ATMOSPHERIC NOISE MEASUREMENTS

Data Summary N.° 2 — Station ARN-2 N.º 10

by

L. G. MEIRA F.º

and

F. DE MENDONÇA

Report N.º LAFE-23

January 1965

The measurements reported herein were performed in cooperation with the Radio Noise Section, Troposphere and Space Telecommunications Division of NBS — Boulder Laboratories.

Comissão Nacional de Atividades Espaciais
São José dos Campos
São Paulo — Brasil

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ABSTRACT

Under the designation of Project "OBRA", one of the 16 atmospheric radio noise receiving stations of the world-wide network supervised by the Boulder Laboratories, NBS, has been in operation at this Laboratory since August 1963.

This report presents the data collected during the period from January to June 1964.

I. DESCRIPTION OF DATA

This report is a continuation of the report nº LAFE-13 of this Laboratory.

Place: São José dos Campos - Brasil (23.3ºS - 45.8ºW)

Time used: GMT minus 3 hours.

Receiver: ARN-2 equipment (NBS) with a vertical omnidirectional whip antenna above a ground plane.

Band width- 200 c.p.s.

Data is presented in tables 1 to 6, as:

F_{am} = median value of daily F_a figures for a given hour (local time) over the month.

D_u and D_l = upper and lower deciles of the distribution of daily values of F_a for a given hour.

L_{dm} = median value of daily L_d figures for a given hour over the month.

V_{dm} = the same for V_d figures.

where

F_a = effective noise figure = external noise avaliable from an equivalent short, lossless vertical antenna, in db above kTB (Boltzmann's constant, absolute room temperature, taken as 288ºC, and receiver bandwidth) this can be converted to

E_n (equivalent vertically polarized ground wave rms noise field strength in db above $1\mu V/m$ for a 1kc/s bandwidth) through

$E_n = F_a + 20 \log_{10} f(mc/s) - 65.5$

L_d = db value of the ratio between the rms value and the the logarithmic average of the noise envelope.

V_d = db value of the ratio between the rms value and the average of the noise envelope.

A detailed description of the equipment and measurement technique employed can be found in the references.

The power measurements (F_a) are obtained by integration on a 15

minutes interval, and this value is taken as representative of the conditions for the whole hour.

The eight channels are scanned two at a time, so that the four lower frequencies are recorded in successive intervals of fifteen minutes during one hour; the same for the four higher ones, through another recorder. L_D and V_D are recorded simultaneously, one week with the high frequency channels and the next with the low frequency ones.

Hence, the measurements related to a given hour, for 51kc/s and 2.5mc/s were obtained between this hour and the hour plus fifteen minutes. The next two frequencies (113kc/s and 5.0mc/s) between the hour plus fifteen minutes and the hour plus thirty minutes, and so on for the other pairs of simultaneous frequencies (246 kc/s with 10.0 mc/s, and 545 kc/s with 20.0 mc/s) until the eight channels were scanned during one hour. This time difference between measurements was considered when the values of F_{am} were ploted. (figs. 1 to 6).

Although special care is taken to avoid interference of man-made noise in the measurements, it is possible that sometimes the received signal is contamined with fields other than atmospheric noise. In this case it has been verified (Crichlow, et al., 1960) that the first parameter to reflect this is the log deviation (L_D), whose absolute value will decrease so that, with the corresponding value of V_D they will not provide a solution for the amplitude probability as dediced from experimental data by Crichlow, et al. (1960). The NBS has published (Crichlow, Disney and Jenkins, 1959) curves that, for a given value of V_D, give the minimum value of L_D providing a solution of the amplitude probability distribution curve of the kind proper to atmospheric noise; also, the value of L_D that will give a best-fit to this solution. The above authors suggest that, whenever a value of L_D is found to be smaller than the minimum required, implying in a possible contamination of the signal, the most probable value of L_D should be used instead of the actually recorded one. This suggestion has been followed throughout this summary; a small circle above an L_{Dm} value indicates a quantity which is not the actually measured value, but a quantity obtained from the corresponding V_D from the above referred curves.

Figures 1 to 6 present the data in graphical form. The vertical thin lines indicate the variation during the month of the local sunrise and sunset time.

An asterisk above a median value indicates it was obtained from less than fifteen measurements for F_{am} or less than seven measurements for L_{Dm} and V_{Dm}.

II. REFERENCES

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MONTH-HOUR VALUES OF RADIO NOISE

Station São José, Brasil Lat. 23.3°S Long. 45.8°W Month January 19 64

Frequency (Mc)

Hour (LST)	.051 Fam	.051 Du	.051 Dℓ	.051 Vdm	.051 Ldm	.113 Fam	.113 Du	.113 Dℓ	.113 Vdm	.113 Ldm	.246 Fam	.246 Du	.246 Dℓ	.246 Vdm	.246 Ldm	.545 Fam	.545 Du	.545 Dℓ	.545 Vdm	.545 Ldm
00	127	6	12			118	8	16			103	10	16			86	7	13		
01	127	6	19			114	10	20			101	10	14			85	10	10		
02	127	6	20			114	10	16			101	8	16			82	13	7		
03	125	8	18			114	10	18			101	8	22			82	7	7		
04	126	5	18			113	11	19			99	10	20			83	12	12		
05	121	6	14			102	9	12			81	6	9			76	9	9		
06	116	9	18			97	10	7			79	7	4			77	9	9		
07	115	9	16			100	8	12			79	11	3			87	8	10		
08	116	7	16			100	12	10			81	16	5			79	10	9		
09	119	5	20			100	11	8			82	7	5			75	8	4		
10	119	6	21			102	10	10			81	8	4			75	6	2		
11	120	7	8			102	14	10			87	15	9			77	8	6		
12	120	11	9			106	12	12			93	16	12			84	14	13		
13	129	4	14			112	13	15			101	17	20			81	21	10		
14	133	3	14			120	7	15			102	15	21			85	15	15		
15	133	6	12			120	11	15			105	10	24			85	16	6		
16	131	8	10			115	7	16			103	12	24			85	15	8		
17	131	6	12			117	11	15			99	12	18			85	10	6		
18	129	6	10			114	10	10			97	10	14			85	12	10		
19	129	4	10			114	10	12			101	10	8			89	6	6		
20	131	4	8			118	10	14			105	8	14			88	7	7		
21	129	6	6			119	7	11			106	9	13			89	8	10		
22	129	6	8			120	8	10			105	10	16			90	7	11		
23	129	6	12			119	7	13			106	7	19			89	8	12		

Hour (LST)	2.5 Fam	2.5 Du	2.5 Dℓ	2.5 Vdm	2.5 Ldm	5.0 Fam	5.0 Du	5.0 Dℓ	5.0 Vdm	5.0 Ldm	10.0 Fam	10.0 Du	10.0 Dℓ	10.0 Vdm	10.0 Ldm	20.0 Fam	20.0 Du	20.0 Dℓ	20.0 Vdm	20.0 Ldm
00	66	10	10			57	8	7			43	16	10			22	8	0		
01	66	8	10			56	9	7			42	5	9			22	0	0		
02	64	8	14			55	8	6			42	5	13			22	2	0		
03	65	7	11			57	6	10			40	15	9			24	0	2		
04	64	8	12			59	10	12			37	6	8			24	2	2		
05	58	12	8			61	8	16			39	6	8			24	2	2		
06	48	6	8			61	8	18			39	4	6			24	2	2		
07	40	4	6			51	8	14			37	3	6			24	8	2		
08	36	12	5			49	6	16			35	6	5			24	2	2		
09	34	9	2			45	8	7			35	5	8			24	2	2		
10	32	3	2			39	6	4			33	5	6			23	3	1		
11	32	9	3			39	6	8			33	6	7			22	4	2		
12	34	16	4			39	7	8			35	4	8			24	6	2		
13	46	24	14			41	12	6			38	5	5			26	4	4		
14	49	21	17			45	10	8			41	4	4			28	4	4		
15	56	16	22			53	8	8			43	4	2			28	8	4		
16	54	12	16			53	6	8			45	4	4			30	6	6		
17	60	6	18			49	5	7			46	3	5			30	10	6		
18	64	4	10			59	10	6			45	6	4			28	8	4		
19	68	8	6			69	6	14			45	6	4			24	10	2		
20	72	6	10			67	6	10			45	6	6			24	8	2		
21	70	8	10			67	8	12			43	6	4			22	10	0		
22	68	6	8			67	12	12			43	6	6			22	10	0		
23	67	9	9			68	5	17			43	4	6			22	10	0		

F_{am} = median value of effective antenna noise in db above ktb
D_u = ratio of upper decile to median in db
D_ℓ = ratio of median to lower decile in db
V_{dm} = median deviation of average voltage in db below mean power
L_{dm} = median deviation of average logarithm in db below mean power

RN-13

MONTH-HOUR VALUES OF RADIO NOISE

Station São José, Brasil Lat. 23.39S Long. 45.89W Month February 19 64

Frequency (Mc)

