

S.C.R.A.P.S.

Society's ChRonological Astronomical PaperS



From the Chair **By Bob Arr**

Things are moving! We have a new library and a new presentation speaker policy. Many project officers and staffs are already at work, and more are still being formed. What they are building is essentially an infrastructure, the resources and procedures to help all levels of members enjoy looking at, and learning about, the stars.

Not long ago I solicited ideas from members about what they thought the club should focus on. The response was gratifying, and one in particular was simply the best idea I ever heard for our club. It was from Ron Dinkins, and is repeated elsewhere in this newsletter. I must tell you, it moved me and opened my eyes to a wonderful opportunity. Please read it.

Putting the dues on a Mar-Feb schedule will help both with the mechanics of keeping the books, and with making decisions about expenditures. Finally, we'll know at the start of the year how much we have to work with, rather than at the end of the year finding out how much we have got.

As you can see, this issue of SCRAPs contains 6 pages, mostly the result of so many new efforts that we felt you wanted or needed to be aware of. A box type calendar, For Sale/Wanted, next speaker profiles...

The Knox Chamber called to say the Universe Knoxville presentation will have to be shifted to March. So be it.

Lastly, thanks for the response to the SMAS Survey. We heard back from virtually everyone, and the Volunteer spirit is alive and well. Those who have not been asked to do specific tasks yet, please be patient. It's a comin'.

Presentation for February: **Ameliorating Climate Change**

Ken Roy, a professional engineer with Oak Ridge's K-25, has co-authored (with Robert Kennedy) an astonishing astronomic solution to our planet's meteorological dilemma, entitled "Mirrors & Smoke: Ameliorating Climate Change with Giant Solar Sails." A few months ago, it was featured in the national Whole Earth Magazine. He will explain their proposal to us at the Feb 8 meeting.

Bruce Sterling writes: "No study of the Greenhouse Effect is quite complete without a high-tech fix. The planet is cluttered with blueprints: we can dump iron filings in the ocean, dam the Bering Straits to contain the melting ice, switch over tomorrow to nuclear everything, grow mutant algae in the high seas, and paint every roof and road white. Here, a special to Whole Earth, is a fresh, untried scheme with grand vision!"

8 PM Friday February 8th at the Discovery Center
Don't miss this vision of the future!

ADAPTIVE OPTICS (PART 1)

By Michael Littleton

***Put an 8-inch telescope into space.
Its resolution will be better the 10-meter Keck Telescopes on a good night on Mauna Kea.***

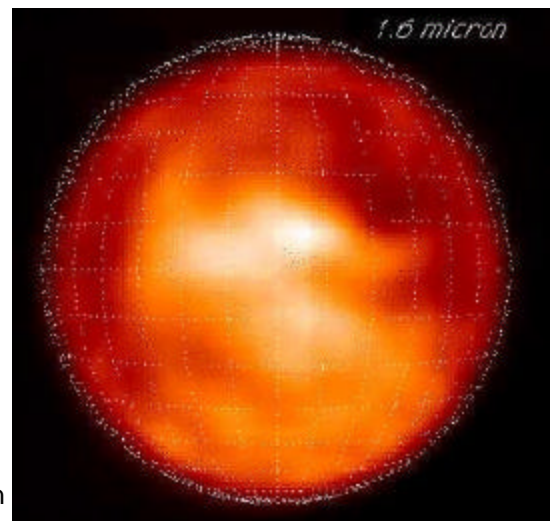
Light from a distant star leaves the star as a spherical wavefront like a ripple from a rock dropped into a pond. Because of the great distance to the Earth, this wavefront is essentially flat as it reaches the outer layers of our atmosphere. Unfortunately, the light must travel through many kilometers of atmosphere to reach our telescopes. The atmosphere is turbulent and temperature variations in air cells associated with the turbulence refract light differently. This distorts the wavefront carrying the star's image. Amateur and professional astronomers alike know only too well this effect called "seeing". When observing Jupiter even under good conditions, fine details fade in and out from moment to moment. This is an example of seeing. Acceptable seeing at a major observatory is about 1 arcsecond, which is greater than the diffraction limited resolution of an 8-inch telescope.

