

Saguaro Astronomy Club

Metro Phoenix, Arizona

SACNEWS



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Perseids 1993 Shower or Storm?

by Dr. Peter Brown

Peter Brown is a Council Member of the International Meteor Organization, a non-profit scientific organization. The International Meteor Organization produces a journal/magazine devoted to amateur meteor astronomy with about 250 pages per year, included with membership, for 18 US dollars a year. To subscribe, send payment through: Peter Brown, 181 Sifton Ave., Ft. McMurray, Alberta, T9H 4V7, Canada. His E-mail address is: peter@canlon.physics.uwo.ca.

After many years of speculation, the parent comet of the Perseid meteor stream returned to the neighborhood of the sun in the last months of 1992.

The original predictions for the comet placed its perihelion passage in the first years of the 1980's. Much anticipation surrounded this event and many people reported

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noticeable increases in Perseid activity, particularly in 1980. In all likelihood, the returns around 1980 were ordinary, the few observers who noted high activity became the "standard" quoted Zenithal Hourly Rates (ZHR's) for many years and therefore a self-fulfilling prophecy developed with respect to high Perseid activity. In addition, these years still saw vastly different methods of reduction and analysis of visual data so that comparisons between different groups and even individuals with varying perceptions were unrealistic.

The returns after 1980/1981 were generally quoted as weaker in activity in direct proportion to the interest in the stream and the belief that P/Swift-Tuttle had arrived

Quick Calendar

SAC Meeting
David Levy

7:30, Friday, June 4

Sedona-Verde Valley Astronomy Festival
Miller Center for Environmental Education
Red Rock State Park
June 11-12

SAC Star Party
Buckeye Hills Recreation Area
Saturday, June 12

3rd Annual Grand Canyon Star Party
June 12-19

SAC Meeting
7:30, Friday, July 2

unseen or not at all. Beginning in 1988, the International Meteor Organization implemented global analysis of the stream using standardized reduction techniques and from data with uniform collection parameters. Additionally, the IMO introduced computer calculated ZHR procedures allowing flexibility to researchers in choosing the methods of reduction and permitting accuracy checks of the final results. This initial global analysis produced a surprise — a double maxima!

The result was widely criticized as the statistical significance of the new structure could not be objectively determined and the reduction procedures, though based on the best available techniques at the time, were still somewhat new. The new peak appeared some 12 hours before the "normal" Perseid peak. Initial explanations ranged from differences in perception between different groups of

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observers to a simple statistical “blip” in the data. Considering more than 53,000 meteors had been used in the analysis the latter explanation seemed doubtful.

Then the same double peak structure was found in the 1989 data at the same location, again separated by 12 hours from the primary “stable” maximum. The data from 1989 were even higher quality than in 1988 with about the same number of meteors. The analysis techniques had been refined through experience with other shower global analysis and the conclusion seemed inescapable—a double peaked structure for the Perseids existed. The double peak profile had not been conclusively observed previously and a few explanations for the structure were given. The newer peak was felt to consist of younger particles than the main peak some 12 hours later (a conclusion that was to ultimately prove true) and the authors of the 1989 analysis speculated that the material might be from a passage of P/Swift-Tuttle in the

early 1980’s.

The 1990 return was destroyed by the full moon and no reliable analysis could be attempted with such bad data. In 1991, observers around the world had been alerted to the possibility of enhanced activity due to the new peak some 12 hours before the main maxima. In 1991 the new peak would favor observers in Japan—and favor them it did! The Japanese observers witnessed one of the strongest displays of the Perseids in the last century with ZHR’s over 400. This was clearly stronger activity than had been witnessed in the past few returns and it seemed that the stream was changing. Shortly after the Japanese announced the heightened activity, Brian Marsden pointed out that in a paper he published in 1973 he discussed the possibility that P/Swift-Tuttle might actually return in 1992 if it was the same comet observed in 1737. While he had ranked the possibility as slight that the 1737 comet was P/Swift-Tuttle in 1973, the enhanced

Comet Comments

by Don Machholz

(916) 346-8963

May 9, 1993

The unusual Periodic Comet Shoemaker-Levy 9 remains near Jupiter. It is quite faint, but you might want to try looking for it. Meanwhile, one faint comet has been recovered.

Periodic Comet Reinmuth 2 (1993g): Jim Scotti of the Lunar and Planetary Laboratory at Kitt Peak recovered this comet on Feb. 26 at magnitude 22. It is a year from perihelion but will not be visible in amateur scopes.