Hour (LST)	.051 F_{am}	.051 D_u	.051 D_ℓ	.051 V_{dm}	.051 L_{dm}	.113 F_{am}	.113 D_u	.113 D_ℓ	.113 V_{dm}	.113 L_{dm}	.246 F_{am}	.246 D_u	.246 D_ℓ	.246 V_{dm}	.246 L_{dm}	.545 F_{am}	.545 D_u	.545 D_ℓ	.545 V_{dm}	.545 L_{dm}
00	135	6	8	8.5	15.0	122	5	9	8.5	14.0	108	6	13	8.0	15.0	92	5	12	5.0	9.0
01	135	7	8	10.5	16.5	120	7	10	9.0	15.0	108	7	14	9.0	15.0	92	5	14	5.0	9.0
02	136	5	9	10.5	18.5	120	6	8	11.5	20.0	105	7	11	9.0	14.5	90	7	12	6.5	12.0
03	135	6	10	10.5	18.5	120	4	12	9.0	16.0	106	5	15	9.0	18.0	90	6	16	6.0	13.5
04	135	6	11	11.0	19.0	117	5	10	10.5	18.5	102	8	12	8.5	15.0	90	4	14	6.5	12.0
05	133	6	15	10.5	18.6	114	6	11	9.5	15.5	92	12	17	10.0	17.5	88	6	10	6.0	11.0
06	125	6	11	12.5	22.0	102	6	12	11.5	20.0	82	13	13	10.0	19.5	86	6	9	5.0	10.5
07	123	8	13	13.0	22.5	102	13	13	16.5	28.5	82	16	15	11.0	19.5	87	6	11	7.0	12.0
08	120	11	10	11.0	19.5	100	14	4	14.0	24.0	82	—	—	12.5	22.0	84	8	11	1.0	5.0
09	120	12	6	9.0	16.0	104	10	14	10.0	12.5	80	17	6	9.5	15.0	88	6	12	6.0	11.0
10	122	7	7	8.5	15.0	102	11	12	6.0	11.0	82	16	10	10.5	18.5	88	4	12	3.0	11.5
11	127	6	8	9.0	16.0	106	16	10	15.0	24.0	84	20	8	11.5	20.0	86	11	8	5.0	10.0
12	129	8	6	13.0	20.5	110	16	10	12.5	22.0	90	26	10	10.0	17.5	88	12	8	5.5	9.5
13	134	13	6	9.5	17.0	118	17	9	9.0	16.0	99	28	15	11.5	19.5	90	22	8	11.5	20.0
14	141	11	9	9.5	17.0	118	18	6	11.0	19.5	99	27	11	11.0	17.0	90	22	10	8.5	14.0
15	137	14	4	8.5	15.0	122	18	10	11.5	20.0	102	26	14	9.0	17.5	92	21	13	9.5	15.5
16	140	14	7	11.0	18.0	123	16	12	10.5	16.5	106	20	18	9.5	12.0	90	16	8	10.5	12.0
17	137	13	6	9.0	14.5	121	11	9	10.0	17.5	102	21	15	8.5	14.5	90	16	9	6.0	10.5
18	139	13	8	8.5	15.0	120	17	10	8.5	15.0	104	16	4	6.0	14.0	90	10	13	5.5	10.0
19	139	9	11	7.5	13.5	122	9	13	7.0	12.5	108	13	9	5.5	11.5	96	6	14	5.0	9.0
20	137	8	11	8.5	15.5	122	9	13	7.0	13.0	108	6	8	4.5	11.0	94	6	14	5.5	10.0
21	137	7	8	9.0	14.5	122	11	11	6.5	11.5	108	8	8	7.5	13.0	96	3	10	4.5	8.5
22	137	6	10	9.0	14.5	122	7	13	9.0	16.0	108	7	9	6.5	13.0	94	4	10	5.0	9.5
23	135	6	11	9.0	15.0	120	8	10	8.0	14.5	108	6	10	8.5	16.5	94	2	13	5.5	10.0

Hour (LST)	2.5 F_{am}	2.5 D_u	2.5 D_ℓ	2.5 V_{dm}	2.5 L_{dm}	5.0 F_{am}	5.0 D_u	5.0 D_ℓ	5.0 V_{dm}	5.0 L_{dm}	10.0 F_{am}	10.0 D_u	10.0 D_ℓ	10.0 V_{dm}	10.0 L_{dm}	20.0 F_{am}	20.0 D_u	20.0 D_ℓ	20.0 V_{dm}	20.0 L_{dm}
00	65	6	7	5.5	10.0	61	11	9	7.5	13.5	44	4	7	4.5	8.0	25	6	2	2.5	5.0
01	65	5	6	5.5	10.0	59	13	7	5.5	10.0	42	6	6	5.0	9.0	27	6	4	2.0	4.0
02	65	6	6	7.5	13.5	63	11	10	5.5	10.0	42	4	6	6.0	11.0	25	6	2	2.0	4.0
03	65	6	8	5.0	9.5	61	11	8	5.5	10.0	42	3	8	5.0	9.0	25	3	2	2.0	4.0
04	65	6	9	7.0	14.0	65	12	8	6.0	10.5	38	6	6	4.5	8.5	25	4	2	1.5	3.5
05	65	5	13	7.0	12.5	65	12	12	7.0	12.0	34	9	4	5.0	9.0	25	2	2	2.0	4.0
06	53	5	13	11.0	19.5	72	5	20	7.5	13.5	38	8	4	4.5	8.0	25	6	2	2.0	4.0
07	43	11	9	6.0	11.0	63	7	25	7.0	11.5	36	8	6	5.5	10.0	27	6	2	3.0	6.0
08	37	8	3	5.0	10.0	55	4	9	—	—	36	8	6	6.0	11.0	27	8	3	2.0	4.0
09	33	9	3	5.5	10.0	51	6	7	—	—	34	3	5	6.5	12.0	25	4	2	3.5	6.5
10	33	10	3	3.0	6.0	44	6	8	7.0	11.5	32	7	7	9.5	17.0	25	8	2	3.0	6.0
11	39	4	6	6.5	12.0	41	6	2	7.5	12.5	34	4	6	8.5	13.5	25	5	2	4.0	7.5
12	38	14	6	6.0	11.0	45	12	12	8.0	14.5	36	14	5	8.5	13.5	25	9	4	4.5	8.0
13	43	24	12	12.5	22.0	48	13	8	7.0	12.5	40	12	3	11.0	19.5	29	12	4	6.0	11.0
14	53	24	21	11.0	17.5	51	14	7	6.5	12.0	42	10	5	8.0	14.5	29	12	4	4.5	8.0
15	51	8	16	8.0	13.0	53	12	5	6.0	11.0	46	10	8	6.0	10.0	31	13	4	5.0	9.0
16	59	13	21	9.0	16.5	61	10	10	7.0	12.5	46	10	4	5.5	9.5	31	6	2	5.5	10.0
17	60	26	24	8.5	15.0	65	6	8	6.5	12.0	46	4	4	6.5	12.0	31	11	3	6.0	11.0
18	66	9	22	6.5	11.5	69	6	7	5.5	10.0	48	4	4	5.0	9.0	31	6	4	5.0	9.0
19	71	6	9	7.5	13.6	75	4	13	5.5	10.0	46	6	3	6.0	10.0	29	8	4	4.5	8.5
20	69	7	8	7.5	12.5	73	5	6	6.5	11.0	48	5	6	4.0	7.5	27	6	4	3.5	6.5
21	69	6	4	5.5	10.0	75	2	7	6.0	10.5	45	6	5	5.0	9.0	29	2	6	3.5	6.5
22	67	6	6	8.5	13.5	73	6	5	5.5	9.5	44	4	6	5.5	10.0	25	4	4	3.0	6.0
23	65	8	5	6.5	12.0	75	5	15	6.5	12.0	43	5	7	4.5	8.5	25	9	4	3.0	6.0

F_{am} = median value of effective antenna noise in db above ktb
D_u = ratio of upper decile to median in db
D_ℓ = ratio of median to lower decile in db
V_{dm} = median deviation of average voltage in db below mean power
L_{dm} = median deviation of average logarithm in db below mean power

RN-13

MONTH-HOUR VALUES OF RADIO NOISE

Station São José, Brasil Lat. 23.3°S Long. 45.8°W Month March 19 64

Frequency (Mc)

