PB 151402

NBS

Technical Note No. 43

Boulder Laboratories

A SUMMARY OF VHF AND UHF TROPOSPHERIC TRANSMISSION LOSS DATA AND THEIR LONG-TERM VARIABILITY

BY D.A. WILLIAMSON, V.L. FULLER, A.G. LONGLEY AND P.L. RICE

U. S. DEPARTMENT OF COMMERCE
NATIONAL BUREAU OF STANDARDS

THE NATIONAL BUREAU OF STANDARDS

Functions and Activities

The functions of the National Bureau of Standards are set forth in the Act of Congress, March 3, 1901, as amended by Congress in Public Law 619, 1950. These include the development and maintenance of the national standards of measurement and the provision of means and methods for making measurements consistent with these standards; the determination of physical constants and properties of materials; the development of methods and instruments for testing materials, devices, and structures; advisory services to government agencies on scientific and technical problems; invention and development of devices to serve special needs of the Government; and the development of standard practices, codes, and specifications. The work includes basic and applied research, development, engineering, instrumentation, testing, evaluation, calibration services, and various consultation and information services. Research projects are also performed for other government agencies when the work relates to and supplements the basic program of the Bureau or when the Bureau's unique competence is required. The scope of activities is suggested by the listing of divisions and sections on the inside of the back cover.

Publications

The results of the Bureau's work take the form of either actual equipment and devices or published papers. These papers appear either in the Bureau's own series of publications or in the journals of professional and scientific societies. The Bureau itself publishes three periodicals available from the Government Printing Office: The Journal of Research, published in four separate sections, presents complete scientific and technical papers; the Technical News Bulletin presents summary and preliminary reports on work in progress; and Basic Radio Propagation Predictions provides data for determining the best frequencies to use for radio communications throughout the world. There are also five series of nonperiodical publications: Monographs, Applied Mathematics Series, Handbooks, Miscellaneous Publications, and Technical Notes.

Information on the Bureau's publications can be found in NBS Circular 460, Publications of the National Bureau of Standards ($1.25) and its Supplement ($1.50), available from the Superintendent of Documents, Government Printing Office, Washington 25, D.C.

NATIONAL BUREAU OF STANDARDS

Technical Note

43

March, 1960

A Summary of VHF and UHF Tropospheric Transmission Loss Data and Their Long-Term Variability

by

D. A. Williamson, V. L. Fuller, A. G. Longley and P. L. Rice

NBS Technical Notes are designed to supplement the Bureau's regular publications program. They provide a means for making available scientific data that are of transient or limited interest. Technical Notes may be listed or referred to in the open literature. They are for sale by the Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C.

DISTRIBUTED BY

UNITED STATES DEPARTMENT OF COMMERCE

OFFICE OF TECHNICAL SERVICES

WASHINGTON 25, D. C.

Price $2.25

TABLE OF CONTENTS

A Summary of VHF and UHF Tropospheric Transmission Loss Data and Their Long-Term Variability

by

D. A. Williamson, V. L. Fuller, A. G. Longley and P. L. Rice

SUMMARY

Cumulative distributions of hourly median basic transmission loss are presented for 135 beyond-line-of-sight radio paths in the United States. In order to allow for seasonal trends of transmission loss, the year is divided into a summer period, May through October, and a winter period, November through April.

The long-term variability of observed hourly medians is compared with predicted variability based on empirical curves by Rice, Longley and Norton [1].

Introduction

The Central Radio Propagation Laboratory of the National Bureau of Standards was established at the close of World War II to centralize and coordinate radio propagation research which was being conducted throughout the United States in the entire frequency spectrum.

In order to obtain information regarding factors that affect transmission loss, [2] a long term program of measurements was undertaken by CRPL with the assistance of FCC, several universities and other agencies. Whenever possible, transmission loss was recorded over particular paths for at least a year to determine seasonal and diurnal variations. A number of paths were studied for much longer

periods of time to determine variability from year to year. This long term program yielded a large amount of data, including nearly a million hourly median values of transmission loss.

Transmission loss is defined as the ratio of total radiated power to resulting signal power available from the receiver. All data are reported in terms of basic transmission loss, defined as the transmission loss expected between isotropic antennas, and here expressed in decibels.

Variations in transmission loss may be classified arbitrarily as short-term and long-term. The study of long-term variations considers the hourly median value of transmission loss as the basic unit. The hourly median value constitutes a measure of the field or power exceeded for 50% of each hour of recording. Such values are determined from Esterline-Angus charts and time totalizer records, and are tabulated for each receiving site.

In this report only long-term variability is investigated, for 135 beyond-line-of-sight paths in the United States. Table I lists these radio propagation paths, ordered by path distance, with the locations of transmitters and receivers, and several of the more important path parameters. Table II lists the number of hourly medians and the basic transmission loss exceeded 1%, 10%, 50%, 90%, and 99% of all hours recorded during the winter months and summer months. Table III lists the predicted and observed winter and summer long-term medians, where the predicted medians were obtained by the methods of Reference 1. Table IV lists dates and times of recording, with paths arranged in numerical order.

Corresponding cumulative distributions of observed winter and summer hourly median values are plotted in Figs. 1 through 135. The odd numbered figures through Fig. 85 show individual winter and summer

distributions for paths where data were recorded during more than one year. The even numbered figures through Fig. 86 show weighted average winter and summer distributions for each path, with the long-term median value set equal to zero decibels. This quantity is denoted by the symbol "$\mathring{y}$". All remaining Figs. 87 through 135 show summer and winter distributions of "$\mathring{y}$" for each path. Each of these figures also shows the predicted cumulative distribution $y(p, \theta)$ as obtained from Figs. 136 and 137, which were redrawn from Figs. 12a and 12b of Reference 1. These empirical curves were derived from an analysis of data from about half of the paths listed in Table I. The angular distance θ is defined in Reference 1 as the angle between horizon rays from transmitter and receiver; the parameter p is defined in equation (1) below.

Each cumulative distribution is referred to a median of zero because this permits ready comparison of observed and predicted values of "$\mathring{y}$", and differences in long-term variability from path to path can easily be noted.

Data for the paths included in this report were recorded commercially, with the exception of paths 250 to 449 which were recorded by the National Bureau of Standards. All the data represent horizontal polarization, except those for paths 42, 43, 47, and 49, where vertical polarization was used.

Procedures

Each distribution plotted in Figs. 1 - 135 corresponds to more than 200 recorded hourly medians, and all of these plotted distributions together represent data from 103 paths. For paths where fewer than 200 hours were available, the cumulative distribution was not plotted but is included in Table II.

Steps in processing the data were:

(1) For each year, observed hourly median values x_n of basic transmission loss recorded from November through April (winter) or from May through October (summer) were obtained. These values were then listed in increasing order from the lowest value x_1, x_2, ..., x_n, up to the highest value x_N. The percentage, p, of hourly median values less than x_n was defined as

$$p(n) = \frac{n}{N} - \frac{1}{2N} \qquad (1)$$

(2) Cumulative distributions, x_n versus p (n) were plotted, and the values of x corresponding to p = 1%, 10%, 50%, 90%, and 99% were obtained by interpolation. These values are listed in Table II for paths where only one winter or one summer was recorded.

(3) For paths where data were available from more than one year, values of basic transmission loss were plotted for each year and season and a weighted average distribution was computed by:

(a) reading the per cent time at given transmission loss levels for each year and each season,

(b) multiplying each reading by the number of hourly medians recorded in that year and season,

(c) computing the weighted mean per cent time at each of the given transmission loss levels, and

(d) plotting the computed mean per cent at each of the selected levels.

These weighted average distributions were plotted, and basic transmission loss values were read at 1%, 10%, 50%, 90%, and 99% for each season. For paths where more than one year's data were available, the weighted averages are recorded in Table II.

Sometimes transmission loss is so great that the signal level is below the noise level, or the signal exceeds the highest value that the recorder can measure. Such values are listed as > and < values, respectively, in Table II. Figures are marked with an asterisk for paths where certain recording difficulties occurred. In some instances, these difficulties prevented measurement of the 1%, 90%, or 99% levels of basic transmission loss. In other cases, where recording difficulties were intermittent, blocks of more than 200 consecutive hours of reliable data were selected and used to represent the entire path. The actual number of hourly medians used to plot distributions may be found in Tables I and II, while the total number of days during which data were recorded is found in Table IV.

Acknowledgements

Data for this report were organized by D. A. Williamson and V. L. Fuller under the supervision of A. G. Longley. The initial statistical treatment of the hourly median values of transmission loss was done by P. H. Elder under the direction of P. L. Rice. M. A. Schafer organized the information shown in Table I. R. P. Baptist and M. M. Coyle helped with calculations and graph plotting. Special thanks are extended to G. Hoffmire and B. Snell for typing the manuscript and tables.

References

[1] P. L. Rice, A. G. Longley and K. A. Norton, "Prediction of the cumulative distribution with time of ground wave and tropospheric wave transmission loss, Part 1 - The prediction formula," NBS Technical Note No. 15, July, 1959.

[2] K. A. Norton, "Transmission loss in radio propagation," Proc. IRE 41, 146 (1953). See also: K. A. Norton, "System loss in radio wave propagation," J. Res. NBS 63-D, 53 (1959).

Explanation of Terms Used in Table I

1. Recording Agencies

CRPL - Central Radio Propagation Laboratory, National Bureau of Standards, Boulder, Colorado.

FCC - Federal Communications Commission, Washington, D. C.

UBC - United Broadcasting Company, Columbus, Ohio.

Collins - Collins Radio Company, Cedar Rapids, Iowa.

Pa State Col - Pennsylvania State College, State College, Pennsylvania.

U of Ill - University of Illinois, Urbana, Illinois.

U of Texas - University of Texas, Austin, Texas.

U of Wash - University of Washington, Seattle, Washington.

2. Path Parameters

d_{km} and d_{mi} - total path distance in kilometers and in statute miles.

$h_{te(m)}$, $h_{te(ft)}$ - effective transmitting antenna height in meters and in feet. The effective height is the height above a curve fit to part of the terrain between the antenna and its radio horizon unless one of the following symbols is used:

s - - structural height

* - - height above 2 to 10 mile average terrain in the direction of the receiver

** - - height above 2 to 10 mile average surrounding terrain

$h_{re(m)}$, $h_{re(ft)}$ - effective receiving antenna height; structural height above ground is used.

N_s - average surface refractivity, see Reference 1.

$f_{(mc)}$ - radio frequency in megacycles per second.

$\theta_{(mr)}$ - angular distance in milliradians between transmitter and receiving antennas; see Reference 1.

N hrs - total number of hourly medians available.

