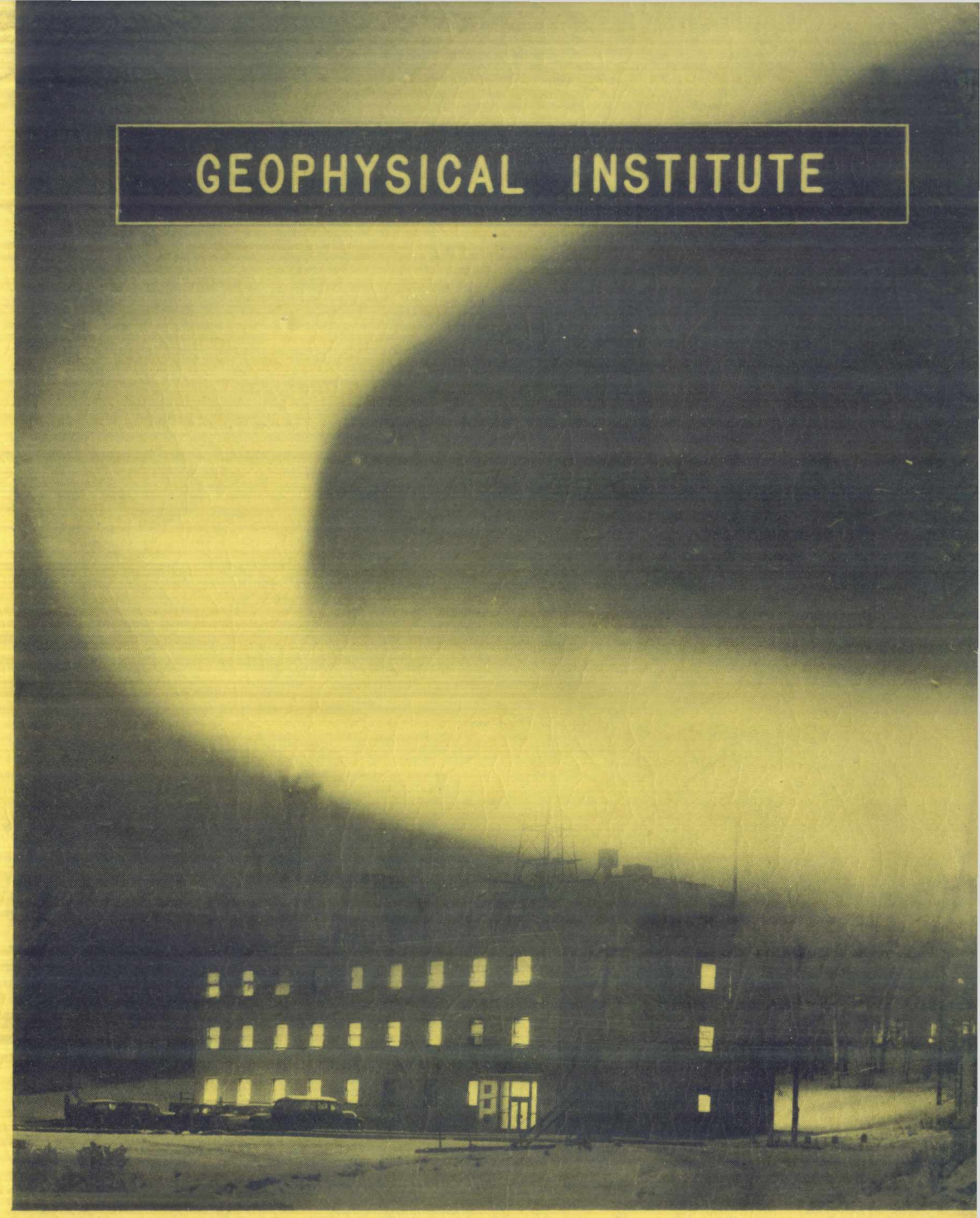

UNIVERSITY
OF ALASKA

COLLEGE
ALASKA

INDICES OF UPPER ATMOSPHERIC DISTURBANCE PHENOMENA IN AURORAL ZONE

by

C. T. Elvey and M. Sugiura

Scientific Report Number 2
IGY Project No. 1.14
NSF Grant No. Y/1.14/177

Principal Investigator: C. T. Elvey, Director

GEOPHYSICAL INSTITUTE

OF

UNIVERSITY OF ALASKA

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INTRODUCTION

Disturbance phenomena in the upper atmosphere over polar regions observed by widely different means are inter-related. However, the relationships between them are complex and as yet not fully established. Our understanding of the physical mechanisms involved in the disturbance is incomplete. The relation between solar activity and the polar atmospheric disturbance, as observed by the techniques developed in recent years, has been thoroughly explored.

The Geophysical Institute, which is ideally located for the study of such polar phenomena, has been operating all-sky cameras, spectroscopic and photometric instruments, auroral radars, a radio telescope for the measurement of cosmic radio noise absorption, and instruments measuring earth currents.

If properly defined, a system, or systems, of indices representing some aspect, or aspects, of the activities in each of these disciplines will undoubtedly be of great value in substantiating correlations between observational results obtained by the different techniques.

As a trial such indices have been prepared for the month of February of 1953 by those of the members of the Geophysical Institute who actually made the observations except for the all-sky camera data.

In this report following indices are presented:

(I) auroral radar
(II) earth currents
(III) ionospheric absorption of cosmic radio noise
(IV) spectroscopic indices, H_β and N_2^+
(VI) photometric indices

A short explanatory note is given for each discipline.

The indices are also collectively shown in a graph to facilitate a comparative study; in this representation solar flares of importance 2 and above, and magnetic K-indices for College are also shown. The solar flare data are based on the report in Solar-Geophysical Data, CRPL-F163 Part B, National Bureau of Standards. Magnetic K-indices for College were supplied by the U. S. Coast and Geodetic Survey.

Although several modifications and improvements have been considered in the derivation of the indices and in the presentation of them, it was felt that in a preliminary report the benefit of making the results available to other workers as early as possible and of inviting their suggestions and discussions surpasses that of making minor changes and improvements which are likely to delay the publication considerably. Therefore, the indices are presented in their original form, as was prepared by the individual workers.

A key to the indices used in the graph is given in page A-4.

Indices for the auroral radar at Farewell in the 400-600 km range are correlated with College K-indices more closely than those for the same station in the 200-400 km range and those for the radar at College. This relation is expected, because the records from Farewell in the 400-600 km range represent activity above College and its vicinity.

Earth-current indices are derived in a similar manner to magnetic K-indices; these two sets of indices vary nearly parrallel.

The ionospheric absorption of cosmic radio noise is much more closely related to the indices for the rapid fluctuations in earth currents than to the magnetic K-indices.

Indices for maximum auroral activity, spectroscopic and photometric measurements show the general trend of their activity; but, because of the limited length of time for the observations per day a direct comparison with other continuous records is difficult.

A possibility is being considered of issuing monthly summaries of the indices such as those given in this report for the whole of the IGY months.

It is a pleasure to acknowledge the assistance of Mrs. Sandra J. Fuller and Mr. Dan Wilder in preparing the diagrams.

C. T. Elvey

M. Sugiura

Key to the indices shown in the figure.

(i) Time is given in U.T.

(ii) Auroral radar: The indices given in the tables are summed in each three-hourly interval.

(iii) Earth currents: Table II is used for earth-current indices. The number of rapid fluctuations during each three-hourly interval, divided by 100, based on Table IV, is used for indices of earth-current rapid fluctuations.

