Saguaro Astronomy Club

Metro Phoenix, Arizona

SACNEWS

April, 1990 — Issue #159

Great Red Spot
by Jim Van Nuland

I have often stated that Henry Coe State Park tends to have clear skies, due to the ridges that separate it from the sea, keeping back the clouds; but that Coe seldom has especially good seeing (steadiness) because those same ridges destroy the laminar flow that is so conducive to steady air. The February 24 star party gave lie to both of those assumptions, as we had persistent haze, passing clouds, and seeing 10 of 10!

The giant planet showed many belts, various spots and lumps, and of course, our favorite Great Red Spot! Looking more nearly "red" than since 1976, the Spot was seen at a glance, even by park visitors who had never looked through a telescope. The region of the missing SEB is still just a little darker than the zone south of it.

Great Red Spot on Meridian MST

D	M	d	time	D	M	d	time
Su	4	1	909pm	F	4	20	955pm
Tu	4	3	1052pm	M	4	23	731pm
F	4	6	819pm	W	4	25	911pm
Su	4	8	958pm	F	4	27	1041pm
Tu	4	10	1137pm	M	4	30	815pm
W	4	11	731pm	W	5	2	951pm
F	4	13	910pm	Sa	5	5	727pm
Su	4	15	1042pm	M	5	7	910pm
W	4	18	821pm				

At the predicted times, the Spot will be facing nearest the Earth, and so will appear on the central meridian of the apparent disk of the planet. The Spot moves its own length in about 40–50 minutes. Good seeing and a power of about 200–300 are needed. Begin half an hour before the given time. Focus carefully, then scan the southeast quadrant of Jupiter. Watch carefully for those moments when the air is especially stable, and the Spot will show itself in all its glory.

To tell the author about your observations, write Jim Van Nuland, Calico Observatory, 3509 Calico Ave., San Jose, CA 95124 (408) 371–1307.

Comet Comments
by Don Machholz

No new comets have been discovered or recovered recently, in that respect this is a slow year for comets. But comets found last year remain visible, not the least of which is Comet Austin.

We know that Comet Austin is a new comet to the inner Solar System and that some of its early brightness was due to the more volatile chemicals burning off. So unless the comet disintegrates near perihelion (unlikely), I expect the comet to put on a good show; but it will not be bright enough to cast shadows! Since much of its brightness in May will be due to a close passage to Earth (22 million miles), the comet can suffer much and still look good at that time. The disadvantage of such distance is that the comet will appear large and you'll need dark skies to see it well. As with most comets, the view will be best with dark skies, trained eyes and high-contrast optical instruments.

Comet Austin (1989c$_1$)

Date	RA-1950-Dec	RA-2000-Dec	Elong	Sky	Mag
03–25	01h41.5m +05°01'	01h44.1m +05°16'	22°	E	4.1
03–28	01h44.3m +08°45'	01h46.9m +09°00'	21°	E	3.6
03–31	01h46.2m +12°43'	01h48.9m +12°58'	20°	E	3.0
04–03	01h46.8m +16°51'	01h49.5m +17°06'	19°	E	2.4
04–06	01h45.2m +21°02'	01h48.0m +21°17'	19°	E	1.9
04–09	01h40.9m +25°04'	01h43.7m +25°19'	20°	E	1.6
04–12	01h33.4m +28°37'	01h36.2m +28°52'	21°	E	1.4
04–15	01h23.1m +31°28'	01h25.9m +31°44'	22°	M	1.6
04–18	01h10.7m +33°33'	01h13.5m +33°49'	24°	M	1.8
04–21	00h57.1m +34°56'	00h59.8m +35°12'	27°	M	2.1
04–24	00h42.6m +35°44'	00h45.3m +36°00'	30°	M	2.4
04–27	00h27.5m +36°02'	00h30.1m +36°19'	33°	M	2.7
04–30	00h11.4m +35°55'	00h14.0m +36°12'	37°	M	2.9
05–03	23h54.1m +35°24'	23h56.7m +35°40'	42°	M	3.1
05–06	23h35.0m +34°26'	23h37.5m +34°42'	47°	M	3.2
05–09	23h13.2m +32°55'	23h15.6m +33°11'	53°	M	3.3

