SKYLIGHTS

Newsletter of the Astronomical Society of Northern New England

FEB. 2010

Member of NASA's Night Sky Network

Astronomical League Member

ASNNE MISSION

ASNNE is an incorporated, non-profit, scientific and educational organization with three primary goals:

1) To have fun sharing our knowledge and interest with others.

2) To provide basic education in astronomy and related sciences to all who are interested.

3) To promote the science of Astronomy.

The Poet Ralph Waldo Emerson aptly noted, *"If the stars came out only once a year, everyone would stay up all night just to watch."*

What's Up In February

By Bernie Reim

The beginning of this month marks the middle of winter and the coldest time of the year. There will be several interesting highlights this month that will make it well worth braving the cold to see and experience.

Mars is still very bright and Saturn now follows it across the evening sky just two constellations to the east. With binoculars you may see a challenging close conjunction of brilliant Venus and Jupiter and the brightest of all asteroids, Vesta cruising through Leo about half way between Mars and Saturn. Through a small telescope you will even be able to see two comets, which is quite rare.

Mars will remain an unusually bright orange beacon in the constellation of Cancer, just to the east of the famous Winter Hexagon. It will lose some of its brilliance by the end of the month as Earth pulls farther ahead of Mars in our faster orbit around the sun. The only star that will outshine Mars this month will be the brightest star in our whole sky, Sirius in the constellation of Canis Major, the lowest part of the Winter Hexagon. Our neighboring planet now rises before sunset and reaches its highest point in the sky before midnight.

Saturn will rise around 9 pm in the constellation of Virgo, just to the east of Leo, by the middle of this month. Its rings are only tilted 5 degrees from edge-on, but they will open to 10 degrees by the end of this year. All four of the gas planets have ring systems around them, but only Saturn's are visible in a small telescope. Using the Spitzer Space Telescope, they recently discovered an enormous dust ring around Saturn which only glows in infrared radiation. It is 100 times larger than the visible ring system which always makes Saturn such a stunning sight in the black sky, no matter how many times you may have seen it. This dust ring is also 20 times thicker than the diameter of Saturn, which makes it by far the largest ring in our solar system, but other solar systems may have much larger dust rings around their planets. This giant dust ring is not very dense. If you could stand in it, you would only be hit by one dust particle about once per minute. By contrast, all 7 billion of us on Spaceship Earth have about 50 trillion neutrinos, generated by our sun, passing through us every second. The average human has about 50 trillion cells in their body.

Jupiter will finally sink below the western horizon later this month even as Venus will be climbing higher into the sky. The two will meet Tuesday evening Feb. 16th just 20 minutes after sunset low in the west-southwestern sky. It will be a challenge to spot them both, even in binoculars, because it will be so soon after sunset.

Another very exciting event will happen on the same Tuesday night the 16th. The brightest of all asteroids, Vesta, will pass directly

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Inside This Issue

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What's Up "*Continued from page 1*"

between Gamma Leonis and another visible star right next to it. Gamma Leonis is the fourth star out of 6 in Leo's sickle, or backwards question mark. You can see Vesta throughout this month and next, but it will be nicely framed by those two bright stars only on that evening. After that Vesta moves up and to the right one degree every four days.

Vesta is the brightest of all the asteroids, but Ceres is the largest and the first one discovered, in 1801. Ceres is nearly 600 miles across, and Vesta, the second largest asteroid, is just over 300 miles across. Ceres by itself has one third of the mass of the entire asteroid belt between Mars and Jupiter, and Vesta is about 10% of the entire belt's mass. If you add the next two largest asteroids, Pallas and Juno, you already have over half the mass of all the millions of asteroids in the main belt. 96,000 of those have been given numbers and 12,000 of them actually have names. All of the asteroids together only weigh 1/35 the weight of our moon. Any object smaller than 50 meters, or about half a football field in diameter, is unofficially just called a meteoroid. NASA launched a spacecraft named Dawn back in September of 2007 that will orbit around Vesta in 2012 and Ceres in 2015 and unravel many of the remaining mysteries of these enigmatic asteroids that could have become full fledged planets if it weren't for Jupiter's disturbing gravitational influence.