Hour (LST)	.051					.113					.246					.545				
	F_{am}	D_u	D_ℓ	V_{dm}	L_{dm}	F_{am}	D_u	D_ℓ	V_{dm}	L_{dm}	F_{am}	D_u	D_ℓ	V_{dm}	L_{dm}	F_{am}	D_u	D_ℓ	V_{dm}	L_{dm}
00	142	5	5	8.5	14.5	118	7	8	8.0	13.0	104	6	6	7.5	12.5	90	5	4	5.5	10.0
01	142	6	6	9.0	15.5	116	6	8	8.5	15.5	102	7	7	5.0	11.5	91	4	6	4.5	8.5
02	142	4	9	9.5	15.5	118	4	9	9.0	16.0	102	6	8	5.5	11.5	89	6	7	6.0	11.0
03	142	5	11	9.5	16.0	116	6	11	6.0	12.0	100	7	10	5.5	11.5	90	3	7	4.0	9.0
04	132	9	7	7.5	15.0	114	8	13	5.0	11.0	98	6	12	6.0	12.5	87	5	6	4.5	10.0
05	132	9	11	8.5	15.5	113	7	14	5.5	12.0	92	11	8	5.5	11.0	89	3	8	4.0	9.0
06	128	6	12	9.5	15.0	96	16	5	4.0	10.5	75	7	5	8.0	13.0	86	5	11	4.0	11.0
07	124	8	8	9.5	17.0	94	10	8	2.5	6.0	74	6	4	5.5	10.0	85	4	12	5.5	10.0
08	124	8	9	8.5	15.0	96	10	6	3.0	6.0	76	3	8	8.0	14.5	85	7	13	3.0	6.0
09	122	8	9	9.5	17.0	100	10	14	7.0	12.5	76	11	9	7.5	12.5	87	6	13	5.5	10.0
10	124	6	8	6.5	12.0	99	7	9	3.0	6.0	75	5	5	8.0	14.5	85	6	6	8.5	15.0
11	123	7	5	10.0	17.5	100	7	8	4.0	7.5	76	7	6	11.0	11.5	85	5	9	6.5	12.0
12	126	7	7	11.5	20.0	102	12	6	4.0	7.5	78	18	5	8.5	15.0	85	8	12	6.0	11.0
13	130	7	5	11.5	18.0	106	12	7	4.5	8.5	83	20	13	10.5	18.5	85	8	4	7.0	14.5
14	134	10	7	8.0	14.5	111	12	10	6.5	12.0	86	21	12	6.5	15.0	85	12	4	4.5	10.5
15	134	8	6	8.5	15.0	112	10	14	6.5	12.0	86	32	12	13.0	22.5	85	16	6	4.5	10.5
16	134	10	6	9.0	16.0	112	11	12	7.0	12.5	88	22	14	10.5	16.5	87	14	4	8.0	15.0
17	134	8	8	9.0	16.0	112	8	13	8.0	13.0	90	24	16	8.0	13.0	85	16	4	8.5	15.0
18	134	6	7	10.0	17.5	114	8	15	9.0	16.0	98	8	10	9.5	15.0	89	8	8	6.0	11.0
19	135	7	7	9.5	17.0	116	7	8	8.0	13.0	100	8	6	8.0	14.5	91	5	8	5.5	10.0
20	136	6	6	9.0	15.0	118	9	7	7.5	13.0	104	7	9	7.5	12.0	93	5	8	5.0	10.0
21	135	5	6	8.5	15.0	120	4	10	7.0	11.5	106	2	6	6.0	10.5	93	3	7	4.5	8.5
22	136	4	9	8.0	15.0	120	4	11	7.0	13.0	106	4	9	6.0	11.0	93	5	7	4.0	7.5
23	136	4	9	10.0	16.0	118	6	6	7.0	13.0	104	5	5	7.5	12.0	91	5	6	4.0	7.5

Hour (LST)	2.5					5.0					10.0					20.0				
	F_{am}	D_u	D_ℓ	V_{dm}	L_{dm}	F_{am}	D_u	D_ℓ	V_{dm}	L_{dm}	F_{am}	D_u	D_ℓ	V_{dm}	L_{dm}	F_{am}	D_u	D_ℓ	V_{dm}	L_{dm}
00	61	6	6	5.0	9.5	68	11	8	3.5	7.0	36	7	8	4.5	8.5	22	7	4	1.5	3.5
01	61	6	8	6.5	11.5	52	7	9	4.0	7.5	35	10	9	5.0	9.0	22	9	4	1.5	3.5
02	61	6	9	4.5	8.5	52	6	11	6.0	11.5	33	10	8	4.0	7.5	22	10	4	2.0	4.0
03	59	8	10	6.5	12.0	49	8	12	5.5	10.0	31	9	8	3.5	6.5	20	4	2	1.5	3.5
04	59	9	10	5.5	10.0	48	10	9	6.0	11.0	30	9	7	2.5	5.0	20	4	2	1.5	3.5
05	59	8	11	5.0	9.0	58	10	19	6.0	13.0	29	8	7	3.0	6.0	20	4	2	1.5	3.5
06	53	10	9	5.0	9.0	64	7	25	6.5	12.0	31	10	10	3.0	6.0	22	5	4	1.5	3.5
07	41	8	11	4.0	7.5	58	4	16	2.5	6.0	29	14	10	5.5	10.0	21	3	3	1.5	3.5
08	37	7	9	5.0	9.0	50	8	11	4.5	9.5	27	12	4	8.0	14.5	22	6	4	1.5	3.5
09	33	4	6	6.0	11.0	46	6	17	3.5	7.5	27*			6.0	11.0	22*			1.5	3.5
10	33	4	5	6.0	11.0	38	6	4			30	9	11	7.0	12.5	22	2	4	1.5	3.5
11	33	5	6	7.5	13.5	36	6	6	4.5	9.0	31	10	8	7.0	12.5	22	4	2	1.0	2.5
12	33	8	6	6.5	12.0	38	6	6	4.5	8.5	33	9	8	7.0	12.5	24	4	4	2.5	5.0
13	33	13	6	10.5	18.5	40	6	9	5.5	10.0	37	8	12	6.0	10.0	26	3	5	4.0	7.5
14	35	28	6	9.5	17.0	44	8	12	8.0	13.5	41	7	10	6.0	11.0	26	4	2	5.0	9.0
15	37	30	6	8.0	13.0	46	12	6	5.5	10.0	43	10	14	5.0	9.0	30	7	6	3.5	6.5
16	39	33	6	5.5	10.0	52	6	8	6.5	11.5	45	8	14	5.5	10.0	30	10	4	3.5	6.5
17	47	19	11	7.5	13.0	58	7	8	6.0	10.0	45	8	11	6.0	10.0	28	13	2	7.0	12.5
18	61	6	8	5.5	10.0	66	7	8	5.5	10.0	45	8	11	8.0	14.5	26	9	2	4.5	8.5
19	67	5	9	5.5	10.0	66	4	9	4.5	8.0	45	7	12	5.0	9.0	24	7	2	3.5	6.5
20	67	4	12	5.5	10.0	70	6	8	4.5	8.5	45	8	16	4.5	8.5	23	9	3	3.5	6.5
21	65	6	12	6.5	12.0	66	6	7	5.5	10.0	43	9	12	5.5	10.0	22	17	2	3.0	6.0
22	65	5	12	6.0	10.0	70	6	11	3.5	6.5	41	7	10	7.0	12.5	22	17	2	2.0	4.0
23	64	6	9	5.5	10.0	68	8	9	3.5	7.0	41	6	12	6.5	12.0	22	4	2	1.5	3.5

F_{am} = median value of effective antenna noise in db above ktb
D_u = ratio of upper decile to median in db
D_ℓ = ratio of median to lower decile in db
V_{dm} = median deviation of average voltage in db below mean power
L_{dm} = median deviation of average logarithm in db below mean power

RN-13

MONTH-HOUR VALUES OF RADIO NOISE

Station S. José, Brasil   Lat. 23.32S Long. 45.82W   Month April   19 64

Frequency (Mc)

Hour (LST)	.051 Fam	.051 Du	.051 Dℓ	.051 Vdm	.051 Ldm	.113 Fam	.113 Du	.113 Dℓ	.113 Vdm	.113 Ldm	.246 Fam	.246 Du	.246 Dℓ	.246 Vdm	.246 Ldm	.545 Fam	.545 Du	.545 Dℓ	.545 Vdm	.545 Ldm
00	122	9	9	12.0	19.0	116	10	10	10.5	18.5	98	10	8	9.0	16.5	88	6	6	6.5	12.0
01	123	6	10	11.0	17.5	115	13	11	9.0	14.5	98	10	8	8.5	15.5	86	8	6	5.5	11.0
02	123	8	8	11.5	20.0	119	9	15	9.5	15.0	100	8	11	7.5	14.0	86	10	6	6.0	10.0
03	122	9	9	10.5	18.5	118	10	14	9.0	16.0	98	8	10	9.0	16.5	85	7	7	4.0	8.5
04	124	7	15	12.5	22.0	118	10	18	8.0	13.5	96	10	10	8.5	15.0	84	8	10	3.0	9.0
05	124	7	15	10.5	18.5	114	12	20	11.0	19.5	92	12	10	8.0	14.5	85	7	11	4.0	8.5
06	116	13	11	10.0	17.5	102	10	14	8.5	15.0	72	10	6	8.0	14.5	84	4	8	7.0	12.5
07	113	10	10	10.0	17.5	96	10	8	2.5	5.0	74	8	4	6.0	11.0	84	4	8	5.0	9.0
08	113	10	12	6.0	11.0	102	7	14	5.0	9.0	74	4	4	9.5	16.0	82	6	8	3.5	10.5
09	111	8	9	8.0	14.5	102	7	12	4.0	8.0	72	10	4	—	—	82	4	8	6.0	10.0
10	111	10	15	5.5	10.0	98	9	12	6.5	12.0	74	4	4	11.5	20.0	84	6	8	6.0	10.0
11	111	10	12	8.5	15.0	96	10	8	6.0	10.0	76	10	6	7.5	13.5	86	6	10	6.0	10.0
12	111	10	10	11.5	20.0	97	15	9	9.0	16.0	75	10	7	7.0	12.5	82	8	6	5.0	9.0
13	115	9	8	10.0	17.5	100	10	12	7.5	12.0	76	16	6	7.5	13.0	84	8	8	4.0	7.5
14	117	10	6	8.5	15.0	102	15	8	9.5	17.0	76	36	6	11.0	19.5	82	15	5	6.5	11.0
15	119	9	7	8.0	13.5	106	28	13	10.0	17.5	81	40	8	11.0	19.0	82	18	2	8.0	14.5
16	116	23	4	12.5	22.0	104	28	4	9.5	17.0	82	32	8	10.5	17.0	84	10	8	5.0	9.0
17	117	17	6	10.5	18.5	106	24	8	9.0	16.0	84	25	8	9.0	16.0	82	17	9	5.0	9.5
18	119	14	9	12.0	21.0	112	16	10	7.0	17.0	95	7	7	9.5	16.0	87	7	7	6.5	11.0
19	121	10	6	10.0	16.0	116	10	8	8.0	13.5	98	10	8	9.5	15.0	88	6	4	6.0	10.0
20	121	14	4	12.0	21.0	117	11	9	8.0	14.0	100	8	10	7.0	13.5	90	8	8	5.0	8.5
21	121	12	4	10.0	17.0	114	10	6	9.0	16.0	104	2	12	9.0	15.0	90	4	6	4.0	8.0
22	120	7	3	11.0	19.5	116	6	6	9.5	15.5	102	6	10	8.5	13.5	89	7	5	5.0	9.0
23	121	12	6	11.0	19.5	117	11	9	7.5	14.5	100	12	8	9.0	15.0	88	8	4	6.0	11.0