Periodic Comet Shoemaker-Levy 9 (1993e)					
Date	RA-2000-Dec	Elong	Sky	Mag	
05-23	12h06.4m	-01°57'	120°	E	13.2
05-28	12h06.2m	-01°55'	115°	E	13.2
06-02	12h06.3m	-01°56'	111°	E	13.2
06-07	12h06.7m	-01°58'	106°	E	13.3
06-12	12h07.4m	-02°02'	101°	E	13.3
06-17	12h08.4m	-02°08'	97°	E	13.3
06-22	12h09.6m	-02°15'	92°	E	13.3
06-27	12h11.1m	-02°24'	88°	E	13.4
07-02	12h12.8m	-02°35'	84°	E	13.4
07-07	12h14.7m	-02°47'	80°	E	13.4

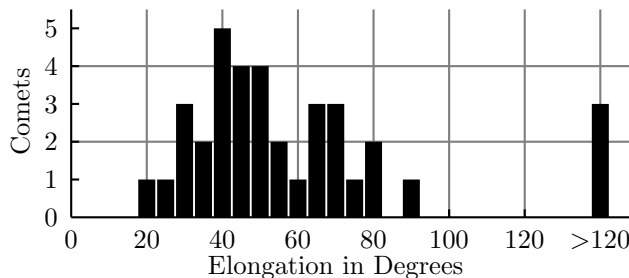
Seeking Comets

by Don Machholz

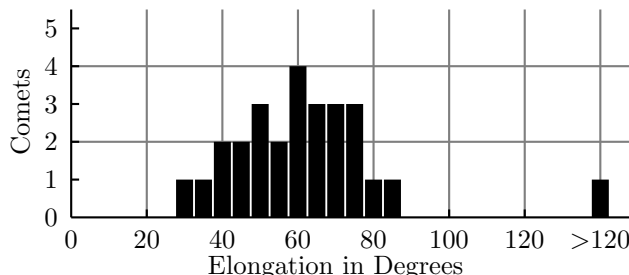
At what elongations (distance from the sun in degrees as seen from the earth) are comets discovered? Here we examine the 36 comets visually found in the morning sky, and 27 comets found in the evening sky between 1975 and 1992. The number of degrees is written along the bottom, the blocks represent the comet discovery elongation.

The morning average was 59.1 degrees with a median of 49 degrees. The evening average was 62.0 degrees with a median of 63 degrees. This doesn’t demonstrate just the behavior of comets, but also the behavior of comet hunters, who tend to concentrate on areas within 90 degrees of the sun.

Morning Sky Elongations



Evening Sky Elongations



Perseid display in 1991 revived the remote chance that the comet might return in 1992.

The telling sign would be Perseid activity in 1992, unfortunately a full moon would compete with the meteor show and make data analysis very tricky. As the data from the previous returns showed that Europe would be the best place to observe the early peak, much preparation was made there to capture the event. Unfortunately, meteor showers, unlike eclipses, have an inherent unpredictability resulting from our lack of knowledge regarding the dust distribution about the parent comet. The 1992 display showed this maxim perfectly; the new peak shifted some 2-3 hours earlier than what had been observed in past years. As a result, Asian and Russian observers were in the best locations to witness the display. After much analysis of the available observations it appears that the 1992 activity was higher than in 1991 — perhaps with a peak ZHR of order 500, though this peak value will remain highly uncertain due to the effects of lunar interference.

This brings us to the next logical stage of the “act”; the 1993 display. With P/Swift-Tuttle recovered shortly after the 1992 display (and with elements close to those predicted by Marsden in his 1973 paper) it became apparent that the geometry between the comet and the Earth could make the 1993 display very strong. Indeed, our geometry with the comet is very similar to that between the Earth and P/Tempel-Tuttle in 1833. This is suggestive that a strong return is in store for observers in 1993. However, P/Tempel-Tuttle is NOT P/Swift-Tuttle and the dust distribution about the latter is unknown. While there is much circumstantial evidence favoring a storm, nothing can be certain.

Keeping these cautionary notes in mind, what might

be predicted for 1993? Based on the node of the comet and the maximum activity in 1992 one would expect peak activity to be at 1 UT on August 12, 1993. Some have suggested that the shift in activity between the 1991 and 1992 displays suggest that we can expect another 0.1 day advancement of activity in 1993, closer to 22 UT on Aug.

Whatever the 1993 display produces it will go down in history as one of the most waited for showers ever.

