



the Webfooted Astronomer

News from the Seattle Astronomical Society

November 2008

Where are they? Musings on Fermi's Paradox

The great physicist Enrico Fermi articulated the paradox that now carries his name during a lunchtime discussion in 1950. UFO reports were the rage, and even the disappearance of New York City trashcans was being blamed on extraterrestrials. Doing a quick calculation of the vast number of planets in the galaxy and the likelihood that some of them may be home to intelligent life, Fermi asked, "Where is everyone?"

Seattle Astronomical Society member Paul Rodman explained Fermi's Paradox in a nutshell: "There is an enormous number of planets in the galaxy with the ability to support intelligent life, but no reliable evidence for extraterrestrial life in the galaxy exists – unless you read the tabloids when you go through the supermarket checkout."

Rodman, who made a presentation on Fermi's Paradox at the SAS meeting Oct. 15, has long had an interest in the question of the existence of extraterrestrial life, an interest he says was sparked when he read *Chariots of the Gods* by Erich von Däniken when he was in junior high.

"He pretty much proved to me that aliens had visited this planet," Rodman said. "At the time I didn't understand the concept of the laws of physics and I didn't understand the concept of burden of proof or the scientific method."

Rodman says von Däniken has admitted he made up much of the book. Still, the hunt for ET was on.

In 1961 Dr. Frank Drake, founder of SETI, devised the "Drake Equation" for estimating the number of civilizations in our galaxy with which we might come into contact.

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NEXT MEETING

November 19 – 7:30 p.m.
University of Washington
Physics/Astronomy Building,
Room A-102

Hubble at 20: Looking behind and ahead

Prof. Bruce Balick will give us the latest on the Hubble Space Telescope. Balick's interests range from star formation to the final throes of stellar evolution; in particular, how planetary nebulae that surround these stars might reveal the history of formation and evolution of stars in various phases in which gas infall or outflow is involved.

Prof. Balick and his collaborators focus on the nebular hydrodynamics and the construction of numerical models in which detailed physical processes are included. Balick is an active user of large optical and radio telescopes and the Hubble Space Telescope.

<http://www.astro.washington.edu/balick/>

SAS Calendar

November 5 — First quarter Moon

November 5 — 7 p.m.

UW Observatory — Public viewing night

November 8 — 7 p.m.

Seattle Astronomical Society Star Parties

- ◆ Green Lake, Seattle
- ◆ Paramount Park, Shoreline

November 15 — 6:30 p.m.

Amateur telescope makers SIG meeting

Contact: atm@seattleastro.org

November 16 — 2 p.m.

Astrophotography/imaging SIG

Contact: astrophoto@seattleastro.org

November 17 — early a.m.

Leonid meteor shower peaks

November 19 — 7:30 p.m.

Seattle Astronomical Society Meeting

Annual meeting, election of officers. Details on page 1.

November 19 — 7 p.m.

UW Observatory — Public viewing night

November 22 — 6 p.m.

Tiger Mountain Star Party (members only)

November 27 — New Moon

November 29-December 1

Moon, Jupiter, and Venus in close grouping

December 6 — 7 p.m.

Seattle Astronomical Society Star Parties

- ◆ Green Lake, Seattle
- ◆ Paramount Park, Shoreline

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SAS mourns the passing of Ed Barnes, Jim Naiden

Two long-time members of the Seattle Astronomical Society passed away recently. Ed Barnes, who served as president of SAS in the 70s and headed the “cookie brigade” for years, died of complications of cancer Sept. 26 at age 79. A memorial service was held Oct. 24. Dr. James Naiden died of cancer Oct. 10, and a funeral service was held Oct. 17. He was 93. Naiden had a long teaching career that included positions at the UW, Seattle University, and Everett and Edmonds Community Colleges.

