

# SPECTRUM

Northern Cross Science Foundation Newsletter

February 1999

## LOOKING UP

**Feb. 4 Thursday**  
**Astronomy 101**  
**7:00 PM**  
**General Meeting**  
**8:00 PM**  
**Carlson Tool & Mfg.**

**Feb. 13 Saturday**  
**Ski and Stars**  
**5:00 PM**  
**Pike Lake State Park**

**Feb. 17 Wednesday**  
**Board Of Directors**  
**7:30 PM**  
**Jeff Setzer's House**

## Iridium Satellites Part 1

**From the Internet** <http://www.satellite.eu.org/sat/vsohp/iridium.html#iridium>

A relatively small communications satellite called IRIDIUM (r) has been providing spectacular visible reflective flares/glints to observers on the ground .

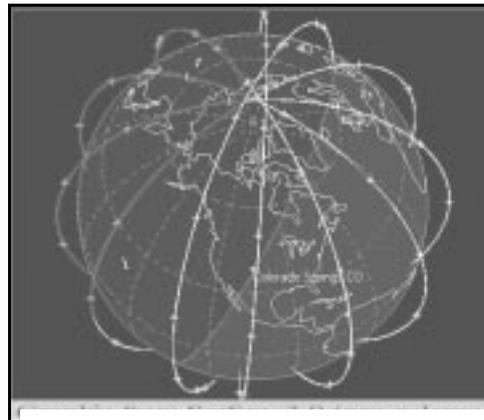
With only a normal brightness of +6 magnitude (binoculars are useful to spot it), occasionally some of the Iridium satellites provide reflective flares/glints of magnitude (-)8. For comparison, Venus can be as bright as magnitude (-)4.9, thus reflections can be up to 30 times brighter than Venus. The flares/glints can last anywhere from 5 to 20 seconds before the satellite once again

becomes almost invisible to the naked eye. Some flares have been observed during the daylight hours which is very unusual for reflective glares from satellites. Knowing where to look to observe these flares dur-

ing the daylight hours is essential.

Initially, the Iridium satellite is placed in a circular orbit at an altitude of approximately 500 km. Over a two week period

the satellites are individually raised to a circular orbit of approximately 780 km. With its job done, the satellite dispenser at the 500 km altitude is placed in a lower eccentric orbit to accelerate decay and re-entry. During the first launch provided by Boeing's Delta II, the dispenser failed to



Iridium Satellites in orbit around Earth

achieve a lower eccentric orbit and went into a higher eccentric orbit.

The mechanism providing the flare/glint appears to be the Main Mission Antenna

(See **IRIDIUM** on page 2)

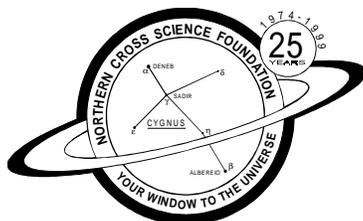
## Astronomy's Problem with Light Pollution IDA Handout #1

**T**oday, people who live in or near cities have lost much of their view of the universe. The view is often substantially diminished even for people who live in smaller towns and rural areas. The spectacular view of the night sky that our ancestors had on clear dark nights no longer exists. The great increase in the number of people living in urban areas has resulted in a rapid increase in urban sky glow due to outdoor lighting, brightening the heavens to

such an extent that the only view most people have of the Milky Way or most stars is when they are well away from cities. This excess light in the sky has an adverse impact on the environment and seriously threatens to remove forever one of humanity's natural wonders our view of the universe.

While this increased urban sky glow

(See **#1** on page 3)



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# January Minutes

By Kevin Bert

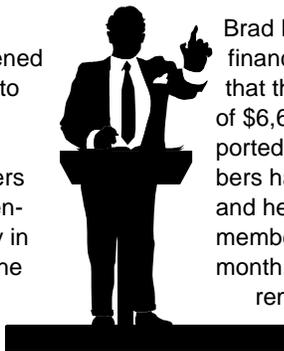
The January meeting of the Northern Cross Science Foundation was held in the conference room of Carlson Tool & Mfg. in Cedarburg. The Astronomy 101 class preceded the business meeting.

President Jeff Setzer opened the meeting at 7:55 p.m. to over 30 people.

Jeff welcomed all members to the meeting and was encouraged to see so many in attendance considering the poor weather conditions.

