

# The *Prairie Astronomer*

The Official Newsletter Of The Prairie Astronomy Club, Inc.  
October 1998

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## October's Program:

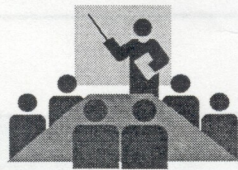
The program at the October PAC Meeting will be:

### Life on Mir

This month's program will feature video highlights of Life on the Mir Spacestation. 6 shuttle missions and dramatic footage of docking maneuvers are Combined with narrative explanations of the day to day activities on Mir.

This video is sure to provide for you - never before scenes - of what it is like to live in space for long periods of time. Mir is a triumph of Soviet technology and this video portrays excellent examples of our two countries working together. This program is a timely one in that Mir is scheduled for a de-orbit burn in 1999 where it will fall into the Pacific Ocean. I would like to thank **Larry Hancock** for providing this video.

*Thanks Erik, for doing a great job as program coordinator  
this past year. - Dave*



## **MEETINGS & EVENTS**

### **PAC MEETING**

**TUESDAY OCTOBER 27, 1998, 7:30 PM**  
at Hyde Memorial Observatory

### **UNL STUDENT OBSERVATORY**

Open to the public

**FRIDAY OCTOBER 30, 1998 (sundown-11PM)**  
**FRIDAY NOVEMBER 27, 1998 (sundown-11PM)**

### **CLUB STAR PARTY**

**FRIDAY NOVEMBER 20, 1998, Sunset 'till ?**  
Olive Creek SRA (see President's report for directions)

### **PAC MEETING**

**TUESDAY NOVEMBER 24, 1998, 7:30 PM**  
at Hyde Memorial Observatory

**NOMINATION &  
ELECTION**  
*of*  
**PAC OFFICERS for 1998**  
at the October 27th meeting

## CONTENTS:

**PRESIDENT'S REPORT - By Dave Knisely**  
**MISC. ASTRONOMY NEWS**  
**WHAT'S UP**  
**FROM THE MAILBOX**  
**JUPITER'S WHITE OVALS**  
**OCEANS ON CALLISTO?**  
**PAC CALENDAR**  
**MISC. & LIST OF OFFICERS**

**Page 2**  
**Page 2**  
**Pages 3, 4**  
**Pages 5-8**  
**Page 9**  
**Page 10**  
**Page 11**  
**Page 12**

The *Prairie Astronomer* is published monthly by the Prairie Astronomy Club, Inc. Membership expiration date is listed on the mailing label. Membership dues are: Regular \$20/yr, Family \$22/yr. Address all new memberships, renewals, or questions to: The Prairie Astronomy Club, Inc., PO Box 80553, Lincoln, NE 68501. For other club information, contact one of the following: Dave Knisely -President (402) 223-3968, Doug Bell - V.P. (402) 489-8197, Liz Bergstrom - Treasurer (402) 464-2038. All newsletter comments and articles should be sent to: Dave Scherping, 640 S. 30th St., Lincoln, NE 68510 (402) 477-2596 or e-mail dscherp1@aol.com ten days prior to the club meeting. Club meetings are held the last Tuesday of each month at Hyde Memorial Observatory in Lincoln, NE.

## **PRESIDENT'S REPORT**

*By: Dave Knisely*

This month's meeting will allow club members to decide on the leadership of our organization via our yearly election of officers. The nominations for the various club offices will remain open until the election vote is taken, so if you wish to nominate someone, be sure and attend. The Giacobinid meteor shower was a bit of a bust for those of us in the midwest. Only a handful of shower meteors were seen, despite clear skies and fairly good observing conditions. Those in Asia and eastern Europe were luckier, as a short-lived burst of between 300 and 500 meteors per hour were seen around 13 hours Universal time. The next major shower is the Leonids, and predictions for a reasonably good shower have been made. However, like the Giacobinids, the best areas on Earth to view a possible Leonid meteor storm are in the Pacific basin, so we probably will see between 10 and 50 meteors per hour (possibly more if the predictions are a little off). The best date seems to most likely be early Tuesday morning, November 17th, although activity should be notable a day either side of this time. We may want to get a Leonid party going at one of the local State Recreation areas, so if you are interested, come to the meeting. If a decision is made, it will also be posted on our PAC list on the internet. See you at the meeting.

## **MISCELLANEOUS ASTRONOMY NEWS**

*From Sky & Telescope's Weekly News Bulletin at <http://www.skypub.com>*

### **Hubble Goes Deeper**

In 1995 the Hubble Space Telescope's main visible-light camera stared into an "empty" patch of sky in Ursa Major for 100 hours, turning up thousands of remote galaxies in what came to be known as the Hubble Deep Field. Now the orbiting observatory has taken another look, this time at infrared wavelengths. Hubble's Near Infrared Camera and Multi-Object Spectrometer (NICMOS) stared into the Deep Field for 36 hours and nabbed more than 300 spiral, elliptical, and irregular galaxies in a tiny patch of sky just 20 arcseconds across. (The original Hubble Deep Field spanned 2.7 arcminutes.) According to team leader Rodger Thompson, some of these objects could be the most distant galaxies ever seen, lying more than 12 billion light-years away. Since the remotest parts of the universe appear highly redshifted, it's no wonder Hubble's infrared camera can see deeper than its ultraviolet and visible-light counterparts. Thompson points out that some of what were thought to be indistinct blue galaxies in the original Hubble Deep Field image are now recognized to be bright knots of star formation in much larger, older, redder galaxies seen clearly in the NICMOS view. For more information and images, see the Space Telescope Science Institute's Web site <http://opposite.stsci.edu/pubinfo/pr/1998/32/>