11. While this is possible, I consider the shift unlikely — meteor storms usually occur very close to the node of their parent comet as the 1992 display did relative to P/Swift-Tuttle. Basing an estimate of this sort on two data points (the 1991 and 1992 maxima) is a bit questionable the least so I see little reason to suppose a further 0.1 day shift will occur.

What sort of display are we likely to encounter? The past meteor storms for which reliable observational data exist suggest that newly ejected cometary material is rich in faint meteors — this seems to be the best guess of what will be seen in 1993. That is not to say that there will be little or no large particles encountered, but the proportion of faint meteors to bright meteors will be higher than in regular Perseid displays. The central questions, how long will the display last and what will be the maximum activity are very difficult to predict. Meteor storms generally last for a few hours at most — some historical records suggest that large displays can carry on for days, but these records are very open to interpretation. Data from more recent storms seems to suggest that several hours (2-6)

Eighth Annual Sedona-Verde Valley Astronomy Festival Miller Center for Environmental Education Red Rock State Park June 11 & 12, 1993

**\$5/day (admission to the park)
\$2/vehicle (overnight camp ground)**

The Verde Valley Astronomy Club (Russell A. Nidey, Director) will present Dr. Nigel Sharp, a professional astronomer from the Kitt Peak National Observatory, who will lecture in the Miller Center theater each evening on the Festival topic: Galaxies and Nebula.

Action begins in the parking lot next to the Miller Center where we may view the sun through H-alpha on a 4" Genesis refractor, and a full aperture Thousand Oaks Optical solar filter. Several C-8s and other telescopes will be added later on (with apertures up to 17"), allowing

viewing and astrophotography. (Piggy-back or prime focus; bring a manual camera with 400 ASA film and a T-Ring.)

Prepackaged snacks and drinks will be provided in the Center. Some picnic tables and a Ramada (with electricity) are available. Please contact the VVAC for further information:

Russell A. Nidey, Director
Verde Valley Astro-Center
1101 Zalesky Road
Cottonwood, AZ 86326

Lowell Observatory Tour

Saturday, August 28

The Saguaro Astronomy Club will be touring Lowell Observatory in Flagstaff. Astronomer Brian Skiff will give us an insider's view of a very active observatory that is rich in history. A tentative itinerary includes visits to the 72-inch, 42-inch, and 31-inch telescopes on Anderson Mesa. This will be followed by a tour of Mars Hill, where we will see the 21-inch photometry telescope, the camera used to discover Pluto, one of the great astronomical libraries on the planet, and the photographic plate vaults. This is not the standard general public tour, so you won't want to miss it.

The tour will take place on Saturday, August 29. The bus will be leaving Phoenix at around 9:00 AM and will arrive back in town around 10:00 PM. Plan to bring a sack lunch for a picnic in Flagstaff.

Bus fare for the tour is \$20. For those who have already signed up at the last meeting, please try to bring your checkbooks to the next meeting. Otherwise, you may mail your checks, made out to Saguaro Astronomy Club, to SAC Treasurer Carol Lee, 3314 N. 68th St. #205, Scottsdale, Az 85251.

—Tom Polakis, SAC Vice President

is a good guess for the longest time for which unusually high activity might be observed. The 1833 Leonids, for example, showed strong activity for nearly 6 hours.

The peak rates are complete unknowns. The largest meteor storms on record for the last few centuries produced activity on the order of 100,000 meteors per hour for intervals shorter than about 1 hour. Ancient records do little to pin down peak rates of meteor storms earlier than about 1800. Everyone's guess is equally valid in this instance.

Whatever the 1993 display produces it will go down in history as one of the most waited for showers ever.

The International Meteor Organization would be interested to receive your observations, whether you see unusual numbers of meteors or not. Please follow the techniques outlined in the August, 1993 issue of Sky and Telescope and send the completed summaries to the addresses given therein.

Selected Landolt Photometric Standard Stars

by Brian Skiff

Last fall I made up for my own use a list of photometric standard stars to use while observing with the Lowell 21-inch telescope. The list is drawn from the standard star work of Arlo Landolt, Louisiana State University, who has been providing measures for these stars to the professional

community for over twenty years. His standard stars establish what is essentially a working definition of the UBV system for folks doing photometry. Although presented in a form convenient for observers using small telescopes with photoelectric photometers or CCDs, I claim no originality for this list.

With a couple of exceptions the stars lie in the Kapteyn "Selected Areas" along the celestial Equator. These fields were set up all over the sky early in this century in order to provide a random collection of stars for study in hopes of finding out more about the distribution of stars and galactic structure generally. Apart from fundamental survey work, however, little has been done with these fields—one of those big astronomical enterprises that never went very far.

