



# the Webfooted Astronomer

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Seattle Astronomical Society • September 2003

## September Meeting

*Speaker:* Vandana Desai

Galaxy Formation  
in Rich Clusters

Wednesday, September 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!

## Sept. Meeting: Galaxy Formation in Rich Clusters

Vandana Desai grew up in Chicago, majored in Astronomy at Caltech in Pasadena, CA, then came directly to graduate school at the UW, where she is working with Professor Julianne Dalcanton. Ms. Desai is interested in all topics related to galaxy formation and evolution, but has concentrated her efforts on how galaxies evolve in clusters.

In order to understand this evolution, Ms. Desai uses both space-based imaging data as well as numerical simulations. She'll show examples of both during her talk in

September about galaxy formation in rich clusters. She will give a basic description of how galaxies are expected to form if the mass of the Universe is dominated by Cold Dark Matter, and will then discuss how the evolution of a galaxy is affected by its environment, focusing on clusters of galaxies. These are active areas of research at the University of Washington, so she will show us some work in progress, including an extremely high-resolution numerical simulation of galaxies forming within a cluster and new Hubble Space Telescope images of clusters at high redshift.

# Seattle Astronomical Society

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## From the President's Desk...

by Stephen Van Rompaey

**For me, the past month has been characterized by “Mars Madness,”** both in my viewing habits and in the club's public viewing events. The members of the SAS have come out in full force to support both the joint events with the UW Astronomy Department and our own club activities. I want to express my gratitude to the many volunteers who have brought telescopes to these events and have willingly suffered sleep deprivation the following day at work for the benefit of the public. Seattle is very lucky to have such a dedicated group of amateur astronomers willing to share the wonders of the sky with them.

Earlier this year the SAS Board decided that we would hold our annual banquet at a new location. Kathy Steyaert volunteered to locate a new

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***I want to express my gratitude to the many volunteers who have brought telescopes to these events and have willingly suffered sleep deprivation the following day at work for the benefit of the public.***

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site and negotiate on behalf of the SAS. I am pleased to announce that **the SAS Banquet will be held at the “Rock Salt on Latitude 47 Restaurant” near Lake Union on Saturday, January 24, 2004.** She was able to keep the price near to what it's been in the past (\$30) and the meal will now include dessert. I want to thank Kathy for all her hard work visiting restaurants and collecting all the information needed to present us with this excellent choice.

I attended the Oregon Star Party this year for the first time, partially driven by Mars Madness, but also because I wanted to see what the

star party was like. Shortly after I arrived **I was told by my neighbor that people who come to the Oregon Star Party are “serious.”** So, now I know I'm a “serious” amateur astronomer and I must confess that I felt particularly serious when I headed off to the espresso bar at 1:00 a.m. for my nightly café mocha :).

I also went to the OSP to attend the annual meeting of the Northwest Region of the Astronomical League (NWRAL). I had the opportunity to

*continued on page 4*



meet the new regional officers and learn more about the Astronomical League. One important thing I learned was that this year the Astronomical League experienced a deficit of about \$17,000 in its spending. At the national meeting held this past July in Nashville, Tennessee, the Astronomical League Board voted to raise dues rather than cut spending. Our representative from the NWRAL, Bob Gown of the Rose City Astronomers, voted on our behalf against raising the dues. It is not clear to me yet how much of an increase this will entail, but I expect it to be modest if their goal is to cover the current deficit. I am passing this information along because **our SAS dues include membership in the Astronomical League (currently at \$3.50 a year) and that means we will have to increase our club dues as well.** I will keep you informed about this issue and other activities of the NWRAL in the coming year.

## 2004 SAS Book and Calendar Sale

We are taking orders for 2004 books and calendars until September 30, 2003. The following items are available:

- ★ **Year in Space Desk Calendar** from Starry Messenger Press: \$10.00 each
- ★ **Observer's Calendar** from The Royal Astronomical Society of Canada: \$12.00 each
- ★ **Observer's Handbook** from The Royal Astronomical Society of Canada: \$17.00 each
- ★ **Beginner's Observing Guide** from The Royal Astronomical Society of Canada: \$15.00 each



**Please send your order with an enclosed check for the total amount by September 30, 2003.** Be sure to include the quantities of each item and your name, address, phone, and e-mail. Make checks payable to the Seattle Astronomical Society and send them to:

Sales  
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PO Box 31746  
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Questions? E-mail Jim Peterson ([treasurer@seattleastro.org](mailto:treasurer@seattleastro.org)).