Table I

Path Description

NBS Path No.	Fig. No.	Call Letters	d_{km}	d_{mi}	Transmitter	$h_{te(m)}$	$h_{te(ft)}$	N_s	Receiver	$h_{re(m)}$	$h_{re(ft)}$	f_{mc}	θ_{mr}	Recording Agency	N_{hrs}
201	87	KGO	61.5	38.2	San Francisco, Calif.	399.3*	1310*	305.0	Livermore, Calif.	9.1	30	179.8	43.3	FCC	5205
56	1, 2	WKBN	72.3	44.9	Youngstown, Ohio	180.4	592	299.8	Hudson, Ohio	9.1	30	98.9	3.6	UBC	7172
39	88	WFMJ	73.5	45.7	Youngstown, Ohio	120.4	395	300.2	Hudson, Ohio	9.1	30	105.1	3.8	UBC	4120
390	-	CRPL	75.0	46.6	Ft. Carson, Colo.	12.2[s]	40[s]	245.0	Kendrick, Colo.	5.8	19	100.0	6.3	CRPL	312
330	3, 4	CRPL	79.5	49.4	Cheyenne Mt. Base, Colo.	419.4	1376	244.7	Kendrick, Colo.	11.3	37	92.0	1.4	CRPL	5428
350	122	CRPL	79.5	49.4	Cheyenne Mt. Base, Colo.	425.5	1396	244.7	Kendrick, Colo.	11.0	36	210.4	1.3	CRPL	3268
370	89	CRPL	79.5	49.4	Cheyenne Mt. Base, Colo.	425.5	1396	244.7	Kendrick, Colo.	11.0	36	236.0	1.3	CRPL	531
66	90	KXOA	99.8	62.0	Sacramento, Calif.	57.0*	187*	307.9	Livermore, Calif.	9.1	30	107.9	57.5	FCC	1522
2	91	KCRA	102.4	63.6	Sacramento, Calif.	119.5*	392*	305.4	Livermore, Calif.	9.1	30	96.1	60.5	FCC	2293
392	-	CRPL	109.4	68.0	Ft. Carson, Colo.	12.2[s]	40[s]	243.8	Karval, Colo.	5.8	19	100.0	9.1	CRPL	241
332	5, 6	CRPL	113.0	70.2	Cheyenne Mt. Base, Colo.	431.6	1416	241.0	Karval, Colo.	11.3	37	92.0	4.7	CRPL	6594
352	122	CRPL	113.0	70.2	Cheyenne Mt. Base, Colo.	437.7	1436	241.0	Karval, Colo.	11.0	36	210.4	4.6	CRPL	1244

Table I (continued)

NBS Path No.	Fig. No.	Call Letters	d_{km}	d_{mi}	Transmitter $h_{te(m)}$	$h_{te(ft)}$	N_s	Receiver $h_{re(m)}$	$h_{re(ft)}$	f_{mc}	θ_{mr}	Recording Agency N_{hrs}
372	128	CRPL	113.0	70.2	Cheyenne Mt. Base, Colo. 437.7	1436	241.0	Karval, Colo. 11.0	36	236.0	4.6	CRPL 483
200	7, 8	KFMB	116.4	72.3	San Diego, Calif. 301.4	989	310.3	Santa Ana, Calif. 9.1	30	185.8	23.3	FCC 8407
23	128	KTSA	119.4	74.2	San Antonio, Texas 98.1	322	306.2	Austin, Texas 9.8	32	101.5	13.8	U of Texas 1245
22	108	KYFM/KTSA	125.7	78.1	San Antonio, Texas 143.9	472	306.5	Austin, Texas 9.8	32	101.5	12.7	U of Texas 1705
21	129	KYFM	125.7	78.1	San Antonio, Texas 140.2*	460*	306.5	Austin, Texas 6.7	22	101.5	13.0	U of Texas 1089
60	109	WTIC	129.9	80.7	Hartford, Conn. 266.7	875	305.5	Millis, Mass. 9.1	30	96.5	16.3	FCC 7596
208	110	WDEL	131.8	81.9	Wilmington, Dela. 146.3**	480**	307.7	Laurel, Md. 9.1	30	209.8	7.3	FCC 2186
228	129	WDEL	131.8	81.9	Wilmington, Dela. 146.3**	480**	308.7	Laurel, Md. 9.1	30	209.8	5.1	FCC 232
6	9, 10	KFSD	136.3	84.7	San Diego, Calif. 141.7*	465*	309.6	Santa Ana, Calif. 9.1	30	94.1	28.8	FCC 4864
450	123	Collins	138.6	86.1	Cedar Rapids, Iowa 12.5^s	41^s	301.5	Mitchellville, Iowa 3.0	10	412.0	14.0	Collins 1172
41	11, 12	WHDL	146.1	90.8	Olean, New York 195.1	640	291.4	State College, Pa. 19.2	63	95.7	29.7	Pa. State Col. 10180

s = structural height
* = height above 2-10 mile average terrain in the direction of the other antenna
** = height above 2-10 mile average surrounding terrain

Table I (continued)

NBS Path No.	Fig. No.	Call Letters		Transmitter			Receiver				Recording Agency	
		d_{km}	d_{mi}	$h_{te(m)}$	$h_{te(ft)}$	N_s	$h_{re(m)}$	$h_{re(ft)}$	f_{mc}	θ_{mr}		N_{hrs}
5	29, 30	KFOR		Lincoln, Nebr.			Grand Island, Nebr.				FCC	
		150.0	93.2	125.3	411	289.2	13.7	45	102.9	14.9		4760
389	-	CRPL		Ft. Carson, Colo.			Haswell, Colo.				CRPL	
		151.0	93.8	10.7[s]	35[s]	248.6	13.1	43	1046.0	12.3		48
394	-	CRPL		Ft. Carson, Colo.			Haswell, Colo.				CRPL	
		151.0	93.8	12.2[s]	40[s]	248.6	5.8	19	100.0	12.4		320
34	31, 32	WEEU		Reading, Pa.			Laurel, Md.				FCC	
		153.8	95.6	162.8	534	303.4	9.1	30	92.9	16.4		2343
254	13, 14	CRPL		Cheyenne Mt. Summit, Colo.			Haswell, Colo.				CRPL	
		155.5	96.6	692.2	2271	251.0	5.8	19	100.0	2.6		9999
274	92	CRPL		Cheyenne Mt. Summit, Colo.			Haswell, Colo.				CRPL	
		155.5	96.6	707.4	2321	251.0	5.5	18	192.8	2.4		6205
294	93	CRPL		Cheyenne Mt. Summit, Colo.			Haswell, Colo.				CRPL	
		155.5	96.6	707.4	2321	251.0	5.5	18	230.0	2.4		795
314	33, 34	CRPL		Cheyenne Mt. Summit, Colo.			Haswell, Colo.				CRPL	
		155.5	96.6	678.5	2226	251.0	13.1	43	1046.0	2.5		7004
3	35, 36	KDKA		Pittsburgh, Pa.			Hudson, Ohio				UBC	
		155.6	96.7	224.3	736	299.8	9.1	30	92.9	12.2		6255
334	37, 38	CRPL		Cheyenne Mt. Base, Colo.			Haswell, Colo.				CRPL	
		155.8	96.8	451.7	1482	247.7	11.3	37	92.0	7.5		4748
354	123	CRPL		Cheyenne Mt. Base, Colo.			Haswell, Colo.				CRPL	
		155.8	96.8	457.8	1502	247.7	11.0	36	210.4	7.4		2932
374	111	CRPL		Cheyenne Mt. Base, Colo.			Haswell, Colo.				CRPL	
		155.8	96.8	457.8	1502	247.7	11.0	36	236.0	7.4		593
451	-	Collins		Cedar Rapids, Iowa			Waukon, Iowa				Collins	
		158.0	98.2	12.2[s]	40[s]	300.6	3.0	10	410.0	15.0		157

Table I (continued)

NBS Path No.	Fig. No.	Call Letters	d_{km}	d_{mi}	Transmitter	$h_{te(m)}$	$h_{te(ft)}$	N_s	Receiver	$h_{re(m)}$	$h_{re(ft)}$	f_{mc}	θ_{mr}	Recording Agency	N_{hrs}
35	112	WENR	160.4	99.7	Chicago, Ill.	188.4*	618*	305.7	Allegan, Mich.	9.1	30	94.7	11.2	FCC	2403
52	39, 40	WIP	167.7	104.2	Philadelphia, Pa.	169.2	555	307.3	Laurel, Md.	9.1	30	93.3	11.8	FCC	8275
223	41, 42	WXYZ	179.9	111.8	Detroit, Mich.	147.8**	485**	304.0	Hudson, Ohio	10.1	33	179.8	10.3	UBC	18358
55	43, 44	WJR	181.5	112.8	Detroit, Mich.	146.3**	480**	304.0	Hudson, Ohio	9.4	31	96.3	10.4	UBC	18519
54	15, 16	WJAS	188.4	117.1	Pittsburgh, Pa.	181.7	596	296.7	State College, Pa.	19.2	63	99.7	30.4	Pa. State Col.	11190
63	124	WVKO	191.3	118.9	Columbus, Ohio	102.1	335	299.0	Hudson, Ohio	9.1	30	94.7	20.9	UBC	306
64	-	WVKO	191.3	118.9	Columbus, Ohio	102.1	335	299.0	Hudson, Ohio	9.1	30	94.7	20.9	UBC	133
29	45, 46	WCOL	195.0	121.2	Columbus, Ohio	122.5	402	299.9	Hudson, Ohio	9.1	30	92.3	20.1	UBC	18394
1	-	KARM	195.9	121.7	Fresno, Calif.	114.0	374	306.5	Livermore, Calif.	9.1	30	101.9	50.7	FCC	499
204	47, 48	WAFM	196.3	122.0	Birmingham, Ala.	246.3**	808**	305.1	Powder Springs, Ga.	9.1	30	215.8	22.4	FCC	12070
42	113	WHKC	201.0	124.9	Columbus, Ohio	218.8	718	299.8	Hudson, Ohio	9.1	30	98.7	19.4	UBC	8302

s = structural height
* = height above 2-10 mile average terrain in the direction of the other antenna
** = height above 2-10 mile average surrounding terrain

Table I (continued)

NBS Path No.	Fig. No.	Call Letters	d_{km}	d_{mi}	Transmitter	$h_{te(m)}$	$h_{te(ft)}$	N_s	Receiver	$h_{re(m)}$	$h_{re(ft)}$	f_{mc}	θ_{mr}	Recording Agency	N_{hrs}
43	130	WHKC	201.0	124.9	Columbus, Ohio	218.8	718	299.8	Hudson, Ohio	9.1	30	98.7	19.4	UBC	1964
44	49, 50	WHKC	201.0	124.9	Columbus, Ohio	218.8	718	299.8	Hudson, Ohio	9.1	30	98.7	19.4	UBC	20800
45	124	WHKC	201.0	124.9	Columbus, Ohio	218.8	718	299.8	Hudson, Ohio	9.1	30	98.7	19.4	UBC	464
46	114	WHKC	201.0	124.9	Columbus, Ohio	218.8	718	299.8	Hudson, Ohio	9.1	30	98.7	19.4	UBC	2081
47	51, 52	WHKC	201.0	124.9	Columbus, Ohio	218.8	718	299.8	Hudson, Ohio	9.1	30	98.7	19.4	UBC	19957
48	53, 54	WHKC	201.0	124.9	Columbus, Ohio	218.8	718	299.8	Hudson, Ohio	9.1	30	98.7	19.4	UBC	5914
49	55, 56	WHKC	201.0	124.9	Columbus, Ohio	218.8	718	299.8	Hudson, Ohio	9.1	30	98.7	19.4	UBC	5231
57	57, 58	WMBI	202.8	126.0	Chicago, Ill.	134.1	440	305.5	Urbana, Ill.	27.4	90	95.5	16.1	U of Ill.	10697
210	59, 60	WENR	203.3	126.3	Chicago, Ill.	201.2**	660**	305.1	Urbana, Ill.	27.4	90	179.8	16.4	U of Ill.	9184
219	115	WNBQ	203.3	126.3	Chicago, Ill.	181.4**	595**	305.1	Urbana, Ill.	33.5	110	81.8	16.7	U of Ill.	2705
206	61, 62	WBKB	203.7	126.6	Chicago, Ill.	181.4**	595**	305.1	Urbana, Ill.	27.4	90	71.8	16.3	U of Ill.	9301
213	63, 64	WGN	204.4	127.0	Chicago, Ill.	178.3**	585**	305.0	Urbana, Ill.	21.9	72	191.8	17.1	U of Ill.	10786
214	65, 66	WGN	204.4	127.0	Chicago, Ill.	178.3**	585**	305.0	Urbana, Ill.	29.9	98	191.8	16.8	U of Ill.	10771

Table I (continued)

