A A V S O   A B S T R A C T S

Edited by R. Newton Mayall

PAPERS PRESENTED AT THE SPRINGFIELD MEETING, OCTOBER 10-12, 1958

The 47th Annual Meeting of the AAVSO was held in the Museum of Natural History, Springfield, Massachusetts, October 10-12, 1958. Again we were favored by good weather,and nature delayed her annual show so that those coming to the meeting were able to see New England fall color in its most glorious dress. Over 50 members attended, and we had plenty of time to get acquainted with each other. The Shelton Hotel is just across the street from our meeting room,so no time is lost in travel. A sumptuous roast beef dinner was laid before us on Saturday evening. After dinner, everyone journeyed to Clint Ford's observatory for observing and a good social time.

Mr. Frank D. Korkosz, the new director of the Museum and friend of the AAVSO, welcomed us to the Museum and extended an invitation to use the Museum for our meetings whenever convenient. He was a most gracious host, and made us feel at home. Mr. Korkosz briefly outlined the unique history of the Museum,which had its beginnings in a one-room private collection. Today a beautiful limestone building houses the numerous collections and the Seymour Planetarium. The planetarium was designed and constructed by Mr. Korkosz, who also designed the newest planetarium to open its doors, at the Museum of Science in Boston. Following the Friday evening lecture, Mr. Korkosz demonstrated the Seymour Planetarium, and the Springfield Stars Club workshop was opened for inspection.

Friday evening Margaret and Newton Mayall jointly occupied the platform, to tell of their recent trip to Russia. Margaret Mayall attended the Tenth General Assembly of the International Astronomical Union, which was held in Moscow, August 12-20, 1958. She outlined the work of the Assembly and the work of the Variable Star Commission, of which she is a member. She pointed out the high regard the astronomers of the world hold for the AAVSO, and their public announcement of the valuable work it is doing. She then took us on a tour of the Pulkova Observatory outside Leningrad, the Sternberg Institute in Moscow, and the new buildings of the Moscow University on the Lenin Hills, by means of colored slides.

Following Mrs. Mayall's talk,Newton Mayall showed color slides of their trip through Holland, Germany, Denmark, Norway, Sweden and Finland, then to Russia. He said that the slides would give a better picture of conditions in the areas of Leningrad and Moscow than any words. They showed vividly that Russia is vigorous, and that much change for the better has been wrought in raising the living standards of the people.

We regret that none of our AAVSO members from outside the U.S.A. were present at the Springfield meeting,but this was offset by those who attended for the first time or not for many years. We were glad to see the Walter Semerau's from Kenmore,New York, the Craycroft Wilson's from East Meadow, New York, the Carl Whittier's from Sharon, Mass.,the Diedrich's and Booth's from Ohio,and the Buckstaff's from Wisconsin. New members present were: Albert Ullmann, Forest Hills,New York, and Casper Hossfield, Ramsey, New Jersey. We were all happy to see Gunnar Darsenius from Sweden, even though via the color slide method. He always sends a paper to be read at our meetings, and we hope sometime he can be present in person. Margaret Mayall visited with Gunnar on her way to Moscow.

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VARIABLE COMMENTS, by Margaret W. Mayall

A light curve of o Ceti (Mira) was exhibited to show the recent broad maximum. The phenomenal rise of RS Ophiuchi after years of do-nothingness was discovered by Cyrus Fernald, and a half hour later by David Rosebrugh. The light curve was made possible by the good response to notices sent out in the midst of packing to leave for the IAU meeting in Moscow, the following day. Our director brought back with her the latest edition of the Russian Variable Star Catalogue, which is in two volumes. The Russians are to be praised for the timeliness of making copies available during the meeting of the IAU. The first volume is much the same as the previous catalogue, but with many additions. The second volume contains 20 tables cross-referencing the variables in every possible manner. This is an extremely valuable work. (ED.)

AFTER THE IGY, WHAT? by George Diedrich

As usual, George's paper is like the movies -- the title bears little resemblance to the context. However, as one might expect, he was laden with cards and appeals for more observers for his Nova Search program. Don't forget, it was Cy Fernald, an AAVSO'er, who made the first report in the recent rise of Nova RS Ophiuchi. (ED.)

