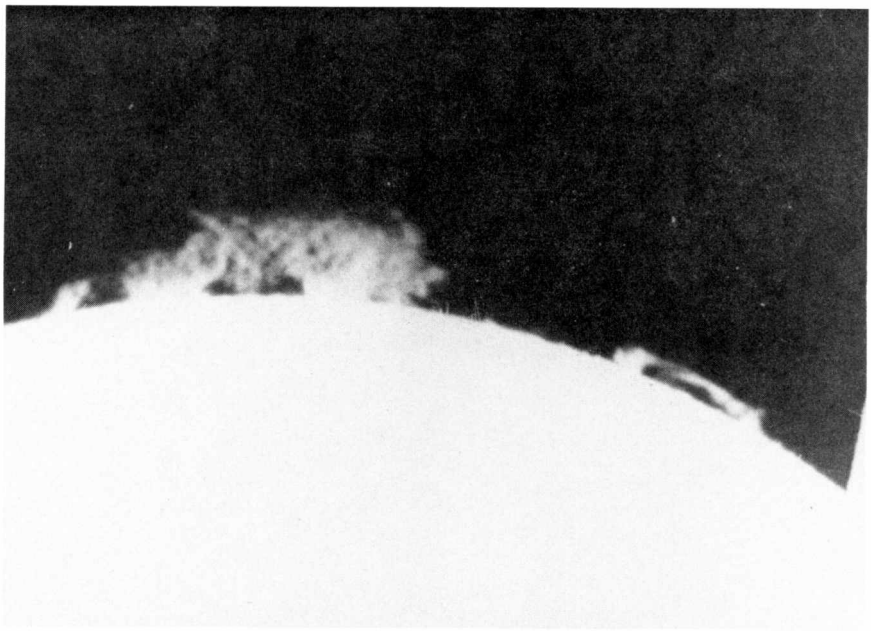
NATIONAL NEWSLETTER

June, 1984

Supplement to the JOURNAL OF THE ROYAL ASTRONOMICAL SOCIETY OF CANADA

Vol. 78, No. 3



Prominences line the limb of the Sun in this photograph taken April 27, 1984. An 8-inch catadioptric telescope with Technical Pan film 2415 shot at 1/15 second were used. *Photo by John Hicks*.

NATIONAL NEWSLETTER

June, 1984

Editor: RALPH CHOU
Associate Editors: IAN MCGREGOR, B. FRANKLYN SHINN
Assistant Editors: HARLAN CREIGHTON, P. JEDICKE
Press Liaison: AL WEIR

Redacteur pour les Centres français
DAMIEN LEMAY
477 ouest 15ième rue,
Rimouski, P.Q., G5L 5G1

Please submit all materials and communications to:

Dr. B. Ralph Chou
School of Optometry
University of Waterloo
Waterloo, Ontario
N2L 3G1.

Deadline is six weeks prior to month of issue

Stars and Schools: Ideas for Presenting Astronomy in a Grade School Classroom (Part II)

by David H. Levy
Jarnac Observatory, Tucson, Arizona
Kingston Centre

Editor's Note: In the last issue, David Levy discussed his experiences teaching astronomy to elementary school pupils. He described several classroom activities which he used successfully with children aged 7 to 12 years. In this concluding segment, he discusses observational activities and telescopes suitable for these students.

A Telescope for Children

What does a telescope have to do to arouse the interest of a child? Should it dance to music? Wear a happy face? Become sugar-coated? Act like a monster?

The idea of a telescope for children has been a concern of mine for some years. I remember my first telescope, a three inch reflector that I've kept through twenty observing seasons, and which works more effectively now than it did the day I got it. I remember, also, the indescribable feeling of wonder and anticipation when I first looked at what to me was a telescope mightier than Palomar. I could see then that the telescope, for all its simplicity, was not a toy but an instrument to be treated with respect.

In the 1980s there is a much greater variety of telescope types and sizes from which to choose. Educators are faced with such a cosmic sea of glass that they almost always make the wrong choice in purchasing a telescope for their young astronomers. I teach, and for a number of years I made wrong choice after wrong choice, until I started to realize that just as professional instruments are designed specifically for the needs of a research astronomer, a telescope should be planned just as carefully for the needs of his seven-year old counterpart.

Each year, my young astronomy students were treated to a different instrument from my telescope collection. We tried an eight-inch reflector, a small Schmidt-Cassegrain, a refractor, and even a plastic working model of the two-hundred-inch. All this time I watched their reactions, and it is from this experience that I developed Levy' s Five Commandments for selecting a classroom telescope. Keep in mind that I am concerned here with a telescope for the elementary school classroom. A private family might find some variations on these laws more suitable for their circumstances.

Commandment 1: Keep the design simple and basic. This limits us to a Newtonian reflector or a refractor.

Commandment 2: Children like bigness, so the telescope should be fairly large. Just as I realized that my first telescope was not a toy, children should not be offered something so small that it could be a substitute for a tricycle.

Commandment 3: The telescope should be one that will be set up often. This is really a corollary of the first commandment and is based on the fact that most schools cannot be expected to have a permanent observatory. Stated differently, the telescope cannot be too big. It must be small enough to be portable so that a teacher will set up often.

Commandment 4: Children must not have to strain or be lifted up to reach the eyepiece. They should feel that they have control of the instrument, that they can reach it and commune with it. We should be trying to make astronomy easy and inviting for children, so it is important that children are comfortable with their telescope.

Commandment 5: The telescope should be rugged enough to withstand a thermonuclear explosion of at least thirty megatons.

Naturally, a number of telescopes could satisfy these requirements. And if the school is fortunate enough to have more than one instrument, a second could satisfy more fully a different combination of these laws.

Considering the first three factors, you'll see that we really have very little freedom on telescope size. If it's smaller than three inches, a telescope violates the second law, and I've seen quite a number of 6″ f/8 reflectors that would violate the third. Combined with the first law, we're left with a compromise: a Newtonian reflector whose mirror is four inches in aperture. As an alternative, a three-inch refractor would do nicely if it were not so expensive!

With this in mind, I designed what could be an early step toward an ideal classroom telescope. Built by Constantine Papacosmas of Montreal, this is a four-inch f/10 reflector whose long focus emphasizes "nifty" views of the Moon and planets, gives adequate separation for the bright double stars, affords reasonable detail on clusters and bright galaxies, and still, with a low power eyepiece, can offer a good interpretation of a Milky Way star cloud.