### **Giacobinids Outburst**

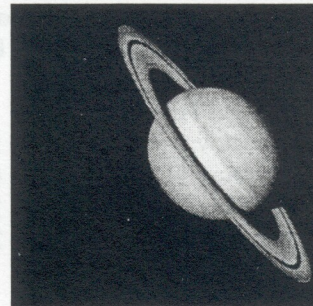
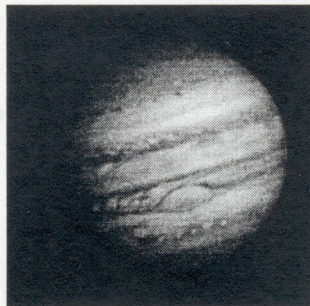
Skygazers eagerly watched for a return of the Giacobinid meteor shower on Thursday evening, October 8th. This long-dormant shower, spawned from Comet Giacobini-Zinner, produced two of the greatest meteor displays in this century, in 1933 and 1946. Most years bring no Giacobinids at all, but with the parent comet now relatively close to where its orbit intersects Earth's, astronomers predicted a potentially dazzling display this year. Early reports received by Sky & Telescope from around the U.S. and Western Europe suggested that the Giacobinids didn't materialize, but subsequent reports from Eastern Europe and Asia -- especially Japan and China -- make plain that an outburst did indeed occur. At its maximum, around 13-14h Universal Time, the zenithal hourly rate (ZHR) of meteors exceeded 500. (The ZHR is the number of meteors a single observer would see per hour if the sky were dark enough for 6.5-magnitude stars to be visible and the shower's radiant, or apparent point of origin, were at the zenith -- directly overhead.) For more information, see the Web sites of the International Meteor Organization and the Dutch Meteor Society.

### **Leonid Threat Downplayed**

On November 17th and 18th the world's space agencies will be nervously awaiting possible strikes to the more than 500 working satellites currently in Earth orbit. That's when the Leonid meteor shower will return to our skies, possibly bringing a fierce meteor storm with hundreds of "shooting stars" per minute. Many spacecraft, including the Hubble Space Telescope, will be carefully turned during the display to present their least vulnerable profiles to the potential sandblasting. But NASA and Department of Defense scientists who have been studying the meteors now believe that the threat to orbiting spacecraft is not serious, only "elevated." In a joint press release issued on October 7th, they estimate that during the 12-hour peak of the shower satellites will be exposed to as much meteoric energy as they normally see over months to years in space. Even so, most satellites go their entire lives without suffering physical or electrical damage from a meteor strike. So spacecraft operators are hoping for quiet nights in mid-November.

## WHAT'S UP

Jupiter and Saturn remain bright and wonderfully viewable in the evening. But the big solar-system story this month is the possibility that some parts of the world may see an intense shower of the Leonid meteors on the morning of November 17th.



**JUPITER** continues to be the brightest object in the evening sky. Look for it well up in the southeast as twilight fades. It continues to offer telescope users more viewable surface area and detail than any other planet. The Moon will pass close to Jupiter on the evening of November 27th.

**SATURN** was at opposition in eastern Pisces on October 23<sup>rd</sup> and is high in the sky early in the evening this. The full Moon is to the right of Saturn on November 2nd and passes under it later that night.

**MARS** is high in the east-southeast before dawn. It spends November beneath Leo. Mars is distinguishable by its lack of twinkling and its orange color. The waning crescent Moon glows quite close to Mars on the morning of November 13th.

**MERCURY** is very low in bright twilight for viewers in the Northern Hemisphere. Look low in the southwest about 30 or 40 minutes after sunset during the first half of November. Around November 9th binoculars may reveal the orange star Antares a bit below Mercury or to its lower left. You'll need a very clear sky and an open southwestern view.

**METEORS:** The Leonid meteor shower will peak on November 17, 1997. In normal years, observers will see approximately 60 meteors per hour. However, due to meteoroids concentrated in a small region of orbit, this rate increases dramatically in certain years. For example, in 1966, approximately 150,000 meteors were seen in a one hour period. The Leonid meteor shower is expected to produce outbursts during the next few years, with strong returns expected from 1998-2001. The peak years will probably be 1998 & 1999. Be sure to get out and observe the Leonids this year. It could possibly be the show of a lifetime. Also, look for the South Taurid Meteors peaking on November 3rd and the North Taurid meteors peaking on November 13th. Both should produce about 15 meteors per hour.

### TRANSIT TIMES OF JUPITER'S RED SPOT (Universal Time)

1998 November 1, 6:07, 16:03; 2, 1:59, 11:54, 21:50; 3, 7:46, 17:42; 4, 3:37, 13:33, 23:29; 5, 9:24, 19:20; 6, 5:16, 15:11; 7, 1:07, 11:03, 20:59; 8, 6:54, 16:50; 9, 2:46, 12:41, 22:37; 10, 8:33, 18:29; 11, 4:24, 14:20; 12, 0:16, 10:11, 20:07; 13, 6:03, 15:59; 14, 1:54, 11:50, 21:46; 15, 7:42, 17:37; 16, 3:33, 13:29, 23:24; 17, 9:20, 19:16; 18, 5:12, 15:07; 19, 1:03, 10:59, 20:55; 20, 6:50, 16:46; 21, 2:42, 12:38, 22:33; 22, 8:29, 18:25; 23, 4:21, 14:16; 24, 0:12, 10:08, 20:04; 25, 5:59, 15:55; 26, 1:51, 11:47, 21:42; 27, 7:38, 17:34; 28, 3:30, 13:25, 23:21; 29, 9:17, 19:13; 30, 5:09, 15:04