Ed Barnes

SAS member Randy Johnson wrote: We all hope for a life as filled with the happiness, kindness, and friendliness that he imparted upon those of us fortunate enough to have been touched by the life of Ed Barnes. I came into the Seattle Astronomical Society in 1983 and Ed was the very fabric of the organization, the man who could be counted upon month after month, year after year to show up early for every meeting, from well before I joined SAS until the middle of the present decade, with an urn of coffee, a pot of hot water for tea and cocoa, cookies and a stack of stick-on “HELLO, MY NAME IS...” labels. Thanks to him, many shy, cerebral, but somewhat geeky folks who otherwise might not have, had the pleasure of meeting each other in the relaxed, informal atmosphere that he provided for us outside the meeting hall. I will miss the comforting smiles of he and his wife Joan in the meadow atop Table Mountain but trust that he has crossed over to similar meadows where the stars also shine brightly!

Bill Torgerson added: Ed Barnes was a true gentleman, and a genuine gentle soul. He was always willing to share coffee, cookies and experiences from his time as a chemist. He was a joy to talk with and an inspiration to students still struggling with school.

I cannot ever remember him without a smile on his face, especially when he got off on the topic of his electric coffee maker, which if memory serves was still the original one from the days of the Pacific Science Center.

He will be missed. The world truly needs more of his ilk.

Added Billy Kreuter: I knew Ed as our most cheerful greeter-at-the-door from when I first started showing up at the monthly meetings in 1995 until the cookies sadly came no more, which I think was only about two years ago. Ed always struck me as vigorous and not particularly elderly, and I was very surprised and saddened to hear this month that he had passed away.

Jim Naiden

Loren Busch remembers meeting Naiden through an Amiga computer users group: When I was looking for information on SAS I called Jim and he invited me to the next meeting. I attended that meeting and Jim greeted me and introduced me around, made me feel very comfortable. I also attended a lot of the Computer SIG meetings that he and Norma hosted at their home (and always closed off with Jim’s pecan pies). I think the last time I saw and talked to Jim was several years ago at the annual SAS Banquet. It was then that I had the privilege of presenting a Lifetime Achievement/Star of the SAS award to Jim and a companion award to his wife Norma as Co-star of the SAS. Jim’s wit and wisdom has already been missed over the last several years as his health kept him from attending meetings and star parties. And now that voice is silenced forever.

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Fermi's paradox

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Drake's equation is a multiplication of the following: The rate of star formation in the galaxy, the fraction of stars that have planets, the fraction of the planets that are suitable for life, the fraction of those on which life actually develops, the fraction of those on which intelligent life develops, the fraction of those with intelligent life which develop the technology to communicate, and the length of time those civilizations actually send signals into space.

It's a simple equation, but we don't really understand much about most of these parameters. Scientists who have taken a crack at the equation have come up with wildly varying answers – somewhere between one and 1,000,000. Even Drake admits the equation isn't going to solve the Fermi paradox. According to a Wikipedia article Drake called the equation "just a way of organizing our ignorance on the subject."

Rodman says the reasons we haven't cracked the paradox fall into six categories:

Physical, having to do with the mind-boggling vastness of space.

Temporal, having to do with time. Though the distances are vast, the universe is some 14 billion plus years old. If someone was going to get about, it may have happened by now.

Sociological. ETs are not like us. They're not curious, maybe not interested in travel. (And these days, who could blame them.) There's the problem of self-destruction. Nuclear war

has been a chilling Armageddon scenario, and there's the possibility of biological war, climate change, or nanotechnology which all have destructive possibilities.

"There are various other horrible disaster scenarios related to network television, junk food, and cell phones which I won't go into," Rodman said, "but there's a jolly good chance that sooner or later every extraterrestrial civilization will wipe themselves out."

Evolutionary. Evolution does not necessarily mean intelligence. As Kurt Vonnegut

wrote in his book *Galápagos*, our big brains can get us into trouble.

Extraterrestrials don't exist. University of Washington professors Don Brownlee and Peter Ward wrote in their book *Rare Earth* (Springer, 2000) that a long list of perfect conditions had to be met before life could



Enrico Fermi: Where is everyone?

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Fermi's paradox

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evolve on Earth, and there's a growing belief among scientists that the answer to Drake's equation is closer to one than a million. Ward spoke on this topic at the SAS banquet in 2006.

They're here. They might even be us.

Rodman admits that he's far from an expert on Fermi's paradox, and that an answer, even given the advances of technology and knowledge, is likely a long ways off. But he's not too concerned.