SUNSPOTS ON THE SAME MERIDIAN, by Ralph N. Buckstaff

Sunspot groups have counterparts in the opposite hemisphere on the same meridian. The latitude, however, varies. Sometimes these twin groups come from the invisible side, others appear on the visible surface. Most of the group types are found in these combinations:

I. Like Pairs		II. J-Combination		III. A-Combination		IV. C-Combination	
A Groups	23	J-A Groups	26	A-C Groups	13	C-B Groups	5
B "	1	J-B "	8	A-D "	2	C-D "	2
C "	5	J-C "	15	A-E "	0	C-E "	0
D "	1	J-D "	2	A-F "	2	C-F "	0
E "	4	J-E "	3	A-G "	2	C-G "	0
F "	0	J-F "	1	A-H "	4	C-H "	1
G "	0	J-G "	0	A-B "	1		
H "	3	J-H "	11				
J "	24						
Total	61	Total	66	Total	24	Total	8

V. H-Combinations		VI. No Combinations	VII. Aging of Groups		VII, continued	
H-H Groups	3	A-F Groups	1 day	51	8 days	4
H-G "	1	A-E "	2 "	23	9 "	9
H-E "	1	J-G "	3 "	24	10 "	7
H-F "	0		4 "	19	11 "	1
H-D "	3		5 "	12	12 "	4
H-B "	4		6 "	8	13 "	1
Total	12		7 "	11	Total	174

In all, 2,139 groups were studied from Aug.1, 1949 to Aug.31, 1958. The sun's image was projected on Stonyhurst charts. Of the number of groups observed, 348 or 16.2% showed spot groups on the same longitude in both hemispheres. This 16.2% showed the same type of groups as follows: A's 23 pair; J's 24 pair; C's 5 pair; E's 4 pair; H's 3 pair; and B and D, one pair each. There were no pairs of F and G types. J-types were combined with others in this manner: J-A 26, J-B 8, J-C 15, J-D 2, J-E 3, J-F 1, J-H 11, and J-G none, making 66 different combinations.

We find the A's combined with these other groups: C 13 times, D 2, F 2, G 2, and H 4 times. C combined with B 5 times, D 2, and H once. There were no combinations of C with E, F, or G.

H combined with G and E once. D 3, and B 4 times. There was no pairing of any of these groups: A-E, C-E, C-F, C-G, H-F, or J-G. These paired groups lasted from one to 13 days. The greatest number, 51, lived but a day, 24 three days, and one C-J combination remained visible the longest time, 13 days.

I am wondering if there is a cause for this phenomena. Is there any physical connection between the spots beneath the photosphere? Or could it be magnetic currents travelling in the sun's chromosphere from one spot to a point on the same longitude in the other hemisphere causing another group? Could there be some law in solar Physics we know nothing about?

AURORA PHOTOGRAPHY AND SPECTROSCOPY, by Walter A. Feibelman

Since the start of the IGY there have been 21 aurorae visible from Pittsburgh, and considering the poor weather that prevailed for most of '58 so far, a good many others must have been missed. For the first 3 months of this year, for instance, there have not been more than a dozen clear nights. Fortunately one clear one was Feb.10/11 when a very extensive red aurora was seen. The first two slides were taken during this red display. The exposure was about 1 minute at f/2.9, using Super Anscochrome 120 size film. With today's fast films one might almost make the statement that a good tripod is more important than a good camera for aurora photography. Although these color photos look very spectacular, they do not quite represent what the eye sees. For red aurorae the match is much closer than for green displays. The green features tend to come out magenta on Anscochrome, whereas Ektachrome tends to be blue.

Although even the brightest displays need a time exposure of about a minute, it is better to use fast panchromatic black and white film, not to mention the price factor. I have found Royal X Pan film well suited for this purpose and I have obtained over 400 pictures so far. Except for unusually bright displays I have adopted a standard exposure time of 15 seconds at f/2.9. This is short enough to bring out brief auroral details yet long enough to give images of a great number of stars which appear untrailed. Two or three pictures taken half a minute apart often show a remarkable amount of change in position and form of aurora. You must be prepared to do your own developing with this film for most camera stores are not willing to accept this very fast film for developing. Eight to 10 minutes at 68°F generally does a good job in DK 60a. A stop bath MUST be used between developer and hypo, otherwise a slimy film will coat the negative. A 120 size negative can be enlarged to 5x7", but above that size graininess becomes too noticeable. Good results also can be obtained with Tri-X film, or Super Hypan, both of which are available in 35mm size. For maximum contrast on the prints use Kodabromide F4 or F5 paper. Correlation between SEA signals and aurorae has not been as frequent as would be desirable, but this is mainly the fault of the weather. Either one gets a clearcut 3+ SEA followed by a week of cloudy nights, or daily thunderstorms cause havoc with the 27kc signals but clear the air for aurorae, not to mention the moon.