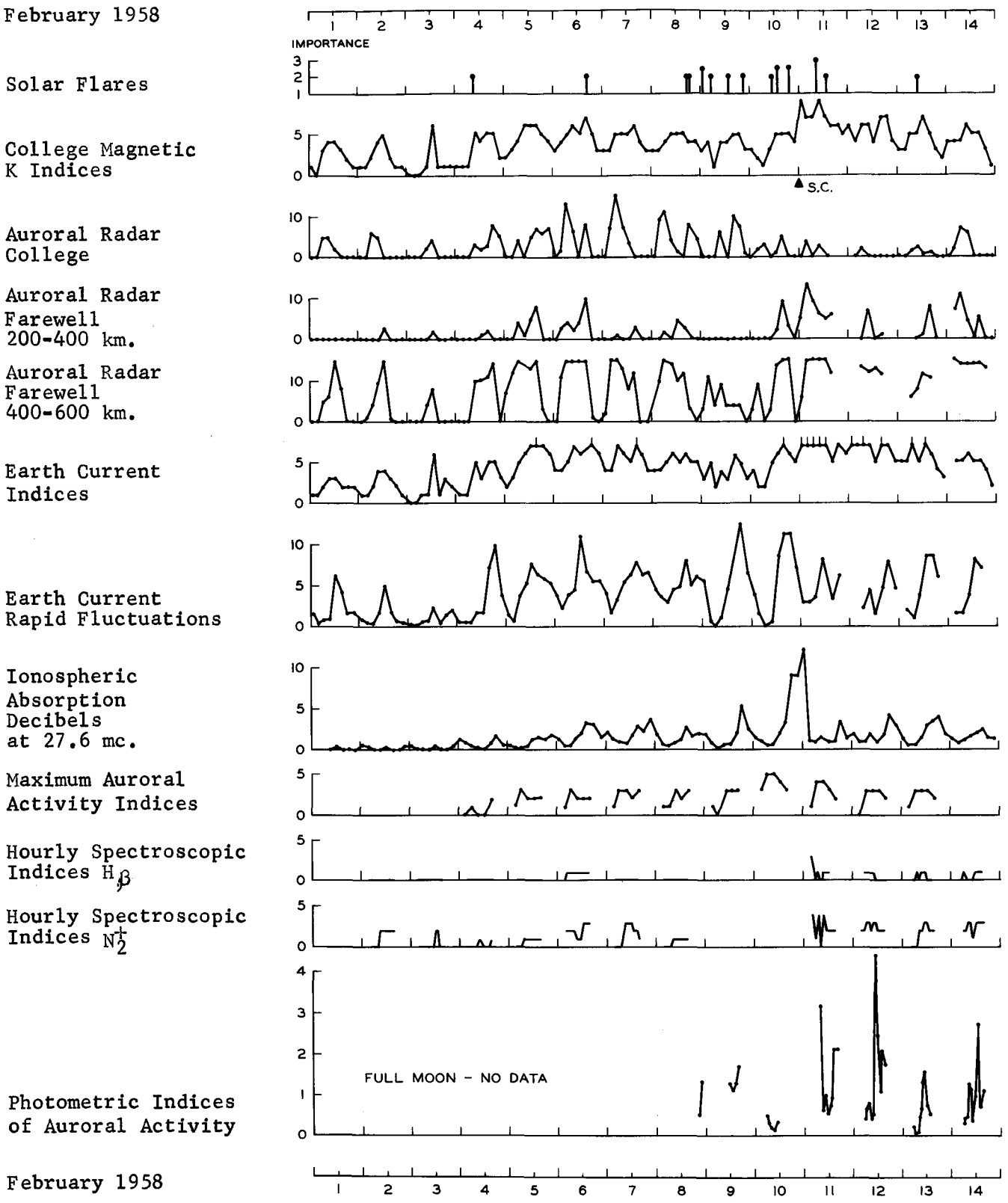
(iv) Ionospheric absorption of cosmic radio noise: mean of hourly indices for each three-hourly interval is plotted.

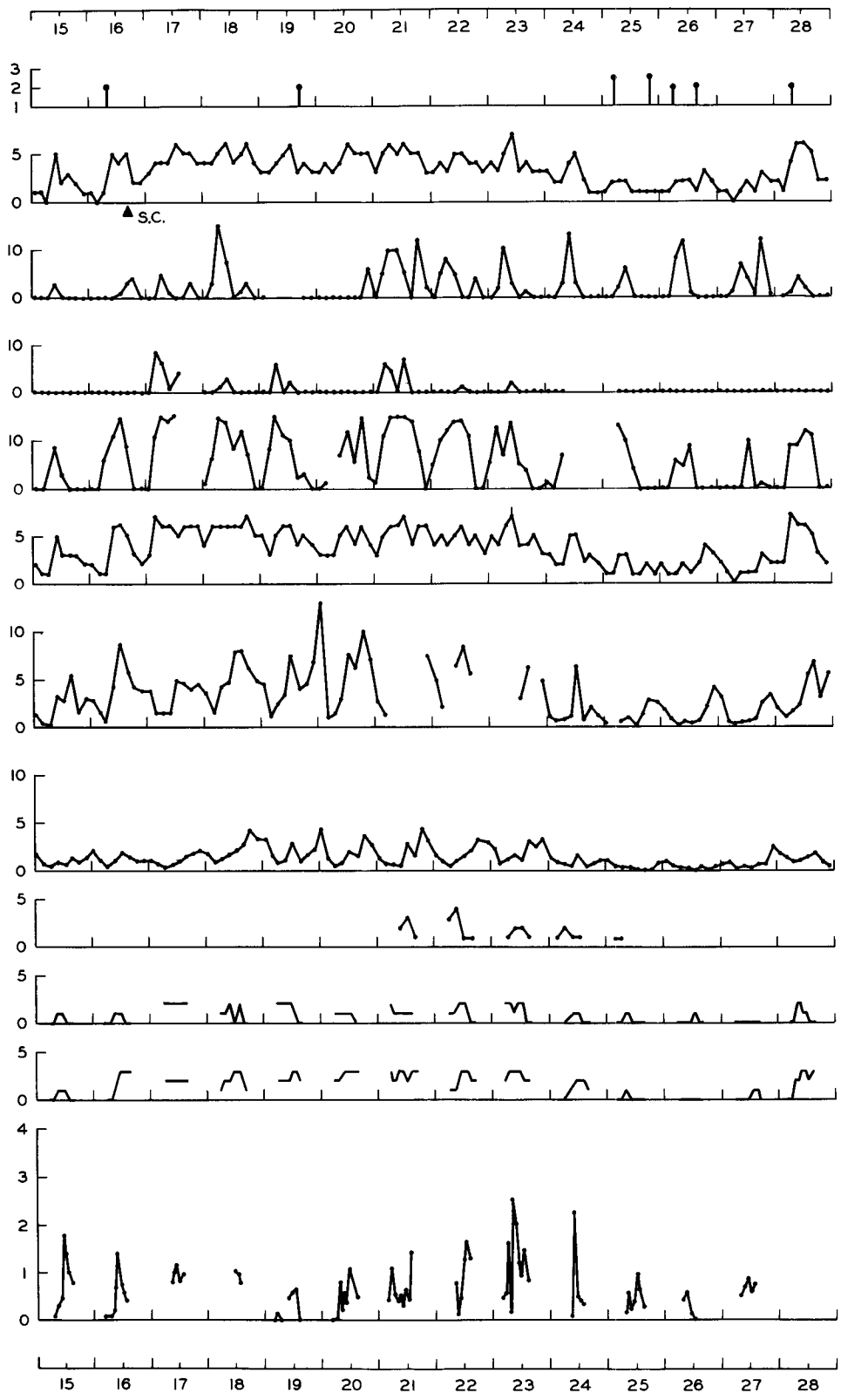
(v) Maximum auroral activity indices (all-sky camera): maximum of the quarter-hourly indices, given in Table II, is used.

(vi) Spectroscopic indices: hourly indices for $H\beta$ and N_2^+ are plotted.

(vii) Photometric indices: hourly indices given in Table I are used.

(viii) In the earth-current indices, dots with a verticle line indicate that the values represented by them are greater than those shown in the graph; they correspond to off-scale records in severe disturbances.


February 1958
1 2 3 4 5 6 7 8 9 10 11 12 13 14
IMPORTANCE
Solar Flares
College Magnetic K Indices
S.C.
Auroral Radar College
Auroral Radar Farewell 200-400 km.
Auroral Radar Farewell 400-600 km.
Earth Current Indices
Earth Current Rapid Fluctuations
Ionospheric Absorption Decibels at 27.6 mc.
Maximum Auroral Activity Indices
Hourly Spectroscopic Indices H_β
Hourly Spectroscopic Indices N_2^+
FULL MOON - NO DATA
Photometric Indices of Auroral Activity
February 1958


15 16 17 18 19 20 21 22 23 24 25 26 27 28
3
2
1
5
0
S.C.
10
0
10
0
10
0
5
0
10
5
0
10
5
0
5
0
5
0
5
0
4
3
2
1
0
15 16 17 18 19 20 21 22 23 24 25 26 27 28

HOURLY RADAR INDICES OF AURORAL ACTIVITY AT COLLEGE, ALASKA FOR FEBRUARY 1958

R. S. Leonard

The index of auroral activity as determined from the 41 Mc Auroral Radar is presented as three separate sets of hourly values. The first of these was made from the records of the College radar and should be considered as representing the activity in a region to the geomagnetic north of College extending roughly from Ft. Yukon (300 km Gm.N) to a point in the Arctic Ocean (1000 km Gm.N). The actual hourly values were determined by scaling the films for the number of minutes in each hour that auroral echoes were present at any range; the number of minutes per hour were then reduced to a six number index running from 0 to 5 in the following fashion:

0	to	10	minutes	0
11	"	20	"	1
21	"	30	"	2
31	"	40	"	3
41	"	50	"	4
51	"	60	"	5

Hours when the records are missing are noted by the letter C.

In order to obtain an index that would more nearly represent activity in the vicinity of College, the records from the Farewell radar (located approximately 400 km Gm.S of College) were scaled for the number of minutes in each hour that auroral echoes were present in the range interval from 200 to 400 km and in the range interval from 400 to 600 km. These two sets of numbers of minutes per hour were reduced to a six number index in the same way as the College data and are the second and third sets of hourly "radar indices". The second set (200 to 400 km range interval) refers to the region roughly between the College zenith and zenith angle of 45°S; the

third set (400-600 km range interval) refers to the region roughly between the College zenith and a zenith angle of 45°N.

These indices were prepared by specially scaling the film and were therefore rather time consuming; however, all the films will be scaled semi-automatically as to the number of echo minutes per hour in each 100 km range interval for each station and punched into IBM cards. Once the data is put into these cards the indices can be produced quickly and automatically.