"I wouldn't worry about an alien invasion any time soon," Rodman said. "With reality shows and FOX News leaking out into space, who's going to want to visit here?" ★



Astronomer and astrophysicist Frank Drake organized the first SETI conference at Green Bank, West Virginia in 1961. At that gathering he proposed his famous Drake Equation for estimating the number of intelligent civilizations in the Milky Way galaxy. Given the uncertainty of so many of the parameters of the equation, Drake has reportedly said it is just a way of organizing our ignorance on the subject.

Still no candidate for SAS president

Board unable to identify candidate, no nominations or volunteers at October meeting, election at November meeting

Members of the Seattle Astronomical Society will elect a new slate of officers for the coming year at the club's annual meeting November 19. As of the deadline date for this issue of *The Webfooted Astronomer*, willing candidates for the positions of president and VP, publicity had yet to be found.

The board published the following slate of candidates in last month's WFA as required by SAS by-laws:

President: no candidate
Vice-president, activities: **Jerry Kuch**

Vice-president, education: **Mohammad Sarwat**

Vice-president, membership: **Rod Ash**

Vice-president, publicity: no candidate

Treasurer: **Maxine Nagel**

Secretary: **Connie Griffith**

Nominations and volunteers from the floor were sought at the SAS meeting on Oct. 15, but none were made. Floor nominations also will be sought before the slate is voted upon at the November meeting. Officers elected at the meeting assume their responsibilities at the close of the meeting.

Deeper Into the Night

Sedna reaches opposition in November

by Ron Hobbs

Lurking deep among the stars along the boundary between Cetus and Taurus is one of the most distant and enigmatic bodies yet found in the Solar System. Around the middle of November, (90377) Sedna will be at opposition and will be closest to the Earth for the year, at just a hair under 87 AU. It will be no brighter than 21st magnitude, a challenging target for all but the biggest scopes. At the time of its discovery, Sedna was the largest object to be discovered in the Solar System since Pluto, as well as the most distant observed ever. In fact, its discovery at almost 90 AU led Mike Brown and his team to look for other slow-moving objects, which led directly to the discovery of (136199) Eris. Of all of the worlds found by the prolific TNO-hunter Brown, he thinks Sedna will do the most to expand our understanding of the outer Solar System.

Eris was discovered not long after it reached aphelion in the mid 1970s. Incidentally, Pluto and Eris will return to perihelion within 20 years of each other in the middle of the 23rd Century. While the semi-major axis of Eris is beyond the so-called “Kuiper Cliff” and it is considered “detached” from the main Kuiper Belt, it can’t hold a candle to Sedna, which was discovered as it approaches a perihelion of 76.27 AU in early 2076. However, its aphelion is currently calculated to be a whopping

911.8 AU,¹ giving it a period of almost 11,000 Earth years. The last time Sedna was this close to the Sun the first cities were being settled here on Earth.