Vesta is the most geologically diverse of all the asteroids. It has light and dark areas and ancient lava flows and a gigantic impact basin. It was discovered by the German astronomer, Heinrich Olbers in 1807. Olbers is well known for his famous paradox, why is the sky dark at night? A dark sky conflicts with a static universe. From that simple question came the great discovery that the entire universe is expanding, which Edwin Hubble proved about 100 years after Olbers' Paradox was formulated in 1823.

Two comets will also be visible through a small telescope. They should reach around 9th magnitude, which is 15 times fainter than what the naked eye can see. Comet 81P/Wild will be just a few degrees above Spica, the brightest star in Virgo, which rises abound 11 pm. The other comet is named C/2007 Q3 and will already be 15 degrees above the northeastern horizon by 10 pm.

Feb. 5. Last quarter moon is at 6:48 p.m. EST.

Feb. 7. The moon passes one degree north of Antares today. At 700 times the diameter of our sun, orange Antares is one of the largest stars in our entire Milky Way Galaxy of over 200 billion stars. If it were placed where our sun is, Antares would extend all the way into the asteroid belt between Mars and Jupiter. Antares is 600 light years away.

Feb. 12. Mercury will be visible low in the morning sky during the first two weeks this month. The moon passes 2 degrees north of Mercury today. The moon is also at apogee, or farthest from the earth today at 252, 613 miles.

Feb. 13. New moon is at 9:51 p.m.

Feb. 15. Galileo was born on this day in 1564. He is known as the Father of modern physics. With his telescopes he first saw four moon of Jupiter, the phases of Venus, the rings of Saturn, sunspots, and many more exciting discoveries never seen before by any human. He proved that the laws of nature are mathematical. 2009 was the International Year of Astronomy, essentially a very successful yearlong birthday party celebrating the 400th anniversary of his first telescope in 1609.

Feb.19. Nicholas Copernicus was born on this day in 1473. A Polish priest and astronomer, Copernicus first formulated the heliocentric theory showing that the earth is not the center of our solar system or universe. That was proved by Galileo over 60 years later. The work of Copernicus marked the beginning of modern astronomy and the scientific revolution, in which Galileo played a major part.

Feb. 21. First quarter moon is at 7:42 p.m.

Feb. 25. The moon passes 5 degrees south of Mars tonight.

Feb. 27. The moon is at perigee, or closest to Earth tonight at 222,344 miles.

Feb. 28. Full moon is at 11:38 a.m. This is also called the Hunger, Snow, or Wolf Moon.

Moon Phases

Feb 5
Last Quarter

Feb 14
New

Feb 22
First Quarter

Feb 28
Full

Moon Data

Feb 2
Saturn 7.5° north of Moon

Feb 12
Mercury 2.3° south of Moon

Feb 13
Moon at apogee

Feb 14
Neptune 3.5° south of Moon

Venus 5° south of Moon

Feb 15
Jupiter 4.6° south of Moon

Feb 16
Uranus 5.4° south of Moon

Feb 26
Mars 5.1° north of Moon

Feb 27
Moon at perigee

ASNNE Business Meeting
January 8, 2009

Present:
Adam Amara, Dave Bianchi, Ron Burk (president), Bob Conley, Alan Goff(secretary), Jim Hatch, Bro. Albert Heinrich, Steve Innes, Brad Irish, Kevin Manley

Secretary's Report:
December minutes were approved.
Ron will send membership list to Alan, Alan will produce 2010 membership cards.

Star Parties:
Club/public:
January and February star parties were canceled due to road condition
March 12 new moon 3/15

Where we meet:
Ron will coordinate with Ian to arrange a visit of the Kennebunk Unitarian Church by board members to evaluate it as a possible meeting site. The goal is to have the visit occur in January.

Meeting programs:

February 5	Ian Durham
March 5	George Whitney
April 9	Alan Friot
May 7	James Standerfer
June 4	Steve Innes
July 2	Jim Hatch

Revised Meeting Schedule:
Business meeting 5:30 – 7:00
Astronomy Class 7:00 – 7:30
Regular meeting and featured presentation 7:30 – 9:30

Observatory/Equipment:
The Zeiss mount is not working. It will be looked at.
The"Dew Buster" controller from Ekholm donation to be installed on Meade
The observatory road will only be plowed to the gate.
An appropriate person should evaluate the observatory road with regard to repairs.

