUNAR OCCULTATIONS FOR: SEPTEMBER 2013**

Civil (24hr)			UT			Moon			Moon			Moon			Star		Star		event		dbl./	
date	hr	min	sec	date	hr	min	sec	Ph	% illum.	alt	azimuth	name	Mag.	PA	Mag.	PA	Mag.	PA	Mag.	PA	Mag.	PA
9	20	: 50	: 37	10	00	: 50	: 37	D	21+	10°	238°	ZC 2091	7.7	129°	7.7	129°	7.7	129°	7.7	129°	NA	NA
13	23	: 55	: 36	14	03	: 55	: 36	D	66+	14	228	ZC 7515	6.3	093°	6.3	093°	6.3	093°	6.3	093°	0.60"	0.60"
14	0	: 35	: 46	14	04	: 35	: 46	d	66+	8	236	ZC 2718	6.7	118°	6.7	118°	6.7	118°	6.7	118°	NA"	NA"
16	0	: 04	: 22	16	04	: 04	: 22	D	86+	31	135	ZC 3021	7.3	034°	7.3	034°	7.3	034°	7.3	034°	0.25"	0.25"
17	4	: 06	: 06	17	08	: 06	: 06	M	94+	8	250	46 CAP	4.5	157°	4.5	157°	4.5	157°	4.5	157°	NA	NA
18	2	: 58	: 47	18	06	: 58	: 47	D	98+	31	230	KAPPA AQR	5.0	026°	5.0	026°	5.0	026°	5.0	026°	0.10"	0.10"
22	22	: 21	: 10	23	02	: 21	: 10	R	85-	13	81	SIGNA ARI	5.5	269°	5.5	269°	5.5	269°	5.5	269°	NA	NA
24	23	: 43	: 47	25	03	: 43	: 47	R	68-	12	76	SZ TAU	6.5v	244°	6.5v	244°	6.5v	244°	6.5v	244°	0.10"	0.10"
25	4	: 14	: 40	25	08	: 14	: 40	m	67-	59	129	ZC 718	6.0	172°	6.0	172°	6.0	172°	6.0	172°	NA	NA
30	4	: 17	: 06	30	08	: 17	: 06	d	21-	14	87	60 CNC	5.4	089°	5.4	089°	5.4	089°	5.4	089°	0.10"	0.10"
30	5	: 21	: 48	30	09	: 21	: 48	R	21-	26	98	60 CNC	5.4	297°	5.4	297°	5.4	297°	5.4	297°	0.10"	0.10"

at MVCO

D= disappearance. Good occultation event.

d= disappearance, the star's magnitude approaches the observing limits of 200mm objective

R= reappearance. Good occultation event

r= reappearance, the star's magnitude approaches the observing limits of 200mm objective

All disappearances (D) occur on the eastern limb (left side in the sky). Reappearances (R) always occur on the western limb.

Position Angle (PA): tells where along the west limb to watch for a reappearance.

PA is referenced to celestial north: North=0° East=90° South=180° West=270°

Occultations computed using Occult v3.6 (I.O.T.A.)



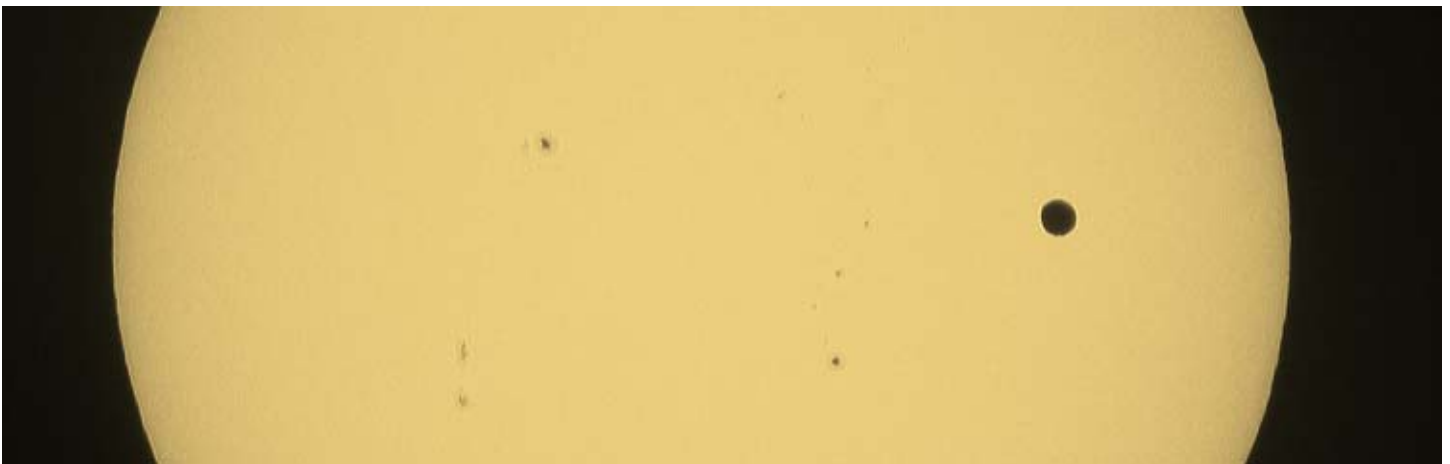
# GALLERY.....