Although aurorae generally follow certain patterns, it is always amazing to see how each display is different from the others,either in color,extent,shape or duration. Direct photography of aurorae turned out a lot easier than anticipated, therefore I decided to try to obtain some aurora spectra. It is well known that aurorae give bright line emission spectra and that the following 4 lines are the most common: the 5577Å green line of oxygen is by far the strongest and is always present, followed by the 6300-6364A doublet, also of oxygen, and the 3914A line of nitrogen.

A small spectrograph was constructed,using a transmission diffraction grating as dispersing element. At the far end of the long tube is a slit, consisting of two razor blades separated by 0.015". At the other end is a lens 20" from the slit. Directly in front of the lens is the grating, and outside of the enclosure a small 35mm camera is mounted. Also in the spectrograph are two photomultiplier tubes. The one on the right side has an independent telescope which focuses a portion of the integrated light of the aurora on the photocathode. The output of the phototube is measured by an external meter and thus a very sensitive exposure meter and monitor results. A little platform sticks out to the left of the tube to support a small camera. Some time ago I acquired a blazed grating, but by the perversity of nature no aurorae have occurred since, so that no really good spectra have been obtained yet, other than the ones showing just the 4 strong lines.

VARIATIONS IN RADIO ATMOSPHERICS, by Philip J. Del Vecchio

Some members of the Solar Division of the AAVSO are using relatively inexpensive radio receivers, operating on 27 kc/s, originated and developed by David Warshaw to record Sudden Enhancement of Atmospherics related to ionospheric disturbances caused by solar flares and possibly other solar phenomena. These enhancements are the results of an increase in the number and strength of radio atmospherics.

A commonly recorded phenomenon is the relatively sudden drop of the trace a short time before sunrise and usually called the "sunrise pattern." Depending on certain variables,such as the location of the major source of atmospherics,the height of the F_2 layer,the strength of the signals being received,and other unknown reasons, the sunrise drop can be negligible or it can drop almost the entire length of the chart.

Although the sunrise pattern was common knowledge to professional astronomers who had been operating similar equipment for many years,Harry Bondy was instrumental in bringing this phenomenon to the attention of amateur astronomers and particularly the Solar Division members of the AAVSO. In so doing he initiated curiosity as to its source and, more important, to two other closely related variations in the recorded trace near sunrise which he called the "dip" and "precursor hump." Although the time varies with the season of the year, the general average from the dip to the beginning of the true sunrise/drop is about 34 minutes. About 16 minutes after the dip and about 18 minutes before true sunrise drop the precursor hump appears. The times given above are average and can and do vary considerably from the averages.

One time I evolved a simple theory to account for these deviations. It was that at any stated time there is a certain height in the ionosphere from which optimum reflection of 27 kc/s radiation takes place; and that there is another height which would offer maximum absorption to this wavelength. These optimum heights would be created by the angle of the sun's rays upon successively lower and lower layers of the ionosphere as sunrise approached. The theory is difficult to prove or disprove without costly equipment and lengthy investigation,and in casting about for ways and means for a simple solution the following has occurred to me. At the time of ionospheric sunrise in the "D" layer directly above the observing station, the earth at the station is still in the twilight zone. The sun's radiation,however, is impinging on the area in which the "D" layer will be formed and in doing so, the rays subtend a certain angle with what is, for all intents and purposes, a relatively thin, almost horizontal band. As the sun's radiation reaches this band, it will begin to increase in electron density, forming the beginning of the "D" layer. However, as the earth rotates toward the sun, there will come a time when the parallel rays of the sun will subtend no angle at all with the narrow flat band above the observing station, and since the radiation will be in the same parallel plane as the "D" layer, less radiation will reach the band and the electron density will decrease.

