THE ROYAL ASTRONOMICAL SOCIETY OF CANADA

SASKATOON CENTRE

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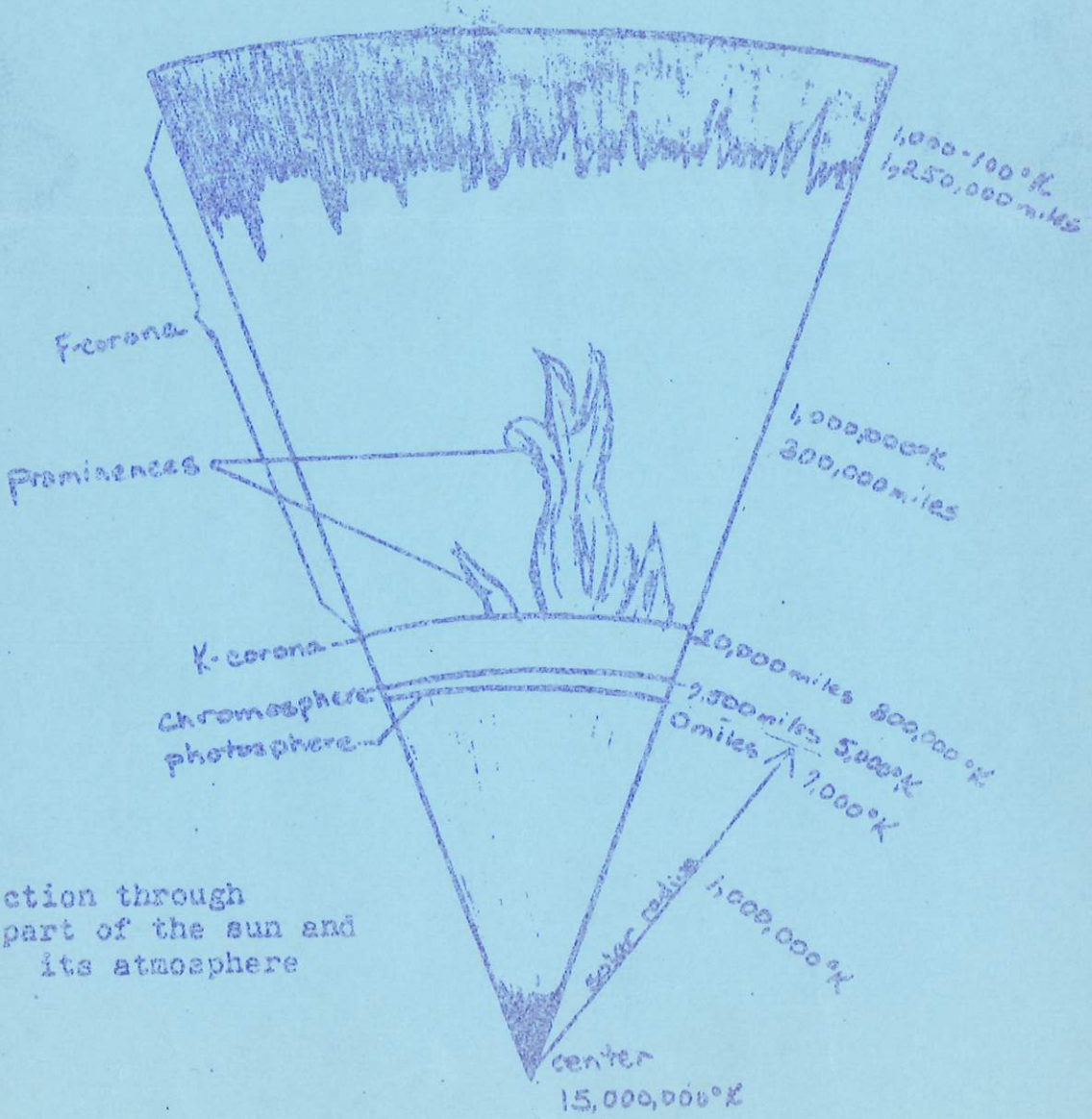
News Letter