The long focal length does involve a sacrifice of those richest field views we enjoy so much. I get around that by putting the finder to work! Why waste the possibilities of that perfectly adequate piggyback instrument? Accordingly, my finder is a peppy little twelve power 40 mm refractor that provides some stunning richest field views all by itself. The narrowness of the finder field limits its effectiveness as a finder – but remember that the whole instrument is to be used mostly for bright and easy-to-find objects.

The mounting is equatorial. I wanted it that way both for ease in keeping an object in the field and as an instructional aid. The tripod was adapted from an antique camera setup: it has an elevator bar in the middle, a feature which is most accommodating to Commandment 4 in that the eyepiece can be adjusted to each child's height. The rotating tube also helps that way. As a final touch, the equatorial shafts are made from bicycle pedals, although I hope that the children will not ride away with their enthusiasm!

And let's not forget one of the most important things – if this is a telescope with a personality, it simply has to have a name! I chose *Andromeda*, and when a child asks why, the door is open to the beautiful mythological story of several fall constellations.

The telescope is so light that I can take it out several times in the course of the day. With its appealing bright green color, Andromeda always attracts the attention of the children whether or not it is in use.

The Sun

"We can't do astronomy in school because the stars are out only at night."

Wrong!

Sometimes I have to explain to school administrators the same thing I so much enjoy telling children: "Every star is a sun, and our sun is a star." And for obvious reasons, the sun, for us on earth, is the most important star of all, and it can be observed safely! But first: do not look directly at the sun, not with your unaided eye, absolutely not with a pair of binoculars , and positively not with a telescope. In 5 seconds – blindness with binoculars may result. In 0.2 seconds, blindness with a telescope will result.

Try this experiment. Focus the telescope on the sun. Take a piece of a plastic garbage bag. Say to the kids: "Say that this is your eye and you are about to look through the telescope at the sun." Then place the bag at the focal point of the telescope's eyepiece, where the rays are smallest – normally about an inch or two away from the eyepiece. The bag should ignite within 2 or 3 seconds. It should burn quickly enough that you can "carve" your childrens' names right in the bag. To project the sun's image, simply let the rays travel through the instrument and out through the eyepiece . Let them strike a piece of white cardboard, preferably at the bottom of a box to keep out stray light. An image from 6 to 18 inches across is ideal to view what sunspots and bright spots (faculae) may be present on a given day. Be watchful, keep the children on the opposite side of the telescope from the eyepiece, and never leave the telescope unattended.

Keeping the children on the opposite side is a natural thing to do if you use the projection method. This is preferable to looking through a filtered telescope for two reasons: 1. It keeps the children a respectful distance from the eyepiece, and 2. It permits everyone to see a very large (1 foot or more in diameter) image of the projected sun at once, thereby enabling you to finish the session quickly and repeat it often. Why repeat? Because the sun is an active, churning, seething furnace which produces sunspots that change shape, size and position every day. Especially when the sun is active, as it was in 1979–80, the children will be able to observe changes quickly, massively and frequently. And remember to point out that the larger sunspots you may see are huge magnetic storms on the sun, possibly larger than the earth itself!

Perhaps the most satisfying feeling comes at the end of a long night session with the children. When finally the last and most inquisitive nine-year old has asked her last question and has gone off to bed, and all that's left is me and my telescope, I raise the elevator as high as it will go. The optical performance is good enough so that I now can begin a peaceful hour with observing variables, observing made even more satisfying with a thought that one of those little children may grow up to become a better astronomer than I'll ever be. And Andromeda – the children's telescope – may have provided that child with her very first cosmic view. Those thoughts make me smile.

Photos Needed

The *National Newsletter* is looking for some interesting photographs suitable for printing on our front cover or within the newsletter itself. Photographs could be of current activities of members or Centres, interesting telescopes or equipment, recent observations, or historical topics. Black-and-white prints are preferred over colour slides but slides can be submitted. Please include descriptive captions. If requested, submissions will be returned when no longer needed but otherwise they will be given to the Society's Archives. Contributions should be sent to the Editor (see Masthead for address).

An Astronomy and Space Science Report from the U.S.S.R.

by Ken McBride
Toronto Centre

In a recent edition of its weekly "Science and Engineering" program, Radio Moscow reported a couple of items of potential interest to Society members.

They proudly proclaimed that Yuri Gagarmn, the first man to orbit the Earth, would have been fifty years old on March 9. Gagarin, who was described in the report as "a man of principle ... frank and straightforward, a good mixer, and exceptionally considerate" (what else?), died in a plane crash in 1968.

The program also mentioned the U.S.S.R. Astronomy and Geodesy Society, a rough analog of the R.A.S.C. It is reported to have 8200 regular members, over 2000 youth members, plus 425 of what are termed "collective" members. The Society, which recently celebrated its fiftieth birthday, co-produces (with the U.S.S.R. Academy of Sciences) a popular publication called *The Earth and the Universe*. If you are interested in finding out more about the Society (and maybe attracting the attention of your local KGB agent) you can write to *The Earth and the Universe* at 21 Povsosvnsky Street, Moscow, 103717. (Yes, they even have zip codes now.) Bizarre, isn't it?

Finally, a Salyut 7 space station update. The twelfth spacecraft to visit the station in its two years in orbit has started three cosmonauts on what will no doubt be another marathon mission. Not much has been said about the two cosmonauts who hold the current record of 211 days in orbit, but no doubt they have spent the past year or so recovering from their ordeal. As for the current Salyut occupants, their automatic supply ship Progress 19 successfully docked in February and replenished the station's consumables.

Any members interested in listening in on "Science and Engineering" can find it on Radio Moscow on Thursdays at 8:45 pm. One of the most reliable shortwave frequencies is 9.70 Megahertz (in the 31 metre band), but you can also find Radio Moscow on a dozen other frequencies in the 16, 19, 25, 41, and 49 metre bands.

Astronomy in Canada

by Steven Morris
Calgary Centre

The National Research Council of Canada has recently published a report entitled "Astronomy in Canada in the 1980s", which outlines the problems and opportunities for Canada in the coming decade. This report is especially interesting in that it outlines many specific recommendations (about 60 in all) that the N.R.C. and the universities should follow to maintain and improve the position of the Canadian astronomical community.