Finance/Legal:
ASNNE had $2,612.87 in its bank account at year end 2010.
Ron will complete the actions to have ASNNE properly registered with Maine.
Ron will be the registered agent for ASNNE for Maine.
Joyce and Ron will have check signing authority for ASNNE.
ASNNE will pay the York lodge rent for the first three months of 2010.

Respectfully submitted,
Alan Goff

Principal Meteor Showers in 2010

January 4
Quadrantids

April 22
Lyrids

May 6
Eta Aquarids

July 30
Delta Aquarids

August 12
Perseids

October 9
Draconid

October 21
Orionids

November 9
Taurids

November 18
Leonids

November 26
Andromedids

December 14
Geminids

December 22
Ursids

Note: Dates are for maximum

NASA Space Place newsletter: News and notes for formal and informal educators

The newsletter has free resources on the Space Place website that can be helpful for kids and adults interested in learning about science, technology, and space.

Here is the link:

http://spaceplace.nasa.gov/en/educators

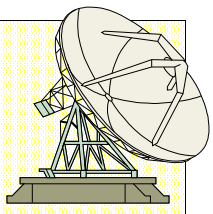
Club Items For Sale

Our club has merchandise for sale at:
www.cafepress.com/asnne

All money raised goes to our operating fund.

Any design can be put on any item.
Just let our Director, David Bianchi, know.

Got any News?
Skylights Welcomes your Input.



Here are some suggestions:

Book reviews -- Items for sale -- New equipment -- Ramblings -- Star parties -- Observing -- Photos.

Sky Object of the Month – February 2010
β Orionis (Rigel)
by Glenn Chaple

You won't need a finder chart to locate this month's featured sky object. It's the first magnitude star β Orionis, better known by its proper name Rigel. Seventh brightest star in the night sky, Rigel dazzles us with a diamond-white color; especially striking when compared with Orion's other first-magnitude star, the ruddy-hued Betelgeuse.

Many backyard astronomers are unaware that Rigel is a double star. Its companion (Rigel B) lies 9 arc-seconds away – a gap that should be easily breached by the smallest of telescopes. Unfortunately, it shines at magnitude 6.8, 400 times fainter than the primary. As a result, the little star often hides in the glare of its master.

In 1822, the first reliable measure of the Rigel system indicated a separation of 8.9" and a position angle of 201o, the latter meaning that Rigel B lay south and slightly west of the main star. Not much has changed in nearly two centuries. In 2004, the separation and P.A. had increased slightly to 9.4" and 204o. Because Rigel A and B share a common proper motion, astronomers believe they form a physical binary separated by a whopping 2500 AU – a distance over 60 times greater than the gap separating Pluto from the sun. Their orbital period is thought to exceed 25,000 years. The last time Rigel B was in its current orbital position the earth was in the grip of the Ice Age!

Because of the large disparity in brightness between its components, Rigel offers a similar challenge to the one presented by the notoriously difficult Sirius. While Sirius and its white dwarf companion the "Pup" require absolutely steady seeing conditions and an 8-inch or larger telescope, Rigel may be split with a 6-inch under normal sky conditions. Years ago, on an evening of unusually steady skies, I managed to glimpse Rigel B with a 3-inch f/10 Edmund reflector (the classic model sold back in the 50s and 60s) and a magnifying power of 120X. I cheated, first spotting the companion with a 6-inch reflector. Knowing where to look, I had no trouble capturing Rigel B with the 3-inch. It appeared as a tiny bluish speck just outside the brilliant sparkle of the main star.

Next time you turn your telescope skyward to admire the Orion Nebula, take a side trip to Rigel. Unlike the legions of backyard astronomers who have marveled at the great nebula, you'll be among a much smaller group of observers who have admired Orion's brightest binary star.

Your comments on this column are welcome. E-mail me at gchaple@hotmail.com

THE VIKING SUNSTONE

Compiled and edited by Barlow Bob

A Viking ship is late in its return home from the newly discovered lands far west. Winter is arriving and the weather will soon turn ugly. It's imperative that the helmsman maintains the course due East. However, where exactly is home? Clouds in the sky increase every passing day. Most nights the stars are not visible and even during the day the sun has difficulty breaking through. Daylight is short and most of the time the sun illuminates the sky from somewhere below the horizon. Hanging from the top of the ship's mast, a sailor squints with his eyes looking for clues in the brightness of the clouds. Then Leif the Lucky spots an opening in the clouds. He reaches for the pouch hanging from his waist and takes out his Sunstone. Through the crystal he looks at the small patch of blue sky. He turns the rock until it becomes yellow. Next he shouts to the helmsman, with his stretched arm pointing starboard towards home.