Section through part of the sun and its atmosphere

THE BLEMISHED SURFACE OF THE SUN

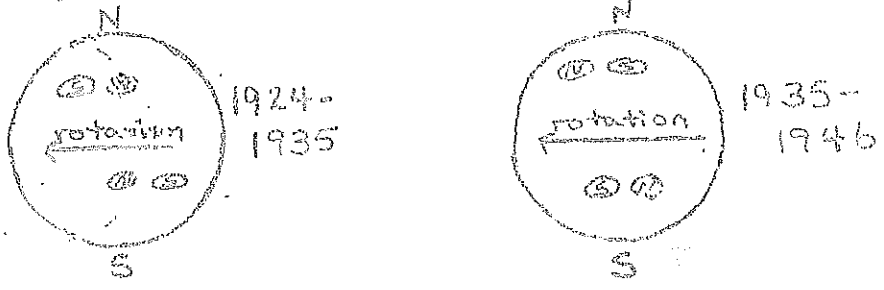
The whirling structure is characteristic of a sunspot: when Hale first detected it with the spectoheliograph, he decided that the sunspots must be caused by cyclonic storms analogous to those in the earth's atmosphere.

The matter composing the sunspots is made up of atoms, fragments of atoms and electrons for the collisions between the atoms tend to smash them to bits. Pictures of the sun in H< shows the surface is not uniform but covered with a coarse, mottled structure. Near a sunspot the chromospheric mottling takes on a form that looks like iron filings around the pole of a bar magnet. It is reasonable to suspect then that the whirling electrical charges of the sunspot group might occasion a magnetic field. Zeeman discovered that light emitted in a magnetic field has decided peculiarities. For example one of the yellow "D" lines of sodium is split by magnetic force into six, while the other line is separated into four components. Hale, using powerful instruments, searched for such an effect in sunspots and concluded, since he found their spectral lines divided in the manner described above, that the "tornadoes" are enormous magnets.

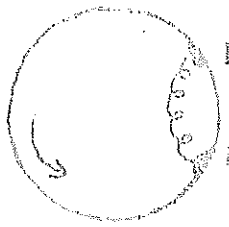
Hale's discovery (1912) of the magnetic fields of sunspots stirred much speculation on the nature of the spots. Whereas they had earlier appeared to be only a darkening on the surface, possibly connected with solar "storms" of some sort, they were now seen to be connected with the occurance of colossal magnetic fields, ranging in strength up to 10,000 times that of the earth's general magnetic field.

We know today that there is no cyclonic motion, but that this structure traces out the magnetic field surrounding the sunspot, which prevents the highly conducting chromospheric material from moving across the lines of force. Since there is a preferred direction of motion whatever irregularities exist spread out along the lines of force, and the whorl structure results.

Hale also found that spots in opposite hemispheres often showed opposite magnetic polarity. In a group of sunspots the largest has a polarity opposite to that of the smaller spot or spots. The polarity of the spots in any one cycle depends upon their latitudes in such a way that the largest spots north of the equator are of opposite polarity to those south of the equator. Furthermore, the polarity of the spots in one eleven year cycle is the reverse of that in the preceding or succeeding cycles, as illustrated:



The magnetic cycle of sunspots [illegible] years--double the eleven year period of the frequency of sunspots. The pairs of spots of opposite polarity can be regarded as the ends of a horseshoe magnet extending about the solar photosphere:



According to Bjerknes, Alfven and others the horseshoe magnet consists of a vortex of ionized gas, mostly below the photosphere, whose spiraling motion is caused by a vast circulation inside the sun which has a period of twenty-two years.

A sunspot may be magnetically classified according to structure:

α A single spot or group of spots with the same magnetic polarity,

β A pair of spots with opposite polarities, or a group of spots in which the preceding (in solar rotation) and following parts have opposite polarities

γ Complex groups with irregular distribution of polarities,

$\beta\gamma$ Groups with bipolar characteristics but no marked north-south dividing line.

The Zurich classification devised by Waldmeier depends on size and complexity, ranging from A for the smallest single spot to F for the largest and most complex groups, with Class G for bipolar groups with the following spot larger, and H and J for groups dominated by a spot of a single polarity.

There are many effects of sunspots as solar radio emission. This is generally divided into two parts; radiation from the quiet sun, which is radiation from the sun when there are absolutely no plages or sunspots present, and radiation from the active sun. The active sun produces some remarkable outbursts of radiation, sometimes lasting a few seconds, sometimes hours, sometimes even days. These great bursts of radiation are invariable associated with solar flares and seem to be produced by the emission of energetic particles or waves from the sun.