SET No. 1
College, Alaska

Time U.T.	Date 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
00-01	0	0	0	0	0	0	0	0	0	0	0	C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	C
01-02	0	0	0	0	0	0	0	0	0	0	0	C	C	0	0	0	0	0	0	0	0	0	0	0	0	C	0	C
02-03	0	0	0	0	0	0	0	0	0	0	1	C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03-04	0	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	0	0	C	0	0	0	0	0	0	0	0	0
04-05	0	0	0	0	0	1	3	4	0	0	0	0	0	1	0	0	0	1	C	0	1	2	0	0	0	0	0	0
05-06	0	0	0	0	0	1	2	5	0	2	2	0	0	1	0	0	0	2	C	0	4	3	2	0	0	0	0	0
06-07	0	0	0	0	0	3	5	3	0	3	0	0	0	1	0	0	2	5	C	0	2	4	3	0	0	5	0	0
07-08	0	1	0	0	1	5	5	3	0	0	1	2	0	2	0	0	2	5	C	0	4	0	5	0	0	3	0	0
08-09	5	5	0	0	3	5	5	5	0	0	0	0	1	4	0	0	1	5	C	0	4	4	2	3	2	0	1	1
09-10	5	2	2	0	0	3	3	2	0	0	0	0	1	5	0	0	1	2	C	0	4	1	2	3	3	3	4	2
10-11	0	3	0	0	0	0	0	1	2	0	2	0	1	1	1	0	0	5	C	0	3	3	0	5	2	4	2	0
11-12	0	0	0	3	0	3	4	1	4	0	1	0	0	0	2	0	0	0	C	0	3	1	1	5	1	5	1	2
12-13	2	0	1	2	3	0	2	0	0	0	0	0	1	0	0	0	0	0	C	0	2	0	0	2	0	1	0	2
13-14	0	0	3	0	2	0	1	0	0	0	0	0	0	0	0	0	0	0	C	0	3	0	0	1	0	0	0	0
14-15	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	1	0	0	C	0	0	0	0	0	0	0	4	0
15-16	0	0	0	0	0	4	0	0	0	4	C	0	0	0	0	2	0	0	C	0	0	0	0	0	0	0	0	0
16-17	0	0	0	2	2	3	0	0	5	1	C	0	0	0	0	0	0	0	C	0	0	0	1	0	0	0	0	0
17-18	0	0	0	1	5	1	0	0	5	0	C	0	1	0	0	1	0	1	C	0	0	0	0	0	0	0	1	0
18-19	0	0	0	0	2	0	0	0	5	0	C	0	0	0	0	4	3	3	C	0	3	0	0	0	0	0	3	0
19-20	0	0	0	3	3	0	0	0	2	0	C	0	0	0	0	0	0	0	0	0	5	1	0	0	0	0	5	0
20-21	0	0	0	5	1	0	0	3	1	0	C	0	0	0	0	0	0	0	0	0	4	3	0	0	0	0	4	0
21-22	0	0	0	5	4	0	0	4	1	0	C	0	0	0	0	0	0	0	0	4	2	0	0	0	0	0	1	0
22-23	0	0	0	0	3	0	0	0	0	0	C	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0
23-24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

SET No. 2

Farewell, Alaska

200-400 km

Time	Date																											
U.T.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
00-01	0	0	0	0	0	0	0	C	0	0	0	C	C	C	0	0	0	0	0	0	0	0	0	0	C	0	0	0
01-02	0	0	0	0	0	0	0	C	0	0	1	C	C	C	0	0	0	0	0	0	0	0	0	0	C	0	0	0
02-03	0	0	0	0	0	0	0	C	0	0	4	C	C	C	0	0	0	0	0	0	0	0	0	0	C	0	0	0
03-04	0	0	0	0	0	0	0	C	0	0	4	C	C	0	0	0	0	0	0	0	0	0	0	0	C	0	0	0
04-05	0	0	0	0	0	2	0	0	0	0	5	C	C	2	0	0	3	0	0	0	1	0	0	0	C	0	0	0
05-06	0	0	0	0	0	1	0	0	0	0	3	0	C	5	0	0	5	0	0	C	5	0	0	0	0	0	0	0
06-07	0	0	0	0	2	1	0	0	0	0	2	0	C	5	0	0	1	0	5	C	4	0	0	0	0	0	0	0
07-08	0	0	0	0	2	3	0	2	0	0	4	0	0	3	0	0	3	0	1	0	0	0	0	0	0	0	0	0
08-09	0	0	0	0	0	0	1	0	0	0	3	0	1	3	0	0	2	1	0	0	1	0	0	0	0	0	0	0
09-10	0	0	0	0	0	1	0	0	0	0	1	1	0	2	0	0	0	3	0	0	0	0	1	0	0	0	0	0
10-11	0	0	0	0	0	0	0	0	0	0	3	4	0	0	0	0	1	0	0	0	0	0	1	C	0	0	0	0
11-12	0	0	0	0	1	1	0	0	0	0	2	2	0	2	0	0	0	0	0	0	0	0	0	C	0	0	0	0
12-13	0	0	2	0	4	2	0	0	0	0	3	0	0	0	0	0	0	0	1	0	1	0	0	C	0	0	0	0
13-14	0	1	0	0	1	1	0	0	0	1	1	0	1	0	0	0	2	0	1	0	3	1	0	C	0	0	0	0
14-15	0	2	0	1	0	1	0	5	0	1	1	0	0	0	0	0	2	0	0	0	3	0	0	C	0	0	0	0
15-16	0	0	0	2	1	4	1	3	0	1	3	0	3	0	0	0	C	0	0	0	0	0	0	C	0	0	0	0
16-17	0	0	0	0	5	5	2	0	0	5	3	0	5	4	0	0	C	0	0	0	0	0	0	C	0	0	0	0
17-18	0	0	0	0	2	1	0	0	0	3	0	1	0	1	0	0	C	0	0	0	0	0	0	C	0	0	0	0
18-19	0	0	0	0	0	0	0	0	0	1	0	2	0	0	0	0	C	0	0	0	0	0	0	C	0	0	0	0
19-20	0	0	0	0	0	0	0	0	0	2	C	C	0	0	0	0	C	0	0	0	0	0	0	C	0	0	0	0
20-21	0	0	0	0	0	0	0	0	0	0	C	C	C	0	0	0	C	0	0	0	0	0	0	C	0	0	0	0
21-22	0	0	0	0	0	0	0	0	0	0	C	C	C	0	0	0	C	0	0	0	0	0	0	C	0	0	0	0
22-23	0	0	0	0	0	0	0	0	0	0	C	C	C	0	0	0	C	0	0	0	0	0	0	C	0	0	0	0
23-24	0	0	0	0	0	0	0	0	0	0	C	C	C	0	0	0	C	0	0	0	0	0	0	C	0	0	0	0

Time U.T.	1	2	3	4	5	6	7	8	9	10	11	12
00-01	0	0	0	0	0	0	0	C	0	0	0	C
00-02	0	0	0	0	2	0	0	C	0	1	1	C
02-03	0	0	0	0	5	0	2	C	3	2	5	C
03-04	0	0	0	0	5	1	5	C	5	3	5	C
04-05	0	0	0	0	4	5	5	5	5	4	5	C
05-06	0	1	0	0	3	5	5	5	1	2	5	5
06-07	0	4	0	0	5	5	5	5	0	0	5	5
07-08	2	0	0	0	5	5	5	5	0	0	5	4
08-09	3	0	0	0	5	5	5	5	4	0	5	4
09-10	1	3	0	1	5	5	5	5	5	0	5	2
10-11	0	3	1	4	4	5	3	5	2	3	5	5
11-12	5	4	3	5	5	5	5	4	2	0	5	5
12-13	5	5	5	2	5	5	4	3	2	4	5	5
13-14	5	5	3	3	5	5	2	2	0	5	5	4
14-15	5	5	0	5	3	5	2	5	2	5	5	4
15-16	5	1	0	5	5	5	5	5	0	5	5	5
16-17	3	0	0	5	5	5	5	5	3	5	5	2
17-18	0	0	0	1	5	5	2	2	1	5	2	5
18-19	0	0	0	5	1	0	0	3	3	5	2	5
19-20	0	0	0	4	0	1	0	0	1	5	C	C
20-21	0	0	0	5	2	0	0	0	0	5	C	C
21-22	0	0	0	0	0	0	0	0	0	0	C	C
22-23	0	0	0	0	0	0	0	0	0	0	C	C
23-24	0	0	0	0	0	0	0	0	0	0	C	C

SET No. 3

Farewell, Alaska

400-600 km

Date

13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
C	C	0	0	0	0	0	0	0	0	0	0	C	0	0	0
C	C	0	0	0	0	0	0	0	2	2	0	C	0	0	0
C	C	0	0	0	1	0	0	1	3	4	1	C	0	0	0
C	5	0	0	1	1	0	0	1	1	5	0	C	0	0	0
C	5	0	0	5	3	3	1	5	4	5	0	C	0	0	0
C	5	0	0	5	2	5	C	5	5	3	0	1	0	0	0
C	5	0	3	5	5	5	C	5	5	3	0	5	3	0	0
1	5	0	1	5	5	5	5	5	5	1	2	3	3	0	4
5	4	0	2	5	5	5	0	5	2	3	5	5	0	0	5
3	4	1	2	5	5	5	2	5	4	5	5	5	0	0	3
1	5	3	4	5	5	5	3	5	5	4	C	1	0	0	1
4	5	5	5	4	4	1	2	5	5	5	C	4	5	0	5
5	5	0	5	5	3	5	2	5	4	4	C	4	5	5	5
5	5	1	5	5	3	4	5	5	5	0	C	0	3	5	2
4	4	2	5	5	2	1	5	5	5	1	C	0	1	0	5
5	5	0	5	C	4	1	3	4	5	0	C	0	0	0	5
5	5	0	2	C	5	1	0	5	5	4	C	0	0	0	5
3	4	0	2	C	3	0	2	5	1	0	C	0	0	0	1
2	0	0	0	C	5	3	5	4	0	0	C	0	0	1	0
0	0	0	0	C	2	0	5	4	0	0	C	0	0	0	0
C	0	0	0	C	0	0	5	0	0	0	C	0	0	0	0
C	0	0	0	C	0	0	2	0	0	0	C	0	0	0	0
C	0	0	0	C	0	0	0	0	0	0	C	0	0	0	0
C	0	0	0	C	0	0	0	0	0	0	C	0	0	0	0