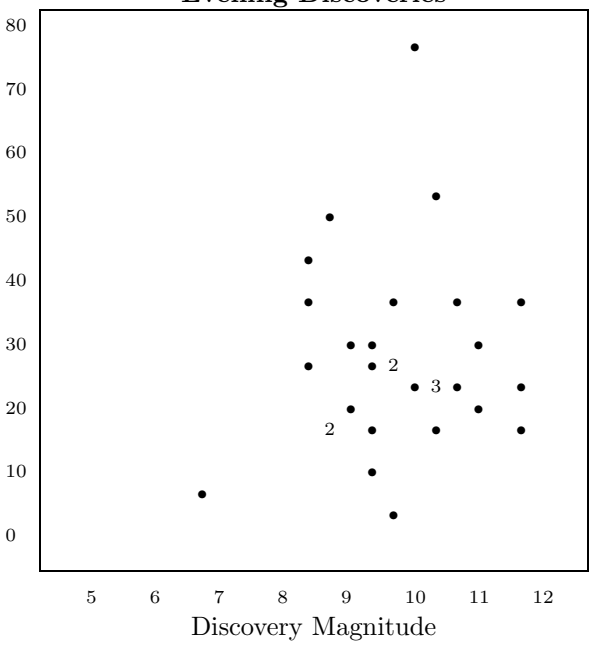
For the ephemeris above I use an absolute magnitude of 6.0 and an "N" value of 4.0. I'm also listing the comet for every three days since it is moving rapidly. The comet

will pass on degree SW of M 33 on the evening of April 12 and six degrees south of M 31 on April 24.

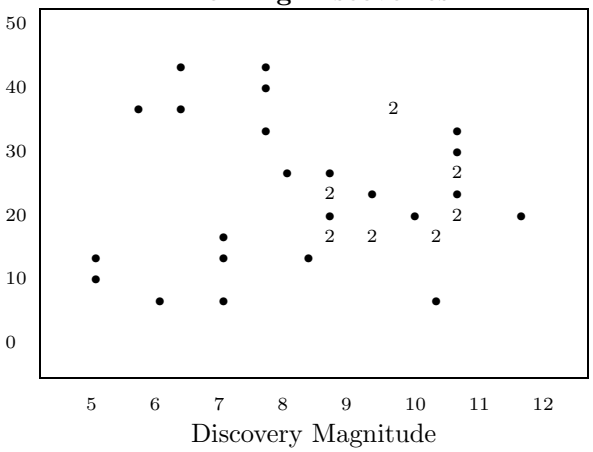
Comet Skorichenko-George ($1989e_1$)						
Date	RA-1950-Dec		RA-2000-Dec		Elong	Sky	Mag
03–25	01h19.0m	+42°19'	01h21.9m	+42°35'	44°	E	8.2
03–30	01h43.1m	+42°14'	01h46.1m	+42°29'	42°	E	8.2
04–04	02h06.8m	+41°55'	02h09.9m	+42°10'	41°	E	8.2
04–09	02h30.1m	+41°25'	02h33.2m	+41°38'	39°	E	8.2
04–14	02h52.5m	+40°42'	02h55.7m	+40°54'	37°	E	8.2
04–19	03h14.1m	+39°49'	03h17.4m	+40°00'	35°	E	8.3
04–24	03h34.7m	+38°47'	03h38.0m	+38°57'	33°	E	8.3
04–29	03h54.3m	+37°37'	03h57.6m	+37°46'	31°	E	8.4
05–04	04h12.8m	+36°21'	04h16.1m	+36°29'	29°	E	8.4
05–09	04h30.3m	+35°01'	04h33.6m	+35°07'	27°	E	8.5