Immediately thereafter, however, the angle which the sun's rays make with the potential "D" layer will begin to increase once again as the sun rises higher in the sky, and electron density will increase.

The situation created is relatively simple and easily understood. As the sun's radiation first strikes the potential "D" layer at an angle the electron density of this lowest layer increases and a drop in signal strength occurs at the receiver -- the "dip." Then as the earth rotates, the angle referred to becomes smaller and smaller until the rays are parallel with the "D" band, all the while accompanied by decreasing electron density, and the signal level rises to form the "precursor hump." Immediately thereafter the angle increases again in the opposite direction and the increased ionization brings about the permanent sunrise drop. (References: 1) Solar Flares and Atmospheric Noise, by King and Sullivan, Proceedings of the I.R.E., Jan'57; 2) AAVSO Solar Bulletin, Sept.Oct. 1957; 3) AAVSO Solar Bulletin, Jan. June 1958.)

PHOTOGRAPHIC OBSERVATIONS OF RS OPHIUCHI
by Margo Friedel and Andrea R. Kundsin

On July 15, 1958, the Maria Mitchell Observatory received notice that RS Ophiuchi, a recurrent nova which had previously attained maxima in 1898 and 1933 and which is usually an 11th magnitude object, had increased in brightness. Starting immediately and continuing over a period of 46 days, a series of single and multiple image plates was taken with the observatory's 7 1/2 inch Cooke Triplet telescope, using blue sensitive plates (Eastman Kodak 103 Ao). Multiple image exposures were taken on the majority of the plates with a minimum exposure time of 30 seconds, and a maximum exposure time of five minutes to ensure the nova's image on the plate in case of any sudden rise or decline in the star's magnitude. In addition a few single image plates were helpful.

From our magnitude estimates of the photographs based on the sequence given by Prager (H.B., No.912, 15, 1940) and the light curves of RS Ophiuchi at previous maxima, it was seen that the nova had already passed maximum at the time of the first photograph (JD 36400) when the mean magnitude of the estimates was 6.1. The magnitude of the nova continued to decline during the period of observation, reaching 10.4 on JD 36446. The shape of the light curve of this maximum and decline is similar to the published curves of earlier maxima. In addition to the photographic measurements, visual observations on JD 36402 showed the nova to be 6.2.

DETERMINING THE HEIGHTS OF AURORAL DISPLAYS, by Francis H. Reynolds

Dr. Carl W. Gartlein of the Physics Dept., Cornell University, has for some years been engaged in research work involving the aurora. One phase of the work involves a more accurate determination of the heights at which auroral displays occur. Dr. Berkey of Colgate University has been associated for a number of years with Dr. Gartlein in the auroral study. By means of cameras located in Ithaca and at Colgate University, they have been conducting a program of determination of heights of the displays, the heights being determined by a system of triangulation. However, their base line, from

Hamilton, N.Y. to Ithaca, N.Y., is only about 60 miles long, and the line is oriented practically southwest to northeast. Desiring a longer base line, and one oriented more nearly north and south, it was decided to locate identical cameras, one at Colgate University in Hamilton, N.Y., and the other at Clarkson College of Technology in Potsdam, New York. The two locations are approximately 133 miles apart. Also, a line drawn through these two locations runs much more nearly north and south than the line from Ithaca to Hamilton. Two identical cameras, fitted with f/1.2 lenses and a simple 2-leaved shutter, electrically actuated through a hand-held pushbutton control are used. The film cases will accommodate 100 ft. spools of 35mm Tri-X (or faster) film. Built into each film case is a motor-driven film advance device which after each exposure automatically advances the film one frame. This is accomplished when the operator releases the pushbutton control to close the camera shutter at the end of the exposure.

Each camera is also provided with a data box which contains a 24 hour dial watch, a film frame counter, and two sets of "grain of wheat" lamps, five lamps per set. Each set of lamps are wired to contacts on the sector plates of the two axes of the mounts and light up in various combinations dependent of the direction the camera points into the sky. By means of an optical train, the clock dial, lamps and counter are photographed on to a corner of each photo taken, thus recording permanently the time the picture was taken, the number of the picture and the position of the pointing of the camera. This eliminates much note-keeping and subsequent possible error.

