NATIONAL NEWSLETTER

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An Invitation to attend the

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See you there!

NATIONAL NEWSLETTER

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Deadline for August issue is June 1.

Eclipse Weather: The March 1988 Total Solar Eclipse

by Jay Anderson
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Mr. Anderson, a meteorologist with the Pacific Weather Centre, has provided a copy of a paper to be published as part of the U.S. Naval Observatory's circular for the March 17-18, 1988 eclipse of the sun. The path of totality for this eclipse runs from the Indian Ocean to the Gulf of Alaska with the major land masses crossed by the eclipse being Indonesia and the Philippines. This eclipse is in the same saros cycle as the March 7, 1970 eclipse of the sun which crossed the eastern coast of North America. Maximum duration of totality is 3 minutes 46 seconds.

On the twentieth of June an eclipse of the sun began at eleven o'clock, and at thirteen minutes after twelve, it was so far eclipsed, that it could not be seen at all. It seemed as if it were night and the stars were seen in the sky, so that we were forced to light candles in order to eat; for there was a dinner that afternoon, on the occasion of a certain feast. As far as I know, this eclipse was not seen in Nueva Espana: it is the most complete one that I have ever seen, though I have seen many.

–Papeles de los Jesuitas, 1628-1629

The unknown Jesuit who penned that description from Manila was blessed with clear skies and an excellent view on that lucky June day in 1629, though appetite seems to have overcome curiosity for some members of the order. As the moon's shadow returns to southeast Asia for the third time in five years, weather prospects for 1988 appear equally promising at many locations.

Broad Scale Weather Patterns along the Eclipse Track

In March, the main position of the earth's weather "equator," the Intertropical Convergence Zone (ITCZ), lies to the south of the eclipse track, across southern Sumatra and southern Borneo (Figure 1). The ITCZ marks the point at which air masses from the north and south hemispheres collide, giving rise to the deep convective clouds and heavy showers that are typically associated with tropical weather.

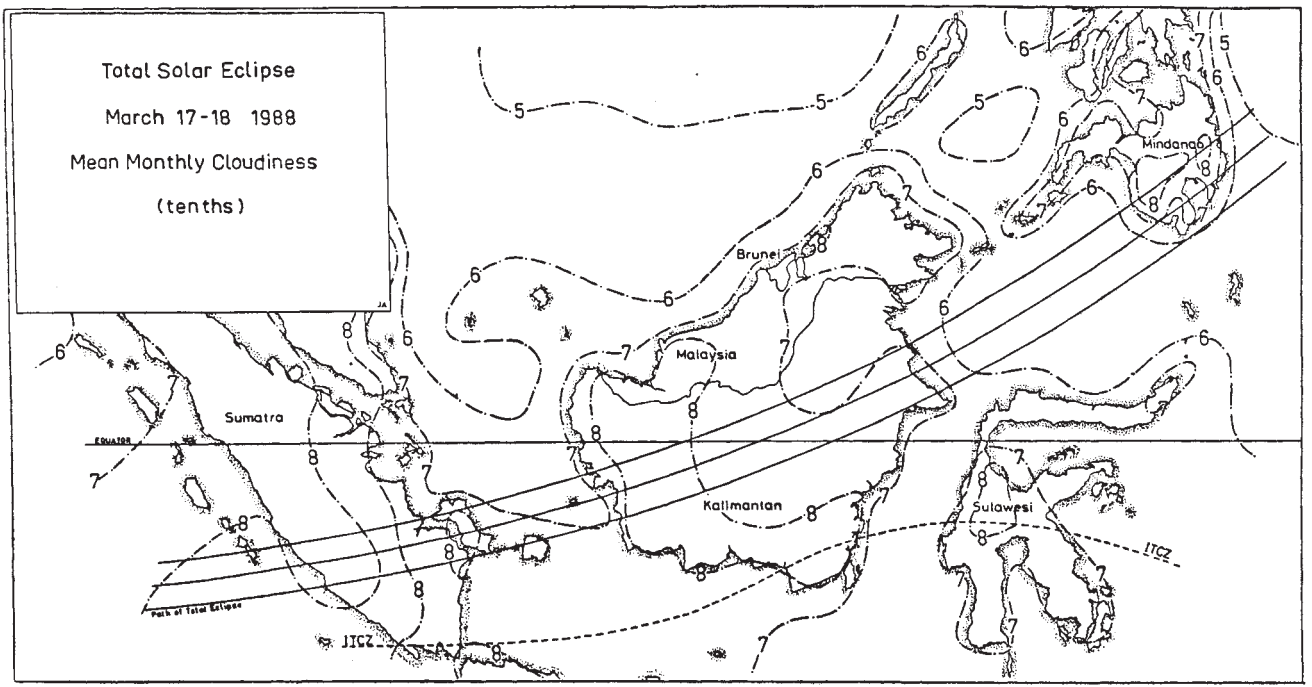

Figure 1. Mean Monthly Cloudiness in Tenths for Daylight Hours. Contours over water are adjusted to follow mean daily (24 hour) cloud amounts. ITCZ refers to the mean March position of the Intertropical Convergence Zone.

The ITCZ reaches its most southerly position in January or February, and by March, is beginning to move northward with the sun. The zone is very disorganized, with considerable day-to-day oscillation in its position and variation in its associated weather conditions.