Hour (LST)	2.5 Fam	2.5 Du	2.5 Dℓ	2.5 Vdm	2.5 Ldm	5.0 Fam	5.0 Du	5.0 Dℓ	5.0 Vdm	5.0 Ldm	10.0 Fam	10.0 Du	10.0 Dℓ	10.0 Vdm	10.0 Ldm	20.0 Fam	20.0 Du	20.0 Dℓ	20.0 Vdm	20.0 Ldm
00	58	6	14	4.5	8.0	68	8	16	5.5	10.5	37	7	9	4.5	8.5	20	5	2	2.0	4.0
01	58	6	15	4.0	7.5	50	4	10	5.0	9.0	35	9	8	5.5	10.0	22	7	4	3.0	6.0
02	58	4	16	3.0	6.5	48	10	9	4.5	8.5	35	10	10	3.0	6.0	21	4	3	2.0	4.0
03	56	6	12	5.0	9.0	48	10	9	4.0	7.5	35	6	10	5.5	10.0	20	4	2	3.5	6.5
04	58	6	14	4.0	7.5	48	8	9	4.5	8.5	31	8	6	4.0	7.5	20	4	2	1.5	3.0
05	54	8	12	4.0	7.5	53	13	17	5.0	9.0	29	11	6	4.0	7.5	22	2	4	1.0	2.5
06	54	8	14	4.0	9.0	68	4	14	6.5	11.0	33	5	5	5.0	9.0	22	2	4	1.5	3.0
07	44	8	16	4.5	8.5	62	4	16	—	—	35	10	10	4.5	8.0	22	4	4	3.0	6.0
08	36	8	8	6.0	11.0	52	4	17	4.0	8.5	39	6	12	6.5	12.0	24	2	6	4.0	7.5
09	34	4	2	5.0	9.0	48	4	17	—	—	31	14	7	6.0	10.0	22	15	4	2.0	4.0
10	32	6	8	6.0	11.0	44	4	12	6.5	12.0	32	7	5	7.5	13.5	22	4	2	2.0	4.5
11	30	6	2	6.5	12.0	42	6	10	5.5	10.0	33	12	6	—	—	24	2	2	4.0	7.5
12	30	8	6	5.0	8.5	40	8	12	—	—	33	13	4	5.0	9.0	24	2	2	3.5	6.5
13	32	3	5	4.0	7.5	40	9	11	3.5	8.0	33	13	4	5.5	10.0	24	5	2	3.5	6.5
14	34	4	4	7.5	13.5	33	6	13	—	—	37	10	6	6.5	12.0	28	9	8	4.5	8.5
15	36	8	7	5.0	9.0	48	14	8	—	—	39	21	6	4.5	8.5	28	16	5	4.0	8.5
16	42	35	10	3.5	6.5	55	15	13	4.0	7.5	42	9	7	4.0	7.5	30	7	6	4.0	8.5
17	51	15	15	5.0	9.0	52	4	18	3.5	6.5	45	6	13	5.0	9.0	28	4	4	3.0	6.0
18	58	13	12	5.5	10.0	64	6	12	1.5	3.0	45	6	11	4.5	8.5	25	5	3	3.5	6.5
19	64	6	15	4.0	7.5	63	7	13	5.0	9.5	43	8	9	4.0	7.5	26	4	6	2.5	5.0
20	64	8	11	3.5	6.5	68	6	8	4.5	8.0	44	7	10	3.0	6.0	26	4	6	2.0	4.0
21	62	8	7	5.0	9.0	66	7	5	4.5	8.5	41	12	8	4.0	7.5	24	4	4	4.0	7.5
22	60	7	9	4.5	8.5	66	10	10	—	—	41	6	10	4.5	8.5	24	4	4	2.5	5.0
23	60	7	9	5.0	9.0	66	6	12	3.5	9.0	39	6	10	3.0	6.0	24	4	4	4.0	7.5

F_{am} = median value of effective antenna noise in db above ktb
D_u = ratio of upper decile to median in db
D_ℓ = ratio of median to lower decile in db
V_{dm} = median deviation of average voltage in db below mean power
L_{dm} = median deviation of average logarithm in db below mean power

MONTH-HOUR VALUES OF RADIO NOISE

Station São José, Brasil   Lat. 23.3°S   Long. 45.8°W   Month May   19 64

Frequency (Mc)

Hour (LST)	.051 F_{am}	.051 D_u	.051 D_ℓ	.051 V_{dm}	.051 L_{dm}	.113 F_{am}	.113 D_u	.113 D_ℓ	.113 V_{dm}	.113 L_{dm}	.246 F_{am}	.246 D_u	.246 D_ℓ	.246 V_{dm}	.246 L_{dm}	.545 F_{am}	.545 D_u	.545 D_ℓ	.545 V_{dm}	.545 L_{dm}
00	129	13	5	11.0	17.5	113	12	6	9.0	16.0	98	12	8	9.0	16.0	89	7	13	7.0	12.5
01	129	13	5	12.5	22.0	113	14	8	10.5	18.5	98	12	6	9.5	17.0	87	9	4	6.0	11.0
02	129	15	6	12.5	22.0	113	14	8	8.5	15.0	97	14	6	10.5	18.5	87	10	4	5.0	9.5
03	127	18	6	13.0	22.5	111	15	7	13.0	23.0	97	11	9	10.5	18.5	85	10	9	7.0	12.5
04	129	15	8	13.0	22.5	109	14	6	9.5	15.0	93	12	6	11.5	18.5	85	10	6	6.5	12.0
05	127	16	8	12.0	21.0	107	14	8	10.5	16.5	91	14	7	13.0	22.5	91	7	8	3.0	6.0
06	123	18	6	12.0	21.0	101	20	8	11.0	19.5	83	15	7	8.5	15.0	93	2	18	5.0	10.0
07	117	17	7	10.5	17.5	97	14	7	7.5	13.5	78	15	4	8.5	15.0	91	4	25	6.5	12.0
08	113	23	8	12.0	21.0	100	17	7	7.5	13.5	78	12	2	8.0	14.5	94	3	24	6.5	12.0
09	115	17	8	8.0	14.5	99	16	8	10.0	17.5	80	14	4	10.5	18.5	91	6	27	5.5	10.0
10	113	20	6	6.5	11.5	97	16	7	9.5	16.0	82	14	6	9.0	16.0	93	7	20	4.0	7.5
11	111	20	2	10.5	18.5	97	16	9	9.0	16.0	80	11	7	10.5	18.5	91	6	5	6.5	12.5
12	117	18	8	10.0	17.5	98	18	9	8.5	15.0	80	13	7	7.5	13.5	91	5	13	8.0	14.5
13	123	13	14	11.5	20.0	101	14	8	9.5	12.0	80	14	4	7.0	12.5	91	5	10	7.0	12.5
14	125	12	14	12.5	22.0	101	12	5	10.5	18.5	78	18	2	9.0	16.0	91	8	4	5.0	12.0
15	123	16	10	10.5	18.5	101	18	8	11.0	19.5	80	20	4	9.5	17.5	93	4	8	5.5	12.5
16	125	14	13	10.5	18.5	99	18	7	7.0	12.5	82	9	6	9.0	16.0	91	6	3	6.0	11.0
17	123	15	9	10.5	18.5	101	16	6	7.0	12.5	85	14	6	8.5	15.0	89	5	5	6.0	13.0
18	127	10	10	10.5	18.5	113	8	14	8.0	14.0	96	11	11	8.5	13.5	91	5	7	4.0	7.5
19	131	8	10	11.0	19.5	115	6	14	8.5	15.0	98	11	8	7.0	12.5	91	5	6	5.0	9.5
20	131	9	10	9.5	16.5	113	10	9	8.5	15.0	101	9	9	6.5	12.5	93	4	7	5.5	9.5
21	129	12	8	10.5	18.5	115	9	11	8.5	15.0	99	10	8	7.0	12.5	91	5	4	5.5	10.0
22	129	12	8	9.5	16.0	113	9	8	9.0	16.0	98	10	6	8.0	14.5	91	4	4	4.0	7.5
23	129	11	6	11.0	19.5	115	7	11	9.5	17.0	98	10	7	8.0	14.0	91	6	4	6.5	12.0

