REPORT UAG-74

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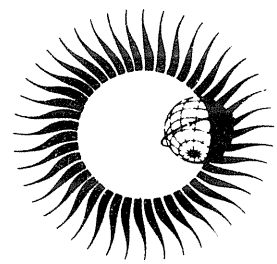
ATS-6 RADIO BEACON ELECTRON CONTENT MEASUREMENTS AT OOTACAMUND, INDIA OCTOBER 1975-JULY 1976



March 1980

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for
Solar-Terrestrial Physics

REPORT UAG-74

ATS-6 RADIO BEACON ELECTRON CONTENT MEASUREMENTS AT OOTACAMUND, INDIA OCTOBER 1975-JULY 1976

by

S.D. Bouwer, K. Davies, R.F. Donnelly, R.N. Grubb, J.E. Jones and J.H. Taylor
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March 1980

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ABSTRACT

We present an atlas of total slant-path columnar electron content data measured between the ATS-6 satellite and Ootacamund, India, a site near the magnetic Equator. Although these measurements were taken during a solar minimum, we summarize the general level of flare and geomagnetic activity that occurred during the observation period. These total content (N_T) data were derived from the modulation phase (group delay) of a carrier signal transmitted from the geostationary satellite's Radio Beacon Experiment. Sudden changes in satellite pitch angle and possibly in roll, absolute calibration, and some sporadic noise contributed an error of about ±4° to our results. This atlas contains two data sets: (1) N_T as 2-min subsamples digitally recorded between 2 October 1975 and 28 January 1976 corrected for ATS-6 pitch maneuvers and (2) N_T as 15-min subsamples chart recorded between 21 October 1975 and 22 July 1976 but uncorrected for changes in satellite orientation.

1. THE ATS-6 EXPERIMENT AT OOTACUMUND

This report summarizes measurements of the total slant-path electron content, N_T, made between the ATS-6 satellite and Ootacamund, India (N11 E77). These measurements were made during Phase II of the radio beacon experiment, when ATS-6 was positioned at an equatorial location of E35 from August 1975 to August 1976. The experiment at Ootacamund was a joint undertaking between the National Oceanic and Atmospheric Administration of the United States and the Physical Research Laboratory, Ahmedabad, India.

The radio beacon aboard ATS-6 transmits on carrier frequencies of 40.016, 140.56 and 360.144 MHz with amplitude modulations of 1.0004 and 0.10004 MHz for the measurement of modulation phase (also called group delay), Faraday rotation and amplitude [Davies et al., 1975]. This report presents results based on the modulation phase measurements from 2 October 1975 to 22 July 1976. The equipment and calibration procedures used during Phase II were essentially the same as those used during Phase I at Boulder [Davies et al., 1975; Fritz, 1976].

The most important results from Ootacamund are based on the modulation phase measurements, ϕ_{141}; the measurement and interpretation of ϕ_{141} is insensitive to the geomagnetic field and therefore can be made at an equatorial station with high accuracy. N_T can be expressed as

$$N_T = \int_0^s N_e ds = -4.82 \times 10^{14} \phi_{141}, \qquad (1)$$

where the integral is of the electron density N_e from the ground station to the satellite. The constant multiplying factor is specific to the ATS-6 Phase II data.

Faraday Rotation, Ω_{140}, was measured concurrently with modulation phase, but it is not included in this report because its accurate measurement requires several corrections discussed by Davies et al. [1979]. Figure 1 illustrates the ray path geometry and Table 1 gives some pertinent information. With this geometry Ω_{140} is very sensitive to certain effects such as satellite orbital inclination, pitch and yaw maneuvers, errors in the calibration of equipment, and inaccuracies in the geomagnetic field models used [Donnelly et al., 1979].

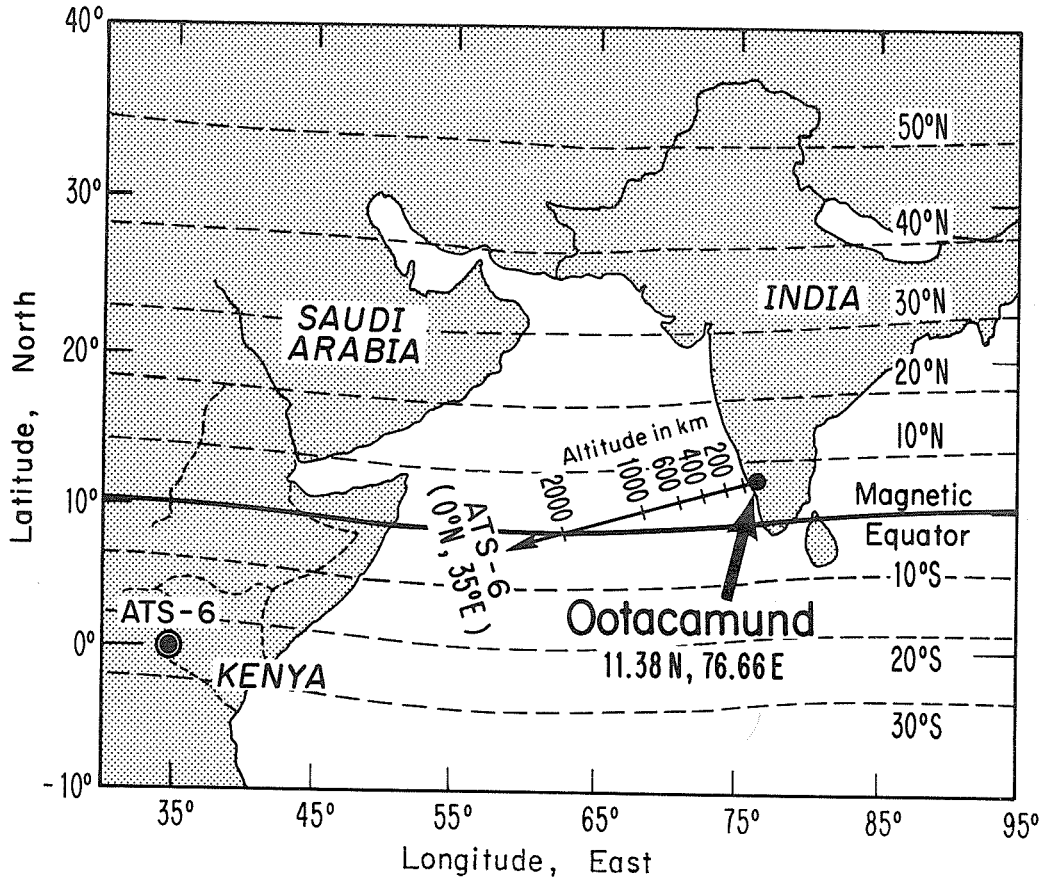

Fig. 1. ATS-6-to-Ootacamund Ray Path

2. DESCRIPTION OF DATA PROCESSING

The data are presented here in two groups, depending on the recording device used. The digital data were recorded from October 1975 to January 1976 (the recording device is briefly described in the next section); these data are presented as 2-min subsamples. The paper chart data were recorded from October 1975 to July 1976 and are presented as 15-min subsamples.

The digital data have high time resolution, high accuracy and have corrections for the effects of satellite maneuvers. Because of the labor required, the chart data are not corrected for satellite maneuvers. For many days between October and January observations exist concurrently in both chart and digital form. Comparisons between concurrent chart and digital data show good agreement. Only the digital data are presented for those days of concurrent records.

Data are not available during the equinox period of March 1976 because of power limitations resulting from the eclipse of ATS-6. On a number of days either the

Table 1. Data on the ATS-6-to-Ootacamund path

Satellite Location	
Geographic:	N0.0 E35.0
Distance from Earth's center:	42,167 km
Receiver Location	
Geographic:	N11.38 E76.66
Distance from Earth's center:	6380 km
Length of Ray Path	37,746 km
Azimuth of ATS-6 at Ootacamund	257.5^{o}
Elevation of ATS-6 at Ootacamund	40.5^{o}
Daily Latitude Excursion of ATS-6	0.7^{o}

transmitter or the receiving equipment failed to operate, or computer processing difficulties arose. Nevertheless, the two groups provide data for at least 20 days out of every month (except March). Also, off-times of the transmitter and short periods of satellite maneuvers interrupted observations during an individual day. For example, in the first figure of the daily plots of N_T on page 23 , the 2 October data show off-times from 0330 to 0630 UT, 0745 to 0800 UT, 1100 to 1600 UT and from 2000 to 2200 UT. At no point in the data processing was interpolation used to bridge these gaps. A dash (-) in the data lists that follow indicates the occurrence of such gaps.

2.1 Digital Data

The receiving equipment was installed at Ootacamund in September 1975. Due to shipping damage, the computer that served as a real-time digital recorder in Boulder during Phase I did not record data at Ootacamund. Instead, a digital recorder originally intended for the occasional recording of scintillation data was provided by Dr. E. Fremouw, formerly of SRI International. This substitute recorder provided data every 0.1 s and was returned to SRI at the end of January 1976.

Tapes of these high-density data were then processed in Boulder on a large batch computer and a versatile BASIC minicomputer with graphic, storage, data communication, and user-interrupt features. Cycle ambiguities were resolved, sporadic noise was removed, and corrections were made for equipment calibrations and satellite motions. The final data are sampled every 2 min and they provide excellent time resolution. These 2-min data are archived and available from World Data Center A for Solar-Terrestrial Physics, Environmental Data and Information Service, NOAA, Boulder, Colorado 80303.

Cycle ambiguities in ϕ_{141} were removed by inspection--a technique that used the graphics/user-interaction capability of our BASIC minicomputer and the relation

$$\phi_{141} = \phi^{M}_{141} + 228^{\circ} + 360^{\circ}n + p, \qquad (2)$$

where p is the satellite pitch angle and n denotes some integer. The satellite pitch angle is a correction specific to the Ootacamund data.

Important to the determination of the absolute value of ϕ_{141} was the orientation of the transmitting antenna on board ATS-6. A comparison between calculated values of ϕ_{141} and both $\phi_{40.1}$ and ϕ_{41} (less sensitive channels to satellite maneuvers) indicated that the 141-MHz modulation phase responded significantly to satellite maneuvers. Upon examination of NASA satellite telemetry data we found that satellite maneuvers were usually sudden changes, followed by long periods of fixed pointing [Donnelly et al., 1979].

Tests for ATS-6 roll, pitch and yaw indicated ϕ_{141} was predominantly sensitive to pitch (see Figure 2). According to Davies et al. [1979], this sensitivity resulted from the electrical phase of the transmission varying with pitch angle. During significant sudden pitch changes, data were deleted, and the appropriate correction was added to ϕ_{141} during periods of fixed pointing.

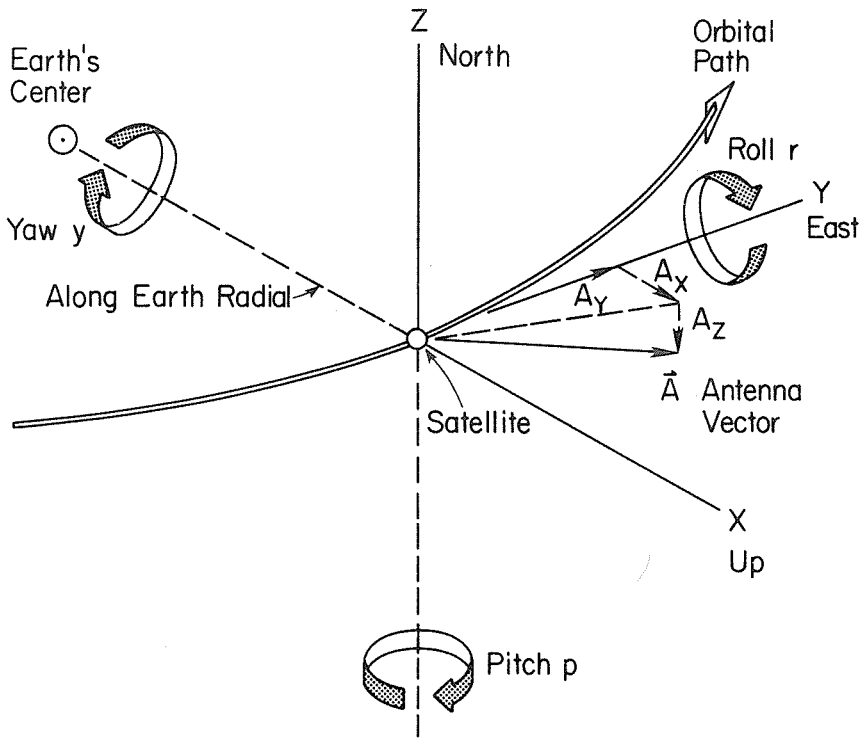

Fig. 2. Definition of the ATS-6 reference orientation for roll, pitch and yaw.

2.2 Chart Data

The charts provide the exclusive source of data between February and July 1976. March is not included because of extensive off-times of the beacon. From 4 May to 22 July there are no data available from 1300 to 1600 UT because another experiment had priority.

The chart data use relation (2) with p=0. The effect of not correcting for pitch in the chart data is discussed (with other errors) in the following section. Also, there exists some residual sporadic noise that has not been removed. Except at night, when N_T is at a minimum, there errors are of minor importance.

2.3 Discussion of Errors

The absolute accuracy (e.g., the accuracy of a measurement with respect to zero) of the calibration value 228° is difficult to determine. The estimated calibration accuracy is ±10°. Intercomparison of ϕ_{141} to ϕ_{41} indicates an overall accuracy of ±4° [Davies et al., 1979]. At night ϕ_{41} is less sensitive than ϕ_{141} to factors affecting calibration values. The estimated absolute error applies to both the chart and digital data.

The relative error (e.g., the accuracy between any two measurements) of the digital data is not the same as the chart data relative error. Intercomparisons of ϕ_{41} and ϕ_{141} digital data indicated a mean relative error in the digital data of 1%. At night the worst-case relative error approximated 3%; a small number of days showed a 6% worst-case error.

Chart data were compared with digital data during 3 months of overlapping records. With respect to simultaneous digital measurements (from Oct 1975 to Jan 1976) of N_T, the chart data had a 2% mean relative error. At night the worst-case relative error approximated 8%; a small number of days showed a 14% worst-case error. These errors should be added to the digital relative error to obtain the best approximation of chart data relative error.

Since the chart data have not been corrected for ATS-6 pointing maneuvers, a number of days show sudden changes in N_T concurrently with ATS-6 pointing changes. This is particularly true during summer nights when N_T is relatively low. During winter nights pointing effects generally are within the relative error.

The pitch corrections suggested by Donnelly et al. [1979] are sometimes insufficient to compensate for sudden N_T changes in the chart data. There is some evidence, albeit inconclusive due to insufficient data, that roll (or some combination of pitch and roll) maneuvers are responsible for significant relative N_T changes at night in the chart data. For example, see 23 May or 24 May 1976 on page 43 , where N_T abruptly changes at 2100 and 2300 UT. Pitch corrections would amount at most, in this specific case, to a 3% change in N_T. Yet it is apparent tha N_T changes by roughly 30%. This effect has not been observed in the digital data.

3. SUMMARY OF SOLAR AND GEOMAGNETIC ACTIVITY

For N_T comparisons, the daily solar flux at 2800 MHz (Table 2) and the provisional hourly equatorial Dst values (Figures 3 & 4) are reproduced from the prompt section of Solar-Geophysical Data [1975-1976]. The Dst index (in UT) represents magnetic field variations at the magnetic Equator on the Earth's surface.

An important feature of the Phase II data is that these measurements were taken when solar activity was, for the most part, at a minimum. For N_T comparisons, effects of solar activity should be considered. As an example, compare 28 March with 1 April 1976 in Table 2 and in the daily N_T plots on page 38 . On 28 March the solar radio flux was relatively high because a prominent active region on the visible solar disk had flared at an X1 level at 1900 UT [SGD, 1976]. Three days later, on 1 April, a very large enhancement in N_T occurred (e.g., $N_T \simeq 6.6 \times 10^{17}$ m^{-2}; the April mean $N_T \simeq 4.5 \times 10^{17}$ m^{-2}) about the same time that the Dst index decreased about 200 nT.

Figure 5 clearly indicates a semiannual variation in N_T. Two arbitrary times were chosen, 0500 and 1700 LT, that approximate the times of diurnal minimum and maximum. During these times N_T was subsampled and plotted against the date. Unfortunately, data during September 1975 and March 1976 were not available to provide measurements around the equinoxes. Nevertheless, Figure 5 indicates N_T is generally greater near the autumnal equinox than near the vernal equinox.

Similarly, the effects of a solstice are apparent in N_T during January and July, N_T generally being greater during the winter solstice than during the summer solstice. Also note that N_T is greater during the equinox months than during the solstice months. It is not clear whether all these relationships agree with the semiannual variations of the solar zenith angle for a receiver located 11° north of the Equator.

Table 2. Daily 2800-MHz Solar Flux in Units of 10^{-22} Wm^{-2} Hz^{-1} Measured Near 1700 UT and Adjusted to 1 AU. Table adapted from Solar-Geophysical Data [1976a].

	1975				1976							
DAY	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG
1	87.0	76.4	74.4	72.1	72.1	68.0	67.7	79.6	77.6	68.4	69.3	75.9
2	87.9	78.1	71.4	74.8	71.2	68.0	68.1	76.8	74.2	67.9	69.1	77.8
3	87.8	78.4	73.8	74.3	71.3	68.4	67.4	76.1	71.9	68.1	69.5	82.3
4	92.6	76.3	75.4	74.1	71.8	68.4	67.4	74.7	71.5	68.4	68.6	82.3
5	94.4	76.1	76.9	77.4	71.9	67.6	67.6	73.0	71.1	68.7	69.5	84.2
6	94.0	75.1	80.1	75.6	71.7	68.1	67.5	71.3	69.9	69.3	69.6	84.3
7	91.1	74.3	80.5	73.7	71.6	69.3	67.9	70.3	70.3	69.0	69.5	83.7
8	86.5	74.0	80.9	76.3	70.3	68.4	67.9	71.9	70.2	70.7	69.7	82.0
9	84.3	75.4	78.8	73.3	69.4	68.3	68.2	74.1	70.6	70.1	69.7	82.8
10	82.5	74.3	78.9	73.3	70.5	68.5	68.4	75.3	71.7	71.0	70.1	82.8
11	81.1	73.3	78.6	74.3	72.1	68.4	68.8	77.1	72.5	71.4	70.2	80.4
12	78.2*	74.8	79.9	73.4	76.9	67.8	68.9	78.1	72.6	71.7	69.8	80.6
13	75.2	79.6	79.2	72.5	80.0	69.7	70.9	79.6	73.6	72.0	69.8	78.7
14	74.2	80.0	82.7	71.8	82.1*	69.9	70.1	79.5	74.2	73.7	70.7	73.4
15	74.1	80.3	83.7	71.8	80.4	69.0	69.1	79.2	76.9	74.3	71.4	72.3
16	74.3	78.5	87.6	70.3	78.1	69.7	72.5	80.6	79.2	77.1	69.8	72.9
17	74.8	78.9	88.9	70.5	76.6	69.9	74.4*	80.5	76.5	77.1	69.4	77.8
18	76.2	79.2	90.8*	69.5	76.7	70.1	79.0	80.5	75.6*	77.9	70.6	78.2
19	76.2	78.0	93.0*	69.1	75.2	70.1	81.6*	79.8	73.8	76.9	70.2	76.1
20	76.5	77.1	90.9	68.7	74.6	70.0	85.0	80.0	73.0	76.9	69.4	74.5
21	76.7	75.7	86.6	69.0	72.1	68.8	91.2	78.0	74.0	77.7	70.1	73.2
22	75.3	74.2	81.5	68.3	70.9	68.9	83.0	76.2*	72.5	78.9	70.1	72.3
23	76.1	74.3	77.2	69.5	70.2	69.2	86.9	75.7	71.9	76.5	68.7	73.8
24	76.6	72.7*	74.7	71.4	69.5	69.6	82.2*	76.8	70.8	75.2	69.4	70.9
25	76.7	72.1	73.7	71.6	68.2	68.4	85.1	75.7	69.8	74.9	68.8	70.6
26	76.7	71.9	71.9	71.8	68.2	68.5	84.1*	75.7	69.5	74.3	68.5	70.1
27	75.7	72.1	70.7	72.5	67.2	68.5	85.5	74.6	69.6	72.8	69.4	71.5
28	76.1	71.7	70.4	71.3	67.1	67.9	87.1*	73.4	69.0	71.8	69.4	72.8
29	75.9	70.8	70.9	72.5	67.4	67.4	84.0	79.6	68.0	71.3	69.4	73.3
30	75.8	70.2	70.6	71.9	68.9		82.4	79.5*	68.1	70.3	70.7	73.0
31		69.9		72.1	69.1		82.7		68.7		72.3	73.8
MEAN	80.4	75.3	79.1	72.3	72.4	68.8	75.8	76.7	72.2	72.8	69.8	76.6

* adjusted for burst

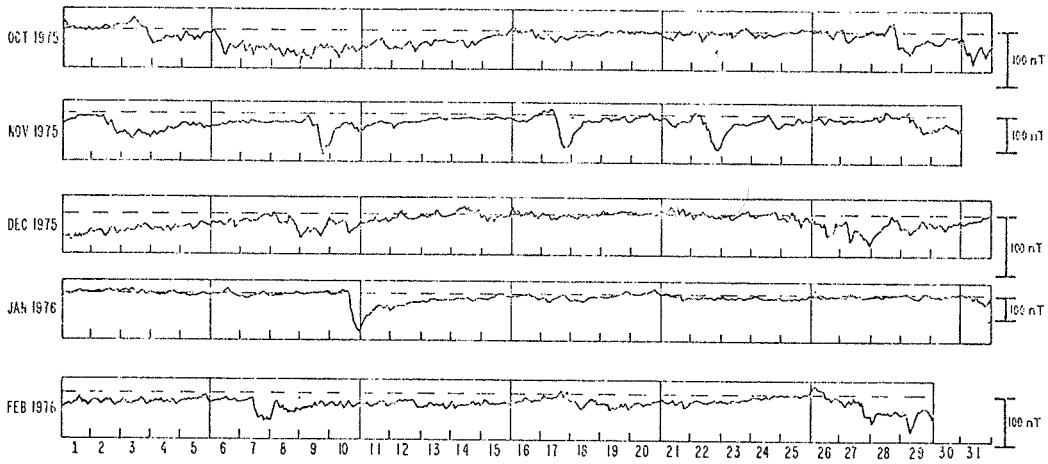

Fig. 3. Graph of the provisional hourly equatorial Dst index for October 1975 through February 1976 in nT units. This index represents magnetic field variations at the dipole Equator on the Earth's surface averaged over local time. Note that both the 100-nT vertical interval, placed on the last day of each month, and the zero-reference level change from month to month.

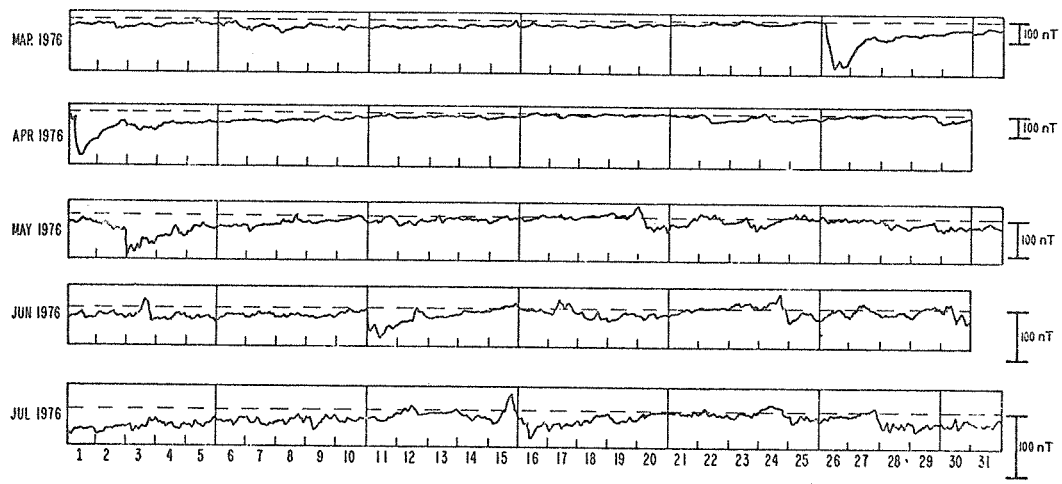

Fig. 4. Graph of the provisional hourly equatorial Dst index for March - July 1976 in nT units. This index represents magnetic field variations at the dipole Equator on the Earth's surface averaged over local time. Note that both the 100-nT vertical interval, placed on the last day of each month, and the zero-reference level change from month to month.

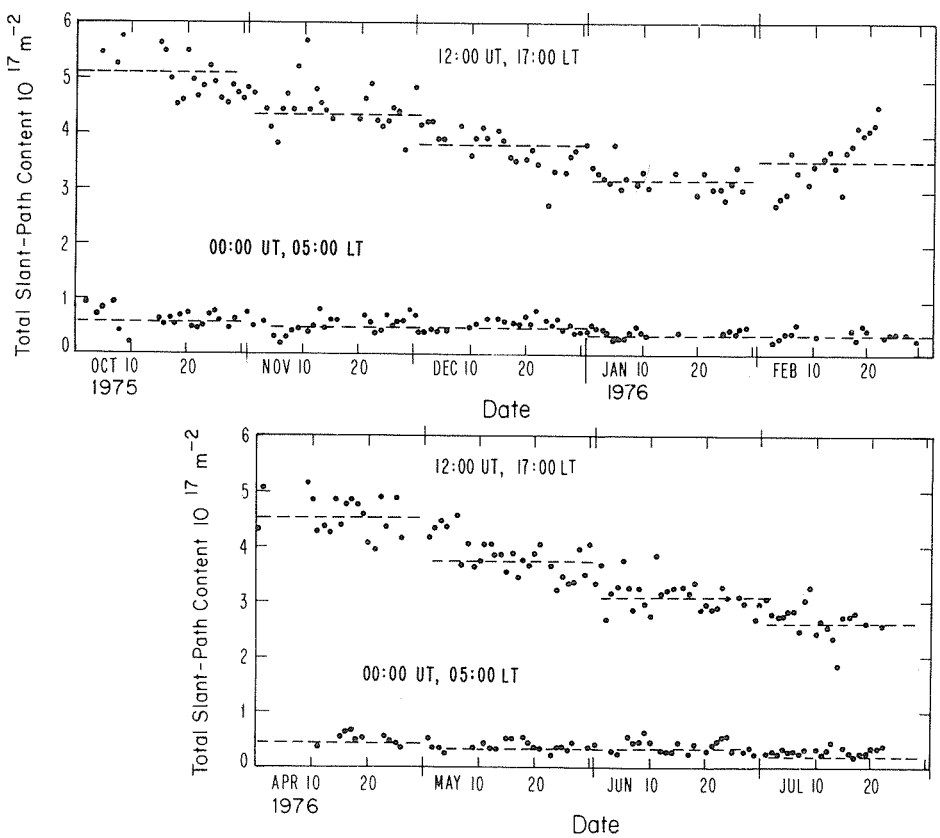

Fig. 5. Semiannual variations in N_T at two selected times.

The nine figures in section 7 with their accompanying tables are plots of the mean hourly N_T values averaged over the month. The means of October 1975 through January 1976 were calculated exclusively from the digital data. These figures have roughly the same scale as the daily plots in sections 9 and 10. Thus, by superimposing tracing-paper duplicates of the monthly average profiles onto the daily plots, one can easily make day-to-day comparisons. Dashed lines in the monthly plots enclose a standard deviation above and below the mean.

Tables 3-6 in section 8 provide the hourly subsamples for each day plotted in sections 9 and 10. Table 3 is exclusively digital data; Tables 4, 5 and 6 exclusively chart data.

4. SUMMARY OF N_T DATA

Sections 9 and 10 contain diurnal plots: solid-line curves denote graphs generated from the digital data; dotted-line curves denote graphs composed from chart recorded data. Three special features in the diurnal plots deserve note.

(a) A local maximum can occur 4 h before the main diurnal maximum. See 19 October on page 24 , where a local maximum appears before the daily peak at 1500 LT.

(b) Two local maxima each having roughly the same N_T value can emerge. See 10 January on page 30 at 1200 and 1600 LT. This splitting of the peak N_T seems to occur more frequently near a solstice than near an equinox.

(c) One or more local maxima can develop during the evening hours. See, for example, the 31 October profile and its three distinct nighttime peaks illustrated on page 25

5. ACKNOWLEDGMENTS

The bulk of the digital data processing was accomplished with the invaluable assistance of Janet E. Falcon, Thomas B. Gray, William M. Retallack and Richard W. White, of the NOAA Space Environment Laboratory Analysis Group. We thank Robert Hetzel for his assistance in processing the ATS-6 pointing data and 40-MHz Faraday rotation data, and Mr. J. Thron for developing corrections for the ATS-6 location. We extend a special thanks to Edward Green for his assistance in software development and data entry.

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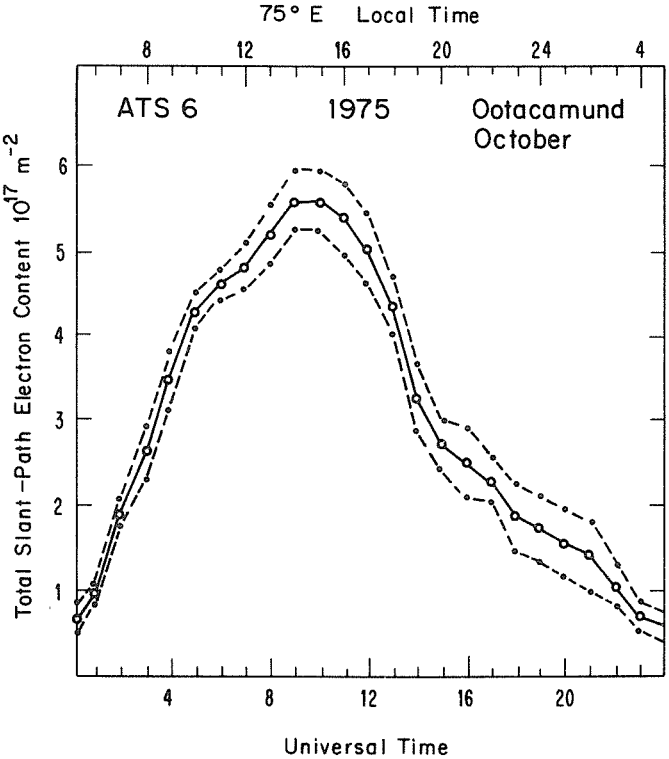
SGD	1976b	*Solar-Geophysical Data,* 380 Part I, 12, April 1976 (U.S. Department of Commerce, Boulder, Colorado, USA 80303).