### MINIMA OF ALGOL (B PERSEID)

1998 November 3, 10:57; 6, 7:45; 9, 4:34; 12, 1:23; 14, 22:12; 17, 19:01; 20, 15:50; 23, 12:39; 26, 9:28; 29, 6:17

- Continued on next page -

### COMET 21P/GIACOBINI-ZINNER:

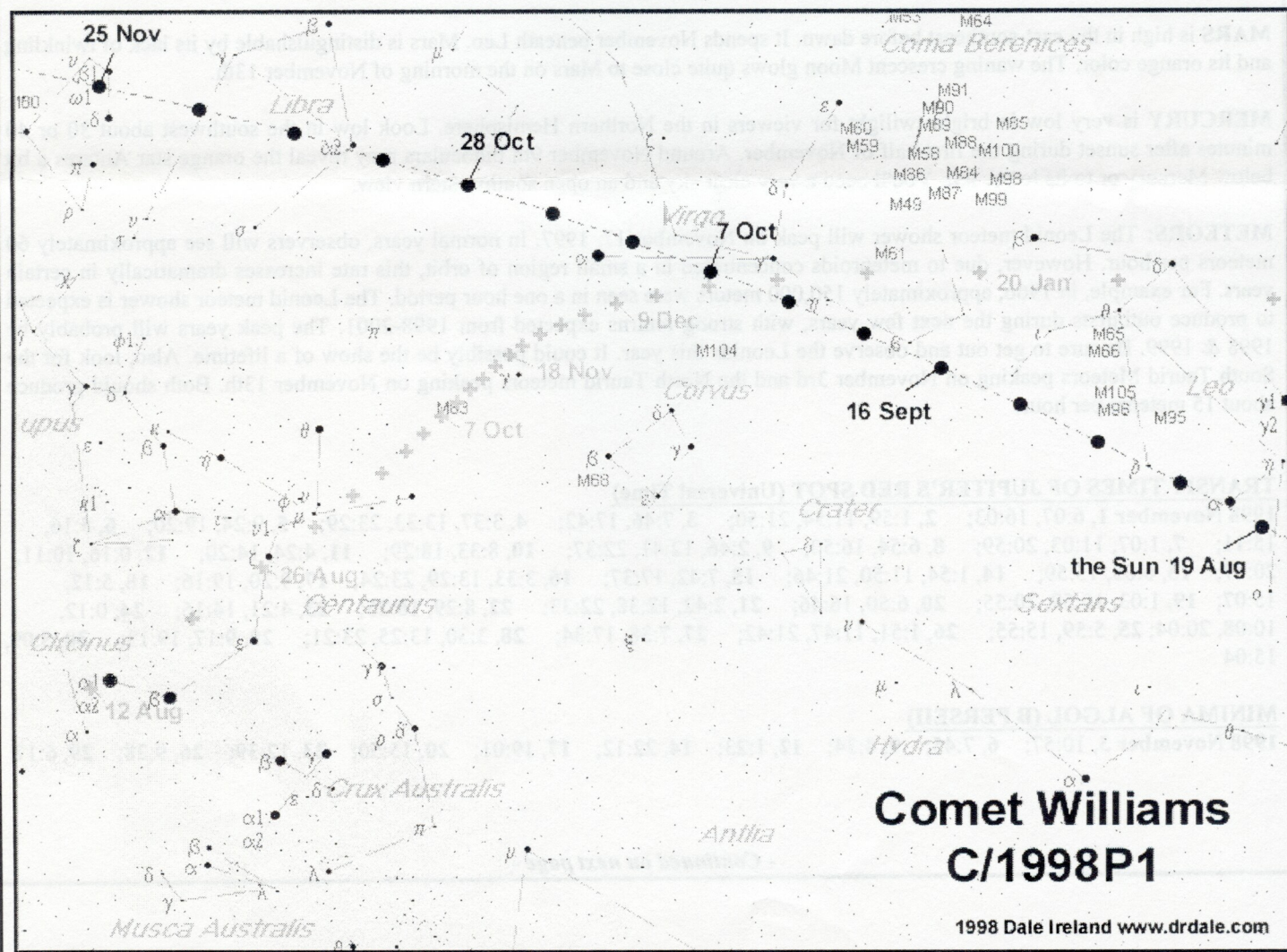
Glowing dimly at about 9th magnitude, Comet Giacobini-Zinner moves east across the evening stars as the stars move west toward the sunset. As a result the comet will seem to hang in nearly the same part of the sky.

The comet should be glowing at about 9th magnitude from late October to early December 1998. If you look just after twilight ends it will remain in the same part of the southwestern sky for weeks on end, in good view 30° or 40° up as seen from mid-northern latitudes. The farther south you are, the higher the comet will appear.