Bees do it. Ants do it. Did the Vikings do it? Can it be that the Vikings used the polarization of the skylight as a navigation compass? Did the Vikings find their way to America by looking at the sky through a crystal, the proverbial sunstone?

The Icelandic sagas tell the story of how Vikings sailed from Bergen on the coast of Norway to Iceland, continuing to Greenland and probably Newfoundland on the North American continent. This remarkable sailing achievement was realized circa 700 to 1100 ACE, before the magnetic compass reached Europe from China. However, this would not have helped much, since this area is so close to theMagnetic Pole. How did they steer true course in the long voyages out of land sight, especially in the common bad weather and low visibility of those high latitudes?

In 1967, a Danish archaeologist, Thorkild Ramskou, suggested that the Vikings might have used the polarization of the skylight for orientation, when clouds hid the sun position. They would have used as polarizers natural crystal available to them, the famous sunstones described in the Sagas. To locate the sun they only needed a clear patch of sky close to the zenith to determine the great circle passing through the sun. There are pros and cons of this theory.

In Favor:

In the Hrafins Saga it says: "The weather was thick and stormy. The king looked about and saw no blue sky. Then the king took the sunstone and held it up, and then saw where (the sun) beamed from the stone.

The crystal cordierite can be found as pebbles in the coast of Norway. It has bierfringent and dichroic properties, changing color and brightness when rotated in front of polarized light. With an adequately cleaved crystal it is easy to tell the direction of the skylight polarization. Its color will change from blue to light yellow, when pointed towards the sun. The Vikings frequented Iceland, the first source of Iceland spar (optical calcite), which has had such an important role in the discovery and study of polarization. Even today many high-performance polarizers use that mineral.

At high latitudes the sun remains close to the horizon, which produces the best skylight polarization pattern for navigation purposes.

Because of perspective, a bank of clouds of uniform density is squeezed together when looking far away. It is usually much easier to find a clear patch of sky towards the zenith.

The method would have worked even when the sun was several degrees below the horizon, but still illuminating the atmosphere. At twilight, when the sun is below the horizon by about two degrees, its location is very difficult to ascertain. Although a bright twilight arch can be seen. It occupies a large part of the horizon and is of uniform intensity. A similar effect may happen when the sun is above the horizon and a thick layer of clouds covers it.

Light fog and overcast of thin clouds do not eliminate skylight polarization.

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The Viking Sunstone
"*Continued from page 6*"

Against:

Little detail is given to identify the sunstone and it is not mentioned specifically in relation to navigation or sailing.

The navigation season was summer, when the sun is not that low during a good part of the day, nor is the weather very bad.

The Viking sailor would probably have used many clues from the sea and the sky to steer his ship. He would have determined the position of the sun between sightings or estimated its position. It is sufficient to look at the pattern of illumination of the clouds, their iridescence, the direction of crepuscular rays, or the general illumination of the sky close to twilight. Knowledge of the sun position is not sufficient for navigation. The helmsman needed to correct the sun direction for the time of the day and day of the year. He must have been a good reader of the sky and the sea.

Under a heavy overcast sky, when a navigational aid would be most useful, the polarization method does not work.

This theory is just a possibility, a statement of what the Vikings could have done. However, it is based on circumstantial evidence.

In the late 1940's, the US National Bureau of Standards developed a Sky Compass based of the same principle. It was inspired by a previous "twilight compass" developed by Dr. A.H. Pfund of Johns Hopkins University. The US Navy and Air Force experimented with the sky compass in the 1950's. Scandinavian Airlines (SAS) used it for several years on its polar flights. Polarization.com has recently developed an inexpensive educational Skylight Compass Card.

When Ramskou originally proposed this theory, it was well received and widely accepted by the general public and the scientific community, remaining so for more than two decades. The Viking navigational triumphs became very fashionable. These include the exploits of Erik the Red and his son Leif (Ericksson) the "Lucky" circa 1000 ACE, and the "discovery" of America centuries before Columbus. However, in the 1990's the theory was disputed on the basis that no real material proof exists and that the advantage provided to navigation would.