Jeff hoped that the club could do some special activity to celebrate the club's 25th anniversary. No specific plans have been set. Rudy Zarling was present to confirm that it was the month of January that the club became incorporated in 1974.

Jeff noted that Astronomy Day for 1999 was on May 22nd, and that the club should start thinking about activities for that day. He reminded that the first public activity would be the Pike Lake Ski and Stars on February 13th. Any



club member that brings a telescope will not need to pay. Harold Rogers recommended that anyone interested in attending should get there early to avoid the traffic.

Brad Plaumann covered the latest financial transactions and reported that the club had ended with a total of \$6,650.00 in all accounts. He reported that quite a number of members had paid their membership dues and he hoped that the remaining members would pay over the next month. Brad would handle selling the remaining 1999 Kalmbach calendars to any interested members while the supplies lasted. They are \$6.00 each.

After some discussion and for clarification, it was noted that the decision for the club to spend \$50.00 to join the International Dark-Sky Association (IDA) was more of a supporting gesture for the work of the association. Most of the materials that we are interested in, and that they provide, are available at no cost.

Kevin Bert went over the Pick-N Save

program and confirmed the 6 digit number. 556190. He solicited for topics for the main programs and hoped that one or more members would come forward to chair a program committee. Kevin made available copies of the Northern Lights, and noted that the club would be increasing the number of copies available for members. He laid out a copy of the Astronomical League's council meeting minutes and business meeting minutes from the national convention last July 23rd at French Lick, Indiana and a brochure for the Nebraska Star Party 1999. A second calendar from Astronomy Inc. was on display for anyone interested in ordering one. Kevin then reported on the progress of the Panarusky 20-inch Telescope. He had on display components of the secondary holder and said that the primary mirror should be present at the February meeting.

The business meeting was closed by Jeff Setzer at 8:25 p.m.

Respectfully submitted,  
Kevin Bert, secretary

( *IRIDIUM* from page 1)

(MMA) on each of the satellites. These antennae (of which there are three-120 degrees apart, 188 cm wide x 86 cm long x 4 cm thick each) are highly reflective aluminum flat plates (treated with silver-coated teflon for thermal control) that are angled 40 degrees away from the axis of the body of the satellite.

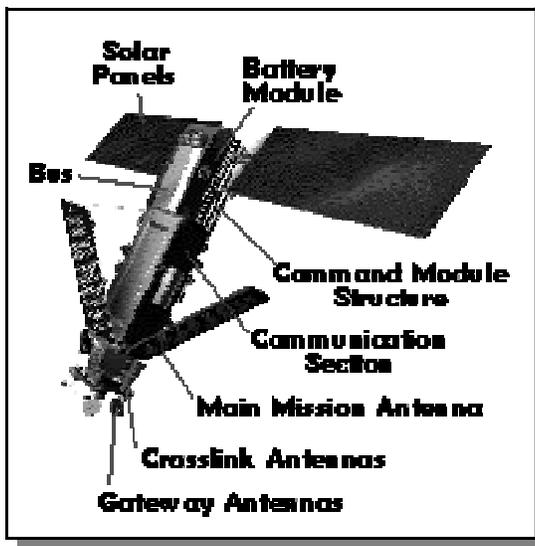
The axis of the satellite body is maintained vertical to the Earth's surface. On each plate are 106 electronic radiation elements.

The plate or MMA can provide a direct (specular) reflection of the sun's disk. This specular reflection is only tens of kilometers wide at the Earth's surface. In order to see a very bright reflection,

the observer must be within this relatively small area. Prediction programs are available to determine this area.

The three sided (similar to an equilateral triangle) satellites themselves are not very large, approximately 4 meters long and less than one meter in width.

"I was astonished to see it so bright," said Randy John of Pleasant Hill, California, USA. John was one of dozens of amateur astronomers around the world who, last August, began spotting orbiting Iridium satellites. News quickly spread as sky-watchers exchanged e-mail accounts of their sightings. In addition to the excitement of discovering new heav-



enly objects, the observers were struck by the occasional brightness of the

(See *IRIDIUM* on page 6)

(#1 from page 1)

brightens the night sky for all of us, and amateur astronomers in particular, it presents a particularly potent threat to professional astronomy. Many advances at the frontiers of astronomy require observations of very faint objects that can be studied only with large telescopes located at prime observing sites, well away from sources of air pollution and urban sky glow. For example, most observations of cosmological interest deal with extremely remote sources: galaxies or quasars at such great distances that their light has traveled for billions of years sometimes twice the age of our solar system only to be lost in the glare of our civilization during the last 1/1000 of a second of the journey.