Periodic Comet Schwassmann-Wachmann 3 ($1989d_1$)							
Date	RA-1950-Dec		RA-2000-Dec		Elong	Sky	Mag
03–25	17h05.0m	−01°16'	17h07.6m	−01°20'	107°	M	11.7
03–30	17h35.9m	−02°25'	17h38.5m	−02°27'	104°	M	11.3
04–04	18h10.7m	−03°44'	18h13.3m	−03°43'	100°	M	10.9
04–09	18h49.2m	−05°10'	18h51.9m	−05°06'	95°	M	10.6
04–14	19h30.5m	−06°36'	19h33.1m	−06°30'	90°	M	10.3
04–19	20h12.9m	−07°55'	20h15.6m	−07°46'	85°	M	10.0
04–24	20h54.7m	−08°58'	20h57.4m	−08°47'	80°	M	9.9
04–29	21h34.1m	−09°42'	21h36.7m	−09°28'	75°	M	9.8
05–04	22h10.0m	−10°05'	22h12.7m	−09°50'	72°	M	9.8
05–09	22h42.2m	−10°11'	22h44.8m	−09°55'	69°	M	9.9

Evening Discoveries



Morning Discoveries



Seeking Comets

by Don Machholz

At what altitude in degrees above the discoverer's horizon are comets found? My study of 37 discoveries of the 28 comets found in the morning sky (some comets were found by several observers) shows an average altitude of 23.4 degrees. For 31 evening discoveries of 23 comets (also 1975–1989) we find an an average of 27.4 degrees.

Below I plot each discovery, the magnitude of the comet is along the horizontal axis, the altitude in degrees is along the vertical axis. Each discovery is indicated by a "•", if two finds are the same position I use a "2", for three finds, a "3".

Bits and Pieces

Swap Meet

Do you have a bunch of old astronomy junk, excuse me, stuff. Things that no longer interest you or that you've out grown. This is your chance to find someone who's tastes are more eclectic than your own. The April meeting is SAC's annual swap meet.

1990 SAC Meetings	**1990 SAC Star Parties**
April 13	April 21
May 11	May 19
June 8	June 16
July 6	July 14
August 10	August 18
September 7	September 15
October 5	October 13
November 2	November 10
December 8	December 15

Membership Roster

It looks like we will be sending out a printed membership list with addresses and phone numbers, possibly with the May newsletter. This will only go to club members. If any of you do not want to be included on this list please let the newsletter editor know.

Observer's Handbook

The following people have not picked up their Observer's Handbooks. Please retrieve them at the April meeting (or make other arrangements) or they will be subject to resale. Thank you.

Stan Celestian	Frank Martin
Dean Corn	Rheta Peiser
Lika Etrog	Stephen Robb
Paul Lind	Earl Timmerman

Riverside Telescope Makers Conference

The 22nd Annual Riverside Telescope Makers Conference will be held May 25th through the 28th. It will be held at the Y.M.C.A. Camp Oakes which is eight miles east of Big Bear City on Highway 38 at Lake Williams Road. This location is about 50 miles northeast of Riverside in the San Bernardino mountains at an elevation of 7,300 feet. Highway 38 off Interstate 10 in Redlands.

Due to the need to plan this Conference far in advance, prices will be discounted for all registrations received before May 1, 1990.

For those of you who didn't get one of the handouts at the March meeting, or want more information about this conference, either phone Gene Lucas (934–1889) or see him at the April meeting.

Minutes of the March Meeting

Pete Burggraaf called the meeting to order at 7:30 PM. The first order of business was upcoming events. The Reach 11 Public Star Party on March 17. For April's Events, see the attached calendar.) Cathe Becker presented the treasurer's report. A collection was taken in the memory of Maynard Clark and $75.61 was collected. A proposal to continue membership in the International Dark Sky Association was table. Gerry Ratley talked about the Deep Sky subgroup and some upcoming topics.

At the Show-and-Tell part of the meeting, Pierre Schwar showed striking video of Jupiter and its moons. After the break the main speaker, Robert Fried from Braeside Observatory, gave an interesting talk on Photometry.

Directions to SAC Events

SAC General Meetings 7:30 PM at Grand Canyon University, Fleming Building, Room 103 — 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.

New Electromagnetic Launcher

Continued from last month...

Sandia is working with several outside organizations in the development of the concept and eventual scale-up. These include McDonnell Douglas, Maxwell Laboratories, and Science Applications International Corporation (SAIC).

A recent study of the Sandia electromagnetic earth-to-orbit concept by Miles R. Palmer and colleagues at SAIC said electromagnetic ETO "appears to be cost-effective ... Launch rates and costs could improve 100-fold over present boosters with full utilization."

