# ECLIPSE '79

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# PREFACE

This solar eclipse portfolio has been compiled by the members of the Winnipeg Centre of the Royal Astronomical Society of Canada. It embodies the kind of information that we believe will be required by those of you who are contemplating an eclipse expedition to our locality. Essentially, the portfolio consists of the following:

1) Manitoba Vacation Handbook
2) Province of Manitoba Highway Map
3) City of Winnipeg Street Guide
4) Solar Eclipse Supplement

The first three items will answer most of the questions you might have regarding living accomodations, transportation, social and cultural events, and tourist services. The last item, the Solar Eclipse Supplement, is addressed to the specific and unique problems that an eclipse expedition will likely encounter. Some of these problems will be aggravated by the severity of our winter weather, however, with a bit of foresight and good fortune these difficulties should be rendered inconsequential.

We have formulated our recommendations according to the assumption that you have not previously visited our province and are therefore unfamiliar with its peculiarities. If you require additional assistance, please feel free to contact any one of the members of the solar eclipse committee. Our addresses appear below. In closing, we would like to join with all the members of the Winnipeg Centre and with the citizens of Manitoba in extending our best wishes to you and your colleagues. We all hope that your expectations and aspirations for the total solar eclipse of 1979 will be completely fulfilled.

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# THE SOLAR ECLIPSE SUPPLEMENT

A scientific expedition will have a greater chance of succeeding if its planners are able to anticipate and minimize the uncertainties that are forever a part of this kind of enterprise. Uncertainties can arise because of:

1) The nature of the phenomena or event that is to be studied.
2) The methods and procedures by which the observations are to be made.
3) The environment that is indigenous to the locality at which the expedition is to be conducted.

Solar eclipse expeditions are not spared these sources of adversity. Therefore, it is not surprising that those of you who have been made responsible for coordinating such an expedition will require information of a very specific nature. This kind of information is often difficult, if not impossible, to obtain. We hope that this solar eclipse supplement will remedy this predicament.

Although the total solar eclipse of 1979 will be visible throughout many areas of the United States and Canada, there exist good reasons why it would be desireable to observe the eclipse from within the province of Manitoba. Mr. Bill Peters, of the Manitoba Planetarium, has published several very informative articles that discuss the observing prospects within the province. He indicates that for all sites that are located at the center of the eclipse path, the duration of totality is within 3 seconds of the 2m 49s maximum and that the sun's altitude is within a degree of the 26° maximum. (The maximum duration of totality for this eclipse will occur in the inaccessible, north-eastern region of the province.) There are numerous communities that are located on or near the center of the path. You can expect to be welcomed to them by their inquisitive residents who are, without a doubt, obliging and warm hearted. Well maintained highways service most of these communities and winter driving conditions are usually excellent. The prospects for good weather appear to be very promising and if the weather on eclipse day is clear you can expect the atmosphere to be transparent and stable. If you find that you must take on additional equipment or supplies, the cities of Winnipeg and Brandon have numerous sporting goods and photography stores that can outfit your group with these special provisions. At the very least, the province of Manitoba should provide better than average circumstances under which to observe the solar eclipse.

Generally, an observing site is evaluated according to the following criteria:

1) The duration of totality and altitude of the sun.
2) The probability of good weather.
3) Accessibility.
4) The availibility of shelter, food services, etc.
5) Security.

These are the standard considerations that enter into the selection of an appropriate observing site. Please be aware, however, that there are other equally important considerations that reflect the capabilities of each particular group and the magnitude or scope of their observing program. Compare, for example, a small party of observers whose sole intention is to simply photograph the eclipse with a larger, well organized, group of researchers who, by unconventional means, are planning to carry out a comprehensive study of eclipse related phenomena. For the latter group of observers, the criteria for site evaluation and selection are more compelling and greater in number. Since we could not possibly know the intentions of each and every eclipse contingent, we have refrained from making specific recommendations about observing sites. Instead, we have elected to present you with the data and information that pertains to the five standard considerations that were listed earlier.