Hour (LST)	2.5 F_{am}	2.5 D_u	2.5 D_ℓ	2.5 V_{dm}	2.5 L_{dm}	5.0 F_{am}	5.0 D_u	5.0 D_ℓ	5.0 V_{dm}	5.0 L_{dm}	10.0 F_{am}	10.0 D_u	10.0 D_ℓ	10.0 V_{dm}	10.0 L_{dm}	20.0 F_{am}	20.0 D_u	20.0 D_ℓ	20.0 V_{dm}	20.0 L_{dm}
00	61	6	6	6.5	12.0	74	2	22	6.0	11.0	39	15	7	2.5	5.0	24	8	2	1.5	3.5
01	59	9	6	6.0	11.0	52	8	11	4.5	8.5	42	16	12	2.0	4.5	24	2	2	1.5	3.5
02	57	8	4	8.0	14.5	52	4	12	4.5	8.5	40	18	10	2.0	4.0	24	2	2	1.5	3.5
03	59	6	4	7.0	12.5	51	7	13	5.5	10.0	38	18	8	2.5	5.0	24	2	2	1.5	3.5
04	59	6	6	8.0	14.5	50	6	14	5.0	9.0	36	14	6	2.5	5.0	24	2	2	1.0	2.5
05	57	6	4	7.0	12.5	51	15	5	5.5	10.0	36	12	6	2.5	5.0	24	2	2	3.5	6.5
06	55	8	2	9.0	16.0	54	20	10	6.0	11.0	36	4	11	6.0	11.0	24	2	2	6.5	12.0
07	49	4	8	5.5	10.0	70	2	16	7.0	12.5	40	12	7	7.0	12.5	24	8	2	1.5	5.5
08	43	8	6	7.5	13.5	62	4	16	7.5	14.0	38	10	7	6.5	12.0	24	10	2	4.5	8.5
09	39	6	8	8.5	15.0	54	6	16	7.0	12.5	38	6	7	4.5	8.5	24	4	2	2.5	5.0
10	39	8	3	11.5	20.0	50	8	12	9.0	16.0	38	4	8	4.0	7.5	24	6	2	1.5	3.0
11	37	3	6	7.5	13.5	48	8	10	9.5	17.0	36	6	4	3.5	11.5	24	5	2	2.5	5.0
12	37	8	4	6.0	11.0	48	5	11	6.5	11.0	36	9	5	9.0	9.0	24	6	2	2.0	4.0
13	37	15	4	3.5	6.5	48	8	12	—	—	38	10	8	3.5	6.5	26	6	2	2.5	5.0
14	39	10	5	3.5	6.5	52	5	14	6.5	11.5	38	6	6	5.0	9.0	26	6	2	2.5	5.0
15	41	10	8	1.0	2.5	56	8	16	—	—	40	6	6	4.0	7.5	28	6	4	2.5	5.0
16	45	6	8	—	—	60	8	12	6.5	11.5	46	4	8	2.5	5.0	28	6	4	3.0	6.0
17	51	8	6	6.5	11.5	68	6	17	4.0	7.5	48	6	8	2.5	5.0	26	6	2	4.0	7.5
18	59	8	4	5.5	10.0	68	7	12	8.5	15.0	48	11	10	3.5	6.5	24	8	2	1.5	3.0
19	59	12	2	6.5	11.5	65	11	15	4.5	8.5	50	10	12	3.0	6.0	26	6	4	2.0	4.0
20	61	9	6	4.5	8.5	72	8	20	7.5	13.5	48	10	12	3.5	6.5	26	7	4	1.5	3.5
21	61	12	6	6.5	11.5	70	6	16	4.0	7.5	44	16	8	2.0	4.0	24	8	2	1.5	3.5
22	61	9	6	4.5	8.5	72	6	20	4.0	8.5	44	15	10	2.5	5.0	25	8	3	7.0	12.5
23	61	10	4	5.5	10.0	69	9	19	—	—	43	11	11	3.0	6.0	24	8	2	7.0	12.5

F_{am} = median value of effective antenna noise in db above ktb
D_u = ratio of upper decile to median in db
D_ℓ = ratio of median to lower decile in db
V_{dm} = median deviation of average voltage in db below mean power
L_{dm} = median deviation of average logarithm in db below mean power

MONTH-HOUR VALUES OF RADIO NOISE

Station São José, Brasil Lat. 23.3°S Long. 45.8°W Month June 19 64

Frequency (Mc)

Hour (LST)	.051 F_{am}	.051 D_u	.051 D_ℓ	.051 V_{dm}	.051 L_{dm}	.113 F_{am}	.113 D_u	.113 D_ℓ	.113 V_{dm}	.113 L_{dm}	.246 F_{am}	.246 D_u	.246 D_ℓ	.246 V_{dm}	.246 L_{dm}	.545 F_{am}	.545 D_u	.545 D_ℓ	.545 V_{dm}	.545 L_{dm}
00	124	10	5	9.0	16.0	110	14	7	8.5	13.5	98	11	6	8.0	16.5	87	9	3	5.5	10.0
01	123	12	5	8.0	14.5	110	11	6	10.5	18.5	96	11	4	7.5	12.0	86	10	4	6.0	11.0
02	124	13	4	9.5	15.0	110	12	6	10.0	17.5	95	11	6	10.5	17.5	86	9	5	5.5	10.0
03	125	11	6	10.0	17.0	109	12	7	12.0	19.0	95	8	7	9.0	16.5	85	7	5	5.5	9.5
04	124	11	5	11.5	18.5	110	10	8	10.0	17.0	96	7	10	9.5	16.5	84	7	4	6.0	10.0
05	123	10	4	9.5	16.0	108	10	7	10.0	17.5	98	12	8	9.5	17.0	88	8	6	9.0	16.0
06	123	10	6	9.0	16.0	100	16	7	11.0	17.5	78	17	5	7.5	12.5	90	5	5	5.5	10.0
07	118	9	10	12.0	18.5	96	13	10	11.5	18.0	78	11	6	11.0	12.5	90	4	8	4.5	10.0
08	113	14	6	10.5	18.5	94	12	10	9.0	16.0	78	10	6	6.5	15.0	92	2	6	5.0	10.0
09	111	16	6	10.5	18.5	98	12	10	12.5	22.0	78	8	6	9.5	17.0	90	2	8	3.0	6.0
10	115	17	11	8.0	14.5	100	10	17	8.0	14.5	78	14	6	12.0	21.0	92	4	10	5.0	10.0
11	115	11	11	12.0	21.0	96	13	10	11.5	20.0	78	14	4	10.5	19.5	90	6	3	6.0	12.5
12	113	14	9	11.5	20.0	96	14	10	12.5	19.5	78	10	4	9.5	16.0	92	3	9	4.5	10.5
13	119	10	12	10.5	18.5	98	10	12	11.0	17.0	76	14	4	8.5	15.0	92	4	8	5.5	9.5
14	119	10	12	10.5	18.5	98	10	7	13.5	23.5	78	12	4	10.0	17.5	92	2	12	5.0	8.5
15	119	10	10	11.5	20.0	96	12	7	10.0	16.5	79	9	5	9.0	14.5	90	6	4	5.5	9.5
16	120	9	9	12.0	21.0	98	12	7	10.5	18.5	80	10	6	10.0	17.0	90	5	2	3.5	10.0
17	117	12	8	15.0	26.0	98	16	10	11.5	19.5	82	14	5	14.0	23.0	88	5	4	7.0	13.0
18	120	11	10	12.5	20.0	104	15	10	11.5	18.5	90	12	12	11.5	17.5	88	5	7	6.5	12.5
19	121	11	7	10.0	17.5	104	15	6	10.5	19.0	91	12	7	9.5	16.5	86	7	6	6.5	12.0
20	122	12	6	11.0	19.5	106	14	6	10.5	18.5	92	12	6	8.0	14.0	90	4	4	6.5	11.5
21	123	10	6	10.0	16.5	108	12	8	11.0	18.0	94	13	5	6.5	13.0	90	4	5	5.5	10.0
22	123	11	6	9.0	15.0	110	12	8	9.0	15.5	94	13	4	7.0	12.5	88	8	4	6.0	11.0
23	123	10	6	8.5	15.0	109	13	6	8.0	15.0	96	13	6	8.0	13.0	87	7	4	6.5	12.0