Cowan says the rapid advancement of capacitor-bank technology in just recent years has helped make the concept feasible. The Strategic Defense Initiative Organization and the Defense Nuclear Agency sponsored research in low-cost capacitors. The size and costs (per unit of energy) of capacitor banks have dropped dramatically. For instance, in 1985 a capacitor bank capable of slowly storing and then suddenly releasing 5 megajoules of energy occupied a volume of 8.5 cubic meters. For 1990, the equivalent volume is 0.8 cubic meters. This trend is expected to continue for a few more years and, says Cowan, should help solve the power-supply problem necessary for the concept.

In the concept, the projectile passes through a series of coaxial (cylindrical) coils. This series of coils forms the contactless barrel. Each coil, or stage, is powered by its own capacitor bank. Just before firing, a pneumatic device sets the projectile spinning, for aerodynamic stability in the present device.

The firing takes place under computer control. As the process begins, first one, then the next, then the next coil is electrically energized. The current acts on the launch-mass's armature, causing it to accelerate forward. This acceleration continues, without interruption, down the length of the flyway.

Between each coil a high-speed optical fiber sensor measures the precise position and velocity of the projectile and instructs the computer to fire the next stage at just the right instant to provide maximum effect.

"The projectile rides this electromagnetic wave, trying to keep out in front of it," says Cowan.

Studies show that very high velocities can be achieved this way.

The accelerations, in contrast, are relatively low for electromagnetic launching. This is because of the payload's large size and limitations in strength. Cowan says the accelerations on the projectile would be in the neighborhood of 1 to 2 kiloGs (1 to 2 thousand times the acceleration of earth's gravity). This is substantially less than the 10 to 30 kiloGs experienced by artillery shells, some of which carry electronics. "There will be an acceleration-hardening penalty to pay, but we don't think it will be that severe," says Cowan.

Cowan sees the new technology as a feasible alternative to rocket launches for many applications. Rockets are a mature technology and no one foresees a 10 to 100-fold improvement in their capabilities. Problems with rockets include high costs, failure rates, launch delays, and certain environmental hazards, especially from a possible chemical explosion.

Electromagnetic launch to orbit may offer improvements in all these categories. The big one is the time to prepare for launch.

Cowan says an electromagnetic launcher could launch with a response time of "a few tens of minutes," and the time between launches could also be much shorter. The concept seems especially fruitful for launching large numbers of relatively small objects into earth orbit.

The concept has grown out of a Sandia project previously termed "the reconnection gun" — so-named because the acceleration was the result of reconnection of magnetic field lines behind a flat-plate projectile. Magnetic reconnection is how the sun propels solar flares into space. The reconnection gun concept was designed initially as a space-based anti-missile interceptor.

The updated concept uses the same basic idea, but the geometry has been changed to cylindrical. The projectile and the coil have the same axes. The magnetic field direction remains unchanged in adjacent stages. This direct-current design produces less heating on the armature, allowing higher launch velocities.

Funding has come from both the U.S. Department of Energy and from the Strategic Defense Initiative Office. Sandia is seeking additional sponsors for specific applications, including earth-to-orbit launch.

The work is being carried out in Sandia's Pulsed Power Sciences Directorate. Cowan holds a 1989 DOE patent (#4,817,494) for the entire "Magnetic Reconnection Launcher," including the launcher itself, the projectile, the power supply, the use of a projectile sensor, and the principle of magnetic reconnection. He is manager of Sandia's Advanced Energy Conversion Systems Department. Widner is supervisor of the Electromagnetic Launcher Division, whose members have been carrying out the development and testing program.

Sandia National Laboratories is a multiprogram research and development facility operated for the U.S. Department of Energy by AT&T. Its major facilities are in Albuquerque, New Mexico, and Livermore, California.

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.

For Sale—Refractor tube assembly – Jaeger's components (cell, dew cap, etc.) 83x711 (#8E1093) with 1.25 diagonal, eyepiece and 1000 Oaks type 1 solar filter, $150; Jaeger's equatorial mount, 44" pedestal, advertised to take 3" to 10" tubes, $30; University 11x80 finder (fl 330 mm) Amici prism uses 1.25 eyepieces, has camera tripod mounting plate, $125; Meade double crossline illuminated reticle 1.25" with 0.965 adapter, requires about 1" in-travel, $40; unmounted 1000 Oaks type 1 solar filter, 2.4" diameter, contact L. Ryan, 20218 Skylark Dr., Sun City West, Az 85875, 584–5992.