North of the ITCZ, the Northeast Monsoon winds take hold, carrying dry Asiatic air (which has been considerably moistened by its passage over water) into the Philippines. These winds bring the dry season to much of Mindanao, particularly where mountains block the steady flow of the wind.

Still farther north along the eclipse track, where equatorial climates give way to more temperate weather, the Northeast Monsoon winds are replaced by the North Pacific Trades. At eclipse time, the trades are likely to be found over the northern Philippines, and along the ocean track to about 20 degrees north latitude.

Between 20 and 40 degrees north, the moon's shadow crosses the Subtropical High, with its light winds and sunny skies, and then moves into the regime of the temperate zone westerlies which affect much of the North American continent. Migrating Pacific lows embedded in these westerlies bring frequent storms and cold blustery weather, making the area south of the Aleutian Islands the cloudiest along the shadow's path.

The Weather in Detail

CLOUDINESS: The early portion of the eclipse track, over Sumatra and southern Borneo, lies close to the mean position of the ITCZ and tends to be cloudier than other over-land parts of the track (Figure 1). In general, daytime cloud cover varies between 70 and 90 percent over Sumatra and Kalimantan (southern Borneo), with considerable variation due to terrain and water influences. Because one particular statistic does not necessarily give a reliable comparison of the prospects from one point to another (due in part to variations in observing routines from one place to another), Table 1 lists four measures of cloudiness for stations along the path of the eclipse. Column 6 is mapped in Figure 1; columns 7, 8, and 9 offer additional information which may make the choice of an observing site more definite.

One location along the path of totality stands out as the most likely to experience sunny skies. This is at General Santos, where the moon's shadow first crosses onto the Philippine island of Mindanao. At this point, the track is well away from the main position of the ITCZ, and is affected by the dry Northeast Monsoon winds. General Santos is one of the driest locations in the Philippines, and in March, it is at the height of its dry season.

A good part of the dry and sunny weather at this location is due to the terrain. General Santos is surrounded by mountains on the east, north, and west sides, and is open to the sea on the south. The mountains wring the moisture from the prevailing northerly monsoon, and the downslope flow on their lee side adds to the drying of the airmass. General Santos is exposed to southerly winds for only about four percent of the hours during March.

Statistics for Tarakan, on the east coast of Borneo, suggest that the coast may also be a good site for viewing the eclipse although access could be a problem.

In general, clouds tend to be less over water than over land, since it is daytime heating of the ground that leads to the development of the cumulus cloud so common in this area. For those who wish to observe from ships, the portion of the eclipse track over the Celebes Sea, or to the east of the Philippines, seems most promising (Figure 2).

TROPICAL CYCLONES: Known as typhoons if they are severe enough, tropical cyclones are common in the waters surrounding the Philippines, with a mean annual frequency of about 20. Fortunately, March is the month in which tropical storms are least likely to occur, and Mindanao is well away from the usual track. The probability that one would interfere with observations on land is very low, though over-water observers east of the Philippines would have to keep a casual lookout for them.

TEMPERATURE: Mean daytime highs over Indonesia and the Philippines are generally in the low 30's Celsius. Cooler temperatures will be found at higher altitudes, falling at a rate of about 0.6 degrees Celsius per hundred metres of ascent. Nighttime temperatures are also very similar along the land portion of the eclipse track, with morning lows ranging through the low 20's at sea level sites. Further north, temperatures range gradually downward, reaching freezing point off Alaska.

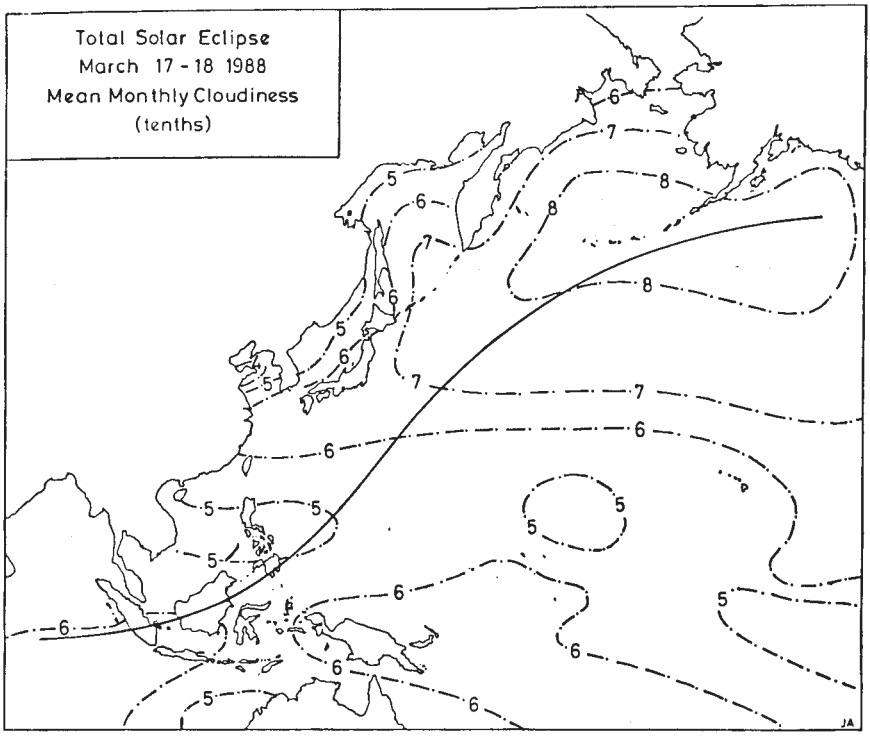

Figure 2. Mean Monthly Cloudiness in Tenths Over Water. Cloud amounts are based on the 24 hour mean for the month. The continuous line represents the centre line of the eclipse.