On reviewing this document, I am particularly impressed by the importance attached to instrumentation. One of the two most urgently stressed recommendations is that "the Canadian Long Baseline Array receive the highest priority from N.R.C. for major new astronomical instrumentation", not only because of the potential for science but because Canadian industry would become a strengthened resource if hired to develop and provide new forms of high technology. The other recommendation urged in part that "the Canada-France-Hawaii Telescope should always have state-of-the-art instruments and adequate data pre-processing facilities". The preamble to a third recommendation noted that "since advances in detector design proceed at a rapid pace, it is essential that Canadian astronomers be engaged in research development of these devices". The spin-offs to industry may be important but they won't be cheap: the last recommendation would have an estimated annual operating cost of one million dollars, and the first one, eight million dollars.

The coming bottleneck in computer facilities was a second theme that many recommendations touched on. More and more telescopes are generating digital data and images requiring computer processing. It will be a waste of effort if each research group has to develop its own software, and many institutions could not handle the volume of computation. One recommendation is that "an astronomical image processing centre be established as a national facility, to provide data handling and image post-processing leadership and services for Canadian astronomers". A second recommendation is that "N.S.E.R.C. take into consideration the needs of observing astronomers and theoreticians for machines of both the VAX and CRAY types", and a third noting specifically that "modern image processing facilities should be made available to the Ottawa River Solar Observatory" to fully exploit the wealth of data it is generating.

Finally, the feast-or-famine employment picture was reviewed. In the 1990s, large numbers of

scientists hired in the 1960s will be retiring, and the next "baby boomlet" will hit the universities. The current unavailability of employment is driving many recent astronomy graduates into other fields. Several recommendations advocated continued hiring and training in anticipation ofthese future needs.

Government reports don't always generate government action. However, high-tech is rapidly becoming a by-word for Canada's industrial future, and the promise of spin-offs and state-of-the-art projects may find increased favour. Even if only a few projects (such as Starlab or another Hawaiian telescope) ever materialize, they will still signal a healthy prospect for Canadian astronomy.

Reprinted from *The Starseeker*

Projet d'observation de la dichotomie de Venus

par Marc Gélinas
Société d'astronomie de Montréal – S.R.A.C.

Introduction

Ce projet visait à vérifier la véracité de ce phénomène connu sous le nom d'effet Schroeter et qui réduit le pourcentage d'éclairement de Vénus par rapport à sa valeur théorique. Ceci est particulièrement visible lors de la dichotomie (50% eclairée). J'ai demandé l'aide des amateurs du pays pour obtenir le plus de dates possibles où la dichotomie serait observée.

Resultats

J'ai reçu dix rapports. La date la plus hâtive était le 5,3 juin T.U. et la plus tardive le 17,1. Les 8 et 12 juin étaient mentionnés deux fois et les 6, 7, 9 et 13 juin une seule fois. La moyenne donne le 9,8 juin T.U. comme résultat avec un écart-type de 3,4 jours. Puisque la date théorique était le 16,3 juin, cela veut dire que nos observateurs ont en moyenne vu la dichotomie 6,5 ± 3,4 j. avant cette date. Je trouve le résultat concluant et positif pour ce qui est du but de l'expérience.

Explication du phénomène

Une perte de luminosité le long du terminateur ferait paraître la phase plus faible qu'elle ne doit et expliquerait la chose. La raison de cette perte de luminosité pourrait avoir une cause photochimique. Les nuages vénusiens sont formés de gouttelettes d'acide sulfurique H_2S0_4. Elles seraient créées de la façon suivante: les rayons ultra-violets (UV) du Soleil décomposent le gaz carbonique CO_2 de l'atmosphère en CO + O. Cet atome d'oxygène O se combine alors à des hydrogènes H qui arrivent du vent solaire et donne de l'eau H_2O.

On trouve aussi du carbonyle de soufre qui est décomposé par les UV en CO + S (soufre). Les "S" se recombineront à des "O" provenant de la première réaction et donneront finalement du SO_3. Le SO_3 + H_20 donnera du H_2SO_4, c'est à dire les nuages.

On voit que la quantité d'acide sulfurique est liée à l'intensité du rayonnement UV. Or près du terminateur l'angle rasant des rayons solaires réduit les UV et on doit s'attendre à y trouver des sommets nuageux moms élevés. Les astronomes Crisp et Young ont trouvé des évidences spectroscopiques montrant que les sommets nuageux sont plus bas côté nuit de Vénus que côté jour.

Imaginons selon ce sécario une pente descendantes de sommets nuageux qui débute côté jour pas très loin du terminateur et qui finit côté nuit. Cette pente se comportera comme le côté ouest d'une montagne au soleil levant et projettera une ombre. Le long du terminateur il y aura une zone d'ombre qui réduira la proportion du disque qui serait normalement éclairé. La phase semblera moindre. Ainsi lorsque Vénus est dans une phase décroissante (élongation du soir) on observera la dichotomie avant la date théorique mais après cette date pour une phase croissant (élongation du matin).

Conclusion

Grâce à ces résultats on peut conclure qu'il semble y avoir une réelle perte de luminosité le long du terminateur de Vénus car les observations tendent à montrer que la dichotomie a eu lieu AVANT la date prévue en juin 1983.

Une seconde conclusion qui s'impose est que les amateurs utilisant des techniques simples peuvent faire un travail sérieux et profitable en astronomie.

Abstract
As a result of my article in the April 1983 *National Newsletter* (Venus? Hmmm ... , fifty-fifty/La Mi-Venus, p. L28–L29) I received ten observations of Venus at dichotomy. The earliest observation was on June 5.3 UT, and the latest on June 17.1. The mean date was June 9.8, with a standard deviation of 3.4 days. This finding is 6.5 days before the theoretical date of June 16.3.

The discrepancy between the observed and predicted dates may be due to a difference in the altitude of the top of the Venusian cloud layer between the daylit and night sides. At the terminator obliquely incident rays from the sun cast a shadow of the higher illuminated clouds on the night side, making the phase apparently smaller. Thus in waning phase, dichotomy would occur before the predicted date, and after the predicted date for waxing phase. This can be verified at every elongation of Venus.