7. PLOTS AND TABLES OF MONTHLY MEANS

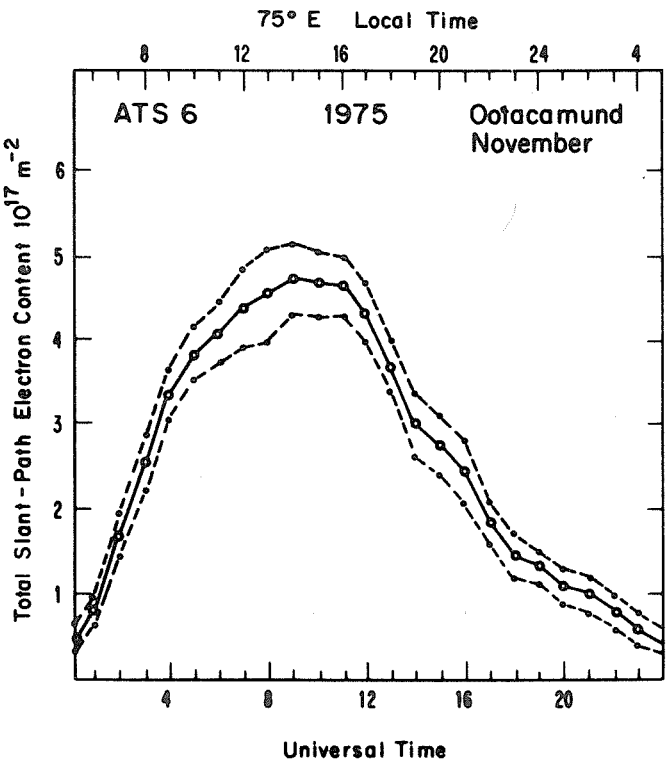
Hourly means,
digital data.

UT	N_T	UT	N_T
00	0.62	12	5.07
01	0.92	13	4.37
02	1.78	14	3.29
03	2.59	15	2.75
04	3.45	16	2.53
05	4.28	17	2.33
06	4.59	18	1.91
07	4.80	19	1.77
08	5.19	20	1.61
09	5.58	21	1.46
10	5.58	22	1.09
11	5.41	23	0.76



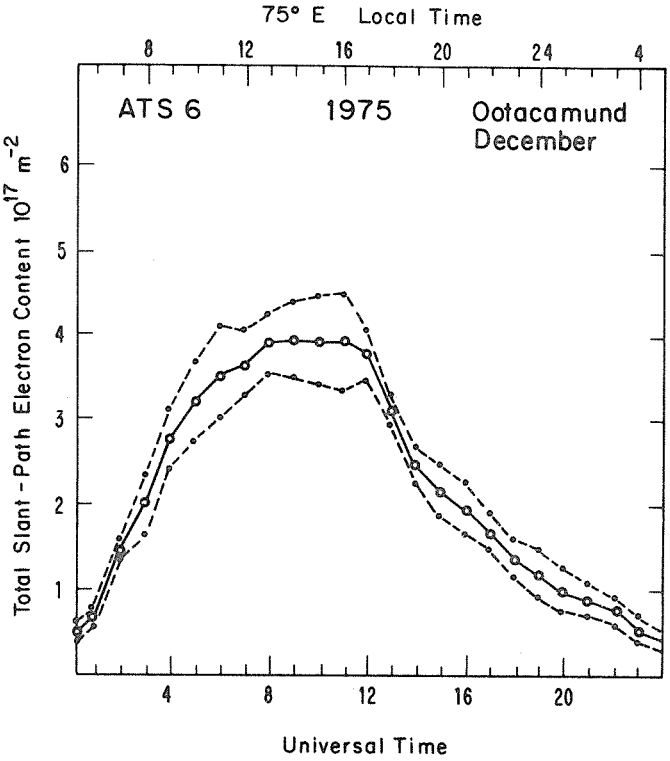
Hourly means,
digital data.

UT	N_T	UT	N_T
00	0.52	12	4.36
01	0.80	13	3.71
02	1.69	14	3.05
03	2.54	15	2.80
04	3.37	16	2.48
05	3.84	17	1.89
06	4.09	18	1.51
07	4.38	19	1.37
08	4.54	20	1.16
09	4.74	21	1.08
10	4.69	22	0.85
11	4.68	23	0.67



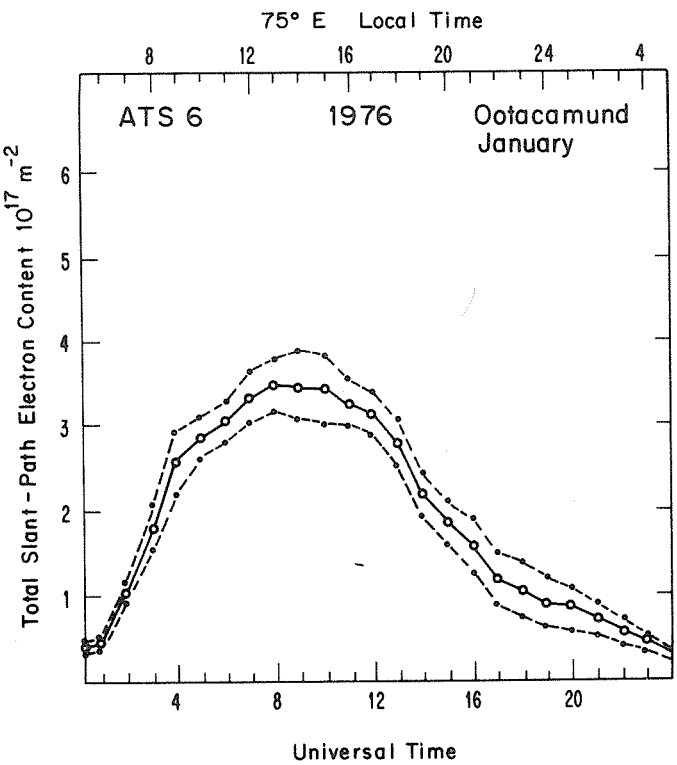
Hourly means,
digital data.

UT	N_T	UT	N_T
00	0.53	12	3.80
01	0.67	13	3.16
02	1.44	14	2.51
03	2.01	15	2.22
04	2.76	16	1.98
05	3.21	17	1.74
06	3.52	18	1.39
07	3.65	19	1.23
08	3.90	20	1.03
09	3.95	21	0.94
10	3.94	22	0.79
11	3.95	23	0.61



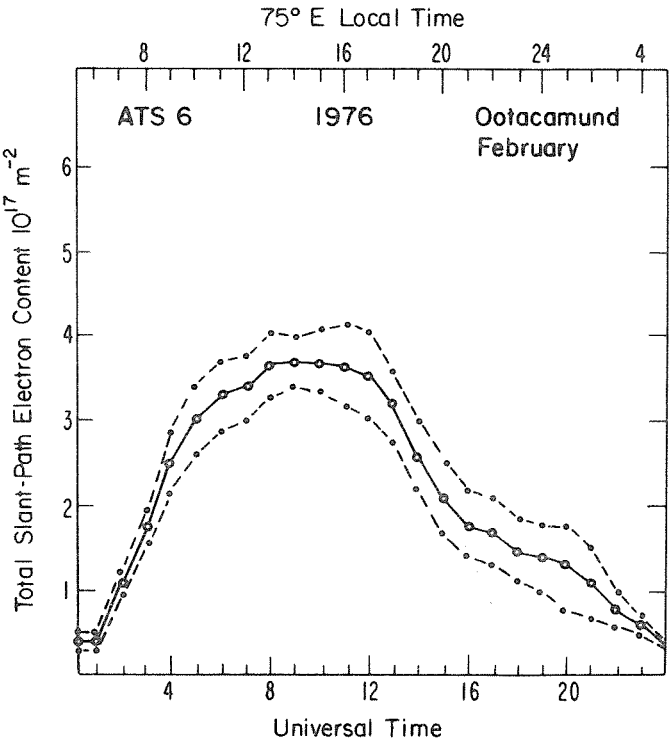
Hourly means,
digital data.

UT	N_T	UT	N_T
00	0.40	12	3.17
01	0.45	13	2.80
02	1.09	14	2.23
03	1.80	15	1.89
04	2.55	16	1.62
05	2.85	17	1.23
06	3.05	18	1.09
07	3.33	19	0.94
08	3.48	20	0.89
09	3.47	21	0.77
10	3.45	22	0.63
11	3.29	23	0.50



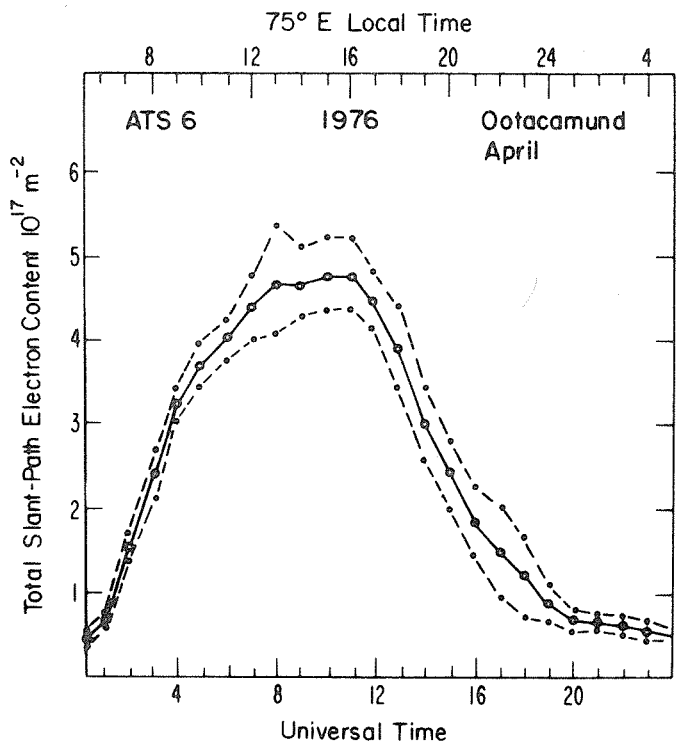
Hourly means,
chart data.

UT	N_T	UT	N_T
00	0.41	12	3.56
01	0.39	13	3.24
02	1.08	14	2.63
03	1.80	15	2.08
04	2.48	16	1.78
05	3.05	17	1.69
06	3.26	18	1.52
07	3.42	19	1.41
08	3.66	20	1.26
09	3.72	21	1.09
10	3.71	22	0.81
11	3.66	23	0.58



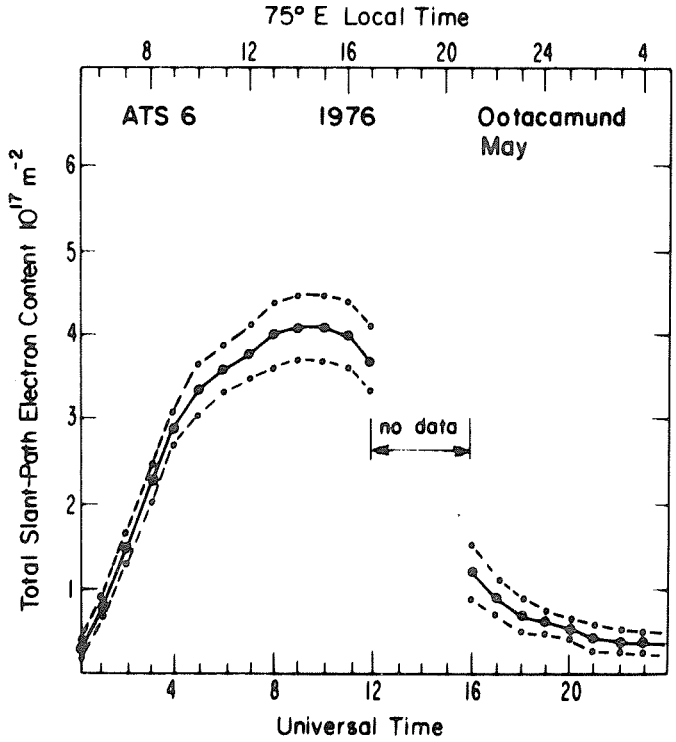
Hourly means,
chart data.

UT	N_T	UT	N_T
00	0.47	12	4.52
01	0.73	13	3.93
02	1.55	14	3.05
03	2.45	15	2.43
04	3.20	16	1.85
05	3.72	17	1.53
06	4.03	18	1.24
07	4.40	19	0.92
08	4.67	20	0.74
09	4.73	21	0.64
10	4.84	22	0.64
11	4.79	23	0.51



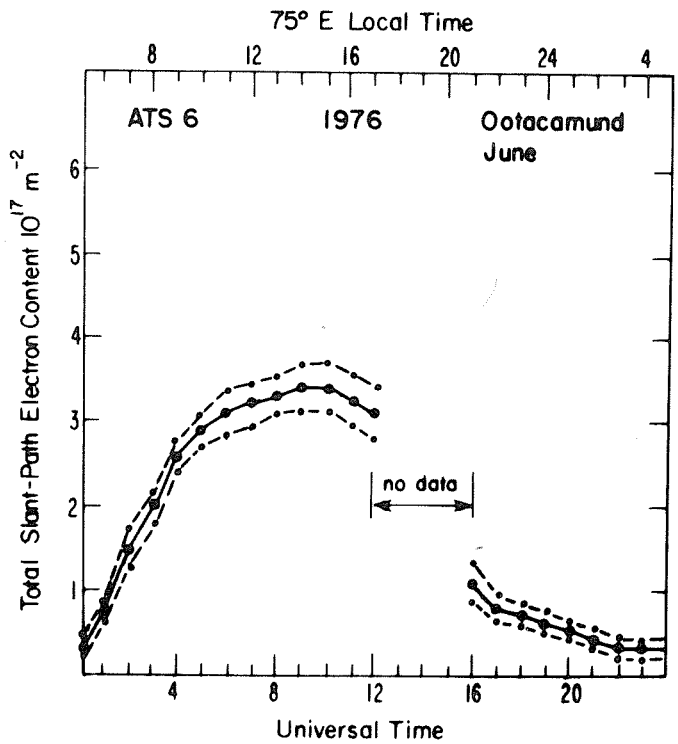
Hourly means,
chart data.

UT	N_T	UT	N_T
00	0.34	12	3.74
01	0.84	13	----
02	1.56	14	----
03	2.25	15	----
04	2.89	16	1.18
05	3.34	17	0.88
06	3.61	18	0.73
07	3.79	19	0.59
08	3.99	20	0.48
09	4.07	21	0.42
10	4.08	22	0.36
11	3.98	23	0.34



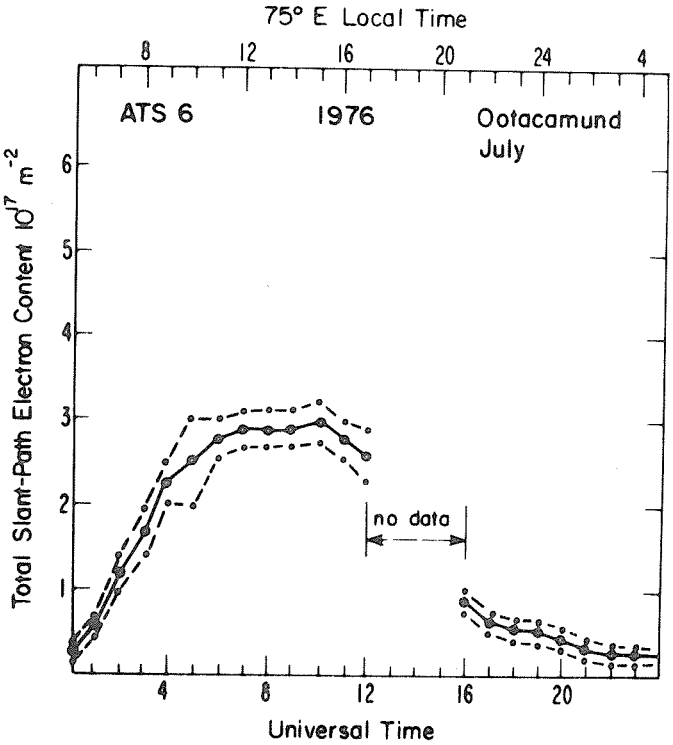
Hourly means,
chart data.

UT	N_T	UT	N_T
00	0.35	12	3.10
01	0.83	13	----
02	1.48	14	----
03	2.02	15	----
04	2.56	16	1.07
05	2.90	17	0.83
06	3.11	18	0.74
07	3.20	19	0.63
08	3.28	20	0.49
09	3.36	21	0.43
10	3.38	22	0.33
11	3.25	23	0.34



Hourly means,
chart data.

UT	N_T	UT	N_T
00	0.25	12	2.64
01	0.61	13	----
02	1.20	14	----
03	1.70	15	----
04	2.25	16	0.88
05	2.47	17	0.66
06	2.79	18	0.56
07	2.87	19	0.48
08	2.92	20	0.39
09	2.90	21	0.35
10	2.96	22	0.26
11	2.83	23	0.26



8. TABLES OF HOURLY SUBSAMPLES

Table 3. Hourly N_T Subsamples Digitally Recorded 2 Oct 1975 - 28 Jan 1976

ATS6 to Ootacamund Total Slant Path Electron Content 10^{17} m^{-2} -- Part I.

		UNIVERSAL TIME											
		0	1	2	3	4	5	6	7	8	9	10	11
Oct.	2	0.8738	1.1154	1.9781	2.8345	------	------	------	4.6462	------	5.3840	5.3136	5.2543
1975	4	0.6867	0.8979	1.7823	2.7125	------	------	------	5.2963	5.6579	6.2202	6.2708	5.6555
	5	0.7870	1.0127	2.0215	2.9363	------	------	------	4.5869	4.9717	5.4072	5.6059	5.8397
	7	0.8714	0.9644	1.8580	3.0081	------	------	------	5.0961	4.9915	5.2967	5.4771	5.6690
	8	0.4128	0.8116	1.5894	2.5997	------	------	------	5.2866	5.5258	6.0837	5.9878	5.8687
	10	0.2069	0.6115	1.4756	2.3518	------	------	------	4.9332	5.4390	5.6907	------	------
	15	0.6394	0.9249	1.9289	2.6908	------	------	------	4.7711	5.3064	5.5200	5.7192	5.8040
	16	0.5449	0.8506	1.6140	2.1734	3.0279	4.0791	4.6592	4.5426	5.1564	5.8489	5.7168	5.5986
	17	0.5782	0.9673	1.9911	2.9662	4.1466	4.5917	4.8092	4.9380	5.4096	6.2265	6.0905	------
	18	0.5483	0.9167	1.8566	2.5606	3.5366	4.4080	4.8883	5.1285	5.5523	5.5745	5.2225	4.8377
	19	0.6539	0.9963	1.8802	2.7516	3.7676	4.5310	4.6621	4.5720	4.8705	5.1796	5.5379	5.0619
	20	0.7253	1.1077	2.0948	------	3.7840	4.7677	------	------	------	5.6589	5.7071	5.8036
	22	0.4504	0.7605	1.3999	------	3.2410	4.2923	4.3193	4.6221	4.9896	------	5.2061	4.6477
	23	0.4861	0.8550	1.6670	2.3007	3.4064	4.0700	4.3188	4.7784	5.1719	5.5403	5.4448	5.3209
	24	0.6968	0.9350	1.7283	2.2645	3.1918	4.1438	4.5141	4.6626	4.8864	5.2871	5.3797	5.1603
	25	0.7566	1.0247	1.8638	------	3.5400	4.1683	------	4.1973	4.4268	5.0455	5.1603	5.2042
	28	0.4545	0.8140	1.5687	2.1102	2.9387	3.8645	------	4.6245	5.0590	5.3782	5.1487	------
	31	0.7547	1.0382	1.6863	------	3.3191	4.2021	------	4.9862	5.6738	5.4795	5.9145	------
Nov.	1	0.4620	0.7585	1.7321	2.5080	3.3683	4.1365	4.4326	4.7952	5.0981	5.2722	5.2934	------
	5	0.2831	0.5849	1.2504	2.2366	3.2198	3.5988	------	3.9118	------	------	------	4.1201
	6	0.1837	0.5194	1.2514	2.1425	3.2974	4.0478	4.2566	------	------	------	4.8608	------
	7	0.2966	------	1.4693	2.3311	3.4927	------	------	------	------	------	------	4.9317
	8	0.4176	0.7383	------	------	------	------	4.2566	4.5797	4.6429	4.8849	4.9949	------
	11	0.4109	0.7798	1.6675	2.3557	3.2902	4.0449	4.6771	4.8444	5.0253	5.1246	------	------
	12	0.5256	0.7528	1.7211	2.7048	3.8221	4.1823	4.3752	4.6829	4.6781	4.6096	4.7007	5.0455
	13	0.8154	1.0836	------	2.6860	3.6620	4.1626	------	5.2109	5.4004	5.3628	5.2080	5.0455
	14	0.4562	0.7701	1.8421	2.9093	3.6046	3.9947	------	4.7195	4.8888	4.7350	------	------
	15	0.5763	0.9124	2.0157	------	3.6176	3.9084	------	4.3217	4.3294	4.6887	4.6482	------
	21	0.7238	1.0030	1.7977	2.5736	------	4.4746	4.5392	4.9346	5.2963	5.4327	5.3078	4.8762
	22	0.5536	0.8232	1.6998	------	3.1889	3.7073	4.2291	4.5020	4.8247	4.8830	4.9529	------
	23	0.3896	0.7171	2.1464	3.2729	3.8236	4.1298	------	4.9365	4.9852	4.7441	4.7465	------
	24	0.4485	0.7007	1.6155	------	3.2603	3.6196	4.0671	4.4070	4.4871	4.6438	4.5609	------
	25	0.7272	0.7315	1.6082	2.2182	2.6653	3.0993	3.6741	4.0545	4.2913	4.4143	4.2957	4.3323
	26	0.5097	0.7629	1.6603	2.4275	3.3023	3.5381	3.7218	3.9325	4.2474	------	4.2248	4.4061
	27	0.5931	0.8289	------	------	3.4286	3.5868	3.8158	3.8293	3.7811	4.0049	4.1674	------
	28	0.6110	0.8574	1.8633	------	3.1730	3.3881	3.5795	3.6712	3.8385	4.1023	4.0642	------
	29	0.7918	1.0918	------	2.6643	3.1861	3.4421	3.6962	3.6721	3.6061	------	------	------
	30	0.6703	0.8719	1.7114	------	3.1875	3.9890	3.9769	3.9104	3.8496	4.2050	4.3612	------
Dec.	1	0.4379	0.6201	1.5494	2.6103	3.3823	4.2296	4.4225	4.3458	4.7147	4.9520	5.2239	4.7287
	2	0.3646	0.6394	1.5412	------	3.2179	3.4778	3.9378	4.0189	4.0946	4.0671	4.0372	------
	3	0.4697	0.7552	1.6328	------	2.9483	3.6162	4.2658	4.1736	4.0642	4.3096	4.4514	------
	10	0.4909	0.6394	1.3391	1.9892	2.6064	2.7603	3.0964	3.3987	------	------	4.0521	------
	15	0.6457	0.8280	1.5721	------	2.8962	3.6114	------	3.8588	3.9504	4.1944	4.1351	4.2604
	16	0.6095	0.7807	1.6820	------	------	3.4161	------	3.6958	3.7329	3.6702	3.5009	------
	18	0.5507	0.6848	1.6063	------	2.6976	3.2203	3.8915	------	3.5024	3.5164	3.5140	3.3973
	19	0.5444	0.6428	1.3044	------	2.9126	3.0915	3.0901	3.1267	3.3109	3.5747	3.5096	------
	20	0.6920	0.7320	1.4582	1.9800	2.4410	2.6175	------	3.2733	------	3.5931	3.3707	------
	21	0.5411	0.5931	1.2557	------	2.9015	3.3249	3.5525	------	4.0271	4.1032	3.9682	------
	25	0.5584	0.6727	1.1202	1.6236	2.3349	2.7149	2.8929	3.3163	3.5072	3.1914	3.1181	3.3997
	26	0.6447	0.7962	1.3044	1.6044	2.1382	2.5519	3.0877	3.4354	4.1307	4.0902	4.0401	------
	29	0.4080	0.5001	1.3951	2.1454	2.7443	3.4387	------	3.9065	3.9904	4.2426	4.2836	------
	30	0.4369	0.5083	1.3449	2.1044	2.6783	2.8760	3.0067	3.2261	3.7826	3.8756	3.9234	3.9547
Jan.	2	0.4475	0.5406	1.3739	------	2.8591	2.9203	3.2319	3.5101	3.6683	3.7652	3.6143	3.5714
1976	4	0.4186	0.4147	1.0831	2.1097	3.0988	3.1292	------	3.5111	3.8438	4.0290	3.8332	------
	5	0.3472	0.4109	1.1491	2.0586	2.8851	3.0462	3.4286	3.6799	3.9938	4.2185	4.2402	------
	6	0.3236	0.4046	1.1279	2.1445	------	3.1706	3.3635	3.4686	3.4778	3.3544	3.2381	3.3158
	7	0.2807	0.3535	1.0590	1.7741	2.3282	2.5003	3.1311	3.6475	3.8689	3.6557	3.6148	3.4026
	8	0.3945	0.4147	1.0918	1.8050	2.7125	2.7000	------	------	------	3.1716	3.4286	3.4942
	9	0.5290	0.5256	1.0064	1.5205	2.1348	------	3.1330	3.6509	3.3442	3.3703	3.5767	3.3201
	10	0.3713	0.4475	0.9447	1.4954	2.0340	2.3677	2.9980	3.2685	3.0129	3.1084	3.0554	3.1267
	17	0.3703	0.3974	1.1086	------	2.6050	2.9392	2.9932	------	------	------	------	------
	25	0.4282	0.4817	1.0040	1.5045	2.4174	2.7467	2.7733	2.8041	2.9054	2.9932	2.8292	2.8138
	26	0.4436	0.4523	0.9939	1.4226	1.9598	2.5876	2.8905	2.8268	------	------	------	------
	27	0.4268	0.4422	1.0276	1.8749	2.7709	2.9662	2.6455	3.0158	3.2791	3.2767	3.3539	3.5154
	28	0.4755	0.5189	1.1786	2.0769	2.8143	3.0886	2.9816	3.2572	3.4117	3.2222	3.1195	3.0240

Table 3. (Continued)

ATS6 to Ootacamund Total Slant Path Electron Content $10^{17} m^{-2}$ -- Part II.