DATE	RA	DEC	ELONG	MAG
Nov 1	18h 58.0m	-3° 42'	68°	9.2
Nov 11	19h 40.8m	-8° 49'	68°	9.0
Nov 21	20h 29.3m	-13° 52'	68°	8.9
Dec 1	21h 22.4m	-18° 20'	69°	8.9

### COMET WILLIAMS HEADING NORTH

Comet Williams (C/1998 P1) will be moving from Hydra into Virgo in November and traveling west through Virgo in December. While it is currently the brightest comet in the sky at about 8th magnitude, it is low above the horizon in evening twilight for even the best-placed observers in the Southern Hemisphere. By late November the comet should be visible from both hemispheres at about 10th magnitude. The finder chart below was re-printed with permission from Dale Ireland's Web page <http://www.drdaile.com/>



**Comet Williams  
C/1998 P1**

1998 Dale Ireland [www.drdaile.com](http://www.drdaile.com)



## FROM THE MAILBOX....

These are some interesting e-mails I received

**From: Martin Gaskell <gaskell@unlinfo.unl.edu>**

**Date: Fri, 9 Oct 1998 (12:35AM CDT)**

Here's a report on tonight's Giacobinid watch in Earl Moser's meadow.

I had the whole family with me and a good showing of students (about 9 cars worth - that's maybe two dozen people, and not a single white flashlight among them!). Earl and Marjorie came and set up chairs and joined us. Bryan Schaaf had his 13" and 8" Coulters. It was quickly apparent as twilight ended that we were not in for a major storm. My main question was "just what will the zenith hourly rate be?"

With having to take care of students and my children I wasn't able to do any serious watching, but my wife Barbara put in a full hour's watching as did some of my students. Two of my students, Elizabeth and Sarah, did a very thorough watch. I'll base my comments on a preliminary inspection of their work.

The limiting magnitude based on star counts was 5.6 approximately. With a population power law index of 2.6 the ZHR correction factor is 2.4. Elizabeth and Sarah were probably seeing about 2 Giacobinids per hour. They were seeing about twice that number coming from the radiant but these other ones were probably sporadics (some could easily be excluded by their high speed -- Giacobinids are slow). So all of this gave a ZHR of about 5, but with a rather large error bar.

What immediately struck me was the high "sporadic rate". The total meteor rate (Giacobinids plus others) was probably 20 per hour (corrected for limiting magnitude). This is very high for that time of night. A number of bright meteors seemed to be coming low in the east and I suspected that another radiant might be active, with twice the rate of the Giacobinids. In the car on the way home Barbara commented how the magnitude distribution of the "sporadics" this evening was brighter than the sporadic distribution she was used to.

When I got home I checked in the IMO handbook and found that we must have been seeing some Taurids (a low ZHR, but noted for bright meteors). from the east. So we were seeing the effect of comet P/Encke. This might be a good year for the Taurids.

To be only "legally accurate" (sorry, I've read too many President Clinton transcripts!), I was able to show my students billions and billions of meteoroids -- Bryan was able to show everyone comet Giacobini-Zinner! It was indeed about 10th magnitude as advertised. Bryan also provided lots of deep sky entertainment for my students (and for Timothy, Daniel and Laura). All in all I think a good evening was had by all even if the Giacobinids misled us.

Martin



**From: Martin Gaskell <gaskell@unlinfo.unl.edu>**

**Date: Fri, 9 Oct 1998 (9:16AM CDT)**

More reports. Sounds like Japan had the best show.

\*\*I observed from North Wales, U.K. for 2.5hrs on 8th October 1998, between 1930UT-2200UT.

Results on just 2 meteors seen in this interval: 1 moonlight affected mag. 3 SPORADIC 1 fine mag. 2 DRACONID, near the radiant.

\*\*I observed the draconids from Malta (Europe) between 21:30 - 23:00 LT (+2UT). After a day of hazy but cloudless skies ... the evening brought some cloud cover and from between the gaps in the sky I observed no unusual activity of the draconids.

\*\*Japanese meteor observers met Giacobinids outburst again since 1985! M.Takanashi posted following preliminary results.

Observers:21      Total observations:2,879minutes      Giacobinids:1,231

UT	JST	N	ZHR	SD															
					14:00-15:00	8/9	23:30	9	174	123	13:30-13:40	8/9	22:35	7	360	220			
Oct.8	09:00-10:00	8/9	18:30	2	14	6	15:00-16:00	8/9	00:30	2	121	72	13:40-13:50	8/9	22:45	6	230	170	
	10:00-11:00	8/9	19:30	3	23	11	Oct.8	12:40-12:50	8/9	21:45	3	550	380	13:50-14:00	8/9	22:55	4	360	270
	11:00-12:00	8/9	20:30	5	61	43		12:50-13:00	8/9	21:55	6	450	240	14:00-14:10	8/9	23:05	3	310	250
	12:00-13:00	8/9	21:30	8	147	55		13:00-13:10	8/9	22:05	7	650	350	14:10-14:20	8/9	23:15	3	220	210
	13:00-14:00	8/9	22:30	14	371	243		13:10-13:20	8/9	22:15	7	760	450	14:20-14:30	8/9	23:25	3	170	230
								13:20-13:30	8/9	22:25	7	520	300	14:30-14:40	8/9	23:35	1	250	-

\*\*Mr. Daiyu Ito (NMS, Japan) forwarded us some results on the Draconids. He reported up to 40 Draconids in 50 minutes (near 14h UT) with Lm near 4.8-5.0. It is clear that Asia has seen a major display with ZHR's at least 200+.