# 2004 Awards Banquet

**When:** January 24, 2004

**Time:** 6:00-6:30 p.m. — No host bar  
6:30 p.m — Dinner served promptly

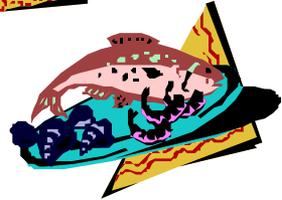
**Where:** Rock Salt on Latitude 47° Restaurant & Catering  
1232 Westlake Ave North  
Seattle, WA 98109

**Cost:** \$30.00 per person

**Entrees:** Roasted King Salmon  
Prime Rib  
Vegetarian Lasagna



**Your entree will come with:**  
Caesar Salad  
Baked Potato  
Bread & butter  
Coffee or Tea  
Dessert



## Reserve Your Spot Today

★★ NO RESERVATIONS WILL BE ACCEPTED ★★  
★★ AFTER JANUARY 7, 2004 ★★

★★ ANYONE WITHOUT A PRIOR RESERVATION ★★  
★★ WILL NOT BE ADMITTED ★★

**Send your entree choice and a check for  
\$30 per person to:**

Kathy Steyaert, Banquet Chairperson  
20609 SE 271st Street  
Covington WA 98042  
(425) 432-2714



## Careful Planning and Quick Improvisation Succeed in Space Biz

by Dr. Tony Phillips

On December 18, 2001, ground controllers at JPL commanded NASA's Deep Space 1 (DS1) spacecraft to go to sleep. "It was a bittersweet moment," recalls Marc Rayman, the DS1 project manager. Everyone was exhausted, including Deep Space 1, which for three years had taken Rayman and his team on the ride of their lives.

DS1 blasted off atop a Delta rocket in 1998. Most spacecraft are built from tried-and-true technology—otherwise mission controllers won't let them off the ground. But Deep Space 1 was different. Its mission was to

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**Deep Space 1's mission was to test 12 advanced technologies, including an experimental ion engine, a solar array that focused sunlight for extra power, and an autopilot with artificial intelligence.**

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test 12 advanced technologies. Among them: an experimental ion engine, a solar array that focused sunlight for extra power, and an autopilot with artificial intelligence. "There was a good chance DS1 wouldn't work at all; there were so many untried systems," recalls Rayman.

Nevertheless, all 12 technologies worked; the mission was a big success.

Indeed, DS1 worked so well that in 1999 NASA approved an extended mission, which Rayman and colleagues had dreamed up long before DS1 left Earth—a visit to a comet. "We were thrilled," says Rayman.

And that's when disaster struck. DS1's orientation system failed. The spacecraft couldn't navigate!

What do you do when a spacecraft breaks and it is 200 million miles away? "Improvise," says Rayman.

Ironically, the device that broke, the “Star Tracker,” was old technology. The DS1 team decided to use one of the 12 experimental devices—a miniature camera called MICAS—as a substitute. With Comet Borrelly receding fast, they reprogrammed the spacecraft and taught it to use MICAS for navigation, finishing barely in time to catch the comet. “It was a very close shave.”



In September 2001, DS1 swooped past the furiously evaporating nucleus of Comet Borrelly. “We thought the spacecraft might be pulverized,” Rayman recalls, but once again DS1 defied the odds. It captured the best-ever view of a comet’s heart and emerged intact.

*This was the final image of the nucleus of comet Borrelly, taken just 160 seconds before Deep Space 1’s closest approach to it. This image shows the 8-km- (5-mile-) long nucleus from about 3,417 kilometers (over 2,000 miles) away.*

By that time, DS1 had been operating three times longer than planned, and it had nearly exhausted its supply of thruster-gas used to keep solar arrays pointed toward the Sun. Controllers had no choice but to deactivate the spacecraft, which remains in orbit between Earth and Mars.

Rayman has moved on to a new project—Dawn, an ion-propelled spacecraft that will visit two enormous asteroids, Ceres and Vesta, in 2010 and 2014. “Dawn is based on technologies that DS1 pioneered,” he says.

Even asleep, DS1 continues to amaze.

Find out more about DS1 at <http://nmp.jpl.nasa.gov/ds1>. For kids, go to <http://spaceplace.nasa.gov/ds1dots.htm> to do an interactive dot-to-dot drawing of Deep Space 1.

