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252 COLLEGE ST. TORONTO 2B



GALAXY

MONTHLY NEWSLETTER

THE ROYAL ASTRONOMICAL SOCIETY OF CANADA

HALIFAX CENTRE

SEPTEMBER 1961

REPORT FROM AURORA GROUP: The following has been taken from NEWSLETTER #48 which is published by the IGY World Data Centre A, Aurora Archive-Visual Observation, Cornell University, Ithaca, New York, and tells what the present guesses are about aurora and what is being done to check them.

"At present the well established facts are that the aurora is related to the earth's magnetic field and the sun. The sun is composed mostly of hydrogen and hydrogen is observed coming into the earth's atmosphere at the beginning of auroras. On the basis of these facts we assume that the aurora is caused by hydrogen ions (protons) which are blasted off the sun with speeds of about 1500 miles per second. They pull some electrons along with them and some of these are lined at the earth. When they get to the earth, the earth's magnetic field separates the electrons and protons. They are pulled together by their electrical charges since they are of unlike sign. This produces one of the radiation belts which is detected close to the earth. Some of the protons come into the earth's atmosphere and are stopped and cause the atmosphere to give off light which we call the aurora. Even after the protons have stopped coming in, the light may go on for an hour or so.

In order to test the ideas outlined in the paragraph above, it is necessary to make a large variety of measurements. Information about the sun and the aurora is obtained by studies of the 27 day rotation which is illustrated in the chart which we send with each newsletter. We have more detailed charts at Ithaca, but they still are not detailed enough for us to tell you whether you will see an aurora. We are doing very well if we get the day right, and this means the aurora has less than 50% chances of being seen, because it may occur when it is daytime.

Information about the travel of protons to the earth and the formation of the radiation belt must be obtained by satellites and the work is being carried on. Our present hypothesis about the aurora indicates that there should be two more radiation belts about 20,000 miles

high over each Pole. Aurora is expected to come down in the region between these belts and the equatorial one. This point is being checked by calculating where the aurora zone should be and comparing it with the measurements which we have made from the observations sent in by observers. At present everything seems to be satisfactory but the calculations are tedious.

We know from studies of the light given off by auroras that the protons come in the earlier part of an aurora and seem to be gone near the end. There are enough of them to cause the aurora but there must be some way for the energy to be stored and then released after the hydrogen ions (protons) have stopped coming in. The storage mechanism which seems most likely is connected with the recombination of nitrogen atoms and ions to form nitrogen molecular bands. These bands give off the blue light which is seen in auroras, and it is for this reason that we try to get information about the color of auroras as seen through filters. According to the hypothesis, in the late stage of an aurora the blue color should be distributed in a wide glow or perhaps patches. This is because the recombination process would cover large areas and should not produce sharp forms like arcs and rays. The instruments which are available at present tell us that blue light occurs in a late stage of an aurora, but only a visual observer with a filter can tell us which forms have the blue light in them. This is because the human eye and mind are vastly superior to any other system of detection used at present.

The development of the auroral forms such as glows, arcs and rays from the cloud of electrons and protons which must be coming in is a more difficult problem to explain. According to our present ideas, if an arc has a curve in it, the east end should curve north. This result seems to be confirmed by the drawings you send us. We would like to know of any such cases you may see. If there are two arcs in the sky and rays are formed, we expect the northern arc to break into rays first. This is also confirmed by your observations. We would guess that the rays themselves are like small arcs but are due to electrons. If the curvature can be seen at the bottom of a ray its east end should curve south. We have one drawing which indicates this but in general it is impossible to see structure in rays. We need measurements on the shape of the various forms in order to do more work on the theory. We have two cameras which take pictures of an aurora from separate points and we can get the height and shape by triangulation. We need such measurements from all across the country and when the weather is clear, can get them from your reports.

Radio and TV information, such as we described in our last newsletter, can be used to give information about the distribution of the electrons which come into the atmosphere along with the protons. You may feel that your observations of an aurora or a TV interference are rather simple and that not much information can be obtained from them, but when combined with similar observations from hundreds of places, then the resulting picture of the aurora is as accurate as can be obtained by a much smaller number of complicated machines. In addition to this, all our observers have an accumulated knowledge of auroras so that at some future time we can send out a questionnaire asking questions which we forgot to ask in the aurora manual. Things like how many arcs are seen in the sky at once, which direction does a glow first appear, how often is red color seen, etc. It is not possible to do this with machines, which only remember what they are told to remember."

Since the July issue of GALAXY only two occurrences of aurora have been reported in the Halifax area. These were on the nights of August 1/2 and August 29/30. Both were submitted by Mr Harold Curran. Fifteen negative reports were received with overcast skies accounting for ten of the reports.

REPORT ON PUBLIC VIEWING NIGHT HELD ON JULY 20, 1961: Eight members turned out for the public viewing night which started under overcast skies. As the night progressed viewing improved and everyone was able to see both Jupiter and Saturn under better than average viewing conditions. Mr Harold Curran's six inch reflector gave everyone a really good view of the moon. Those persons present were as follows:

Mr Harold Curran
Mr Scott Robson
Mr Jim McGuigan
Mrs P. O'Hagan
Mr J. A. Michieli
Mr Bryan O'Hagan
Mr W. Betts
Mr Bert Allen

SEPTEMBER MEETING NOTICE: The next meeting of The Royal Astronomical Society of Canada, Halifax Centre, will be held on the evening of September 27, 1961, at 8:00 pm in the Planetarium Room of the Nova Scotia Museum of Science, Spring Garden Road, Halifax, Nova Scotia.

This is the first meeting of the fall season and it is hoped that as many members as possible will attend. The public in general have, due to the satellite programmes of both the United States and Russia, taken a keener interest in astronomy and this is being reflected within the Halifax Centre by the increase in membership which has taken place over the past two years.

A new slate of officers must be appointed and if you are asked to serve in an executive capacity please accept the appointment and do all you can to help make the coming year a successful one.

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