Briefly, Landolt made measures of over 600 stars in these fields that were published in 1973. Usually the stars were measured only a few times each, making them barely adequate as standards of magnitude and color. Work continued on about half of these stars until 1983, when an improved list was published. The stars now averaged about a dozen measures each on twenty nights. The work was extended to fainter stars in the ensuing decade, and in 1992 a third list was published containing stars as faint as mag. 17. The few bright stars remaining from the 1973 list have been observed on as many as one hundred nights. The very faint stars were observed by way of providing standards faint enough to observe with CCDs on 4-meter class telescopes.

The problem with Landolt's lists is that there are simply so many stars to choose from. My idea, then, was to make a selection of the best-observed stars bright enough to observe easily with the 21-inch telescope that span a

wide range in color. The list given in the table has 76 stars pretty evenly distributed in R.A., so that on any night there are several of these stars available to calibrate measurements of “unknowns,” be they blue stars in a young star cluster, red semiregular variables, asteroids, galaxies, or whatever. All the stars are brighter than mag. 10.0, although just barely in several cases.

The table lists the stars in RA order and gives in the first column the name used by Landolt. Some are common HD or BD catalogue numbers, but most are a pair of numbers separated by a hyphen: these are the Selected Area field and a serial number.

To fill out the table, I found precise J2000 positions for all the stars in astrometric catalogues or from the Space Telescope Guide Star Catalogue (version 1.1, August 1992) — the positions in Landolt’s papers are not very good. Next come Landolt’s V magnitude and B-V color, given to 0.001 magnitude precision. Landolt’s papers provide UBVR colors, but since I plan to observe in only two colors, the other indices are omitted. The un-

certainties in the values for a typical star are only a few thousandths of a magnitude. I went through the literature and dug out MK spectral types, finding at least an approximate type for all the stars.

Next is a reference to which of Landolt’s lists the star data come from; the citations are given at the end of this article. If you would like to know more details about the equipment and how the stars were observed, this is the place to look. The Notes column gives HD and BD identifications for the stars Landolt does not identify as such. These are more useful than the Selected Area names for doing bibliographic searches in the technical literature.

Several of the stars have been suspected of variability. However, the long series of observations by Landolt and other independent checks indicate that they are sensibly constant. I’ve given references to confirming work in the literature. The reddest star on the list, 110-353 = HD172829, has the disturbing annotation of a variable-star designation, HK Aquilae! Never fear: the star is a strongly reddened K giant, and has been measured hun-