Selecting a site on the basis of duration of totality should be relatively easy. As mentioned earlier, the maximum duration of totality for this eclipse will occur in an inaccessable region that lies east of Lake Winnipeg. It appears that the observer has very little choice in the matter; the observing site must be selected from within the region that lies west of Lake Winnipeg. For those of you who are not compelled to journey to the center of the eclipse path, the City of Winnipeg would be, for obvious reasons, an attractive alternative to other sites. Manitoba's capital city will experience 1 min. 20 sec. of totality. Another possibility that is worth considering is the town of Portage la Prairie where totality will be of 2 min. 30 sec. duration.

In the final analysis, the selection of an observing site may be governed solely by the weather conditions that prevail over the eclipse path. Environment Canada has provided us with a study of the weather prospects over Manitoba at eclipse time. From this study we have learned that the most probable weather conditions include clear skies and low temperatures. The degree of cloud cover is expressed in terms of the probability of 0-2, 3-6, 7-8, and 9-10 tenths of cloud opacity. The percentage probability of tenths of cloud opacity for selected climatological recording stations within Manitoba appear below:

| Recording Station | 0-2 | 3-6 | 7-8 | 9-10 | Period of Record |
|---|---|---|---|---|---|
| Portage la Prairie | 39 | 22 | 19 | 20 | 1953-76 |
| Brandon | 39 | 17 | 16 | 28 | 1958-76 |
| Shilo | 36 | 20 | 21 | 23 | 1955-70 |
| Gimli | 46 | 14 | 15 | 25 | 1972-76 |
| Winnipeg | 42 | 18 | 17 | 23 | 1953-76 |
| Bissett | 32 | 21 | 24 | 23 | 1969-76 |
| Inland Lake | 58 | 15 | 12 | 15 | 1971-76 |

NOTE: Tenths of cloud opacity as expressed in terms of chances of observing the eclipse are:

| | |
|---|---|
| 0-2 tenths | Excellent |
| 3-6 " | Fair |
| 7-8 " | Poor |
| 9-10 " | None |

A broad interpretation of this data would be that the chances of encountering favorable sky conditions are greatest along the eastern side of the Interlake District, that is, in the Gimli - Hecla Island area.

Information regarding wind speed and direction, extreme temperatures, and precipitation is as follows:

| Recording Station | A | B | C | D | E | F |
|---|---|---|---|---|---|---|
| Portage La Prairie | 7.8 | -34.4 | NW | 21 | 44 | 22 |
| Brandon | 7.8 | -40.0 | W | 19 | 51 | 24 |
| Shilo | | | N | 9 | 60 | 23 |
| Gimli | 2.2 | -34.4 | | 4 | 67 | 23 |
| Winnipeg | 8.3 | -42.2 | S | 25 | 43 | 27 |
| Bissett | 11.1 | -36.1 | | | 80 | 20 |
| Island Lake | -2.8 | -39.4 | | 2 | 63 | 21 |

Key:
- A: Extreme maximum temperature
- B: Extreme minimum temperature
- C: Most frequent wind direction for winds greater than 30 km/h
- D: Percent probability of winds greater than 30 km/h
- E: Percent probability of winds less than 17 km/h
- F: Percent probability of precipitation (snow, rain, freezing rain)

NOTE: Entries for those stations that do not show a preferred direction for high winds or for which the data sample was of insufficient size have been omitted.

Based on this data, we can conclude that observers will have to withstand very low temperatures, no matter where the observing site is located. Winds may vary over a wide range of directions and strengths - the strongest usually occur in the relatively unsheltered prairie regions of south and south-western Manitoba. There exists one redeeming quality that is inherent to our severe winter climate, that being the exceptional astronomical seeing conditions that are common place at this time of year. During the warmer seasons, the atmosphere is typically unsettled and less transparent than during the winter. Large areas of our province have been cleared for agricultural use and the strong winds that prevail over these areas introduce large quantities of particulate matter, usually topsoil dust, into the atmosphere. More importantly, the warmer temperatures of the summertime bring about peculiar heating effects that take place over the plowed fields. These effects are manifested as wide spread instabilities of the atmosphere, and consequently, the astronomical seeing deteriorates accordingly. So if observers are to be blessed

with clear skies for the eclipse, they have good reason to be optimistic about the seeing conditions.