NBS Path No.	Fig. No.	Call Letters		Transmitter			Receiver				Recording Agency	
		d_{km}	d_{mi}	$h_{te(m)}$	$h_{te(ft)}$	N_s	$h_{re(m)}$	$h_{re(ft)}$	f_{mc}	θ_{mr}		N_{hrs}
215	67,68		WGN	Chicago, Ill.			Urbana, Ill.				U of Ill.	
		204.4	127.0	178.3**	585**	305.0	37.5	123	191.8	16.5		9831
216	69,70		WGN	Chicago, Ill.			Urbana, Ill.				U of Ill.	
		204.4	127.0	178.3**	585**	305.0	21.9	72	191.8	17.1		10152
28	71,72		WCAC	Anderson, S. Car.			Powder Springs, Ga.				FCC	
		205.2	127.5	125.6	412	304.8	9.1	30	101.1	19.8		6008
222	130		WOW	Omaha, Nebr.			Grand Island, Nebr.				FCC	
		210.3	130.7	173.7*	570*	288.9	9.1	30	87.8	17.8		1094
202	131		KMTV	Omaha, Nebr.			Grand Island, Nebr.				FCC	
		211.5	131.4	191.7	629	289.6	9.1	30	65.8	18.0		926
452	116		Collins	Cedar Rapids, Iowa			Quincy, Ill.				Collins	
		215.6	134.0	12.5^s	41^s	302.9	3.0	10	412.0	22.5		518
453	117		Collins	Cedar Rapids, Iowa			Quincy, Ill.				CRPL	
		215.6	134.0	12.5^s	41^s	302.9	3.0	10	418.0	22.5		2071
454	118		Collins	Cedar Rapids, Iowa			Quincy, Ill.				CRPL	
		215.6	134.0	12.5^s	41^s	302.9	3.0	10	418.0	22.5		1990
457	73,74		Collins	Cedar Rapids, Iowa			Quincy, Ill.				CRPL	
		215.6	134.0	11.9^s	39^s	303.2	9.1	30	418.0	20.3		3100
458	125		Collins	Cedar Rapids, Iowa			Qunicy, Ill.				CRPL	
		215.6	134.0	11.9^s	39^s	303.1	50.3	165	418.0	19.1		1164
459	75,76		Collins	Cedar Rapids, Iowa			Quincy, Ill.				CRPL	
		215.6	134.0	11.9^s	39^s	303.1	111.3	365	418.0	17.6		1864

s = structural height
* = height above 2-10 mile average terrain in the direction of the other antenna
** = height above 2-10 mile average surrounding terrain

Table I (continued)

NBS Path No.	Fig. No.	Call Letters		Transmitter			Receiver				Recording Agency	
		d_{km}	d_{mi}	$h_{te(m)}$	$h_{te(ft)}$	N_s	$h_{re(m)}$	$h_{re(ft)}$	f_{mc}	θ_{mr}		N_{hrs}
460	-		Collins	Cedar Rapids, Iowa			Quincy, Ill.				CRPL	
		215.6	134.0	11.9[s]	39[s]	303.1	141.7	465	418.0	16.8		191
461	125		Collins	Cedar Rapids, Iowa			Quincy, Ill.				CRPL	
		215.6	134.0	11.9[s]	39[s]	303.2	172.2	565	418.0	16.2		1057
462	119		Collins	Cedar Rapids, Iowa			Quincy, Ill.				CRPL	
		215.6	134.0	11.9[s]	39[s]	303.2	202.7	665	418.0	15.7		2322
62	94		WTOP	Washington, D.C.			State College, Pa.				Pa. State Col.	
		215.8	134.1	118.0	387	296.1	19.2	63	96.3	63.8		7511
16	131		KRFM	Fresno, Calif.			Livermore, Calif.				FCC	
		218.1	135.5	586.7**	1925**	303.8	9.1	30	93.7	34.1		436
61	95		WTOP	Arlington, Va.			State College, Pa.				Pa. State Col.	
		220.2	136.8	157.0	515	291.7	19.2	63	96.3	62.4		5051
17	-		KVCI	Chico, Calif.			Livermore, Calif.				FCC	
		222.9	138.5	146.9	482	304.8	9.1	30	101.1	80.3		1199
31	77, 78		WCSI	Columbus, Ind.			Urbana, Ill.				U of Ill.	
		223.7	139.0	76.2**	250**	304.8	27.4	90	93.7	20.9		11854
36	17, 18		WEST	Easton, Pa.			State College, Pa.				Pa. State Col.	
		224.2	139.3	75.3	247	293.7	19.2	63	107.9	36.9		10875
33	96		WDET	Detroit, Mich.			Allegan, Mich.				FCC	
		224.5	139.5	95.1*	312*	304.0	9.1	30	101.9	23.1		1508
262	-		CRPL	Cheyenne Mt. Summit, Colo.			"Marble" site, Colo.				CRPL	
		226.9	141.0	692.2	2271	255.1	9.8	32	100.0	10.7		236
302	132		CRPL	Cheyenne Mt. Summit, Colo.			"Marble" site, Colo.				CRPL	
		226.9	141.0	707.4	2321	255.1	9.8	32	230.0	10.6		450
322	-		CRPL	Cheyenne Mt. Summit, Colo.			"Marble" site, Colo.				CRPL	
		226.9	141.0	689.2	2261	255.1	9.8	32	1046.0	10.8		97

Table I (continued)

NBS Path No.	Fig. No.	Call Letters	d_{km}	d_{mi}	Transmitter $h_{te(m)}$	$h_{te(ft)}$	N_s	Receiver $h_{re(m)}$	$h_{re(ft)}$	f_{mc}	θ_{mr}	Recording Agency	N_{hrs}
342	132	CRPL	227.1	141.1	Cheyenne Mt. Summit, Colo. 426.7	1400	250.7	"Marble" site, Colo. 9.8	32	92.0	16.2	CRPL	440
382	-	CRPL	227.1	141.1	Cheyenne Mt. Summit, Colo. 432.8	1420	250.7	"Marble" site, Colo. 9.8	32	236.0	16.0	CRPL	140
203	79, 80	KPRC	229.6	142.7	Houston, Texas 152.4**	500**	316.3	Austin, Texas 9.8	32	59.8	18.0	U of Texas	10558
217	120	WJBK	231.9	144.1	Detroit, Mich. 146.6*	481*	303.6	Allegan, Mich. 9.1	30	59.8	22.9	FCC	2864
7	19, 20	KING	232.9	144.7	Seattle, Wash. 219.5	720	279.3	Portland, Ore. 9.1	30	98.1	46.4	FCC	6571
19	81, 82	KXOK	235.8	146.5	St. Louis, Mo. 200.3	657	305.2	Urbana, Ill. 27.4	90	93.7	19.3	U of Ill.	9060
13	83, 84	KPRC	237.9	147.8	Houston, Texas 106.1	348	316.6	Austin, Texas 9.8	32	102.9	20.2	U of Texas	9702
20	85, 86	KXYZ	237.9	147.8	Houston, Texas 134.7	442	316.6	Austin, Texas 9.8	32	96.5	19.5	U of Texas	8488
12	97	KOIN	239.9	149.1	Portland, Ore. 552.3	1812	301.2	Seattle, Wash. 28.7	94	101.1	49.9	U of Wash.	9312
59	98	WMRC	243.8	151.5	Greenville, S. Car. 355.7	1167	301.9	Powder Springs, Ga. 9.1	30	94.9	23.5	FCC	1819
425	-	CRPL	243.8	151.5	Pikes Peak, Colo. 2377.4	7800	259.5	"Marble" site, Colo. 9.8	32	1046.0	2.6	CRPL	106

s = structural height
* = height above 2-10 mile average terrain in the direction of the other antenna
** = height above 2-10 mile average surrounding terrain

Table I (continued)

NBS Path No.	Fig. No.	Call Letters	d_{km}	d_{mi}	Transmitter $h_{te(m)}$	$h_{te(ft)}$	N_s	Receiver $h_{re(m)}$	$h_{re(ft)}$	f_{mc}	θ_{mr}	Recording Agency	N_{hrs}
37	99	WEVD	270.2	167.9	New York, N. Y. 103.6**	340**	309.2	Millis, Mass. 9.1	30	107.5	28.8	FCC	3368
38	100	WFAA	280.3	174.2	Dallas, Texas 148.7	488	306.2	Austin, Texas 9.8	32	97.9	32.2	U of Texas	3145
211	21, 22	WFAA	281.8	175.1	Dallas, Texas 106.7**	350**	306.3	Austin, Texas 9.8	32	185.8	34.4	U of Texas	7894
8	23, 24	KIXL	283.1	175.9	Dallas, Texas 168.6	553	306.5	Austin, Texas 9.8	32	104.5	32.4	U of Texas	23294
15	133	KRBC	285.0	177.1	Abilene, Texas 70.4	231	296.3	Austin, Texas 9.8	32	96.9	39.5	U of Texas	332
32	101	WDAE	298.8	185.7	Tampa, Fla. 118.9**	390**	336.0	Ft. Lauderdale, Fla. 9.1	30	100.7	26.6	FCC	6514
51	121	WHOO	299.0	185.8	Orlando, Fla. 140.2**	460**	337.4	Ft. Lauderdale, Fla. 9.1	30	96.5	25.0	FCC	4179
58	102	WMIT	305.0	189.5	Clingman's Peak, N. Car. 1102.8	3618	281.5	Powder Springs, Ga. 9.1	30	106.9	35.3	FCC	6514
53	103	WJAS	307.9	191.3	Pittsburgh, Pa. 209.1	686	293.9	Laurel, Md. 9.1	30	99.7	40.9	FCC	2716
71	133	WJAS	307.9	191.3	Pittsburgh, Pa. 209.1	686	294.8	Laurel, Md. 9.1	30	99.7	45.8	FCC	452
385	-	CRPL	359.8	223.6	Ft. Carson, Colo. 10.7	35	259.2	Garden City, Kans. 2.7	9	1046.0	41.5	CRPL	60
396	-	CRPL	359.8	223.6	Ft. Carson, Colo. 12.2^s	40^s	259.2	Garden City, Kans. 5.8	19	100.0	40.8	CRPL	108
256	104	CRPL	364.5	226.5	Cheyenne Mt. Summit, Colo. 692.2	2271	262.6	Garden City, Kans. 5.8	19	100.0	30.4	CRPL	4683

Table I (continued)

NBS Path No.	Fig. No.	Call Letters	d_{km}	d_{mi}	Transmitter	$h_{te(m)}$	$h_{te(ft)}$	N_s	Receiver	$h_{re(m)}$	$h_{re(ft)}$	f_{mc}	θ_{mr}	Recording Agency	N_{hrs}
276	105	CRPL	364.5	226.5	Cheyenne Mt. Summit, Colo.	707.4	2321	262.6	Garden City, Kans.	5.5	18	192.8	30.3	CRPL	3153
296	106	CRPL	364.5	226.5	Cheyenne Mt. Summit, Colo.	707.4	2321	262.6	Garden City, Kans.	5.5	18	230.0	30.3	CRPL	548
316	134	CRPL	364.5	226.5	Cheyenne Mt. Summit, Colo.	678.5	2226	262.6	Garden City, Kans.	13.1	43	1046.0	29.0	CRPL	1644
317	126	CRPL	364.5	226.5	Cheyenne Mt. Summit, Colo.	678.5	2226	262.6	Garden City, Kans.	2.7	9	1046.0	31.1	CRPL	675
323	-	CRPL	364.5	226.5	Cheyenne Mt. Summit, Colo.	678.5	2226	262.6	Garden City, Kans.	7.9	26	1046.0	30.0	CRPL	51
324	-	CRPL	364.5	226.5	Cheyenne Mt. Summit, Colo.	678.5	2226	262.6	Garden City, Kans.	10.1	33	1046.0	29.6	CRPL	47
325	-	CRPL	364.5	226.5	Cheyenne Mt. Summit, Colo.	678.5	2226	262.6	Garden City, Kans.	2.7	9	1046.0	31.1	CRPL	51
336	107	CRPL	364.7	226.6	Cheyenne Mt. Base, Colo.	451.7	1482	258.7	Garden City, Kans.	11.3	37	92.0	34.5	CRPL	2095
356	126	CRPL	364.7	226.6	Cheyenne Mt. Base, Colo.	457.8	1502	258.7	Garden City, Kans.	11.0	36	210.4	34.5	CRPL	862
376	134	CRPL	364.7	226.6	Cheyenne Mt. Base, Colo.	457.8	1502	258.7	Garden City, Kans.	11.0	36	236.0	34.5	CRPL	305
9	25, 26	KLTI	365.6	227.2	Longview, Texas	93.0	305	311.1	Austin, Texas	9.8	32	105.9	40.3	U of Texas	6451

s = structural height
* = height above 2-10 mile average terrain in the direction of the other antenna
** = height above 2-10 mile average surrounding terrain