		UNIVERSAL TIME											
		12	13	14	15	16	17	18	19	20	21	22	23
Oct.	2	------	------	------	------	------	2.2558	2.2775	2.2052	1.9901	------	------	0.7446
1975	4	------	------	------	------	2.9155	2.6763	2.1117	1.6699	1.6101	------	------	0.9292
	5	5.4043	------	------	------	2.4005	2.5770	2.0673	1.5065	1.2268	------	------	0.4292
	7	5.2331	------	------	------	------	------	0.9273	0.7421	------	------	------	0.4803
	8	5.6883	------	------	------	2.8215	2.0027	1.3261	------	------	------	------	------
	10	------	------	------	------	2.8249	2.5948	------	------	------	------	------	------
	15	5.6343	------	------	------	2.7106	2.3952	2.0032	1.8074	1.5817	------	1.0517	0.8000
	16	5.4438	4.7542	3.6181	3.2825	2.8065	2.7275	1.9800	1.4785	1.1896	1.0811	0.8786	0.6809
	17	4.9515	4.7133	3.7483	3.1523	3.1234	------	------	------	------	------	0.9456	0.6944
	18	4.4963	4.2445	3.6475	2.7492	2.4873	2.4873	2.6783	2.3113	2.0601	1.7582	1.1954	0.8656
	19	4.5527	------	------	2.4593	1.9762	------	2.3552	1.7891	1.3362	1.1597	0.9514	0.7894
	20	5.4515	------	3.2299	2.4357	2.0562	2.4444	------	1.9366	1.6810	------	1.0469	0.6664
	22	4.6467	3.9147	2.5032	------	1.6916	1.8927	1.7813	1.5489	1.2504	1.0773	0.9534	0.6843
	23	4.8222	------	------	------	2.1893	2.1613	1.6290	1.4370	1.2258	1.1612	1.0107	0.9186
	24	5.1960	4.1558	3.0607	2.5977	2.2838	2.1917	1.7972	2.0032	2.1608	2.1483	1.5812	1.0927
	25	4.8864	4.1433	3.0997	2.5384	2.6595	2.2693	2.0779	2.1633	------	1.6994	------	0.7701
	28	4.8560	4.1042	3.2131	2.7197	2.5833	2.0625	1.7500	1.6386	1.2504	1.0860	------	0.8974
	31	4.8333	4.9042	3.4759	2.8524	2.8818	2.2930	1.8903	2.2660	2.4073	1.9491	1.3353	------
Nov.	1	4.6906	4.0724	3.2516	------	2.6566	2.0904	1.5745	1.3010	1.0691	0.9341	0.7127	0.5377
	5	3.7903	3.5275	3.2974	2.5553	2.2091	1.7625	1.8556	1.7809	------	------	0.7291	0.3540
	6	4.3820	3.7310	2.9285	2.6344	2.6190	------	------	------	------	------	0.5372	0.3458
	7	4.7277	4.0107	2.9637	2.5621	2.2877	2.0803	1.7698	1.5219	------	1.4327	0.9784	0.6823
	8	4.3805	3.8366	3.2164	2.7506	2.5312	2.0065	1.7375	1.6458	------	1.1106	0.7547	0.5251
	11	4.4422	3.7093	2.9425	3.3442	2.9729	------	------	------	------	------	1.1819	0.8314
	12	4.7538	3.9875	3.0033	2.9715	3.0052	1.8691	1.4206	1.4881	1.3628	1.1945	0.9886	0.8945
	13	4.5541	3.7237	3.0708	2.7405	2.7169	------	------	------	1.1679	1.0840	------	0.6780
	14	4.4249	------	2.9695	------	2.3692	2.2414	2.0586	1.7799	1.4322	1.2384	0.8285	0.6380
	15	4.2494	3.4079	2.8586	2.8798	2.8258	2.1753	------	------	1.1829	------	------	0.7431
	21	4.6158	4.3000	3.6196	3.1046	2.9329	2.0562	1.4322	1.2615	1.1347	0.9702	0.7214	0.6336
	22	4.8656	4.2465	3.8809	------	1.8310	1.6449	1.2702	1.1549	1.0122	------	0.5714	0.5174
	23	4.2055	3.6823	3.5487	3.5376	2.2124	1.4934	1.1120	0.9268	0.8309	0.6823	------	0.5676
	24	4.0970	3.6721	3.1128	2.9531	2.6517	2.0620	1.7268	1.6892	1.5118	1.5296	1.2060	0.9866
	25	4.2378	3.4373	2.8606	------	------	------	------	------	------	------	------	------
	26	4.4403	3.4624	2.9845	2.5206	1.8300	1.3960	1.2605	1.2875	1.2311	1.1795	1.0474	0.7634
	27	4.4316	3.3968	2.3933	------	------	------	------	1.2099	1.1684	0.9953	0.8834	0.6703
	28	3.7001	3.1697	2.8499	2.5056	2.2785	1.6950	1.3801	1.1988	0.9992	0.9731	0.8974	0.7826
	29	------	------	------	------	------	------	1.3141	1.4317	1.4095	1.1284	1.0035	0.9543
	30	3.7932	3.3167	2.2144	2.0948	2.2414	1.9188	1.2171	0.8839	0.7865	0.7103	0.5849	0.5695
Dec.	1	4.1505	------	2.8186	2.8943	2.5215	1.8614	1.4177	1.5774	1.5219	1.3049	0.9567	0.5628
	2	4.2180	3.1711	2.4960	2.5278	------	------	------	------	------	------	------	0.4904
	3	4.1727	3.1894	2.4574	2.0702	1.6429	------	------	------	0.7764	0.7947	0.7339	0.5276
	10	3.6263	3.1648	2.4347	2.2491	2.1150	1.5605	1.1014	0.9572	0.7831	0.7311	0.6462	0.6317
	15	4.0521	------	2.6450	2.0658	2.0866	1.8879	------	------	------	------	------	------
	16	------	------	------	------	------	------	------	------	------	------	------	------
	18	3.5390	3.0997	2.0707	1.8826	1.9188	1.8522	1.6304	1.4269	1.1896	0.9413	0.6322	0.6259
	19	------	------	------	------	------	------	------	------	------	1.0522	1.0223	0.8738
	20	3.4696	2.9213	2.2071	1.8257	1.8344	1.6680	------	------	------	------	0.9683	------
	21	3.7271	3.4947	2.5823	------	2.2105	------	------	------	------	------	------	------
	25	3.2897	2.9430	2.3899	2.0634	1.9954	------	1.0927	0.9659	0.8796	0.8781	0.8299	0.7296
	26	------	3.3100	2.5862	2.0244	1.4674	1.3391	1.6381	1.4057	1.0373	0.8285	0.5232	0.4514
	29	3.7151	3.3134	2.7757	2.4396	------	2.0017	1.4529	1.0498	1.0286	0.9953	0.7465	0.5719
	30	3.8187	3.0293	2.6161	2.3706	------	------	------	------	------	------	------	------
Jan.	2	3.3360	3.0708	2.4820	2.4121	1.6502	1.2239	1.0035	0.8463	0.7677	0.7050	------	0.5271
1976	4	3.0766	2.8326	2.3571	1.8498	1.3194	1.0117	0.8236	0.7306	0.6134	0.5367	0.4586	0.3998
	5	3.7691	3.3669	2.7492	------	1.8734	1.5721	1.3112	1.1294	0.9418	0.6944	0.4909	0.3858
	6	3.0014	2.6614	2.3200	1.8108	------	------	------	------	------	0.7122	0.5873	0.5092
	7	3.1986	------	1.9559	1.7982	1.4949	1.2080	1.1665	1.2248	1.0826	0.8569	0.6785	0.5218
	8	3.0197	2.5119	2.0268	1.6087	1.2615	0.9423	0.9080	0.8916	0.8521	0.7494	0.6491	0.5898
	9	3.0665	2.7656	2.3547	2.0692	1.3729	0.9673	0.7590	0.6582	0.5864	0.5030	0.4461	0.4157
	10	3.2878	2.6281	2.3827	2.0224	1.2586	0.6669	0.6418	0.4239	------	------	0.6481	0.4364
	17	------	------	------	------	2.0808	1.4279	1.1159	0.8960	0.7291	0.6790	------	------
	25	2.8384	2.3624	1.7606	1.9332	1.5388	1.1299	1.0450	0.9090	0.8815	0.9432	0.7981	0.5271
	26	3.0751	3.0414	2.0355	1.4645	1.4144	1.3965	1.1409	0.9471	0.8781	0.8309	0.6510	0.5087
	27	3.4190	2.8369	2.1580	1.9834	2.2563	1.7452	1.5074	1.3010	0.9939	0.8796	0.6385	0.4866
	28	3.0105	2.7458	2.1705	1.8368	1.8749	1.4660	1.6130	1.3811	1.4631	1.1974	0.8690	0.6611

Table 4. Hourly N_T Subsamples Chart Recorded 21 Oct 1975 - 13 Apr 1976

ATS6 to Ootacamund Total Slant Path Electron Content $10^{17} m^{-2}$ -- Part I.

		UNIVERSAL TIME											
		0	1	2	3	4	5	6	7	8	9	10	11
Oct.	21	0.4515	0.7825	1.5957	2.2575	3.1399	4.0496	4.5871	4.5458	4.7115	4.8628	4.8628	5.0285
1975	26	0.6172	0.9343	1.7061	2.5332	3.2917	------	3.9118	------	------	------	------	------
	27	------	------	------	------	------	------	------	------	------	------	5.0972	------
	29	0.6446	1.0582	1.7614	2.0923	2.9468	4.2014	4.7389	4.9593	5.3455	5.6899	------	------
	30	------	------	------	------	------	------	------	------	4.9733	4.9320	4.9459	4.9180
Nov.	2	------	------	------	------	------	------	------	------	------	------	------	------
	3	0.6172	1.0582	2.1749	2.9329	4.1735	5.2351	4.9320	5.0420	5.4281	5.8278	5.4834	4.8494
	4	------	0.8651	1.7888	2.7124	3.7739	------	4.2427	4.3114	4.1049	4.0083	4.4906	4.2566
	9	0.4515	------	1.7201	2.7816	3.5534	4.0083	4.4771	------	------	------	------	------
	10	------	------	------	------	4.4632	5.2490	5.4421	5.4008	5.6212	5.6212	5.8691	5.7591
	16	0.6172	0.9895	1.9132	3.0294	3.6361	4.1601	4.2979	4.4079	4.4771	4.5184	4.7250	4.7802
	20	------	0.7825	1.6922	2.3954	3.0707	3.7600	------	------	4.5736	4.8767	------	------
Dec.	4	0.3936	0.5447	1.4651	2.1657	2.8663	3.5119	4.0202	4.3087	4.4461	4.3499	4.2675	3.9515
	5	------	0.6271	1.4788	2.3718	3.1823	3.5257	3.8416	3.9378	4.1713	4.2538	4.2263	3.9790
	6	0.4486	0.6821	1.5887	2.6328	3.3471	3.6356	3.9241	4.3362	4.3087	4.3499	4.4049	4.3087
	8	------	------	------	------	3.0037	3.4433	3.6081	4.0614	4.1026	4.4598	4.5010	4.4049
	11	0.5447	0.7920	------	------	3.1823	3.4707	3.6905	------	------	4.1988	4.2263	4.1576
	12	------	0.6409	1.4788	2.2481	3.0174	3.3196	3.4295	3.3746	------	3.9241	4.0202	4.0065
	13	0.6409	0.8195	1.5750	2.3031	2.8526	3.1410	3.3746	3.4021	------	3.6356	3.6631	3.9103
	14	------	0.8057	1.6162	2.4267	3.1960	3.3608	3.4570	3.4845	------	4.0065	3.8966	3.8416
	17	------	------	------	------	------	3.4295	3.4433	3.5394	3.9241	4.1301	3.8966	3.6218
	22	0.7783	0.8607	------	1.9184	2.6465	3.0037	------	3.0037	------	------	4.2675	3.8279
	23	------	0.8744	1.4514	2.2344	2.9213	3.3471	3.4707	2.9625	3.1685	3.4845	3.6356	------
	24	0.5997	0.6546	1.2453	1.7948	2.3031	2.5641	2.7427	2.7564	------	3.0311	2.9213	2.8251
	27	0.4486	0.5585	1.4102	2.4404	2.8526	3.1273	3.2097	3.4021	4.0477	------	4.3224	3.7043
	28	0.5310	0.5585	1.3827	2.3718	3.0311	3.2784	3.4570	3.5669	3.9790	3.8829	3.8966	3.8416
	31	0.4211	0.4211	1.3277	2.4542	2.7289	2.9350	3.3059	3.4570	3.7730	4.1576	3.7730	------
Jan.	1	0.4898	0.4898	1.1629	2.0146	2.8800	2.9899	3.2784	3.3883	3.5806	3.7455	3.7730	3.3746
1976	3	0.4486	0.4898	1.1492	2.1794	3.0174	2.9762	3.0174	------	3.2509	3.2922	3.3059	3.2235
	11	0.3524	0.5447	1.0805	2.2893	3.1136	3.4845	3.9103	4.0752	4.0340	3.7592	3.8004	3.5257
	16	------	------	------	------	------	------	------	------	------	------	3.3746	3.4570
	21	------	------	------	------	1.9459	2.7976	3.1136	3.4845	3.6081	3.4433	3.1548	3.1136
	22	------	------	------	------	2.7289	2.8800	3.0861	3.3059	3.6081	3.4021	3.2647	3.2922
	23	------	------	------	------	2.0558	2.5091	2.6328	2.8938	3.4433	3.0586	3.2372	3.2784
	24	------	------	------	------	------	------	------	------	------	------	------	3.1685
	29	0.4760	0.4623	1.0667	1.7536	2.5641	2.9625	3.2647	------	------	------	------	------
Feb.	3	0.2589	0.2724	0.8651	1.5130	1.9679	2.4919	2.7950	3.0847	3.6361	3.4017	3.3877	2.8781
	4	0.3415	0.3276	0.8238	1.2926	1.8992	2.3954	2.4646	2.3128	2.7403	3.0847	2.8781	2.7537
	5	0.4102	0.4102	1.0169	1.7201	2.2849	2.7403	2.7537	2.6159	2.9055	3.0847	3.2777	3.2499
	6	0.4242	0.3968	0.9895	1.5409	2.0510	2.4919	2.9468	3.2777	3.5395	3.6634	3.7326	3.8705
	7	0.5620	0.5346	1.0995	1.5270	2.0784	2.4780	2.9194	3.4843	3.8013	3.6361	3.3051	3.1812
	9	------	------	------	------	2.0510	2.5332	2.8363	2.8916	3.0847	3.3330	3.2638	3.1538
	10	------	------	------	------	2.0923	2.6572	3.0847	3.2086	3.6221	3.5948	3.4017	3.4156
	11	0.3689	------	------	------	2.2989	2.9881	2.9881	3.2364	3.4156	3.3051	3.1812	3.2499
	12	------	------	------	------	2.2436	2.9881	3.4295	3.3191	3.3877	3.5395	3.6774	3.7326
	13	------	------	------	------	2.6159	3.4843	3.5674	3.5674	3.9809	4.2014	3.8431	3.3464
	14	------	------	------	------	2.7950	3.5674	3.6087	3.3330	3.8978	3.6634	3.1260	3.0847
	15	------	------	------	------	2.8363	3.3191	3.4156	------	------	------	------	------
	16	------	------	------	------	2.7537	3.3330	3.4982	3.6221	3.7052	3.7739	3.9257	3.8978
	17	0.5068	0.4655	1.1687	1.9405	2.7537	3.5674	3.6634	3.7326	3.6087	3.8013	3.8978	3.5808
	18	0.2863	0.3968	1.2513	2.1197	3.0020	3.4017	3.4708	4.0083	4.4771	4.1322	3.8844	4.0222
	19	0.5481	0.4381	1.0582	1.7335	2.6985	3.4982	3.6221	3.5674	3.7326	4.0222	4.0496	4.0635
	20	0.5346	0.5068	1.2513	2.0784	2.8363	3.5674	3.8152	3.9118	3.9670	4.2014	4.3945	4.2427
	21	------	------	1.0029	1.7888	2.6298	3.2638	3.7739	4.0083	3.7326	3.6361	4.0909	4.3945
	22	------	------	------	------	2.6159	3.1260	3.3464	------	3.9257	4.0496	4.1462	4.3666
	23	0.3415	0.3002	1.0169	1.7061	------	------	------	3.5674	3.7326	3.8152	3.8978	3.9531
	24	0.4102	0.3829	1.1408	1.9958	------	------	------	3.4843	3.6634	3.8844	4.0770	------
	25	0.4242	0.4242	1.1960	1.9958	------	------	------	------	------	3.5256	3.4295	3.5121
	26	------	------	------	------	------	------	------	3.4982	3.6221	3.7052	3.8705	3.8431
	27	0.4242	0.3968	1.1821	------	------	------	------	3.5674	3.7878	------	------	------
	28	------	------	1.1687	2.0784	3.1260	------	------	3.6361	3.9809	4.0770	4.1735	4.2979
	29	0.3276	0.2863	1.1134	2.0231	------	------	------	3.8292	3.9944	4.1875	4.2701	4.0357
April	1	------	------	1.3340	2.0370	------	------	------	4.9457	6.5724	4.2978	4.3529	4.4357
	2	------	------	1.8578	3.2363	------	------	------	5.4833	5.9245	5.6350	5.2076	5.1111
	9	------	------	1.3891	2.3403	------	------	------	4.7527	4.4357	4.3116	4.7251	5.1249
	10	------	------	1.3064	1.9819	------	------	------	4.8354	4.9733	4.9733	5.2490	5.5109
	11	0.3277	0.6309	1.4167	2.3265	3.1812	------	------	4.2702	4.4219	4.8354	5.0422	4.9457
	12	------	0.7688	1.4994	2.4230	3.3466	3.5672	3.8429	4.0497	4.2427	4.4357	4.8216	4.8630
	13	------	0.7550	1.5408	2.5333	3.6637	4.2289	4.5735	4.7665	4.9457	5.0698	5.4833	5.2490

Table 4. (Continued)

ATS6 to Ootacamund Total Slant Path Electron Content $10^{17} m^{-2}$ -- Part II.

		UNIVERSAL TIME											
		12	13	14	15	16	17	18	19	20	21	22	23
Oct. 1975	21	4.8767	4.0357	2.8363	------	2.2989	------	2.2302	2.0923	1.7201	1.3065	0.9203	0.6446
	26	4.6284	------	------	------	------	------	------	------	------	------	------	------
	27	4.4906	3.8705	2.9329	2.2849	1.7753	1.9266	1.8579	1.9679	1.8440	1.4304	0.9616	0.6033
	29	4.6702	4.3253	------	2.9194	2.8363	2.2715	1.8166	1.4717	1.3339	1.2926	1.1134	0.7964
	30	4.5871	3.9257	2.5885	1.8853	1.5822	------	------	------	------	------	1.0029	0.8790
Nov.	2	------	------	3.0847	3.0707	2.9742	2.5885	2.2989	2.2023	1.8992	1.2239	0.9756	0.7551
	3	4.3806	4.2427	3.7878	2.6572	2.0092	1.3339	1.0995	1.0029	0.9482	------	------	------
	4	4.1049	3.8013	3.0433	------	2.0923	1.2787	0.9756	0.8930	0.6446	0.5481	0.5207	0.3968
	9	5.1798	4.2979	3.1538	1.4444	------	------	------	------	------	------	------	------
	10	5.6625	5.0146	3.9944	3.6774	3.4569	2.9194	2.3680	------	------	------	------	------
	16	------	------	------	------	------	------	------	------	------	------	------	------
	20	4.2566	3.8152	3.0294	2.2715	1.8579	1.3478	------	------	------	------	------	0.8238
Dec.	4	3.9103	3.2509	2.5641	2.3168	2.2481	1.8223	------	------	------	0.9019	0.7096	0.5585
	5	3.9378	3.5669	2.5229	2.2481	1.5613	------	------	------	------	0.5859	0.4623	0.4623
	6	3.9653	3.6356	2.5366	1.6986	1.5887	------	------	------	------	------	------	------
	8	4.1576	3.7043	2.8251	2.4267	2.1382	1.5201	1.2728	1.1904	1.3827	1.1492	0.8469	0.8195
	11	3.9241	3.1548	2.3992	2.3992	2.2481	------	------	1.1354	------	------	------	------
	12	4.1026	3.1136	2.2756	2.0558	2.0283	1.6986	------	------	------	0.7920	0.7096	0.7096
	13	3.8829	3.5119	2.7701	2.2344	------	------	------	------	------	------	------	------
	14	3.8554	3.0586	2.0146	1.3552	1.0667	0.9980	1.0393	1.1354	1.1217	0.9980	0.7920	0.6409
	17	3.5532	3.2235	2.6602	2.0833	2.2893	1.9322	1.6025	1.6574	1.2453	0.8744	0.9156	0.7783
	22	3.4433	2.9075	2.0283	1.7124	1.6437	1.2728	0.8881	0.8057	0.7920	0.7920	0.7645	------
	23	------	2.9350	2.2619	1.9596	1.3690	1.0667	0.8469	------	------	------	------	------
	24	2.6877	------	2.0146	1.5750	1.6300	1.0118	0.8057	0.7645	0.7370	0.6409	0.6134	0.5722
	27	3.3196	2.7564	2.4404	2.4130	1.9871	1.5201	1.6025	1.3827	0.7096	0.4623	0.5722	0.7920
	28	3.6356	3.5532	2.6740	2.2207	2.0146	1.3415	0.9568	0.8607	0.7508	0.7783	0.5859	0.4486
	31	3.7867	3.3059	2.5503	2.2344	1.8360	1.3552	1.1766	------	------	------	------	------
Jan. 1976	1	3.3608	3.0449	2.3168	2.0695	1.3003	0.9706	0.8195	0.6821	0.6134	0.5310	0.4898	0.4348
	3	3.1685	2.6465	2.0970	2.0833	1.4788	1.3827	1.1354	0.9843	------	------	0.5447	0.4898
	11	2.9625	2.9213	2.3718	2.4267	1.6437	1.6025	1.3003	------	------	------	------	------
	16	3.3059	2.5916	2.0009	1.8910	1.8635	1.3140	0.8744	0.7783	0.8881	0.7920	0.6546	0.4348
	21	2.9350	2.7152	2.1245	2.2069	1.8360	1.1217	0.8195	0.9843	0.7783	0.5310	0.3936	0.3249
	22	3.2922	2.8388	2.4542	2.2619	1.9459	1.3827	1.2316	1.0667	0.8607	0.6546	0.4486	0.4211
	23	3.0037	2.4954	1.9459	1.4926	------	------	------	------	------	------	------	------
	24	3.0174	2.5366	2.0970	1.8223	1.3964	1.1354	0.8744	0.8332	0.7645	0.6546	0.5310	0.4348
	29	------	------	------	------	------	------	------	------	------	------	------	------
Feb.	3	2.7263	2.4646	2.1471	1.9679	1.9132	1.2926	0.9482	0.7685	0.5894	0.5207	0.4242	0.3829
	4	2.8503	2.6850	1.9958	1.5822	1.4857	1.2513	1.1134	0.9895	0.7825	0.6586	0.5207	0.4515
	5	2.9194	2.6711	2.1471	1.3891	1.6509	1.4717	1.5270	1.3339	1.1134	0.9064	0.6446	0.5068
	6	3.6774	3.2086	2.3954	1.9545	1.7061	1.4996	1.2787	1.4165	1.1821	0.9895	0.8377	0.6725
	7	3.2917	3.0433	2.8229	2.2302	------	------	------	------	------	------	------	------
	9	3.0847	2.7403	1.9958	1.1960	1.1547	1.2787	1.4031	1.1134	0.8790	------	------	------
	10	3.4430	2.9055	2.4093	2.3128	2.0092	1.6374	1.2239	0.9064	0.7412	0.7551	0.6033	0.5481
	11	3.5674	3.1951	2.6298	1.9679	1.6788	1.6096	1.2926	1.0860	0.9203	0.8930	------	------
	12	3.6774	3.3051	2.6985	2.4367	2.0231	1.7753	1.0860	0.9343	0.8651	0.7685	------	------
	13	3.3877	3.3051	2.8363	2.1610	------	------	------	------	------	------	------	------
	14	2.8916	2.8503	2.2989	1.9679	------	------	------	------	------	------	------	------
	15	------	3.4982	3.2364	2.4506	------	------	------	------	------	------	------	------
	16	3.7187	3.3330	2.6159	1.9818	1.8166	2.1336	1.6096	2.2436	1.8579	1.4031	0.9756	0.6725
	17	3.8013	3.9391	2.8090	2.0784	1.7474	1.4031	1.2926	1.0995	1.2926	1.1960	0.7138	0.4794
	18	4.1462	3.6361	2.7676	2.2575	2.1471	2.1471	2.3402	2.2023	1.9818	2.0510	1.3617	0.8930
	19	4.0357	3.6634	3.0986	2.4646	2.4646	2.2849	1.7335	1.4444	1.6374	1.2373	0.8103	0.6033
	20	4.1322	3.7052	2.7950	1.9679	1.6096	1.5822	1.8440	1.8579	2.0784	1.7614	0.9343	0.5759
	21	4.1875	3.4982	2.8090	2.2436	------	------	------	------	------	------	------	------
	22	4.4906	3.8844	3.4430	2.8916	2.2023	1.7474	1.8579	1.6648	1.3891	1.3752	0.9616	0.5346
	23	------	------	------	------	------	------	------	------	1.2787	0.9482	0.6999	0.5207
	24	------	------	------	------	------	2.0371	1.5957	1.5822	1.4304	1.1408	0.7551	0.5481
	25	------	------	------	------	------	------	------	------	------	------	------	------
	26	------	------	------	------	1.3065	1.3617	1.1687	1.5409	1.3891	1.2787	1.1273	0.6999
	27	------	------	------	------	1.1273	0.9895	1.4031	1.1547	0.7412	0.7272	------	------
	28	------	------	------	------	2.2302	2.4919	2.2989	1.9545	1.8853	------	------	0.6586
	29	------	------	------	------	------	2.0923	1.8166	------	------	------	------	------
April	1	4.2978	------	------	------	------	0.9342	------	------	------	------	------	------
	2	4.9733	------	------	------	------	------	------	------	------	------	------	------
	9	5.1111	------	------	------	2.2438	2.1749	2.3817	------	------	------	------	------
	10	4.7941	------	------	------	1.6235	1.4856	1.2651	0.8239	0.7688	0.6447	------	0.4793
	11	4.2151	------	------	------	2.4919	2.3127	1.4994	1.0583	0.8101	------	------	------
	12	4.3116	------	------	------	------	------	------	------	------	------	------	------
	13	4.1737	3.2088	2.9193	2.4230	1.7338	------	------	------	------	------	------	------

Table 5. Hourly N_T Subsamples Chart Recorded 14 Apr - 28 Jun 1976

ATS6 to Ootacamund Total Slant Path Electron Content $10^{17} m^{-2}$ -- Part I.

		UNIVERSAL TIME											
		0	1	2	3	4	5	6	7	8	9	10	11
April	14	------	------	1.8992	3.0020	------	------	------	------	------	4.8216	4.8216	4.8079
1976	15	0.5344	0.7550	1.4167	2.1060	3.1123	4.1324	4.4081	4.6562	4.7941	4.7941	4.7527	4.6838
	16	0.5896	0.8239	1.6235	3.0020	3.4845	3.8291	3.9256	4.0359	4.3667	4.9043	5.0008	4.9753
	17	0.6309	0.8791	1.4856	2.3679	3.0847	------	4.0910	4.1875	4.4494	4.6149	4.4908	4.6149
	18	0.4517	0.6447	1.5270	2.2576	2.8779	3.5672	4.2013	4.3667	4.4908	4.6424	4.4770	4.4081
	19	0.5069	0.7550	1.5270	2.3954	3.1536	3.6085	3.9394	4.0910	4.1599	4.2013,	4.2013	4.3805
	20	------	0.8101	1.5545	2.3954	3.1123	3.6637	4.0221	4.2013	------	------	4.7251	4.4219
	21	------	------	1.5821	2.3679	3.1123	3.4569	3.6223	3.9807	4.1737	4.5459	4.8492	4.3116
	22	------	------	1.7062	2.4782	3.2226	3.8842	4.1324	4.3392	4.7251	5.3317	5.6763	5.2903
	23	0.5207	0.6723	1.5408	2.2714	2.9469	3.6223	4.0910	4.3116	4.5459	4.9043	4.9043	4.8768
	24	0.4379	0.6723	1.6510	2.5057	3.3191	3.7050	3.9256	4.1599	4.2289	4.3116	------	------
	25	0.3828	0.6723	1.6924	2.4368	3.2639	3.8153	4.0635	4.2427	4.4219	4.9733	4.9733	4.8768
	26	0.3277	0.6447	1.5545	2.5333	3.1674	3.2915	3.6637	3.9945	4.0359	4.2289	4.2151	4.2151
May	1	0.4794	0.7272	1.6646	2.4919	3.0433	3.2638	3.5121	3.6634	3.8431	4.0909	4.3806	4.4492
	2	0.2724	0.6999	1.3065	2.1471	3.0573	3.7326	4.3527	4.3393	4.1601	3.9257	4.1462	4.3527
	3	0.3415	0.8238	1.7061	------	2.6159	4.2840	4.0909	4.2566	4.9459	5.0837	5.1251	4.8080
	4	0.1898	0.6307	1.4996	2.5059	3.2086	3.5808	3.8844	4.6563	5.0972	5.0146	4.7528	4.8628
	6	------	------	------	------	2.8642	3.3743	3.5808	4.1875	4.4358	4.4632	4.6563	4.6563
	7	------	------	1.3339	1.8714	2.8229	3.2364	3.3191	3.5256	4.0909	4.2014	4.2427	4.0222
	8	------	0.6999	1.2373	1.9132	2.5885	2.9329	3.3191	3.7739	4.1322	4.1875	4.0909	4.1322
	9	0.2724	0.7551	1.4031	1.9818	2.6985	3.1538	3.3877	3.5674	3.6913	3.8013	3.7739	3.6361
	10	------	------	------	2.2436	3.0160	3.0986	3.2364	3.4843	3.7739	3.8844	3.7739	3.6913
	11	0.3829	0.9064	1.7888	2.3680	2.8503	3.0573	3.3464	3.4708	3.6634	3.9531	4.2701	4.1875
	12	0.2724	0.8238	1.6922	2.5193	3.1812	3.5674	3.8152	4.0909	4.3527	4.5458	4.5458	4.0635
	13	0.3002	0.9064	1.8579	2.6711	3.3051	3.5674	3.8978	4.1735	4.2701	4.2701	4.4079	4.0222
	14	------	0.9895	1.7614	2.6298	3.0707	3.4982	3.7326	3.9257	4.0635	4.2427	4.3806	4.0635
	15	0.5207	1.0169	1.7753	2.4646	3.1260	3.5256	3.6913	3.6361	3.6361	3.7739	3.9257	3.8844
	16	0.5068	0.9756	1.5409	2.1471	2.6572	3.1260	3.8152	3.9531	3.9257	3.8152	3.8978	3.8431
	17	------	1.1134	1.7061	2.4646	3.2086	3.7326	3.6361	3.5534	3.7878	4.0083	4.0222	3.6361
	18	0.4928	1.0169	1.7335	2.4228	3.1120	3.6634	3.8705	3.9670	4.1735	4.2148	4.0357	3.8431
	19	0.3829	0.9064	1.6509	2.2436	2.7263	3.0707	3.2499	3.3191	3.5674	3.8013	3.9809	3.9118
	20	0.3415	0.8790	1.4165	1.9818	2.8363	3.3464	3.6634	3.9257	4.6010	4.6976	4.5184	4.4358
	21	0.3002	0.9064	1.8027	2.3680	2.6985	3.3191	3.8844	3.9809	4.0909	4.2427	4.4358	4.4358
	23	0.1898	0.7685	1.4717	2.1889	3.0020	3.6087	3.7187	3.7739	3.8152	3.7878	3.5808	3.7326
	24	0.3002	0.8103	1.4717	2.2715	3.0986	3.5534	3.8844	3.9531	3.8978	3.9809	3.8152	3.6361
	25	0.3002	0.8103	1.4304	2.0510	2.5606	2.9194	3.1399	3.2364	3.2917	3.5674	3.5948	3.6087
	26	0.2589	0.7272	1.3752	1.8714	2.7950	3.3877	3.5256	3.5808	3.7187	3.7052	3.5674	3.5674
	27	0.3968	0.8238	1.7061	2.4228	2.8503	2.9881	3.0160	3.1951	3.2777	3.3877	3.3877	3.1538
	28	------	0.6033	1.2926	2.0923	2.8229	3.1399	3.2777	3.5256	3.5808	3.4843	3.4708	3.6087
	29	------	0.8238	1.5544	2.0092	2.5885	3.1673	3.7326	3.6361	3.7739	3.7739	3.5256	3.5256
	30	0.3276	0.8238	1.2513	2.3128	2.8229	3.0160	3.4843	3.8152	4.0357	4.0083	3.8431	3.8844
	31	0.3829	0.8651	1.7614	2.1610	2.5746	3.0020	3.4843	3.6361	3.8705	4.0083	4.1322	3.7878
June	1	------	0.7964	1.5683	1.7753	2.3680	2.9881	3.4156	3.4569	3.4569	3.4156	3.4708	3.5256
	2	------	------	------	------	2.4228	2.7537	3.0160	3.2638	3.4156	------	3.6634	3.2364
	3	0.2589	0.6446	1.3200	1.8714	2.5606	2.8503	3.2638	3.2499	3.3464	3.2917	3.1673	3.2086
	4	0.1898	0.6307	1.1960	1.9818	2.6985	2.7950	3.1399	3.6087	3.3051	3.4982	3.2364	3.2638
	5	------	------	------	2.0923	2.4919	2.8781	3.2499	3.3191	3.4708	3.5808	3.4708	3.6634
	6	0.5346	1.0029	1.7474	2.1610	2.6850	2.8503	3.2777	3.5395	3.5948	3.8978	3.7326	3.7326
	7	0.4102	0.9064	1.6509	2.0784	2.6850	3.1260	3.4569	3.2086	3.0573	3.3464	3.3191	2.9881
	8	0.4381	0.9756	1.7888	2.1610	2.8229	2.9881	3.2499	3.2917	3.4569	3.5674	3.6913	3.5256
	9	0.5759	1.0582	1.8027	2.5472	3.0707	3.2364	3.1812	3.3330	3.2499	3.4569	3.0573	2.9607
	10	0.4102	0.9064	1.6788	2.2849	2.7537	2.9607	3.3743	3.3191	3.0707	3.2364	3.2917	3.0847
	11	------	------	1.4031	2.0510	2.4367	2.7816	3.0020	3.4295	3.4843	3.6361	3.9391	3.9809
	12	0.2589	0.8377	1.4857	2.3128	------	3.4156	3.6087	3.4708	3.6913	3.9809	3.8431	3.4569
	13	0.2589	0.7272	1.5409	1.9958	2.7950	3.4569	3.5256	3.4708	3.4156	3.4156	3.3743	3.2364
	14	0.2311	0.8103	------	1.7753	2.5332	2.8363	3.1538	3.1951	3.3877	3.3191	3.0847	3.0707
	15	0.3829	0.8516	1.4996	2.0231	2.2849	2.8916	3.0160	------	------	------	------	------
	16	------	0.7272	1.2926	1.9405	2.6985	3.0986	2.9607	3.1399	3.2917	3.4982	3.3877	3.1673
	17	0.2311	0.7138	1.3617	1.6648	2.0510	2.5746	2.7263	2.8363	3.0160	3.1260	2.9468	3.1812
	18	0.3968	0.9343	1.4304	1.9132	2.3954	2.6850	3.0573	3.1399	3.4982	3.5256	3.6913	3.5948
	19	0.3276	0.8790	1.2513	1.6648	2.4367	2.9055	3.1120	3.0707	------	------	------	------
	20	0.2450	0.7272	1.3752	1.9132	2.5193	2.7537	2.8503	2.8916	2.8781	2.7676	2.9468	3.0020
	21	0.3415	0.7964	1.4717	2.0231	2.4919	3.0020	3.1538	------	3.2086	3.0707	3.2364	3.2086
	22	0.3968	0.9343	1.5822	2.1610	2.3954	2.7816	3.0020	3.1120	3.2364	3.4295	3.3877	3.0433
	23	0.5207	1.0029	1.6096	2.1749	2.7263	2.8781	2.8229	2.8642	3.0433	3.1260	3.0573	3.0573
	24	0.4794	0.9343	1.4996	2.0510	2.5746	2.6298	2.6985	2.8503	3.0433	3.0847	2.9742	3.0020
	25	0.2589	0.6999	1.1547	1.9818	------	2.6437	------	------	------	------	------	------
	27	0.2450	0.7272	1.4165	2.0923	2.7263	2.7816	2.8363	3.0847	3.2638	3.1399	3.1673	2.9607
	28	0.3002	0.8103	1.2652	1.9132	2.4367	2.6711	2.8229	2.7403	2.7950	2.9468	2.9742	2.9881

Table 5. (Continued)

ATS6 to Ootacamund Total Slant Path Electron Content $10^{17} m^{-2}$ -- Part II.