Easy access to the observing site is of prime importance. It just so happens that, in Manitoba, the path of totality coincides with an extensive, well maintained highway system. The local bus lines provide reliable service to most of the outlying communities. Although somewhat restrictive, this mode of transportation is certainly the most economical. Of course it is not recommended to those of you who intend on bringing a large array of delicate instruments and apparatus or if you are unable to book living accomodations at, or in the immediate vicinity of, the observing site. The automobile rental companies provide an attractive alternative to the bus lines. Most accept the major credit cards and all one needs to do is to consult the yellow pages of the telephone directory to select one of the many reputable companies. Although the highways are well maintained, you might encounter icy road conditions on some of the less travelled routes. Difficulties can arise when the motorist fails to reduce his or her speed to one that is better suited to the road conditions. Common sense in this respect will ensure the observer of a safe and uneventful journey to the observing site.

It is preferred that the observing site be in close proximity to some form of shelter where the observer may seek relief from the cold and to perhaps have a hot meal. Luckily, there is an abundance of roadside restaurants and coffee shops, especially along the Trans-Canada Highway. These roadside diners cater to the transport truck drivers and are open for business year round - often on Sundays and holidays. Most of the major oil companies like Shell, Imperial Esso and Texaco operate these establishments and they are usually congregated in and around the major townsites. They are encountered less frequently in the Interlake District. There, the observer will have to rely on the coffee shops and restaurants that are part and parcel of the motels that are found in and around the towns and villages. Please consult the "Vacation Handbook" for more details. There is a chance that some of the community centers will be available for use by eclipse observers. You are welcome to consult us at a later date regarding this possibility, but at the present time, we are not able to guarantee their use.

Finally, a word about the security of the observing site. Prior to the eclipse, various individuals in our Centre and those that are on staff at the Manitoba Planetarium will be conducting lectures that will be devoted to educating the public at large about the many aspects of solar eclipses and their observation. We will frequently make mention of the fact that solar eclipse observers must not be hindered in the preparation and execution of their observing programs. Once the public is made aware of this, you can be certain that they will gladly comply. Actually, there is a greater likelihood that some of our colleagues who are less experienced than we are, or who are ill-prepared, will pose a greater threat to the security of the site and the integrity of the observing program. You will have to decide for yourselves as to the kind of measures that must be taken in order to ensure that this problem does not go unchecked. It may even be advisable to avoid those areas

of the province that promise to be congested with eclipse observers. This would mean, of course, that certain conveniences like on-site living accomodations, prepared food outlets, etc. would have to be sacrificed for the security of a less accessable site in a less populated area of the province. The decision rests with you.

If you are unaccustomed to our winter climate it is imperative that you adopt certain precautions against the low temperatures and penetrating winds. Let us begin by considering measures that have proven to be effective in keeping the body comfortably warm and dry. The kind of winter clothing that is preferred by astronomers who regularly observe in our climate includes:

1) Thermal-type long underwear
2) Wool socks
3) Heavy-weight trousers
4) Heavy-weight shirts and sweaters
5) Hooded snowmobile suit
6) Felt lined snowmobile boots
7) Wool gloves inside mittens.

All garments must be of sufficient size so as to permit ample movement of the body and to avoid restricting the blood supply to the extremities. The choice of fabrics should be restricted to the wool or cotton blends. They have a distinct advantage over the synthetics in that they readily absorb perspiration and allow for better circulation of air. Synthetic fabrics trap the perspiration next to the skin and are therefore ineffective as insulators. The common denominator in proper winter attire is the retention of a layer or layers of "dead-air" space next to the body. For example, the "loft" that is characteristic of down insulated garments accomplishes this by enveloping the body in a layer of air through which cold and heat is not readily conducted. In the absence of a snowmobile suit, any quality down-insulated parka will suffice. The hood is a handy feature of any outer garment, for no other device will protect the observer's head and neck from the penetrating winds. It is advisable to have a fur "ruff" around the front edge, so that the face is also sheltered from the wind. If your footwear includes the removable felt liners you must make sure that you remove them from your boots each evening so that they can dry overnight. If you fail to do this, the perspiration that accumulates in the liners during the day will provide a means for the cold to penetrate through to your feet. Astronomers in Manitoba know that the most vulnerable parts of the body are the feet, hands, and face. Remember that observing usually involves a minimum of physical activity and consequently your pulse and circulation is not very rapid. You must conserve your body heat if you are to avoid frostbite, hypothermia, or even the simple discomfort that might prove to be responsible for an inattentiveness to the observing routine. By wearing gloves inside a pair of oversized mittens you will be able to remove the mittens for those tasks that require the use of your fingers while at the same time protecting your hands. Gloves, by themselves, are definitely not adequate and those who insist on wearing them are inviting trouble.