**From: Martin Gaskell <gaskell@unlinfo.unl.edu>**  
**Date: Tue, 13 Oct 1998**

It was a lovely morning in Lincoln this morning (Tuesday Oct. 13) and "Dowp" gave me a fantastic view of Mars. Even though Mars is only 4.3 arcseconds across the apparition is now definitely underway for me. Last apparition I didn't start until over 6 arcseconds, but this time we have Dowp (an 8" with perfect optics) versus Tel'Poke (6" with less than perfect optics).

The seeing was absolutely perfect. I was seeing right down to the Rayleigh limit and imagining a bit beyond it (a bit of image enhancement by the brain!). I was using about 500X magnification. Even though Mars was at an altitude of about 40 degrees, differential atmospheric dispersion was quite apparent because of the small disk size and high magnification. I compensated for this by moving Mars a bit to the left in the eyepiece and using the residual transverse chromatic aberration to balance the differential atmospheric dispersion. A good trick if you have cheap eyepieces!

The north polar cap (NPC) was big and white. I measured it as coming down to about latitude 68 deg. N, so it hasn't shrunk much yet. The "Martian date" is early May. There was strong white (probably blueish white) cloud over the S. pole. It was a little bit smaller than the ice cap at the other end of the planet, and not quite as brilliantly white.

The darkest feature on the planet was Mare Acidalium. The Baltia/Ortygia region at the bottom of it was particularly dark and intense. The northern maria next to the NPC was almost equally dark all the way along to Umbra.

I didn't see any sign of blue clouds along the equator but at 4.3 arcseconds I could easily be missing many things. The only cloud was a quite bright compact one over the Xanthe-Ganges region on the morning limb (to the right of Chryse in an inverting telescope). This cloud looked maybe a bit yellowish (dust often gets mixed in with water clouds near the Chryse region).

The contrast of the southern maria at the top of the planet was not as great. At 4.3 arcseconds Sinus Sabaeus, Mare Serpentis and Mare Erthraeum were all blended together. In the very best seeing Margaritifer Sinus and Aurorae Sinus could be seen coming down towards Chryse on the equator.

I looked hard for Syrtis Major on the evening limb. I saw it yesterday at about 8:30 in the morning, but couldn't see it this morning at 7:20. Maybe there was some evening haze over it, or maybe it was a bit closer to the evening terminator.

All in all Mars was looking completely normal for this Martian season. If you've got a high resolution telescope consider getting out there just before dawn to have a look at Mars. Dawn is pretty late until the clocks change.

Martin



**From: Martin Gaskell <gaskell@unlinfo.unl.edu>**  
**Date: Thu, 15 Oct 1998**

Dear PAC folks,

Here's a little more on some of the fantastic planetary viewing earlier in the week. First some extracts from an e-mail from Don Taylor. I sure wish I'd been out the night before too as he was!

Hi Martin,

Thanks for your report on the fantastic Mars observing this morning. I am not at all surprised because when I looked last night at midnight the seeing was as good as I have ever seen it. I didn't look at any star diffraction patterns, I was too busy enjoying the best and steadiest views of Jupiter and Saturn I have had in a very long time. With the 8" the Encke division in Saturn's ring was easy, and there was detail visible in the red spot of Jupiter. Too much detail to draw on Jupiter at least in the half hour I had available to look and starting to look very much like a Voyager picture of Jupiter, ditto Saturn. . . .

Here is some of what I saw on Saturn the night before that:

The night before that wasn't as good, but still had some very good moments when I looked at Saturn. Using my normal double star and Mars magnification of 500X Saturn was HUGE! "Wow!" I thought when I first looked at it at 500X. Unfortunately because the surface brightness is much less than for Mars or Mercury I could see features better with 375X or even only 250X. During one of the moments of extremely good seeing I was pretty sure that I saw the "spokes" on Saturn's rings looking just like a Voyager pictures. I only saw the spokes on one side (the following side). Because they were quite large they were easily resolved, but I needed the moments of perfect seeing to get good enough contrast to see them. I'm saying "them" but I should really say "it" because there was only one obvious spoke.

The break in the A ring just before you get to Cassini's division was more prominent than the Encke division, which I wasn't 100% sure I was seeing. The division just outside of Cassini's is helped by the change in brightness of the A ring there. The Encke division doesn't have that advantage and it also has the problem of the strong contrast effect of the abrupt outer edge of the A ring. In the best moments of seeing I was also fairly confident that I was seeing about three divisions in the B ring. The most prominent was right in the middle of the B ring. Inspection of Voyager photos shows that they are actually bands of gaps or changes of contrast in sections of the ring. Whatever they really are it is interesting to see what one can see under optimum conditions.

These moments of fantastic viewing with our 8-inch "Dowp" are beginning to inspire me to finish the 12" mirror. Maybe after the end of the semester I'll tackle it. But if I do that I'll have to start another mirror to have one to demonstrate at Astronomy Day outside the planetarium!

Happy planetary viewing,  
Martin



**From: Martin Gaskell <gaskell@unlinfo.unl.edu>**  
**Date: Mon, 19 Oct 1998**

I enjoyed reading Dave K.'s Saturn report last night. It was especially interesting as I observed Saturn just 30 minutes beforehand with "Dowp" (our 8-inch Newtonian). I found the seeing conditions to be almost identical to what Dave described (average with some quite good moments, not as good as last week) and my view agreed in almost every detail with what Dave described. Here are a few additional comments though:

1. The Crepe ring looked bluish to me.
2. I would describe the fading of the B ring towards the planet as discontinuous. In the best moments of seeing there seemed to be a couple of steps down in brightness.
3. Perhaps there is another belt around the polar cap (at a latitude of about 45 - 50 degrees S.)
4. Last week (when the seeing was better), I thought I saw a thin dark band right on the equator. I looked for it last night, but didn't think that I saw it.
5. Last week there seemed to be a dark region in the SEB (perhaps a widening of the N component), but I didn't see anything last night. I would also characterize the SEB more as "double" rather than showing three components.