**A lifetime of Solar Images.** Thought it was time to collect some of my favorite solar photos that I was lucky enough to capture during my years of eclipse chasing. In doing so, it became a default subject for this month's Gallery. Not much from our imaging section to use lately- clouds I guess. So you'll have to settle for these! Some of the older shots are not that good, as being copied from slides and negatives using an old 35mm slide copier on a dslr (yikes- old meets new!). My scanner would probably work better but it's not hooked up to the new computer yet and time was running short for this article. Anyway I hope you enjoy these. Brings back many good memories for me. I can't believe I did all this! -Phil Plante



Sunrise just before the total eclipse of 2012. On Trinity Beach, Queensland, Australia. The sun is about 1 degree high.

Below: Transit of Venus 2012. From Hawaii, The Big Island.



Below: Jet liner transits the 2012 Annular Eclipse, as seen from the 12th floor hotel balcony, Albuquerque, NM.



Above: The Annular Eclipse of 2012, setting while approaching 4th contact. Albuquerque, NM.

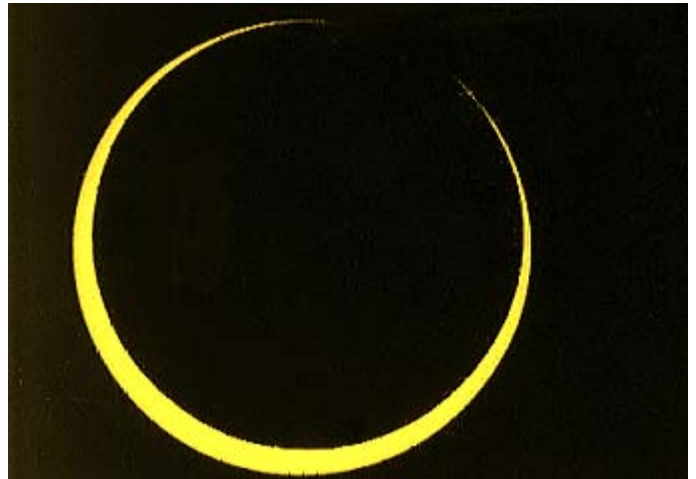
All photos on this page were shot with my 3" University refractor of 1985 vintage. Used a Baader white light solar filter in combination with a Baader Solar Continuum filter between the white light filter and camera (Sony alpha 500).



Above: 2004 Transit of Venus at sunrise. New Jersey coast. 80-800mm zoom at around 120mm. No filter. Print film.



Above: Not an eclipse, but my best solar shot using the MVCO 8" refractor. White light filter, Sony alpha 100 in B&W mode.



Above: May 10, 1994 Annular eclipse as seen from the MVO. Lot's of fun with the MVAS gang. Used a C-8 at prime focus and white light filter. Print film- probably Ektar 100. Minolta camera.



Above: July 1991 total eclipse. "The Big One" also my 1st eclipse. Shared with my brother Larry on a cruise to Mexico. Ship was stationed at sea near Mazatlan. Used a 300mm telephoto and Kodachrome 64. Minolta camera.



Above: June 2001 total eclipse from Zambia. Used an 80-800mm zoom near 800mm, on a Minolta XTsi body. Print film- Royal Gold 100? Set-up used a barn door tracker. If only I had remembered to turn the camcorder on! The safari in South Africa (Kruger National park) was even more spectacular.



Above: April 8, 2005 Hybrid eclipse positioned aboard the MV Discovery within the totality segment of the track. In the South Pacific near Pitcairn Island. It's 3rd contact, with a double Diamond Ring! used the 3" refractor, Minolta XTsi. Eclipse duration was only 33 seconds.



Above: August 1, 2008 total eclipse from near Yiwu, China. (NW China- near Gobi dessert). After being chased out by the Chinese Army (AK-47s helped us comply) our group set up a second time, now after 1st contact. Clouds almost got me! Used a Sony/Zeiss 135mm lens with 2x converter. Sony a100 dslr.



Above: March 29, 2006 total eclipse from Al Salum, Egypt. 10 miles from the Libyan border. 2,000+ people at the site. 80-800mm zoom, Minolta X700. Royal Gold 1000. The Kodachrome 64 from the 3" refractor got lost in the mail.



Above: July 22, 2009 total eclipse near the Pacific atoll of Marakie. East of Tarawa Island. At 1 deg. north latitude aboard a small cargo ship. It was an international group of around 28 people. This was a repeat eclipse of my first eclipse in 1991. It is one Saros cycle later so I have completed at least one eclipse cycle. Ship rocked too much to keep the sun centered in the camera. This is a video frame grab. The Sun was moving through the field and I was lucky to grab this. Panasonic camcorder was used. This was my back-up plan.



Left: November 23, 2003 total eclipse. Flight over Antarctica. Only 76 people on the 767 plane, all on one side to view the eclipse. It was a 14 hour flight that left Punta Arenas, Chile and returned there. This is another video frame grab shot through the plane window. Used a Canon ZR10. Coronal streamers went way past the frame corners visually (top R bottom L). The image just doesn't show them. We were at 39,000 ft. Along the way we flew over the Amundsen-Scott Station at the South Pole and cruised around the Vincent Massif mountain range. Good food and wine was served. If doing something you might think is crazy....this just might be it!