What if you could offset the effects of turbulence? The concept was introduced in 1953, but it was beyond the technology of the time. The United States military in the 1970's worked on a device to counter the effects of turbulence for reasons completely different than observing distant astronomical objects. The first reason was they wanted to better identify Soviet military satellites using ground-based photography. The second reason was to maintain the focus of lasers used in an anti-ballistic missile defense system. The US military's work was declassified in the early 1990's and adapted for astronomical telescopes soon thereafter.

The idea of adaptive optics (AO) is simple in theory. If you know how the image is distorted, do the opposite to decrypt the original image. In the case of the light from a star, the image is encrypted by distortion by air cells blowing across the light path of the telescope. The cells range in size from centimeters to meters and act like lenses producing a blurred and shivering image changing hundred of times per second. To restore the image, the AO system measures the distortions and imposes the opposite distortion producing the improved image. The AO system splits the light from the star and sends a portion of the beam to a sensor array. Each sensor detects the distortion in its area and sends correction signals to appropriate actuators. Actuators are made from piezoelectric crystals that deform when subjected to electric currents. The actuators only change shape a few microns, but this is sufficient to correct the turbulence. The high-speed tilt-tip mirror corrects the large-scale errors in the light, which is moving of the image. This part of the system is similar to the image stabilized binoculars on the market. The "rubber" mirror corrects for small-scale waveform deformation. The "rubber" mirror is a thin mirror deformed by hundreds or thousands of actuators on the back of the mirror. While the theory of AO is simple, it is not simple in practice. The distortions have to be measured and accurate control signals must be sent to each actuator hundreds of times per second.

The use of AO has two fundamental problems. The first is that there must be enough photons arriving per second at each detector in the sensor array. This limits the use of AO to correcting images from objects only when a 10th magnitude or brighter star is nearby. On average, there are only three stars of 10th magnitude or brighter per square degree. Compounding the first problem are the severe limitations on the field of view of AO systems. The guide star must be less than five arcseconds from the target. Over larger fields, the turbulence varies too much for accurate measurements of the effect of turbulence on the target. These problems make most of the sky unavailable for AO using natural guide stars. Tolerances are not so tight at longer wavelengths, so many of the AO systems are designed for the near infrared.

In the next installment, I shall discuss potential alternatives to using natural guide stars.



*The Surface of Titan Taken with AO
(Astronomy Picture of the Day 8/20/00)*

JANUARY MEETING

by Lee Erickson

The SMAS Meeting was held on January 11, 2002 began at 8:04 at the Discovery Center. Out-going Chair Tom Rimmell presided. There were 15 members in attendance and no guests.

Old Business:

There was no old business.

New Business:

2002 Elections were held. The new officers are:

- Chair: Bob Arr
- Co-Chair: Tom Rimmell
- Treasurer: Janice Erickson
- ALCOR Representative: John Sparks
- Secretary: Lee Erickson
- Star Party Coordinator: Yet to be filled

There was a group discussion on goals for the upcoming year. Bill Burgess suggested a club activity of building some telescopes to give to students as a way to encourage astronomy. The students receiving the telescopes could be selected by school teaches or as a telescope-making project involving students and SMAS Members. Bill offered to donate mirrors for the project. The new officers took an action to deliver a report recommend the clubs course of action at the next meeting.

Bob Arr presented his vision for organizing the club to better utilize our resources and attract new members. Central to this is the creation of club activities to promote the understanding of astronomy by our members. Some activities could be using more experienced members to welcome and help newcomers to astronomy, support a astronomical lending library, better organize monthly meeting's programs, and a pattern of action to develop astronomical projects.

Janice Erickson announced that Sky and Telescope subscription payments are due for those members wanting the club's discount.

Bob Arr made a motion to change the annual dues schedule. All dues would be due in February. Persons with renewing dates later in the year would get prorated dues to take them through the end of the year. In February 2003 everyone would have dues due. The motion was seconded by Shawn Grant and was passed.

Jack McConnell reminded us of public observing at the UT physics building the first and third Friday of the month.