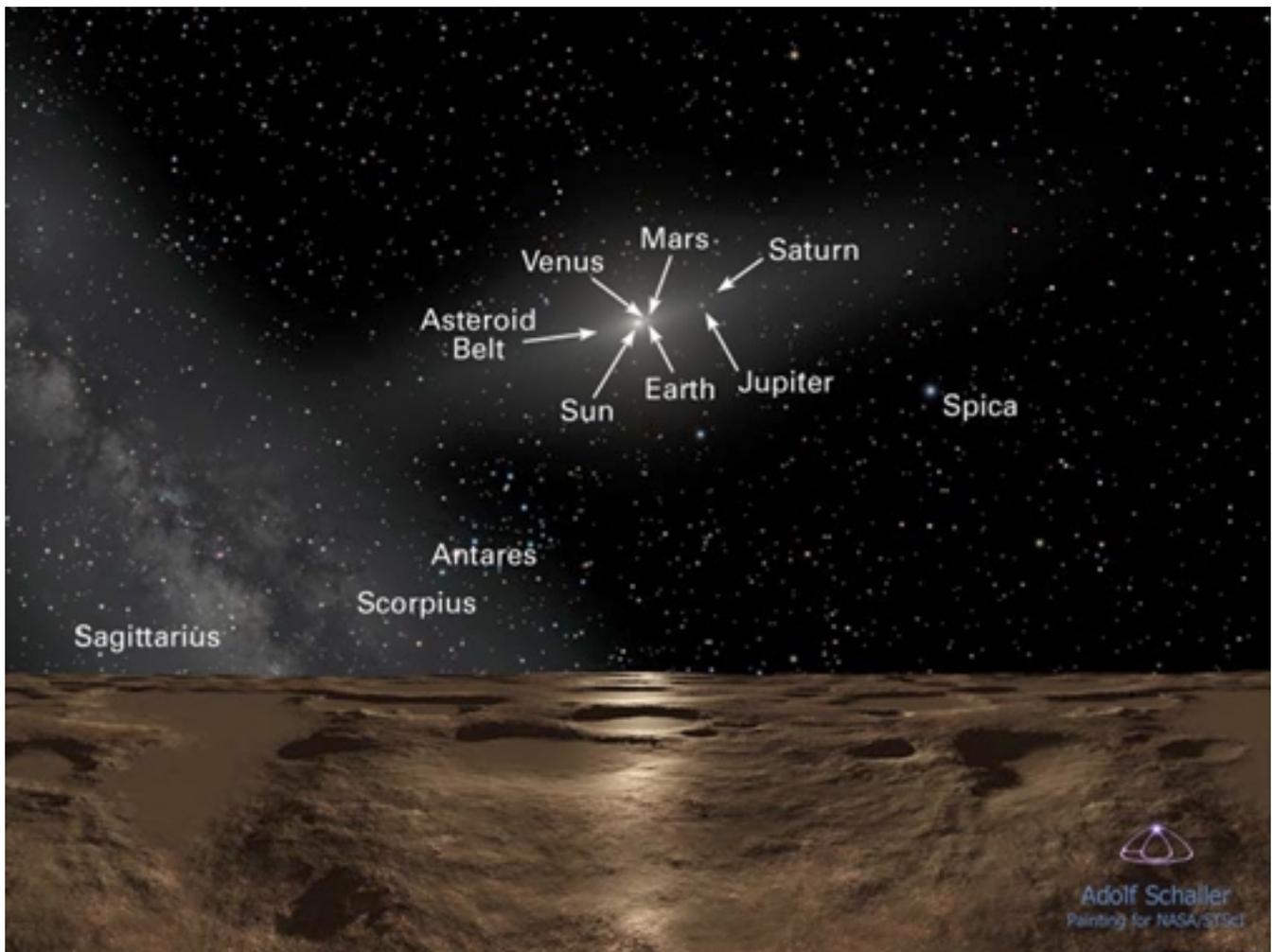
While Sedna was originally described as an “inner Oort cloud” object, there is really no good answer to the question of how Sedna got into such an eccentric, extended orbit. Its “perihelion is too high for direct interactions with Neptune,” and its “aphelion is too low to be affected by the Galactic tide.”² Cornell astronomer Matja Cuk has found theoretical resonances with the outer planets that could have emplaced Sedna, and it has even been suggested that Sedna was stripped away from a low-mass star that got too close to the Sun during its formation.³ All of the theories about how this large trans-Neptunian world got into this orbit are embarrassed by the fact that no similar large objects have been found. At this point it looks as if we humans were just lucky to find this enigmatic world when it was close enough to be seen. Of

course, that kind of luck drives statisticians and theorists crazy.

In a recent teleconference from JPL, Brown confessed that he conducted his survey of the trans-Neptunian realm with the equivalent of “baling wire.” He is getting out of the business of looking for outer planets, primarily because new technology is coming along that will make his efforts look even more crude by comparison. Pan-STARRS 1 should begin regular service from its dome on Haleakala after the beginning of the year. Pan-STARRS 1



Solar System Ambassador Ron Hobbs spent Halloween as Dr. Hobbs, Medical/Science Officer aboard the starship Museum of Fright -- er, Flight! The event drew nearly 1,000 kids to the Museum.



Artist Adolf Schaller's impression of noontime on Sedna. The Sun is more than eight billion miles away. Illustration credit NASA/ESA.

has a 1.8-meter objective mirror and a 1.4-gigapixel camera, and "will be able to scan the visible sky to approximately 23rd magnitude in less than one week. This unique combination of sensitivity and field of view will open many new possibilities in time-domain astronomy and address a wide range of astrophysical problems in the Solar System, the Galaxy, and the Universe."⁴ Thousands of new TNOs should be discovered, including a few as large as, or possibly larger than, Sedna and its sisters. I am looking forward to this next phase in the survey of the outer Solar System.