We now know that solar flares are always connected with sunspots, and often with geomagnetic storms, and that they produce streams of high-energy corpuscles or low energy cosmic rays. The flux of high-energy particles at the time of large solar flares may even reach dangerous levels to

interplanetary spa[illegible] gone into the study of these events in recent years.

Sunspots do affect the earth. We have known for years that the appearance of a large group is often marked by terrestrial magnetic disturbances. Some of the resulting terrestrial effects of the active sun are radio fade-outs, burst of radio noise, magnetic storms, and auroral displays, and extraordinary increases in cosmic radiation. All of these terrestrial effects increase in number and in violence at sunspot maximum.

The beautiful aurorae also become more numerous at sunspot maximum. There seems to be some evidence that spots shoot atoms and electrons into space and these, on striking the earth, cause magnetic disturbances. In the case of aurorae, the gases of the upper atmosphere glow like the rarefied vapor of a cathode ray tube when bombarded by electrons.

Probably the most fascinating characteristic of sunspots is that of rapid change. Some show changes from week to week, some day to day, and in some cases the appearance changed even from one minute to the next. Men have tried to connect these changes with occurances upon the earth. Attempts have been made to correlate the sunspot cycle with a large number of variable phenomena--such as rainfall, earthquakes, the price of wheat, economic depressions, the behavior of human beings, wars and so forth--without reaching any conclusions that have been generally accepted. In fact, of all the influences which sunspots have been suspected of having upon the earth, only one is so definite that the connection is unquestionable. It is the relationship between sunspot activity and disturbances of the earth's magnetic field.

There are still many unsolved problems and many possible answers to the mysteries of the sun. There are wonderful phenomena to be observed. There are great discoveries to make and when we come to understand the sun we can next turn to the other stars.

ANNUAL GENERAL MEETING

DATE: Tuesday, October 15, 1974

TIME: 8:00 p.m.

PLACE: Room B111 Health Sciences Building (across from Observatory)

AGENDA: Election of the Executive 1975
Payment of Membership dues

For those members who haven't been attending our meetings or classes for the past several months, you have been missing quite a lot of fun.

With the end of the June meeting, members looked forward to the General Assembly (June 28-July 1) in Winnipeg, they met the Lieutenant-Governor of Manitoba, took in a dinner at Monty's Warehouse, and visited the Winnipeg Planetarium at the Museum of Man & Nature, and also the University of Manitoba Planetarium. Papers were presented by various members of both the RASC and ALPO. Displays were also set up by the centres and the exhibits were more in the nature of individual efforts, such as photographic displays and several home-made telescopes.

Our centre was awarded with a plaque and gift certificate for the "Best Centre Display". Our display included the Astro-camera, photographs, exams of the astrophotography and theory class and their certificates of achievement, Gordon Patterson's book ASTROPHOTOGRAPHY, and Long Beck's telescope for which he was awarded the "Best Telescope made by a Junior". All fourteen of the attending members enjoyed the Assembly.

The executive was meeting throughout the summer and the Minutes have been published in the Newsletter. The summer also saw two major events for this Centre. The second Annual Wiener Roast and Picnic was held in July in Diefenbaker Park. The evening was threatened by rain but the clouds disappeared and some observing was done. August 10 was the night of the Meteor Shower Outing at Auckland's farm just outside the city. The members were having great fun, little serious observing was done, and when they decided to do some work clouds moved in and the evening wound up.

An observing site three miles south of Prestige Arsenal was secured for our use. Members are doing observing Saturday evenings, meeting at the Observatory at 8:00 p.m. weather permitting.

Open house on Sundays and Wednesdays are bringing large crowds to see the Observatory. Due to weather conditions, the Observatory will not remain open only on Wednesday evenings from 8:00 p.m. until 10:00 p.m.

Remember that October is the month for elections of the new executive and membership fees should also be paid.

Saskatoon Centre, R.A.
Held in the Observatory, 7:30 p.m.