		UNIVERSAL TIME											
		12	13	14	15	16	17	18	19	20	21	22	23
April	14	4.8492	4.3667	3.9807	3.1398	2.7539	2.4506	------	------	------	------	0.8101	0.5896
1976	15	4.3116	4.1462	3.2363	2.4506	1.7338	1.4305	------	------	------	------	------	0.5344
	16	4.6838	4.3805	3.4845	2.5195	1.6786	1.4305	1.2788	1.0583	0.9480	------	------	------
	17	4.7803	------	------	------	------	------	------	------	------	------	0.6723	0.6034
	18	4.7251	4.2978	2.8366	2.1473	1.4856	1.1410	0.8929	0.8653	0.7274	0.7412	0.6309	0.5344
	19	4.5459	4.1462	3.0571	2.3954	1.4994	1.3478	1.1686	1.1410	0.5620	------	------	------
	20	4.0221	3.1674	2.6436	1.9681	1.6373	1.4167	1.1272	0.7274	0.6447	------	------	------
	21	3.8842	3.1536	2.4506	2.2025	1.5821	1.3478	0.9618	0.7550	------	------	------	------
	22	4.8492	4.0221	3.6637	3.2363	2.4919	2.0370	------	------	------	------	------	0.3690
	23	4.3392	3.9532	3.1123	2.3265	1.6510	1.2099	------	------	------	------	------	------
	24	------	------	------	------	------	------	------	1.0996	0.8239	------	------	------
	25	4.8492	4.3392	3.3191	------	1.8440	1.4305	1.0583	0.7550	0.6034	0.5482	0.4655	0.4793
	26	4.0910	3.9532	2.8779	1.9405	1.3202	0.8515	0.7274	------	------	------	------	------
May	1	4.0909	3.3464	2.1471	1.2926	0.8790	0.6033	0.5068	0.4102	0.3829	0.3829	0.3550	0.2724
	2	4.3393	3.8844	2.6985	1.7614	1.1134	0.9343	0.7138	0.6307	0.4928	0.4102	0.3968	0.3689
	3	4.3806	2.7950	1.5683	0.9064	0.6033	0.5759	0.4928	0.3829	0.3002	0.3002	0.2589	0.1898
	4	4.2701	------	------	------	1.4996	1.1408	0.8377	0.5346	0.3689	------	------	------
	6	4.4771	------	------	------	------	------	------	------	------	------	------	------
	7	3.5674	------	------	------	------	0.7138	0.5759	0.5207	0.4381	------	------	------
	8	3.9809	------	------	------	------	------	0.6446	0.6033	0.4928	0.3002	0.2589	0.2863
	9	3.5674	------	------	------	------	------	0.5620	0.5068	0.4515	------	------	------
	10	3.7052	------	------	------	1.2373	0.9064	0.7272	0.6307	0.5068	0.4515	0.4102	0.3829
	11	4.0222	------	------	------	1.6788	1.1134	0.8790	0.7685	0.6446	0.4928	0.4102	0.3415
	12	3.9944	------	------	------	1.1547	0.7685	0.7412	0.4102	0.3415	0.2589	0.2171	0.3002
	13	3.8013	------	------	------	------	------	------	------	------	------	------	------
	14	3.7739	------	------	------	1.3617	1.1273	0.9756	0.8516	0.6725	0.5759	0.5068	0.3968
	15	3.4982	------	------	------	1.1821	1.0582	0.9616	0.7685	0.6446	0.5759	0.4928	0.5346
	16	3.8431	------	------	------	1.5270	1.1408	1.0582	0.9343	0.8103	0.7825	------	------
	17	3.4156	------	------	------	0.9616	0.8516	0.7964	0.7551	0.6725	0.6446	0.5759	0.5346
	18	3.7326	------	------	------	1.2239	------	------	------	------	------	------	------
	19	3.5948	------	------	------	1.1960	0.9895	0.8930	0.6725	0.4928	0.4102	0.3689	0.3002
	20	3.7878	------	------	------	1.2787	0.9756	0.8651	0.5346	0.4102	0.3415	0.3415	0.3002
	21	4.0222	------	------	------	------	------	0.9482	0.7272	0.5207	0.4655	------	------
	23	3.5674	------	------	------	0.9482	0.7825	0.5894	0.5068	0.4102	0.3002	0.2724	0.3415
	24	3.2364	------	------	------	------	0.6999	0.5620	0.5068	0.3829	0.2311	0.1898	0.2724
	25	3.3877	------	------	------	------	0.7551	0.5346	0.4794	0.3968	0.2311	0.2171	0.2589
	26	3.2917	------	------	------	------	0.8790	------	------	0.4928	0.4381	0.3968	0.3829
	27	2.5606	------	------	------	------	0.6307	0.5346	0.3829	------	------	------	------
	28	3.8705	------	------	------	------	1.0169	0.8930	------	------	------	------	------
	29	3.4430	------	------	------	------	0.8238	0.6999	0.5068	0.4102	0.3829	0.3550	0.2724
	30	3.9944	------	------	------	1.0582	0.9064	0.6446	0.5481	0.4102	0.4102	0.3968	0.3829
	31	3.3191	------	------	------	------	------	------	------	------	------	------	------
June	1	3.6087	------	------	------	------	------	------	------	------	------	------	------
	2	2.6437	------	------	------	------	0.6725	0.5346	0.4381	0.3968	0.3415	0.2724	0.2589
	3	3.0986	------	------	------	------	0.7272	0.6307	0.5068	0.3968	0.4242	0.2724	0.2450
	4	3.1951	------	------	------	------	0.7551	0.7551	0.4102	0.3415	0.2724	0.2450	0.2450
	5	3.6634	------	------	------	------	0.8790	0.8516	0.8516	0.7272	0.7412	0.5068	0.5346
	6	3.1812	------	------	------	1.3478	0.9756	0.8651	0.7685	0.5068	0.3276	0.2724	0.3689
	7	2.8229	------	------	------	1.0308	0.8516	0.8516	0.7964	0.5620	0.3968	0.3550	0.4381
	8	3.1673	------	------	------	------	0.9064	0.7825	0.7551	0.7138	0.6307	0.6033	0.6033
	9	2.9194	------	------	------	------	0.8516	0.7272	0.6999	0.5894	0.4102	0.3415	0.4102
	10	2.6711	------	------	------	------	------	------	------	------	------	------	------
	11	3.8152	------	------	------	1.2373	0.9895	0.8238	0.6586	0.5620	0.5207	0.3002	0.2589
	12	3.0707	------	------	------	------	0.6725	0.6307	0.5759	0.4515	0.3002	0.2171	0.2311
	13	3.1538	------	------	------	0.6446	0.6033	0.5759	0.4515	0.3550	0.3002	0.2589	0.2311
	14	3.2086	------	------	------	------	------	0.7138	0.6307	0.5759	0.5068	0.4515	0.4102
	15	------	------	------	------	------	------	------	------	------	------	------	------
	16	3.1951	------	------	------	------	0.7551	0.7272	0.5481	0.4515	0.3968	0.4102	0.2863
	17	3.1260	------	------	------	------	0.9343	0.8651	0.6586	0.5346	0.5346	0.3550	0.4381
	18	3.3191	------	------	------	------	0.8651	0.7138	0.5759	0.3550	0.2450	0.2450	0.2863
	19	2.8229	------	------	------	------	0.8103	0.6586	0.5346	0.3002	0.2863	0.1211	0.1898
	20	2.8781	------	------	------	1.1547	0.8516	0.7685	0.7551	0.5620	0.5207	0.3002	0.3415
	21	2.8229	------	------	------	------	0.9343	0.9064	0.7272	0.5620	0.5207	0.2589	0.3415
	22	2.8503	------	------	------	1.2100	0.9203	0.8790	0.7964	0.6033	0.4794	0.4794	0.5068
	23	3.2364	------	------	------	1.1547	0.9064	0.8516	0.7272	0.5346	0.6033	0.4102	0.4794
	24	3.0433	------	------	------	0.8790	0.7272	0.5759	0.4102	0.2311	0.2171	0.1898	0.2171
	25	------	------	------	------	------	------	------	------	------	------	------	------
	27	3.0573	------	------	------	1.2239	0.9895	0.8651	0.7551	------	0.4794	0.3550	0.3002
	28	2.9055	------	------	------	0.8238	0.5759	0.5620	0.5759	0.4794	0.3689	0.2724	0.2311

Table 6. Hourly N_T Subsamples Chart Recorded 29 June - 22 Jul 1976

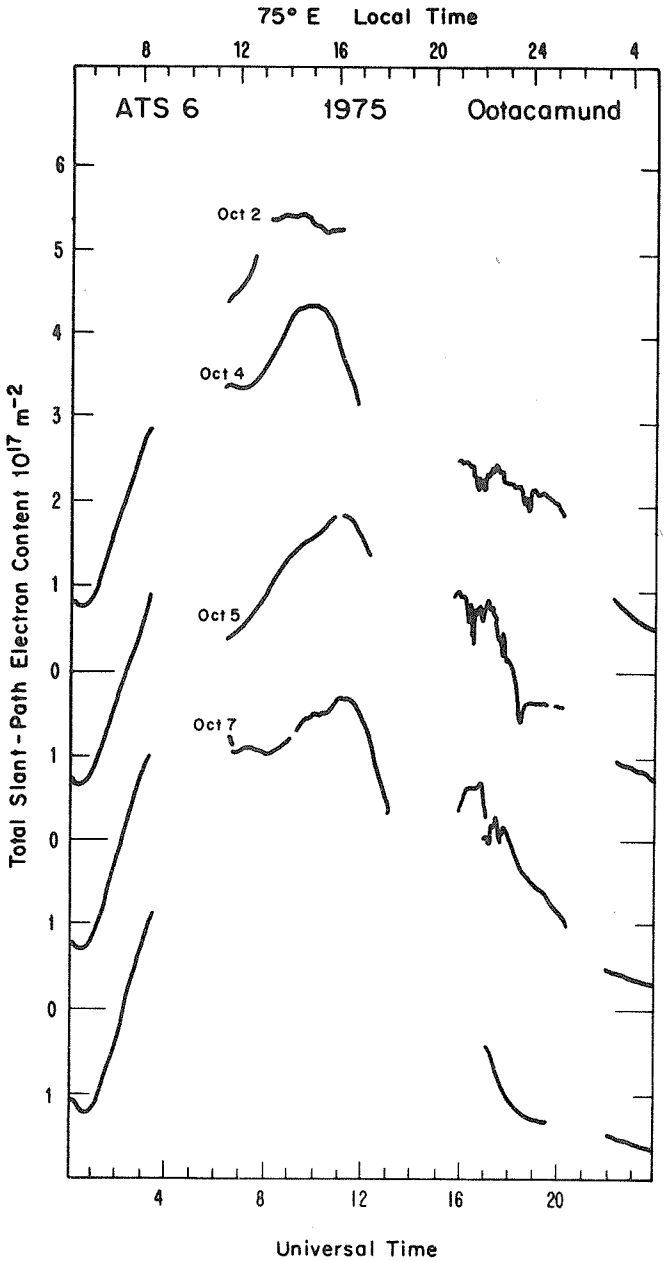
ATS6 to Ootacamund Total Slant Path Electron Content $10^{17} m^{-2}$ -- Part I.

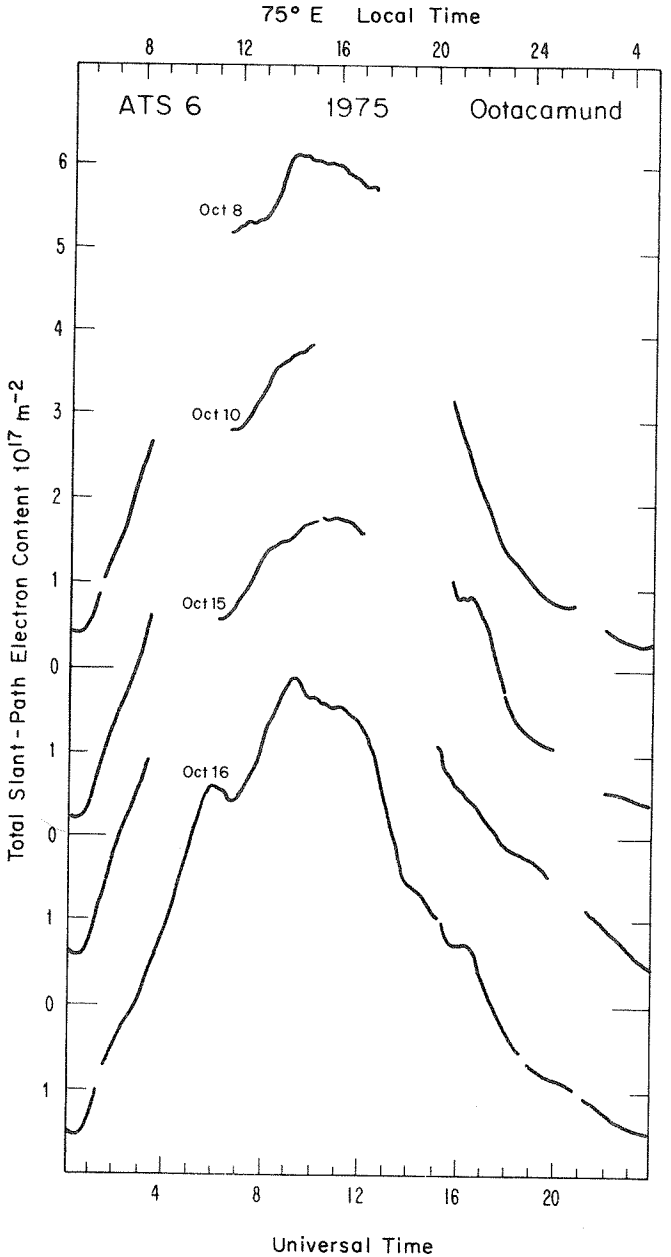
		UNIVERSAL TIME											
		0	1	2	3	4	5	6	7	8	9	10	11
June	29	0.2171	0.6033	1.2787	1.9545	2.5606	2.7403	2.7676	2.7537	2.7537	2.7950	2.7537	2.5885
	30	0.1485	0.5481	1.4031	1.9405	2.2436	2.4228	2.7263	2.6298	2.6850	2.8229	2.7403	2.6850
July	1	0.1898	0.6307	1.1273	1.4996	2.2302	2.5193	2.7950	2.9881	2.9881	2.5885	2.8229	2.9055
1976	2	0.2450	0.5207	0.9756	1.3200	1.8714	2.2715	2.5193	2.7403	2.8642	2.9329	2.8363	2.8781
	3	0.2311	0.6307	1.2100	1.7061	2.1749	2.4646	2.7403	2.9468	3.0707	3.2364	3.1951	2.8229
	4	0.3002	0.7138	1.2513	1.5957	1.9958	2.2989	2.5193	2.7263	3.0847	2.8503	3.0160	2.8503
	5	0.2450	0.6307	1.2787	1.8579	2.5193	2.5746	2.5885	2.9194	3.0433	3.0433	3.0020	2.9194
	6	0.2450	0.6586	1.3891	1.8853	2.6985	3.0433	2.9607	2.6985	2.6711	2.8503	3.2917	3.1399
	7	0.2171	0.6307	1.4031	1.9958	2.4228	2.5885	2.8229	2.7676	2.8503	2.8229	2.9055	2.7676
	8	0.2724	0.6307	1.3478	1.8853	2.2715	2.6711	2.7537	3.1120	3.0707	2.9607	2.8781	2.8503
	9	------	------	------	------	2.6437	2.9194	3.0847	3.2499	3.4295	3.4708	3.2086	3.2086
	10	0.3002	0.7272	1.5544	2.2849	2.5472	2.6711	2.7950	2.9468	3.1812	2.9194	2.7537	2.5885
	11	0.1898	0.5759	1.3752	1.7201	2.0092	2.5059	2.9881	3.0160	2.8916	2.9881	3.2364	3.0707
	12	0.2589	0.6446	1.2100	1.7335	2.1471	2.5332	------	------	2.7403	2.8503	2.9194	3.0020
	13	0.3689	0.6999	1.1547	1.6648	2.2849	2.5885	2.7537	2.5885	2.6711	2.8642	3.0986	2.6437
	14	------	------	------	------	2.1471	2.5606	2.8642	2.9607	2.8229	2.7950	3.0707	2.2436
	15	0.3002	0.6725	1.2513	1.6922	2.2436	2.7950	2.9468	2.9468	2.9055	2.7263	2.8229	2.7816
	16	0.2171	0.6307	1.1821	1.9818	2.5193	2.7950	3.2364	3.1951	3.2364	3.2917	3.3191	------
	17	0.1485	0.4515	1.0169	1.7201	2.2849	2.4919	2.8642	2.9329	2.8642	3.0294	2.8642	2.7816
	18	0.2171	0.6033	1.2239	1.5822	2.1749	2.5472	2.5059	2.5606	2.6298	2.5606	2.5332	2.4919
	19	0.1898	0.4515	0.9482	1.2239	1.7753	2.1610	2.4919	2.5606	2.5059	2.5059	2.7537	2.9881
	20	0.2724	0.5481	0.9616	1.3200	2.0510	2.2715	2.7537	2.7676	------	------	------	------
	21	0.2863	0.6033	0.9616	------	------	------	------	------	------	------	------	------
	22	0.3550	0.6725	1.1821	1.6922	2.2989	2.6985	2.7263	2.7403	2.8229	2.7403	2.7263	2.7403

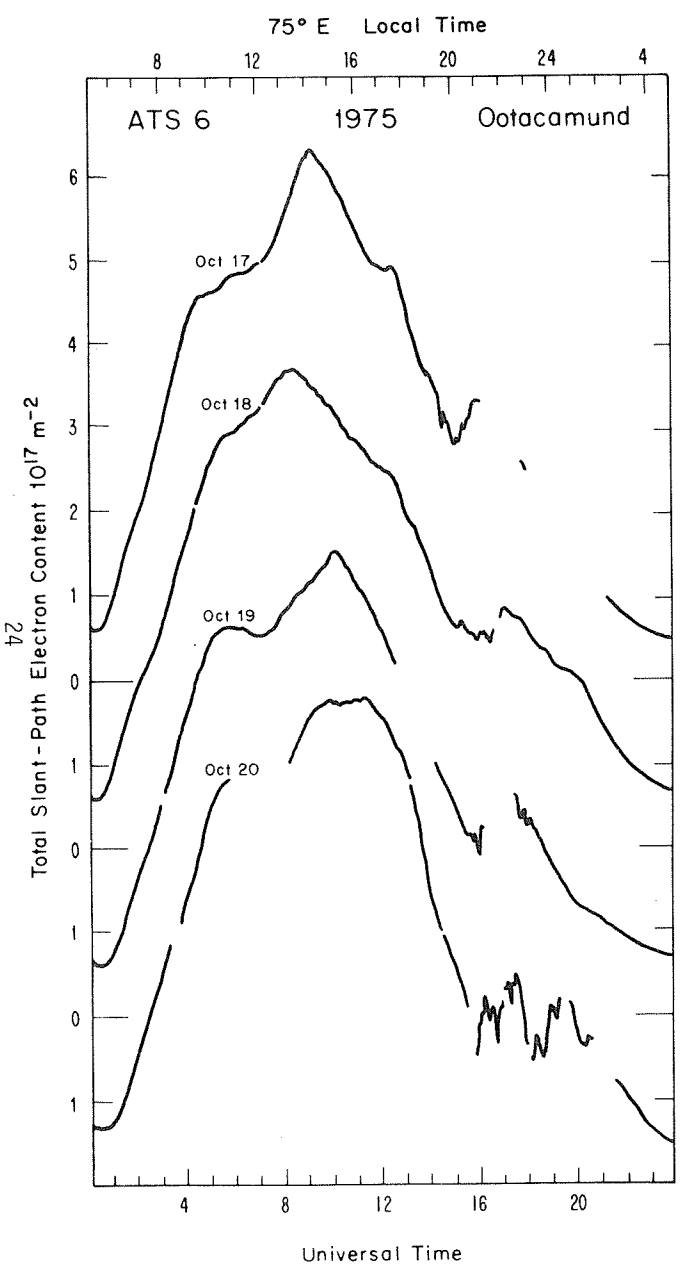
ATS6 to Ootacamund Total Slant Path Electron Content $10^{17} m^{-2}$ -- Part II.

		UNIVERSAL TIME											
		12	13	14	15	16	17	18	19	20	21	22	23
June	29	2.6437	------	------	------	------	0.6307	0.3829	0.3002	0.2724	0.2311	0.1211	0.1624
	30	2.9055	------	------	------	0.5207	0.6307	0.5481	------	------	------	------	------
July	1	2.9881	------	------	------	0.8651	0.5481	0.4655	0.4102	0.3968	0.4242	0.2311	0.2589
1976	2	2.7403	------	------	------	------	0.5894	0.5207	0.4381	0.3968	0.3968	0.3002	0.2450
	3	2.6711	------	------	------	------	0.7551	0.7551	0.7551	0.5068	0.4794	0.4102	0.3002
	4	2.6711	------	------	------	0.8238	0.5620	0.5346	0.4794	0.4102	0.2863	0.2171	0.2450
	5	2.7816	------	------	------	0.9064	0.5620	0.4794	0.4381	0.4102	0.4381	0.2171	0.2450
	6	2.8229	------	------	------	0.8651	0.6446	0.5481	0.4794	0.3968	0.3002	0.2171	0.2171
	7	2.3680	------	------	------	------	------	------	------	0.3002	0.2171	0.2171	0.2724
	8	3.0020	------	------	------	------	------	------	------	------	------	------	------
	9	3.2364	------	------	------	0.9343	0.6307	0.4515	0.3968	0.3415	0.3002	0.3415	0.3002
	10	2.3680	------	------	------	0.7551	0.6307	0.5346	0.4794	0.4655	0.4515	0.3415	0.3002
	11	2.6159	------	------	------	0.7551	0.5068	0.4242	0.3002	0.2589	0.2311	0.2171	0.2171
	12	2.5059	------	------	------	0.9895	0.6446	0.5346	0.4655	0.3968	0.3689	0.3002	0.3550
	13	2.3128	------	------	------	------	------	------	------	------	------	------	------
	14	1.8027	------	------	------	------	------	------	------	0.4794	0.3968	0.3550	0.3002
	15	2.7124	------	------	------	0.9482	0.8377	------	------	------	------	------	0.2450
	16	2.7124	------	------	------	------	0.8516	0.6307	0.5207	0.3276	0.2863	0.2311	0.1898
	17	2.7537	------	------	------	------	0.6725	0.6033	0.4102	0.2724	0.2589	0.1071	0.1898
	18	------	------	------	------	------	------	0.4655	0.3968	0.3002	0.3002	0.1211	0.1898
	19	2.5472	------	------	------	0.9064	0.6725	0.6033	0.4515	0.3415	0.3689	0.1898	0.2450
	20	------	------	------	------	0.7964	0.6307	0.6033	0.6033	0.5207	0.3689	0.3550	0.3002
	21	------	------	------	------	1.0029	0.8651	0.8103	0.6307	0.5207	0.3829	0.3002	0.3550
	22	2.5059	------	------	------	------	------	------	------	------	------	------	------