¹ JPL Small-Body Database Browser, <http://ssd.jpl.nasa.gov/sbdb.cgi?sstr=Sedna&orb=1>

² Cuk, M. Resonances near the orbit of 2003 VB12 (Sedna). 2005:IAU, <http://journals.cambridge.org/action/displayAbstract?fromPage=online&aid=284102>

³ Schwamb, M. Searching for Sedna's Sisters: Exploring the Inner Oort Cloud. 2007:Caltech http://www.astro.caltech.edu/~george/option/candex07/schwamb_report.pdf

⁴ Pan-STARRS PS1 Consortium Website, <http://www.ps1sc.org/>

Ron Hobbs is the Public Programs Assistant for The Museum of Flight and a Solar System Ambassador for NASA's Jet Propulsion Laboratory. For more information on the SSA program see www2.jpl.nasa.gov/ambassador

The chemical weather report

“Sunny tomorrow with highs in the mid-70s. There’s going to be some carbon monoxide blowing in from forest fires, and all that sunshine is predicted to bring a surge in ground-level ozone by afternoon. Old and young people and anyone with lung conditions are advised to stay indoors between 3 and 5 p.m.”

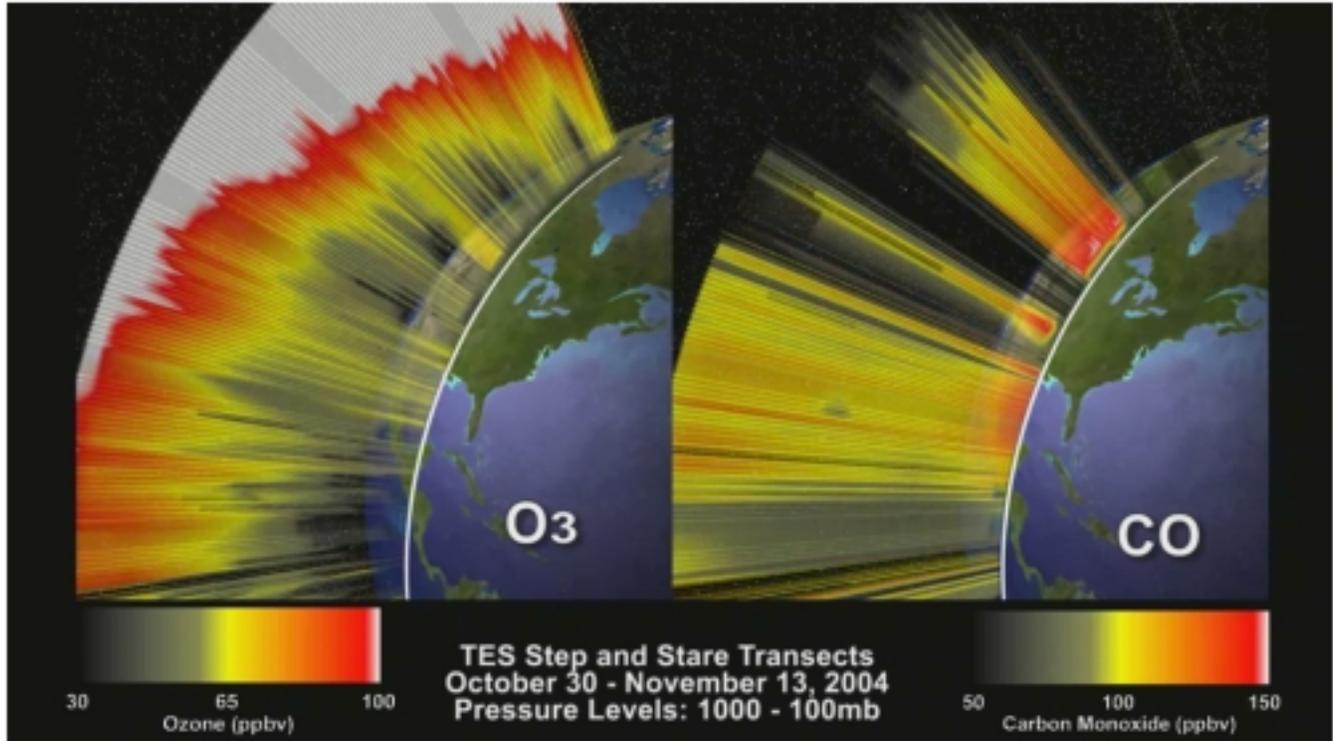
Whoever heard of a weather report like that?