Hour (LST)	2.5 F_{am}	2.5 D_u	2.5 D_ℓ	2.5 V_{dm}	2.5 L_{dm}	5.0 F_{am}	5.0 D_u	5.0 D_ℓ	5.0 V_{dm}	5.0 L_{dm}	10.0 F_{am}	10.0 D_u	10.0 D_ℓ	10.0 V_{dm}	10.0 L_{dm}	20.0 F_{am}	20.0 D_u	20.0 D_ℓ	20.0 V_{dm}	20.0 L_{dm}
00	58	9	6	5.0	9.0	63	14	18	4.5	8.5	34	9	4	3.0	6.5	23	2	0	—	—
01	57	10	5	4.0	7.5	47	7	6	5.0	9.0	34	7	4	3.5	6.5	23	2	0	3.0	6.0
02	57	9	6	5.0	9.0	[illegible]	6	4	4.5	8.5	34	7	4	3.5	6.5	24	1	1	2.0	4.0
03	57	11	5	5.5	10.0	45	10	2	3.5	6.5	32	4	2	4.5	8.0	24	2	1	2.0	5.5
04	57	8	6	5.0	9.0	43	6	4	4.5	8.5	32	3	3	3.0	6.0	23	2	0	2.0	5.5
05	55	11	8	5.0	9.0	41	9	4	5.5	9.5	30	2	2	1.5	3.5	24	1	1	2.5	5.5
06	54	9	8	3.5	6.5	44	21	5	4.5	8.5	32	7	4	3.5	6.5	23	2	0	3.0	6.0
07	45	13	5	3.5	6.5	66	6	11	7.0	11.5	36	8	7	5.5	10.0	23	2	0	3.0	6.0
08	41	10	6	4.5	8.5	60	5	12	6.0	11.0	34	10	4	4.0	7.5	23	2	0	—	—
09	36	11	7	3.0	6.0	54	5	11	7.0	11.5	32	9	4	—	—	23	2	0	—	—
10	37	10	5	7.5	12.0	49	4	12	4.5	10.0	34	10	6	6.0	10.5	23	2	2	4.0	7.5
11	33	8	4	6.0	11.0	47	6	18	7.5	12.5	34	9	6	4.0	7.5	25	7	4	4.5	8.5
12	33	6	6	4.0	7.5	45	4	10	9.0	16.0	34	8	7	6.0	11.0	24	6	1	3.0	6.0
13	33	6	4	5.0	9.0	49	6	8	5.5	12.5	34	12	6	6.5	12.0	27	4	4	3.5	6.5
14	33	6	4	4.5	8.5	51	5	16	—	—	38	10	8	6.0	11.0	27	10	4	3.5	6.5
15	37	4	7	5.0	9.0	51	8	11	5.0	9.0	40	6	6	6.0	11.0	27	16	4	4.0	7.5
16	45	4	9	6.5	12.0	59	6	7	6.0	10.5	40	8	5	3.5	6.5	28	11	4	3.0	7.0
17	47	8	6	5.5	10.0	63	8	8	7.0	12.5	38	12	4	3.5	6.5	25	5	3	3.0	6.0
18	56	8	7	3.5	6.5	68	5	11	6.0	10.5	40	13	6	3.0	6.0	24	3	2	2.5	5.0
19	56	8	7	4.5	8.0	63	8	8	3.5	6.5	38	16	5	3.0	6.0	23	4	0	2.0	5.0
20	57	8	5	4.0	7.5	67	4	15	7.0	12.5	37	15	5	2.5	5.0	23	4	0	2.5	5.0
21	57	10	4	5.0	9.0	63	6	11	6.5	11.5	38	13	7	3.5	6.5	23	3	0	2.5	5.0
22	57	10	5	4.5	8.5	64	9	13	6.0	11.0	36	11	5	3.0	6.0	23	3	0	2.5	5.0
23	57	10	5	4.5	8.5	59	13	14	4.5	8.5	34	11	4	3.0	6.0	23	3	0	2.5	5.0

F_{am} = median value of effective antenna noise in db above ktb
D_u = ratio of upper decile to median in db
D_ℓ = ratio of median to lower decile in db
V_{dm} = median deviation of average voltage in db below mean power
L_{dm} = median deviation of average logarithm in db below mean power