There was a discussion to put a monthly calendar on the SMAS web site or separate and earlier than SCRAPS to provide members current information.

Mike Littleton gave a presentation from his astronomy studies with Swinburne University from a presentation entitled, "Seeing More Clearly". It discussed the development and recent use of adaptive optics, to remove some of the limitations of ground-based telescopes. See his article in the Astronomer's Corner.

OPPORTUNITIES AVAILABLE!

Sick of being a "couch potato" with your brain slowing atrophying watching sitcoms? Do some mental exercise and share your astronomical experience with the rest of SMAS and everyone on the Internet by writing an article for SCRAPS. Contact Mike Littleton at (865) 671-1022 or email littlen@ix.netcom.com.

Starlight Star Bright-Those Stars Are Quite A Sight

BY JOHN "SPARKY" SPARKS

February offers many of the brightest stars of the year for the winter observer and anyone who braves the weather will be well rewarded. A "wondering star" named Jupiter shines brightly in Gemini and Taurus has two shining eyes as Saturn has joined the bull. On the 20th, Luna (our moon) will occult Saturn. To the southeast, Sirius shines brighter than any sun in our night sky and is only 8.6 light years away. Man do we have open clusters! The Pleiades and Hyades are very large and close open clusters in Taurus and great binocular objects. Auriga holds three bright open clusters: M36, M37 and M38. Canis Major holds M41, M46 and M47. Cassiopeia holds more open clusters than about any area in the sky. Perseus holds interesting open clusters off the beaten path like "The Strong Man" as well as a nearby familiar sight, the Double Cluster. However, you will only see these things if you go out.

Is one Starparty per month not enough for you? Do you want more than public starparties? If you are the type who can't get enough of the sky, I invite you to become a member of the SMAS "Astrofreaks". So what is an Astrofreak? Astrofreaks are people that I contact for impromptu Starparties. The Astrofreaks are contacted on short notice when the weather looks good enough for a Starparty. Astrofreaks observe in dark skies every clear weekend with less than a half-moon. Membership is free as an extra benefit for being a dues paying SMAS member. If you became a SMAS member yesterday, you can become an Astrofreak. We are 15 members strong, but are growing and have existed on and off since 1997. While the official monthly SMAS starparties are going to be more open to the public this year, the Astrofreaks will go out to the darkest locations year round. While non-members are still welcome as guests, our starparties are for you, the astronomer. All you have to do is contact me in person or call 522-0750 and leave a message or email me at astrofreak@hotmail.com and give me your name, phone number and email address if you have one. You will then receive a welcome and will get all future notices on our starparties. Even if you have no telescope or binoculars, most of our members are happy to let you "astro-mooch" views through their eyepiece.

Lunar Wars 2001/Telescope Wars 2002

BY JOHN "SPARKY" SPARKS

Lunar Wars 2001 was held the same night that Tennessee beat the Florida Gators, so we didn't have as large a crowd as in the past. At the same time, let me remind all of you that the moon is by far the most interesting 1/2 degree of sky you will ever see. The sky was cloudy at times, but clear at other times during the competition and some astronomers came in later due to the football game. We each searched for the Monolith that was found on the moon last year, (according to 2001, A Space Odyssey) but couldn't find it. It boiled down to two telescopes, but in the end we had a winner. The winner of Lunar Wars 2001 is the ETX90 Maksutov Cassegrain owned by Lee Erickson. While this doesn't sound like a lot of scope, he has seen M4 in Scorpio with it. You see, you never know what scope can win, given the right conditions! Lee, if I don't find your ribbon, I will replace it soon. Thank you for the Moon Pies and "Monolith Bars" you handed out. "Wow, it's full of chocolate!"