I also looked at Jupiter. During those moments when the seeing was better the amount of detail in the equatorial zone at the boundary with the north equatorial belt was overwhelming - no way I could memorize and draw that much detail. There were probably between 10 and 20 wispy features coming up off the NEB into the EZ. There was a similarly overwhelming amount of detail inside the SEB. This is why I stick with simple planets like Mars - there is far less detail to see on a planet only a few arcseconds across! By the way, the NEB looks quite different from what it looked like in the 1960s. In those days there were just a few really big white ovals.

We've got some great planetary viewing coming up in the evening sky for the next couple of months. I hope everyone enjoys it.  
Martin

**From: Edwin Woerner <m611@ugru.uae.ac.ae>**  
**To: Rick Johnson <wa0cky@inetnebr.com>**  
**Date: Sunday, 4 Oct 1998**

*Ed Woerner was a long time club member and many of our long time members remember him. He now teaches mathematics in Saudi Arabia. I received this email from him which tells a bit about what it is like to be an amateur astronomer in that country. I wonder how long that new eyepiece he wants to order will be held in customs?* Rick Johnson

Hi Rick,

I'm still here in the UAE. Last year was great, and I stayed through the summer working on a curriculum-development project. I'm not sure what I'll be doing at the end of this year.

I finally got a telescope over here. I bought a 6-inch, f/6 Newtonian from Starsplitter. It comes with an equatorial mount. I enjoy it a lot. It was quite a project getting it here. Starsplitter advertised these scopes long before they actually had any in stock. Finally they got one to me, and it was taken by customs at the Al Ain Airport. They sent it to a local police station where it sat on a sergeant's desk for 3-1/2 months. It didn't seem to bother him any. I went in every couple of weeks to visit it (and him). Apparently it takes permission to import a telescope. Remember last spring when Iraq was worried about the UN inspectors looking into palaces? Well, they have lots of palaces here in the UAE as well. Finally, we appealed to the Minister of the Interior in Abu Dhabi, and after waiting for many weeks, he approved it. One day three workers brought it up to my office. It took another three signatures to get it off campus. I got a bill recently from customs. They want to charge me storage for the time they held it. But it was worth it!

There are lots of lights in my neighborhood, but even as fast as it is, it shows the moon, Jupiter and Saturn very well these evenings. The other evening kids from all over the neighborhood came by, wanting to look. I don't know how much English most of them speak, and my Arabic. I know the word for moon, and I think the planets have pretty much the same name everywhere. Everyone went away impressed. We saw Jupiter occult one of its moons, and we watched sunrise on a lunar crater (I don't know which one). It was a good experience for me as well as them.

There are a few other amateur astronomers in the UAE. The Dubai Natural History Group is holding a star party on October 22. They sent me a note about it and asked me to come with my scope. It sounds like fun. I have not had a chance to use the scope in really dark skies. I found a few summer globulars and M-57 in it easily enough. It has a wide field of view, even with the 10-mm. and 25-mm. Plossel eyepieces it came with. It should show things like M-42, M-31, Double Cluster, etc. very well. I'd like to get a good Barlow.

I'm also thinking of getting some sort of long-focus refractor if possible. Maybe another 2.4, f/15 or so. The solar eclipse next summer, Aug. 11, 1999 just misses the UAE. Dubai will see about 95 percent totality, the extreme northern part about 97 percent. Totally occurs just across the Gulf in Iran. This is also the place with the best chance of seeing totality -- over 95 percent probability of clear skies. I probably can't go to Iran, but Turkey, Greece and the Aegean, Munich (spelling?), Germany, and the Black Sea areas are going all out to attract viewers. Maybe the University here has some travel money available . . .

"Sky and Telescope" finally found me over here. So now I get that. I especially enjoy seeing the Hubble Telescope pictures.

How are things going with you and the PAC? Did the summer star party at Valentine happen? Is the observatory at Holmes Park still holding public viewing on weekends? Are you still active?

There is no Ham Radio over here. One of my colleagues is a Ham. He tried to get permission to set up a station. That got a very quick negative.

I need to prepare for my next class. I hope you and your family are well. Take care, and best wishes . . .

Ed Woerner



# JUPITER'S 'WHITE OVALS' TAKE SCIENTISTS BY STORM

From the JPL Web Site <http://www.jpl.nasa.gov>

As powerful hurricanes pummel coastal areas on Earth, NASA space scientists are studying similar giant, swirling storms on distant Jupiter that have combined to spawn a storm as large as Earth itself.

Three separate cold storms, called "white ovals" because of their color and egg shapes, have been observed in one band around Jupiter's mid-section for half a century. Two of the storms recently merged to form a larger white oval, according to scientists studying data from NASA's Galileo spacecraft, the Hubble Space Telescope and the agency's Infrared Telescope Facility atop Mauna Kea, HI.

"The newly merged white oval is the strongest storm in our solar system, with the exception of Jupiter's 200-year-old 'Great Red Spot' storm," according to Dr. Glenn Orton, senior research scientist at NASA's Jet Propulsion Laboratory (JPL), Pasadena, CA. "This may be the first time humans have ever observed such a large interaction between two storm systems."