Fiction to Fact

by Philip Mozel
Toronto Centre

No longer are only the storied heroes of science fiction confronting space-borne perils. It is we who face a similar situation now. For while it is to be hoped that space is used for beneficial, or even recreational purposes, this may not turn out to be so. Reality is indeed overtaking science fiction.

For example, those who say that the orbital dog fights in Star Wars are just fantasy may soon be proven wrong. "Space Fighter Planned by U.S. to Match Soviets" read the headline in a recent *Globe & Mail*. The story described U.S. Air Force plans for a small military version of the Space Shuttle which could reach orbit after being launched from the back of a rocket powered 747. The weapon has been described euphemistically as a "space sortie system." The report stated that the system will be the responsibility of a new division of the Air Force, the "Space Command" which "hopes to have an operational space fleet by the end of the decade." The name Space Command is itself reminiscent of a similarly named CBC science fiction TV show of the 1950's (starring James Doohan, alias Scotty, of *Star Trek* fame). The term "Battlestar" has also been bandied about in the press (remember *Battlestar Galactica*?). How long will it be before we begin speaking of operational Death Stars? Even NORAD (the North American Air Defense Command) has undergone a name change to North American Aerospace Defense Command.

The present shuttle system has a military aspect too, of course, for the Air Force both supports and uses the programme and is developing its own facilities. Indeed, it was Air Force requirements which in part delayed the shuttle's development. The Jet Propulsion Laboratory has also taken on a military aspect. Its new director is a former chief of staff of the Air Force and for the first time it has agreed to undertake classified research.

Not all science fiction-come-true is sinister, however. For example, in Arthur C. Clarke's short story, "The Wind From the Sun," a yacht race to the moon is held. The motive power is radiation pressure from the sun acting on huge solar sails extended from small spacecraft. The French are now promoting an unmanned version of the race with the finish line being occultation of the spacecraft by the moon. It is estimated that such a feat could be accomplished with no more expense involved than that for a major yacht race on Earth. Examples from many other fields, such as medicine, art, communications and computers could be cited also.

It would indeed be tragic if man were to foul space with terrestrial violence rather than exploiting it for his benefit and pleasure. While both the American and Russian space programmes have always had a high level of political motivation, they have entered a dangerous new phase. With killer satellites, lasers and particle beam weapons being developed, I wonder if this is the true space race with the winner claiming sole possession of the so-called "high ground." While the United Nations prohibits nuclear weapons in space, it can apparently do nothing about these other forms of destruction.

It is naive to think of the problem of defense in simplistic terms. One-sided disarmament is feared as an invitation to destruction or conquest, but will the ages-old dream of world domination be realized by a nation holding a sword of Damocles above the atmosphere?

Such speculations must especially make us, as observers of the sky, feel a sense of trespass for we have derived great pleasure from studying a universe only lately touched by the creations of men. Not very long ago it was only in the mind's eye that objects other than the moon circled the Earth. Now, on any clear night, we can see the rapidly moving lights that denote passing spacecraft. We must work to ensure that in the future none are equipped to rain destruction onto Earth; else then the heavens will have truly been perverted for the profit of hell.

Reprinted from *'Scope*

Relative Sunspot Number

by Carl Savage
Calgary Centre

Making daily sunspot counts can be a very simple and valuable endeavour for us amateur astronomers. But before I go on, I must warn you never to look at the sun through a telescope unless the telescope has a filter that can fit on the objective side of your telescope. The type of filter that fits on the eyepiece end of the telescope should not be used, because the heat at the eypiece may cause it to crack and cause eye damage. But if you can't afford one of these objective-type filters, you can still use the projection method. Projection is very simple and cheap: first you take a piece of cardboard about 30cm square and with the telescope pointing at the sun you hold the cardboard about 30 cm away from the eyepiece. Now it is just a matter of focusing the telescope so the image of the sun is sharp and clear.

To make your daily sunspot counts, it is necessary not only to count the number of spots but also the groups these spots are in. For example, there are 3 groups and 7 spots in Figure 1.

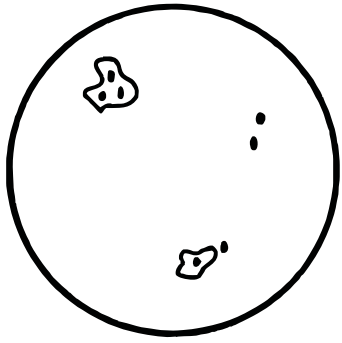


Figure 1

But it is not just counting the spots and their groups: you must also take other things into account. It was Rudolf Wolf (1816–1893), a Swiss astronomer, who proposed that sunspot numbers and the number of groups the spots are in can be combined in such a way that the groups represent 10 times (10×) the intensity of a single spot on the surface of the sun. So now not only do you count the numbers of spots and their groups, but you must also multiply the number of groups by ten and add on the number of spots. So the formula would look like this: $RSN = (N_g \times 10) + N_s$, where N_g is the number of groups and N_s is the number of spots. While you are counting the spots and groups, it is

important to count the single spots as one group if they appear not to be associated with any other groups on the sun. Also, these types of groups must be counted as a spot too. To show you what I mean, here are two examples:

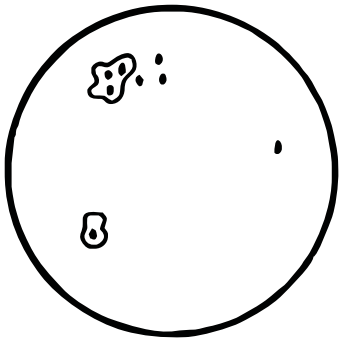


Figure 2

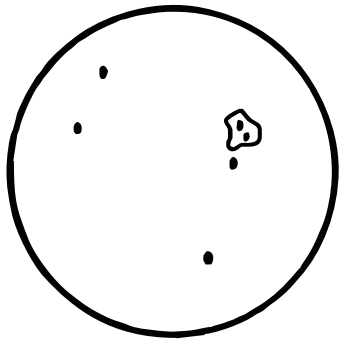


Figure 3

In Figure 2 you can see 3 groups of spots and 8 spots, so your Relative Spot Number for that day is RSN = (3 × 10) + 8 or RSN = 38, whereas in Figure 3 there are 4 groups and 6 spots, so RSN = (4 × 10) + 6 or RSN = 46.