Get used to it. Weather reports of the future are going to tell you a lot more about the atmosphere than just how warm and rainy it is. In the same way that satellite observations of Earth revolutionized basic weather forecasting in the 1970s and 80s, satellite tracking of air pollution is about to revolutionize the forecasting of air quality. Such forecasts could

help people plan around high levels of ground-level ozone—a dangerous lung irritant—just as they now plan around bad storms.

“The phrase that people have used is chemical weather forecasting,” says Kevin Bowman of NASA’s Jet Propulsion Laboratory. Bowman is a senior member of the technical staff for the Tropospheric Emission Spectrometer, one of four scientific sensors on NASA’s Aura satellite.

Aura and other NASA satellites track pollution in the same way that astronomers know the chemical composition of stars and distant planetary atmospheres: using spectrometry. By breaking the light from a planet or star into its spectrum of colors, scientists can read off the atmosphere’s gases by looking at the “fingerprint” of wavelengths absorbed or



Example of visualization of data from the Tropospheric Emission Spectrometer. These frames are from an animation that steps through transects of the atmosphere profiling vertical ozone and carbon monoxide concentrations, combining all tracks of the Aura satellite during a given two-week period.

emitted by those chemicals. From Earth orbit, pollution-watching satellites use this trick to measure trace gases such as carbon monoxide, nitrogen oxide, and ozone.

However, as Bowman explains, "Polar sun-synchronous satellites such as Aura are limited at best to two overpasses per day." A recent report by the National Research Council recommends putting a pollution-watching satellite into geosynchronous orbit—a special very high-altitude orbit above the equator in which satellites make only one orbit per day, thus seeming to hover over the same spot on the equator below. There, this new satellite, called GEOCAPE (Geostationary Coastal and Air Pollution Events), would give scientists a continuous eye in the sky, allowing them to predict daily pollution levels just as meteorologists predict storms.

"NASA is beginning to investigate what it would take to build an instrument like this," Bowman says. Such a chemical weather satellite could be in orbit as soon as 2013, according to the NRC report. Weather forecasts might never be the same.

Learn more about the Tropospheric Emission Spectrometer at tes.jpl.nasa.gov. ★

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



SAS mourns Barnes, Naiden

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Kreuter also remembered Naiden: I think that I first must have started crossing paths with him at about the time of the 1991 Baja eclipse, because I remember seeing him at either the Baja or Los Angeles airport. After that I started coming to his house for the SIG meetings. I remember the pie and the Latin completely well. And I remember Loren's presentation of the award to Jim. At that point it was the first I'd seen him in a pretty long time. He had stopped doing the SIG meetings in the mid-90s; I think his health was starting to fail, but it seems that he held on for more than a decade longer.

"Uncle Bob" Suryan added: I am truly saddened by the passing of Jim. He was my master in the art of curmudgeonness and clear thinking. Jim also ran the computer users SIG for a number of years. Those who attended these meetings will remember a lot intellectual stimulation, followed by the eating of pie.

My deepest sympathy goes out to his large and loving family. I shall always remember this fine man.

Condolences to Ed's and Jim's families from all of us at SAS. ★

Pryal completes work on AL's Caldwell club

SAS President Jon Bearscove recently confirmed that Jim Pryal has completed 70 observations to qualify for the Astronomical League's Caldwell Club observing certificate. The club requires not only observations, but sketches as well! For information about the Caldwell Club, visit the AL Web site at <http://www.astroleague.org/al/obsclubs/caldwell/cldwl.html>.

Congratulations, Jim!



NEXT MEETING
November 19
 SAS elections
 Hubble at 20
 Prof. Bruce Balick
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