9. DAILY N_T PLOTS OF DIGITALLY RECORDED DATA, OCT 1975 - JAN 1976



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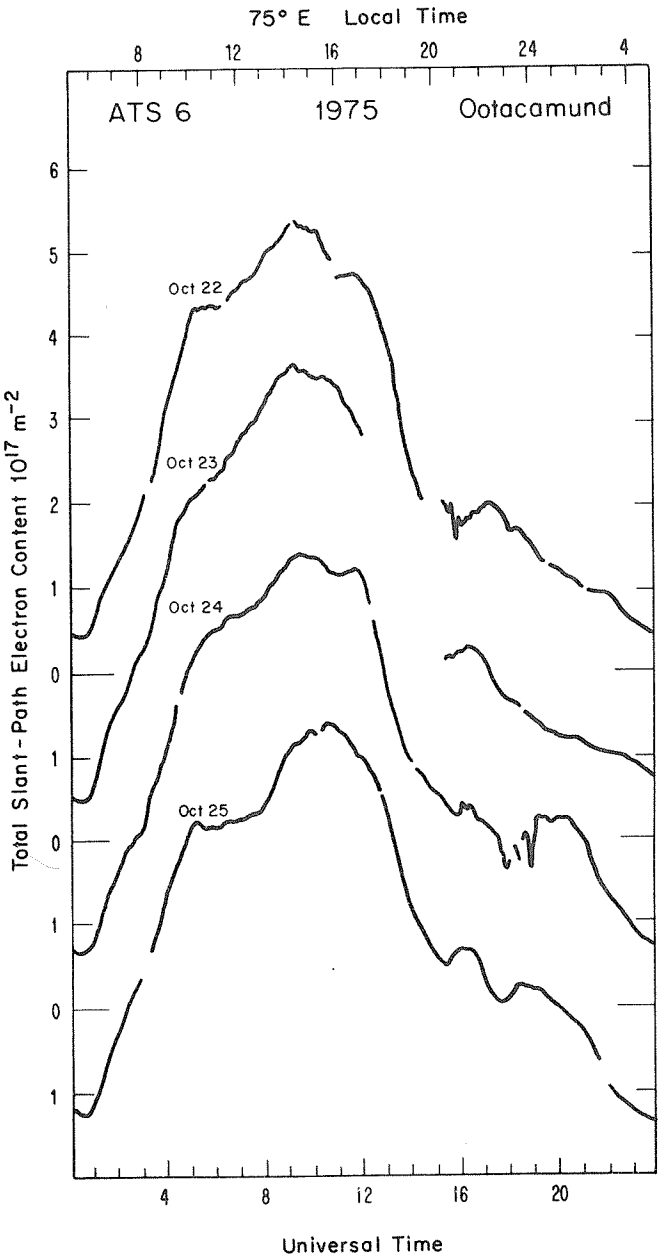
8 12 16 20 24 4
ATS 6 1975 Ootacamund
Oct 17
Oct 18
Oct 19
Oct 20
Total Slant-Path Electron Content 10^{17} m^{-2}
6 5 4 3 2 1 0 1 0 1 0 1
4 8 12 16 20
Universal Time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8 12 16 20 24 4
ATS 6 1975 Ootacamund
Oct 22
Oct 23
Oct 24
Oct 25
Total Slant-Path Electron Content 10^{17} m^{-2}
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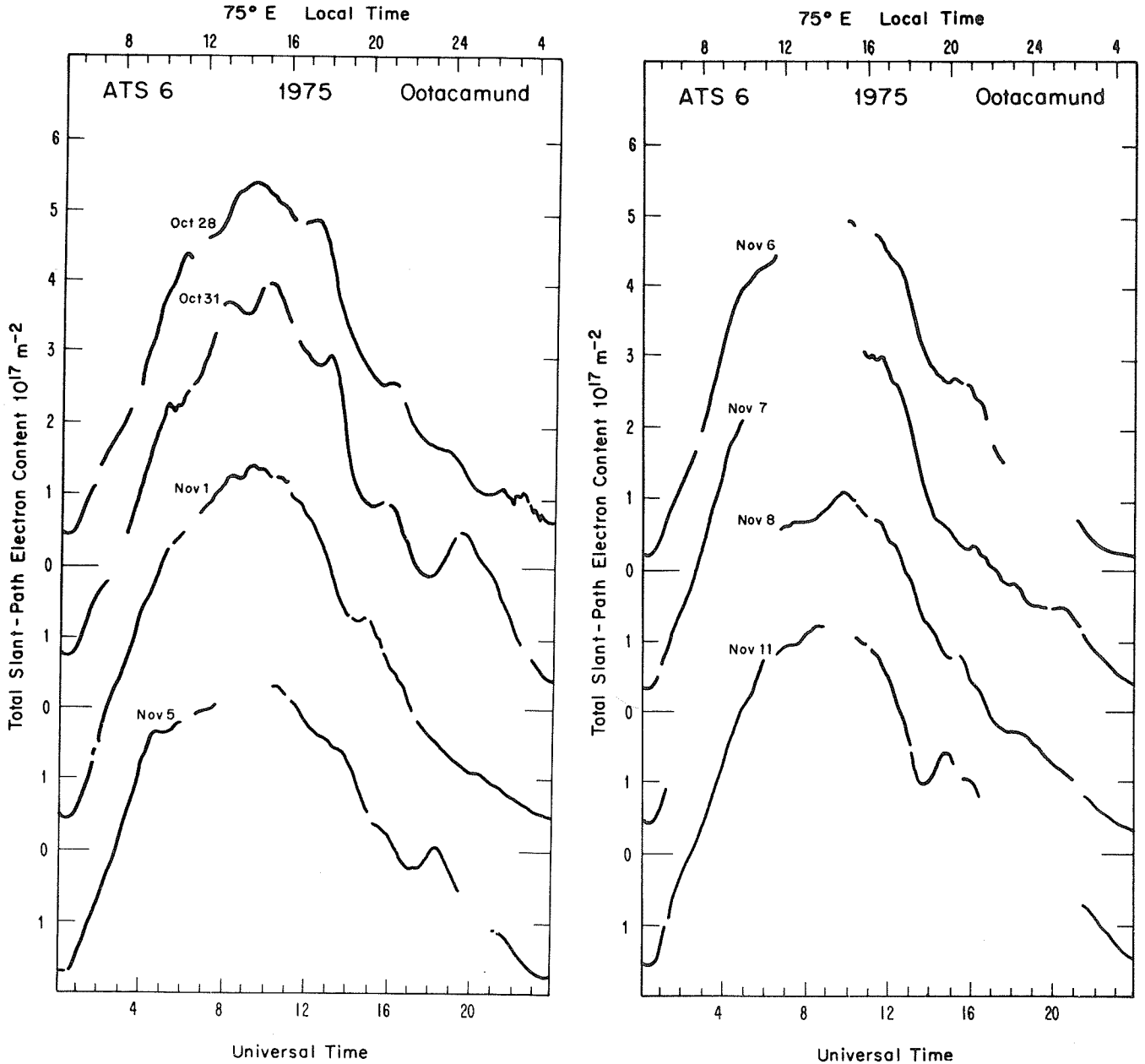
4 8 12 16 20
Universal Time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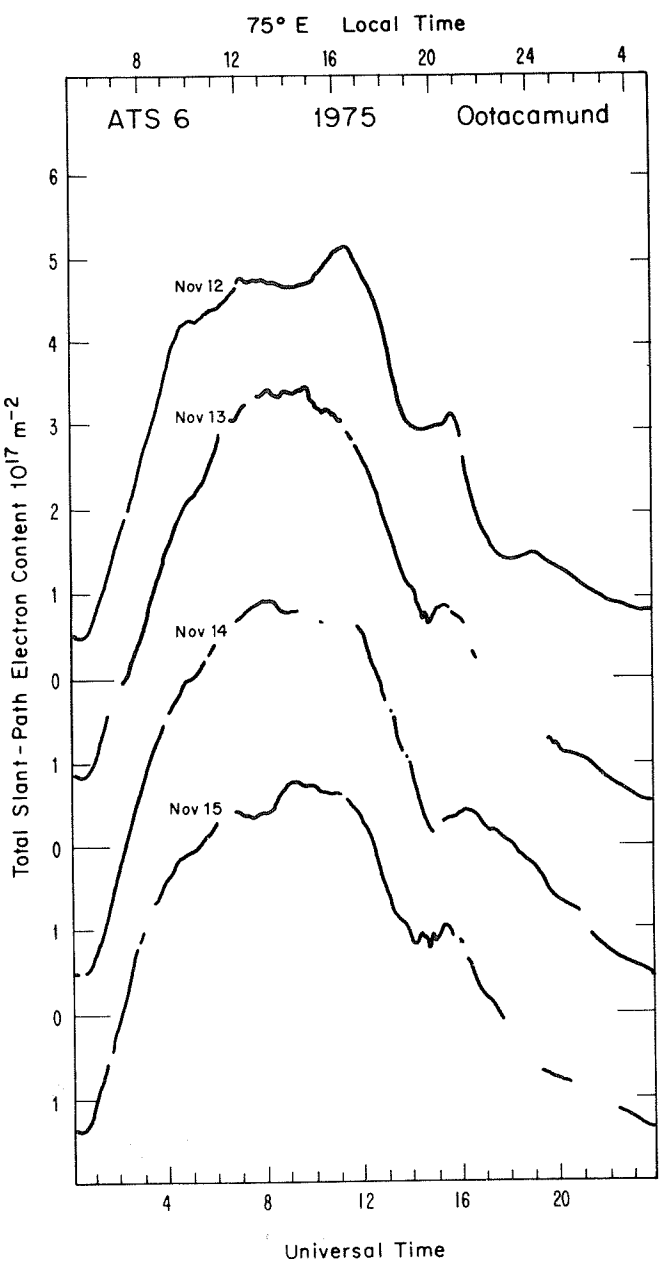
ATS 6 1975 Ootacamund
Oct 28
Oct 31
Nov 1
Nov 5
Total Slant-Path Electron Content 10^{17} m^{-2}
6 5 4 3 2 1 0 1
4 8 12 16 20
Universal Time
75° E Local Time
8 12 16 20 24 4
ATS 6 1975 Ootacamund
Nov 6
Nov 7
Nov 8
Nov 11
Total Slant-Path Electron Content 10^{17} m^{-2}
6 5 4 3 2 1 0 1
4 8 12 16 20
Universal Time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ATS 6 1975 Ootacamund
Nov 12
Nov 13
Nov 14
Nov 15
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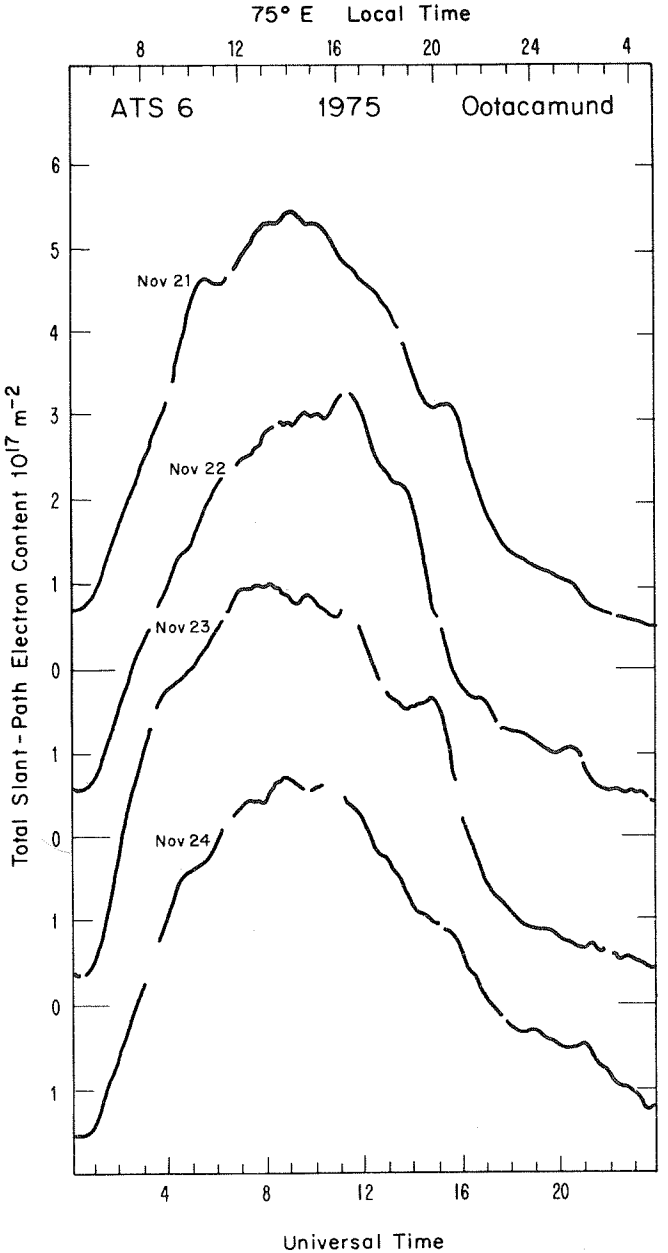
4 8 12 16 20
Universal Time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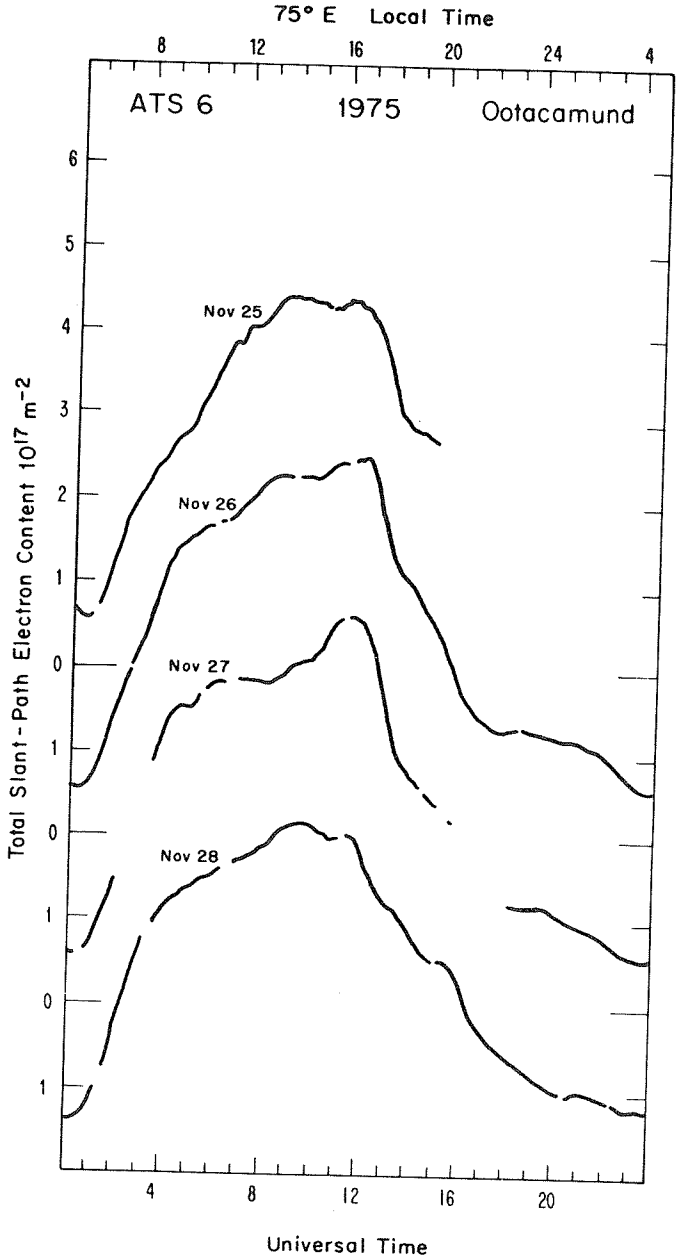
8 12 16 20 24 4
ATS 6 1975 Ootacamund
Nov 21
Nov 22
Nov 23
Nov 24
Total Slant-Path Electron Content 10^{17} m^{-2}
6 5 4 3 2 1 0 1
4 8 12 16 20
Universal Time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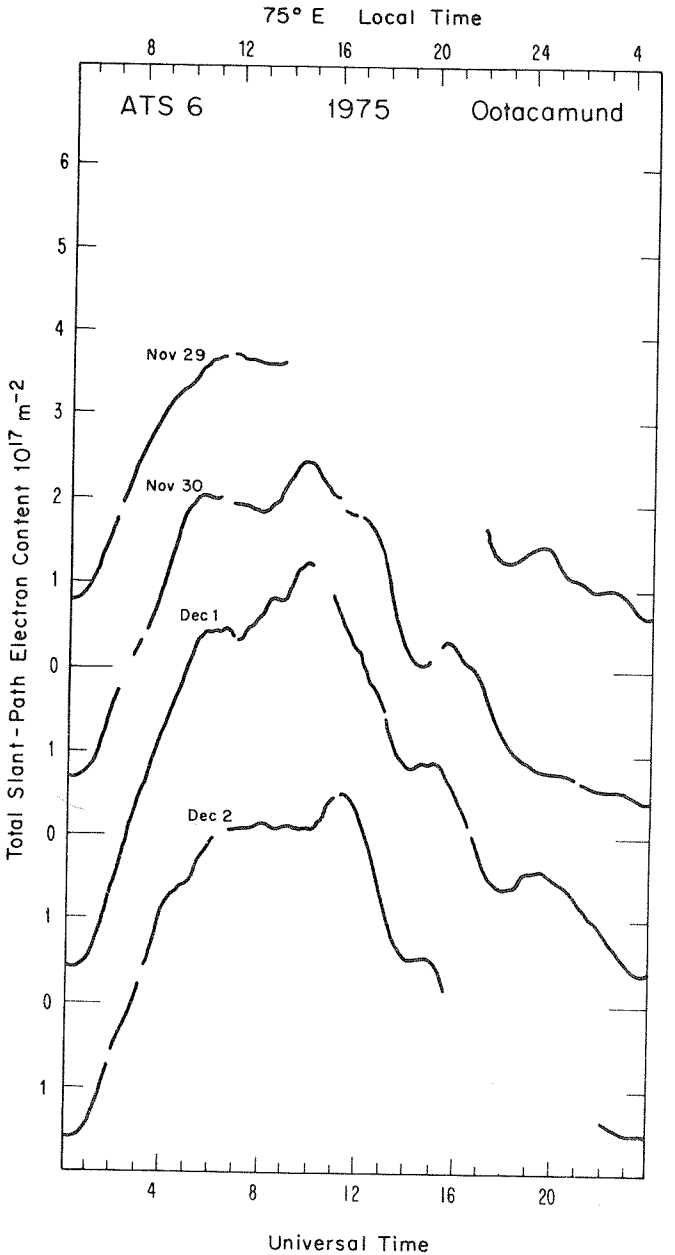
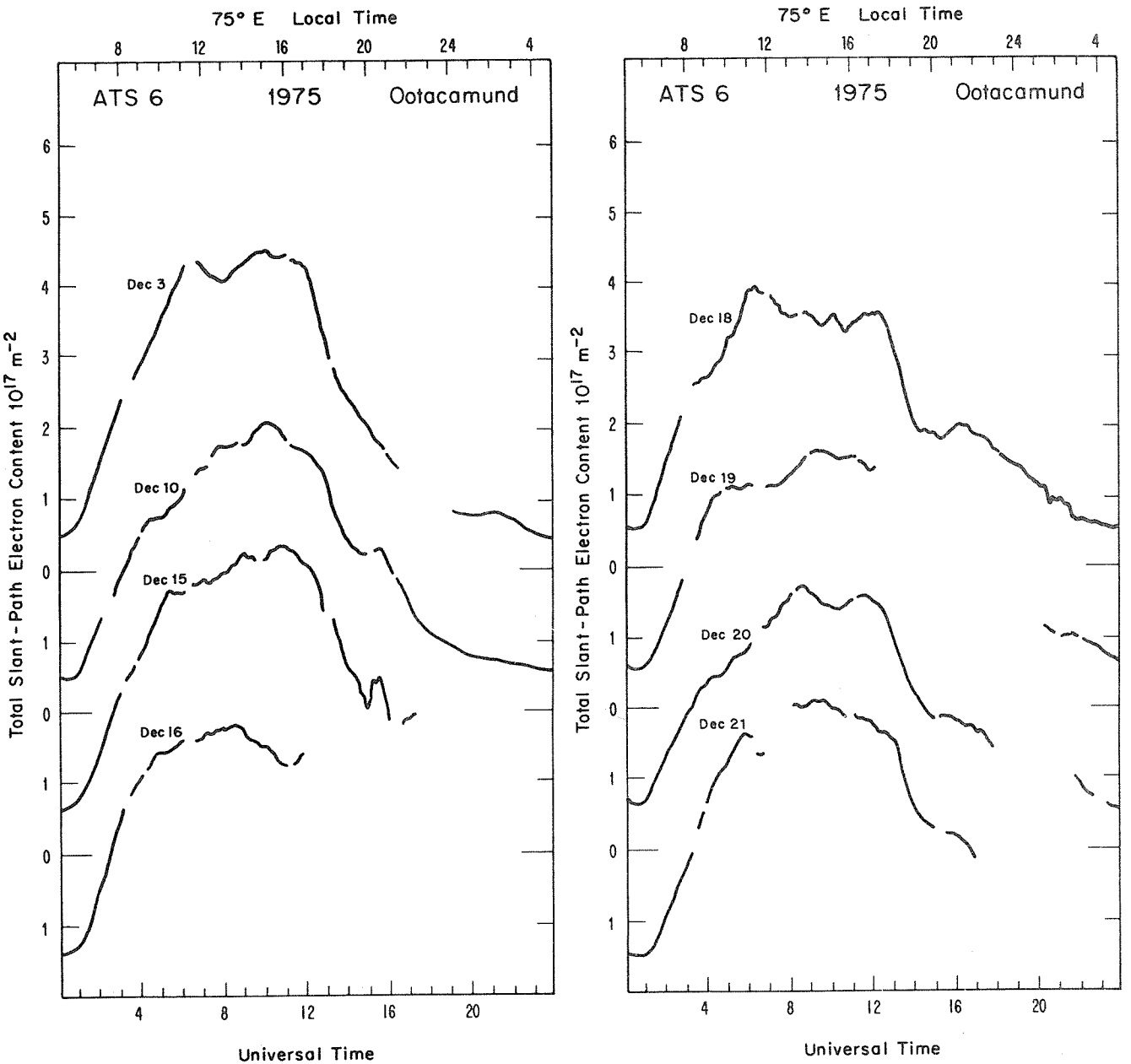
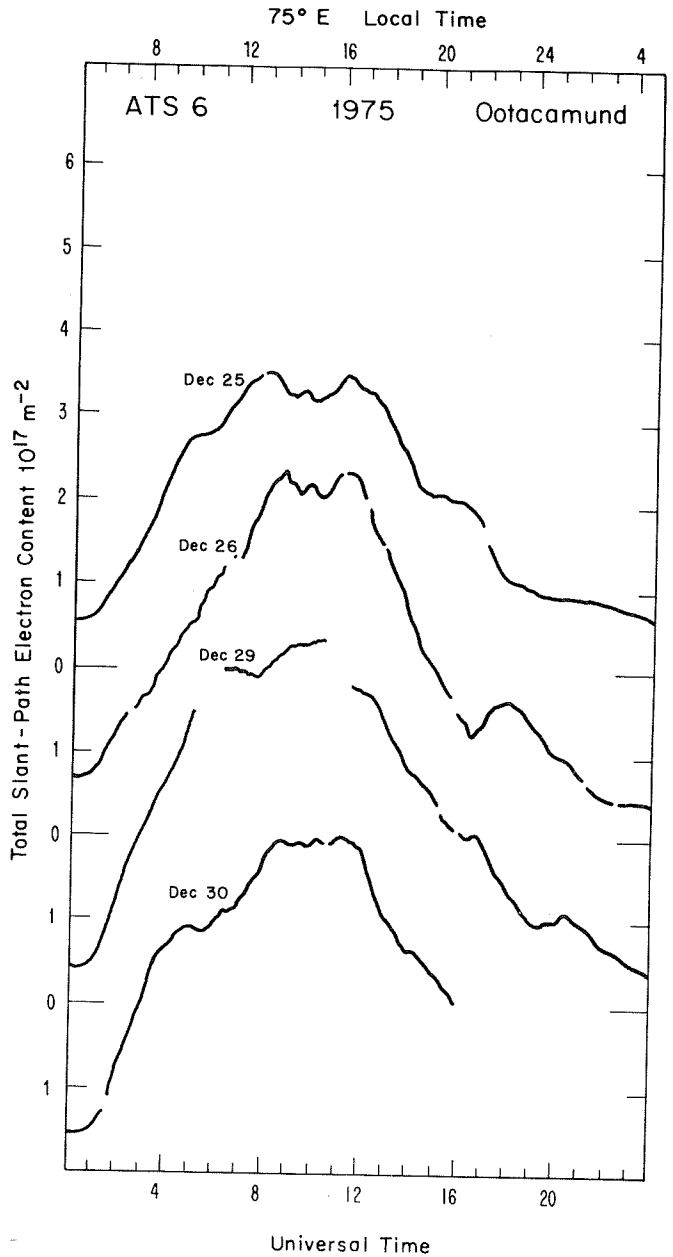
8
12
16
20
24
4
ATS 6
1975
Ootacamund
Nov 25
Nov 26
Nov 27
Nov 28
Total Slant-Path Electron Content 10^{17} m^{-2}
Universal Time
4
8
12
16
20


75° E Local Time
8
12
16
20
24
4
ATS 6
1975
Ootacamund
Nov 29
Nov 30
Dec 1
Dec 2
Total Slant-Path Electron Content 10^{17} m^{-2}
Universal Time
4
8
12
16
20


75° E Local Time
8 12 16 20 24 4
ATS 6 1975 Ootacamund
Dec 3
Dec 10
Dec 15
Dec 16
Total Slant-Path Electron Content 10^{17} m^{-2}
6 5 4 3 2 1 0 1
4 8 12 16 20
Universal Time
75° E Local Time
8 12 16 20 24 4
ATS 6 1975 Ootacamund
Dec 18
Dec 19
Dec 20
Dec 21
Total Slant-Path Electron Content 10^{17} m^{-2}
6 5 4 3 2 1 0 1
4 8 12 16 20
Universal Time


75° E Local Time
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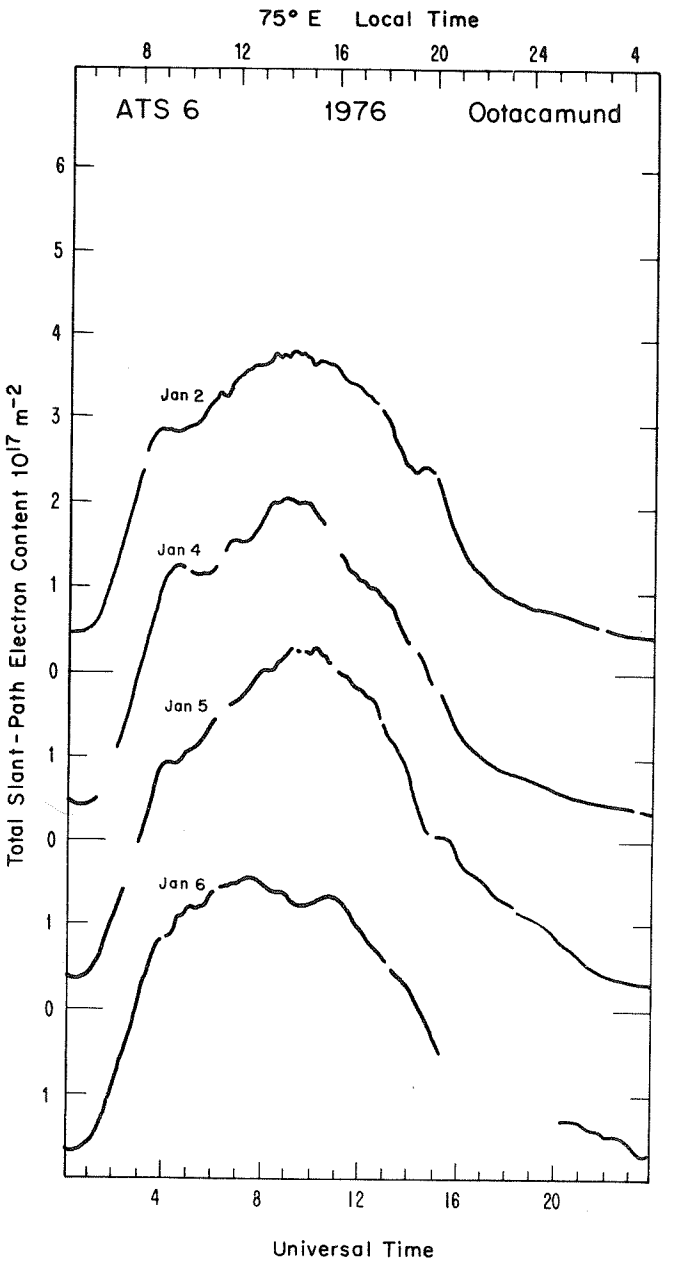
ATS 6 1975 Ootacamund
Dec 25
Dec 26
Dec 29
Dec 30
Total Slant-Path Electron Content 10^{17} m^{-2}
Universal Time
4 8 12 16 20