Table I (continued)

NBS Path No.	Fig. No.	Call Letters	d_{km}	d_{mi}	Transmitter	$h_{te(m)}$	$h_{te(ft)}$	N_s	Receiver	$h_{re(m)}$	$h_{re(ft)}$	f_{mc}	θ_{mr}	Recording Agency	N_{hrs}
416	-	CRPL	381.6	237.1	Pikes Peak, Colo.	2377.4	7800	264.6	Garden City, Kans.	5.8	19	100.0	22.6	CRPL	21
429	-	CRPL	381.6	237.1	Pikes Peak, Colo.	2377.4	7800	264.6	Garden City, Kans.	2.7	9	1046.0	23.2	CRPL	117
18	27, 28	KWKH	446.4	277.4	Shreveport, La.	121.6	399	312.8	Austin, Texas	9.8	32	94.5	47.7	U of Texas	13013
26	-	WABB	469.4	291.7	Mobile, Ala.	86.9**	285**	315.1	Powder Springs, Ga.	9.1	30	102.1	52.6	FCC	537
398	-	CRPL	628.8	390.7	Ft. Carson, Colo.	12.2^s	40^s	268.5	Anthony, Kans.	11.9	39	100.0	75.3	CRPL	137
404	-	CRPL	628.8	390.7	Ft. Carson, Colo.	12.2^s	40^s	268.5	Anthony, Kans.	11.9	39	100.0	75.3	CRPL	59
258	127	CRPL	633.3	393.5	Cheyenne Mt. Summit, Colo.	692.2	2271	271.9	Anthony, Kans.	11.9	39	100.0	64.1	CRPL	537
264	127	CRPL	633.3	393.5	Cheyenne Mt. Summit, Colo.	692.2	2271	271.9	Anthony, Kans.	11.9	39	100.0	64.1	CRPL	266
278	135	CRPL	633.3	393.5	Cheyenne Mt. Summit, Colo.	707.4	2321	271.9	Anthony, Kans.	11.9	39	192.8	64.0	CRPL	243
318	-	CRPL	633.3	393.5	Cheyenne Mt. Summit, Colo.	678.5	2226	271.9	Anthony, Kans.	2.7	9	1046.0	65.4	CRPL	184
338	-	CRPL	633.4	393.6	Cheyenne Mt. Base, Colo.	421.5	1383	267.7	Anthony, Kans.	11.9	39	92.0	70.1	CRPL	134
358	-	CRPL	633.4	393.6	Cheyenne Mt. Base, Colo.	427.6	1403	267.7	Anthony, Kans.	11.9	39	210.4	70.1	CRPL	148
418	-	CRPL	650.3	404.1	Pikes Peak, Colo.	2377.4	7800	275.7	Anthony, Kans.	11.9	39	100.0	55.1	CRPL	50

Table I (continued)

NBS Path No.	Fig. No.	Call Letters	d_{km}	d_{mi}	Transmitter	$h_{te(m)}$	$h_{te(ft)}$	N_s	Receiver	$h_{re(m)}$	$h_{re(ft)}$	f_{mc}	θ_{mr}	Recording Agency	N_{hrs}
400	-	CRPL	988.1	614.0	Ft. Carson, Colo.	12.2[s]	40[s]	274.0	Fayetteville, Ark.	11.6	38	100.0	123.8	CRPL	54
260	-	CRPL	994.1	617.7	Cheyenne Mt. Summit, Colo.	692.2	2271	275.5	Fayetteville, Ark.	11.6	38	100.0	112.2	CRPL	103
420	-	CRPL	1010.8	628.1	Pikes Peak, Colo.	2377.4	7800	279.3	Fayetteville, Ark.	11.6	38	100.0	102.4	CRPL	40

s = structural height
* = height above 2-10 mile average terrain in the direction of the other antenna
** = height above 2-10 mile average surrounding terrain

Table II

Basic Transmission Loss in Decibels
Winter and Summer

NBS No.	Fig. No.	Winter N	Winter 1%	Winter 10%	Winter 50%	Winter 90%	Winter 99%	Summer N	Summer 1%	Summer 10%	Summer 50%	Summer 90%	Summer 99%
201	87	2198	141.7	144.8	148.5	152.2	154.9	3007	136.1	140.4	147.9	153.8	158.6
56	1, 2	3216	137.8	141.3	144.5	147.7	150.6	3956	137.4	141.9	146.2	150.5	155.8
39	88	3204	140.1	144.6	146.8	148.6	150.5	916	135.2	142.3	147.7	149.5	150.9
390	-	259	-	150.2	152.3	153.8	154.9	53	-	147.3	152.0	154.7	-
330	3, 4	3741	128.9	131.7	133.9	135.7	137.3	1687	123.6	128.3	132.7	134.2	135.4
350	122	3268	132.7	136.1	139.4	141.7	143.4	-	-	-	-	-	-
370	89	268	135.1	137.8	140.9	142.8	143.6	263	<121.6	<126.8	132.6	136.0	138.3
66	90	482	152.5	158.6	163.2	167.6	173.7	1040	153.9	158.9	165.1	170.8	173.6
2	91	534	134.4	139.6	146.2	151.1	155.2	1759	132.7	137.8	145.1	151.9	157.9
392	-	167	-	154.4	157.7	159.7	-	74	-	148.8	156.7	161.4	-
332	5, 6	4302	137.1	140.5	143.4	146.1	148.4	2292	126.4	134.6	142.9	146.0	148.3
352	122	1244	140.2	144.5	149.7	154.5	160.4	-	-	-	-	-	-
372	128	178	-	145.9	150.8	153.2	-	305	117.9	126.4	138.2	142.0	143.9
200	7, 8	3648	142.8	147.2	152.3	157.7	168.3	4759	140.0	144.1	150.4	156.0	161.9
23	128	28	-	149.4	156.3	159.8	-	1217	153.1	160.1	167.2	171.3	173.4
22	108	1231	<149.5	155.5	163.2	168.4	172.2	474	152.9	159.3	166.6	170.3	171.9
21	129	-	-	-	-	-	-	1089	<150.7	159.1	167.6	172.1	175.3
60	109	3415	152.0	158.0	164.4	167.5	178.7	4181	147.1	155.4	164.5	169.7	172.8
208	110	418	152.6	161.8	172.3	>172.3	>172.3	1768	136.1	150.6	166.9	>172.3	>172.3
228	129	-	-	-	-	-	-	232	138.5	152.6	164.9	170.3	>172.2

Table II (Continued)

NBS No.	Fig. No.	N	1%	10%	50%	90%	99%	N	1%	10%	50%	90%	99%
6	9,10	2386	138.4	147.7	158.8	164.6	168.4	2478	132.0	138.9	150.1	160.9	167.7
450	123	1172	169.3	179.2	190.1	200.1	211.8	-	-	-	-	-	-
41	11,12	5182	162.6	170.6	175.6	179.8	184.0	4998	161.4	168.7	174.9	179.2	187.9
5	29,30	2309	151.2	161.6	172.4	181.5	185.4	2451	150.0	160.3	170.4	178.3	184.4
389	-	-	-	-	-	-	-	48	-	185.4	190.6	>194.4	-
394	-	233	-	174.8	181.9	187.9	-	87	-	164.4	172.6	180.8	-
34	31,32	1002	153.4	159.9	167.6	171.8	176.1	1341	151.8	160.9	168.8	173.7	176.7
254	13,14	4502	<140.3	<145.7	152.4	157.3	160.5	5497	132.4	143.4	152.0	157.3	160.1
274	92	2901	<143.8	149.4	156.2	163.8	170.5	3304	<141.4	148.1	157.6	162.9	166.5
294	93	536	142.9	148.5	153.9	157.9	160.0	259	<129.8	135.2	148.2	157.2	159.6
314	33,34	2932	<146.7	<155.6	166.8	175.6	>180.2	4072	<129.7	<145.7	161.6	171.6	>177.3
3	35,36	3304	158.9	168.2	178.0	184.2	189.9	2951	152.5	164.9	174.1	180.6	184.9
334	37,38	3143	145.9	154.1	162.1	169.9	181.7	1605	137.2	149.7	161.0	167.8	172.0
354	123	2932	<152.4	161.6	172.2	>179.6	>184.7	-	-	-	-	-	-
374	111	282	148.2	158.4	170.2	178.8	183.4	311	<128.2	<141.1	158.9	172.4	175.9
451	-	56	-	179.7	196.4	203.3	-	101	-	176.8	189.2	198.2	-
35	112	1076	153.8	162.5	171.8	179.2	182.6	1327	147.6	158.7	168.0	176.6	182.0
52	39,40	3375	148.4	159.2	171.1	177.8	> 207.8	4900	<143.2	155.3	168.0	178.9	>195.3
223	41,42	9167	148.1	162.3	176.4	>185.3	> 193.3	9191	129.8	149.2	166.3	179.0	>188.5
55	43,44	9013	145.4	155.9	168.7	178.8	184.4	9506	137.2	150.8	162.8	171.9	>177.6
54	15,16	6023	163.3	169.8	177.9	184.8	>188.4	5167	159.5	165.2	172.0	178.4	> 184.5
63	124	306	167.1	172.8	178.5	182.4	183.8	-	-	-	-	-	-
64	-	133	166.1	171.6	180.3	188.6	193.2	-	-	-	-	-	-
29	45,46	8867	150.8	159.9	171.1	>181.8	>189.7	9527	147.4	157.2	167.8	176.8	>187.0
1	-	100	170.6	174.2	178.6	> 182.3	> 182.3	399	172.6	>175.9	>180.5	> 182.3	> 182.3

Table II (Continued)

Basic Transmission Loss in Decibels

NBS No.	Fig. No.	Winter N	Winter 1%	Winter 10%	Winter 50%	Winter 90%	Winter 99%	Summer N	Summer 1%	Summer 10%	Summer 50%	Summer 90%	Summer 99%
204	47, 48	5869	164.3	173.9	183.4	> 194.0	>206.8	6201	164.1	171.7	180.1	>195.0	-
42	113	4884	159.9	170.2	181.1	> 186.4	>190.2	3418	159.0	167.5	178.1	> 186.1	>191.8
43	130	199	163.1	169.2	174.3	179.9	>181.1	1181	162,8	171,1	181,0	191.1	199.2
44	49, 50	9778	153.2	162.9	173.4	>181.5	> 186.6	11022	< 150.0	160.4	170.4	178.7	>184.6
45	124	464	160.5	167.9	176.2	188.3	192.7	-	-	-	-	-	-
46	114	408	155.2	162.6	171.4	176.7	> 181.0	1673	159.1	168.9	178.3	> 186.2	>191.5
47	51, 52	9686	161.9	170.3	181.4	> 190.9	> 199.6	10271	149.9	161.3	172.4	184.0	>194.8
48	53. 54	3683	153.7	163.8	176.8	189.2	> 198.0	2231	154.9	166.0	178.3	191.3	> 199.7
49	55, 56	3105	164.2	174.7	188.2	> 198.2	> 199.3	2126	156.1	170.2	184.0	> 195.7	> 199.3
57	57, 58	5352	155.6	164.1	174.7	184.5	190.9	5345	151.4	161.0	171.5	179.6	185.9
210	59, 60	4654	157.3	165.9	176.8	184.0	188.8	4530	146.3	161.7	173.9	182.2	186.9
219	115	2107	143.2	152.5	164.2	174.4	183.0	598	134.7	148.8	167.0	174.5	180.0
206	61, 62	3397	151.8	160.2	170.8	181.9	191.3	5904	148.8	159.0	170.4	180.0	187.4
213	63, 64	5478	158.2	167.8	179.4	188.8	195.3	5308	148.6	163.6	176.4	185.5	191.6
214	65, 66	5247	153.2	163.9	176.2	186.8	192.4	5524	145.4	159.8	172.8	182.7	190.3
215	67, 68	5086	151.5	163.3	175.7	185.2	190.8	4745	142.3	156.8	171.4	181.3	187.2
216	69, 70	5447	159.4	168.6	179.7	187.3	192.7	4705	148.3	163.4	175.7	184.6	189.4
28	71, 72	2569	155.9	164.9	175.9	186,3	>198.1	3439	153.5	162.9	172.8	181.8	>194.6
222	130	370	170.9	176.6	>182.3	>182.3	>182.3	724	163.8	171.3	179.1	>183.4	> 187.9
202	131	217	162.6	173.1	>182.6	>182.6	>182.6	709	160.8	168.5	177.6	>182.6	> 182.6