HOURLY INDICES OF GEOELECTRIC AND MAGNETIC ACTIVITY AT COLLEGE, ALASKA FOR FEBRUARY 1958

V. P. Hessler

The earth potential indices presented herein were derived from earth potential records taken with a Brown Electronik recording potentiometer connected to a pair of geographic North-South electrodes spaced 300 ft. Since the earth potential fluctuations are quite directive along a line about 30° west of north, the North-South records give a good measure of amplitude activity. Hourly values of the earth potential arithmetic range in mv/km were scaled in a manner similar to that used in scaling magnetic K-indices. By range is meant the difference between the greatest positive and negative departure from an arbitrarily assigned zero trace(the diurnal variation is negligible in comparison with disturbances at College).

The earth potential indices of Table I were derived from the hourly scalings according to the following schedule which is identical with the College gamma to K-index schedule.

Earth Potential Indices

Index	mv/km
0	0 - 25
1	25 - 50
2	50 - 100
3	100 - 200
4	200 - 350
5	350 - 600
6	600 - 1000
7	1000 - 1650
8	1650 - 2500
9	> 2500

Indices tabulated as $>$ 7 correspond to hours in which the recorder with a maximum range of 1350 mv/km pegged at both ends of the scale.

Earth potential indices for three hour periods are given in Table II. These indices were determined exactly as the hourly indices except for scaling over three-hour periods, corresponding to the K-index scaling periods.

For convenient reference, the College K-indices as determined by the Coast and Geodetic Survey Magnetic Observatory are given in Table III.

Studies at the Geophysical Institute indicate that the occurrence of earth potential rapid fluctuations is of considerable significance as a measure of ionospheric activity. Data concerning rapid fluctuations are presented in Table IV. The tabulated frequency values must be multipled by 10 to obtain the number of cycles per hour. The trace from which these data are obtained consists of a series of pips recorded on the edge of the earth potential record with an operation pen. The pen is energized by a 10-point stepping relay which in turn is operated by a sensitive microswitch coupled to the potentiometer pen drive shaft through a sliding clutch. This equipment is sensitive to a 5 mv/km earth potential reversal at any part of the potentiometer scale. Scaling is done by counting the number of pips recorded by the operations pen per hour.

TABLE I

EARTH POTENTIAL INDICES

February 1958 Observatory: Geophysical Institute College, Alaska

Hour (Universal Time)

Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	1	1	1	1	1	0	0	3	3	2	2	3	4	3	3	3	2	1	2	2	2	2	1	2
2	1	1	1	1	0	1	2	1	1	3	4	3	2	4	4	2	2	2	1	2	1	1	1	1
3	1	0	0	0	0	0	0	0	1	2	1	1	6	3	1	1	1	1	2	1	3	2	2	2
4	1	0	1	1	1	1	1	1	1	0	2	5	3	2	3	5	5	4	4	5	4	3	2	2
5	2	2	2	3	2	3	3	5	5	4	4	6	7	5	5	4	>7	7	5	5	7	6	5	5
6	4	4	3	3	4	4	3	3	5	4	>6	6	6	5	6	>7	>7	>7	6	7	3	4	6	4
7	3	4	2	3	2	4	3	3	7	6	4	5	5	3	4	5	7	6	4	6	5	3	4	3
8	3	4	4	3	4	3	4	5	4	6	5	4	3	3	5	6	5	6	3	4	4	4	4	3
9	3	3	3	3	5	2	1	1	2	2	3	4	3	3	2	5	6	4	5	5	4	3	3	4
10	4	4	2	2	2	2	2	1	1	0	5	3	3	6	5	5	>7	7	6	6	6	5	5	3
11	4	>7	>7	>7	>7	>7	>7	>7	6	6	>7	>6	>7	7	6	5	5	5	>7	7	7	6	6	6
12	>7	6	>7	5	5	7	6	7	4	5	6	6	5	3	3	4	6	7	>7	7	6	6	5	5
13	5	3	-	5	3	2	1	1	>7	5	4	5	7	6	4	6	6	4	3	4	4	-	2	3
14	3	-	-	4	5	4	4	3	5	5	5	6	5	5	4	5	5	5	3	3	2	1	2	1
15	2	1	1	1	0	0	0	1	0	3	5	5	3	2	2	2	3	3	3	2	2	2	2	1
16	1	2	1	1	1	1	1	1	1	2	5	6	6	5	4	3	5	4	3	3	3	2	2	2
17	2	3	2	3	3	7	4	3	6	4	4	5	5	6	4	4	4	6	6	5	4	6	3	3
18	3	4	4	3	3	6	5	4	6	6	6	5	6	6	4	6	6	5	6	6	5	4	4	5
19	5	4	3	3	3	3	5	4	4	4	6	6	6	6	4	3	3	4	5	4	3	4	3	3
20	3	3	3	2	2	3	3	3	2	5	4	3	5	6	6	4	3	4	5	6	5	4	4	3
21	3	2	2	2	4	5	5	6	5	4	3	6	6	7	6	4	4	4	6	5	5	4	6	5
22	4	3	3	3	5	4	4	3	3	5	5	4	5	6	5	4	3	3	5	5	4	3	3	3
23	4	4	4	3	4	3	5	6	5	6	6	>7	4	2	3	4	4	3	5	4	2	4	3	2
24	2	2	3	2	2	1	1	1	2	3	4	3	5	5	3	1	1	2	2	2	3	1	1	2
25	0	1	0	1	0	2	3	1	3	3	3	1	1	1	0	1	1	1	1	2	2	1	1	1
26	1	1	2	1	1	1	2	1	1	2	2	2	1	1	1	1	2	2	2	3	4	3	2	2
27	2	2	1	1	0	0	0	1	0	1	2	1	1	2	2	2	2	2	4	3	4	3	3	2
28	2	2	1	1	2	2	2	2	7	5	2	6	6	4	4	5	4	3	2	3	3	2	2	2

TABLE II

GEOELECTRIC ACTIVITY - EARTH POTENTIAL INDICES

February 1958 Observatory: Geophysical Institute College, Alaska

Date	Hour (Universal Time) 00-03	03-06	06-09	09-12	12-15	15-18	18-21	21-24	Sum
1	1	1	2	3	3	2	2	2	16
2	1	1	2	4	4	3	2	1	18
3	0	0	1	1	6	1	3	2	14
4	1	1	1	5	3	5	5	3	24
5	2	3	5	6	7	>7	7	6	43
6	4	4	5	7	6	>7	>7	6	46
7	4	4	7	6	5	>7	6	4	43
8	4	4	5	6	5	6	5	5	40
9	3	5	2	4	3	6	5	3	31
10	4	2	2	5	6	>7	6	5	37
11	>7	>7	>7	>7	>7	5	>7	6	53
12	>7	7	>7	7	5	>7	>7	5	52
13	5	5	>7	5	>7	6	4	3	42
14	-	5	5	6	5	5	4	2	32
15	2	1	1	5	3	3	3	2	20
16	2	1	1	6	6	5	3	2	26
17	3	7	6	6	5	6	6	6	45
18	4	6	6	6	6	6	7	5	46
19	5	3	5	6	6	4	5	4	38
20	3	3	3	5	6	4	6	4	34
21	3	5	6	6	7	4	6	6	43
22	4	5	4	5	6	4	5	3	36
23	5	4	6	>7	4	4	5	3	38
24	3	2	2	5	5	2	3	2	23
25	1	1	3	3	1	1	2	1	13
26	2	1	1	2	1	2	4	3	16
27	2	1	0	1	2	2	4	3	15
28	2	2	7	6	6	5	3	2	33

TABLE IV

EARTH POTENTIAL RAPID FLUCTUATIONS (Cycles per hour/10)

February 1958 Observatory: Geophysical Institute College, Alaska

Hour (Universal Time)