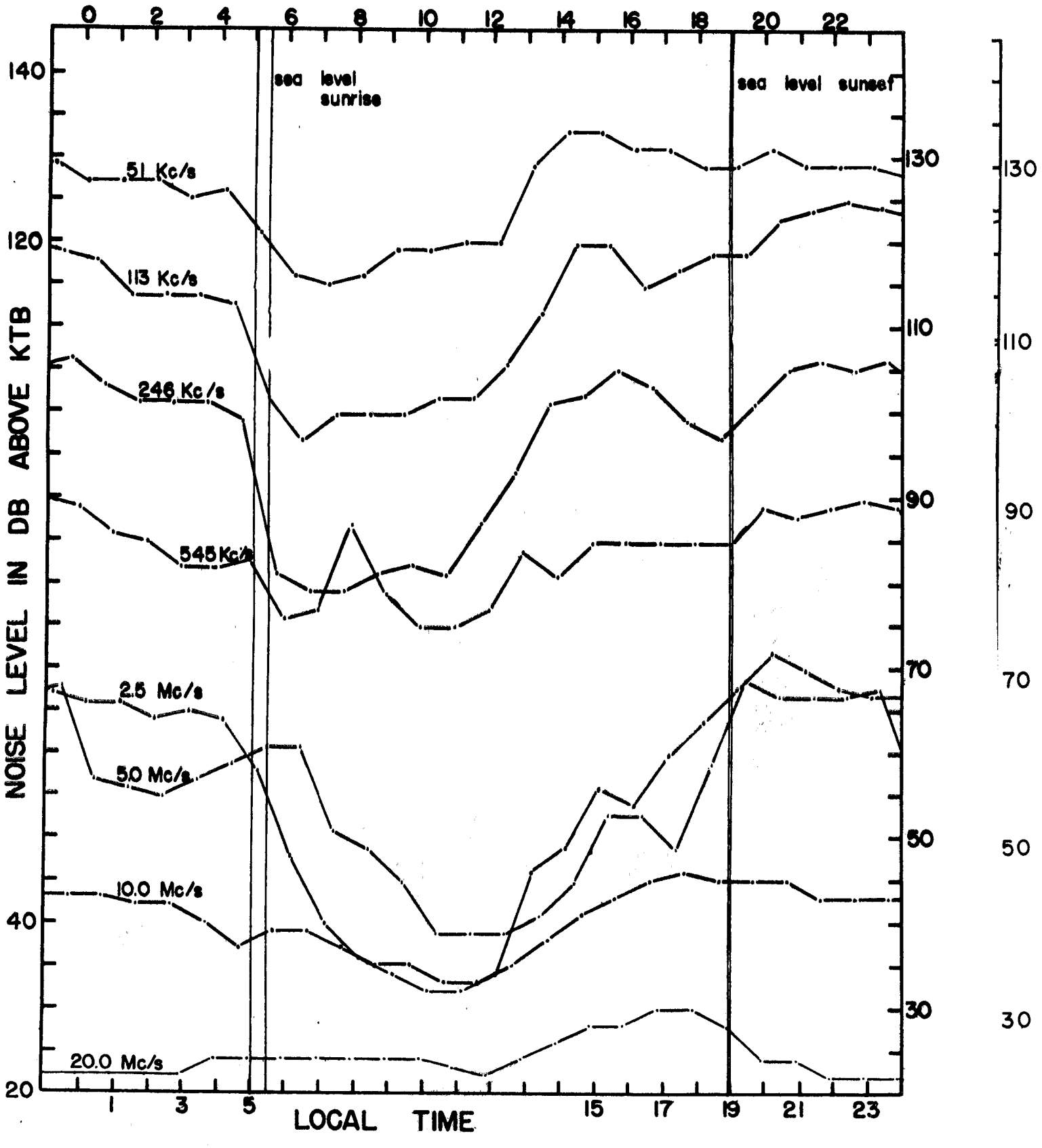

Fig: 1 Monthly Median Values for January 1964

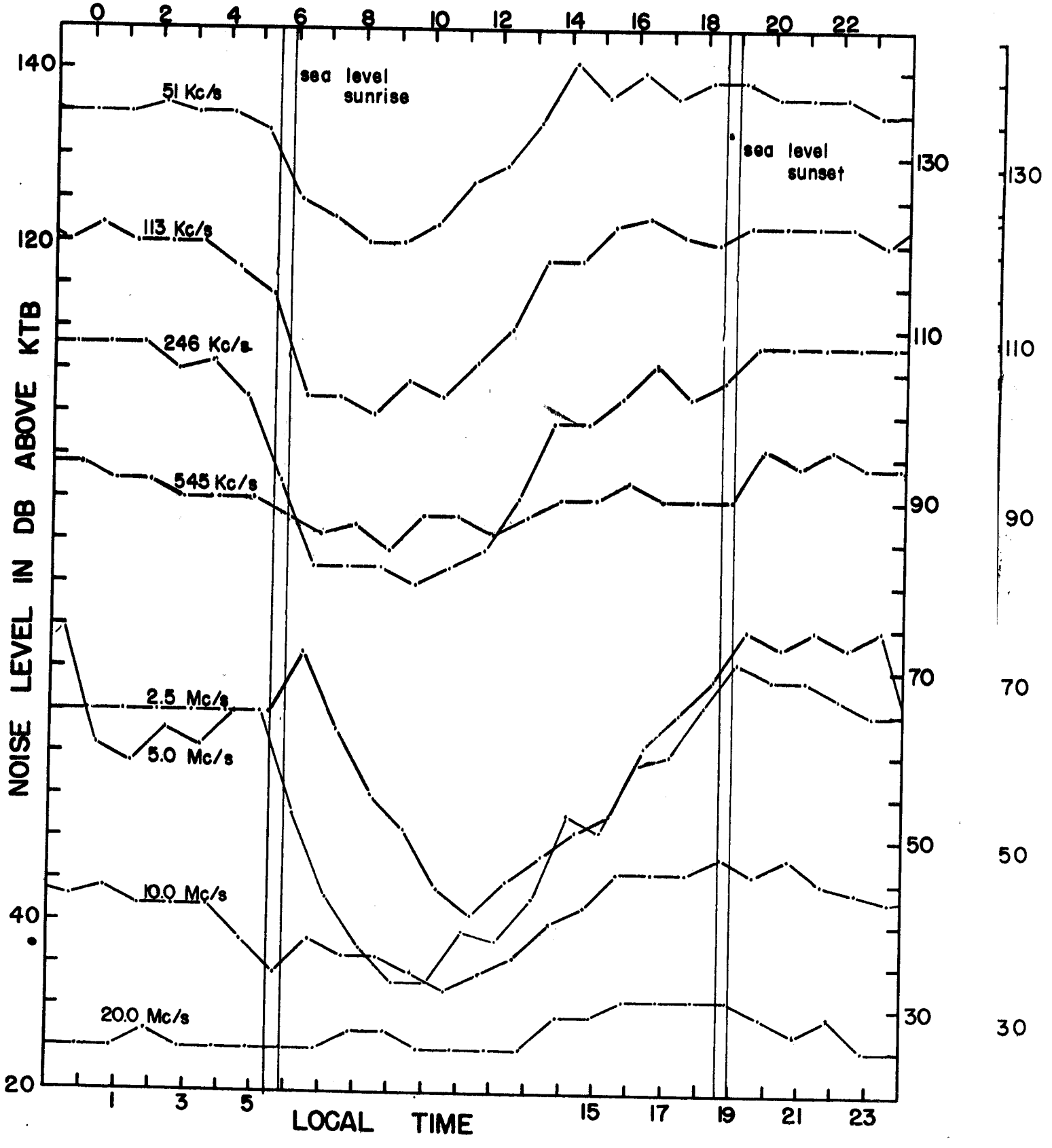

Fig.2 Monthly Median Values for February 1964

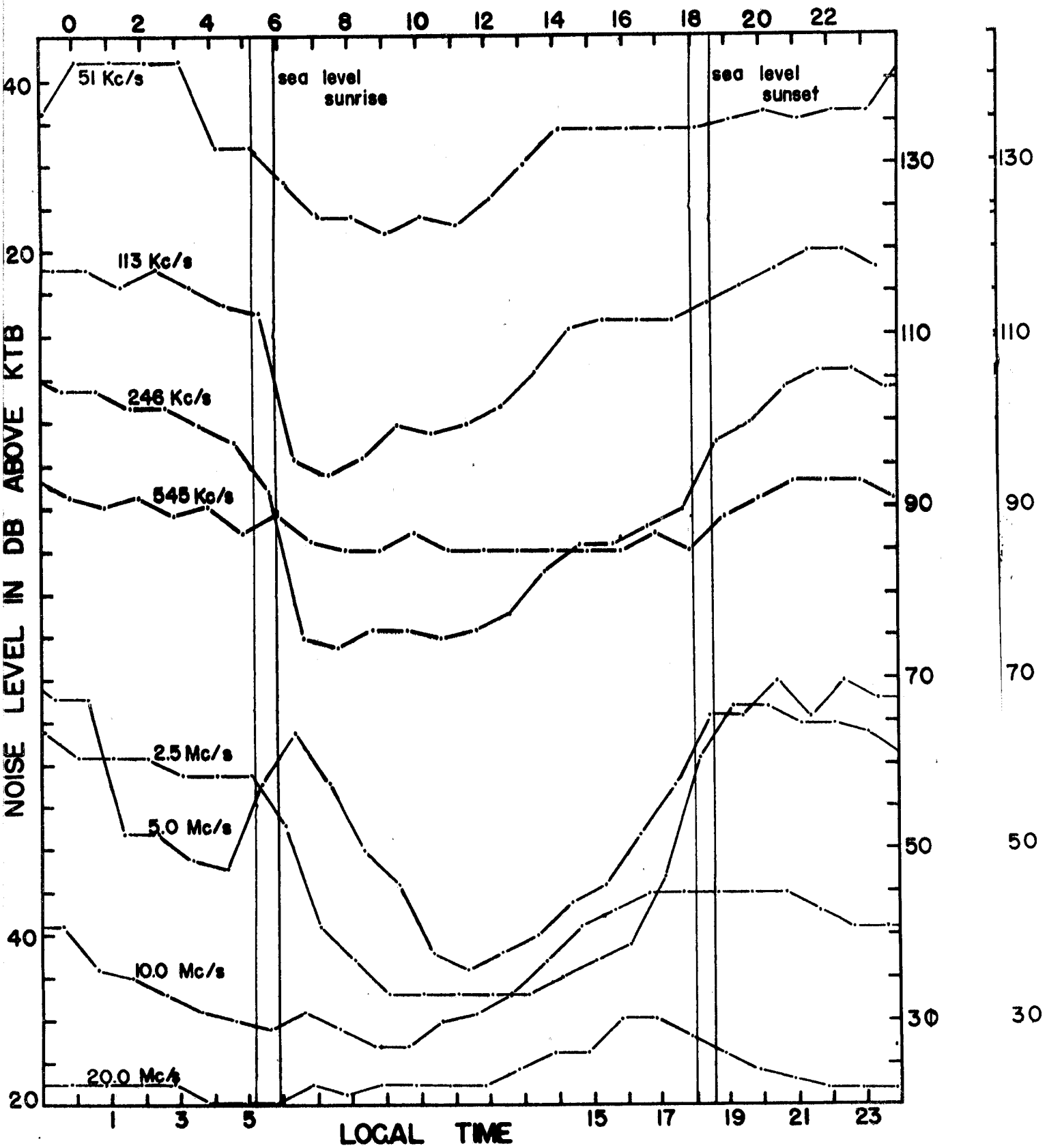

Fig: 3 Monthly Median Values for March 1964