Table II (Continued)

NBS No.	Fig. No.	N	1%	10%	50%	90%	99%	N	1%	10%	50%	90%	99%
452	116	228	182.4	187.3	192.9	198.1	>206.7	290	169.0	187.0	191.7	195.2	197.4
453	117	465	185.1	190.0	197.0	206.3	>210.9	1606	172.0	180.3	191.3	199.4	209.9
454	118	500	180.1	184.4	190.7	>198.0	>203.7	1490	<163.0	174.7	185.7	>193.4	>201.7
457	73,74	1575	171.6	181.2	189.7	>198.7	>206.0	1525	<149.9	<167.4	182.1	191.5	>197.8
458	125	928	<163.3	176.9	188.9	>198.0	>203.8	236	<156.6	<170.7	182.7	192.4	-
459	75,76	986	167.1	178.5	188.4	196.4	201.8	878	<152.2	<165.3	180.4	>189.3	>195.3
460	-	-	-	-	-	-	-	191	135.3	151.5	174.3	185.7	189.5
461	125	950	155.6	173.7	184.8	194.7	200.9	107	-	174.8	182.3	190.1	-
462	119	748	163.2	176.1	188.0	>197.4	>203.3	1574	<148.7	<162.6	179.8	189.8	>196.4
62	94	3918	170.9	178.4	185.8	>188.0	>188.0	3593	162.5	171.4	178.8	184.4	>188.0
16	131	-	-	-	-	-	-	436	149.4	153.3	158.5	165.1	170.7
61	95	3361	170.3	177.3	182.9	187.7	>188.0	1690	167.9	172.0	177.7	182.8	187.2
17	-	237	168.3	176.2	183.8	>184.7	>184.7	962	167.7	>176.6	>184.5	>184.7	>184.7
31	77,78	5891	166.0	172.7	180.3	187.4	192.7	5963	159.2	167.8	176.9	184.4	189.3
36	17,18	6091	170.2	176.3	182.7	188.6	>190.0	4784	165.9	171.9	178.6	184.9	>189.6
33	96	1026	174.4	181.2	189.2	>192.1	>192.1	482	171.8	178.4	185.9	>192.1	>192.1
262	-	100	-	<156.4	168.8	177.8	-	136	-	135.5	153.0	168.5	-
302	132	146	-	149.0	171.7	178.4	-	304	123.0	134.7	155.3	175.0	178.3
322	-	63	-	174.9	179.8	183.9	-	34	-	<146.2	170.7	>194.1	-
342	132	147	-	166.7	179.7	190.1	-	293	141.1	149.5	165.7	176.3	181.7
382	-	-	-	-	-	-	-	140	-	149.8	169.9	182.4	-
203	79,80	5302	<159.3	<164.8	173.8	181.4	>184.7	5256	<156.8	<162.1	171.5	177.8	181.8
217	120	2303	168.1	176.0	183.7	>184.9	>184.9	561	169.8	174.8	181.4	>184.9	>184.9
7	19,20	2982	165.7	170.1	173.7	177.7	179.8	3589	163.9	167.9	172.6	177.1	180.4
19	81,82	4521	160.0	166.9	175.3	183.1	187.8	4539	154.8	163.4	172.1	180.2	186.8

Table II (Continued)

Basic Transmission Loss in Decibels

NBS No.	Fig. No.	Winter N	Winter 1%	Winter 10%	Winter 50%	Winter 90%	Winter 99%	Summer N	Summer 1%	Summer 10%	Summer 50%	Summer 90%	Summer 99%
13	83, 84	4078	<160.2	168.6	178.4	>186.3	>192.4	5624	<157.3	165.4	174.9	>181.4	>184.8
20	85, 86	3632	<156.4	165.7	175.5	183.2	>187.4	4856	<154.6	163.2	174.2	180.8	185.4
12	97	781	178.5	181.4	184.3	>187.0	>189.9	517	175.9	179.1	182.5	>186.3	>192.9
59	98	703	154.6	164.6	177.4	186.2	191.4	1116	159.4	167.2	175.7	182.9	189.4
425	-	-	-	-	-	-	-	106	-	141.3	155.0	>167.6	-
37	99	2380	169.8	179.8	191.0	>195.8	>195.8	988	167.9	177.0	185.8	>195.8	>195.8
38	100	1872	171.2	180.4	187.6	>191.2	>194.2	849	170.5	178.4	184.2	188.4	191.7
211	21, 22	1829	182.7	189.7	196.4	>200.7	>200.7	4557	<181.4	187.0	192.9	>198.1	>200.7
8	23, 24	12160	<168.4	<175.8	184.9	>190.8	>194.7	11134	<165.4	<170.7	178.7	>185.6	>190.5
15	133	101	174.9	178.9	184.6	190.5	>191.5	231	173.8	178.9	184.7	189.2	>191.9
32	101	2891	158.3	165.2	173.4	181.5	187.8	3623	160.6	165.8	172.3	178.3	182.6
51	121	2807	163.0	169.8	178.2	187.0	>203.5	1372	162.2	169.5	177.4	183.4	187.6
58	102	2682	170.0	180.5	187.9	>194.6	>204.0	3832	169.6	177.6	189.1	>196.6	>201.5
53	103	2382	175.8	181.5	188.4	>188.4	>188.4	334	177.1	181.1	185.7	>188.4	>188.4
71	133	-	-	-	-	-	-	452	173.3	176.7	182.4	>188.4	>188.4
385	-	-	-	-	-	-	-	60	-	209.1	213.0	216.8	-
396	-	33	-	204.4	207.4	210.4	-	75	-	186.7	196.4	206.2	-
256	104	1562	186.7	194.2	201.8	206.4	211.7	2426	<177.7	<183.9	191.6	199.4	>205.8
276	105	712	186.1	191.1	197.4	>205.1	>211.8	972	171.3	183.0	192.7	>197.7	>201.0
296	106	269	<193.9	<197.3	201.9	>206.3	>209.6	279	<177.6	<183.0	188.6	192.4	195.4

Table II (Continued)

NBS No.	Fig. No.	N	1%	10%	50%	90%	99%	N	1%	10%	50%	90%	99%
316	134	-	-	-	-	-	-	1644	191.4	200.6	208.6	215.1	221.4
317	126	623	215.3	218.9	223.5	228.4	232.7	52	-	206.4	215.1	219.5	-
323	-	-	-	-	-	-	-	51	-	197.6	203.9	208.9	-
324	-	-	-	-	-	-	-	47	-	195.0	205.2	211.4	-
325	-	-	-	-	-	-	-	51	-	198.6	207.7	210.9	-
336	107	1791	189.6	195.3	200.8	>206.7	>210.2	304	173.3	180.3	184.4	188.5	190.8
356	126	862	194.7	200.8	209.1	214.8	217.5	-	-	-	-	-	-
376	134	-	-	-	-	-	-	305	<174.4	<180.7	186.1	190.2	192.4
9	25,26	2915	<180.1	186.5	191.8	>195.6	>195.9	3536	<175.9	182.9	189.1	>193.4	>195.7
416	-	-	-	-	-	-	-	21	-	182.8	187.4	193.8	-
429	-	-	-	-	-	-	-	117	-	205.9	214.5	>221.5	-
18	27,28	6940	<180.7	188.1	192.9	>196.3	>198.8	6073	<177.4	<183.4	189.2	>193.4	>196.1
26	-	-	-	-	-	-	-	537	179.0	185.9	>192.1	>192.1	>192.1
398	-	67	-	215.3	217.2	219.6	-	70	-	203.7	208.6	211.7	-
404	-	59	-	217.7	219.2	220.7	-	-	-	-	-	-	-
258	127	349	210.8	214.1	217.3	223.2	230.2	188	189.6	195.6	202.9	210.8	216.9
264	127	266	212.5	214.2	216.8	219.6	224.1	-	-	-	-	-	-
278	135	-	-	-	-	-	-	243	<192.3	<197.6	206.7	>214.2	>217.7
318	-	-	-	-	-	-	-	184	214.9	219.0	225.4	>232.5	>237.7
338	-	134	-	212.2	214.9	217.6	-	-	-	-	-	-	-
358	-	148	-	220.1	223.6	227.4	-	-	-	-	-	-	-
418	-	-	-	-	-	-	-	50	-	192.4	199.7	206.6	-
400	-	9	-	225.1	229.4	247.0	-	45	-	227.7	231.4	234.9	-
260	-	-	-	-	-	-	-	103	-	223.9	228.3	230.6	-
420	-	-	-	-	-	-	-	40	-	218.8	224.3	228.4	-

TABLE III

Observed and Predicted Median Basic Transmission Loss
Winter and Summer

L_{bmo} = Observed Median L_{bmc} = Predicted Median

NBS Path No.	Winter		Summer	
	L_{bmo}	L_{bmc}	L_{bmo}	L_{bmc}
1	178.6	186.1	>180.5	180.8
2	146.2	159.0	145.1	153.6
3	178.0	169.4	174.1	165.6
5	172.4	170.3	170.4	166.3
6	158.8	154.5	150.1	150.1
7	173.7	188.0	172.6	182.8
8	184.9	183.8	178.7	179.3
9	191.8	190.2	189.1	185.3
12	184.3	185.7	182.5	180.4
13	178.4	176.8	174.9	172.7
15	184.6	186.9	184.7	182.0
16	-	157.7	158.5	153.1
17	183.8	194.2	>184.5	189.0
18	192.9	195.4	189.2	190.2
19	175.3	171.3	172.1	167.2
20	175.5	175.9	174.2	171.8
21	-	170.6	167.6	166.8
22	163.2	168.4	166.6	164.6
23	156.3	168.9	167.2	165.0
26	-	199.1	>192.1	193.8
28	175.9	177.3	172.8	173.2
29	171.1	176.7	167.8	172.6

Table III (continued)

NBS Path No.	Winter		Summer	
	L_{bmo}	L_{bmc}	L_{bmo}	L_{bmc}
31	180.3	172.5	176.9	168.4
32	173.4	179.1	172.3	172.8
33	189.2	179.4	185.9	175.2
34	167.6	171.9	168.8	167.8
35	171.8	168.3	168.0	164.6
36	182.7	182.3	178.6	177.6
37	191.0	182.3	185.8	177.9
38	187.6	181.3	184.2	176.8
39	146.8	139.7	147.7	136.8
41	175.6	175.3	174.9	170.9
42	181.1	176.6	178.1	172.5
43	174.3	176.6	181.0	172.5
44	173.4	176.6	170.4	172.5
45	176.2	176.6	-	172.5
46	171.4	176.6	178.3	172.5
47	181.4	176.6	172.4	172.5
48	176.8	176.6	178.3	172.5
49	188.2	176.6	184.0	172.5
51	178.2	177.8	177.4	173.6
52	171.1	169.1	168.0	165.4
53	188.4	189.3	185.7	184.4
54	177.9	177.1	172.0	172.7
55	168.7	169.3	162.8	165.8
56	144.5	144.4	146.2	141.4
57	174.7	168.8	171.5	164.8
58	187.9	187.7	189.1	183.1
59	177.4	178.5	175.7	174.4