Selected Landolt Photometric Standard Stars

Name	RA (2000)	Dec	V	B-V	MK	Ref	Notes
HD 315	00h07m44.0s	-02°32'55"	6.440	-0.145	B8pSi	1983a	= HR 11 = 4 Ceti
92-336	00h55m01.4s	+00°47'22"	8.046	0.985	K0III	1983a	= HD 5319
HD 7615	01h16m27.7s	+23°35'22"	6.693	0.047	A0	1983b	
93-103	01h53m20.5s	+00°23'14"	8.831	1.161	K0III	1983a	= BD -0 288 (NErn/brtr of two)
93-326	01h54m50.4s	+00°47'02"	9.569	0.454	F5	1983a	= BD +0 307
93-241	01h55m18.4s	+00°36'31"	9.400	0.853	G8IV	1983a	= BD -0 294
HD 11983	01h57m31.9s	-07°32'10"	8.192	1.512	K0	1983a	
HD 16581	02h39m34.7s	+01°22'08"	8.195	-0.057	B9	1983a	
94-308	02h56m13.8s	+00°31'20"	8.743	0.494	F7	1983a	= HD 18286
HD 21197	03h24m59.7s	-05°21'46"	7.866	1.150	K5V	1983a	
95-306	03h54m15.2s	+00°17'22"	8.737	0.502	F8	1983a	= HD 24537
96-180	04h51m40.7s	-00°05'13"	8.930	1.049	K0III	1983a	= BD -0 789
96-406	04h52m50.4s	+00°07'04"	9.300	0.220	A6	1983a	= HD 31073
HD 35299	05h23m42.2s	-00°09'35"	5.691	-0.211	B2V	—	= HR1781; Johnson std
HD 37981	05h42m58.1s	+14°10'42"	6.731	1.096	K1IV	1983b	
97-351	05h57m37.3s	+00°13'44"	9.781	0.202	A0V	1992	= HD290984
HD 50167	06h52m04.2s	+01°15'06"	7.861	1.535	K5	1983a	= ADS 5533
98-653	06h52m05.0s	-00°18'18"	9.539	-0.004	B9	1992	= HD 50188 (Wrn/fntr of two)
HD 52533	07h01m27.0s	-03°07'04"	7.702	-0.088	O8.5V	1983a	= ADS 5705 (m9 comp @ 23")
99-296	07h54m46.7s	-00°29'37"	8.454	1.187	K0III	1983a	= HD 64633
99-447	07h56m06.7s	-00°20'42"	9.417	-0.067	B9V	1992	= HD 64887
99-408	07h55m13.0s	-00°25'33"	9.807	0.407	F5V	1983a	= BD -0 1856
100-606	08h52m57.6s	-00°09'30"	8.641	0.052	A0	1983a	= HD 75914
100-162	08h53m14.4s	-00°43'30"	9.150	1.276	K2III	1992	= BD -0 2084
100-95	08h54m52.8s	-00°58'07"	8.915	0.814	G9V	1983a	= HD 76242
101-324	09h55m56.6s	-00°23'16"	9.742	1.161	K4III	1992	= BD +0 2586
101-333	09h56m39.1s	-00°27'41"	7.835	1.485	K5	1983a	= HD 86135
101-363	09h58m18.7s	-00°25'36"	9.874	0.261	A7	1992	= HD 86408
102-58	10h55m17.0s	-01°25'29"	9.380	0.060	Ap	1983a	= HD 94603 (ApSrCrEu)
102-1081	10h57m04.0s	-00°13'12"	9.903	0.664	G5IV	1992	= BD +0 2717
HD 97503	11h13m13.2s	+04°28'56"	8.702	1.178	K5V	1983a	
HD100600	11h34m42.4s	+16°47'49"	5.948	-0.158	B4V+B6	—	= 90 Leo AB = HR4456; Johnson std
HD101906	11h43m47.1s	+24°00'37"	7.411	0.858	G2IV	1983b	
HD106542	12h15m13.5s	+16°54'26"	6.819	1.184	K2	1983b	

Name	RA (2000)	Dec	V	B-V	MK	Ref	Notes
HD107146	12h19m06.5s	+16°32'54"	7.028	0.602	G2V	1983b	
HD109995	12h38m47.5s	+39°18'32"	7.61	0.051	A0p	—	Lowell std
104-461	12h43m06.0s	-00°32'18"	9.705	0.476	F7	1992	= HD110572
105-405	13h35m59.5s	-00°34'40"	8.309	1.521	K5	1983a	= HD118290
105-28	13h36m44.0s	-01°15'38"	8.345	1.039	G9III	1983a	= HD118390
105-448	13h37m47.1s	-00°37'33"	9.176	0.249	A3	1983a	= HD118579
106-834	14h39m28.3s	-00°14'57"	9.088	0.701	G5IV	1983a	= HD128866
106-700	14h40m51.0s	-00°23'37"	9.785	1.362	K4III	1992	= BD +0 3222
106-485	14h44m14.1s	-00°37'07"	9.484	0.380	F4	1983a	= HD129727
HD129975	14h45m37.6s	-00°21'53"	8.373	1.504	K3III	1983a	
107-35	15h37m28.8s	-00°53'05"	7.779	1.275	K1III	1983a	= HD139308
HD140850	15h45m57.6s	-01°26'44"	8.816	1.670	K2III	1983a	
HD149382	16h34m23.4s	-04°00'52"	8.944	-0.281	B5n	1983a	
108-702	16h35m37.5s	-00°24'41"	8.208	0.559	G0	1983a	= HD149646
108-827	16h37m21.2s	-00°24'49"	7.964	1.303	K0III	1983a	= HD149845
HD160233	17h38m40.6s	+04°20'10"	9.095	-0.054	B1V	1983a	
HD161198	17h43m16.0s	+21°37'04"	7.521	0.745	G8V	1983b	
0109-747	17h44m50.7s	-00°08'04"	8.477	0.305	A0	1983a	= HD161304
109-231	17h45m19.9s	-00°25'52"	9.332	1.462	K2II	1992	= BD -0 3353
109-1082	17h45m29.9s	+00°04'12"	9.017	0.802	G5IV	1983a	= HD161427
HD161817	17h46m40.6s	+25°44'57"	6.982	0.147	A2p	1983b	= NSV 9679 (not var: PASP 88,495)
+04 3508	17h47m33.3s	+04°50'21"	9.326	1.753	K3	1983a	
110-353	18h42m17.7s	+00°09'18"	8.447	2.002	K5	1983a	= HD172829 = HK Aql
HD175544	18h55m46.7s	+00°15'55"	7.395	0.107	B3V	1983a	
HD184914	19h36m45.2s	-04°17'58"	8.170	1.180	K5	1983a	
111-717	19h36m54.8s	+00°07'31"	8.529	0.425	F0	1983a	= HD184965 (brtr of two; unequal pair)
111-773	19h37m15.8s	+00°10'58"	8.963	0.206	B9	1992	= HD185025
111-2864	19h38m47.1s	+00°36'20"	8.292	1.716	K5	1983a	= HD185378
HD196395	20h37m07.5s	-00°31'03"	8.711	1.662	K5	1983a	
112-275	20h42m35.4s	+00°07'20"	9.905	1.210	K2III	1992	= BD -0 4073
HD199280	20h56m18.1s	-03°33'41"	6.566	-0.076	B8Vn	1983a	= HR 8014
HD200340	21h02m59.7s	-00°55'30"	6.498	-0.099	B6V	1983a	= HR 8054
HD205556	21h35m55.8s	+05°28'35"	8.301	-0.054	B9	1983a	
113-267	21h41m56.6s	+00°20'46"	7.653	0.488	F5V	1983a	= HD206404
HD209796	22h06m01.5s	+01°22'49"	8.933	1.187	K2	1983a	
114-172	22h42m49.2s	+00°13'54"	6.969	0.311	F0	1983a	= HD215093
114-272	22h42m58.0s	+00°24'07"	7.737	0.864	K0V	1983a	= HD215110
114-176	22h43m10.2s	+00°21'16"	9.239	1.485	M0III	1992	= HD215141
HD218155	23h05m33.1s	+14°57'33"	6.783	0.004	A0V	1983b	= NSV14421
HD219018	23h12m38.6s	+02°41'10"	7.708	0.620	G1V	1983b	not var: IBVS 1742
115-271	23h42m41.8s	+00°45'14"	9.695	0.615	G2V	1992	= BD -0 4557
115-427	23h43m14.5s	+01°06'47"	8.857	1.168	K0III	1983a	= HD222732