75° E Local Time
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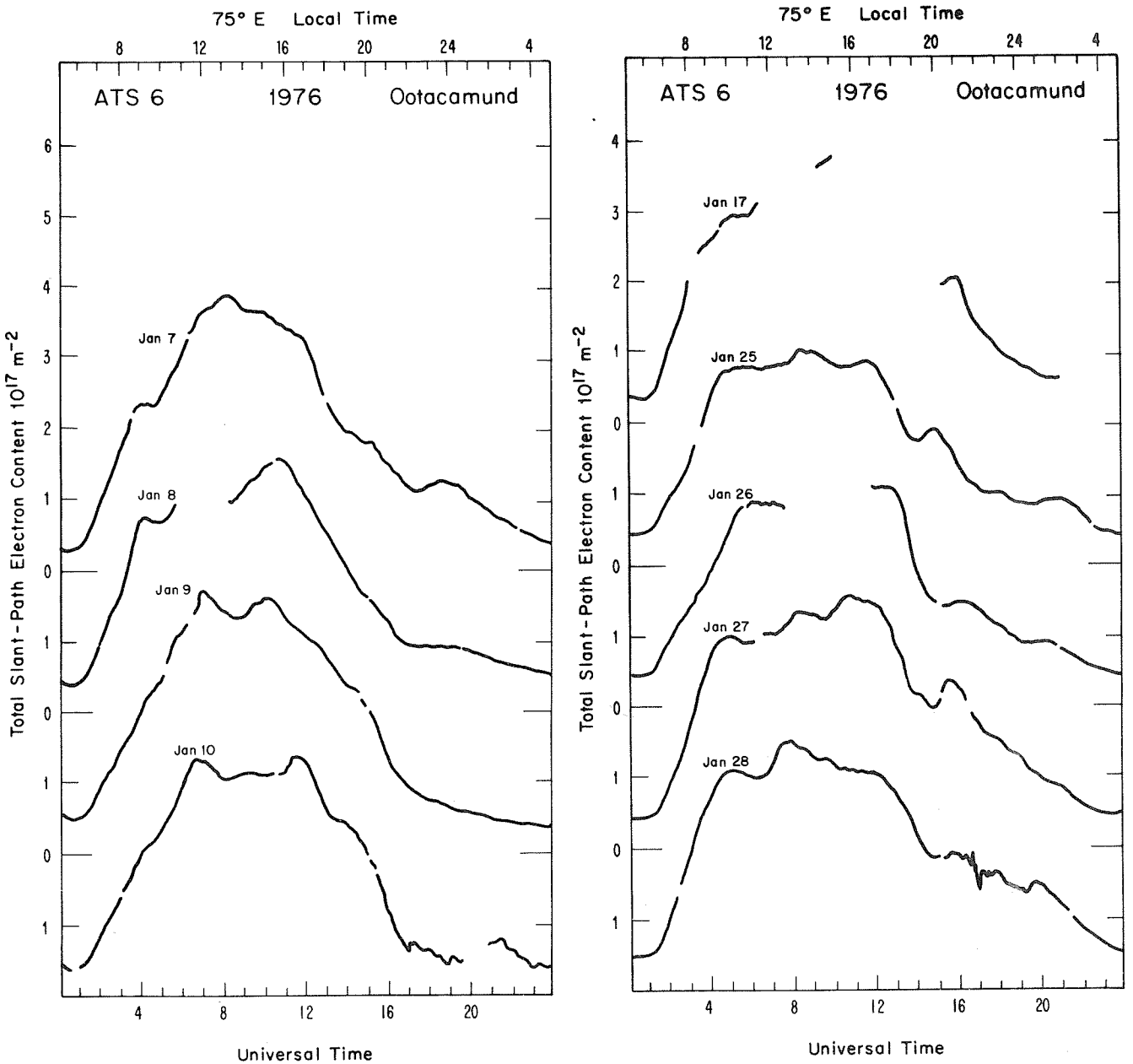
ATS 6 1976 Ootacamund
Jan 2
Jan 4
Jan 5
Jan 6
Total Slant-Path Electron Content 10^{17} m^{-2}
Universal Time
4 8 12 16 20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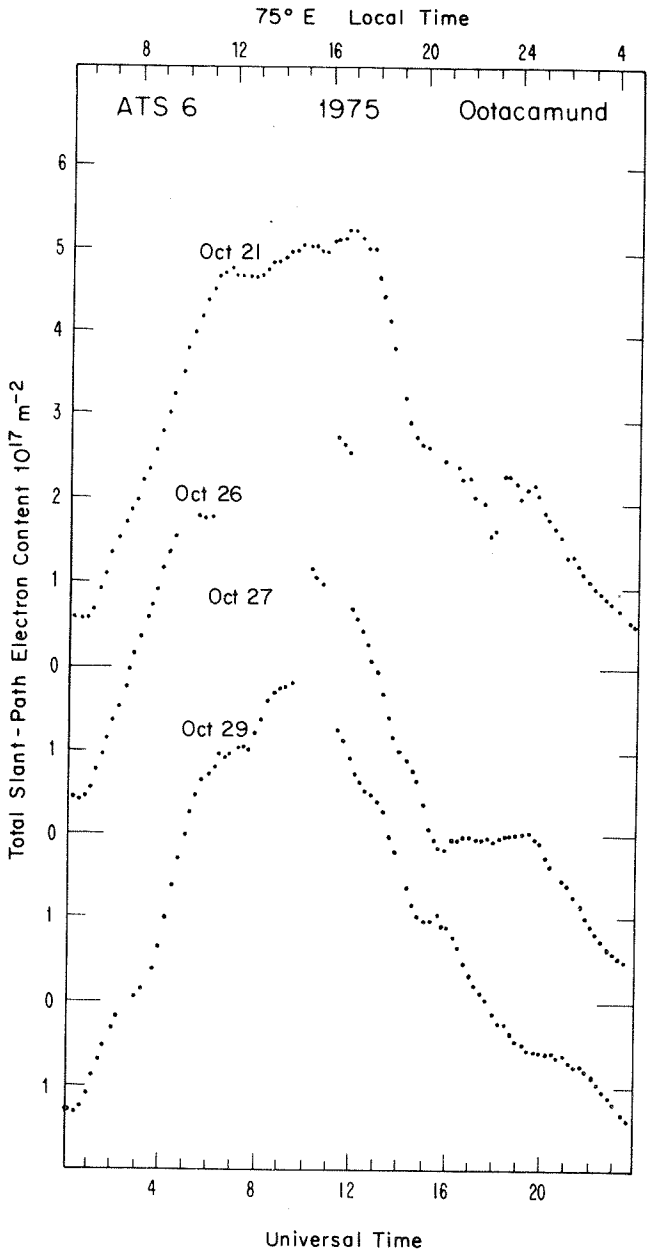
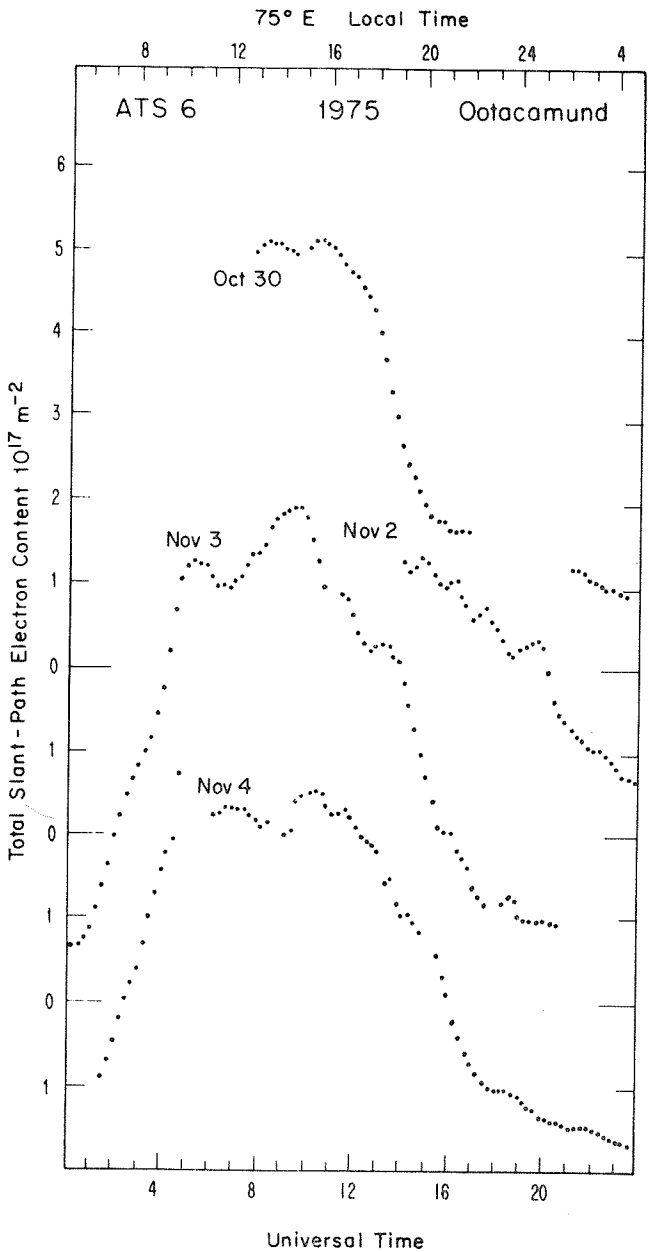
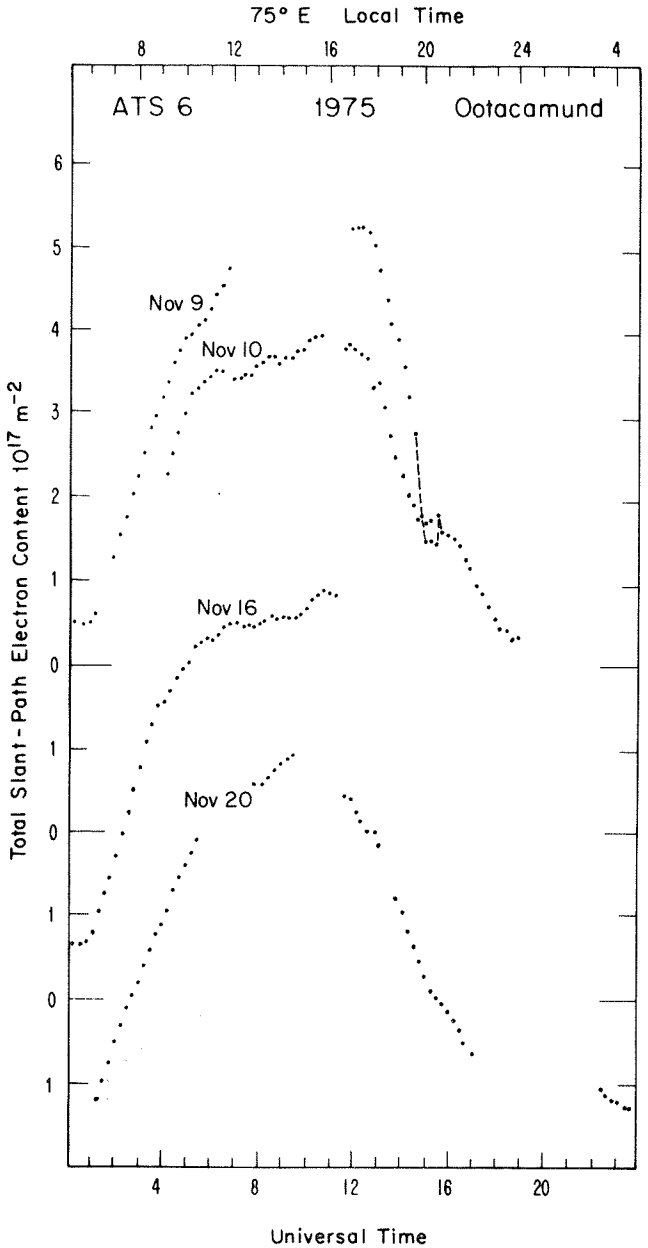
8 12 16 20 24 4
ATS 6 1976 Ootacamund
Jan 7
Jan 8
Jan 9
Jan 10
Total Slant-Path Electron Content 10^{17} m^{-2}
Universal Time
4 8 12 16 20
75° E Local Time
8 12 16 20 24 4
ATS 6 1976 Ootacamund
Jan 17
Jan 25
Jan 26
Jan 27
Jan 28
Total Slant-Path Electron Content 10^{17} m^{-2}
Universal Time
4 8 12 16 20

10. DAILY N_T PLOTS OF CHART RECORDED DATA, OCT 1975 - JUL 1976



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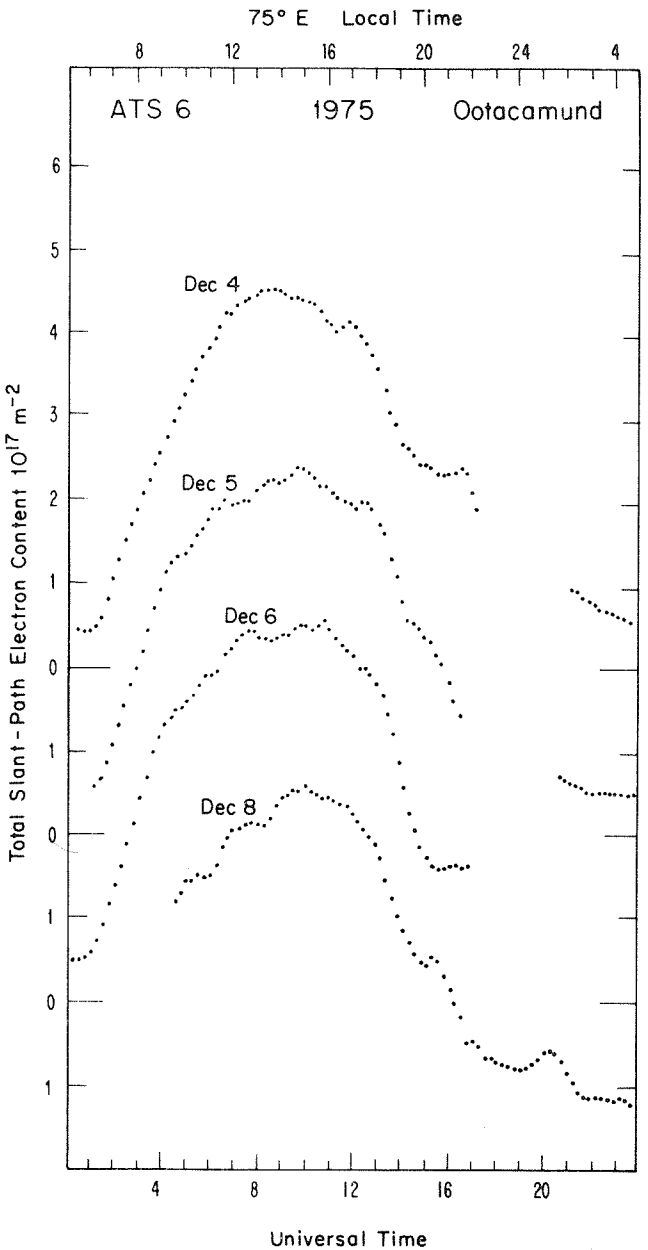
ATS 6 1975 Ootacamund
Nov 9
Nov 10
Nov 16
Nov 20
Total Slant-Path Electron Content 10^{17} m^{-2}
6 5 4 3 2 1 0 1
4 8 12 16 20
Universal Time


75° E Local Time
8 12 16 20 24 4
ATS 6 1975 Ootacamund
Dec 4
Dec 5
Dec 6
Dec 8
Total Slant-Path Electron Content 10^{17} m^{-2}
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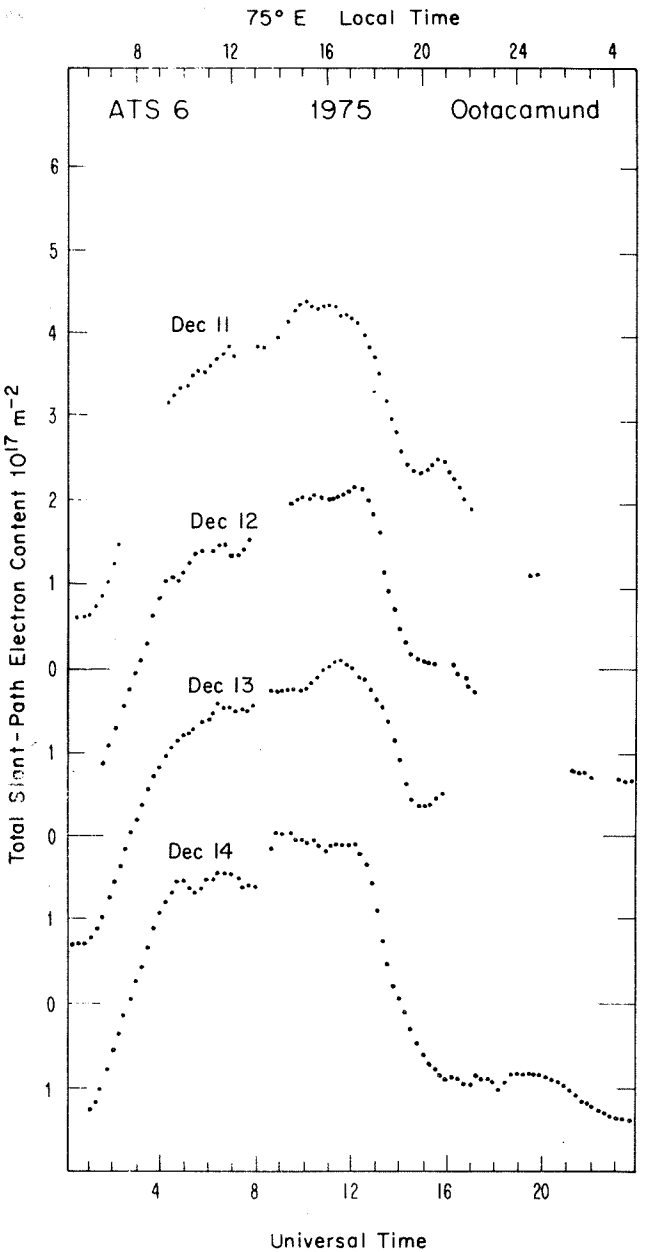
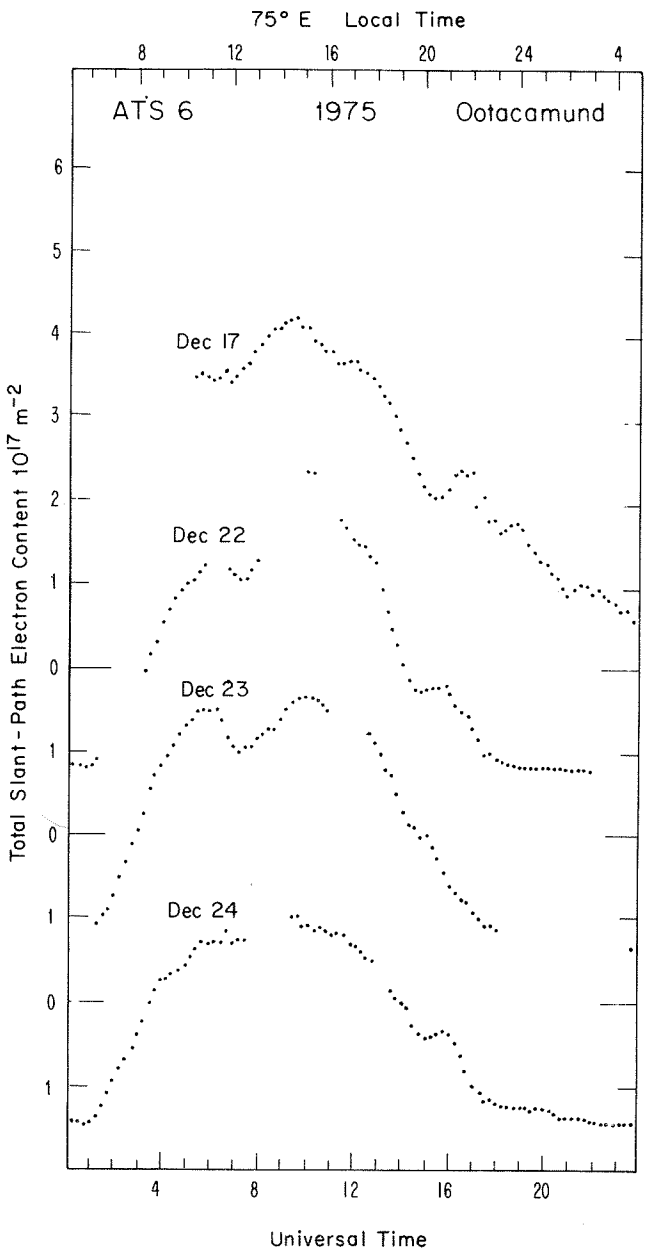
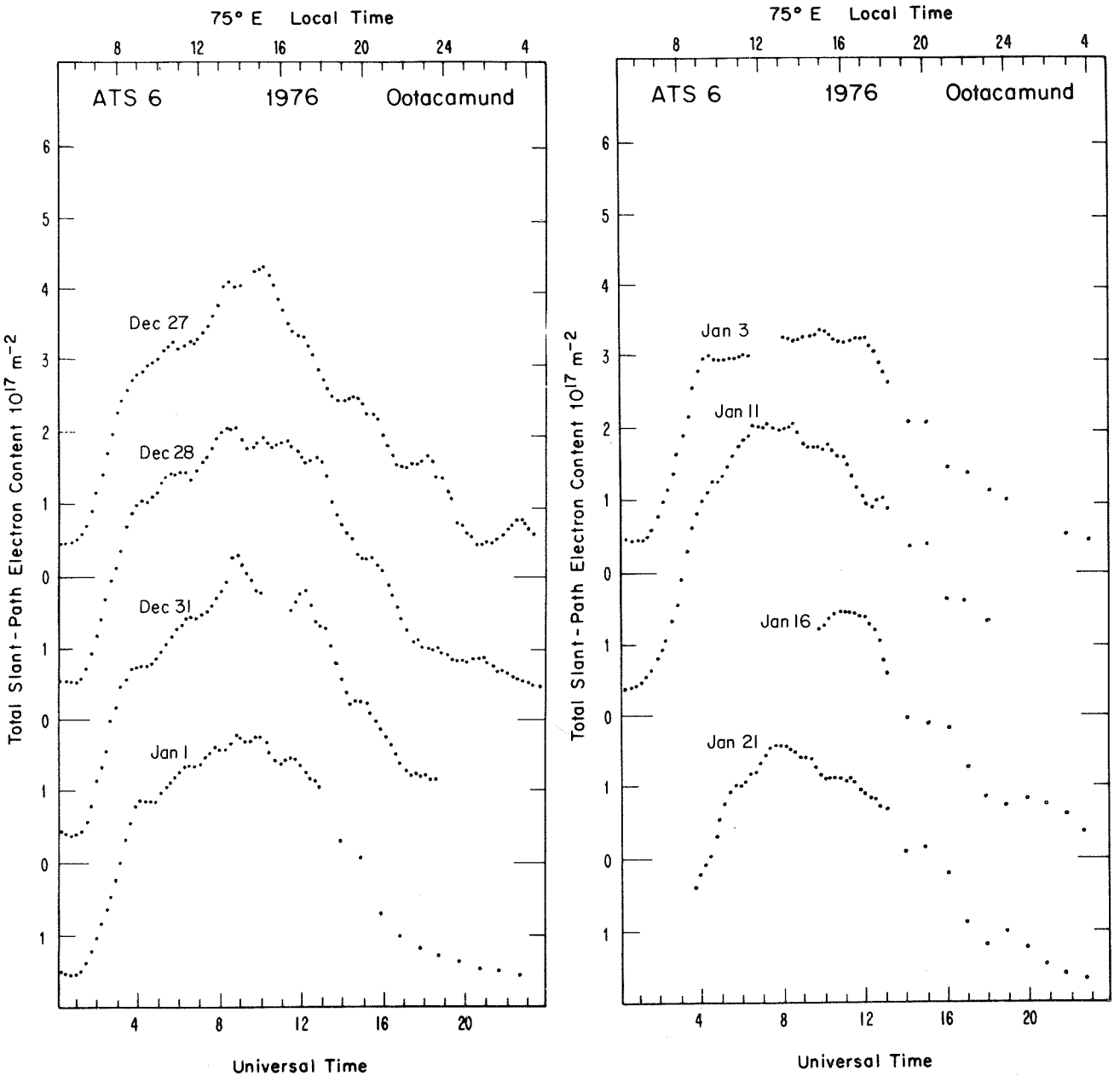
4 8 12 16 20
Universal Time


75° E Local Time
8
12
16
20
24
4
ATS 6
1975
Ootacamund
Dec 11
Dec 12
Dec 13
Dec 14
Total Slant-Path Electron Content 10^{17} m^{-2}
6
5
4
3
2
1
0
1
4
8
12
16
20
Universal Time


75° E Local Time
8
12
16
20
24
4
ATS 6
1975
Ootacamund
Dec 17
Dec 22
Dec 23
Dec 24
Total Slant-Path Electron Content 10^{17} m^{-2}
6
5
4
3
2
1
0
1
4
8
12
16
20
Universal Time