Telescope—Meade Model 2080/LX3, 8", Schmidt-Cassegrain; Hardly used—excellent condition; Multicoated/Silvered Optics group; quartz electronic LX drive system (never used); equatorial wedge; 9.7 mm & 26 mm Super Plössl eyepieces; 2 filters; foam lined carrying case; field tripod. Asking $975. Call Marty Wicoff at 246–1105 (ans. mach.).

For Sale—80mm Brandon Apochromat, 32mm 2" O.D. eyepiece, 2" O.D. mirror diagonal, 20mm erfle with 1.25" diagonal and amici prism and necessary adaptors. $600. Dwight L. Bogan, 277–4297 home, 231–3906 work.

Universal Time and Date of Total Lunar Occultations for Phoenix (33.5º Lat., 112.1º Long.)
Corrected from Standard Station NM (1) and LA (2)

Mo/DY/YR	H1:M1:S1	H2:M2:S2	Mag	Star Info	PH	PA1	PA2	PS	ELG	MAL	MAZ	SAL	SAZ
04/17/90	8:59:11	NL:NL:NL	4.9	ZC2809 (ψ Sgr)	RD	277	NL	52	266	8	127	-41	31
04/19/90	NL:NL:NL	12:29:40	4.2	ZC3079 (θ Cap)	RD	NL	299	38	291	31	142	-5	73
06/07/90	4:13:41	4:12:17	3.0	ZC2287 (π Sco)	DD	143	162	95	171	24	148	-17	314
06/07/90	5:23:57	5:24:04	3.0	ZC2287 (π Sco)	RB	258	241	95	172	29	164	-27	328

NOTES:
Subtract 7 hours for correct Mountain Standard Time and Day.
H1,M1,S1 = Hrs,Min,Sec (Std Sta NM)
H2,M2,S2 = Hrs,Min,Sec (Std Sta LA)
PH = Phenomenon, i.e. RD = (R)eappearance on (D)ark Limb
PA1 = Position Angle of star from north point of moon (90=East) (NM Std Sta)
PA2 = Position Angle of star from north point of moon (90=East) (LA Std Sta)
PS = Percent Sunlit
ELG = Elongation of moon from sun (180 = full; 270 = 3^{rd} Qtr)
MAL = Moon Altitude in degrees (90 = directly overhead)
MAZ = Moon Azimuth (90 = East)
SAL;SAZ = Sun Altitude;Azimuth
NL = Not Listed at Standard Station
Compiled by Brian K. Vorndam

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04/19/90	NL:NL:NL	12:29:40	4.2	ZC3079 (θ Cap)	RD	NL	299	38	291	31	142	-5	73
06/07/90	4:13:41	4:12:17	3.0	ZC2287 (π Sco)	DD	143	162	95	171	24	148	-17	314
06/07/90	5:23:57	5:24:04	3.0	ZC2287 (π Sco)	RB	258	241	95	172	29	164	-27	328
08/14/90	7:06:23	NL:NL:NL	3.8	ZC0560 (27 Tau)	RD	191	NL	48	273	6	64	-42	352
08/18/90	11:16:28	NL:NL:NL	-2	Jupiter	DB	132	NL	14	334	6	68	-19	59
08/18/90	12:05:47	12:06:11	-2	Jupiter	RD	249	260	14	335	15	74	-10	67
08/28/90	3:52:43	3:53:31	3.0	ZC2287 (π Sco)	DD	102	95	50	91	19	220	-23	300
08/28/90	NL:NL:NL	5:13:21	3.0	ZC2287 (π Sco)	RB	NL	272	51	91	7	233	-36	317
09/10/90	NL:NL:NL	12:57:59	4.0	ZC0547 (20 Tau)	RD	205	205	61	249	74	NL	-2	82
09/10/90	NL:NL:NL	12:58:31	4.4	ZC0539 (19 Tau)	RD	238	238	61	249	74	NL	-2	82

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