



# the Webfooted Astronomer

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Seattle Astronomical Society • March 2004

## March Meeting

*Speaker:* Dr. Julie Lutz

Educational Outreach  
Resources

Wednesday, March 17  
7:30 p.m.

Physics-Astronomy Building  
Room A102  
University of Washington  
Seattle

Come early at 7 p.m. for coffee  
and snacks and to visit with  
your fellow members!

## March Meeting

**NASA's Office of Space  
Sciences and educational  
outreach resources for  
amateur astronomers**

**Dr. Julie Lutz, Research Professor  
of Astronomy at the University of  
Washington**

Dr. Lutz is the Director of the NASA  
Regional Educator Resource Center  
and has been involved in astronomy  
education and public outreach for  
many years.

She will talk about resources that are  
available from NASA's Office of

Space Science for amateur astronomers for education and public outreach. She will also bring examples of materials available from NASA for us to examine. For those members who are currently involved in public outreach or are interested in becoming involved, this will be an excellent opportunity to learn about materials available from NASA for your activities.

*Check out some resources for education and outreach, page 12.*

# Seattle Astronomical Society

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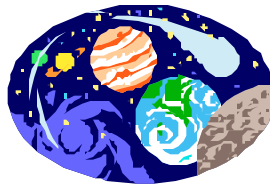
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## From the President's Desk...

by Stephen Van Rompaey

A couple of weeks ago we had one of those rare nights when it was clear and the moon wouldn't be rising until after midnight. There have been few observing opportunities this winter and I was really looking forward to some telescope time. I have been near-sighted since childhood and have been at that stage in my life where the need for bifocals has loomed for a few years. When out observing I would need to take off my glasses to read my charts and then put them back on to look through the finderscope. I finally got my new "progressive" bifocals and hoping that this would solve the problem, I headed out to Tiger Mountain. Boy was I wrong. The inherent problem with progressive bifocals is that there is a lot of variation in how the lens is shaped and it's really difficult to look through the finderscope, especially at zenith, and not have the image go in and out of focus depending on the tilt of your head. In any case, it was a very frustrating and I wasn't looking for the opportunity to observe new dimensions of "faint and fuzzy" objects. So, if anyone has some good observing advice for my aging eyes, I would be happy to hear about it and I'll pass along anything that I think would be helpful.

At the December meeting I was asked to report on the club's finances. The following table shows the overall flow of money in and out of the club during 2003 resulting in a net loss for the year.

### SAS 2003 Cash Flow

INFLOWS		OUTFLOWS	
Banquet	2,679.00	Admin. Costs	4,048.88
Dues	6,220.00	Banquet Cost	2,436.48
Gifts Received	493.55	Donations Given	300.00
Interest Inc	9.93	Newsletter Cost	3,600.50
Sales	2,995.15	Sales Cost	2,479.61
Subscriptions	4,753.74	Subscription Cost	4,901.39
Webfoot Ads	360.00		
<b>TOTAL INFLOWS</b>	<b>17,511.37</b>	<b>TOTAL OUTFLOWS</b>	<b>17,766.86</b>
		<b>OVERALL TOTAL</b>	<b>-255.49</b>

The board has decided that April will be the last bulk mailing of the newsletter. Under your current membership, you must contact the Treasurer directly to request that you continue receiving the newsletter in the mail, otherwise the default is that you will read the newsletter online. In the future, when you renew your membership, you will need to pay the increased membership dues of \$30 to continue receiving the newsletter.

*continued on page 4*

ter in the mail. The newsletter has been used to remind members that their membership dues need to be renewed and we are planning to substitute a postcard reminder for members who are not receiving the snail-mail newsletter.

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In the spirit of moving the club increasingly into the electronic realm I want to urge all club members to join our Webftweb newsgroup. The SAS has used this listserver group to communicate among club members for several years. There is not a lot of traffic on this group, so it should not add significantly to your email inbox. To subscribe to the "webftweb" send an email message to [majordomo@scn.org](mailto:majordomo@scn.org) and in the body of the message type: `subscribe webftweb`

*Find out more about webftweb on page 5, at right.*



*Planetary line-up on March 27: see page 14 for details.*

# Webftweb: SAS E-Mail List

by Randy Johnson, list owner

Webftweb is the club email mailing list and can be considered a companion to the club newsletter, The Webfooted Astronomer. The purpose of the mailing list is to provide a forum to members and friends of the SAS who wish to correspond and communicate on things astronomical, matters of club interest, or things and events happening in the amateur astronomy community at large.

Presently there are about 70 subscribers to the mailing list with plenty of room for many more. Most days email traffic is light on this list with a typical day seeing 5-10 postings to Webftweb. Unlike the club newsletter, which is published once a month, discussion in Webftweb is ongoing and is a two-way conversation.