This sky glow that adversely affects the environment and compromises astronomical research is called **light pollution**, for it is wasted light that does nothing to increase nighttime safety, utility, or security. Such wasted light only serves to produce glare, clutter, light trespass, light pollution, and wastes energy, money, and natural resources in the process.

The argument that all astronomy can be done from space is not correct; the largest telescopes will continue to be ground-based for a long time because it is much less expensive. It doesn't make sense to do in space, at much higher cost, what can be done from the ground. There are many things that can only be done in space, and this type of research is and will continue to be in great demand. The experience of nearly four decades of space astronomy is that space research has greatly increased the demand for ground-based telescopes, both large and small. Planning and implementation of several very large ground-based telescopes is well underway. There are exciting times ahead for astronomy, using present and future ground based telescopes which *complement* the telescopes in space.

Fortunately, viable solutions do exist for the problem of light pollution, and control programs are underway now in a number of communities. Outdoor

lighting codes and ordinances are essential to the long term success of astronomical research and for the preservation of humanity's view of the universe. There is much more to be done, however, everywhere, and most people are not yet even aware of the issue.

Lack of awareness, rather than resistance, is generally the biggest problem in controlling light pollution. Educating the public, government officials and staff, and lighting professionals is a major thrust of our current activities. These efforts have helped. The increase in light pollution near major observing sites is moderating. More can and must be done locally, nationally, and internationally. Amateur and professional astronomers and many others who are not astronomers are urging better outdoor lighting practices which will benefit us all.

Astronomers are not against lighting at night. They have the same needs for quality lighting as everyone else. They advocate the best possible lighting for the task, with lighting designs that take into consideration all of the relevant factors such as glare control, energy efficiency, and the need for dark skies. Fortunately, everything that is done to minimize light pollution also saves energy because the efficiency and utility of the nighttime lighting is improved. Everyone wins. Here are some solutions that minimize light pollution without compromising in any way nighttime safety, security, or utility:

- 1) Use night lighting only when necessary. Turn off lights when they are not needed. Timers can be very effective. Use the correct amount of light for the need, not overkill.
- 2) Direct the light downward, where it is needed. The use and effective placement of well-designed fixtures will achieve excellent lighting control. When possible, retrofit or replace all existing fixtures of poor quality. In all cases, the goal is to use fixtures which control the light well, minimizing glare, light trespass, light pollution, and energy usage.

- 3) Use low pressure sodium (LPS) light sources whenever possible. This is the best possible light source to minimize adverse effects on astronomical activities. LPS lamps are also the most energy efficient light sources that exist. Areas where LPS is especially good include street lighting, parking lot lighting, security lighting, and any application where color rendering is not critical.

- 4) Avoid development near existing observatories, and apply rigid controls on outdoor lighting when development is unavoidable. Such controls do not compromise safety, security, or utility. Outdoor lighting ordinances and codes have been enacted by many communities to enforce quality, effective nighttime lighting.

All of these solutions to the problem say, really, "Do the best possible professional lighting design for the task. Include all relevant factors such as glare, light trespass, and light pollution." All the solutions needed for protecting astronomy have positive fringe benefits of maximizing the quality of the lighting, and of saving energy.

We must do what we can, now, to protect the nighttime environment. It is another of the key environmental issues confronting our civilization, one that most men and women are unaware of, however.

The International Dark-Sky Association, a tax-exempt, non-profit, membership-based organization, exists to help overcome this awareness problem and to help preserve dark skies while at the same time maximizing the quality and efficiency of outdoor lighting.