Telescope Wars 2002 was held at the Johnson's house on January 12, 2002 and man do they have great hot chocolate! I brought my girlfriend and she met SMAS for the first time. For a winter Starparty in Knoxville City limits, the turnout was pretty good, but not as large as some past Telescope Wars. In the end, the winner boiled down to two telescopes, but the true winner was anyone who attended. Fellow astronomers, for the first time, my 1962 6" Edmund Scientific reflector has finally lost a Telescope War hands down, with clear skies and without forfeit! The winner of Telescope Wars 2002 is the 6" Refractor owned and built by Bill Burgess! Congratulations Bill, you have the best planetary telescope in East Tennessee! You see both telescopes can give better views of the planets than even the observatory at Bays Mountain. Bill was awarded with a Mars Bar, a Milky Way Bar and will be receiving a nice ribbon. True to SMAS etiquette, he appreciates the chocolate more than the ribbon.

Internet Sites To Help Beginning Astronomers

BY RON DINKINS

The most daunting task for the stargazing beginner is where to even begin. You want to learn more about the hobby of stargazing so you go to a bookstore and purchase something. After reading about azimuths and celestial coordinates, most people just say its too complicated! Well, who can blame them? In this fast-paced World Wide Web community, everything is always available in some form of information or another. How can any binocular or telescope view compete with a Hubble Space Telescope photograph? The truth is the views never will, but you can still learn the sky and have great enjoyment looking at the night sky.

So go dust off those binoculars in the closet and do some thrilling observing yourself. Ok, you say what can I look at with those old things? I'm glad you asked. Here are a few websites on the Internet connected that will help the new binocular user find something interesting to look at. One of the better places on how to get started with binoculars is the Sky & Telescopes website. The www.skypub.com/tips/binoculars/halfway.html site gives general information as well as some suggestions for planetary and deep sky interests. Also, www.skypub.com/sights/moonplanets/moontour has a nice printable lunar map with sites visible in binoculars. My personal favorite site for binocular observations is www.lightandmatter.com/binosky/binosky. This site is geared toward beginners with nice black and white drawings of what you will see and simple constellation diagrams of how to find interesting objects. More involved constellation maps are available at freespace.virgin.net/m.poxon/hba-home.htm and www.dibonsmith.com/learning.htm. Smith's site also includes his personal introduction to binocular astronomy as well as nice historical background on objects.

I hope you give your old binoculars a try sometime. Even old hands can appreciate a new wider view of the universe sometimes just for the thrill of doing it.

A PROPOSAL

BY RON DINKINS

My proposal is to canvas the club for mentors for new astronomers. I've belonged to several types of clubs over the years, computers, model airplanes, etc. The best one I had experience with had mentors. As a newbie, you have lots of instant enthusiasm, but not much knowledge. I would propose getting up a list of volunteers to mentor newbies. When a new visitor comes to a meeting, ask them if they would like to join then assign them a mentor. The mentor would then be a close contact and friend they can call whenever they have a question or need help learning something. Even as far as having them over to observe with the mentor. This would help fill in between the monthly meetings or star parties for the newbie.

I have to commend Mike Fleenor for acting in this capacity for me. He answered numerous email questions and phone calls from me. He even helped me to borrow the 10" dobsonian so I could learn more about the sky. His informal example is just the way a newbie needs help.



February 2002

Chair:
Bob Arr

Vice Chair:
Tom Rimmell

ALCOR:
John Sparks

Secretary:
Lee Erickson

Treasurer:
Janice Erickson

SCRAPS Editor:
Mike Littleton

SUN	MON	TUE	WED	THU	FRI	SAT
					1 UTK observing	2
3	4 Last Quarter	5	6	7	8 SMAS Mtg.	9 Star Party
10	11	12 New Moon	13	14	15 UTK observing	16 Star Party Alternate
17	18	19	20 First Quarter	21	22	23
24	25	26	27 Full Moon	28		

SCHEDULE OF EVENTS

- **2/8/02** SMAS meeting sits at 9:17 PM and sets 8 PM at the Discovery Center: Ken Roy is the featured speaker presenting, "Ameliorating Climate Change with Giant Solar Sails".
- **2/16/02** Alternate date for the star party at Look Rock
- **2/9/02** Star party at Look Rock
- **2/1/02 & 2/15/02** Public observing from the roof of the Physics Building at UTK
- **2/15/02** Mars sets at 10:33 PM; Jupiter tran-

SMAS Website:
<http://www.smokymtnastro.org/>