To join: Send an email message to [majordomo@scn.org](mailto:majordomo@scn.org). In the body of that message type:

subscribe webftweb

End

After your message is sent you should receive notification that your request is being evaluated by the list-owner (me) for approval. Because of the potential for spam, webftweb is a closed email list that requires the approval of the listowner to join. Because email addresses can be cryptic or if you think that I may have a difficult time identifying you as a club member or friend of the club, feel free to drop me a note at [listmom@seattleastro.org](mailto:listmom@seattleastro.org) or [owner-webftweb@scn.org](mailto:owner-webftweb@scn.org) to advise me that you have sent in a subscription request. If you don't think that I will know you or be able to find your name on a current club roster, a few words about an interest in astronomy are generally enough to assure me that you are not a spambot signing into the list for nefarious purposes. In this way we have successfully kept the mailing list spam free.

I hope that you will consider this invitation to join Webftweb. Webftweb is a great way to stay abreast of club news and to stay in touch with your fellow members of the SAS.

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**To join, send an email  
message to  
[majordomo@scn.org](mailto:majordomo@scn.org).  
In the body of that  
message type:  
  
[subscribe webftweb](#)**

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## Deep Space Network 2-for-1 Sale!

By Patrick L. Barry

Call it a “buy one, get one free” sale for astronomers: Build a network of radio dishes for communicating with solar-system probes, get a world-class radio telescope with a resolution nearly as good as a telescope the size of Earth!

That’s the incidental bonus that NASA’s Deep Space Network (DSN) offers the astronomy community. Designed to maintain contact with distant spacecraft in spite of the Earth’s rotation, the large, widely spaced dishes of the DSN are ideal for performing a form of radio astronomy called “very long baseline interferometry” (VLBI).

VLBI produces very high resolution images of the cosmos by combining the output from two or more telescopes. The result is like having a giant “virtual” telescope as large as the distance between the real dishes! Since bigger telescopes can produce higher resolution images than smaller

ones, astronomers need to use dishes that are as far apart as possible.

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That need dovetails nicely with the DSN’s design. To maintain continuous contact with deep space missions, the DSN has tracking stations placed in California, Spain, and Australia. These locations are roughly equally spaced around the Earth, each about 120 degrees of longitude from the others—that way at least one dish can always communicate with a probe regardless of Earth’s rotation. That also means, though, that the straight-line distance between any two of the stations is

roughly 85 percent of Earth’s diameter—or about 6,700 miles. That’s almost as far apart as land-based telescopes can be.

“We often collaborate with other VLBI groups around the world, combining our dishes with theirs to produce even better images,” says Michael J. Klein, manager of the DSN Science Office at NASA’s Jet Propulsion Laboratory. “Since our 70-meter dish in Canberra, Australia, is the largest dish in the southern hemisphere, adding that dish in particular makes a huge difference in the quality of a VLBI observation.”

Even though only about 1 percent of the DSN’s schedule is typically spared from probe-tracking duty and scheduled for radio astronomy, it manages to make some important contributions to radio astronomy. For example, the DSN is currently helping image the expanding remnant of supernova 1987A, and Dr. Lincoln Greenhill of the Smithsonian Astrophysical Observatory is using the DSN dishes to explore a new way to measure the distances and velocities of galaxies.





And all this comes as a “bonus” from the dishes of the DSN.

To introduce kids to multi-wavelength astronomy, NASA’s website for kids, The Space Place, has just added the interactive demo, “Cosmic Colors,” at [spaceplace.nasa.gov/cosmic](http://spaceplace.nasa.gov/cosmic).





# March 2004





Sun	Mon	Tue	Wed	Thu	Fri	Sat
	1	2	3 UW Public Viewing Night 7 p.m.	4	5	6  Amateur Telescope Makers SIG Meeting 6:30 p.m.
7	8	9	10	11	12	13 
14 Astrophotography/Imaging SIG Meeting 2 p.m.	15	16	17 UW Public Viewing Night 7 p.m. Monthly SAS Meeting UW Room A102 7:30	18	19	20  Tiger Mountain Star Party 7:00 p.m.
21	22 SAS Board Meeting 7 p.m.	23	24	25	26	27 Green Lake and Paramount Park Star Parties
28 	29	30	31			

**See page 14** for information about March's long planetary lineup consisting of Mercury-Venus-Mars-Saturn-Jupiter! March 27 - a scheduled Star Party night - will be an excellent night to view this event (weather permitting, of course)!