dreds of times by several groups of observers, who have published V magnitudes very close to the number given here. The variable star name is based on old photographic estimates, and is almost certainly spurious.

A few relatively blue stars (small or negative B-V colors) were added from other sources to fill some gaps in the R.A. sequence: HD 35299, HD100600, and HD109995. The latter two have been used as standards for work at the Lowell 21-inch for over two decades, and are guaranteed to be constant. The first star is an early Johnson UB system standard, and the values here come from work by South African astronomer A. Cousins.

In closing, I might mention that I am quite willing

to help interested observers plan photometry programs, select targets, and so on. Don't ask me about hardware or electronics — I don't know much about that side of this business! Ordinary mail or e-mail (address provided by your faithful editor) are the best ways to get my attention.

Brian Skiff
 Lowell Observatory
 1400 West Mars Hill Road
 Flagstaff, AZ 86001-4499
 E-mail: bas@lowell.edu (Internet)

Landolt A. 1983a, "UBVRI Photometric Standards Around the Celestial Equator," AJ 88,439.

Landolt A. 1983b, "UBVRI Photometry of Stars Useful

Such-A-Deal

SUCH-A-DEAL is a place to advertise equipment, supplies, and services related to amateur astronomy. This is a free service for SAC members and friends. SAC is not responsible for the quality of advertised items or services.

Telescope—Celestron C-8 and all the goodies for less than 35 cents on the dollar. This is a complete package. Used for several seasons but is in excellent condition. W. Edwin Poe, 942-8500.

for Checking Equipment Orientation Stability,” AJ 88,853.

Landolt A. 1992, “UBVRI Photometric Standards in the Magnitude Range $11.5 < V < 16.0$ Around the Celestial Equator,” AJ 104,340.

Newsletter Deadline

Mail items at least two weeks before the end of the month. Items arriving too late for an issue will be included in the next newsletter.

Bits and Pieces

Coming Events

The Lowell Observatory Field Trip is planned for Saturday, August 29. See the note in this newsletter for details.

David Levy will be making another of his yearly visits to SAC. This just after he co-discovered Comet Shoemaker-Levy (1993e) last March.

The Eighth Annual **Sedona-Verde Valley Astronomy Festival** will be taking place June 11 & 12, more

detail are in this newsletter. This might be a good stop-over on the way to the Grand Canyon. The 3rd Annual **Grand Canyon Star Party** is scheduled for June 12-19.