Table III (continued)

NBS Path No.	Winter		Summer	
	L_{bmo}	L_{bmc}	L_{bmo}	L_{bmc}
60	164.4	170.5	164.5	166.4
61	182.9	188.3	177.7	182.9
62	185.8	187.9	178.8	182.5
63	178.5	177.1	-	173.0
64	180.3	177.1	-	173.0
66	163.2	167.0	165.1	161.7
71	-	190.3	182.4	185.2
200	152.3		150.4	
201	148.5		147.9	
202	>182.6	174.7	177.6	170.6
203	173.8	172.2	171.5	168.1
204	183.4	183.6	180.1	179.5
206	170.8	166.8	170.4	162.7
208	172.3	167.6	166.9	164.4
210	176.8	174.7	173.9	170.6
211	196.4	189.4	192.9	184.8
213	179.4	176.5	176.4	172.4
214	176.2	175.6	172.8	171.5
215	175.7	174.8	171.4	170.7
216	179.7	176.5	175.7	172.4
217	183.7	176.1	181.4	172.0
219	164.2	166.9	167.0	162.8
222	>182.3	176.2	179.1	172.1
223	176.4	172.4	166.3	168.9
228	-	165.0	164.9	162.0
254	152.4	158.8	152.0	155.8

Table III (c0ntinued)

NBS Path No.	Winter		Summer	
	L_{bmo}	L_{bmc}	L_{bmo}	L_{bmc}
256	201.8	190.3	191.6	185.9
258	217.3	206.8	202.9	201.5
260	-	232.1	228.3	227.1
262	168.8	173.2	153.0	169.6
264	216.8	206.8	-	201.5
274	156.2	162.8	157.6	159.8
276	197.4	195.5	192.7	191.1
278	-	212.3	206.7	207.0
294	153.9	163.9	148.2	160.9
296	201.9	196.8	188.6	192.4
302	171.7	179.3	155.3	175.7
314	166.8	169.1	161.6	166.1
316	-	211.4	208.6	207.0
317	223.5	214.4	215.1	210.0
318	-	234.1	225.4	228.9
322	179.8	193.3	170.7	189.8
323	-	212.5	203.9	208.1
324	-	211.9	205.2	207.5
325	-	214.4	207.7	210.0
330	133.9	135.0	132.7	131.9
332	143.4	152.9	142.9	149.9
334	162.1	164.3	161.0	161.1
336	200.8	187.9	184.4	183.3
338	214.9	209.0	-	203.8
342	179.7	178.6	165.7	174.5
350	139.4	139.3	-	136.2

Table III (continued)

NBS Path No.	Winter		Summer	
	L_{bmo}	L_{bmc}	L_{bmo}	L_{bmc}
352	149.7	158.7	-	155.7
354	172.2	171.7	-	168.5
356	209.1	196.3	-	191.7
358	223.6	216.3	-	211.1
370	140.9	140.2	132.6	137.1
372	150.8	159.3	138.2	156.3
374	170.2	172.9	158.9	169.7
376	-	197.0	186.1	192.4
382	-	184.8	169.9	180.7
385	-	219.6	213.0	214.6
389	-	194.1	190.6	190.3
390	152.3	160.2	152.0	157.1
392	157.7	174.0	156.7	170.6
394	181.9	183.6	172.6	179.8
396	207.4	201.7	196.4	196.8
398	217.2	217.5	208.6	212.3
400	229.4	243.9	231.4	238.9
404	219.2	217.5	-	212.3
416	-	187.0	187.4	182.9
418	-	202.3	199.7	197.0
420	-	228.6	224.3	223.6
425	-	171.6	155.0	168.6
429	-	210.4	214.5	206.2
450	190.1	188.1	-	184.1
451	196.4	189.8	189.2	185.8
452	192.9	196.3	191.7	192.2

Table III (continued)

NBS Path No.	Winter		Summer	
	L_{bmo}	L_{bmc}	L_{bmo}	L_{bmc}
453	197.0	196.4	191.3	192.3
454	190.7	196.4	185.7	192.3
457	189.7	190.9	182.1	186.8
458	188.9	188.1	182.7	184.0
459	188.4	187.0	180.4	182.9
460	-	186.5	174.3	182.4
461	184.8	186.0	182.3	181.9
462	188.0	185.5	179.8	181.5

Table IV

Dates and Hours of Recording

NBS Path No.	Fig. No.	d_{km}	Period of Recording						Number of Days	
			Dates			Hours			Winter	Summer
1	-	195.9	4-17-51	to	6-30-51	1400	to	2100	14	58
2	91	102.4	7- 1-53	to	6-30-54	1900	to	2200	181	179
3	35, 36	155.6	2-25-52	to	6-20-53	0900	to	2300	239	213
5	29, 30	150.0	2-19-51	to	7-31-52	1500	to	2400	250	272
6	9, 10	136.3	3-13-51	to	6-30-53	1400	to	2000	407	421
7	19, 20	232.9	1- 1-52 10- 1-53	to	9-30-53 10-31-54	1500 1900	to	2400 2200	444	539
8	23, 24	283.1	6-13-50 10- 1-50	to	7-31-50 6-15-53	2400	to	2400	538	509
9	25, 26	365.6	6-13-51 12- 1-52	to	9-30-52 12-31-52	0800	to	2300	206	254
12	97	239.9	6-23-51	to	3-31-53	0600	to	2400	322	276
13	83, 84	237.9	5- 1-49 2- 1-50	to	11-16-49 6-31-51	0600	to	2400	286	412
15	133	285.0	4-14-50	to	6-10-50	1500	to	1800	17	41
16	131	218.1	8-13-52	to	9-30-52	1200	to	2100	-	49
17	-	222.9	4-17-51	to	6-30-51	0600	to	2400	14	57
18	27, 28	446.4	8- 1-51 12- 1-52	to	10-31-52 6-15-53	0500	to	0100	333	315
19	81, 82	235.8	7- 1-51	to	6-30-52	0600	to	2000	363	368
20	85, 86	237.9	6-14-51	to	12-31-52	0700	to	2300	237	324
21	129	125.7	5-18-49	to	8-31-49	1100	to	2200	-	106
22	108	125.7	9- 1-49	to	4-26-50	1500	to	1800	177	61
23	128	119.4	4-27-50	to	10-24-50	1500	to	1800	4	184
26	-	469.4	10- 1-52	to	10-31-52	0600	to	2400	-	31
28	71, 72	205.2	4- 9-51	to	9-22-52	0600	to	2400	190	305
29	45, 46	195.0	4-15-50	to	6-20-53	0700	to	0100	560	603
31	77, 78	223.7	7- 1-50	to	6-30-52	0600	to	2300	361	367
32	101	298.8	8- 7-52	to	9-30-53	0600	to	2400	181	234
33	96	224.5	9- 1-52	to	5-31-53	1500	to	2200	172	84
34	31, 32	153.8	9- 5-51 6-15-52	to	3-15-52 11-29-52	1400	to	2100	145	196

Table IV (Continued)

NBS Path No.	Fig. No.	d_{km}	Period of Recording						Number of Days	
			Dates			Hours			Winter	Summer
35	112	160.4	5-25-51	to	7-14-52	1500	to	2100	182	235
36	17,18	224.2	7-31-51	to	4-30-53	0600	to	2400	359	277
37	99	270.2	9-18-52	to	5-31-53	0700	to	2400	181	75
38	100	280.3	11- 1-49 3-16-50	to	3-15-50 8-31-50	0700 1500	to	2200 1800	181	123
39	88	73.5	11-11-52	to	6-20-53	0600	to	0100	171	51
41	11,12	146.1	5-16-51	to	4-30-53	0600	to	2300	357	346
42	113	201.0	11- 1-50	to	1-21-52	0600	to	0100	263	184
43	130	201.0	2-17-51	to	10-31-51	0500	to	0100	16	97
44	49,50	201.0	5- 1-50	to	6-20-53	0600	to	0100	534	597
45	124	201.0	1-30-52	to	2-25-52	0600	to	0100	27	-
46	114	201.0	2- 3-51	to	10-31-51	0500	to	0100	27	90
47	51,52	201.0	5-23-50	to	6-20-53	0600	to	0100	528	566
48	53,54	201.0	11- 1-51	to	6-20-53	0600	to	0100	220	133
49	55,56	201.0	11- 1-51	to	6-20-53	0600	to	0100	183	119
51	121	299.0	10-13-52	to	7-16-53	0800	to	2400	181	93
52	39,40	167.7	3- 9-51	to	10- 9-52	0900	to	2400	235	344
53	103	307.9	11-24-52	to	5-25-53	0800	to	2400	153	20
54	15,16	188.4	6-23-51	to	4-30-53	0700	to	0100	363	315
55	43,44	181.5	6- 1-50	to	6-20-53	0700	to	2400	538	572
56	1,2	72.3	8- 4-50	to	11- 7-52	1500	to	0100	360	454
57	57,58	202.8	7- 1-50	to	6-30-52	0600	to	2200	358	368
58	102	305.0	5-15-52	to	7-11-53	0600	to	2400	175	241
59	98	243.8	3- 1-51	to	12-25-51	1500	to	2200	116	184
60	109	129.9	7- 1-51	to	7-31-52	0400	to	2400	182	215
61	95	220.2	8- 2-51	to	4-17-52	0500	to	0200	169	91
62	94	215.8	4-18-52	to	4-30-53	0500	to	0200	194	180
63	124	191.3	4- 1-50	to	4-27-50	1200	to	2300	27	-
64	-	191.3	4- 1-50	to	4-14-50	1200	to	2300	-	14
66	90	99.8	8-16-53 10- 1-53	to	9-30-53 6-30-54	0400 1900	to	2300 2200	181	136

Table IV (Continued)

NBS Path No.	Fig. No.	d_{km}	Period of Recording						Number of Days	
			Dates			Hours			Winter	Summer
71	133	307.9	6-12-53	to	7-14-53	0500	to	2300	-	28
200	7, 8	116.4	11-20-51 4-26-52	to	2-25-52 10-20-53	0900	to	2300	276	357
201	87	61.5	7- 1-51	to	9-17-52	0900	to	2300	182	252
202	131	211.5	4-13-51	to	6-30-51	1000	to	2400	18	61
203	79, 80	229.6	3- 1-51	to	6-15-53	0700	to	2400	395	402
204	47, 48	196.3	2-23-51 7- 1-51	to	3-28-51 6-12-54	0900	to	2300	381	431
206	61, 62	203.7	5-17-51 5- 1-53	to	12-31-52 5-29-53	0700	to	2400	248	352
208	110	131.8	6-12-53	to	6-30-54	0600	to	2300	140	199
210	59, 60	203.3	7- 1-51 6- 1-52	to	4-15-52 6-30-53	0900	to	2400	317	292
211	21, 22	281.8	4-25-57	to	6-15-53	1200	to	2300	321	405
213	63, 64	204.4	7- 1-51	to	6-30-53	0900	to	0100	363	350
214	65, 66	204.4	7- 1-51	to	6-30-53	0900	to	0100	346	368
215	67, 68	204.4	9- 1-51	to	6-30-53	0900	to	0100	333	303
216	69, 70	204.4	9- 1-51	to	6-30-53	0900	to	0100	360	306
217	120	231.9	10- 1-52	to	5-14-53	0900	to	0100	169	43
219	115	203.3	10-12-50	to	5-22-51	0700	to	2400	152	42
222	130	210.3	4- 3-51	to	6-30-51	0900	to	2400	28	61
223	41, 42	179.9	5-11-50	to	6-20-53	0700	to	0100	541	584
228	129	131.8	5-12-53	to	5-28-53	0600	to	2300	-	17
254	13, 14	155.5	2- 1-52 2, 3, 8-54	to	8-31-53	2400	to	2400	242	279
256	104	364.5	2-23-52 10- 1-52 2, 3, 8-54	to	5-31-52 4- 9-53	2400	to	2400	149	61
258	127	633.3	7-30-52 2-17-53	to	8-20-52 3-10-53	2400	to	2400	22	21
260	-	994.1	8- 8-52 2-20-53	to	8-20-52 2-27-53	2400	to	2400	5	12
262	-	226.9	2-14-54 8-16-54	to	3- 2-54 8-29-54	2400	to	2400	12	14