But there is an obvious problem when you are comparing the RSN of a 15 cm (6 inch) telescope and, say, that of a 6 cm (2.4 inch) telescope. Not only is the aperture a determining factor when making a comparison with another RSN for that day, but other factors include the experience of the observer, the method used and the time and weather condition. So there were some accepted values made up, based on a telescope used at the Zurich Observatory in Switzerland for their sunspot counts. This telescope is 8 cm (3.15 inches) with a 110 cm (43 inch) focal length. Because this telescope is used to set worldwide standards, a factor must be adopted by each of you would-be spot counters to bring your estimates to within the values determined by the Zurich telescope. This factor (k), once determined, is multiplied by the value you have already determined, so the formula now looks like this: $RSN = ((N_g \times 10) + N_s) \times k$.

Here is how to find out your factor (k). First, make one month's worth of spot counts. Then you can compare your observations with others by checking in astronomical journals. The magazine *Sky and Telescope* publishes daily sunspot counts made from the results of the A.A.V.S.O. Solar Division and the Zurich Observatory, but these counts come out three months later. So if you do your counts in July you must wait for October's *Sky and Telescope* to come out. When you compare your RSN with those in the magazine, you may find your RSN a bit higher or lower. So you must adjust your factor (k) up or down. In summary, here is how to make your daily sunspot count:

1 Always make your count at the same time of day with the same telescope and with the same eyepiece.
2 Count the number of groups with a low power eyepiece and then with a high power eyepiece count the number of spots.
3 Now, using the RSN formula ($RSN = ((N_g \times 10) + N_s) \times k$) find your RSN value for that day and record it on paper.
4 At the end of the month, send a copy of your RSN for that month to:

Peter O. Taylor
American Sunspot Numbers
11 Fayette Drive
Ocean Ridge
Florida 33435
U.S.A.

Across the R.A.S.C.

by Peter Jedicke
Assistant Editor

VANCOUVER: 45 persons attended the Vancouver Centre's annual dinner meeting at the "Victoria Station." It was the 3rd year that the meeting had been held at the same location. Dr. Michael Ovendon was the guest speaker. Also, Centre President David Dodge and his wife Joanne recently added a second baby boy, Spencer, to their family. It seems another generation of potential R.A.S.C. members is on the way!

MONTREAL: Mrs. Betty Pride is the editor of the Montreal Centre's newsletter *Skyward* which has been produced bimonthly of late, with the assistance of Centre President Stew Marshall. Centre members Alister Ling and Garry Boyle were watching for the March 25 occultation of a 9th magnitude star by Saturn, but they were watching from downtown Montreal, which made it impossible to see the dim star.

ST. JOHN'S: Some ten members drove out to Upper Gullies, about 35 km outside of St. John's, on the night of Saturday, March 17, for an observing session. The site for the session is also the location of father-and-son-team Nelson and David Newburry's 25 cm telescope project. Centre members are taking a rest this year from their award-winning television efforts on local Cable TV. Peter Kent is still working on his 25 cm telescope, and Dora Russell has recently finished a novel about life in Newfoundland.

OTTAWA: University of Ottawa Physics Professor, Dr. Y. Varshni, spoke at the recent Ottawa Centre meeting in Room 3001 of the National Research Council's beautiful building on Sussex Drive. The topic of his talk was "Quasars," and Dr. Varshni outlined an alternative interpretation of quasars' peculiar spectra, suggesting that the spectra are not red-shifted lines of familiar elements, but rather unknown other elements not red-shifted. Thus, Dr. Varshni concluded, the quasars may not be cosmologically distant objects at all, but relatively nearby.

SASKATOON: On March 19, the Saskatoon Centre hosted Tony Whyte of the Edmonton Centre, as the first half of a speaker exchange between the two centres. Tony told the members of his trip to Indonesia for the solar eclipse in June, 1983. The Saskatoon Centre holds its meetings on the 3rd Monday of each month in the Health Sciences Building at the University of Saskatchewan.

WINDSOR: Windsor-native Michael O. Best was the speaker at the Windsor Centre's regular meeting in Room 312 of St. Clair College on Tuesday, March 27. Mr. Best is Science Editor for the *Detroit News*, one of Detroit's two major newspapers, and is also involved in the Livonia Astronomical Society. He spoke about UFO's, and focussed on the political response to many years of UFO reports in the United States, and suggested that the FBI and CIA often take active steps to suppress such reports.

TORONTO: Congratulations to Randy Attwood, the Centre's President, and Betty Robinson, the *'Scope* newsletter editor, who were married in April. Jack Newton of the Victoria Centre was a recent visitor at a Centre meeting. He showed about 70 of his most recent slides taken with his 20-inch telescope using cold camera techniques, some with new 1000 ASA film. The pictures were stunningly beautiful. Several members are very close to completing the requirements for the Society's Messier Certificate and hope to have their observations completed this summer. Centre meetings during July and August will be held on Thursdays instead of the usual Friday nights.

Please send Centre newsletters and late items describing the activities of R.A.S.C. Centres and members to Peter Jedicke, 810–1297 Huron Street, London, Ontario, Canada, N5Y 4L9. Centres should also delegate one member to call late items in during the last few days of the second month prior to upcoming issue of the *National Newsletter*. The number to call is (519) 455-5907. You may call late at night, when the rates go down.

The Edmonton and Kingston Centres have new addresses for all correspondence, effective immediately:

R.A.S.C. Edmonton Centre
Edmonton Space Sciences Centre
11211–142 Street
Edmonton, Alberta
T5M 4A1

R.A.S.C. Kingston Centre
P.O. Box 1793
Kingston, Ontario
K7L 5J6

Telescope Eyepiece Field in Arc and Time

by Fr. Lucien J. Kemble
Calgary Centre

The area of sky seen through an eyepiece of given focal length varies according to the aperture and focal length of the telescope on which the eyepiece is used. Determination of this field for one's specific telescope-eyepiece combination can quite easily be made and has many practical applications.