Day	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	7	5	3	2	1	0	0	2	6	2	2	5	16	22	22	22	13	7	4	5	5	4	6	7
2	4	2	2	3	0	1	2	0	1	4	10	5	7	20	23	9	6	3	3	3	2	0	3	3
3	1	1	0	0	0	1	0	1	3	3	1	1	10	9	2	1	0	2	2	7	6	6	7	7
4	3	1	1	1	2	0	1	1	0	0	3	13	9	4	3	32	30	9	21	44	32	18	12	7
5	7	4	2	3	2	2	6	14	17	17	17	19	26	32	19	22	23	16	11	16	32	27	23	13
6	14	11	13	8	7	7	11	16	12	9	8	28	41	39	31	30	17	19	22	19	12	14	17	25
7	23	10	7	7	4	7	8	15	10	18	22	15	26	18	18	27	28	23	11	18	37	29	23	15
8	16	13	17	8	10	19	12	8	10	18	20	9	5	12	32	33	26	21	16	10	25	33	16	13
9	15	21	19	2	3	2	0	1	1	0	4	9	21	11	15	28	31	30	33	47	44	34	19	13
10	16	15	8	11	4	1	0	1	0	0	4	1	19	34	34	37	36	40	37	38	39	37	24	10
11	4	13	12	13	9	7	11	12	12	33	35	15	31	13	16	17	7	11	20	24	19	16	7	—
12	—	9	5	—	4	3	6	9	8	3	21	20	7	2	5	16	11	20	46	25	9	16	15	15
13	14	9	—	11	7	2	1	1	8	13	14	12	33	32	21	34	31	21	14	26	20	—	11	10
14	10	—	—	3	5	11	11	4	3	6	5	26	35	24	22	14	26	31	15	—	5	5	6	5
15	6	2	4	2	1	2	1	0	1	1	11	21	18	4	5	7	24	22	7	2	5	10	10	11
16	11	8	9	5	4	3	3	1	2	2	8	31	32	31	25	32	19	6	10	12	20	17	11	11
17	13	15	8	5	5	5	3	3	9	3	2	11	17	24	8	10	15	20	16	10	13	21	12	11
18	11	9	15	3	3	9	19	14	10	4	15	28	28	31	20	29	26	23	28	20	13	11	16	21
19	18	21	6	4	3	5	10	10	5	8	9	19	24	27	22	7	18	17	17	18	8	15	24	30
20	51	43	35	4	3	4	7	4	3	6	14	10	16	31	29	20	16	26	32	33	35	26	30	14
21	13	8	7	4	3	6	16	12	—	—	—	—	—	—	—	—	—	—	—	32	31	26	24	26
22	30	13	6	11	2	7	—	—	7	15	22	27	25	35	24	19	16	18	—	—	—	—	—	—
23	—	—	—	—	—	—	—	—	—	—	8	23	18	3	8	16	33	14	19	16	—	18	20	12
24	4	5	2	1	3	2	2	2	3	2	4	5	32	27	5	1	2	3	7	9	6	3	5	3
25	2	2	1	—	—	3	1	2	3	3	3	2	1	1	0	3	2	6	6	9	14	6	12	8
26	10	4	3	4	2	2	1	1	1	2	3	1	1	2	1	1	2	3	5	6	9	14	16	12
27	13	11	8	4	1	0	1	0	1	1	1	1	0	3	2	2	2	2	6	10	11	13	8	13
28	9	5	4	3	4	3	2	4	11	7	2	15	22	10	23	32	26	11	8	9	12	17	18	20

HOURLY IONOSPHERIC ABSORPTION AT COLLEGE, ALASKA FEBRUARY 1958

Harold Leinbach

The average absorption expressed in decibels, is given for each hourly interval of the day, 150° West Meridian Time. (To obtain U.T., ~~subtract~~ add 10 hours.)

The basic data is obtained by a riometer recording cosmic noise at 27.6 Mc, using a wide beam antenna (60° x 100° to half-power points) directed towards the zenith.

The amount of ionospheric absorption (in decibels) is computed by taking the logarithm of the ratio of the cosmic noise power received to that received on an ionospherically quiet day at the same sidereal time. The quiet day cosmic noise curve is compiled from the least disturbed days of each month.

The absorption in decibels is proportional to the product of the electron density and the electron collisional frequency integrated throughout the absorbing region(1);

$$A\ (db) \propto \int N\nu\, ds$$

The absorption index thus gives a measure of the average value of $\int N\nu\, ds$ over the period of an hour.

(1) This formula is valid when the observing frequency is much larger than the electron collisional frequency. For the case of a standard atmosphere, this formula applies at 27.6 Mc for heights greater than 60 km.

The diurnal variation of absorption can be obtained from a monthly table of the absorption index. Fig. 1 shows the monthly average diurnal curve for February 1958, as well as the diurnal curves for the five most disturbed days and the five least disturbed days of the same month. Daily sums of the absorption index give a measure of the overall degree of absorption activity for each day (see Fig. 2).

HOURLY MEAN VALUE OF ZENITHAL IONOSPHERIC ABSORPTION
(IN DECIBELS AT 27.6 MC)

February 1958 — 150° West Meridian — College, Alaska

Date	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	0.2	0.2	0.5	0.4	0.3	0.2	0.2	0.1	0.2	0.2	0.2	0.1	0.4	0.2	0.3	0.7	1.0	0.6	0.2	0.2	0.1	0.0	0.2	0.3
2	0.2	0.2	0.2	0.2	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.4	0.6	0.4	0.4	0.4	0.2	0.1	0.0	0.0	0.0	0.0	0.0
3	0.0	0.0	0.4	0.1	0.0	0.0	0.0	0.0	0.1	0.2	0.1	0.3	0.5	0.8	0.8	1.4	1.8	1.5	0.7	0.6	0.4	0.4	0.3	0.2
4	0.3	0.4	0.2	0.1	0.1	0.9	1.1	0.4	0.5	3.5	1.8	0.4	0.5	0.7	0.8	0.4	0.5	0.7	0.2	0.3	0.3	0.2	0.5	0.4
5	0.4	0.5	1.6	1.5	0.9	0.6	2.5	1.8	1.1	0.4	2.3	2.5	2.1	1.0	1.4	0.8	1.1	0.7	0.2	0.4	0.4	0.5	0.6	0.6
6	0.5	3.6	3.0	1.3	1.7	3.8	3.7	2.9	4.9	2.7	1.7	1.0	1.0	2.1	2.9	1.5	1.8	1.9	0.8	0.8	0.7	0.8	1.2	1.4
7	0.7	0.7	1.7	2.0	1.1	1.5	4.1	3.4	1.3	1.1	4.6	5.3	4.1	2.2	2.2	1.9	1.7	1.0	0.5	0.5	0.4	0.9	0.5	0.9
8	1.3	0.6	0.5	0.5	2.4	2.5	3.0	2.6	2.6	1.0	1.9	2.9	2.2	1.2	1.4	2.4	1.8	1.0	0.5	0.4	0.3	0.1	0.4	0.5
9	0.5	0.7	1.0	0.4	0.5	1.1	2.5	2.3	3.6	4.3	8.3	4.1	2.0	1.4	1.4	1.3	1.3	1.8	0.9	0.5	0.7	0.6	0.6	0.6
10	0.7	0.7	1.0	2.9	2.3	2.7	3.0	4.3	11.4	7.8	8.3	9.6	7.8	9.7	14.5	17.4	5.2	1.5	1.3	0.7	0.8	1.2	0.9	0.9
11	2.2	1.4	0.9	1.1	0.9	1.1	1.1	1.3	4.9	3.2	2.7	1.0	0.9	2.1	3.2	1.6	1.2	1.0	1.3	0.7	0.8	1.2	0.9	0.9
12	2.0	2.7	1.2	0.6	0.7	1.7	1.5	2.1	6.3	4.3	2.7	3.9	2.9	2.0	1.7	1.1	0.7	0.5	0.6	0.5	0.6	0.6	1.0	1.6
13	1.2	1.2	5.3	1.9	1.9	2.2	5.5	2.8	4.2	3.6	3.6	2.0	1.6	1.7	1.5	1.9	0.9	0.9	0.9	1.0	1.0	1.2	0.8	0.9
14	0.9	2.9	2.5	1.9	1.5	1.5	2.0	3.6	2.0	1.2	1.2	1.3	1.2	1.6	1.3	1.2	2.5	1.0	0.7	0.5	0.6	0.7	0.5	0.5
15	0.6	1.4	0.8	0.7	0.5	0.5	1.8	1.9	1.0	1.0	1.1	1.2	1.6	1.7	2.2	2.3	2.0	1.4	1.1	0.6	0.5	0.5	0.5	0.5
16	0.9	1.9	2.4	2.0	1.4	1.8	1.4	1.2	1.3	1.1	0.9	1.0	1.1	1.2	1.1	0.9	1.0	0.8	0.6	0.6	0.5	0.5	0.6	0.7
17	0.7	0.6	1.0	1.4	1.0	1.1	1.1	3.0	2.0	1.4	2.0	3.6	2.2	1.2	1.0	1.8	2.6	1.3	0.7	0.8	1.2	1.1	1.2	1.2
18	1.9	2.0	1.8	3.4	1.0	2.7	2.7	2.8	3.8	4.1	4.3	3.0	4.3	2.8	2.7	3.9	3.6	2.3	1.5	0.6	0.6	0.9	0.9	0.8
19	1.3	0.8	3.0	3.8	1.6	0.5	0.6	1.5	1.4	2.3	0.8	1.8	2.3	2.1	4.4	4.8	3.8	2.3	0.8	0.4	0.5	0.5	0.5	0.9
20	0.9	0.6	0.5	2.1	3.4	1.5	0.7	2.2	2.7	3.5	4.6	2.3	3.7	1.6	1.4	0.9	1.4	1.2	0.7	0.5	0.5	0.5	0.9	0.5
21	0.4	0.5	1.8	4.3	2.1	1.3	1.3	1.9	6.3	3.7	3.7	2.3	3.3	3.7	2.2	0.9	1.1	1.8	0.7	0.4	0.4	0.5	0.7	0.7
22	1.4	1.4	0.6	3.0	1.5	1.4	1.6	3.3	3.3	4.1	2.9	3.0	2.5	3.5	2.8	2.2	1.2	1.0	0.5	0.4	0.5	1.4	1.2	1.4
23	0.9	2.7	1.1	1.2	0.7	2.0	2.9	4.0	3.4	2.7	1.3	2.4	3.1	2.4	2.0	1.2	0.8	0.5	0.8	1.5	1.3	0.6	0.3	0.3
24	0.7	0.6	1.9	1.6	0.7	0.3	0.2	0.3	0.4	0.8	0.8	0.9	1.0	1.1	0.9	0.7	0.7	0.7	0.3	0.1	0.3	0.3	0.4	0.4
25	0.5	0.3	0.3	0.1	0.1	0.0	0.1	0.2	0.1	0.1	0.2	0.5	0.7	0.9	0.9	0.8	1.1	1.0	0.4	0.1	0.2	0.3	0.3	0.3
26	0.3	0.2	0.2	0.1	0.1	0.3	0.1	0.2	0.2	0.1	0.0	0.2	0.5	0.6	--	--	0.6	0.9	0.7	0.5	0.3	0.3	0.3	0.2
27	0.3	0.3	0.2	0.4	0.3	0.3	0.4	0.4	0.4	0.7	0.5	1.6	2.8	2.7	2.4	1.5	0.9	1.0	1.3	1.3	1.1	0.6	0.7	0.7
28	0.9	1.4	2.2	0.6	1.0	2.2	1.6	1.0	0.5	0.9	0.6	0.5	0.4	0.5	0.3	0.7	1.6	1.1	0.7	0.8	0.5	0.3	0.3	0.3