# MarsWatch 99

Taken from their web site



The International MarsWatch is a group founded by amateur and professional astronomers more than 30 years ago to facilitate better communication between the amateur and professional Mars observing communities. Here you will find images of Mars con-

tributed by amateurs and professional, tools to aid you in planning your own Mars observations, current and past issues of the International Mars Watch Electronic Newsletter, and links to other Mars-relevant sites on the Internet. The primary purpose of this project

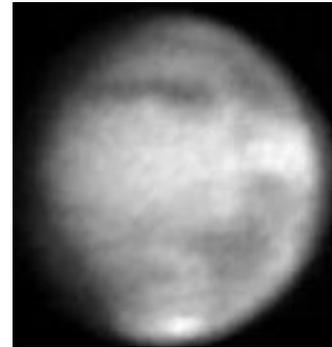
is frequent CCD imaging of Mars using B,V,R or other standard filters and visual drawings and photos in order to monitor the planet's atmospheric dust and cloud activity.

2 a.m. and 2 p.m. local time (the rest of the planet is over the horizon), so quality ground-based observations are needed in order to place these single-time-of-day orbiter views of the planet as well as the single-location lander data, into a global context.

The Astronomical League is hosting the MarsWatch 1998-1999 Apparition Site. You can preview the site at [www.astroleague.org/marswatch](http://www.astroleague.org/marswatch)

tributed by amateurs and professional, tools to aid you in planning your own Mars observations, current and past issues of the International Mars Watch Electronic Newsletter, and links to other Mars-relevant sites on the Internet. The primary purpose of this project

The upcoming apparition (1999) is particularly important because the U. S. Orbiter (Mars Global Surveyor) will start regular imaging during this time. In addition, the orbiter will be in a low sun-synchronous polar orbit, so it will only "see" the surface of Mars around



December 23, 1998  
MARS

## MARS IN 1998-99

Mars has an average 15.8-year seasonal opposition cycle, which consists of three or four Aphelic oppositions and three consecutive Perihelic oppositions.

The 1998-99 apparition will be considered an Aphelic apparition because opposition occurs only 58 degrees after aphelion (70 Deg. Ls). Mars will reach opposition on 24 April 1999 (128 Deg. Ls) and be closest to Earth on 01 May 1999 (132 Deg. Ls) with an apparent diameter of 16.2 seconds of arc. Mars will be at a distance of 0.57846 A.U. or 53,771,107 miles from Earth.

For observers located in Earth's Northern Hemisphere, Mars will not be positioned as favorably during the upcoming apparition as it was in 1997, since it will be placed south of the celestial equator throughout the entire apparition.

Mars' North Pole will be tilted earthward during the entire 1998-1999 apparition, permitting study of the planet's Northern Hemisphere during Martian late spring, summer, and autumn.. Thus astronomers can again investigate the regression of the NPC and



follow Martian arctic meteorology. This apparition should also allow careful scrutiny of the summer NPC remnant.

## DAYS AND SEASONS

### ON MARS

The Martian solar day, also called a "sol" by space scientists, is about 40 minutes longer than a day on Earth. Thus Mars rotates through only 350( of longitude in 24 hours. An astronomer on Earth, who observes a particular surface feature on Mars, on a particular night, sees the same feature 10 ( further to its west (closer to its morning limb) the next night.

Mars and Earth have four comparable seasons because their axes of rotation are each tilted at about the same angle to their respective orbital planes. In describing Martian seasons, scientist use the term "Ls" which stands for the Areocentric longitude of the Sun along Mars' ecliptic. ("Areo-" is a prefix often employed when referring to Mars or "Ares.") Mars' axial tilt is 25.2 Deg. as compared to 23.5 for that of the Earth. The Martian year is 687 Earth days, nearly twice as long as ours, so that

the Martian seasons are similarly longer. While Earth's are nearly equal in duration, the length of a Martian season can vary by as much as 52 days because of the greater eccentricity of its orbit.

The axis of Mars does not aim at our North Star, but is displaced about 40 Deg. towards Alpha Cygni. Because of this celestial displacement the Martian seasons are 85 Deg. out of phase with the terrestrial seasons, or about one season in advance of ours. Consequently, when you observe Mars next spring and summer you will be seeing summer and autumn, respectively, in the Martian Southern Hemisphere.

## MAKING OBSERVATIONS OF MARS

The ancient art of visual observation at the telescope is still a most useful tool to the modern astronomer, and is the forte of the amateur astronomer. The authors, attending various professional meetings over the past few years, were pleasantly surprised to find that carefully made amateur drawings were considered to be useful sources of data by Mars's professionals.