Field in degrees, minutes and seconds of arc is found by aiming the 'scope at a bright star on or near the equator (motor off), letting the star drift across the field, and timing the passage to the nearest second of time. This time in right ascension at the equator translates into arc measurements as follows: 1^h in right ascension (R.A.) = 15°; 1^m = 15′; 1^s = 15″. Knowing the visual diameter becomes useful in making rough estimates of distance between objects in the eyepiece.

Field diameter in units of time in R.A. is more difficult to determine, since it increases from equator to pole, i.e. an eyepiece covering 15′ of arc at the equator spans 1 min. of R.A., but much more at increased positions of declination. How can one tabulate an R.A. field diameter for a given declination? And for what purpose?

First of all, the purpose. In tracking down deep sky objects, one finds in the catalogues and lists frequent descriptions such as this: e.g. "faint galaxy 2.5 min. in R.A. W, 3′ N." Knowing where to look for a faint object that may or may not be in one's field is half the battle. The "3′ N" bit is easy if one knows the arc diameter of one's eyepiece, as described above. The "2.5 min. in R.A." becomes tougher, depending on the declination at which one is observing.

Now for the "how to." There probably is a very neat, simple trigonometric function formula, or computer program for calculation of such data, but I was unable to find the former and do not have the latter. And I'm sure most amateurs are in the same fix. But not to worry. I tackled the problem and solved it quickly in one short evening's session at the 'scope recently, when full moon precluded faint galaxy hunting anyway. And, in the process, I gained some good, practical "eyes-on" experience of sky geometry. The process was done for both of my best, working eyepieces, Meade orthoscopic research-grade: 28mm (on the 11-inch Celestron telescope, giving 100×, and a field of 23.4′ of arc) and 16.8mm (166.6× and a field of 15′ of arc). Timings were made on stars at 5′ Dec. intervals from the equator to +80°. The results, plotted large-scale on grid paper, produced two lovely, smooth curves, showing fields for the eyepieces, respectively, from 1.56^m to 9.66^m and from 1^m to 5.38^m of R.A. From these curves I can readily extrapolate my field diameter for any given declination. For immediate reference at the 'scope I have typed a list of tabulated values and glued it to the inside cover of my well-used copy of the *Revised New General Catalogue* from which I regularly take observational data.

I find it especially useful in my present ongoing project of observing and drawing all the circumpolar galaxies I can find, and in crowded galaxy fields such as those now appearing in our spring skies in Virgo, Coma and Ursa Major, wherein identification of several galaxies in the same area can be made.

I would appreciate hearing from someone who knows of the mathematical formulae involved, for use on a pocket calculator.

Reprinted from *The Starseeker*

An Observing Night in Chatham

by M.E. Flegel
London Centre

I'm not generally known as an observer. My strengths in astronomy have always been worrying about introducing the next speaker or sitting in armchairs thinking up stories such as this. I am not saying that I am totally ignorant of observing altogether, it's just done very infrequently and with large groups of people using their equipment.

This past year a few London Centre members, including me, formed the Chatham-Kent Astronomy Club. It has turned out fairly successful; we've reached 25 members and enthusiasm is high. We hold regular observing nights at least once a month, usually east of Chatham at the home of Rene Van Goethem. This past November 12 was just such an observing night, the Saturday after our regular meeting. The skies out Rene's way are fairly dark, although that night they would be marred by haze and incoming clouds. I showed up later than anyone else and as I turned into the driveway, I noticed that all the equipment that had been set up in his backyard was left unattended. It was about 9:30 p.m. and, since everyone had been observing for about an hour already in the sub-zero weather, they were taking a coffee break. Mike Marchand, our Secretary-Treasurer, was holding what looked like two telephoto lenses for his camera. I asked him what he paid for them (I like to get down to brass tacks in a hurry) and he said $525.00. That was a lot for two telephoto lenses, I thought, but when he explained that they were two eyepieces I was aghast. How could two eyepieces possibly be worth that much money? He said they were cabled "Naglers" and handed me the larger of the two, the 13mm., and I immediately noticed the weight and craftsmanship that went into it. Weighing about half a kilogram the most impressive visible feature was its aperture, an 82° apparent field of view. I then wondered if I would get a chance to test it, considering the haze, dew and fast-approaching cloudcover.

Mike had to leave for work then, but said I could use the eyepiece if the opportunity arose. About half an hour later we bundled up and headed outside to see what we could salvage in the way of observing. Jim Lucyk's impressive 17½-inch Dobsonian stood out among the rest of the equipment, but he walked right by it for his 8-inch Celestron. When questioned about this, he said that he had left the finderscope for the 17½-inch at home and that he was too angry about it to even bother with the scope. He said I could do with it what I liked, so I ran back into Rene's house and retrieved the Nagler eyepieces from the basement. I walked back outside, pulled the 13 mm. out of its case and was pleased to see that the dew had completely disappeared from both the eyepiece and the telescope mirror. Securing it onto the eyepiece holder was a little different than the average eyepiece. This one goes 'over' the holder and is held in place by two tightening screws. The 82° apparent field practically swallowed my eye, as I focused the image for my first glimpse. It took the full distance of the focusing knob to bring the stars to a point and I was instantly delighted with the brightness and clarity of the star images.

I quickly came across a lovely open star cluster and commented on this, but Jim didn't think that was surprising, since that area in southern Orion is full of these. I had viewed open star clusters through the 17½-inch before and I wasn't particularly overwhelmed by the difference this eyepiece made, in spite of the excellent images. I realized that without a finderscope, a neophyte such as I might not be altogether successful in locating specific objects. However, Orion was low in the southeast at this time, so I thought I might be able to find M42 just by pointing and hunting. I moved the telescope a bit and a large object passed through the field of view. Backtracking a little, it slowly moved into view and I could hardly believed my eyes! It was definitely the Great Nebula in Orion, but not as I had ever seen it before. It filled the entire 82° field of view, its gaseous arms billowing out from the centre, where the

four stars of the Trapezium burned intensely. Its low altitude in the sky and the terrible haze had robbed it of most of its colour, but the variations in gray, white and silver were breathtaking. I pulled myself up off the ground and realized my compatriots had gathered around to see what had elicited my shrieks of surprise and delight. Even through the haze, which was slowly giving way to clouds, the sight of this great nebula, produced through Mike's wonderful new toy, left everyone awestruck. Few would now disapprove of his extravagance. After the clouds had prematurely terminated the enjoyment of our newfound discovery, we headed back inside for more coffee, to discuss each person's interpretation of what we had just witnessed.