THE REGULAR RED VARIABLES, by Thomas A. Cragg

In the AAVSO, more than 80% of the stars observed are "Mira type," or regular red variables. These stars are quite fundamental as they far outnumber any other single class of star listed in the Russian General Catalogue of Variable Stars. There are four general groups of stars included in the red variable class, M (Mira type); LP (long period), SR (semi-regular), and N (carbon stars). In the General Catalogue, 2,594 stars are listed in just the M class alone.

Without question, the fastest and easiest method of following these objects is visually by organized groups of amateurs with the proper charts and instruments. In general the magnitude range of these stars varies from less than one magnitude to about 10, in periods varying from around 100 days to 1,380 days in the case of Harvard Variable 10446. The "M" stars generally cluster around a period of 200 to 400 days, while the N stars generally cluster around 425 days.

By comparison with such objects as the U Geminorum type, R Coronae Borealis type, Z Camelopardalis type, and similar others, they are quite predictable. As a result, a number of people are of the opinion they are no longer worth watching. However, the facts of the matter are a little different. Of the 400 odd variables of this type covered in the AAVSO program, generally 3 to 5% of them are either one magnitude off the predicted curve or are 30 or more days out of phase with predictions each month! If the same relation exists with the rest of those which are not being so ardently watched, this would mean at least 125 M stars are going on some kind of caper each month! It certainly seems that in order to construct a satisfactory model of this very fundamental star we should have information on its irregular properties as well as the standard variation. Any model must certainly be flexible enough to encompass the observed deviations.

Another interesting item is the slowly changing period which can generally be found only after years of observing regularly. The best two current examples of changing period are R Hydrae and R Aquilae. The period of R Hydrae has decreased from 500 days to 400 in 280 years, while R Aquilae has dropped from 350 days to 300 in only 80 years. The chances are very good that T Cephei is doing the same thing, as it is currently running some forty days ahead of schedule and getting farther out.

The kind of variation exhibited by these stars generally falls into two main classes. The first kind generally have a rather sinusoidal type variation with a period of about 200 days, but as the period increases, a more and more prominent hump appears on the ascending branch of the curve, making the minimum sharp and narrow. The second kind is quite sinusoidal also, with a period of about 200 days, but as the period increases the rising branch becomes steeper and the minimum longer and flatter. Generally, the sharper the maximum the brighter the maximum with this group.

Of course, more stars can be added to the lists when more observers become available. One or two estimates per month on these stars is generally all that is necessary. Do you want to join the fun?

MAGNITUDE PEAKS OF THE SPUTNIKS, by Philip Seldon

At the Nantucket meeting I described one of the unusual facets of the magnitude variations of the Sputniks. This phenomenon was the almost instantaneous rise and fall of its brightness for a very short interval of time, two seconds or less. The next morning when we observed the rocket of Sputnik III from the roof of the Maria Mitchell Observatory, we noticed this phenomenon more pronounced for this satellite than for the other Sputniks. It occurred during the minimum of the cycle at the upper culmination point and at 30° multiples from this point. At these times when the rocket was almost invisible, its brightness increased over 5 magnitudes for an interval of about one second.

This summer of 1958 I have observed this phenomenon over 25 times. Also I have received reports of this phenomenon from many others, which confirms the fact that it occurs often and with some regularity. The amplitude of the peak varies from 5 to 7 magnitudes. The time interval is always less than 1.5 seconds for Sputnik III.

Some people have tried to explain the phenomenon by means of reflections from tail fins, mirrors mounted on the rocket, and so forth. Recently released photographs of the Sputnik I and II rockets do not show any evidence of tail fins or other objects protruding from the surface. In these photographs the rocket appears as a cylinder approximately 10 times longer than its diameter. The unusual feature is a bright spot on the side of the rocket, so bright that its image is overexposed on the film. This spot covers from 1/10th to 1/5th of the length of the rocket and appears to move along the side as the rocket rotates, and changes its orientation to the observer. The bright spot is the image of the sun on the side of the rocket and can be compared to the image of the sun in a pocket mirror.