Polarized skylight could have been of real use to the Vikings. However, until direct evidence is found, we should be skeptic and accept the simplest explanation, that the Norsemen were extremely good sailors. Fearless Norsemen were not wimpy Vikings, who did not know that the world was flat. At this time, Europeans sailed along coastlines in sight of land.

The mineral iolite can also found in Scandinavia, where Vikings started their journey to the North American Continent. The mineral labradorite can be found in Labrador, Canada, where Vikings sailed to. Both of these minerals also have bierfringent and dichroic properties, changing color and brightness when rotated in front of polarized light.

I bought a sample of iolite and labradorite, from a rock and mineral vendor. While observing the sun at amateur solar astronomy outreach programs, I demonstrate the principal of the Viking Sunstone, using these minerals, for children of all ages. I place this sunstone on flat surface and slowly turn the stone. As the stone moves, it changes color from pale yellow-brown to bright iridescent blue. Most people find this demonstration fascinating. I never know when my simple Sunstone demonstration creates a child's life-long interest in history or science.

Vikings did navigate using a notched stick to mark the elevation of the North Star above the horizon. If they wanted to travel to Iceland, they would sail along the coastline of Norway, until they reached a point where the North Star appeared at the same elevation in the sky, as the view from Iceland. They would sail west to Iceland. Unfortunately, this method was not very accurate, which is how Vikings discovered North America. The Vikings could not have seen Iceland from Norway. They also could not have seen Greenland from Iceland. However, they could have seen Labrador, Canada from Greenland.

A descendent of Leif the Lucky visiting the NSSP NEAF Solar Star Party From Norway, said that the Viking Sunstone was just a myth. Perhaps we should invite the Myth Busters to visit NSSP.

Building a Case Against Ozone

by Patrick Barry

When it comes to notorious greenhouse gases, carbon dioxide is like Al Capone—always in the headlines. Meanwhile, ozone is more like Carlo Gambino—not as famous or as powerful, but still a big player.

After tracking this lesser-known climate culprit for years, NASA's Tropospheric Emission Spectrometer (TES) has found that ozone is indeed a shifty character. Data from TES show that the amount of ozone—and thus its contribution to the greenhouse effect—varies greatly from place to place and over time.

"Ozone tends to be localized near cities where ozone precursors, such as car exhaust and power plant exhaust, are emitted," says Kevin Bowman, a senior member of the TES technical staff at the Jet Propulsion Laboratory. But the ozone doesn't necessarily stay in one place. Winds can stretch the ozone into long plumes. "Looking out over the ocean we can see ozone being transported long distances over open water."

Unlike CO2, ozone is highly reactive. It survives in the atmosphere for only a few hours or a few days before it degrades and effectively disappears. So ozone doesn't have time to spread out evenly in the atmosphere the way that CO2 does. The amount of ozone in one place depends on where ozone-creating chemicals, such as the nitrogen oxides in car exhaust. are being released and which way the wind blows.

This short lifespan also means that ozone could be easier than CO2 to knock off.

"If you reduce emissions of things that generate ozone, then you can have a quicker climate effect than you would with CO2," Bowman says. "From a policy standpoint, there's been a lot of conversation lately about regulating short-lived species like ozone."

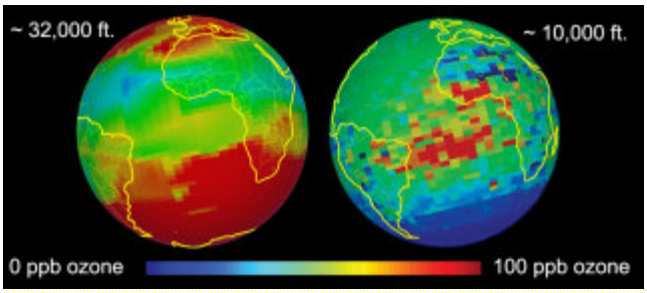
To be clear, Bowman isn't talking about the famous "ozone layer." Ozone in this high-altitude layer shields us from harmful ultraviolet light, so protecting that layer is crucial. Bowman is talking about ozone closer to the ground, so-called tropospheric ozone. This "other" ozone at lower altitudes poses health risks for people and acts as a potent greenhouse gas.

TES is helping scientists track the creation and movement of low-altitude ozone over the whole planet each day. "We can see it clearly in our data," Bowman says. Countries will need this kind of data if they decide to go after the heat-trapping gas.