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



# September 2003

Sun	Mon	Tue	Wed	Thu	Fri	Sat
	1	2	 3 UW Public Viewing Night 7 p.m. Martian Party Red Square UW	4	5	6 Green Lake & Paramount Park Star Parties
7	8	9	 10	11	12	13 Amateur Telescope Makers SIG Meeting 6:30 p.m.
14 Astrophotography/Imaging SIG Meeting 2 p.m.	15	16	17 Monthly SAS Meeting UW Room A102 7:30 UW Public Viewing Night 7 p.m.	 18	19	20
21	22 SAS Board Meeting 7 p.m.	23	24	25 Orion Nebula Star Party (Table Mountain) begins	 26 <b>SAS Goldendale Star Party Brooks Mem. State Park</b>	27 Tiger Mountain Star Party 7:30 p.m.
28	29	30				
Orion Neb. Star Party Sept 25-28						

**See page 13** for more information about the SAS Goldendale Star Party at Brooks Memorial State Park!



# October 2003

Sun	Mon	Tue	Wed	Thu	Fri	Sat
			1 UW Public Viewing Night 7 p.m.	 2 UW Astronomy Colloquium: Re'em Sari, CalTech 4 p.m.	3	4 Green Lake & Paramount Park Star Parties
5	6	7	8	 9 UW Astronomy Colloquium: Bruce Balick, UW 4 p.m.	 10	11 Amateur Telescope Makers SIG Meeting 6:30 p.m.
12	13	14	15 Monthly SAS Meeting UW Room A102 7:30 UW Public Viewing Night 7 p.m.	 16 UW Astronomy Colloquium: Wm. Abbett UC Berkeley 4 p.m.	17	 18
19	20	21	22	 23 UW Astronomy Colloquium: Erica Bohm-Vitense, UW 4 p.m.	24	 25 Tiger Mountain Star Party 7:00 p.m.
26	27 SAS Board Meeting 7 p.m.	28	29	 30 UW Astronomy Colloquium: Geo. Coyne Dir. of Vatican Observatory, Vatican 4 p.m.	31	



# August Minutes Take it Outside

by Thomas Vaughan

*Speaker:* Jackie Alan Giuliano, Ph.D.

## Announcements

The meeting began with the following announcements:

- ★ Don't forget the UW Astronomy Department's Martian Party! September 3, at 9 p.m. at Red Square at the UW.
- ★ Karl Schroeder is putting together his annual Goldendale Star Party, held at Brooks Memorial State Park. Please contact Karl for more information at [kschroe225@aol.com](mailto:kschroe225@aol.com).
- ★ Mary Ingersoll is taking orders for another run of the SAS t-shirts and sweatshirts. Contact Mary at [missioncontrol13@yahoo.com](mailto:missioncontrol13@yahoo.com).

## Talk: Take it Outside

Dr. Giuliano spent 20 years at NASA, starting with the Voyager missions. He specialized in building some of the robotic explorers. While working at NASA, Dr. Giuliano took his Master's and Doctorate in Environmental Sciences. Since then, it has become his mission to reconnect people with the environment.

For this talk, Dr. Giuliano focused on how astronomy education was a key element in helping people reconnect to nature. He pointed out that "classroom astronomy" does little to increase one's excitement for the Universe. He prefers more experiential forms of teaching, getting people out to physically interact with the environment.

Dr. Giuliano pointed out a few principles which we sometimes take for granted:

- ★ We inhabit a special oasis in a vast and forbidding solar system.
- ★ The Earth is special: we have liquid water, free oxygen, and active plate tectonics.
- ★ A few degrees of temperature difference, or (equivalently) a few million miles difference in orbit, could have drastic consequences on life here on Earth.

He then posed a question: How would our lives be different if we could see the night sky? Dr. Giuliano pointed out that two-thirds of the Earth's inhabitants, and more than 99% of people in First World countries, live in highly light-polluted environments. It is rare for people to live in places where they regularly see dark skies.

As an example of this disconnect, he gave an anecdote about a planned Europa mission. A small probe, powered by a plutonium power source, will hover in the area around Europa for about a

month. After that, it will be fried by the intense electromagnetic fields around Jupiter. At that point, NASA will crash the probe into Europa. Dr. Giuliano noted the conflicting effects of the mission: on the one hand, we would be attempting to get real data on what could be the only other source of life in the Solar System. On the other hand, we were going to shotgun a highly radioactive plutonium core right into the prospective ecosystem.

Dr. Giuliano noted that only recent generations have had this disconnect. He mentioned how hard it is for modern (urban) astronomy students to come to grips with the phases of the moon. Yet these would be familiar concepts even for children of 200 years ago, for whom dark sky observing was a nightly occurrence.

In the past, civilizations were much more connected to the heavens, since they were synchronized with planting, harvesting, and the cycles of life. He claims that without that connection, we are missing inspiration and an expanded sense of self. Some medical practitioners even claim that the disconnect has affected our bodies' sleeping and light cycles, so that the disconnect is physically unhealthy.