75° E Local Time
8 12 16 20 24 4
ATS 6 1976 Ootacamund
Dec 27
Dec 28
Dec 31
Jan 1
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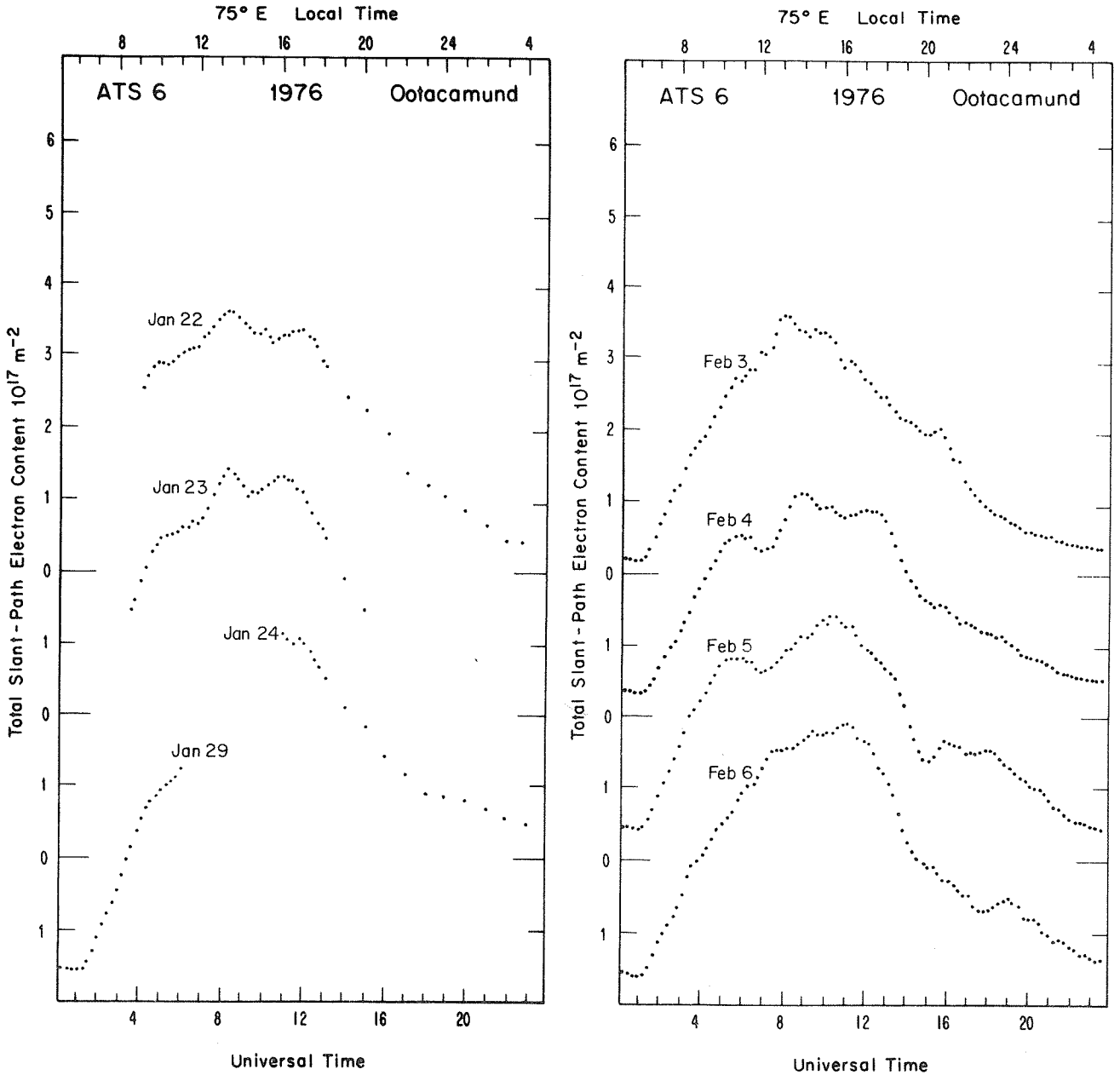
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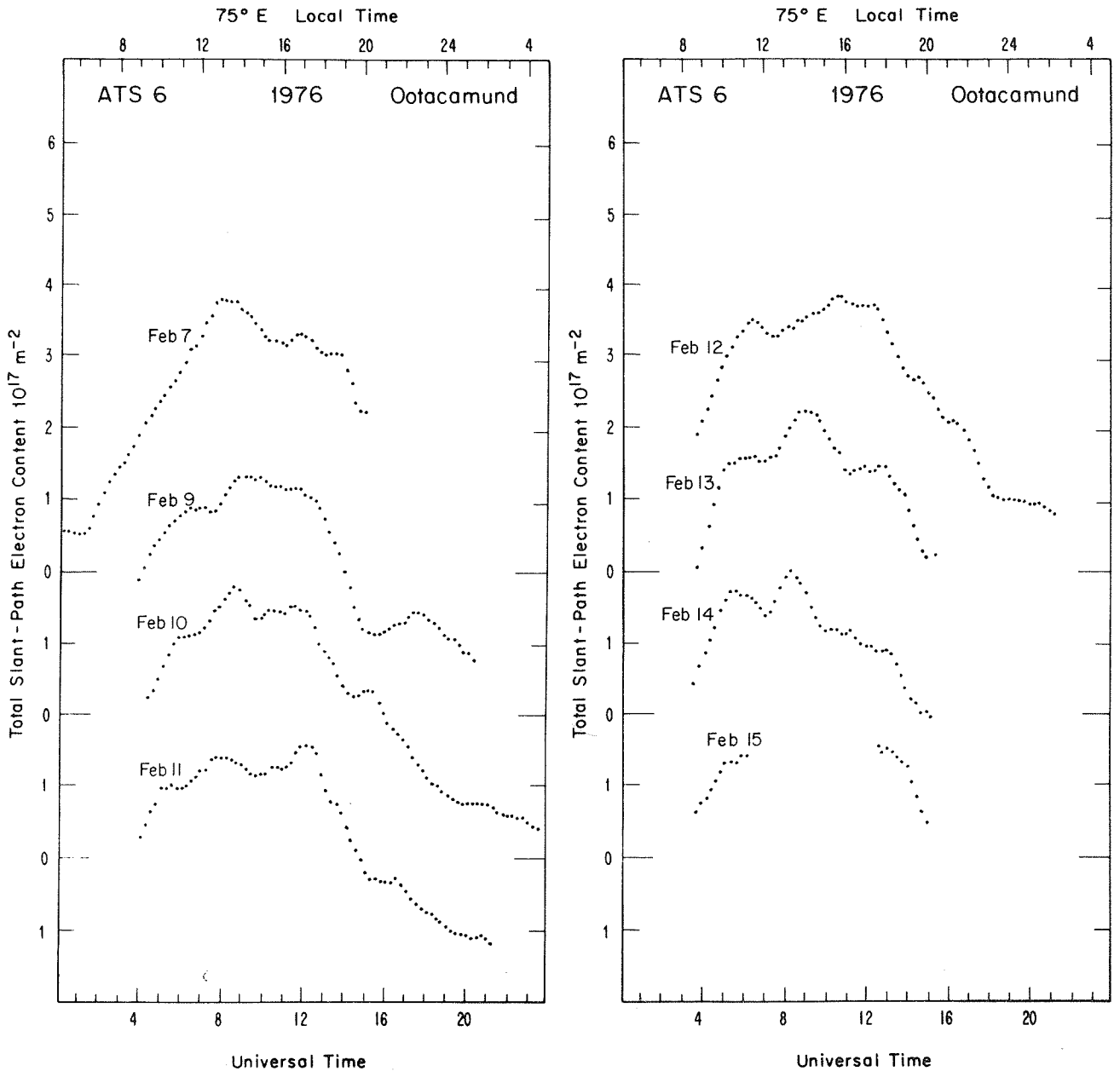
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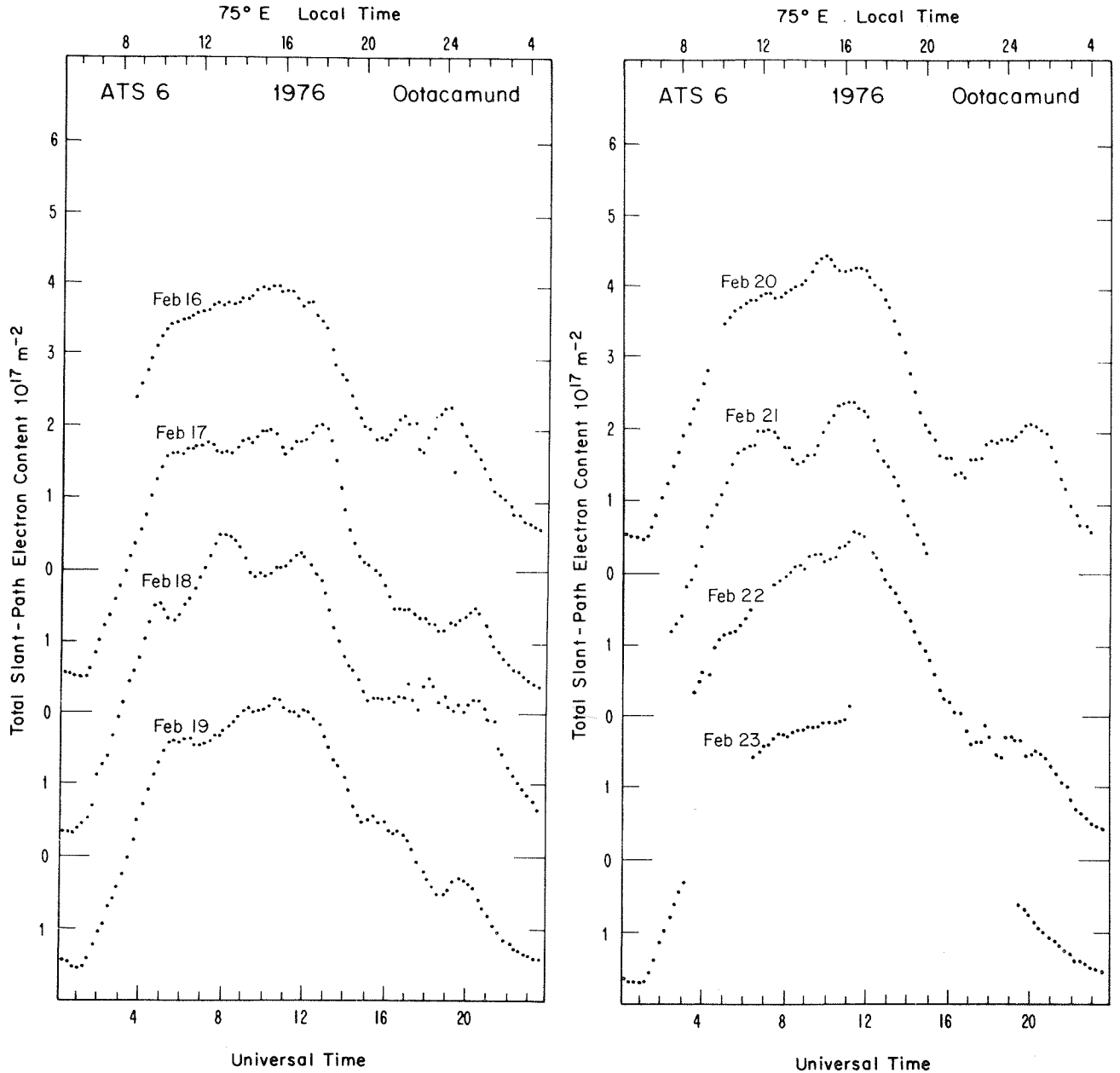
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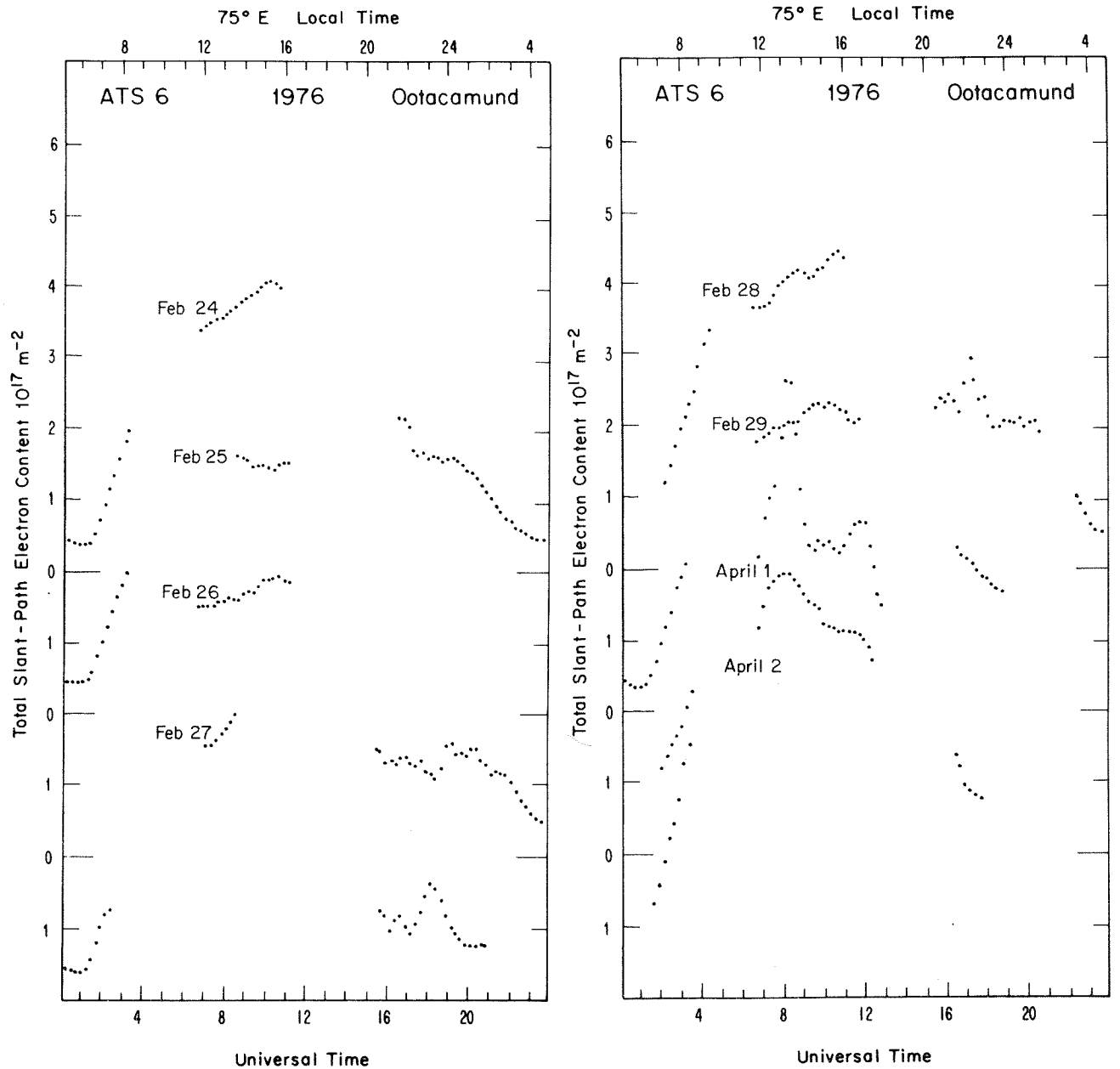
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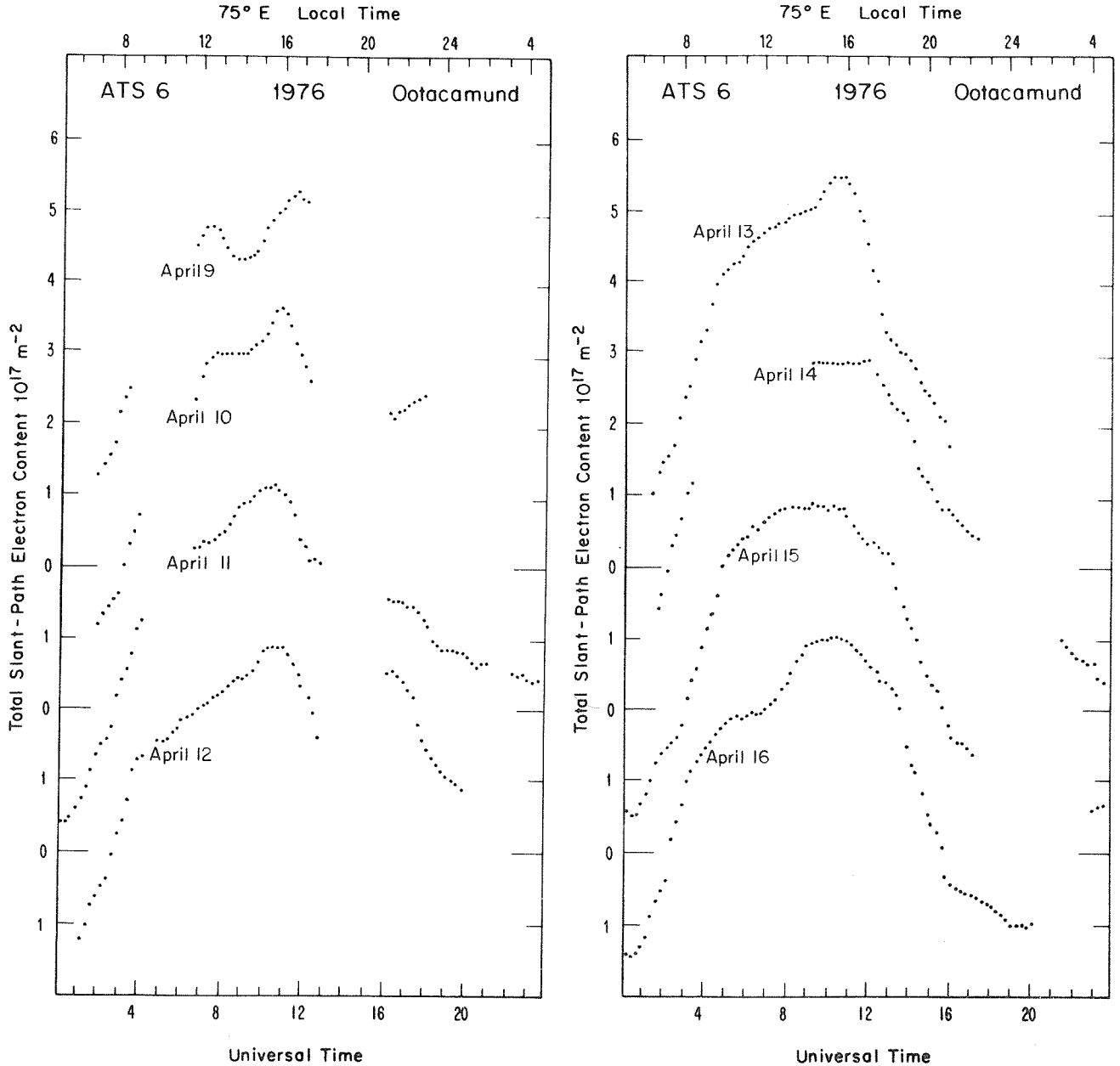
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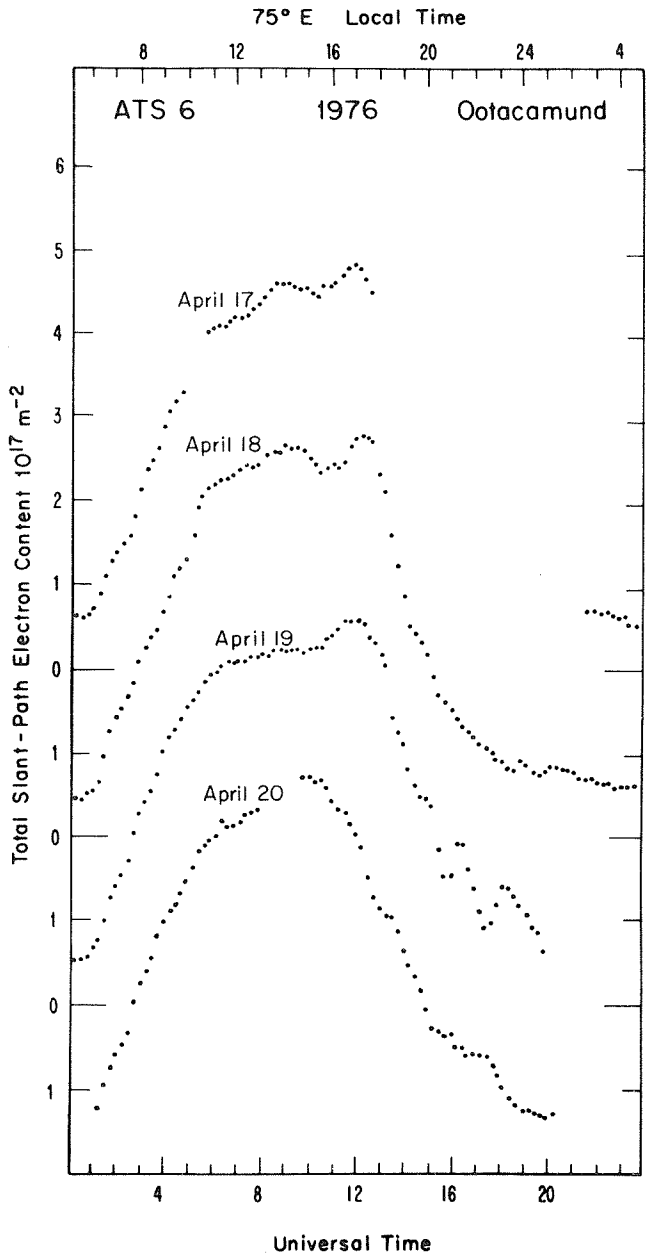
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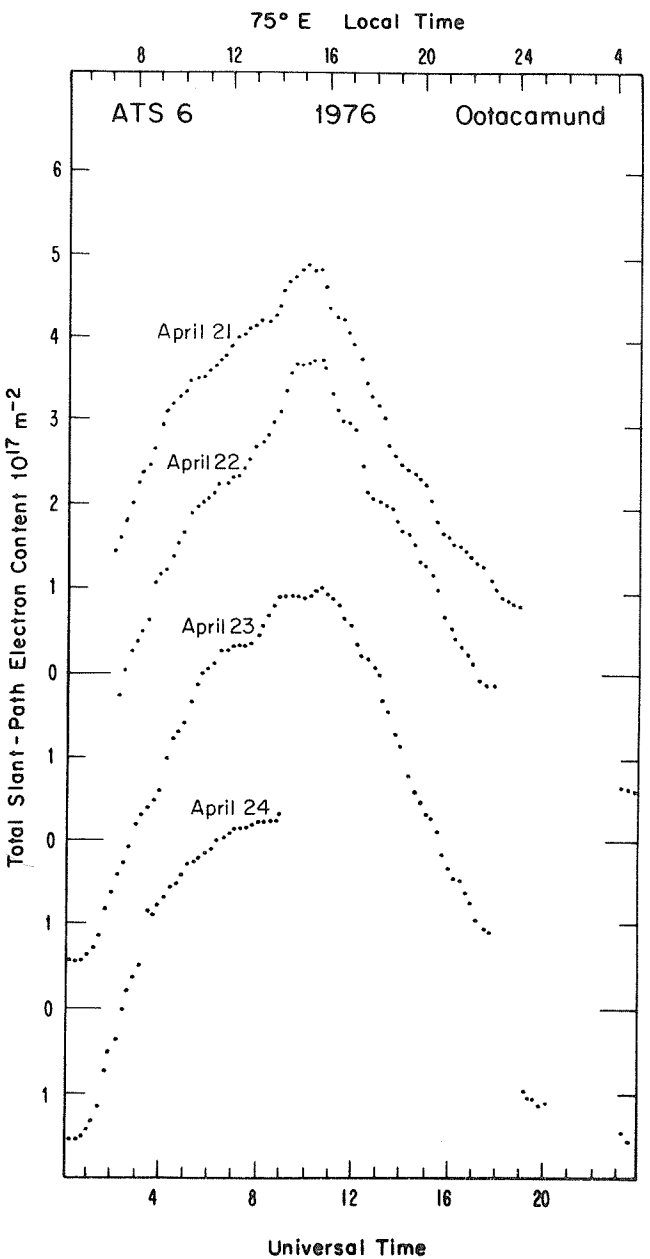
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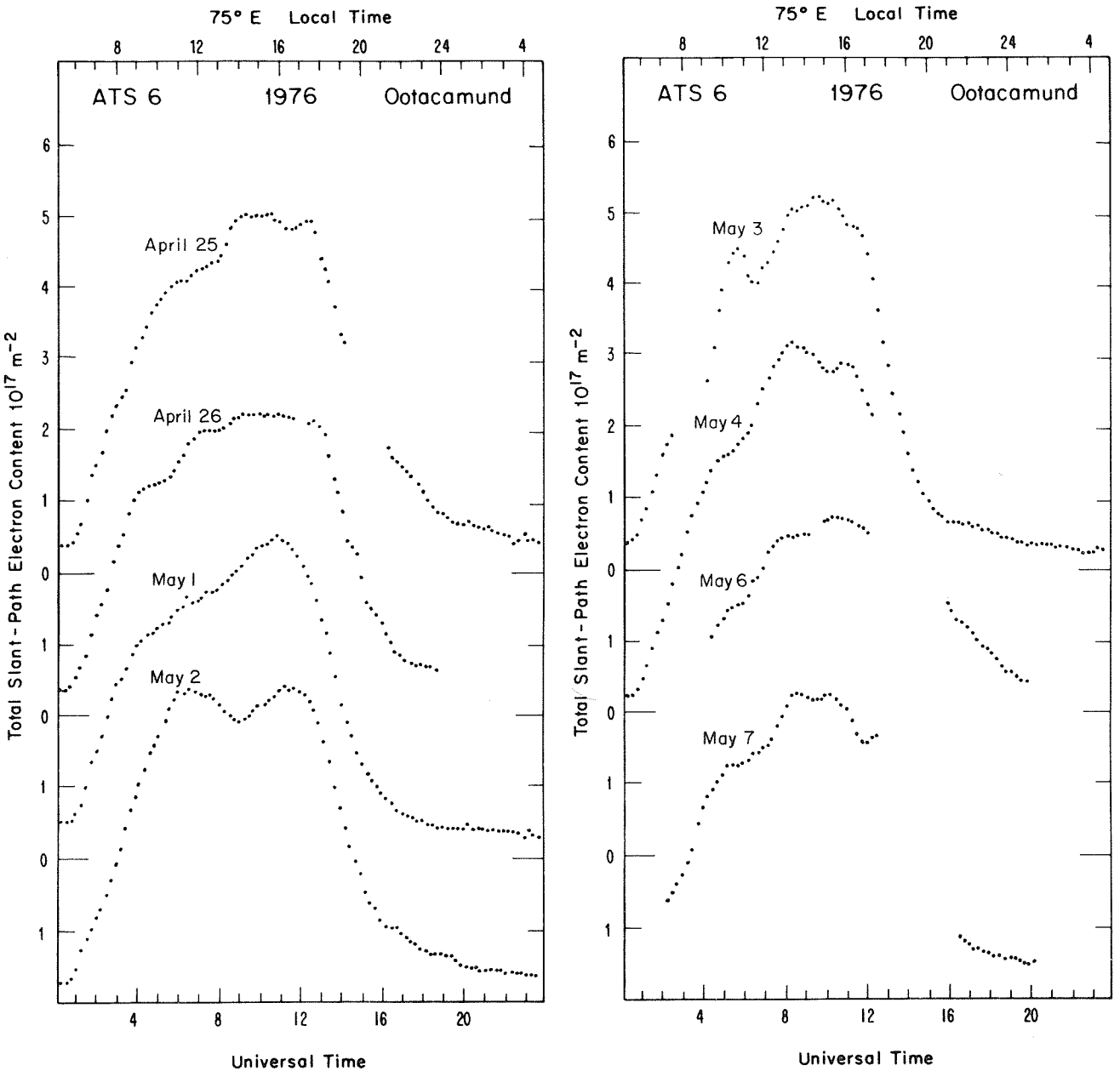
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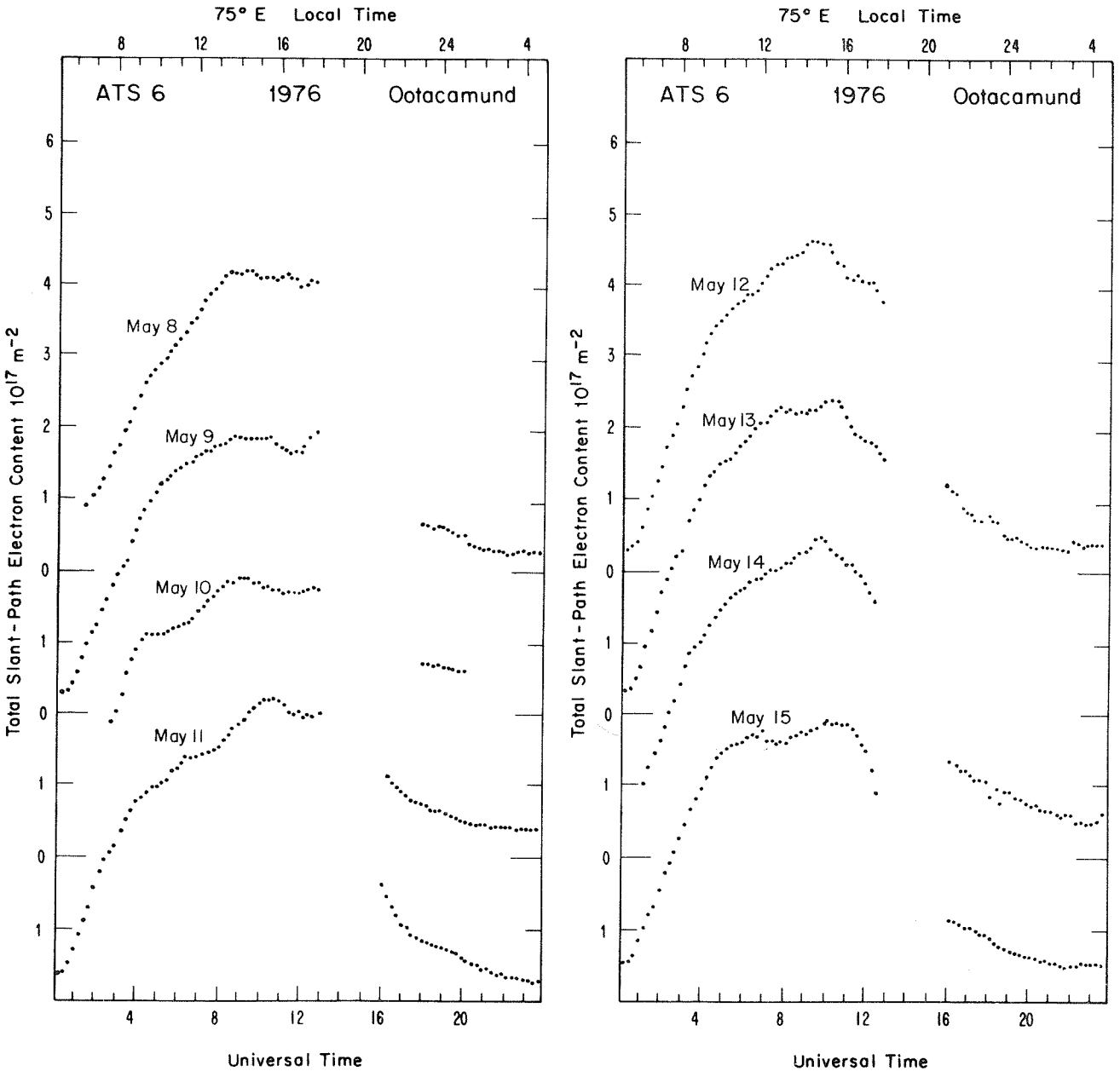
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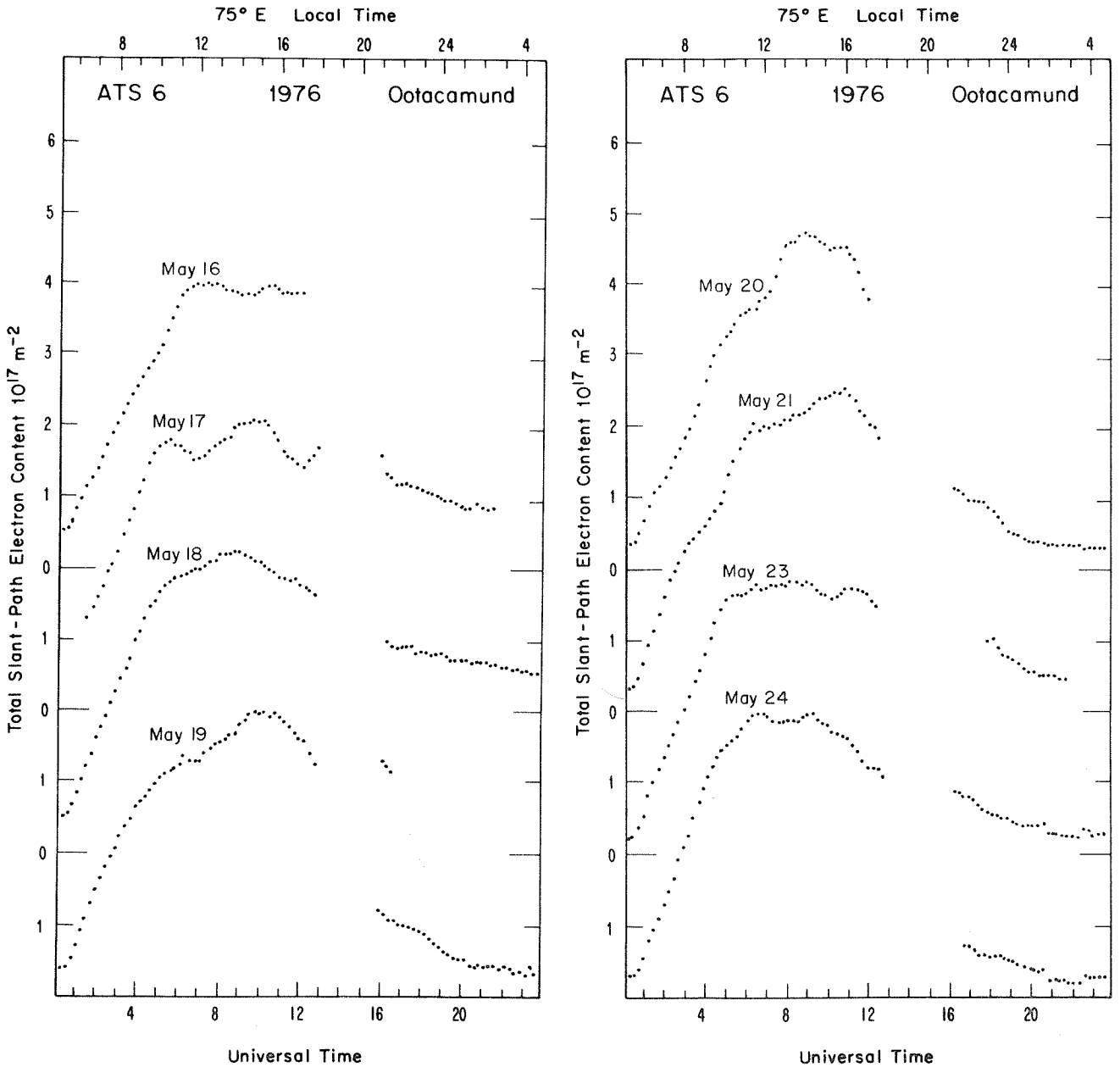
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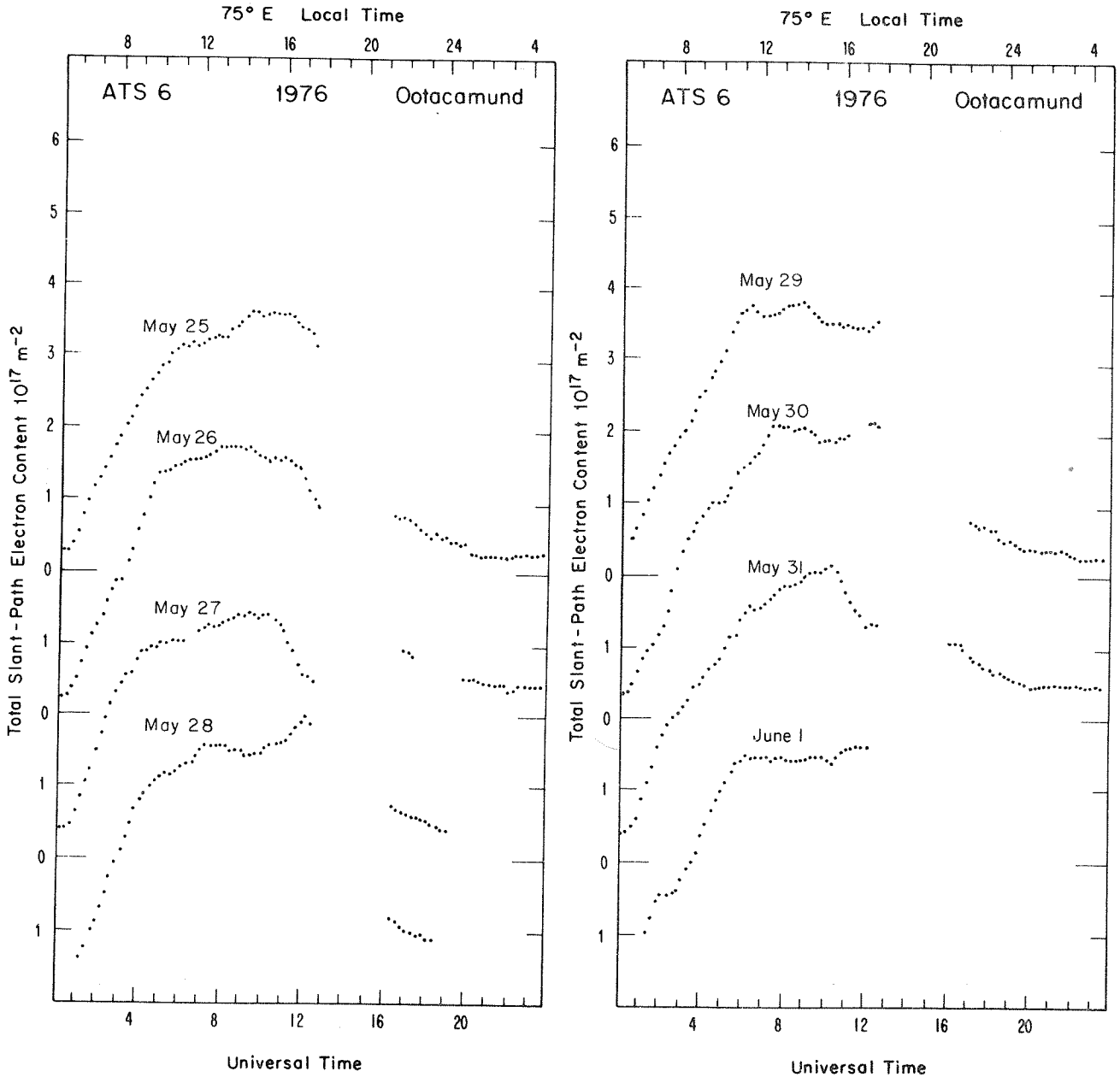
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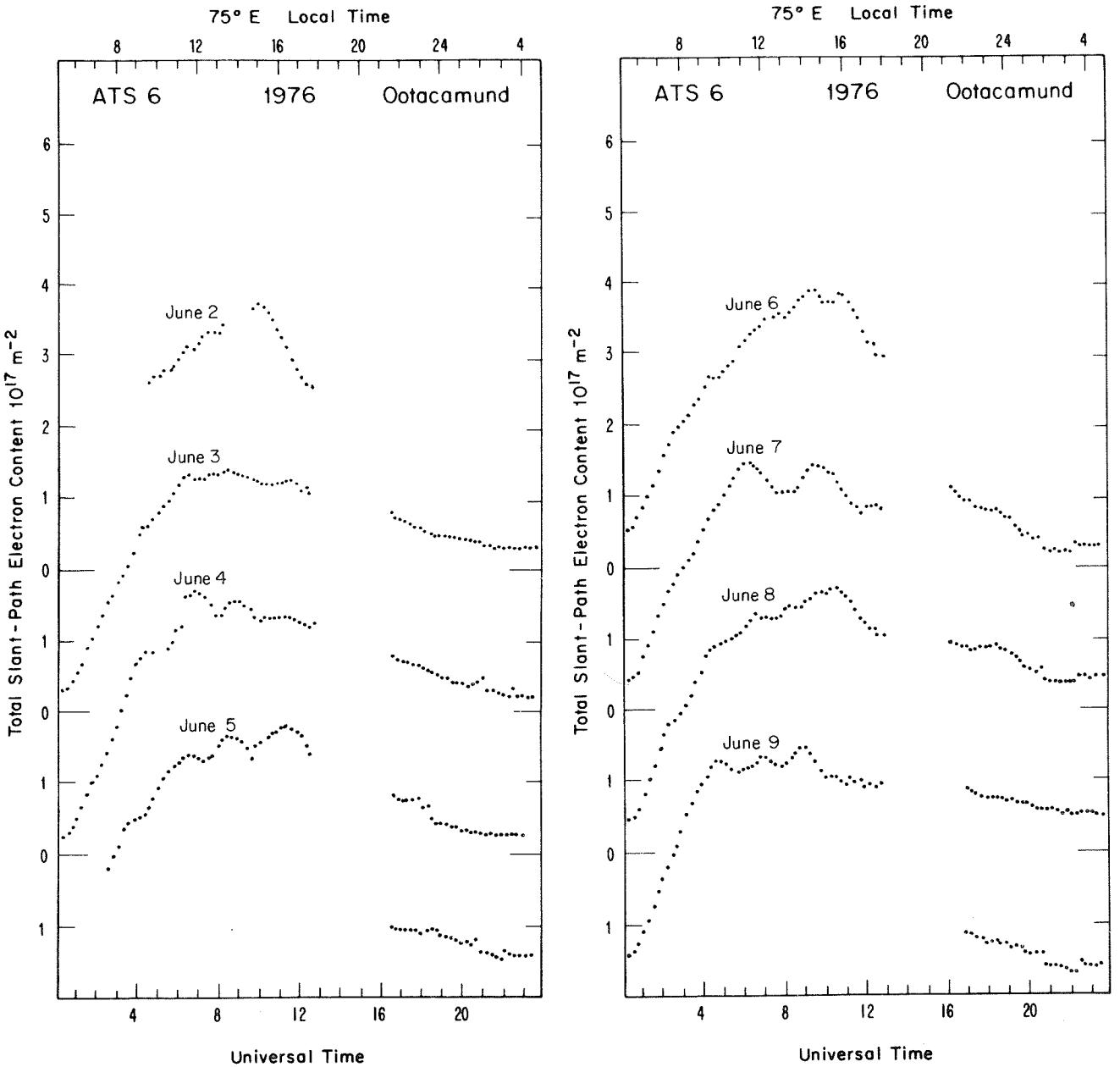
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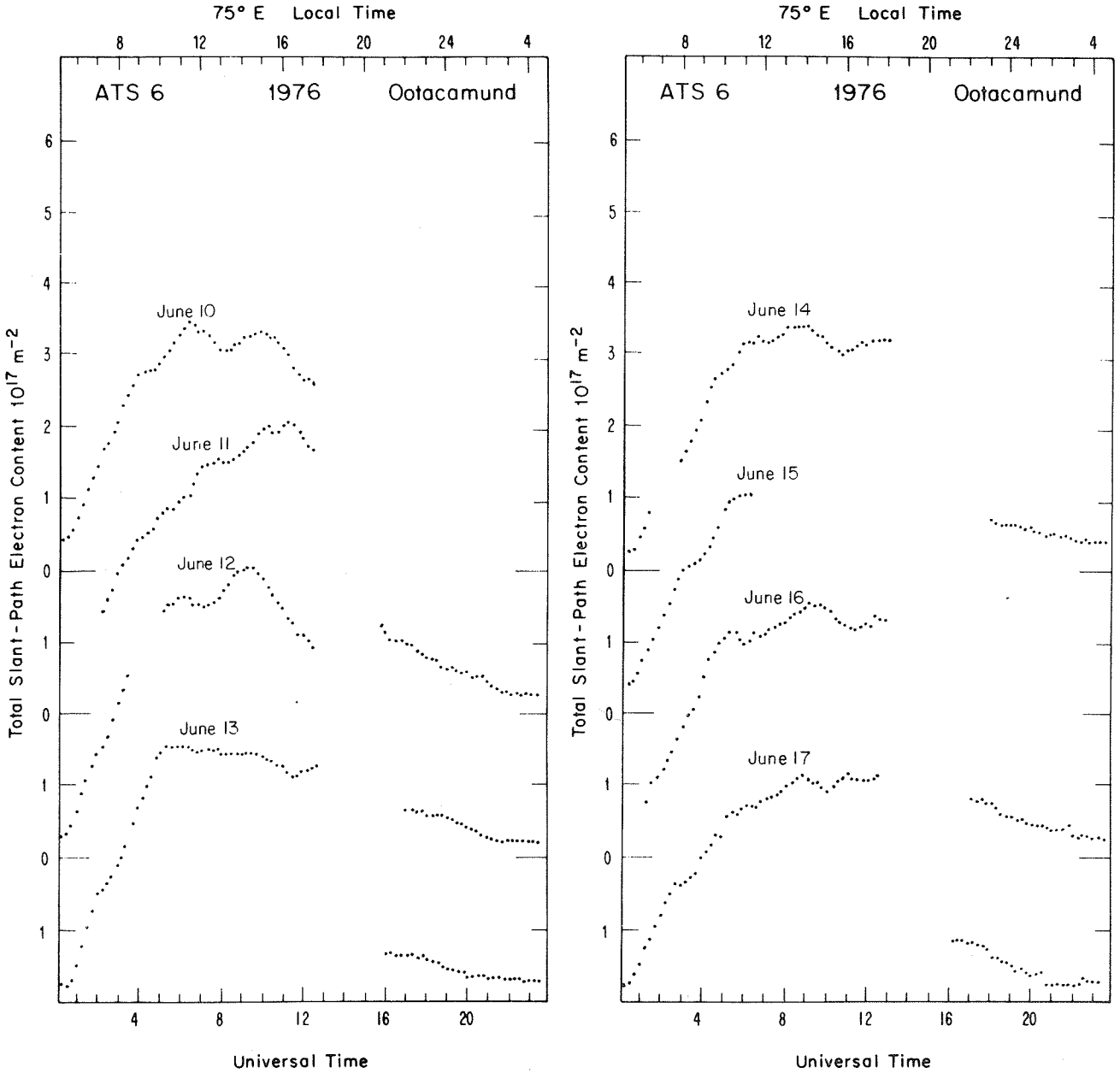
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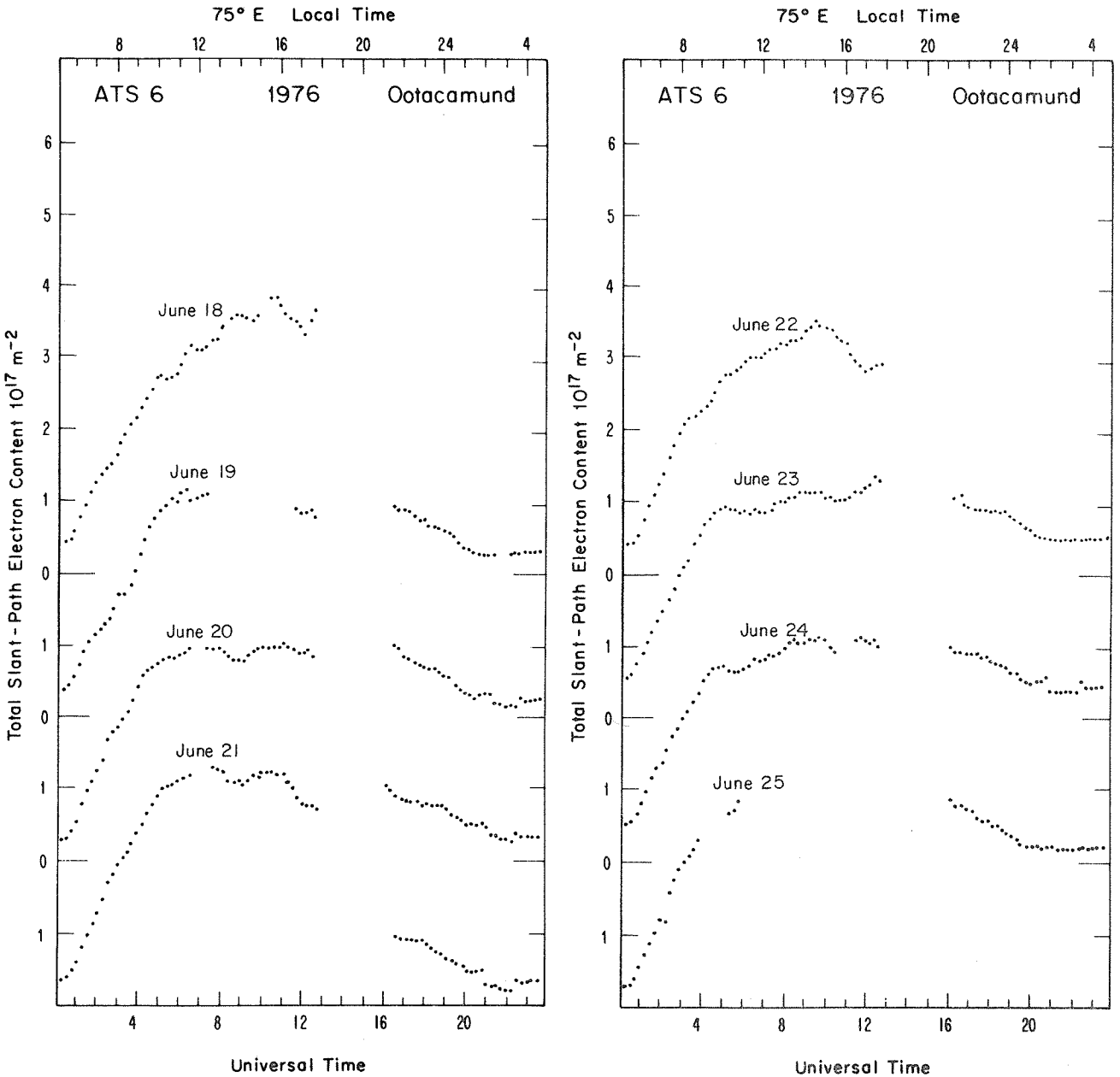
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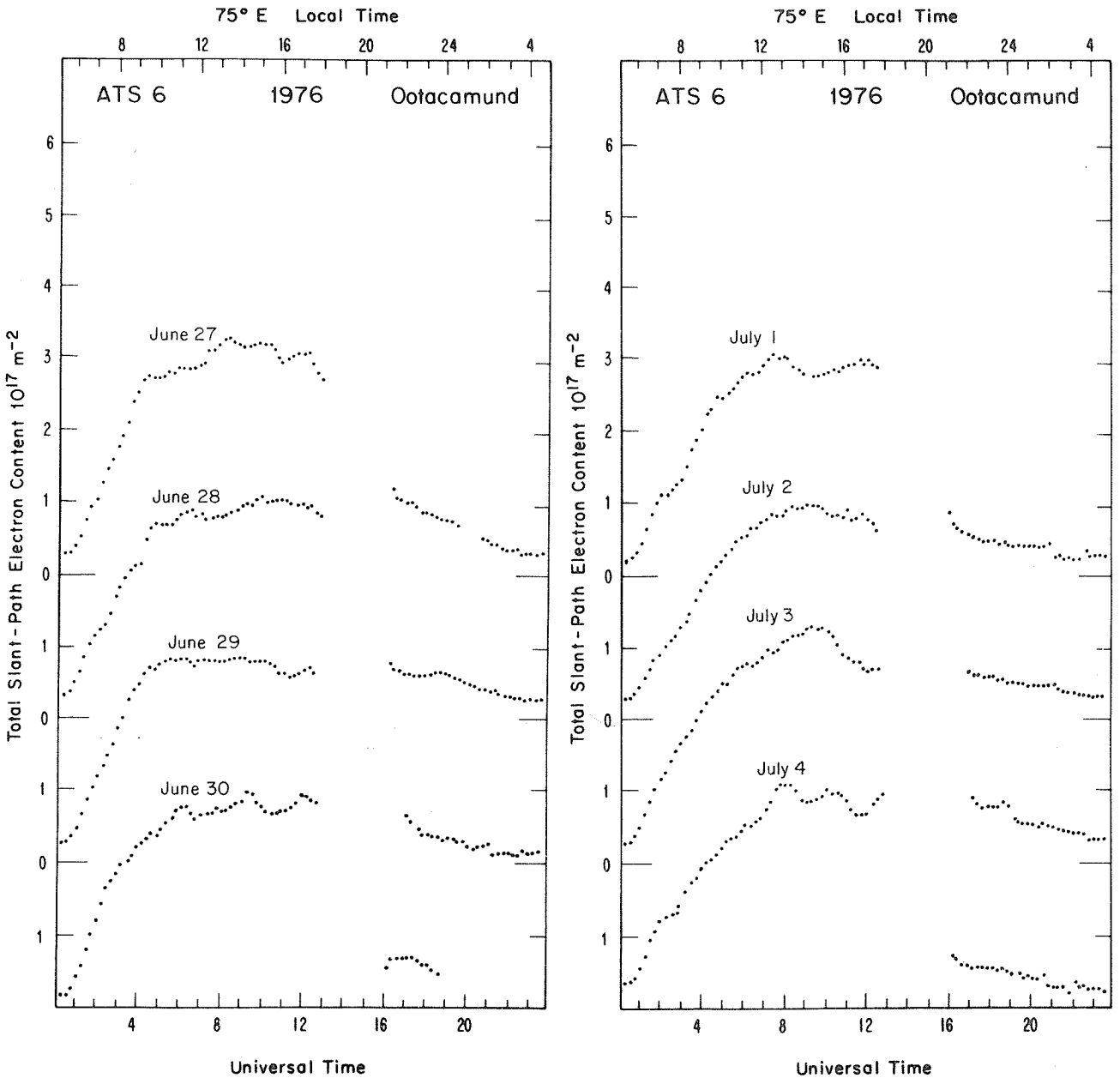