Present:
Wendel Frenzel, President — F.A. Holden, Councillor
Melodie Andrews, Secretary — Halyna Kornuta
Alan Blackwell, Treasurer — Gordon Patterson
Ron Walcron, VP/PR

Absent:
Hugh Hunter, Librarian — Doug Beck, Sub-councillor
Dave Pristupa, Sub-councillor

Item	Detail
92.	The meeting was opened.
94.	A pair of binoculars was left at the [illegible] (July). If these belong to you please [illegible] Observatory. The annual picnic [illegible] and members enjoyed themselves.
95.	The Meteor Shower Outing will be at 8:00 p.m. Saturday August 10, 1974, at Buckland's Farm regardless of weather (except rain). Please [illegible] at the Observatory before leaving for [illegible]
96.	The members are holding star outings on [illegible] If it is not overcast, they meet at the Observatory at 8:00 with cars leaving at 8:30 p.m.
97.	Note: October is when [illegible] are held.
98.	Meeting adjourned.

MINUTES OF THE EXECUTIVE MEETING
Saskatoon Centre, R.A.S.C.
Held in the Observatory, 7:30 p.m. September [illegible]

Present:
Wendel Frenzel, President — Ron Walcron, VP/PR
Melodie Andrews, Secretary — F.A. Holden, Councillor
Halyna Kornuta, Editor — Doug Beck, Sub-council[illegible]
Gordon Patterson, Activities — Dave Pristupa, Sub-[illegible]

Absent:
Hugh Hunter, Librarian — Alan Blackwell, Tre[illegible]

Item	Detail
99.	The meeting was opened at 7:30 p.m.
100.	Parking is a problem for [illegible] ularly on meeting nights. [illegible] Frenzel is looking into the [illegible] parking stall.

101.	The Tuesday ev[illegible] ted to include [illegible] ity sessions.
102.	Nominations for positi[illegible] October general meeti[illegible] membership dues.
103.	Hand rails are needed [illegible] the telescope.
104.	Criterion's $50.00 gift [illegible] to purchase with it was discussed.
105.	The position of progra[illegible] Milton Heuneger will [illegible]
106.	Mailing the Newsletter wi[illegible] third class mail and [illegible] office. Alternatives [illegible] mailing the Newsletter a week or [illegible]
107.	The possibility of a second hand duplicat[illegible] the Newsletters and other papers is a [illegible] being considered.
108.	Wendel Frenzel and Gord[illegible] lecture given in Rosetown to the cripple[illegible] and adults.
109.	Meeting adjourned.

MINUTES OF THE GENERAL MEETING
Saskatoon Centre, R.A.S.C.
Held in the Health Sciences Building
September 17, 1974, 3:00 p.m.

Present:

Wendel Frenzel, President	Gordon Patterson, [illegible]
Melodie Andrews, Secretary	Alan Blackwell, [illegible]
Halyna Korduta, Editor	Hugh Hunter, [illegible]

Absent:

Ron Waldron, VP/FR	F.A. Holgan, [illegible]

Item	Detail
110.	The meeting was opened at 3:00 p.m.
111.	Mr. Frenzel welcomed members back from [illegible] Keys and Jim Patterson from Kent, [illegible]
112.	Motion for the adoption of the June [illegible] August minutes as published. G. Tait [illegible] J. Liebe.
113.	The August 10 meteor shower [illegible] farm was discussed.
114.	Wendel Frenzel and Gor[illegible] in Rosetown to the cri[illegible]

115. The Fundamental classes [illegible] tinued until there are more members and Saturday evenings should be used for and practical classes.

116. Motion for the deferal of nominations executive until next month.

117. Publicity for the September Meeting was [illegible].

118. Gordon Patterson gave a talk on the trip to the General Assembly in Winnipeg showing slides as well as those taken by Wendel Krenzel.

119. Jim Patterson, officer in charge of the Alert Meteorlogical Station, NWT, gave a talk with slides of his home and work.

120. The meeting was adjourned.

NOTICE TO MEMBERS:

As most of you are aware, the membership dues for 1975 will be a part of the General Meeting for October. The fees this year will be $10.00 for a Junior Member (under 18 years) and $15.00 for an Adult. Both prices include the Newsletter subscription.

Members are asked to keep in mind these following executive positions and possible candidates for each:

President
Vice-President/Press Representative
Secretary
Editor
Activities Director
Treasurer
Program Director
Librarian
Appointed sub-councillors

For further details in regard to these check elsewhere in the Newsletter.