Each of the white ovals that merged were about two-thirds the diameter of the Earth before the merger, when they combined to form a feature as large as Earth. Although scientists have observed the end result of the merger of the two white ovals, the actual "collision" took place under cover of darkness while Jupiter was turned away from view.

This new, powerful white oval has a mysterious trait, according to Orton. "We can see it, along with the other white ovals, at visible light and some infrared wavelengths, but we cannot see the new white oval at certain infrared wavelengths that peer underneath the storm's upper cloud layers," Orton said. This might mean the storm is in a transition stage, undergoing a rebirth after the merging of the two storms.

"With mature white ovals, we can see the upwelling of winds in the center, which in turn leads to downwelling around it," Orton said. The new white oval has a very cold center at a temperature of -157 C (-251 F), about one degree colder than its surroundings. "Because of this, the oval may have generated a thick cloud system which obscures the downwelling," Orton said, which could explain the new oval's "disappearing act" at some wavelengths.

Adding to the mystery is the fact that a nearby storm rotating in the opposite direction to the new white oval used to be warmer than its surrounding. "This probably means that the feature contained mostly downwelling winds," said Orton. However, Galileo's photopolarimeter radiometer instrument showed this feature had cooled down to temperatures that were about the same as its surroundings.

Orton suspects that this storm somehow lost power and is no longer spinning as fast or downwelling as strongly as a year ago. This storm was once positioned between the two smaller white ovals that merged, and Orton theorized that when this storm system lost power, it removed the buffering mechanism that kept the two original white ovals apart.

Orton and his colleague, Dr. Brendan Fisher, a California Institute of Technology postdoctoral fellow at JPL, based their conclusions about the temperatures using data gathered by Galileo on July 20, 1998, during the spacecraft's 17th orbit of Jupiter and its moons. Although much data from the flyby of Europa in that time period was lost because of a problem with the spacecraft's gyroscope, Galileo's photopolarimeter radiometer gathered the new data on the white ovals before the anomaly occurred.

The photopolarimeter radiometer measures temperature profiles and energy balance of Jupiter's atmosphere, helping scientists study the huge planet's cloud characteristics and composition. Scientists believe that the bright, visible clouds of the white ovals are composed of ammonia.

Galileo has been in orbit around Jupiter and its moons for 2-1/2 years, and is currently in the midst of a two-year extended mission, known as the Galileo Europa Mission. JPL manages the Galileo mission for NASA's Office of Space Science, Washington, DC. JPL is a division of Caltech, Pasadena, CA.

Images and information on the Galileo mission are available on the Internet at the Galileo website: <http://www.jpl.nasa.gov/galileo>. The images are also available at <http://www.jpl.nasa.gov> and <http://photojournal.jpl.nasa.gov>.

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# JUPITER'S MOON CALLISTO MAY HIDE SALTY OCEAN

From the JPL Web Site <http://www.jpl.nasa.gov>

Jupiter's second largest moon, Callisto, may have a liquid ocean tucked under its icy, cratered crust, according to scientists studying data gathered by NASA's Galileo spacecraft.

The Galileo findings, to be published in the Oct. 22 issue of the journal *Nature*, reveal similarities between Callisto and another of Jupiter's moons, Europa, which has already displayed strong evidence of a subsurface ocean.

"Until now, we thought Callisto was a dead and boring moon, just a hunk of rock and ice," said Dr. Margaret Kivelson, space physics professor at UCLA and principal investigator for Galileo's magnetometer instrument, which measures magnetic fields around Jupiter and its moons. "The new data certainly suggest that something is hidden below Callisto's surface, and that something may very well be a salty ocean."

This premise was inspired by Galileo data indicating electrical currents flowing near Europa's surface cause changes in Europa's magnetic field. "This seemed to fit nicely with other data supporting the idea that beneath Europa's icy crust, a liquid ocean might be serving as a conductor of electricity," said Kivelson.

Armed with that information, Kivelson and UCLA colleagues Drs. Krishan K. Khurana, Raymond J. Walker, and Christopher T. Russell set out to test a similar theory about Callisto, "although it seemed far-fetched at the time," Kivelson said. The team went back and studied data obtained during Galileo's flybys of Callisto in November 1996, and June and September of 1997.

Kivelson and her colleagues found signs that Callisto's magnetic field, like Europa's, is variable, which can be explained by the presence of varying electrical currents associated with Jupiter that flow near Callisto's surface. Their next challenge was to discover the source of the currents.

"Because Callisto's atmosphere is extremely tenuous and lacking in charged particles, it would not be sufficient to generate Callisto's magnetic field; nor would Callisto's icy crust be a good conductor, but there very well could be a layer of melted ice underneath," Kivelson said. "If this liquid were salty like Earth's oceans, it could carry sufficient electrical currents to produce the magnetic field."

Lending further credence to the premise of a subsurface ocean on Callisto, Galileo data showed that electrical currents were flowing in opposite directions at different times. "This is a key signature consistent with the idea of a salty ocean," Khurana added, "because it shows that Callisto's response, like Europa's, is synchronized with the effects of Jupiter's rotation."

Although scientists consider the possible presence of an ocean on Europa as one factor hinting that life could have developed there at some point, it is doubtful that Callisto could harbor life, according to Galileo Project Scientist Dr. Torrence Johnson of NASA's Jet Propulsion Laboratory (JPL), Pasadena, CA.