# A.L. Book Service

Taken from their web site <http://www.astroleague.org/>

Members of the Astronomical League may order any book on astronomy at a ten per cent discount through the Book Service. Just send us the following:

- The book's title,
- The author of the book,
- The publisher of the book,
- The publisher's address (if known),
- The name of the Astronomical League Society you belong to, or indicate your direct membership status in the Astronomical League, and
- A check made out to the Astronomical League Book Service for the retail price of the book minus 10%. There is no shipping or handling charge.

Address your request to:

*Paul Castle*

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A review of a number of books can be found at the web site too.



## Astronomy 101

By Kevin Bert

The February 101 topic will be "Taking Notes of Your Observations" by Kevin Bert. Taking notes can improve your observing skills by forcing yourself to look for details in objects. It is never too late to start a log book of your observations. It is rewarding to look back and see



just how much your observing skills have improved over the years. The Astronomical League observing programs require you to keep some kind of log if you want credit.

The highlighted constellation will be Lepus.

## From The Editor

By Kevin Bert

Greetings to one and all. The lead article on Iridium Flares is one of growing interest to stargazers. It may explain something you might have experienced. It is the first of a two part story.

I am really looking forward to the February meeting. Following the Astronomy 101 class, we will have our first main program of the year entitled-

### "Experiencing the Total Solar Eclipse of February 26, 1998"

Imagine taking a luxurious eight-day Caribbean cruise that satis-

fies two of your main interests: astronomy and space travel. Hy Pitt and his wife, Jeanne, traveled aboard a special eclipse cruise ship a year ago. He will describe the unique intellectual,

physical, and emotional experience of observing the spectacular eclipse and

also meeting Buzz Aldrin, second astronaut to set foot on the moon in 1969. Buzz is chairman of the National



## CURRENT CLACK

### Welcome New Members

Paul Peck from Cedarburg

Roberta Olson from Grafton

### Panarusky 20-Inch Telescope

The primary mirror for the Panarusky 20-Inch Telescope should be at Carlson Tool for the March meeting.

### Rare Conjunction

Jupiter and Venus will make a rare close conjunction on the evening of February 23rd. It should make a spectacular view in a telescope, contrasting brilliant Venus, with the large disc of Jupiter and it's moons. Separation will be only 15 minutes of arc. A medium power of 150x should fit both objects in the same field of view. Both objects will remain close for a few days before and after the 23rd.

About one week earlier, the Moon will join the group and come within 5 degrees of Venus on the evening of the 17th and within 5 degrees of Jupiter on the 18th.

### 1999 Calendars

Brad Plaumann will make available the Kalmbach 1999 calendars at the February meeting. Only 20 have been purchased at this time. They will be distributed on a first come first serve basis. They will be sold at the discount bulk price of \$6.00. You can simply include it into the total when you pay your membership dues.

### For Sale

8" f/9 Dobsonian. It has an 8x50 finder scope, 2" Low Profile rack and pinion focuser. 2 eyepieces-a 12 Kelnor and a 40 Plossl. It's a great planet scope for anybody interested but rather long for a solid tube assembly. Asking \$475.00 See Jeff Setzer.

### For Sale or Trade

10" f/8 Dobsonian. Very Good mount and optics. Asking \$475.00" for more details call John at 628-2948

Space Society. Slides will be shown, and handouts will be presented.

## 1998 OFFICERS

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*(IRIDIUM from page 2)*

passing Iridium satellites. "If I had been more prepared I would have looked for a shadow on the ground - that's how bright it was," said John.

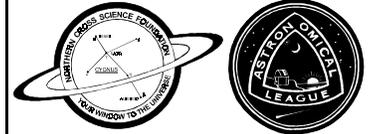
Like other man-made satellites, an Iridium satellite can be visible to ground-based observers as a faint dot moving quickly across a backdrop of stars and planets. But - as John and his colleagues discovered to their surprise - when sunlight strikes them at certain angles, Iridium satellites can quickly brighten to an intensity that rivals Venus, one of the brightest heavenly lights. This flare, or glint, usually lasts from five to 20 seconds. Some keen-eyed observers have even spotted flaring Iridium satellites in daytime.

This photo by Chris Dorreman



## SPECTRUM

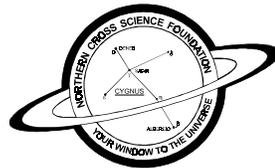
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