HUMIDITY: The discomfort associated with high humidities is likely to be the most telling aspect of tropical weather for those not acclimatized to it. Columns 4 and 5 in Table 1 list the relative humidity in the morning and again in the early afternoon for most sites. A value of 70% with a temperature of 30 degrees Celsius would be very humid by northern hemisphere standards, comparable to the muggy airmasses from the Gulf of Mexico which often cover the southeastern United States in summer months. AS with temperature, drier air is found at higher altitudes, especially in the Philippines.

VISIBILITY: Visibilities are usually good over equatorial portions of the eclipse track, though morning fog is not uncommon in interior valleys, where colder air pools overnight but dissipates by 9 am (after the eclipse). Fog can also occur when stratiform cloud piles up against rising terrain, and eclipse observers will have to select higher sites with care to avoid upslope winds. Haze can be a problem over Borneo, if the season is very dry, but otherwise should not hinder eclipse observations.

The frequency of foggy conditions increases as the eclipse track passes the latitude of Japan, reaching a 15% frequency of less than five kilometres visibility south of the Aleutians.

WINDS: Winds blow almost monotonously from northerly directions across the Philippines, but tend to become more westerly in regions close to the ITCZ. Islands and mountains will deflect the winds so that they blow parallel to the coast or mountain axis. Wind speeds tend to be light, except in storms. Land and sea breezes are very common near the coast, but should not be well-established at the morning eclipse time.

TABLE 1
CLIMATOLOGICAL PARAMETERS ALONG THE ECLIPSE TRACK

	Parameter									
Station	1	2	3	4	5	6	7	8	9	10
					Indonesia (Sumatra)					
Bengkulu	—	32	22	96	66	74	4.4	0.7	—	W
Palembang	17	32	23	96	67	74	4.2	0.5	0.7	N
Pangkalpinang	16	31	24	95	71	82	3.5	2.2	1.3	N
Tandjungpandan	—	29	23	83	—	—	—	2.6	4.3	—
					lndonesia (Java)					
Jakarta	16	31	24	93	67	81	4.1	—	—	W
					Indonesia (Kalimantan)					
Balilpapan	17	31	24	93	75	76	4.4	3.5	6.6	N
Tarakan	19	31	24	95	73	70	—	3.7	19.8	N
					Singapore					
Singapore	11	31	23	95	68	83	6.3	—	—	NE
					Philippines (Mindanao)					
General Santos	5	34	22	73	58	69	—	16.4	25.9	—
Davao City	7	32	22	81	63	79		8.8	4.8	N
Francisco Bangoy	—	32	22	78	—	—	—	7.8	4.8	N

1. Mean number of days with measurable precipitation in March.
2. Mean daily high temperature for March (degrees Celsius).
3. Mean daily low temperature for March (degrees Celsius).
4. Mean relative humidity at 7-8 pm local time for March.
5. Mean relative humidity at 1-2 pm for March.
6. Mean daytime cloudiness for March in %.
7. Mean daily sunshine (hours/day) for March.
8. Mean number of days in month with less than 3/10ths cloud, cover and visibility greater than 10km (ie. sunny with no fog) at or near eclipse time (morning hours).
9. Same as 8, but for evening or overnight hours.
10. Most common wind direction for month at eclipse time.

Note: this is a shortened list from the document prepared by Mr. Anderson. Stations in italics are in the path of totality.

North of the trade wind belt, winds become more variable and increase in strength. At temperate latitudes, winds will depend on the pressure pattern on eclipse day, though northerlies are slightly more frequent than other directions at Alaskan stations.

Selecting the Eclipse Site

From the meterological viewpoint, a tropical eclipse is a nighttime event, in that the clouds which form and dissipate follow a pattern that is driven by falling surface temperatures. The changes that occur as the eclipse progresses may be extremely rapid, and it is unlikely that the prevailing conditions at the start of the eclipse will be those dominant at the end, unless it is clear.

The most common type of cloud across the tropical portions of the eclipse is cumuliform, which builds rapidly as the ground is heated during the morning. This type of cloud will tend to dissipate at

some point between first and second contact. Stratiform cloud may form as the cumulus dissipates, though in general the eclipse cooling would appear to be of too short a duration to allow an extensive cloud cover to grow. The exception is where the winds are blowing upslope, for then the additional influence of cooling by lifting of the airmass comes into play, and certain hilly locations may suddenly deteriorate just before totality.

To assess the importance of the various influences, it is advisable to monitor the weather conditions in the mornings and evenings prior to eclipse day. Night is, after all, a form of solar eclipse, and the behaviour of the clouds as temperatures fall may provide valuable clues for site selection.