"The basic ingredients for life -- what we call 'pre-biotic chemistry' -- are abundant in many solar system objects, such as comets, asteroids and icy moons," Johnson explained. "Biologists believe liquid water and energy are then needed to actually support life, so it's exciting to find another place where we might have liquid water. But, energy is another matter, and currently, Callisto's ocean is only being heated by radioactive elements, whereas Europa has tidal energy as well," from its greater proximity to Jupiter.

Galileo flies by Callisto four more times between May and September of 1999, which may yield more clues about the possibility of a Callisto ocean. However, Kivelson said that scientists will rely heavily on theoretical models to test their interpretations about Callisto.

Kivelson and her team also are reexamining magnetometer data from Jupiter's largest moon, Ganymede, to address the tantalizing concept that Callisto and Europa may not be the only moons of Jupiter with subsurface oceans.

The latest Galileo exterior images of Callisto, released on Oct. 13, and a new artist's concept of a cutaway view of the moon's interior are available on the Internet at the following websites:





<http://www.jpl.nasa.gov/galileo> <http://www.jpl.nasa.gov> <http://photojournal.jpl.nasa.gov>

Galileo has been in orbit around Jupiter, studying the huge planet, its moons and its magnetic environment, for more than 2 ½ years. It is currently in the midst of a two-year extension known as the Galileo Europa Mission. Galileo is managed by JPL for NASA's Office of Space Science, Washington, DC. JPL is a division of Caltech, Pasadena, CA.

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# The PRAIRIE ASTRONOMY CLUB CALENDAR

## for NOVEMBER 1998

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
1	2	3 South Taurid Meteors Peak	4 FULL MOON 	5	6 OAS Meeting 7:30PM UNO campus Durham-Rm 169	7 Hyde Observatory open to the public 7 - 10 PM
8	9	10	11 3 <sup>RD</sup> QUARTER 	12 NSP Planning meeting 7:30 PM Mahoney State Park Lodge	13 North Taurid Meteors Peak	14 Hyde Observatory open to the public 7 - 10 PM
15	16 Leonid Meteors	17 <b>LEONID METEORS PEAK</b>	18 Leonid Meteors	19 NEW MOON 	20 Observing at Olive Creek SRA	21 Hyde Observatory open to the public 7 - 10 PM
22	23	24 PAC Meeting 7:30 PM Hyde Observatory	25	26 1 <sup>ST</sup> QUARTER  THANKSGIVING	27 UNL Student Observatory Open to the public sundown-11PM	28 Hyde Observatory open to the public 7 - 10 PM
29	30	<b>1999 MAHONEY STAR PARTY DATES HAVE BEEN SET:</b>  FRIDAY MAY 21 (new moon is 5/15) FRIDAY JUNE 18 (new moon is 6/13) FRIDAY JULY 16 (new moon is 7/11) FRIDAY SEPTEMBER 10 (new moon is 9/7) FRIDAY OCTOBER 8 (new moon is 10/6)				

### MOON, JUPITER & SATURN TO BE FEATURED AT OCTOBER UNL STUDENT OBSERVATORY PUBLIC NIGHT

The October public night at the UNL Student Observatory will be from 7:00 p.m. until 10:00 a.m. on Friday October 30. The viewing is free and children are welcome. Even though this is the night before Halloween, nothing spooky is planned - no tricks here, just celestial treats for all the family! Planned treats of the evening will be the craters of the waxing gibbous moon, and the giant planets Jupiter and Saturn. Gas giant Jupiter is the biggest planet in the solar system. If it had been a bit bigger it would have been a star. Through the telescope you can see lots of activity in the planet's clouds. You can also see Jupiter's four large moons encircling it. The ringed planet Saturn is now moving into the evening sky. It will be on show at the next several public nights. As well as the splendid ring system, several of Saturn's moons can be seen too. If you've never seen the glory of Saturn's ring system in a telescope, you've really missed out on something in life!

It is cold at night in the fall and the observatory is unheated so attendees (children in particular) should dress very warmly. The observatory is located on the roof of the parking garage on Stadium Boulevard directly across from Memorial Stadium. The viewing session will be canceled if it is totally overcast. Because of the Thanksgiving holiday, the November public night will be on Friday November 20. There will be no public night in December because of the Christmas holidays.

## MISCELLANEOUS

**CLUB LIBRARY:** Did you know that the Prairie Astronomy Club has a library with scores of astronomy related books, which are available for loan at no cost to it's members? These books are now located in a cabinet at Hyde Observatory, and may be checked out by PAC members at any monthly meeting of the Prairie Astronomy Club. Larry Hancock is our librarian.

**PAC SHIRTS & HATS:** The club shirts and hats with the PAC logo are in. If you placed an order and haven't picked it up yet, see Larry Hancock at the club meeting. Payment is due upon receipt. T-shirts are \$7, polo shirts are \$14 & hats are \$5.

**PAC-LIST:** Mark Dahmke maintains an e-mail list server for PAC. If you have an e-mail address and are not on the PAC List, you may subscribe by submitting an e-mail to list@4w.com. Write "Subscribe PAC-List" in the body of the e-mail.

**FOR SALE:** 6" MEADE NEWTONIAN on an equatorial mount. Call Dave Scherping for details 477-2596.

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Next PAC Meeting  
October 27, 1998  
7:30 PM  
Hyde Observatory

EARL MOSER 9/99  
P O BOX 162  
HICKMAN NE 68372-0162