A TEST OF THE SEEING, by Gunnar Darsenius

Many variable stars are close double stars (RU Peg, T Dra, DO Cep, UV Cet, etc.), and my experience is that on certain nights it is difficult to separate the components. Sometimes one doesn't know whether the air is so dusty or bright that it is darkened below the visibility border or whether warm airstreams are diffusing the star images. Every telescope maker knows very well the accuracy in testing mirrors with the Foucault shadow test. Try the same test with the telescope but instead of a pinhole in the cellar, use a bright star! Direct the telescope against the star and then remove the eyepiece. In the empty hole you will see the mirror of the objective brightly illuminated if the eye is in focus. Cut the rays with a razorblade and you will see the same shadows as you see in the cellar test, when the mirror is still spherical; that is, if the air is quiet and the mirror is correctly parabolized.

But seldom is the air so quiet as in the cellar. The shadows dance and move around. If one keeps a hand in front of the telescope it appears as a black shadow and the air currents from the heat of the hand are easily visible.

It is easy to understand that the air currents play an important role in disturbing the images of objects and it is very seldom one can enjoy fully the perfection of a good mirror. Of course the same test of the steadiness of the atmosphere can be done with a refractor as well as a reflector.

ASTRONOMICAL PRINTS, by Albert Ullmann

Many beautifully colored prints of old fashioned star charts and individual charts of the constellations were exhibited, and excited the interest of everyone in collecting such prints. The prints shown were collected in Paris bookshops. (ED.)

BRIGHTNESS AND MAGNITUDES OF SOME VERY BRIGHT STARS, by Herbert A. Luft

A new catalogue with magnitudes of the brightest stars was published a short while ago, based on measurements with the photoelectric photometer. (Sky and Telescope, August 1957, p. 470.) The new magnitudes are brighter than those given in the RHP (Revised Harvard Photometry) which is in general use. So, for instance, the magnitude for Vega is now 0.04 and for Arcturus -0.06, whereas the brightness of these two stars in the RHP are 0.24 and 0.14 respectively, and in the Potsdam Photometry 0.38 and 0.24.

FERNWOLD OBSERVATORY, by Cyrus F. Fernald

I have forgotten just when I decided to purchase a Cave 10" Astrola, and also just what I expected to be able to do with it. The first time that I used the new instrument convinced me that a prefix was necessary before the word "portable," -- that at most "semi-portable" only applied, and that for best results a permanent mounting in an observatory was advisable.

I was fortunate in having the example of Clint Ford's observatory and those illustrated in the various Amateur Telescope Making books to guide me in making what few plans were necessary. The inside dimensions of the observatory are 10' 5" wide, 15' 2" long. The side walls are built of cement block up to 3' 10" above the floor. The walls go down to a cement footing about 4' in the ground. The axis of the building is about 15 degrees west of north, to match our other buildings.

The roof and movable parts of the side walls are mounted on 4 wheels, 2 on each side. Two wheels on each side have worked very well, but if I had the job to do over, I think I would use 6 wheels. The track for the roof to slide on is a pair of 3" T-beams supported by the building sidewalls and 4 posts of 2" pipe. The effort needed to move the roof is surprisingly small. There are 2 doors, one in the center of the north wall, and the other in the west side of the south wall. To the east, in the south wall, there is a window that can be raised, which provides access to a desk for record keeping for both the Astrola and my 8' Springfield, which is about

7 feet south of the southeast corner of the observatory. The pier for the Cave is a section of 5" pipe set 4 feet in the ground equidistant from the west, north and east walls. We put a paper sleeve between the floor and the pipe, when the floor was poured, so there is no contact between the two. Eight months' use of the observatory through one of the severest winters we have had in a generation leaves me well satisfied that I have a building that will stand up and give good service for many years to come. There is little about it that I would change if I had the job to do over. The one improvement I would like to make is to replace the Cave with a Springfield mount, with a 10" or 12" mirror of about 70" focal length. Until the chance to make that change comes along, I think I have as good an observing outfit as a visual astronomer can hope to use effectively in the seeing that our Maine weather affords.

SOLAR PHOTOGRAPHY, by Walter J. Semerau

The amateur astronomer can produce some remarkable photographs when his camera is hitched to a telescope. Walter Semerau showed slides of beautiful equipment which he made to take pictures of the sun. He set himself the task of constructing an instrument to enable him to take pictures of solar prominences. In addition to that he has made a spectroheliograph. Many slides of his observatory attest to the quality of his instrumentation. His photographs of flares and spectrograms were remarkable, and worthy of a professional. (ED.)