If cumulus clouds dissipate early, likely before the sun has even set, then the prospects for eclipse day are favourable, providing no change in the overall condition occurs. Keep watch over nearby hills before the light disappears, to see where stratiform cloud forms most quickly, and then avoid those locations on eclipse day. If darkness comes too quickly, it may be necessary to visit the site and observe the cloud conditions, or even hold a star party.

Morning conditions (at sunrise) will also give an indication of cloud prone areas, though the 12 hours of cooling overnight will build more extensive cloud cover than the one or two hours of cooling associated with an eclipse. Nevertheless, early risers may obtain valuable clues on which areas to avoid. Both Tarakan and General Santos have a history of clearing skies overnight.

Observations should be made of the low clouds, since middle and upper clouds are much less influenced by the eclipse cooling. The presence of considerable high level cloudiness at eclipse time would be cause for some concern. Being able to recognize the general types of cloud will aid in assessment of the viewing site. Topographic maps could also be useful.

Watch the direction that the clouds move to ascertain the direction of the winds above the surface. Since winds are relatively light, it may take some time to see the motion (a telescope will help here). Once cloud directions have been determined, position yourself so that the winds are blowing downhill toward you for the eclipse. It is usual for winds below 1500 metres to blow from the east or northeast over Mindanao, so that westward facing slopes would be most favoured.

Summary

The equatorial regions of the earth have a deserved reputation for sunny days, and with careful planning, it is likely that the eclipse can be successfully viewed from many locations. Philippine sites have a history of sunnier weather than those in Indonesia, but local terrain may have the most important influence on the cloud. The favourable skies that graced the Jesuits 357 years ago are likely to awe modern viewers again in 1988.

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In Memoriam: Tom Tothill (1921-1987)

Many members will be saddened to learn of the death of Tom Tothill of the Vancouver Centre in January. Prior to moving to Vancouver in 1973, he had been very active with the Ottawa Centre where he had chaired the Observers' Group, edited *Astronotes*, and helped build the centre's 16-inch telescope. During this time he built his own telescope and won a prize for it at the annual Stellafane conference in Vermont. In Vancouver, he became *Nova* editor, eventually centre president, and successfully instigated a telescope project for the centre.

Tom initiated a move in the late 1960s to create a national newsletter for the society, and his dream came true when the *National Newsletter* appeared.

Teacher, enthusiastic observer, builder, leader, and friend, Tom will be missed by many.

Across the R.A.S.C.

by Betty Robinson
Assistant Editor

CALGARY: In January, the Calgary Centre hosted a public lecture featuring Michael Watson's audiovisual presentation, "South of Capricorn." The lecture was well-attended.

VICTORIA: Members of the centre had a chance to mingle with Vancouver Centre members at a tour of the Dominion Astrophysical Observatory in December. Asteroid 3034 has been named for Victoria Council member, Dr. John Climenhaga. Dr. Climenhaga has been a centre member for a long time and has held many offices (including president). The asteroid, discovered September 24, 1917, was named on the occasion of Dr. Climenhaga's 70th birthday. Congratulations Dr. Climenhaga!

EDMONTON: At the end of November, the centre held its most successful observing session of the year, with more than 20 observers present at the Blackfoot staging area. There will be a change in council executive with President Bob Carson retiring after his two year term.

MONTREAL: National President Mary Grey visited the centre in early March. Dr. Hubert Reeves, Director of the French National Research Council, has been confirmed as the speaker for the Montreal Centre's annual Townsend Lecture in October. The Saturday Night Talks continue to be well-attended, varied, and enjoyed by members. The annual Christmas party, organized by Bill Strople was a success. At the party, Stew Marshall presented, as a Christmas gift, a picture of William Herschel's 20-foot reflecting telescope, printed from the original copper engraving of 1794.

TORONTO: The Toronto Centre continues its active public education interests with its television show, Astronomy Toronto, a city star party in early January, and monthly displays and talks at the Royal Ontario Museum. The General Assembly Organizing Committee has been busy finalizing details for this year's event in May. The telescope-making program, under Jack Winzer, started in January. The 10-session program filled immediately, and all attendees are delighted with the course and impressed with the instructor. A second course is already filled up and a waiting list is building for a third course.

OTTAWA: Doug George has assumed the editorship of *Astronotes* from Rolf Meier. The Novices' Workshops, started last autumn, are scheduled to continue throughout the winter and early spring. These monthly workshops are informal sessions for beginners interested in learning the basics of observing.

SASKATOON: For the January centre meeting, the public was also invited to view two films, Comet, and Satellites of the Sun. The Centre's 16-inch mirror has been partially repolished with about 50 hours more polishing required to complete it. There is now also a four-inch blank for a secondary mirror which is in the rough grinding stage. It is hoped the first set of optics will be ready by the spring.

NIAGARA: John Dekker has succeeded Charles Fassel as president. He reports that the mounting components for the centre's future observatory telescope have been delivered. Dennis Beach is working on the mounting, the steel for which was donated by Newman Brothers Limited in St. Catharmnes. There are also plans to order club jackets with a centre logo on them.

KITCHENER-WATERLOO: About 15 members of the Centre attended the Christmas dinner held at a local Swiss Chalet restaurant. The newsletter, *Pulsar*, is mostly computerized now, with some graphics produced on a Hewlett-Packard plotter and the text printed with a laser printer.