Looking back, I know this isn't anything that hundreds of other amateurs haven't already seen, but being sheltered behind my library of books and wondering about meeting agendas, it takes events like this to bring everything back into perspective.

Notes from Abroad

by B.R. Chou
Editor

Michael Boschat of Halifax Centre has been corresponding with an amateur astronomer in the German Democratic Republic. Dietmar Boehme is an active variable star observer who would like to contact North American observers and exchange photoelectric photometry observations and publications. His address is Dietmar Boebme, DDR-4851 , Nessa 11, PF 93.

Astroclub Hesperos in Avignon, France held its annual meeting in the town of Les Angles on June 15–17. The theme of the meeting was "Astronomy through the ages," and featured working models of ancient astronomical instruments. The group was privileged to have as its special guest the French astronaut J.-L. Chretien.

At the sixth National Encounter of Venezuelan Amateur Astronomers, held on 20 November 1983 in Merida City, a new national amateur organization was formed. The Liga Venezolana de Aficionados a la Astronomia (LIVAA) will promote astronomy in Venezuela, and represent Venezuelan amateur astronomers internationally. The organization produces both a monthly newsletter and a bimonthly bulletin *Nuestro Cielo*. The Venezuelan League would like to correspond with other amateur groups and exchange publications. Their address is LIVAA, c/o Miss Zaida Main, Secretary, Apdo. 264, Merida 5101A, Venezuela.

The meeting on active galactic nuclei which was to be held in Trieste, Italy in September 1984 (see *NNL* April 1984, p. L23) has been postponed to 10–13 April 1985. The amended program will cover structure and evolution of active galactic nuclei. Information requests should be directed to the address given in the April issue.

Dr. Kennedy O'Brien, President of the International Union of Amateur Aitronomers (I.U.A.A.) recently announced that the I.U.A.A. has endorsed the International Halley Watch as the principal co-ordinating agency for observations of Comet Halley. The I.U.A.A. is looking for volunteers to fill two administrative positions: History Commissioner, and Regional Councillor for North America. Interested individuals should contact Dr. O'Brien at Box 3993, Station C, Ottawa, Ontario K1Y 4P2 for more information.

Preparations are under way in the United Kingdom to observe National Astronomy Week from 9 to 16 November 1985. Organized to mark the return of Comet Halley, the event will involve amateur and professional astronomers and organizations throughout the U.K. The program of events includes special public meetings, lectures, displays, planetarium shows and open days at professional observatories. Telescope demonstrations and star parties are also planned.

The Astronomical League in the U.S. is considering the organization of expeditions to South America in April 1986 to observe Comet Halley. Sites under consideration include LaPaz (Bolivia), Maccu Picchu (Peru), and other locations in Chile and Eduador. Details will be presented at the Astronomical League's 1984 National Convention at Milwaukee in August.

Sun Line Cruises recently announced plans for special Comet Halley cruises in 1986. The *Stella Solaris* will take comet watchers up the Amazon River in January, while the *Stella Oceanis* will sail through the southern Caribbean and up the Orinoco River in March.

The Halifax Planetarium

by Pat Kelly
Halifax Centre

Although not as visible as Saint Mary's observatory, the Halifax Planetarium provides a large number of people with an introduction to the night sky of Nova Scotia.

Originally, the planetarium was located in the former Nova Scotia Museum on Spring Garden Road. When the new museum was built on Summer Street, the planetarium was put into storage as the only area in the new building which had a ceiling high enough to hold the dome, was the main exhibit area, and it was felt that this space could be put to better use.

Fortunately, a search was started to find a new home for the planetarium, and one was found when Dalhousie University closed off one end of the main corridor in the James Dunn Building which provided a light-proofroom in which to house it. It should be noted that despite the very high ceilings in the Dunn Building, a large section of the tiles still had to be removed in order to accommodate the dome! The dome is made out of cloth which is suspended in a metal framework. It has a diameter of about 7 metres and allows seating room for about 30 people.

The heart of any planetarium is the projector, and in the case of the Halifax Planetarium, it takes the form of a Spitz Model A-1 . Despite the fact that it was built back in 1950, it is an impressive instrument. The projector is set up much like an equatorial mounting in that it has a "polar axis" with the star projector on one end and the planet projectors on the other. Rotation about this axis simulates the motion of the sky during the course of the night or from season to season; while the axis can be rotated to show the sky as it appears from as far south as –70 degrees latitude.

The star projector is made out of metal plates which form a dodecahedron. Images of stars from magnitudes 2 to 4, as well as the Andromeda Galaxy and the Praesepe cluster are produced by holes of different sizes. To produce sharp images of first magnitude stars, lenses are used. In addition, tiny slides mounted in lenses around the "globe" are used to produce the Milky Way and the Magellanic Clouds, and if desired, colored circles can be used to show the position of the sun at the solstices and equinoxes. A freely hung cylinder ensures that the light from the main bulb shines only on the top half of the "globe," as one usually does not want stars all over the floor!

Separate projectors are provided for the planets, the sun and the moon (which can be shown in 14 different phases). These are all equipped with ingeniously simple mercury switches so that they are only visible when above the horizon. These can be positioned fairly accurately with a right ascension and declination grid which can be projected onto the dome. In conjunction with a projector for the north-south meridian this grid is used to "align" the sky for a given date and time. Two clusters of blue and orange lights are used to mimic sunrise and sunset. The main projector is supplemented by slides which can be projected onto the center of the dome. Last but not least is an "arrow" flashlight which is used to point out the objects and constellations being discussed.

Although public shows are given once a month, most of the roughly 4000 people who attend the shows are school groups, scouts, guides, etc. In conclusion, although the Halifax Planetarium is not as big as others in Canada, the live narration allows for a dialogue between the operator and the audience and it is this that makes the Halifax Planetarium a valuable educational resource.