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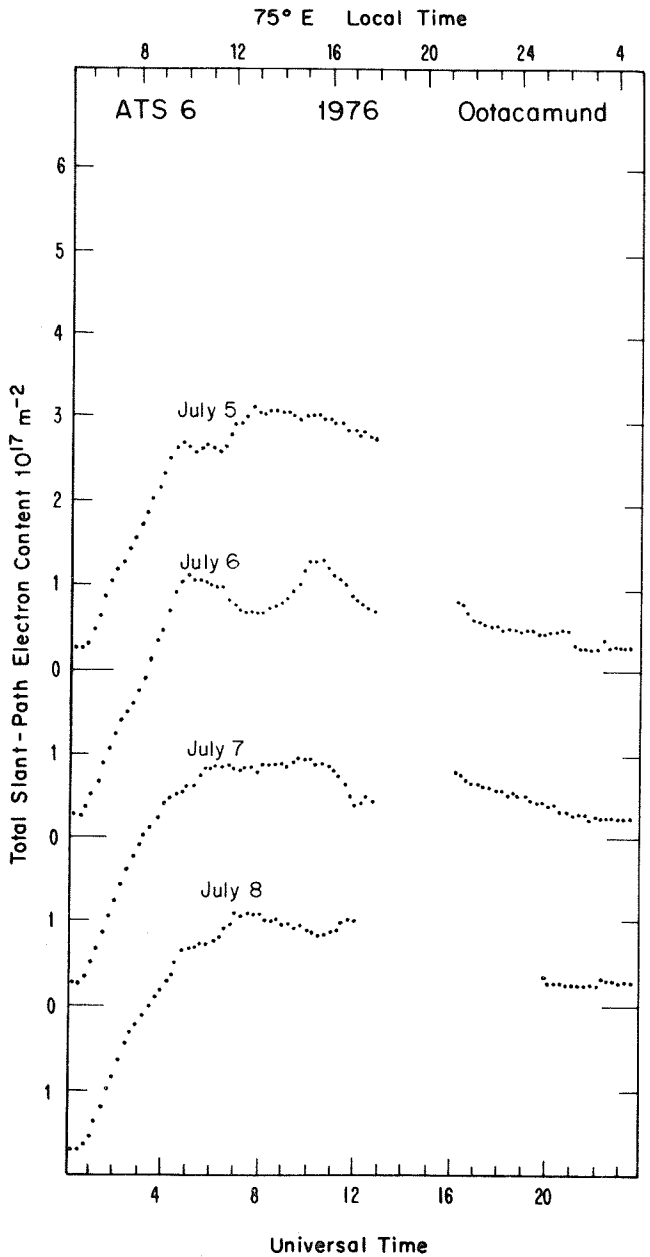
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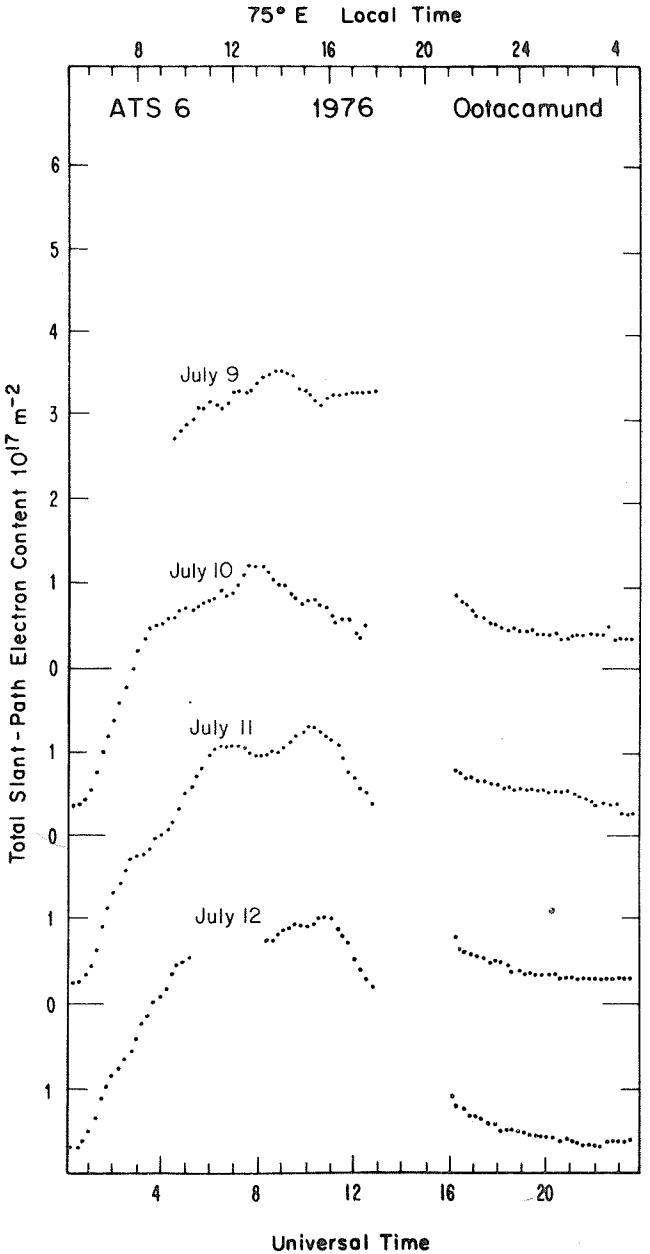
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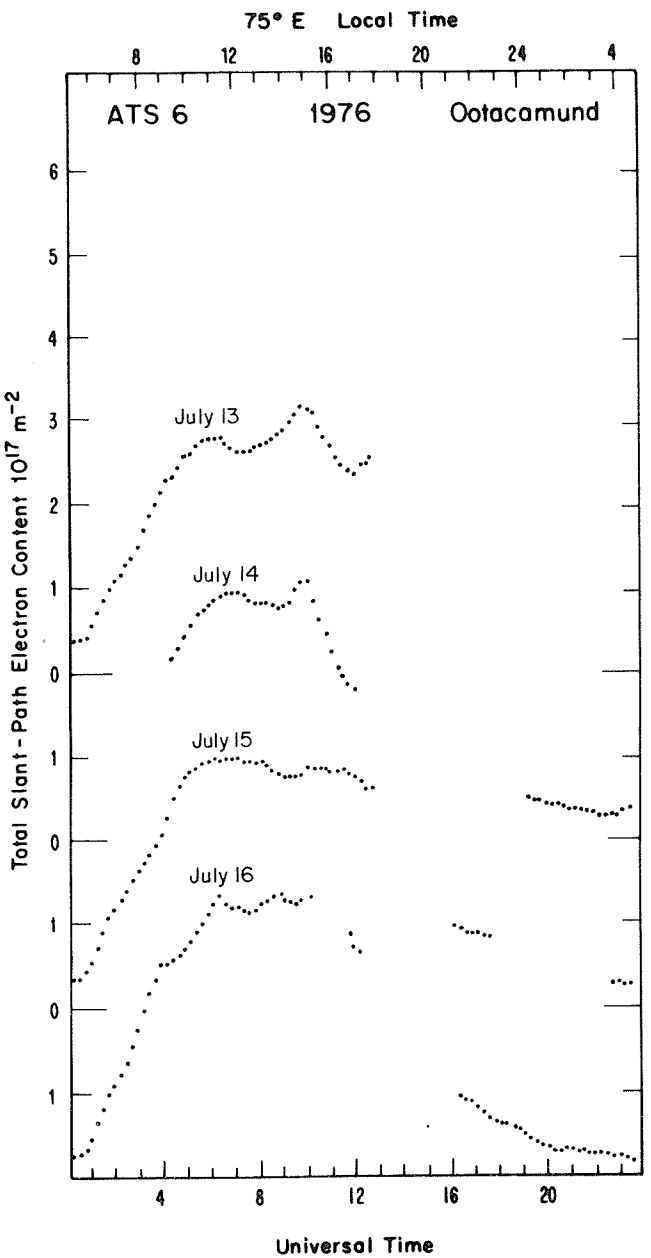
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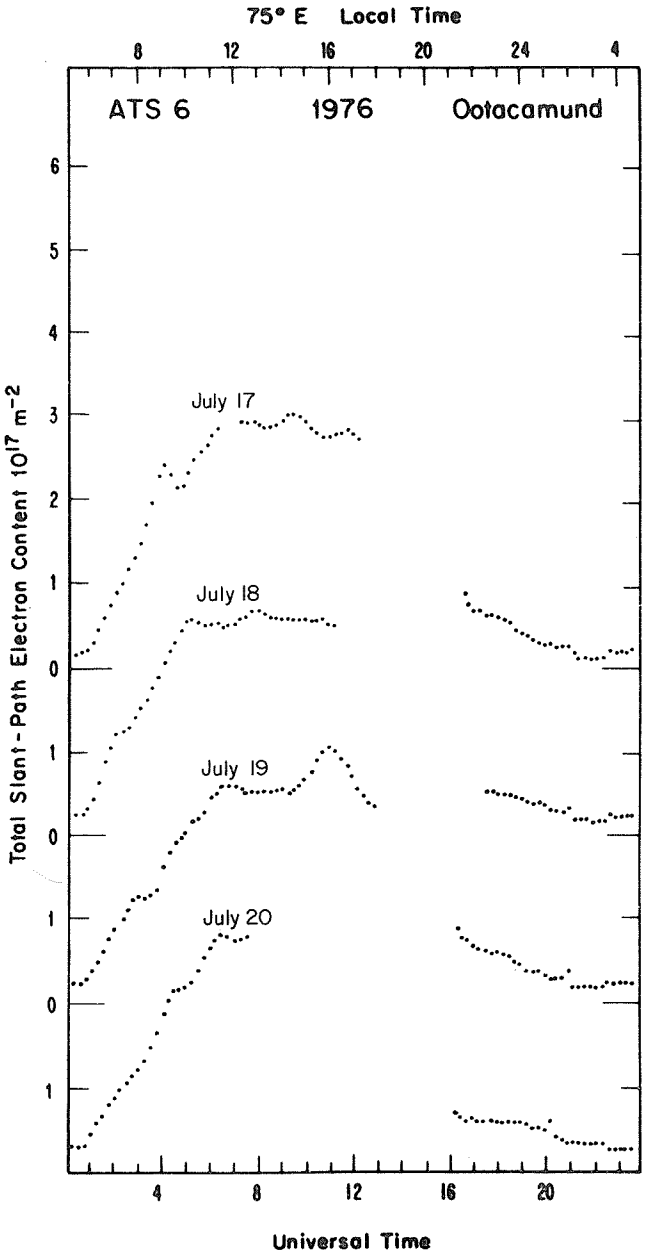
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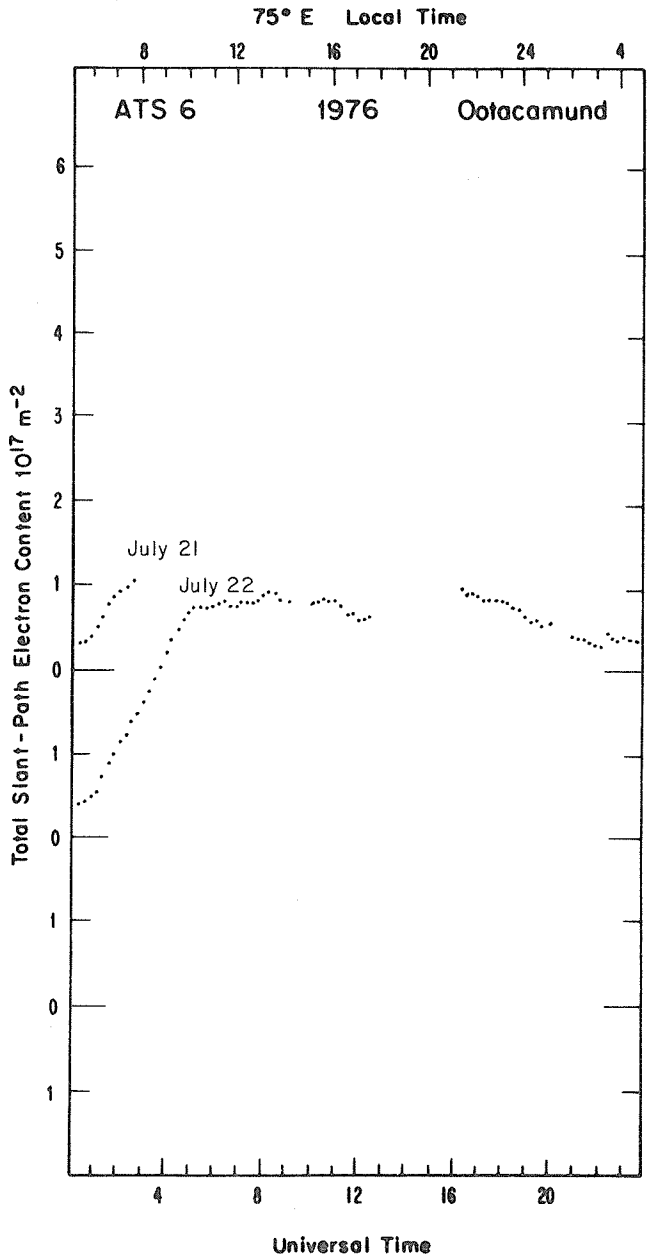
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July 22
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Universal Time

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UAG-66 "Synoptic Radio Maps of the Sun at 3.3mm 1970-1973" by Earle B. Mayfield, Space Science Lab., and Fred I. Shimabukuro Electronics Res. Lab., The Ivan A. Getting Laboratories, The Aerospace Corp., El Segundo, California 90245, May 1978, 30 pages, price 75 cents.

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UAG-72 "Energy Release in Solar Flares, Proceedings of the Workshop on Energy Release in Flares, 26 February-1 March 1979, Cambridge, Massachusetts, U.S.A.", edited by David M. Rust, American Science and Engineering, Inc., Cambridge, MA and A. Gordon Emslie, Harvard-Smithsonian Center for Astrophysics, Cambridge, MA, July 1979, 68 pages, price $1.50.

UAG-73 "Auroral Electrojet Magnetic Activity Indices AE(11-12) for January-June 1975", by J. H. Allen, C. C. Abston, J. E. Salazar and J. A. McKinnon, NGSDC/EDIS/NOAA, August 1979, 114 pages, price $1.75.