WINNIPEG: First Vice-President Guy Westcott is producing a series of short programs on the various aspects of astronomy, in association with VPW, the Videon public station. Two courses, one in astrophotography and the other on telescope equipment, are now being held at the Glenlea Observatory.

Across the R.A.S.C. is a regular feature of the *Newsletter*. Centre editors or secretaries should send newsletters and reports of centre activities to the *Newsletter* editor. Deadline for the August issue is June 1.

Beginners' Guide to Astrophotography
Part 1: Methods

by Bryce Heartwell
Edmonton Centre

Anyone can become a good astrophotographer. It is with this belief in mind that I hope to instill in some members the desire to attempt some of photography of their own. Astrophotography is really not as difficult as it appears, and in fact, one method only requires a camera and a tripod. Visual astronomy with naked-eye, binocular, or telescope is great and nothing can beat it but it can be very satisfying to look at a good photograph of some celestial object you have taken with your own equipment. The main ingredients are patience and practice.

In this article, I will discuss two of the main types of astrophotography. In future articles, the other two major types of astrophotography as well as polar alignment, and guiding will be reviewed.

There are four main types of astrophotography.

1. *Fixed*: This is the simplest method with only a camera and a tripod required.
2. *Piggyback*: This method uses a camera with a telephoto or wide-angle lens to take a photograph. The camera is either mounted "piggyback" on a telescope, or it is mounted on a tracking platform. The telescope, or tracking platform is then used to follow the object through the sky as the earth turns during the exposure.
3. *Prime Focus*: The optics of a telescope are used to gather light for the photograph. There are no optical devices such as eyepieces in the light path from the telescope objective to the film. A certain amount of skill that comes with practice is required for this method which is used for deep sky objects.
4. *Eyepiece Projection*: The optics of the telescope are again used to gather light but this time an eyepiece is inserted into the light path to magnify the image. Because high magnification is required to get enough image scale, vibration, poor seeing, poor focus, etc. can greatly affect the exposures and it is difficult to get good results. The moon and planets are principle targets.

Now let's look at the first two of these in greater detail.

1. FIXED PHOTOGRAPHY

Some uses of this method are photographing a) aurora b) star trails c) bright comets d) constellations e) planetary conjunctions and f) meteors.

Equipment required: a) camera with "time" exposure capability b) cable release c) camera tripod and d) film (fast colour or black and white).

Method

(1) Attach the camera to the tripod and the cable release to the camera, aim through the viewfinder, and centre the area of the sky to be photographed.
(2) "Stop down" the lens by one stop to reduce lens aberrations (faults) that can affect the photo.
(3) Focus the lens at infinity.
(4) Using the cable release, open and lock the shutter. Time the exposure.
(5) After the desired length of time, close the shutter and record the exposure information in a log book.

Note: If long exposures are to be taken, stop down the lens more than one stop to prevent the film from becoming sky fogged. Also, take exposures on a moonless night and from a dark sky location.

Advantages of fixed astrophotography method: a) relatively inexpensive because equipment investment is low b) easy to do c) wide sky fields can be photographed at one time d) polar alignment and guiding are not required.

Disadvantages of fixed astrophotography: a) If star trails are not wanted, the maximum exposure time is about 30 seconds with a 50 mm lens b) Small, faint objects cannot be photographed due to the image scale and limiting magnitude of the system

This method can be very effective for certain types of objects. It is very easy for the beginner because anyone with a 35 mm camera and a tripod just has to point the camera towards the sky and shoot.

2. PIGGYBACK PHOTOGRAPHY

Some uses of this method are for photographing a) constellations b) star clouds, clusters and nebulae c) comets d) Milky Way and e) meteors.

Equipment required: a) Tracking platform-manual or motor driven. A short focal length lens can be used on a manual platform but a motor is needed as well as possibly a guide scope if long focal lenses are used. b) Telescope with equatorial mount and drives c) Camera with time exposure capability. A camera with interchangeable lenses is desirable but not essential. A Schmidt camera can be used in place of a 35 mm camera to take wide-angle photos with very short exposure times. d) Drive corrector used to make guiding corrections during an exposure when a telescope or motor driven platform is used. Single or dual axis. e) Fast colour or black and white film. Colour slide film recommended. f) Wide-angle or telephoto lenses of good quality and as "fast" as possible (ie. low f-number). g) Illuminated reticle eyepiece and Barlow lens for the guide telescope to allow for accurate guiding.

Method:

(1) The telescope or platform is set up and polar aligned.
(2) Mount the camera on the platfonn or telescope. A telescope must be balanced for the drives to operate properly.
(3) Centre the object to be photographed in the camera viewfinder. Stop down a wide-angle lens by one stop and make sure the shutter speed is set to "time" or "bulb." Set the focus at infinity.
(4) Find a suitable guide star for the guide telescope and centre it in the illuminated reticle eyepiece. (Note: If a bright enough guide star is used, a normal eyepiece can be used in place of a reticle eyepiece if the star is put out of focus and its light disk is kept centred in the eyepiece field of view). A Barlow lens may also be used to increase the guiding magnification so that tracking errors are seen in the eyepiece before they show up on the film.
(5) Align the reticle lines in the guiding eyepiece to allow the motion of the guide star in declination to follow one set of parallel lines while motion in right ascension will follow the other set of lines. The type of correction needed is then easy to determine. Carefully adjust the brightness of the reticle lines so that they do not wash out the guide star.
(6) Using a cable release, open and lock the shutter. Guide on the guide star during the exposure and make corrections in right ascension and declination as required by using the drive corrector and/or manual slow motion control. After the desired length of time, close the shutter and record all information about the exposure in your log book.