# April 2004

Sun	Mon	Tue	Wed	Thu	Fri	Sat	
				1	2	3 Amateur Telescope Makers SIG Meeting 6:30 p.m.	
4		5	6	7 UW Public Viewing Night 7 p.m.	8	9	10
11		12	13	14	15	16	17 Tiger Mountain Star Party 7:00 p.m.
18		19	20	21 UW Public Viewing Night 7 p.m. Monthly SAS Meeting UW Room A102 7:30	22	23	24 Green Lake and Paramount Park Star Parties
25	26 SAS Board Meeting 7 p.m.		27	28	29	30	



# February Minutes Impact Craters

by Thomas Vaughan

*Speaker:* Toby Smith, University of Washington

## Talk: Impact Craters

The guest speaker was Dr. Toby Smith, in the Astronomy Department of the University of Washington. Dr. Smith spoke about the role of impact craters in the solar system.

Dr. Smith noted that impact craters are the unsung heroes of space exploration. He said that while other aspects of missions usually received all the press, it was “craters that get the work done.”

Up until the middle of the 20th century, the thought that impact craters might constantly be forming in the solar system seemed vaguely heretical. It wasn't until Eugene Shoemaker studied the Barringer Crater in Arizona, and the craters on the surface of the moon, that astronomers took impact craters seriously.

Shoemaker championed the study of impact craters, with the amazing (and useful) result that for most impact craters, the depth of the crater is just about one tenth of the width. Furthermore, the deepest ejecta tend to be large fragments near the rim of the crater, while surface ejecta are smaller and are scattered far away from the edge. This means that as you approach a crater and pick up debris, you are actually getting samples of rock that were once buried deep under the surface. Even better, you can choose what depth of strata to sample by picking rocks at different distances from the crater rim.

This is a useful trick that has been used on many missions, including craters on the Moon, Mars, and Earth. Studying impact craters from a distance has also been useful, for instance in studying Europa.

Dr. Smith started with some of the Apollo missions. Many of the missions were chosen to land near craters, and astronauts had specific instructions to walk towards the rim, and pick up rocks as they went. By tracking what rocks were picked up where, NASA was able to get a sample of the moon's crust at different layers. One rock from Apollo 15 was called the “Genesis Rock,” and is the oldest moon rock we have. It is thought to be 4.5 billion years old, and is a sample of the original crust of the moon.

The Viking 2 Mars lander touched down near an impact crater on Mars, and although it couldn't move, one could certainly see the rocks on the surface from the impact.

Opportunity and Spirit, the current generation of Mars explorers, were also placed near impact craters. Opportunity had the good fortune to land in a crater, a small impact crater around 20 meters wide. Spirit landed near Bonneville Crater (several 100 meters wide) and is moving towards it now.

But you don't have to land near a crater to leverage it for science. You can also learn a lot about planets by studying craters from a distance. Over the past year, scientists have been studying impact craters on the surface of Europa. The surface of Europa is icy, and we believe there might be liquid water beneath the ice. However, we don't know how deep the ice might be. By studying impact craters on the surface of Europa, one can estimate the thickness of the ice.

By looking at dozens of craters, scientists were able to determine that the icy crust must be at least 3 to 4 kilometers deep. If the ice were any shallower, some of the impacts would have punched through and let liquid water escape.

Dr. Smith ended the talk with some links to useful and interesting web sites. NASA has several pages devoted to impact craters. Dr. Smith's website is <http://www.astro.washington.edu/smith/>.

There was a long question and answer session at the end. Some notes:

**You said that impact craters are about one-tenth as deep as they are wide. Is that always true?** No, it depends on the size of the impact. For planets with atmospheres (such as Earth and Venus), it is possible for an incoming meteorite to be slowed down enough that no real crater results. Also, for larger craters (bigger than ~10km wide), the rock at the center of the impact will "rebound," resulting in a central peak. You can see this in many large craters on the Moon, and Mars. So only middle-sized impacts will follow the "one-tenth" rule.

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*continued on page 14*

# Resources for Astronomy Education and Outreach

## Office of Public Outreach: Education Group

<http://oposite.stsci.edu/pubinfo/edugroup/educational-activities.html>

The Office of Public Outreach's Education Group is dedicated to providing K-12 astronomy and space science education support. We have a variety of services, products, activities, and resources that are just click away.

## Amazing Space

<http://amazing-space.stsci.edu/>

We are the Formal Education Group of the Space Telescope Science Institute's Office of Public Outreach.

We promote the science and majestic beauty of the universe for use in the classroom. The materials we develop for educators and learners of all ages are accurate, classroom-friendly, visually appealing, and carefully crafted to adhere to accepted educational standards.