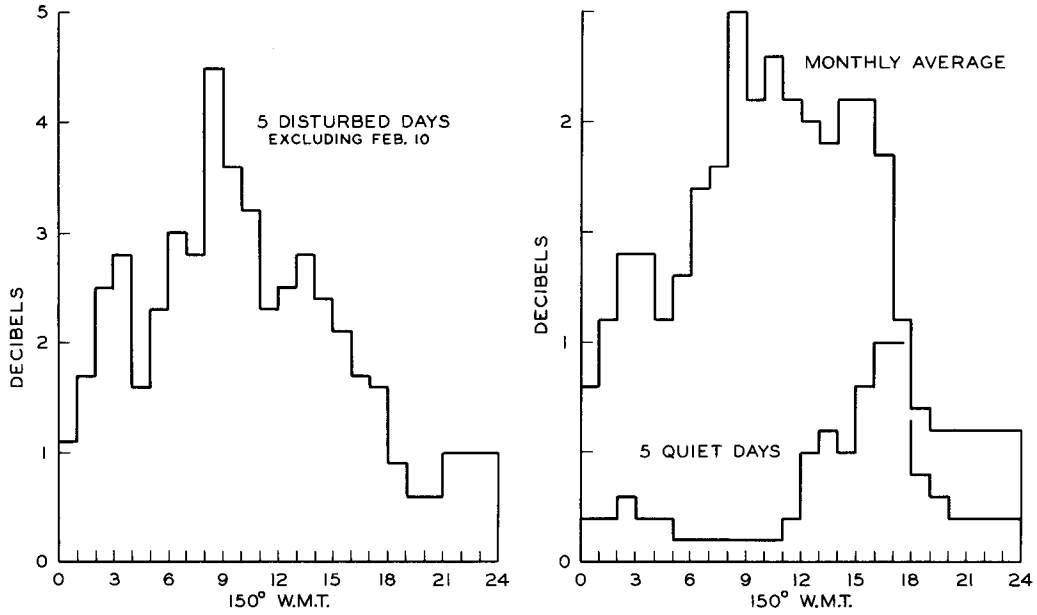


Fig. 1. Diurnal Variation of Hourly Mean Absorption.

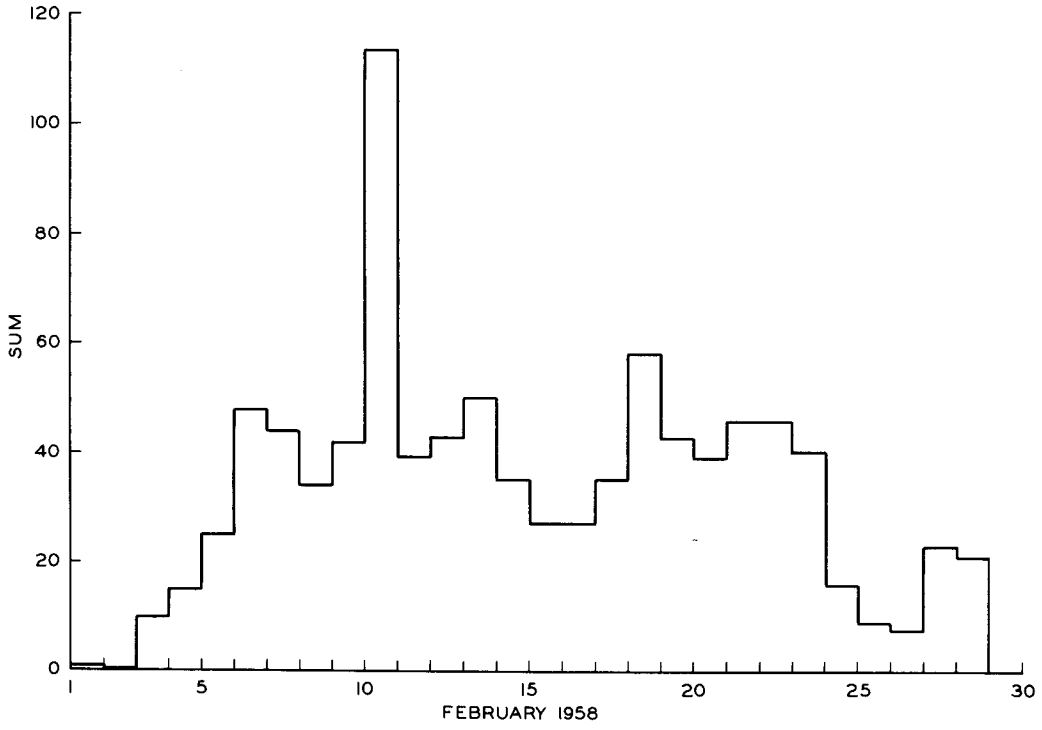


Fig. 2. Daily Sum of Absorption Index.

HOURLY PHOTOMETRIC INDICES OF AURORAL ACTIVITY AT COLLEGE, ALASKA FOR FEBRUARY 1958

W. Murcray

These are scalings from the photometer readings through the 3914 filter, 5° field, pointed at zenith, arbitrary units representing relative zenith intensity. Scalings in first column are average values of 3914 radiation over first 15 minutes of the hour given at the head of the page. Second column is second 15 minutes and so on, as marked at bottom of column. Numbers at left of page refer to day of month.

$>$ sign means that photometer was off scale part of the time and the number given is a lower limit.

Scaling time, with no corrections, a reasonably good operator should do a months data in about four days. Computing corrections would require one day a month for a scientist. Operating photometers requires reasonably skilled personnel.

Missing data around the first of the month due mainly to moonlight. Most of it could probably be used after corrections (full moon, 4 Feb.).

TABLE I

HOURLY PHOTOMETRIC INDICES OF AURORAL ACTIVITY

February 1958 — Local Time — College, Alaska

Date	1900-2000	2000-2100	2100-2200	2200-2300	2300-0000	0000-0100	0100-0200	0200-0300	0300-0400	0400-0500
1										
2										
3										
4										
5										
6										
7	45	--	--	55	130	--	--	--	--	--
8	--	--	--	--	--	--	132	114	134	175
9	55	32	22	18	28	--	--	--	--	--
10	96	--	> 316	~ 62	97	54	76	94	216	216
11	38	65	80	41	51	> 441	245	110	225	176
12	18	11	8	45	61	128	> 160	76	62	51
13	32	42	44	125	114	31	96	272	69	109
14	14	--	--	15	31	46	181	139	105	80
15	12	8	9	--	22	75	138	77	60	37
16	--	--	--	40	--	79	98	115	78	99
17	45	--	--	19	--	--	--	112	108	81
18	2	15	7	4	6	--	54	58	66	0
19	0	0	0	79	22	56	37	113	111	45
20	46	69	110	52	39	52	23	68	45	150
21	25	32	27	--	79	17	47	129	171	128
22	51	54	164	15	254	197	122	88	152	81
23	9	9	10	--	14	168	> 210	49	42	27
24	--	--	--	18	59	23	32	87	59	33
25	36	35	17	--	44	57	14	0	0	0
26	--	--	--	71	--	56	68	86	58	66
27	--	--	--	--	42	--	--	--	--	--
28	--	--	--	--	--	31	116	97	12	55