S.E.A. SIDELIGHTS, by David D. Warshaw

A strange pre-sunrise dip and hump pattern is a curious sidelight of SEA recordings made during the past two years. These dips and humps have shown up in the recordings of a number of solar division members from widely divergent places. Harry Bondy, who tabulates SEA recordings for the Indirect Flare Detection Patrol and for publication by the National Bureau of Standards, was the first to notice the similar pattern of a dip and hump just before sunrise, in a number of tracings received from various members. Neither the High Altitude Observatory nor Edinburgh Observatory could explain this strange phenomenon -- so it became a challenge which stimulated further investigation. About 36 minutes before sunrise there is a dip in the traces, followed by the normal sunrise decline.

In an effort to solve the mystery of the pre-sunrise dip and hump, I feel there is a possibility that a narrow isolated D layer exists at a point about 50 miles above the earth where the sun's rays first penetrate that height. This area must contain almost the same concentration of electron density as that area of the actual D layer, located the same distance from the sunrise terminator, toward the sun. The parallel rays of the sun form a greater angle to this area than to the adjoining area. I believe it must be selectively illuminated and ionized because the sun's rays strike it at a greater angle to form a greater concentration of ionization than in its adjoining area -- for the same reason that there is a greater illumination at the equator than at its adjoining latitudes when the sun's rays strike the equator at a greater angle.

Perhaps in the future, some perceptive observer will discover the undisputed cause of this phenomenon and will be able to offer proof to support it. Another SEA sidelight is noticed when the first rainfall of charged raindrops strikes the aerial following a geomagnetic storm. The pattern of the atmospherics rapidly rise and falls every few seconds for the duration of the rainy weather overhead and completely obscures any solar flare SEAs. My records show a good example of this on Sept. 27, following the geomagnetic storm of Sept. 26, 1958. Still another SEA sidelight could be recorded at night, when a large solar flare occurs and cosmic ray protons strike the ionosphere a few minutes later. Dr. Ellison said he wanted all those recording SEAs to be looking for such a pattern, which shows up as a Sudden Decrease of Atmospherics, on the recorder. There have been only five 3+ solar flares since 1942 which have generated bursts of cosmic radiation and which were recorded on the earth by other methods. However, Dr. Ellison is very happy to have recorded on his SEA receiver the only one which occurred during the past nine years. That was on Feb. 23, 1956. (NOTE: An article describing Mr. Warshaw's revised circuit for his SEA receiver should appear in the December 1958 issue of Radio Electronics magazine. ED.)

RECORDING SUDDEN ENHANCEMENT OF ATMOSPHERICS, by Harry L. Bondy

A successfully operating network of stations recording Sudden Enhancement of Atmospherics on 27 kc/s has been established by the Solar Division AAVSO. Thanks to Mr. David Warshaw and his transistorized receiver for 27 kc/s noise, we now have 8 stations across the U.S.A. The stations record SEA for the U.S IGY program. These data are tabulated monthly and forwarded to the National Bureau of Standards IGY center in Boulder, Colorado. There they are processed with others on IBM cards, and eventually published. Copies of our reports are forwarded to the other 3 World IGY centers. A special summary is prepared by the Solar Division Chairman, who is coordinating and analyzing the results obtained. This special "SEA Circular" of the Solar Division is kindly reproduced by Mr. Del Vecchio, and it is mailed to our active members as well as to all professional observatories engaged in this study.

The results obtained with Warshaw's units are most heartening. In fact on several occasions our SEA Patrol apparently secured the only indirect flare available anywhere. The Solar Division AAVSO stations which operate successfully are as follows:

1.	David D. Warshaw	Brooklyn, New York	recording since Sept. 1956
2.	Walter A. Feibelman	Pittsburgh, Penna.	" May 1957
3.	Philip J. Del Vecchio	Paterson, New Jersey	" Aug 1957
4.	Val Isham - Denison	Powell, Ohio	" Oct 1957
5.	C. H. Hossfield	Ramsey, New Jersey	" July 1958
6.	Ralph N. Buckstaff	Oshkosh, Wisconsin	" July 1958
7.	Justin Ruhge,	China Lake, Calif.	" Aug. 1958
8.	Walter Scott Houston	Manhattan, Kansas	" Sept 1958

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