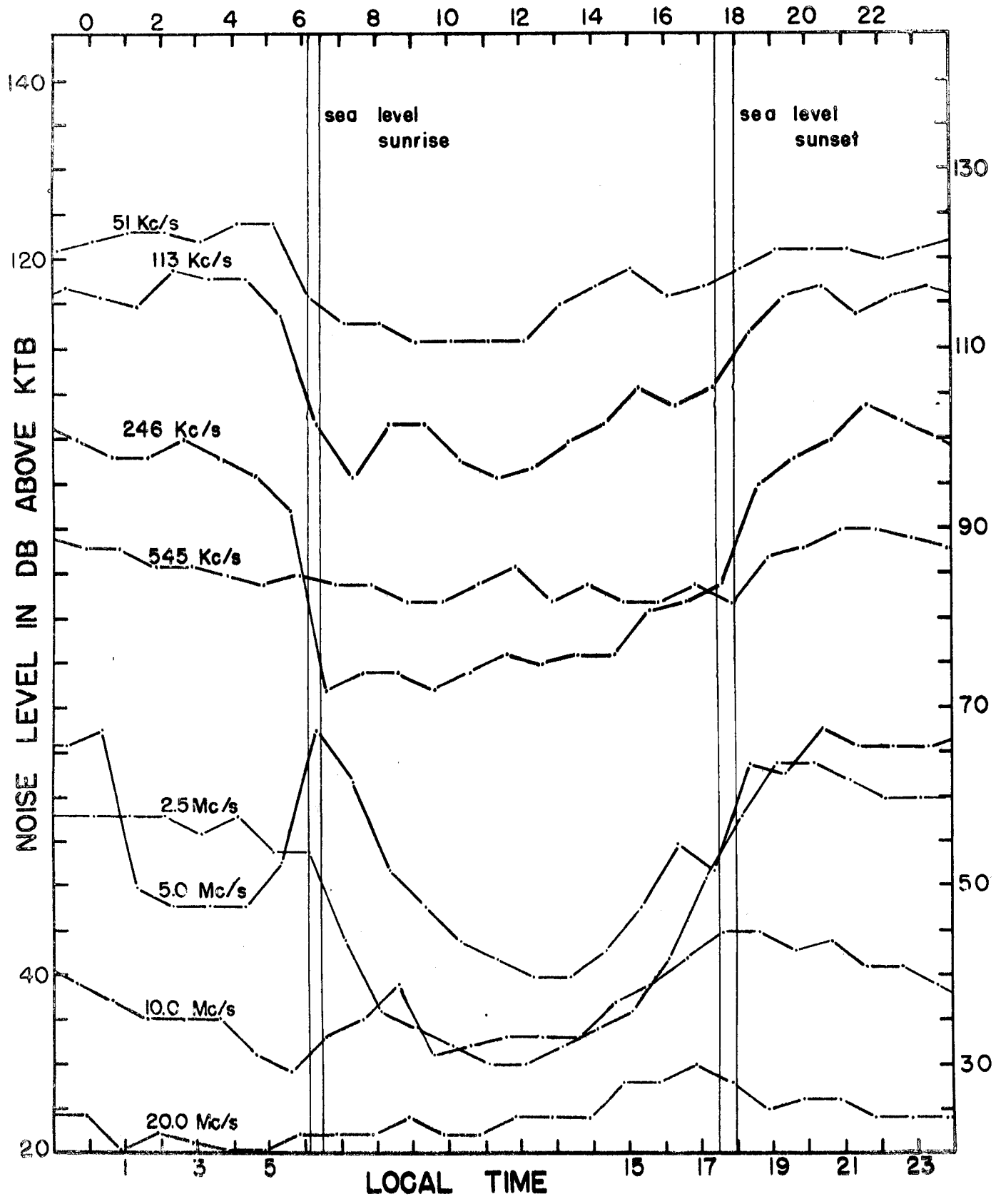

Fig: 4 Monthly Median Values for April 1964

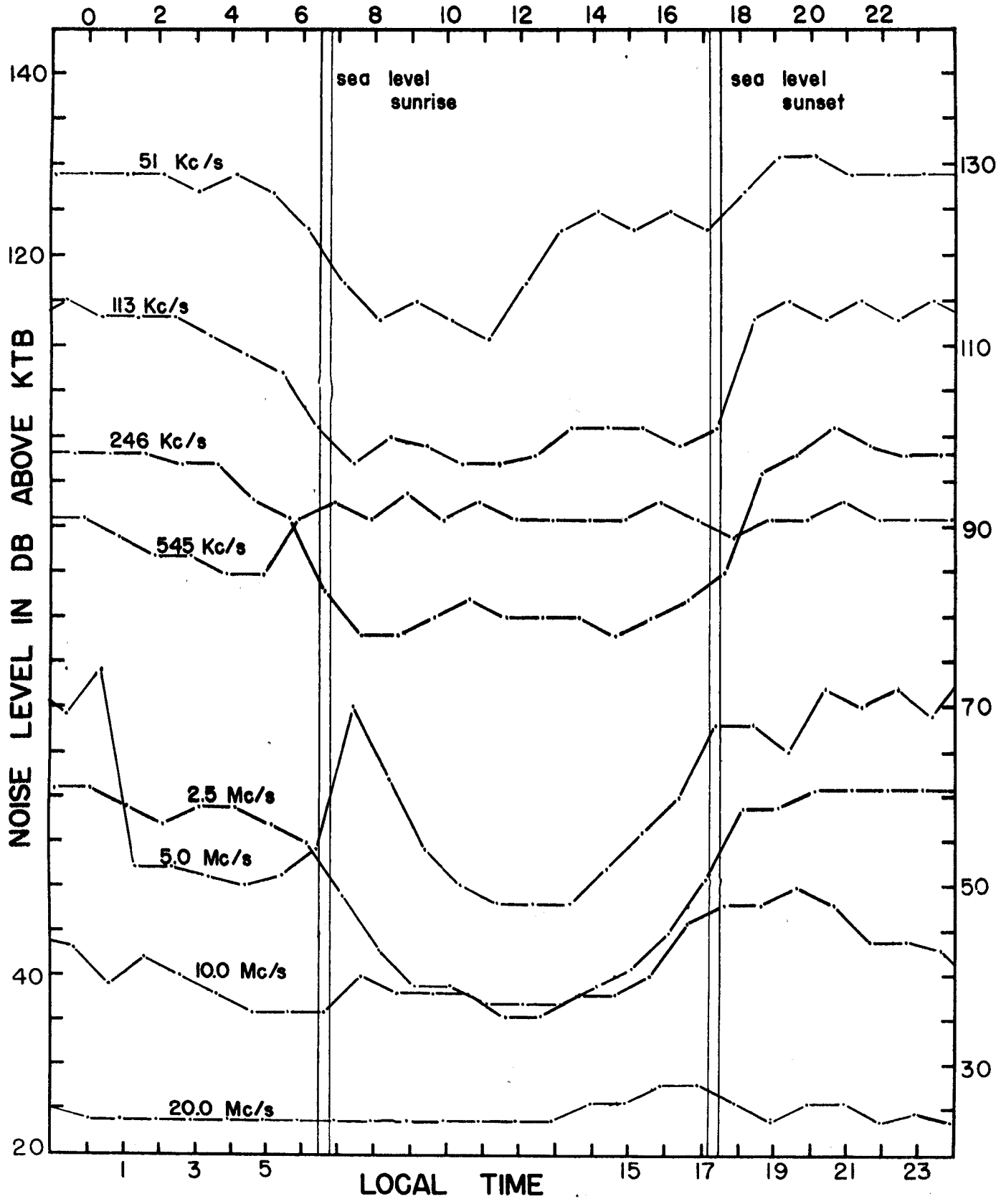

Fig: 5 Monthly Median Values for May 1964

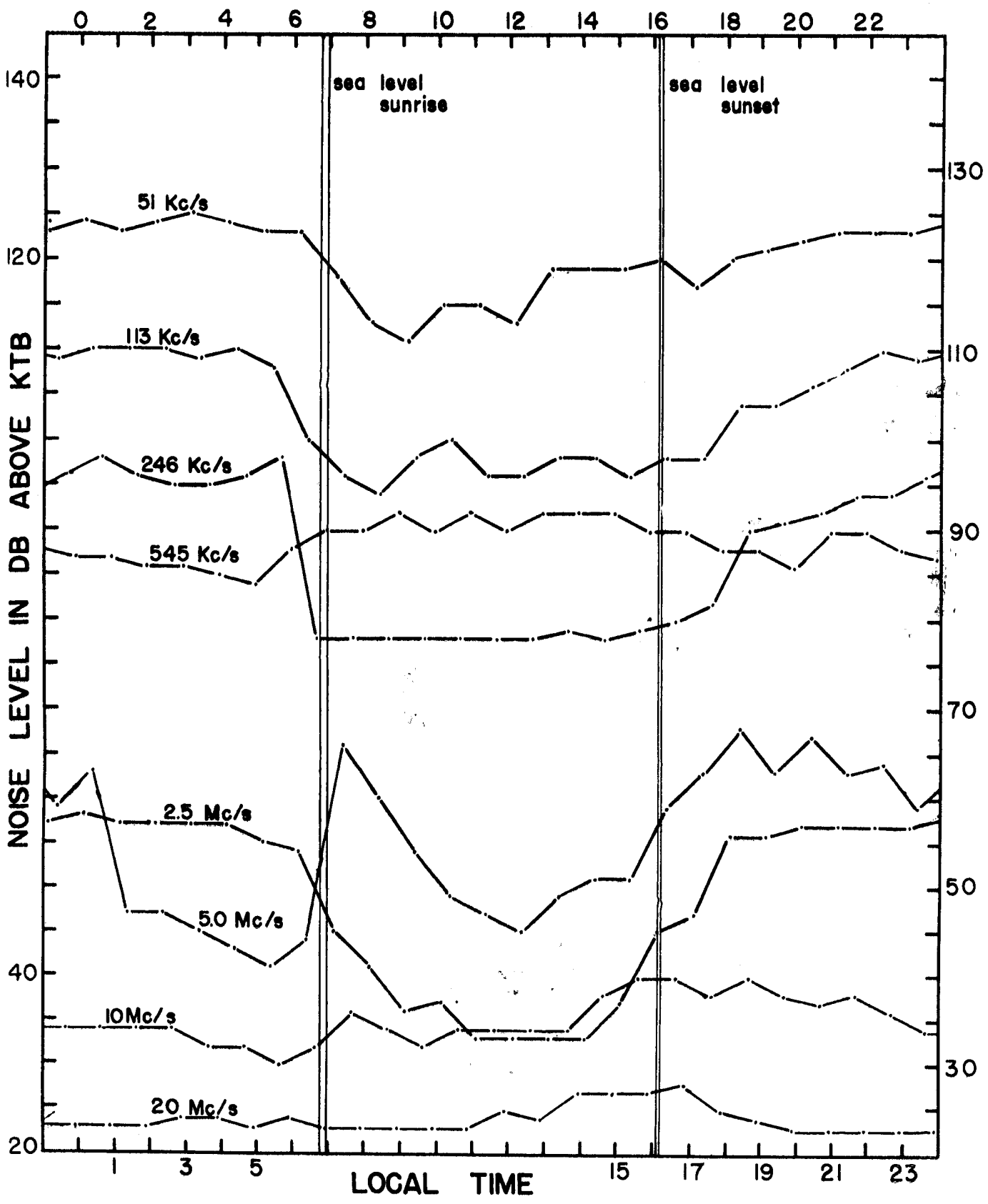

Fig: 6 Monthly Median Values for June 1964