So Dr. Giuliano is a big proponent of reconnecting people to the heavens, and their environment. Some of the best tools are very experiential, such as planetariums and star parties.

Dr. Giuliano noted that space exploration itself could be a powerful tool

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***How would our lives be different if we could see the night sky? Two-thirds of the Earth's inhabitants, and more than 99% of people in First World countries, live in highly light-polluted environments.***

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*continued on page 12*

for education. He said the best way to help this was for us as interested astronomers and teachers to discuss the challenges involved as well as the “exciting stuff,” to keep ourselves grounded (“this is not a Star Trek Universe!”), and to remember that even the basics of astronomy and space exploration can be fascinating. Don’t try to teach too much.

As an example, he posed the question: Where does outer space begin? The audience made some guesses, but we didn’t arrive at a consensus. Dr. Giuliano then showed definitions of the atmosphere/space boundary:

- ★ In medicine, 24 kilometers of altitude is considered the boundary, because at that point the human body requires life support systems such as oxygen and heat.
- ★ Propulsion engineers use 45 kilometers as the boundary, because at that point the air becomes too thin for jet engines.
- ★ The US Government defines the boundary as 80.47 kilometers (50 miles).
- ★ International Law defines the boundary as the “lowest perigee attained by an orbital satellite.”
- ★ The US Space Command considers the boundary to be that at which the orbital period is 86 minutes or more.

Dr. Giuliano’s point was that there is no “real” answer, and that different people give different answers depending on their point of view.

He closed the talk with a look at Mars and some discussions of space exploration. He noted that by virtue of our different orbits, Earth and Mars come very close to each other every 2 years and 2 months. Because the orbits are slightly elliptical, some close approaches are closer than others. This particular close approach is the closest since 51000 BC, and the next closer approach will be in 2287 AD.

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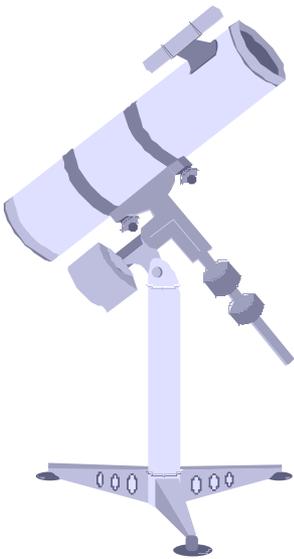
**Dr. Lovelock’s studies  
of planetary  
atmospheric systems  
led to the concept of  
Gaia, where a planet,  
its atmosphere, and  
regulatory systems  
were compared to an  
organism.**

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Dr. Giuliano gave a brief description of James Lovelock's experience. James Lovelock was a respected biochemist, and NASA invited him in the late 60s to help them design probes to detect life on Mars. At the time, NASA was focusing on the rocks. Dr. Lovelock was convinced that this was the wrong approach, and that we should study the Martian atmosphere instead. He felt that the atmosphere was a surer predictor of life. NASA disagreed, and stuck with its rock analysis.

Dr. Lovelock later analyzed the atmospheres of Venus and Mars independently, and determined that there was no life there. His studies of planetary atmospheric systems led to the concept of Gaia, where a planet, its atmosphere, and regulatory systems were compared to an organism. This was a breakthrough in how scientists perceive and model planetary environments, but NASA is only now starting to agree.

Dr. Giuliano pointed out that the original Mars probes could have landed in the middle of the Amazon rainforest, and their measurements for life would have come up "inconclusive." Even modern instruments have failed to detect life when placed in terrestrial deserts. Dr. Giuliano pointed out that the detection of life is so difficult that NASA is now wisely focusing on other things, such as the detection of water.



## Third Annual SAS Goldendale Adventure

Join your SAS friends at the group camp at **Brooks Memorial State Park**, 16 miles north of Goldendale. Grass, picnic tables, vault toilets, water on hand—complete facilities (showers) across the highway at the other Brooks State Park. Good horizons, dark skies—opportunities for observing wildlife as well as stars. Stonehenge Memorial, Maryhill Museum, and Goldendale Observatory are just down the road. **The park is reserved for SAS folks on Friday, Sept. 26, and Saturday, Sept. 27, 2003.** Cost for the weekend: \$10 per person for adults; children, \$4 (these are park mandated fees). Call or e-mail Karl Schroeder to make your reservations now: 206 362-7605 or [Kschroe225@aol.com](mailto:Kschroe225@aol.com).

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