Table IV (Continued)

NBS Path No.	Fig. No.	d_{km}	Period of Recording		Number of Days	
			Dates	Hours	Winter	Summer
264	127	633.3	2-17-53 to 3-10-53	2400 to 2400	19	-
274	92	155.5	2- 1-52 to 11-26-52 12- 5-52 4- 9-53	2400 to 2400 2400 1800	185	162
276	105	364.5	2-13-52 to 2-25-53	2400 to 2400	68	149
278	135	633.3	7-27-52 to 8-20-52	2400 to 2400	-	21
294	93	155.5	2- 1-54 to 3- 2-54 8-18-54 8-29-54	2400 to 2400	29	12
296	106	226.5	2-16-54 to 3- 2-54 8-17-54 8-29-54	2400 to 2400	14	13
302	132	226.9	2-16-54 to 3- 2-54 8-16-54 8-29-54	2400 to 2400	10	14
314	33, 34	155.5	2- 8-52 to 8-31-53 2, 3, 8-54	2400 to 2400	151	221
316	134	364.5	6- 1-52 to 10-14-52	2400 to 2400	-	113
317	126	364.5	3- 1-53 to 4- 9-53 2, 3, 8-54	2400 to 2400	46	5
318	-	633.3	7-28-52 to 8-20-52	2400 to 2400	-	18
322	-	226.9	2, 3, 8-54	2400 to 2400	9	5
323	-	364.5	8-24-54 to 8-29-54	2400 to 2400	-	5
324	-	364.5	8-24-54 to 8-29-54	2400 to 2400	-	5
325	-	364.5	8-24-54 to 8-29-54	2400 to 2400	-	5
330	3, 4	79.5	2- 1-52 to 3- 7-52 12- 8-52 6-30-53 2, 3, 8-54	2400 to 2400	188	74
332	5, 6	113.0	2- 1-52 to 3- 7-52 11-24-52 7-31-53 2, 3, 8-54	2400 to 2400	203	103
334	37, 38	155.8	2- 1-52 to 3- 7-52 12- 8-52 6-30-53 2, 3, 8-54	2400 to 2400	167	71
336	107	364.7	2-20-52 to 3- 7-52 12-29-52 4- 9-53 2, 3, 8-54	2400 to 2400	103	14
338	-	633.4	2-11-53 to 2-18-53	2400 to 2400	8	-
342	132	227.1	2, 3, 8-54	2400 to 2400	15	14
350	122	79.5	2-13-52 to 3- 7-52 12- 9-52 4-30-53	2400 to 2400	154	-

Table IV (Continued)

NBS Path No.	Fig. No.	d_{km}	Period of Recording						Number of Days	
			Dates			Hours			Winter	Summer
352	122	113.0	1-13-53	to	4- 6-53	2400	to	2400	70	-
354	123	155.8	2-12-52 12- 9-52	to	3- 7-52 4-10-53	2400	to	2400	138	-
356	126	364.7	12-12-52 2-17-53	to	12-30-52 4- 9-53	2400	to	2400	52	-
358	-	633.4	2-27-53	to	3-10-53	2400	to	2400	11	-
370	89	79.5	2- 1-54 8-17-54	to	2-14-54 8-29-54	2400	to	2400	14	13
372	128	113.0	2- 1-54 8-16-54	to	2-14-54 8-29-54	2400	to	2400	11	14
374	111	155.8	2- 1-54 8-16-54	to	2-14-54 8-29-54	2400	to	2400	14	14
376	134	364.7	8-16-54	to	8-29-54	2400	to	2400	-	14
382	-	227.1	8-23-54	to	8-29-54	2400	to	2400	-	7
385	-	359.8	8-25-54	to	8-28-54	2400	to	2400	-	4
389	-	151.0	8-25-54	to	8-28-54	2400	to	2400	-	4
390	-	75.0	8- 6-52 2-20-53 2-15-54	to	8-10-52 2-27-53 3- 2-54	2400	to	2400	24	5
392	-	109.4	8- 7-52 2-25-53 2-15-54	to	8-13-52 2-27-53 3- 2-54	2400	to	2400	19	7
394	-	151.0	8- 6-52 2-20-53 2-16-54	to	8-13-52 2-27-53 3- 2-54	2400	to	2400	22	8
396	-	359.8	8- 5-52 2-22-53	to	8-13-52 2-25-53	2400	to	2400	4	9
398	-	628.8	8- 7-52	to	8-13-52	2400	to	2400	8	7
400	-	988.1	8- 8-52 2-22-53	to	8-12-52 2-27-53	2400	to	2400	4	5
404	-	628.8	2-20-53	to	2-27-53	2400	to	2400	8	-
416	-	381.6	8-18-52	to	8-20-52	2400	to	2400	-	3
418	-	650.3	8-14-52	to	8-20-52	2400	to	2400	-	7
420	-	1010.8	8-14-52	to	8-20-52	2400	to	2400	-	7
425	-	243.8	8-19-52	to	8-23-52	2400	to	2400	-	5
429	-	381.6	8-17-54	to	8-23-54	2400	to	2400	-	5

Table IV (Continued)

NBS Path No.	Fig. No.	d_{km}	Period of Recording						Number of Days	
			Dates			Hours			Winter	Summer
450	123	138.6	11-16-49	to	3-12-50	2400	to	2400	59	-
451	-	158.0	10-27-49	to	11- 3-49	2400	to	2400	3	5
452	116	215.6	4-14-50	to	5-28-50	2400	to	2400	11	14
453	117	215.6	3-23-51	to	12-15-51	2400	to	2400	26	86
454	118	215.6	3-20-51	to	12-10-51	2400	to	2400	28	83
457	73, 74	215.6	1-18-52	to	5-19-53	2400	to	2400	86	79
458	125	215.6	1-25-52 6-14-52 1-20-53	to	2- 2-52 6-25-52 5-20-53	2400	to	2400	47	16
459	75, 76	215.6	1-14-52 2-28-53	to	11- 2-52 5-22-52	2400	to	2400	56	53
460	-	215.6	6- 9-52	to	6-28-52	2400	to	2400	-	15
461	125	215.6	1-14-52 4-17-53	to	3-29-52 5-23-53	2400	to	2400	55	10
462	119	215.6	5-12-52	to	5-23-53	2400	to	2400	37	84

PART I

(Figures 1 through 86)

Cumulative distributions - winter and summer - of paths for which two or more complete years of recording are available.

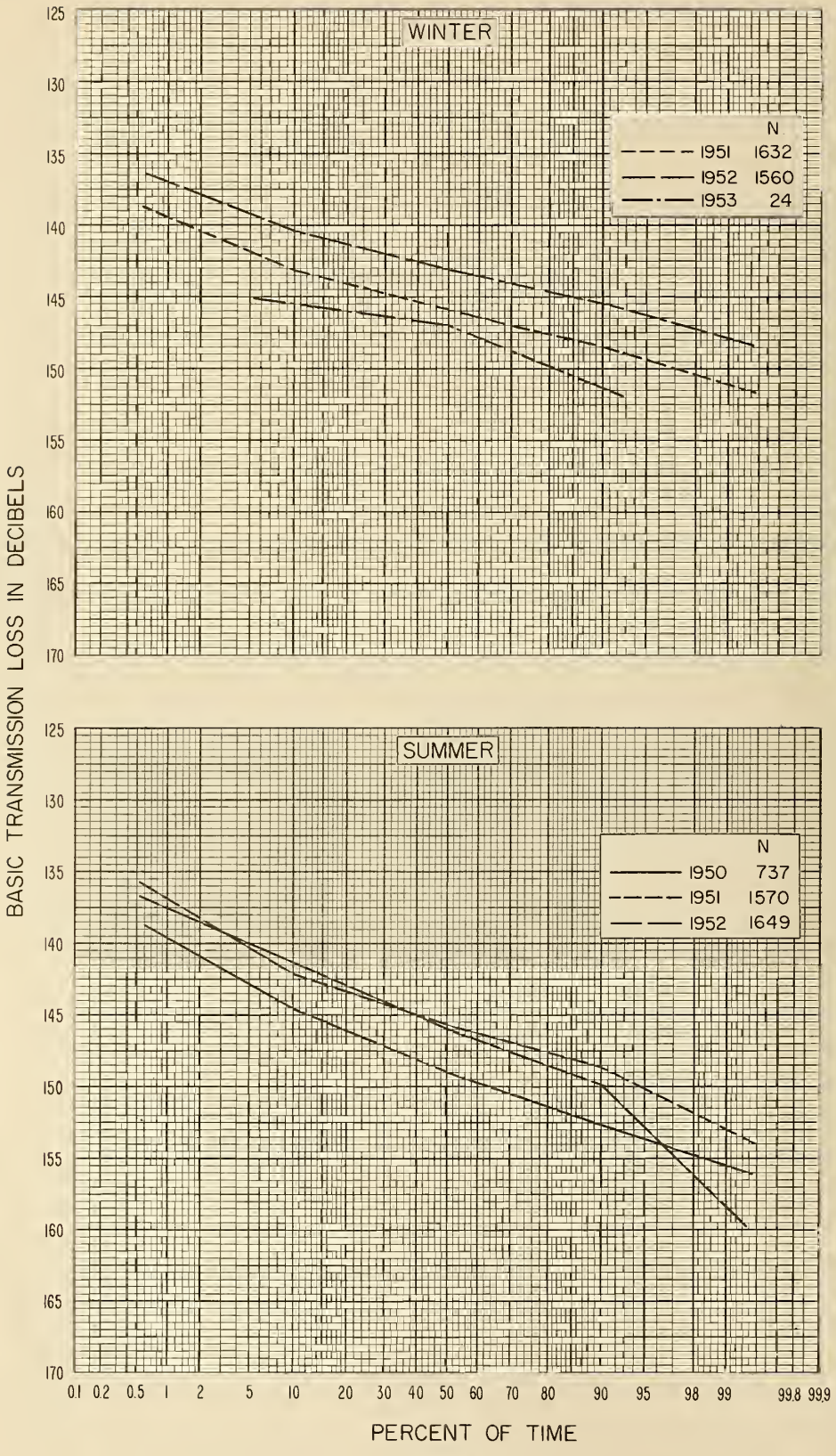

WINTER
N
1951 1632
1952 1560
1953 24
SUMMER
N
1950 737
1951 1570
1952 1649
BASIC TRANSMISSION LOSS IN DECIBELS
125
130
135
140
145
150
155
160
165
170
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9
PERCENT OF TIME