Ozone has been caught red-handed, and TES is giving authorities the hard evidence they need to prosecute the case.

Learn more about TES and its atmospheric science mission at tes.jpl.nasa.gov. The Space Place has a fun "Gummy Greenhouse Gases" activity for kids that will introduce them to the idea of atoms and molecules. Check it out at spaceplace.nasa.gov/en/kids/tes/gumdrops.

This article was provided by the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.



Caption:
These images are TES ozone plots viewed with Google Earth. Colors map to tropospheric ozone concentrations. The image on the left shows ozone concentrations at an altitude of approximately 32,000 feet, while the one on the right shows ozone at approximately 10,000 feet. The measurements are monthly averages over each grid segment for December 2004.

Club Meeting & Star Party Dates		
Date	Subject	Location
February 5	**ASNNE Club Meeting** **5:30-6:30 PM:** Business Meeting **6:40-7:30PM:** Social Hour and Joan's Beginner Astronomy Class (Public walk-ins welcome). **7:30-9:30PM:** Club Meeting: *Bernie Reim's "What's Up." *Astro Shorts & Astro News. *NASA Night Sky Network Activity. **Guest Speaker**: **Ian T. Durham, PhD, FRAS** Topic: Unifying principles and emergent phenomena in the universe: how do we as amateur and professional scientists properly communicate these ideas to each other and the public.	Masonic Hall West Kennebunk, Me.
TBD	Club/Public Star Party. (*Visit website for updates and or cancellations*).	Starfield Observatory, West Kennebunk, Me.

Directions to ASNNE event locations

Directions to Masonic Hall

From I-95:
If coming southbound, take Exit 25 off of I-95. Come out to Rte. 35. Turn left at stop sign and turn right at next stop sign. Proceed straight ahead and you will see a variety store on the left and the Masonic Hall will be on the right.

If coming northbound, take Exit 25 off of I-95. Turn right at the stop sign and cross over I-95. Proceed straight for about 1/2 mile. There will be a variety store on the left and the Masonic Hall will be on the right.

Directions to Starfield Observatory

From North:
Get off turnpike at exit 32, (Biddeford) turn right on Rt 111. Go 5 miles and turn left on Rt 35. Go 2 miles on Rt 35 over Kennebunk River to very sharp 90 degree left turn. The entrance to the Starfield Observatory site is at the telephone pole at the beginning of the large field on the left. Look for the ASNNE sign on the pole.

From South:
Get off the turnpike at exit 25 in Kennebunk. After toll both turn right on Rt 35. Go up over the turnpike and immediately turn right on Rt 35. About 4 miles along you will crest a hill and see a large field on your right. Continue until you reach the end of the field. Turn right into the Starfield Observatory site at the last telephone pole along the field. Look for the ASNNE sign on the pole. If you come to a very sharp 90 degree right turn you have just passed the field.

To join **ASNNE**, please fill out the below membership form. *Checks should be made payable to: Astronomical Society of Northern New England (A.S.N.N.E).* For more details, please visit our website: **http://www.asnne.org**

Astronomical Society of Northern New England
P.O. Box 1338
Kennebunk, ME 04043-1338

2010 Membership Registration Form

(Print, fill out and mail to address above)

Name(s for family): _____

Address: _____
City/State: _____ Zip code: _____

Telephone # _____

E-mail: _____

Membership (check one):
Individual $35 _____ Family $ 40 _____ Student under 21 years of age $10 _____ Donation_____

Sky & Telescope ($32.95)_____ Astronomy ($34)_____

Total Enclosed_____

Tell us about yourself:
1. Experience level: Beginner____ Some Experience ____ Advanced_____

2. Do you own any equipment? (Y/N) And if so, what types?

_____
3. Do you have any special interests in Astronomy?

_____
4. What do you hope to gain by joining ASNNE?

_____
5. How could ASNNE best help you pursue your interest in Astronomy?

_____
6. ASNNE's principal mission is public education. We hold many star parties for schools and the general public for which we need volunteers for a variety of tasks, from operating telescopes to registering guests to parking cars. Would you be interested in helping?
Yes_____ No_____

7. ASNNE maintains a members-only section of its web site for names, addresses and interests of members as a way for members to contact each other. Your information will not be used for any other purpose. Can we add your information to that portion of our web site?

Yes_____ No_____