Of course, if you can't make either of these two events, there is the usual, much closer club star party at Buckeye Hills.

Deep Sky Meeting

The Deep Sky Group is made up of people that like to observe celestial bodies out past the far reaches of our Solar System. These bodies include stars, nebula and galaxies. If you are interested in sharing your observations, or knowing what they look like in telescopes — then by all means come join us at the next meeting. We will discuss Deep Sky objects in Ophiuchus. The meeting will be held at John McGrath's house; directions are here in the newsletter.

You don't need to RSVP, we don't extend special invitations to anyone — ourselves included. If you are interested show up, we'd love to have you.

The Deep Sky meeting will take place on Thursday, July 8 at 7:30pm.

SAC and SAC Meetings

Saguaro Astronomy Club (SAC) was formed in 1977 to promote fellowship and the exchange of scientific information among its members — amateur astronomers. SAC meets monthly for both general meetings and star parties, and regularly conducts and supports public programs on astronomy.

SAC meetings are usually held on the Friday nearest the full moon. This means that over the course of the year, meetings are not held on same week of the month. The same is true of the club's star parties. Star parties at Buckeye Hills are mostly held on the Saturday of the third quarter moon.

1993 SAC Meetings

Jan. 8
Feb. 5
Mar. 5
Apr. 2
May 7
Jun. 4
Jul. 2
Aug. 27
Sep. 24
Oct. 29
Nov. 19
Dec. 18 Party

1993 SAC Star Parties

Date	Sunset	Moonrise
Jan. 16	5:46pm	3:11am
Feb. 13	6:12pm	2:05am
Mar. 20	6:41pm	5:24am
Apr. 17	7:01pm	3:55am
May 15	7:22pm	2:25am
Jun. 12	7:38pm	12:55am
Jul. 17	7:38pm	4:44am
Aug. 14	7:15pm	3:39am
Sep. 11	6:40pm	2:15am
Oct. 9	6:03pm	1:04am
Nov. 6	5:33pm	11:57pm
Dec. 11	5:22pm	6:35am

Minutes of the May Meeting

The meeting opened at 7:35 PM with President Bob Dahl welcoming visitors and new members. He asked all guests to sign the guest book and they would receive a copy of the newsletter. He had recently received a lot of promotional material and copies were on the table for members, including some free calendars. Carol Lee gave the Treasurer's Report and reminded members that she still has 4 copies of the Observer's Handbook.

Gene Lucas reminded members about the Riverside Telescope Makers Conference coming over Memorial Day Weekend. If you need reservations, please contact him for phone numbers. The conference will have excellent speakers, and all members are urged to attend. Piet Burggraaf reported about the events on National Astronomy Day and the Thunderbird Park Public Star Party. At Thunderbird, there were 26 scopes there and estimates of 500+ people attending. He had available some free astronomy shareware programs for Windows for members and could make more copies if necessary. A.J. Crayon asked if any members were planning on attending the Grand Canyon Star Party on June 12-19. He has Dean Ketselsen's phone number for information. [293-2855 -editor] The next meeting of the Deep Sky Group would be May 13 at the McGrath house. The constellations studied would be Corvus, Crater, Hydra and Sextans. He is currently working on a new observing program beyond the Herschel 400 — perhaps a Lifetime award.

Stan Student mentioned that the club's library now contains shareware software, along with books available for checkout. Tom Polakis presented information about the forthcoming bus trip to Lowell Observatory in August. The trip will be on Saturday, August 28 and will cost members \$20. More details will be in the newsletter.

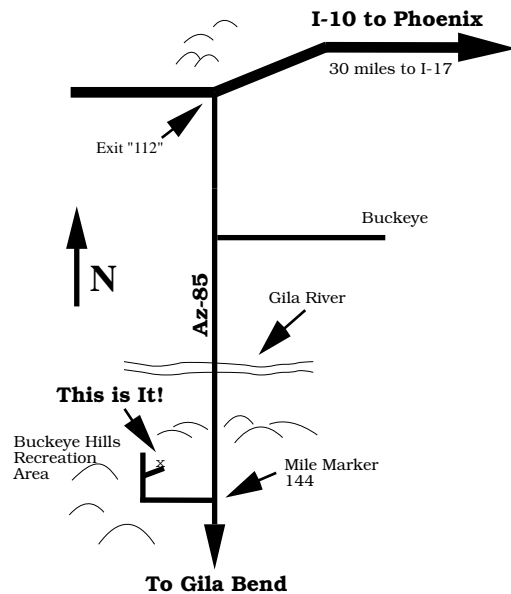
After the break, the main program of the meeting consisted of short presentations by members. Jim Stevens demonstrated his tracking platform; Michael Janes talked about Mars observations; Stan Student showed overheads of CCD generated globular clusters; Tom McGrath had slides of the Chili observatories; Steve Coe distributed forms for note taking; A.J. Crayon had drawings of Virgo and other galaxies; Rich Walker displayed