By producing and sharing classroom resources based on the Hubble Space Telescope's greatest discoveries, it is our sincere hope that young people will enjoy learning about the universe we inhabit... and perhaps pursue an even greater understanding of it in the future.

## NASA Ames Educator Resource Center

<http://amesnews.arc.nasa.gov/erc/erchome.html>

At the Educator Resource Center (ERC), educators can access a wide variety of NASA resources to develop their own educational programs. The facilities and staff at the center will assist teachers in gathering ideas, doing research, and duplicating selections from an outstanding collection of audiovisual and printed materials.

ERC materials reflect NASA research and technology development in such curriculum areas as life science, physical science, astronomy, energy, earth resources, the environment, mathematics, geography, and careers in aerospace. Teachers in disciplines other than science and mathematics are also encouraged to visit the ERC and explore ways in which aerospace materials may be incorporated into their lessons.

The Ames ERC is located at NASA Ames Research Center, Moffett Field,

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CA. It serves educators in the western states Alaska, Northern California, Hawaii, Idaho, Montana, Nevada, Oregon, Utah, Washington, and Wyoming. If you are outside of this area, you can access the Educator Resource Center Network to find the ERC serving you.

## **Washington NASA Space Grant Consortium**

*<http://www.waspacegrant.org/>*

We offer educational and research programs related to NASA's missions on Earth and in Space. We serve as a NASA point of contact for Washington residents, housing the NASA Regional Educator Resource Center and Space Science Network Northwest (S2N2).

Our Space Grant programs include college and university scholarships, graduate fellowships, research opportunities, courses, teaching resources, public events and more through a network of affiliate institutions around Washington state.

Washington NASA Space Grant Consortium is housed in the Department of Earth and Space Sciences at the University of Washington.

### **Washington NASA Space Grant E-mail Newsletter for Teachers**

*<http://www.waspacegrant.org/e-news.html>*

The Washington NASA Space Grant Consortium's electronic newsletter for teachers provides curriculum ideas, Internet links and other resources to help you better meet the Washington Essential Academic Learning Requirements and the National Science Education Standards. The newsletter also includes local events and workshops for Washington educators.

New bulletins are e-mailed the first and third Wednesday of each month during the school year.

If you are not a regular subscriber and would like to receive our newsletter, send an e-mail to [listproc@u.washington.edu](mailto:listproc@u.washington.edu). In the body of the message, type the words:

subscribe sgteachers <your name>

The e-mail account from which you send the message is the account that will receive the newsletter.

### **Washington Space Grant's cool links page**

*<http://www.waspacegrant.org/coollink.html>*

*February Minutes: Impact Craters continued from page 11*

**How many impact craters are there on Earth?** There are around 200 cataloged impact craters on Earth. There are almost certainly many more that we haven't found yet.

**Is it common to see the actual impact?** Shoemaker-Levi's collision with Jupiter is the only time we've seen large impacts in the solar system. NASA did smash the boosters of some of the Apollo missions into the moon, to test the seismometers there. And if you have a CCD camera, you can see smaller impacts on the moon in infrared during meteor showers.

**Did the seismometers on the moon record a lot of impacts?** Actually, no. The seismometers on the moon record around 1 percent of the activity of similar seismometers on Earth. This is expected since the moon is not geologically active. But there have been some impacts measured on the moon using the seismometers. They stopped functioning a few decades ago.



## **Planet Panorama in the Evening Sky**

*from the Washington NASA Space Grant E-mail Newsletter for Teachers (<http://www.waspacegrant.org/e-news.html>)*

Over the next few weeks, all five naked-eye planets can be seen simultaneously. In order from west to east, this March's long planetary lineup will consist of Mercury-Venus-Mars-Saturn-Jupiter. Not until April 2036 will there be a more easily observed display of all five naked-eye planets at dusk. In late March, Mercury and Venus will be about as high as possible at dusk for viewers at mid-northern latitudes. Viewing sessions should begin by about 45 minutes after sunset to insure catching Mercury before it sinks too low.

From March 22 through April 1, the Moon will fit within the span of five planets, bringing the total of visible solar system bodies to six. Another fine chance to view all five planets, but in the morning sky, will come in late December 2004 through early January 2005. For a chart of the sky March 27, go to [http://www.oms.edu/visit/planetarium/graphics/starparty/Mar27\\_2004.jpg](http://www.oms.edu/visit/planetarium/graphics/starparty/Mar27_2004.jpg).



## Membership Information

Choose from the membership and subscription options listed and mail this form and your check to the address below. For family memberships, please include the names of persons you want to appear in the membership directory. For student memberships, please include verification of full-time student status (such as student ID card). For renewals, please attach magazine subscription renewal cards.

### The Seattle Astronomical Society

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**Seattle, WA 98103**

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