Advantages of Piggyback Method: a) Long exposures can be made without star trails b) photography of faint objects possible c) Relatively easy to do because guiding is not too critical. (Guiding becomes more critical if longer focal length lenses are used). d) Wide fields of sky can be photographed.

Disadvantages of Piggyback Method: a) Unless a manual tracking platform is used with short focal length lenses, the cost of equipment can be appreciable. b) guiding is required to prevent star trails. c) Dark skies are a "must" or fogging of the film will result.

The piggyback method is very effective for many objects, provided that the object is not too small or faint. This could be beyond the capability of the lens being used to take the photograph. The piggyback method is often better than prime focus for taking photographs of objects such as comets, star clouds, and large nebulae because the object may be too large to fit in the field of the telescope using the prime

focus method. Also, this method is good for practicing guiding techniques that are required for prime focus photography. A beginner should use this method first before attempting the prime focus method.

In the next issue, prime focus and eyepiece projection photography will be discussed.

This series of articles appeared in the Edmonton Centre's newsletter *Stardust*. It has been revised and reprinted with permission of the author.

Long Range Goals for the R.A.S.C.

by Lloyd Higgs, Chairman
R.A.S.C. Endowment Fund Committee

From time to time, all organizations must take a look at themselves and the direction in which they are heading. Currently the R.A.S.C. is enjoying a period of strong membership and general vitality, generated to some extent by the recent public interest in Comet Halley. The heightened awareness of astronomy that has resulted may, however, begin to wane now that the comet has faded. The National Council of the R.A.S.C. has decided, therefore, that we should take time this year to look at ourselves with the object of establishing long range goals for the Society, and the identification of projects that might be undertaken by the Society to fulfill these goals.

To this end, a special "brain-storming" session will be held at the Toronto General Assembly in May, open to all participants. It is hoped that Centre representatives will come to this session prepared with innovative ideas concerning directions in which we might proceed and projects that might be undertaken. If goals and related projects can be identified, the Society will undertake a fund-raising drive to obtain resources required to ensure their successful completion. The open session will probably be held Sunday, May 17, at 3:30 pm, directly after the Annual Meeting, and will be limited to an half hour of discussions. Please come prepared! For information and comments contact Dr. L.A. Higgs c/o R.A.S.C. National Office.

Comet Halley Tlme Capsule

by Michael Watson

As our most famous celestial visitor recedes from the sun, we may think of a future generation who will marvel at a much more spectacular view on warm summer evenings in July and August 2061. What can we tell them about our thoughts and experiences in 1985/86?

The National Council of the R.A.S.C. has established the Comet Halley Time Capsule Committee to assemble records, photographs, sketches, articles, accounts, and memorabilia of the 1985/86 apparition of Comet Halley. The capsule will hopefully be sealed at this year's General Assembly in May, to be opened at the General Assembly of the Society in the year 2061. This is not intended to be a record of scientific results, but rather a compilation of personal descriptions and mementos to give future members of the R.A.S.C. an insight into the experiences and feelings of their predecessors.

Any member who has material that might be suitable for inclusion in the time capsule is asked to send it to the committee at the address below, or to his or her Centre Secretary with instructions to forward to the Committee. Send material to: Comet Halley Time Capsule Committee c/o Michael S.F. Watson, Chairman, 441 Davisville Avenue, Toronto, Ontario M4S 1H7.

On the Naming of Minor Planets

by Christopher E. Spratt
Victoria Centre

Asteroids, or minor planets, have, for many years, been accidentally discovered and re-observed by photographic means. Upon discovery a new minor planet is assigned a provisional designation. This temporary designation is used until the object has been re-observed over enough oppositions to allow the orbital elements to be sufficiently accurate for any subsequent recovery. A secure status has then been reached and the object is assigned an unique number by the Minor Planet Center of the Smithsonian Observatory in Cambridge, Massachusetts. Prior to 1942, this task of assigning identification numbers rested with the Astronomisches Rechen-Instit in Berlin. The right to name a minor planet after it has been numbered remains with the discoverer.

Since 1925, the temporary designation assigned a new asteroid has been based on a formula, whereby the year is divided into 24 parts. Each half-month observing period is assigned a designation consisting of the year and a capital letter (A to Z but excluding I and Z). Each new object reported (in order of notification, not date of observation) to the Minor Planet Center is then assigned a second letter (A to Z but including Z). Should more than 25 designations be required during any one half-month period, a second letter is reallocated followed by a numeric symbol to indicate the replication. Prior to 1925, the designation for the year started with a letter "A" (ie. A919 SA).

Before receiving a permanent number, a minor planet must have been well observed at three oppositions, or at four or more sporadically observed oppositions. This allows a definitive orbit to be calculated and the object should not be lost in the future.