TABLE II

1/4 HOURLY PHOTOMETRIC INDICES OF AURORAL ACTIVITY

February 1958 — Local Time — College, Alaska

Date	1900 - 2000				2000 - 2100				2100 - 2200				2200 - 2300				2300 - 0000			
1																				
2																				
3																				
4																				
5																				
6																				
7	9	11	11	14	13	12	14	--	--	--	--	34	23	11	10	11	17	28	48	37
8	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
9	17	15	13	10	8	8	8	8	7	4	6	5	4	4	4	6	6	6	8	8
10	48	28	14	6	8	--	--	--	>96	92	66	62	32	10	12	8	7	7	50	33
11	8	8	9	12	18	12	15	20	28	36	9	7	7	14	10	10	10	15	16	10
12	5	5	4	4	4	4	4	3	3	3	2	0	2	3	21	19	21	14	15	11
13	7	7	8	10	11	11	9	11	8	5	7	24	10	11	32	72	30	44	27	13
14	3	4	4	3	3	4	--	--	--	--	--	--	10	10	10	10	8	8	8	12
15	3	3	3	3	2	2	2	2	3	2	2	2	3	3	4	5	6	5	4	7
16	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
17	8	10	12	15	16	--	6	5	6	--	--	7	5	6	1	12	--	--	--	--
18	0	0	0	2	3	9	2	1	2	1	2	2	2	7	7	3	0	0	3	3
19	0	0	0	0	0	0	0	0	0	0	0	0	3	1	0	0	2	1	0	19
20	11	12	16	16	17	17	18	17	10	4	20	76	32	18	16	13	11	11	11	6
21	4	6	5	7	8	8	9	7	7	7	6	7	8	8	7	29	17	14	19	29
22	13	15	13	10	9	7	13	25	38	43	34	49	--	--	--	--	62	62	66	64
23	3	2	2	2	2	2	3	2	2	2	2	4	5	4	3	3	2	3	4	5
24	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	14	16	14	15
25	11	10	8	8	9	9	8	9	9	8	0	0	0	4	6	8	8	10	12	14
26	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
27	--	--	--	--	--	--	--	--	--	--	--	--	24	14	17	16	13	13	8	8
28	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

TABLE II (CONT'D)

1/4 HOURLY PHOTOMETRIC INDICES OF AURORAL ACTIVITY

February 1958 — Local Time — College, Alaska

Date	0000 - 0100				0100 - 0200				0200 - 0300				0300 - 0400				0400 - 0500			
1																				
2																				
3																				
4																				
5																				
6																				
7																				
8	19	--	--	17	36	38	28	30	26	26	30	32	34	30	30	40	39	38	46	52
9	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
10	10	10	18	16	18	20	18	20	20	20	26	28	58	88	44	26	34	58	54	70
11	30	31	>100	280	~108	60	44	33	33	29	29	19	27	46	100	52	22	26	36	92
12	27	34	30	37	50	~60	28	22	22	18	20	16	18	16	14	14	13	11	12	15
13	9	7	7	8	8	19	26	43	54	78	88	52	27	9	12	26	37	30	19	23
14	8	7	9	22	64	64	36	17	27	52	38	22	16	28	40	21	13	26	26	15
15	16	16	17	26	42	38	33	25	20	20	19	18	17	15	15	13	12	10	8	7
16	18	21	22	18	20	29	27	28	28	30	27	30	27	20	16	15	16	26	25	32
17	--	--	--	--	--	--	--	--	34	29	22	27	20	27	30	31	21	20	20	20
18	--	34	28	32	18	11	13	12	12	4	14	28	24	24	16	2	0	0	0	0
19	6	18	21	11	9	5	3	20	28	13	36	36	34	29	29	19	20	15	9	1
20	17	8	16	11	8	2	4	9	12	4	40	12	4	2	13	26	36	46	30	38
21	5	5	5	2	0	0	24	23	54	19	19	37	45	26	47	53	43	22	34	29
22	37	41	61	58	25	31	34	32	28	13	12	35	36	54	30	32	17	12	26	26
23	40	16	40	72	> 90	>90	20	10	10	13	14	12	11	11	10	10	8	6	6	7
24	5	7	6	5	9	7	7	9	21	27	26	13	21	14	13	11	11	9	7	6
25	19	16	14	8	6	4	2	2	0	0	0	0	0	0	0	0	0	0	0	0
26	16	15	12	13	16	20	16	16	26	20	22	18	16	14	14	14	15	17	16	18
27	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
28	7	7	8	9	11	19	36	50	33	30	21	13	3	1	2	6	9	14	19	13

HOURLY SPECTROSCOPIC INDICES OF AURORAL ACTIVITY AT COLLEGE, ALASKA

FEBRUARY 1958

Gerald J. Romick

These data were taken from spectroscopic plates exposed in a Huet C-1 flint glass prism f/0.7 moving plate spectrograph. The instrument monitors an eleven degree field centered on the magnetic zenith. Effective exposures of one hour result from the selected combination of plate motion and slit length.

The enclosed table contains eye estimates of the hourly intensity of the N_+^2 (4709 A) and Hβ (4861 A) lines for the month of February, 1958. A scale of 0-5 was used with 0 indicating weak to zero intensity of the spectrum line. The original plates enlarged twenty times were viewed through a plastic, time graduated, overlay, this procedure permitted the reduction of the month's data in four hours.

In the future this task could probably be relegated to non-technical personnel after due familiarization.

Hourly Indices of Auroral Intensity Bas

Plate #	Date	18:00 -19:00		19:00 -20:00		20:00 -21:00		21:00 -22:00		22:00 -23:00	
	Feb. '58	H	N + 2	H	N + 2	H	N + 2	H	N + 2	H	N + 2
604	1/2	0	0	0	0	0	0	0	0	0	2
605	2/3	0	0	0	0	0	0	0	0	0	0
606	3/4	0	0	0	0	0	0	0	0	0	0
607	4/5	0	0	0	0	0	0	0	1	0	1
608	5/6	0	2	1	2	1	2	1	2	1	1
609	6/7	0	0	0	0	0	0	0	0	0	3
610	7/8	0	0	0	0	0	0	0	1	0	1
612	10/11	3	4	2	3	0	1	1	4	0	0
613	11/12			1	2	1	2	1	3	1	3
614	12/13			0	0	0	0	0	0	1	2
615	13/14			0	2	1	2	0	2	0	3
616	14/15			0	0	0	0	0	1	1	1
617	15/16			0	0	0	0	0	0	1	1
618	16/17			2	2	2	2	2	2	2	2
619	17/18			1	1	1	2	1	2	1	2
620	18/19			2	2	2	2	2	2	2	2
621	19/20			1	2	1	2	1	2	1	2
622	20/21			2	3	1	2	1	2	1	3
623	21/22			1	1	1	1	1	1	1	2
624	22/23			2	2	2	3	2	3	1	3
625	23/24			0	0	0	0	1	1	1	1
626	24/25			0	0	0	0	0	0	1	1
627	25/26			0	0	0	0	0	0	0	0
628	26/27			0	0	0	0	0	0	0	0
629	27/28			0	0	0	0	2	2	2	2
630	28/Mar. 1			0	0	0	0	0	0	0	0

ed on Spectroscopic Data (150° West Meridian Time)

23:00 -00:00		00:00 -01:00		01:00 -02:00		02:00 -03:00		03:00 -04:00		04:00 -05:00		05:00 -06:00	
H	N_2^+	H	N_2^+	H	N_2^+	H	N_2^+	H	N_2^+	H	N_2^+	H	N_2^+
0	2	0	2	0	2	0	2	0	2	0	2	0	2
0	0	0	0	0	0	0	2	0	2	0	0	0	0
0	0	0	0	0	1	0	0	0	0	0	0	0	1
0	1	0	1	0	1	0	1	0	1	0	1	0	1
1	1	1	1	1	3	1	3	1	3	1	3	1	3
0	3	0	2	0	3	0	3	0	2	0	2	0	1
0	1	0	1	0	1	0	1	0	1	0	1	0	1
0	1	1	4	1	3	1	2	1	2	1	2		
1	2	0	3	0	3	0	2	0	2	0	2		
0	2	1	2	1	3	1	3	0	2	0	2		
0	3	1	1	1	3	1	3	1	3	1	3		
1	2	1	2	0	2	0	1	0	1	0	1		
1	2	1	3	0	3	0	3	0	3	0	3		
2	2	2	2	2	2	2	2	2	2	2	2		
1	3	2	3	1	3	2	3	1	2	0	1		
2	2	2	3	2	3	1	3	0	3	0	2		
1	3	1	3	1	3	0	3	0	3	0	3		
1	3	1	2	1	3	1	3	1	3	1	3		
2	3	2	3	2	3	1	3	0	2	0	2		
2	3	2	3	1	3	0	2	0	2	0	2		
1	2	1	2	0	2	0	2	0	2	0	1		
1	1	0	0	0	0	0	0	0	0	0	0		
0	0	1	0	1	0	1	0	1	0	0	0		
0	0	0	0	0	0	0	1	0	1	0	0		
1	2	1	2	1	3	0	3	0	2	0	3		
0	0	0	0	1	2	1	2	1	2	0	1		

AURORAL INDICES USING THE ALL-SKY CAMERA FILM FROM COLLEGE, ALASKA

FEBRUARY 1958

Glenn M. Stanley

The all-sky camera photographs for the month of February 1958 have been scaled by two different techniques in an attempt to obtain an auroral index. The first of the methods included projecting the all-sky camera film with a 16 mm movie projector and scaling the film for maximum intensity (using a scale of 5) in the North, Zenith, and South sectors of the sky. The data were punched directly into IBM punch cards. In addition, notations of camera operation, film condition, and weather were made. Table I gives the indices obtained by this method.

The second method consisted of examining each 15 minute period and estimating the average intensity for the whole sky over the 15 minute period on a scale of 6. The same notations for weather and camera operation were used. These data were also punched directly into IBM cards. Table II gives indices determined by this method.