his double star wheel; Pierre Schwaar demonstrated his camcorder-telescope hookup; Rick Rotramel displayed pictures of the Thunderbird Star Party; and Brian Vornadam passed around his calculations of star positions. — *Susan V. Morse, SAC Secretary*

Directions to SAC Events

SAC General Meetings 7:30 PM at Grand Canyon University, Fleming Building, Room 105 — 1 mile west of Interstate 17 on Camelback Rd., north on 33rd Ave., second building on the right.

SAC Star Parties at Buckeye Hills Recreation Area



Interstate 10 west to Exit 112 (30 miles west of Interstate 17), then south for 10.5 miles, right at entrance to recreation area, one-half mile, on the right. No water and only pit toilets. Please arrive before sunset; allow one hour from central Phoenix.

SAC Deep Sky Subgroup Meeting at John & Tom McGrath's, 11239 N. 75th St., Scottsdale, 998-4661 — Scottsdale Rd. north, Cholla St. east to 75th St., southeast corner.

June 1993

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
			EVAC Meeting Directions: Joe Murray 482-2918		SAC Meeting Full Moon Total Eclipse 6:02 a.m. MST	
		1	2	3	4	5
6	7	8	9	Venus at greatest elongation 46°W	Last Quarter Moon 10:36 p.m. MST	SAC Star Party Buckeye Hills (members & guests)
Grand Canyon Star Party August 12–19				Mercury at greatest elongation 25°E		New Moon 6:52 p.m. MST
13	14	15	16	17	18	19
Mercury 4°N of Moon	Solstice 2:00 a.m. MST Mercury 4°N of Moon	Mars 0.8°N of Regulus		Mars 7°N of Moon		First Quarter Moon 3:43 p.m. MST
20	21	22	23	24	25	26
Jupiter 7°N of Moon						
27	28	29	30			

Magazines & Discounts

Club members may subscribe to astronomical magazines at reduced rates through the club Treasurer. See the Member Services Form on the back page of this newsletter. Furthermore, club members are encouraged to align their subscriptions with the Jan.–Dec. calendar year. This eases the burden both on the Treasurer and the Publisher by permitting a single Group Renewal to be placed in the autumn for the upcoming calendar year.

Those members who experience problems with their subscriptions to *Astronomy* magazine may call Kalmbach Publishing Customer Service at (800) 446-5489.

Those members who experience problems with their subscriptions to *Sky & Telescope* magazine may call Sky

Publishing at (800) 253-0245.

Besides the club discount on *Sky & Telescope* magazine, Sky Publishing offers club members a 10% discount on all other Sky publications. This means books, star atlases, observing aids, Spotlight prints, videos, globes, computer software, and more.

Club members who subscribe to *Sky & Telescope* through the Club Discount Plan may order Sky publications directly, at the above toll-free number, without going through the club Treasurer. Simply mention the Club Discount Plan and give the Saguaro Astronomy Club name to receive the discount. Sky Publishing will check their records to verify that you are eligible to receive the discount.

Saguaro Astronomy Club Member Services Form

Membership

Memberships are for the calendar year and are pro-rated as follows: Jan - Mar 100%, Apr - Jun 75%, Jul - Sep 50%, Oct - Dec 25%.

- \$20.....Individual Membership
- \$30.....Family Membership (one newsletter)
- \$100.....Business Membership (includes advertising)
- \$4.....Nametag for members
- \$10.....Newsletter Only

Subscriptions

The following magazines are available to members. Subscribe or renew by paying the club treasurer. You will receive the discounted club rate only by allowing the treasurer to renew your subscription.

Sky & Telescope.....\$20.00 for one year

Astronomy.....\$16.00 for one year

Write your name, address, and phone number in the space below.

Make checks payable to SAC.
Mail the completed form to:
Carol Lee
SAC Treasurer
3314 N 68th Street, #205-W
Scottsdale AZ 85251



SACNEWS

c/o Paul Dickson
7714 N 36th Avenue
Phoenix AZ 85051

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