There are, however, certain anomalies in the asteroid nomenclature. For example, some bear the designation P-L after the number (ie. 6344 P-L). These were discovered during the Palomar-Leiden survey undertaken during the fall of 1960. There is also a small group of three numbered planets which are considered "lost." These date from the time when minor planets automatically received a number and a name before the orbit was sufficiently well-enough known for recovery at future oppositions to be predicted. See the February 1987 *Newsletter* page 10 for a current update on these objects. Finally, the last exception is the naming of the Earth-Mars orbit crossing asteroid Hermes without a number being assigned. This minor planet's orbit is not well-known and Hermes is now classified as lost.

After receiving a permanent number, the discoverer has the first opportunity to name the asteroid. Some suggestions have included friends, pets, and political heroes. Custom at one time was to put all minor planet names into the feminine form and find the name from mythology. Again there are exceptions. The objects in the Jupiter triangular libration points, L4 and L5, are always named after heroes of the Trojan War. Those in L4 are named after the Greek warriors (with 624 Hektor as the "Trojan spy") and those in L5 after their Trojan counterparts (with 617 Patroclus as the "Greek spy").

In a private communication, B.G. Marsden points out that the group of asteroids that crosses the orbits of the Earth or Mars (the Aten-Apollo-Amor minor planets) were to receive masculine names. This however has not stayed that way as feminine names have been assigned to some of these unusual objects.

If the discoverer is deceased by the time a permanent number is to be assigned (or ten years have elapsed since the number assignment, others may propose names, and such names are judged by a committee of three, consisting of the President and Vice-president of the International Astronomical Union Commission 20 and the Directors of the Minor Planet Center. In general, names are proposed by individuals who have in some way been associated with the deceased discoverer or with the particular minor planet concerned (ie. have done the orbital computations and crucial identifications of the minor planet).

Names proposed for minor planets will not be accepted, however, if the Minor Planet Names Committee feels that the names do not fall within the following certain criteria which are as follows:

1. Names should not be too similar to those of other minor or major planets or natural satellites, or be of questionable taste.
2. Names are to be pronounceable, preferably single word and no more than sixteen characters long,

including spaces and hyphens. Those consisting simply of a first and last name of an individual are not really prohibited but are, however, discouraged.
3. The naming of pet animals, although not specifically prohibited, is regarded as being in "questionable taste" especially when other worthy individuals are being honoured.
4. Names glorifying individuals or events of a political or military nature are usually considered unsuitable, unless at least one hundred years have elapsed since the event commemorated or those concerned have died.
5. The "Trojans" are to be named after the Trojan War heroes.

The number of secure (numbered) asteroids as of January 1987 is 3547. About two-thirds of these are named and seven honour Canadian scientists or places.

Events Calendar

May 9 International Astronomy Day
(See February 1987 *Newsletter* for details)

May 10-17 Canada-Wide Science Fair, University of Toronto, Erindale College Campus, Mississauga, Ontario.

May 15-18 R.A.S.C. General Assembly. Hosted by the Toronto Centre. For information, contact Steven Spinney, 154 John Tabor Trail, Scarborough, Ontario M1B 2P8.

July 11-17 Joint conference of the Astronomical Society of the Pacific, the Astronomical League, and the Western Amateur Astronomers, Los Angeles, California. For information write to: Summer Meeting, ASP, 1290 24th Avenue, San Francisco CA 94122.

News from the A.S.P.

The Astronomical Society of the Pacific (A.S.P.) is a sister organization to the R.A.S.C. It has an active public education program and in particular produces many materials for use by teachers and astronomy enthusiasts. In recent weeks a variety of announcements has come from the A. S. P. and we are pleased to pass them on to you.

New President: Congratulations to Dr. James Hesser, Director of the Dominion Astrophysical Observatory, who has been elected as the 78th president of the A.S.P.. Dr. Hesser became Director just last December but was an active amateur astronomer before making astronomy his profession.

1987 Catalogue: The 1987 Astronomy Selectory is available and contains a wealth of material of interest to the amateur and teacher. Slides, posters, information packets, bumper stickers, books, T-shirts, etc. are all listed. Two new products are a 39-minute videotape featuring Clyde Tombaugh, the discoverer of Pluto, and a 15-colour slide set titled *Splendors of the Universe*.

For information on the A.S.P., or to order their catalogue, write to: Astronomical Society of the Pacific, 1290 24th Avenue, San Francisco, CA 94122, or call (415) 661-8660.

Correction: In the February 1987 Newsletter, the discoverer of Comet Wilson was incorrectly named Catherine Wilson instead of Christine Wilson. We regret any confusion this may have caused.

Observer's Cage

by David Levy
Assistant Editor

I always thought that New Year's resolutions were silly. You know, those little improvements we vow to make to make our lives better. Anyway, for 1987, I made two. The first was to finish a book on observing variable stars on which I had been working since 1979. The second was to find a comet.

Variable stars provide an incredible observing opportunity for an amateur astronomer. Depending on their type, they change in brightness over periods of years, months, or even days. Some variables, known as eclipsing binaries, undergo most of their brightness change as one star passes in front of the other. Then there are the pulsating variables which physically change their size, getting smaller and brighter, then larger and dimmer. They include the stars called Cepheids which vary with clockwork precision, and the red giant stars known as Mira variables, with their leisurely cycles covering periods of several months. Other types include the eruptive variables that can flicker over a period of minutes, the dwarf novae with their bimonthly rises of three or four magnitudes, the novae that suddenly increase by many magnitudes, and the supernovae, which at the height of their outbursts can outshine their galaxies.