TABLE I. MAXIMUM HOURLY INTENSITIES OF AURORA IN

February 1958

U.T. Date	03–04	04–05	05–06	06–07	07–08	08–09	09–10
01							
02	40 ---	40 ---	40 ---	40 ---	40 ---	40 ---	40 ---
03	40 ---	40 ---	40 ---	40 ---	40 ---	40 ---	40 ---
04		42 ---	42 ---	42 ---	42 ---	42 ---	42 ---
05		22 000	22 000	22 000	22 220	22 222	22 000
06		00 100	00 100	00 111	00 111	00 222	00 000
07		00 100	00 100	00 100	00 100	00 331	00 111
08		00 100	00 100	00 100	00 330	00 330	00 333
09		00 100	00 000	00 000	00 100	00 110	00 110
10		00 100	00 100	00 000	00 000	00 000	00 100
11		00 333	00 233	00 333	00 113	00 113	00 133
12				00 232	00 222	00 222	00 222
13				00 100	00 100	00 332	00 221
14			20 300	20 310	00 333	00 333	00 333
15			40 ---	40 ---	40 ---	40 ---	40 ---
16			66 ---	66 ---	66 ---	66 ---	66 ---
17			66 ---	66 ---	66 ---	66 333	66 333
18			66 322	66 211	66 211	66 333	66 333

THE NORTH, ZENITH AND SOUTH SECTORS OF THE SKY

College, Alaska

10–11	11–12	12–13	13–14	14–15	15–16	16–17
40 ---	40 ---	40 ---	40 ---	40 ---	40 ---	40 ---
40 ---	40 ---	40 ---	40 ---	40 ---	40 ---	40 ---
40 ---	40 ---	40 ---	40 ---	40 ---	40 ---	40 ---
42 ---	42 ---	42 ---	42 ---	42 ---	42 ---	42 ---
22 000	22 000	22 000	22 000	22 000	22 022	
02 001	02 131	04 111	04 111	04 111	04 111	04 111
00 111	00 111	00 111	00 111	00 111	00 111	00 111
00 311	00 111	00 111	00 111	00 121	00 113	04 ---
00 133	00 132	00 111	00 111	00 111	00 133	04 ---
00 330	00 320	00 222	00 222	00 221	00 221	00 211
00 444	00 233	00 334	00 443	00 333	00 333	04 ---
00 333	00 222	00 222	00 111	00 111	00 221	04 ---
00 110	00 333	00 222	00 222	00 222	00 220	04 ---
00 333	00 333	00 333	00 133	00 133	04 133	04 ---
40 ---	40 ---	40 ---	40 ---	40 ---	44 ---	44 ---
66 200	66 222	66 222	66 222	66 ---	66 ---	66 ---
66 222	66 222	66 ---	66 322	66 322	66 ---	66 ---
66 333	66 222	66 333	66 ---	66 ---	66 ---	66 ---

TABLE I. MAXIMUM HOURLY INTENSITIES OF AURORA IN THE NORTH, ZENITH AND SOUTH SECTORS OF THE SKY (continued)

February 1958 College, Alaska

U.T. Date	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17
19			66 21-	66 331	66 222	66 322	66 3--	66 222	66 222	66 222	66 222	66 222	66 ---	66 ---
20			66 200	66 200	66 222	66 222	66 222	66 222	66 ---	66 333	66 333	66 333	66 ---	66 ---
21			66 ---	66 ---	66 222	66 ---	66 ---	66 110	66 120	66 111	66 111	66 ---	66 ---	
22			40 ---	40 ---	40 ---	20 220	20 330	20 222	20 222	20 123	20 222	20 220	20 111	24 ---
23			40 ---	40 ---	20 3--	30 333	30 333	00 333	00 222	00 111	00 111	00 111	40 111	
24			00 111	00 111	00 300	00 200	00 200	00 211	00 112	00 333	00 111	00 111	00 100	04 ---
25			00 100	00 100	00 200	00 300	00 200	00 110	00 100	00 100	00 000	00 100	00 000	
26			00 100	00 100	00 000	88 ---	88 ---	88 ---	88 ---	88 ---	88 ---	88 ---	88 ---	
27			40 ---	40 ---	40 ---	40 ---	40 ---	40 ---	40 ---	40 ---	40 ---	40 ---	40 ---	
28			88 ---	88 ---	88 ---	88 ---	88 ---	88 ---	88 ---	88 ---	88 ---	88 ---		
01 (March)			88 ---	88 ---	88 ---	88 ---	88 ---							

Column 1 for each UT hour relates to weather
Column 2 for each UT hour relates to camera operation
Column 3, 4 and 5 for each UT hour relates to North, Zenith, and South sectors of sky respectively

CODE

Weather
- 0 Clear
- 2 Partly Cloudy
- 4 Cloudy
- 5 Moon
- 6 Doubtful
- 8 No Observation

Camera Operation
- 0 O.K.
- 2 Fogged Film
- 4 Daylight
- 5 Camera Skipping Frames
- 6 Film Damaged
- 8 Film Missing

Intensity
- 0 No Aurora
- 1 Faint Aurora
- 2 Weak Aurora
- 3 Strong Aurora
- 4 Very Strong Aurora
- - No Observation

TABLE II. QUARTER-HOURLY INDICES OF AURORAL ACTIVITY

February 1958 College, Alaska

U.T. Date	04–05	05–06	06–07	07–08	08–09	09–10	10–11	11–12	12–13	13–14	14–15	15–16	16–17
01		- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -
02		- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -
03		- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -
04		0 0 0 0	0 0 0 0	0 0 0 0	1 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	1 1 1 1	2 1 1 1
05	1 1 1 1	1 1 1 1	0 0 0 0	0 1 1 1	1 3 1 1	1 1 1 1	1 1 1 2	2 1 0 0	0 0 1 1	1 1 2 1	2 1 1 1	1 1 1 2	2 2 - -
06	0 0 0 0	0 1 1 1	1 1 1 1	1 1 1 1	1 2 2 3	1 1 1 1	0 0 0 0	1 1 2 2	2 2 1 1	1 1 1 1	1 1 1 1	2 2 2 2	2 2 - -
07	0 0 1 1	1 1 1 1	1 1 1 2	2 3 2 2	2 2 2 2	3 3 3 3	2 2 2 2	2 2 2 1	1 1 1 1	1 2 1 1	2 2 2 2	3 3 2 2	3 - - -
08	1 1 0 0	0 0 - -	0 0 0 0	0 0 0 0	1 1 1 1	1 1 1 1	1 2 3 2	1 1 1 2	2 2 1 1	1 1 1 1	1 1 2 2	3 3 3 -	- -
09	0 0 1 1	1 1 1 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 1	2 2 3 2	2 2 2 1	2 2 2 3	3 3 2 2	2 2 3 3	3 3 3 3	3 -
10	3 3 3 2	2 2 2 2	2 1 4 3	4 5 5 4	3 2 2 2	2 2 3 2	2 2 5 5	5 4 3 3	3 4 3 4	4 4 3 2	3 3 3 3	3 3 2 2	- - - -
11	0 0	0 1 - -	1 1 2 3	4 3 2 3	2 1 2 2	2 2 2 2	3 3 2 3	4 3 3 3	3 2 2 2	2 2 2 2	2 1 1 1	2 - - -	- -
12		0 0 0 0	0 0 0 0	0 0 1 1	1 1 3 2	3 2 - -	1 1 1 1	1 2 3 3	3 3 3 2	2 1 1 2	2 2 2 2	2 1 2 2	- - - -
13		1 1 1 1	1 1 1 1	1 1 1 2	2 2 2 3	3 3 2 1	1 1 1 3	3 3 2 2	2 2 3 2	2 2 3 2	2 3 3 2	2 2 2 2	- - - -
14		- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- -
15		- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- -
16		- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	
17		- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	
18		- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	

TABLE II. QUARTER-HOURLY INDICES OF AURORAL ACTIVITY (continued)

February 1958 College, Alaska

U.T. Date	04–05	05–06	06–07	07–08	08–09	09–10	10–11	11–12	12–13	13–14	14–15	15–16	16–17
19	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- -
20	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	
21	- - - -	- - - -	- - - -	- - -	2	1 1 1 1	1 1 1 1	1 2 2 2	2 2 2 3	2 2 2 2	1 1 1 1	1 1 1 -	
22	- - - -	- - - -	- - -	1	2 2 3 3	4 3 3 2	2 2 3 3	3 3 2 1	1 1 1 1	1 1 1 1	1 1 1 1	1 1 1 -	
23	0 0 0 0	0 0 0 0	0 0 1 1	1 1 1 1	1 1 1 2	2 2 2 1	1 1 1 2	3 2 2 2	2 2 2 1	1 1 1 1	1 0 - -	-	
24	0 0 1 1	1 1 1 1	1 1 1 1	1 2 2 2	1 1 1 1	1 1 1 1	1 1 1 1	1 1 1 0	0 1 0 1	1 1 0 0	- - -		
25	0 0 0 1	1 1 1 1	1 0 0 0	0 - - -	- - - -	- 1 - -	- - - -	- - - -	- - - -				
26	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	
27	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	-
28	- - - -	- - - -	- - - -	- - - -	- - - -								

INTENSITY CODE:

0 = No aurora.
1 = Faint aurora.
2 = Weak aurora.
3 = Medium aurora.
4 = Strong aurora.
5 = Very strong aurora.