Anyone who intends to drive a vehicle to the eclipse areas of Manitoba, would be wise to take certain precautions especially if they are leaving warmer climes. The motor oil must be light weight as the ambient temperature could well be -30° or -40° C. The plugs and points should be cleaned and properly adjusted. The battery should be up to strength and the charging rate checked. Carry a set of battery jump cables for receiving or giving assistance in starting up a cold, stiff motor. An immersion block heater is a necessity too, and most establishments can provide electric outlets for their use. A container of gas-line anti-freeze in the glove compartment is a valuable aid. The snow and ice on the roads can make driving difficult, but winter tires are a great help, and studded tires are legal in Manitoba.

The low temperatures can have a profound effect on the operation of certain astronomical instrumentation. Telescopes, and in particular their mountings, must be winterized by replacing the lubricants with low temperature greases. Last winter, one of our members purchased a Schmidt-Cassegrain telescope from a well-known manufacturer. On the first cold evening that it was put to use, The instrument's mounting became immovable. It was carefully disassembled and the factory lubricants were replaced with low-temperature grease. This remedied the trouble and since then the astronomer has had no further difficulties. This example serves to illustrate the fact that all instruments, regardless of their manufacture, may seize-up at low temperatures. If there is any doubt in your mind as to whether or not your instrument has been equipped to operate at these temperatures, then it would be advisable to relubricate the moving parts with the appropriate preparations. The same advice holds for any other instruments and apparatus having moving parts as part of their construction and operation. Some single-lens reflex cameras are notorious for having their mirrors fail to return after the shutter has been released. This problem occurs more frequently with cameras that have accumulated an inordinate amount of dirt and grease in their reflex mechanisms. A qualified service technician can make the necessary modifications. For battery operated instrumentation, Mr. Bill Peters recommends increasing the battery capacity to at least twice that which is normally required. There are measures that may have to be taken to prevent moisture from condensing on optical surfaces whenever they are brought indoors. Camera lenses, eyepieces, filters, etc. must be enclosed in some kind of air-tight container. The "Zip-Lock" plastic bags or the vacuum-type food savers come in handy for this. Then, when the equipment is brought indoors, it warms gradually thus preventing condensation from developing on its surfaces. Camera lenses are particularly susceptible to this. The lens assemblies are not sealed against the intrusion of moisture and it is not unusual for a film of condensation to be permanently trapped between the optical elements of the lens. It has happened to more than one observer. Another common difficulty occurs when the observer inadvertently exhales on or near the eyepiece of the instrument. Spare eyepieces and a generous supply of lens cleaning tissue should be within the immediate reach of the observer.

Finally, what might be worth considering is a portable wind screen to shelter the observer and his equipment from the strong winds that

we have made frequent mention of. These winds can initiate intolerable vibrations in the mountings of most portable instruments. Of course, a great deal depends upon how well the site is sheltered by such things as buildings, trees and topographical features.

Although you may have many questions that are as yet unanswered, we hope that the information that we have included in this eclipse synopsis will familiarize you with the most important aspects of astronomical observing within our province. We, in the Winnipeg Centre of the R.A.S.C., envisage our responsibilities as being limited to compiling and distributing advice to interested eclipse observers. We look forward to receiving correspondence from you over what time remains between now and the eclipse. Included in our membership are many experienced eclipse chasers. They, along with the rest are very enthusiastic about this solar eclipse - partly because it will provide a rare opportunity for us to meet with our colleagues from other provinces within Canada and from countries other than ours.

Good luck with your preparations, have a safe journey to our province, and we'll see you at the total solar eclipse of 1979.