There are variables enough for everyone. Even if funds and observatories were unlimited, professional astronomers could not hope to continuously monitor all these stars. We amateurs have a chance to make a significant contribution to scientific knowledge through observing variables and furthermore, variable star observing is fun. We can watch our galaxy in action before our eyes.

Closer to home are the comets. Each is a leftover from the birth of the solar system, and originally orbited the sun out to two light years from the sun in the Oort comet cloud. There, the slightest gravitational tug or collision could send a comet on its way to the inner solar system. Comets come just frequently enough to cause some fun and excitement on our observing lives. If the Oort cloud was much denser, we would have so many racing around the solar system that their everyday appearance would be taken for granted. If the cloud was less dense, a single comet every century would be considered an anomaly.

Comets are also individual – we even have one that returns once a human lifetime as if to remind us of the fragility and importance of human life. Each comet has its own proportion of gas and dust and comets rotate so that from night to night their appearance changes as different regions on a comet's nucleus are exposed to sunlight.

Variable stars and comets. These two types of object are so different, and yet together they offer two of the most fruitful areas for amateurs to make contributions to astronomy.

On January 5, at 5 am., I fulfilled the first New Year's resolution and finished the observing guide to variable stars. I recently had put so much of my time into the project that I was in danger of considering these variables as friends – anthropomorphizing comes easily at that hour. Was it really that late? Hours earlier I had set to work with a cloudy sky outside. Semiconsciously, I looked out, and the sky had cleared. I started the printer and a short comet hunt at the same time. Forty minutes later, while the variable star guide was getting ready for the publisher, I discovered Comet 1987a.

Stamps Remember Newton

Great Britain issued four new stamps in the early spring to commemorate the 300th anniversary of the publishing of the theory of gravity by Sir Isaac Newton. It was in 1687 that Newton's great work, commonly known as the *Principia*, was published and established Newton as one of the greatest scientists of all time.

The four stamps depict some of the most famous discoveries of Newton. An 18-pence stamp shows an apple traditionally associated with Newton's research into gravity. A 22-pence stamp depicts a model of the solar system with the sun at the centre. A 31-pence stamp depicts his work in studying light and colour. The fourth stamp worth 34 pence shows how a projectile is subjected to gravity and will orbit the earth if launched with sufficient speed. The stamps were designed by 22-year old Sarah Godwin of Etchingham, Sussex, England.

Comet Levy 1987a

Just over two years since his codiscovery of Comet Levy-Rudenko, well-known Canadian observer David Levy discovered his second comet in early January. As the first new comet of 1987, and since no other observers also claimed discovery of it, the new comet is named Comet Levy 1987a.

Leo Enright, writing in the Kingston Centre's newsletter *Regulus* reports the events leading up to the discovery.

"Early in the morning of Monday, January 5, while observing with "Jupiter," his 16-inch reflector, David noticed a faint object of eleventh magnitude not far from the star Alpha Ophiuchi. He suspected a comet but because of the approaching morning twilight, he could not make the definite confirmation of motion which he wished. On the following morning, he was still frustrated in his wish to make this confirmation, this time because of cloudy weather-a fact with which we have become all too familiar in this area and at this time of year! Finally, on the morning of January 7, David was able to confirm that there indeed was motion and it was a comet, one that appeared to be moving due south."

Comet Levy was a difficult object in the morning sky in January. Orbit calculations indicated it had reached perihelion in December and was outward bound from the sun when discovered.

Congratulations David on your second discovery (the first one was reported in the February 1985 *Newsletter*). We are looking forward to your third discovery!

GA '87

May 15-18 1987
Victoria Day Weekend

The Toronto Centre extends a special invitation to all members of the R.A.S.C. and other interested astronomy enthusiasts to participate in the annual General Assembly of the R.A.S.C. in Toronto this May.

G.A. '87 is a four-day event over the Victoria Day long weekend. The program features events of interest to members of all backgrounds whether you are a beginner or knowledgable amateur, a new member or long-time member, an armchair amateur or an active observer.

The program includes:

Friday – Evening Reception
– Murphy Slide Show & Contest
– Song Contest
Saturday Paper Sessions
– Display Competition
– Evening boat cruise of Toronto Harbour and the Islands
Sunday – Visit to the Star Theatre and the new Astrocentre of the McLaughlin Planetarium
– Annual Meeting
– Annual Banquet
Monday – Visit to the David Dunlap Observatory

Special Ways to Participate

* Compose a song on an astronomical theme for the song contest (open to individuals, groups, and Centres)
* Select your favourite astronomical slide(s) which turned out different from what you had expected (Murphy's Law) for the Murphy Slide Show

* Prepare a display for the Display Competition (see December 1986 *Newsletter* for details)
* Present a 10-minute paper on a research or observational topic.

Deadline for abstract was March 31. (See December 1986 *Newsletter*)

For Additional Information

An information package was sent to all Centre Secretaries in March. Further details can be obtained by writing to: 1987 R.A.S.C. General Assembly c/o Steven Spinney, 154 John Tabor Trail, Scarborough, Ontario M1B 2P8 or phone Randy Attwood, General Assembly Chairman, at (416) 624-4629.