Reprinted from *Nova Notes*

Mt. Kobau Star Party

The Okanagan Astronomical Society invites you to attend the Mt. Kobau Star Party this August 23–27, during new moon. Mt. Kobau offers fine, dark skies in the dry B.C. interior. Twenty years ago it was selected as the site for a 4-metre weather road to the observatory's intended location at 6107 feet. This is where the star party will be held. While we cannot offer a 4-metre instrument, there will be a 0.5 metre (the Victoria RASC Centre's 20″). OAS members are bringing 17.5″ and 13.1″Dobsonians and other

large telescopes are expected. We hope your telescope will be there as well, whatever its aperture. The oustanding opportunities afforded by this combination of large instruments and an excellent dark sky will be protected by a complete ban of all lights during the six hours of darkness, except for dim red flashlights.

The Mt. Kobau Star Party will include a telescope-making competition (the chief judge will be Mr. Leo Vander Byl of Victoria); an astrophotography competition judged by Mr. Jack Newton, also of Victoria; a Saturday swap table; and special twilight talks by Mr. Newton and Dr. Tom Landecker, an astronomer at the Dominion Radio Astrophysical Observatory (DRAO). There will be time available for you to speak on Thursday and Sunday evenings. All of these events will take place on the mountain between 6 p.m. and 9:45 p.m. Tours of DRAO will be given Sunday from 2 to 5 p.m.

The summit offers only very spartan facilities . There will be electrical power, a large awning for shelter, and privies. There is no water – you must carry your own. Thus accommodation will be in the resort village of Osoyoos, 17 miles away and a mile lower in altitude. There are numerous campgrounds and motels along the warm waters of Osoyoos Lake to choose from. In addition to the beaches on its chain of lakes, the Okanagan Valley offers scenic drives and many tourist attractions.

Commercial exhibitors are welcome and encouraged but will have to provide their own exhibit space such as a van, motorhome, or tent.

Please register early if possible, so that we know how many to plan for the registration fee is $18 for one person, $35 for two, and $40 for a family. Detailed brochures on the star party and accommodations in Osoyoos will be sent on request.

For information and registration forms, please write to

Mrs. Jackie Warrington,
Site 16 Comp 30, RR# 1,
Winfield, British Columbia V0H 2C0

New Educational Materials from A S P

The Astronomical Society of the Pacific (A.S.P.) has introduced more items of interest to amateur astronomers.

The "Quasars Packet" is a collection of non-technical articles which describe observations and interpretations of these remarkable objects. There is also an extensive bibliography. The cost of the information packet is US $2.00, postage and handling included.

The "Astronomers of the Past" slide set portrays 50 astronomers from the time of Copernicus to the 20th century. The portraits, taken from public and private archives, depict the scientists at the time when they did their most significant work. A booklet containing biographical notes and a bibliography is included. The cost of the slide set is US $37.95 in North America, US $40.95 outside North America.

"Worlds in Comparison" is a set of 15 slides which compare spacecraft and radar images of various solar system objects. A detailed booklet giving characteristics of each object and explaining the significance of each comparison is included. The price is US $14.95.

All of these materials can be ordered by writing to The Astronomical Society of the Pacific, 1290 24th Avenue, San Francisco, California 94122.

Comet News

by Chris Spratt
Victoria Centre

Amateur comet watchers planning to contribute observations to the International Halley Watch should obtain a copy of the amateur observer's manual as soon as possible. The full title is *The International Halley Watch Amateur Observers' Manual for Scientific Comet Studies* by Stephen J. Edberg. The version available from the Superintendent of Documents, US Government Printing Office, Dept. 33,

Washington DC 20402, USA, has been printed in two parts. Part I, *Methods*, is a descriptive how-to-do-it version – stock number 033-000-00888-1. Part II, *Ephemeris and Star Charts*, includes a daily ephemeris, star charts showing the path of Halley's comet over a six-month period, and lists of standard and calibration stars – stock number 033-000-00889-9. Each part costs US $5.65. Those who plan to contribute to the IHW should purchase both parts.

Enslow Publishers, Bloy Street and Ramsay Avenue, Box 777, Hillside NJ 07205, and Sky Publishing Corp., 49 Bay State Rd., Cambridge MA 02238-1290 offer the same book in a single volume. This printing also contains the Halley observing conditions and illustrations from Yeoman's *Comet Halley Handbook*. The price is US $9.95.

The Observer Index form in the book should be sent to IHV Amateur Co-ordinator Stephen Edberg as soon as possible.

Observations must be reported on duplicates of the report form found in the amateur manual. Photographic and spectroscopic observation reports should be submitted with duplicate slides or contact prints. In the US and Canada reports should be submitted to the Volunteer Recorders, who will submit the data to the IHW Lead Centre.

Reprinted from *Skynews Victoria*

Telescopes and Canada Customs

R.A.S.C member P.M. Preston of Brantford, Ontario, sent this letter from Customs and Excise, which speaks for itself.

Dear Mr. Preston:

This is further to your letter of September 11, 1982, addressed to my attention, concerning the Department's policy on the tariff classification of astronomical telescopes. Please accept my apologies for not answering your concerns earlier, because of circumstances and a change in my own area of responsibilities. I have enclosed a copy of your letter.

Tariff item 46203-1 provides for free entry of astronomical telescopes. The difficulty that Customs has had in administering this tariff item stems from the definition of astronomical telescopes offered in Tariff Board Reference No. 156. In the reference, astronomical telescopes were described as those which provide an inverted image. Terrestrial telescopes and astronomical telescopes were differentiated from each other, for duty purposes, largely on the grounds of whether or not the final image was inverted. This position was challenged by telescope retailers and by members of the Royal Astronomical Society of Canada.

My predecessor, Ms. Kate Humpage, thoroughly researched this problem and spoke to a number of experts in the field, among them Dr. Ian Halliday of the R.A.S.C. She concluded, and I agree totally with her conclusions, that the criterion that the image received be inverted is meaningless in determining whether a telescope is astronomical or terrestrial.

To this end, I have issued instructions to regional personnel that astronomical telescopes are to be interpreted as those primarily designed and marked for use in astronomy (regardless of whether or not these provide an inverted image). The astronomical telescopes admissible under tariff item 46203-1 must meet the lens and minor size provisions within the tariff item.

A Departmental D-Memorandum on astronomical telescopes shall be published in due course. I shall be pleased to send you a copy.

Yours truly
Tom Kobolak,
Tariff Policy Administrator,
Agriculture & Transportation,
Tariff Programs,
Customs and Excise