Figure 1

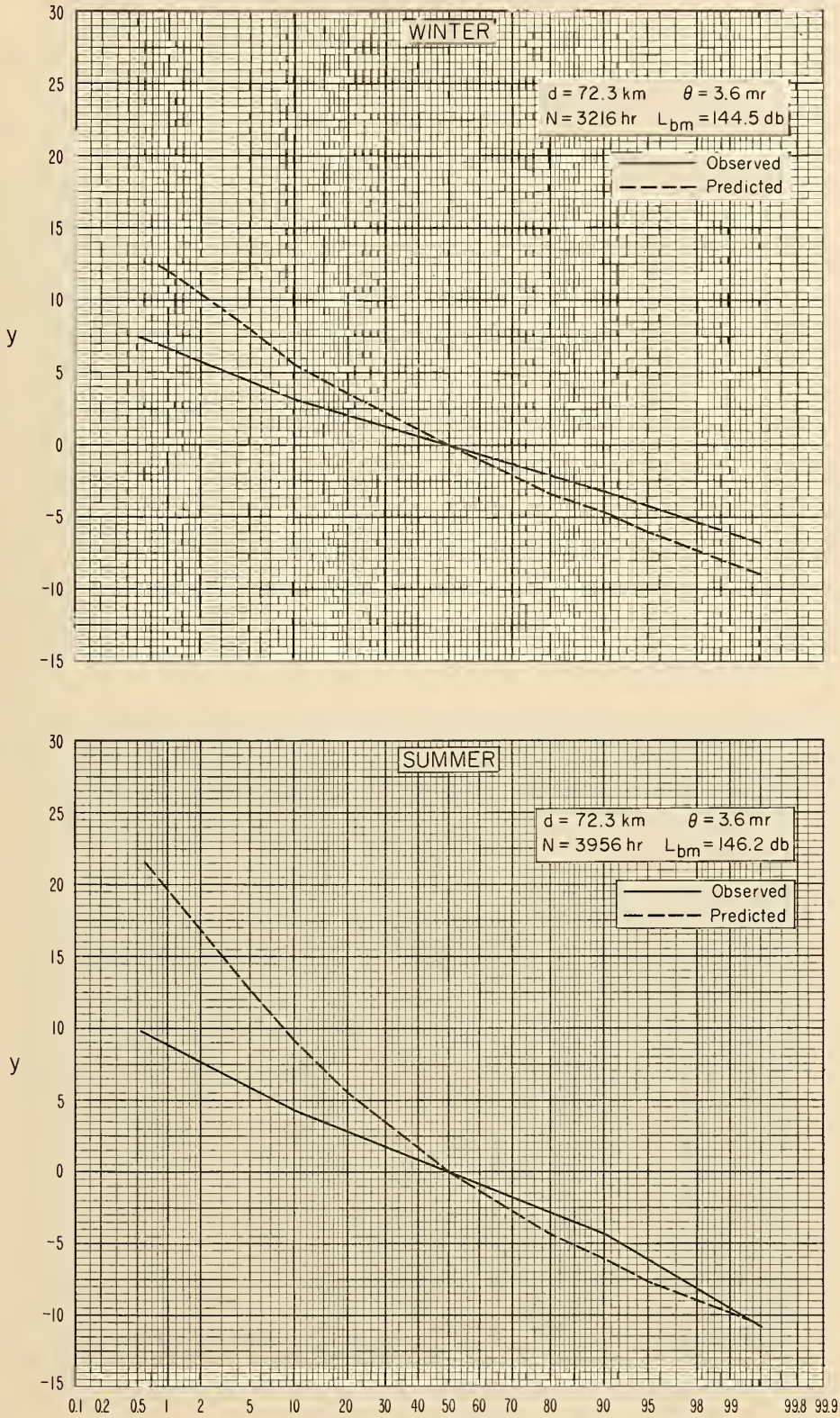

WINTER
d = 72.3 km θ = 3.6 mr
N = 3216 hr L_{bm} = 144.5 db
Observed
Predicted
SUMMER
d = 72.3 km θ = 3.6 mr
N = 3956 hr L_{bm} = 146.2 db
Observed
Predicted
y
30
25
20
15
10
5
0
-5
-10
-15
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9
PERCENT OF TIME

Figure 2

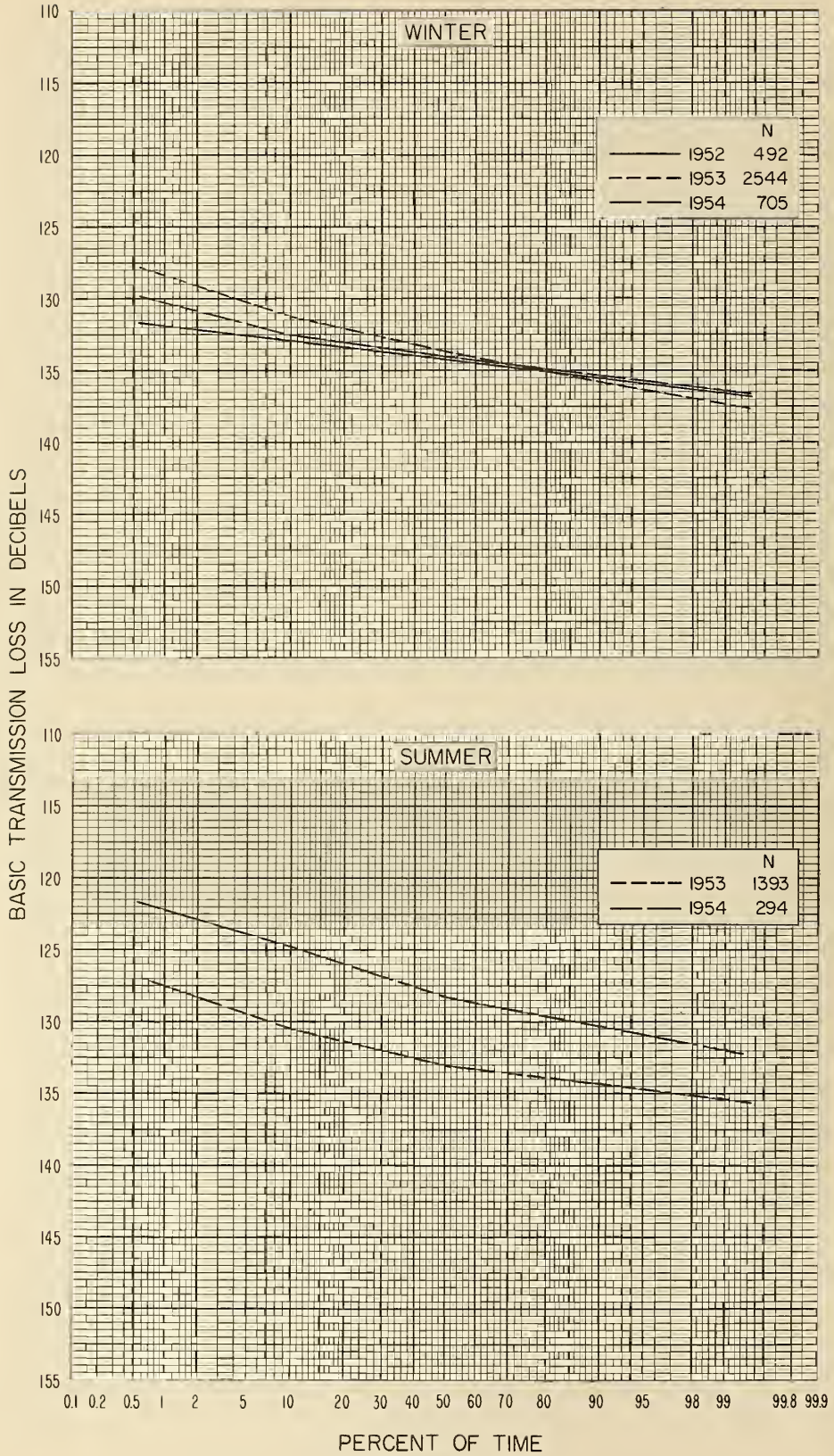

WINTER
N
1952 492
1953 2544
1954 705
SUMMER
N
1953 1393
1954 294
BASIC TRANSMISSION LOSS IN DECIBELS
110
115
120
125
130
135
140
145
150
155
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9
PERCENT OF TIME

Figure 3

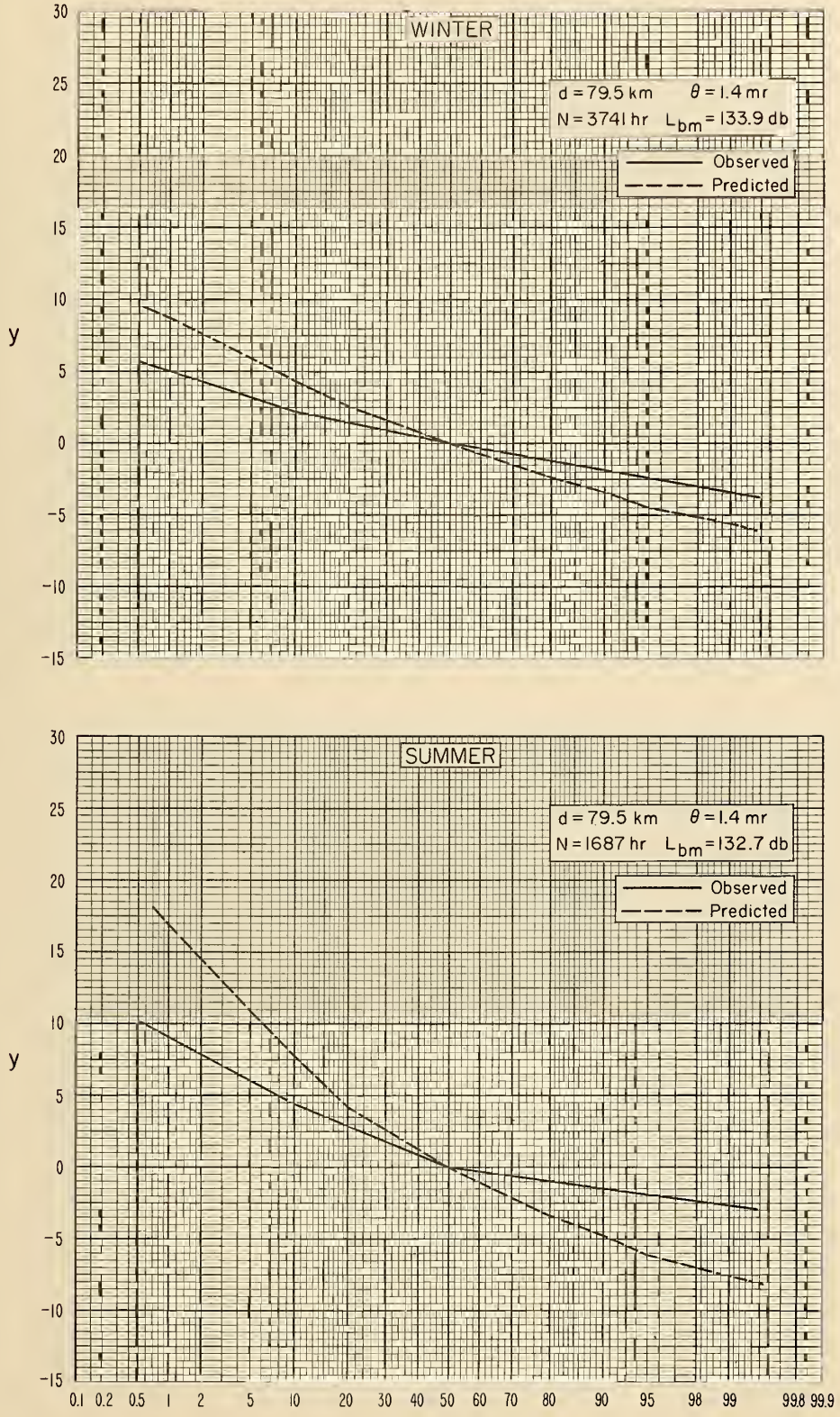

WINTER
d = 79.5 km θ = 1.4 mr
N = 3741 hr L_bm = 133.9 db
Observed
Predicted
SUMMER
d = 79.5 km θ = 1.4 mr
N = 1687 hr L_bm = 132.7 db
Observed
Predicted
y
30
25
20
15
10
5
0
-5
-10
-15
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9
PERCENT OF TIME

Figure 4

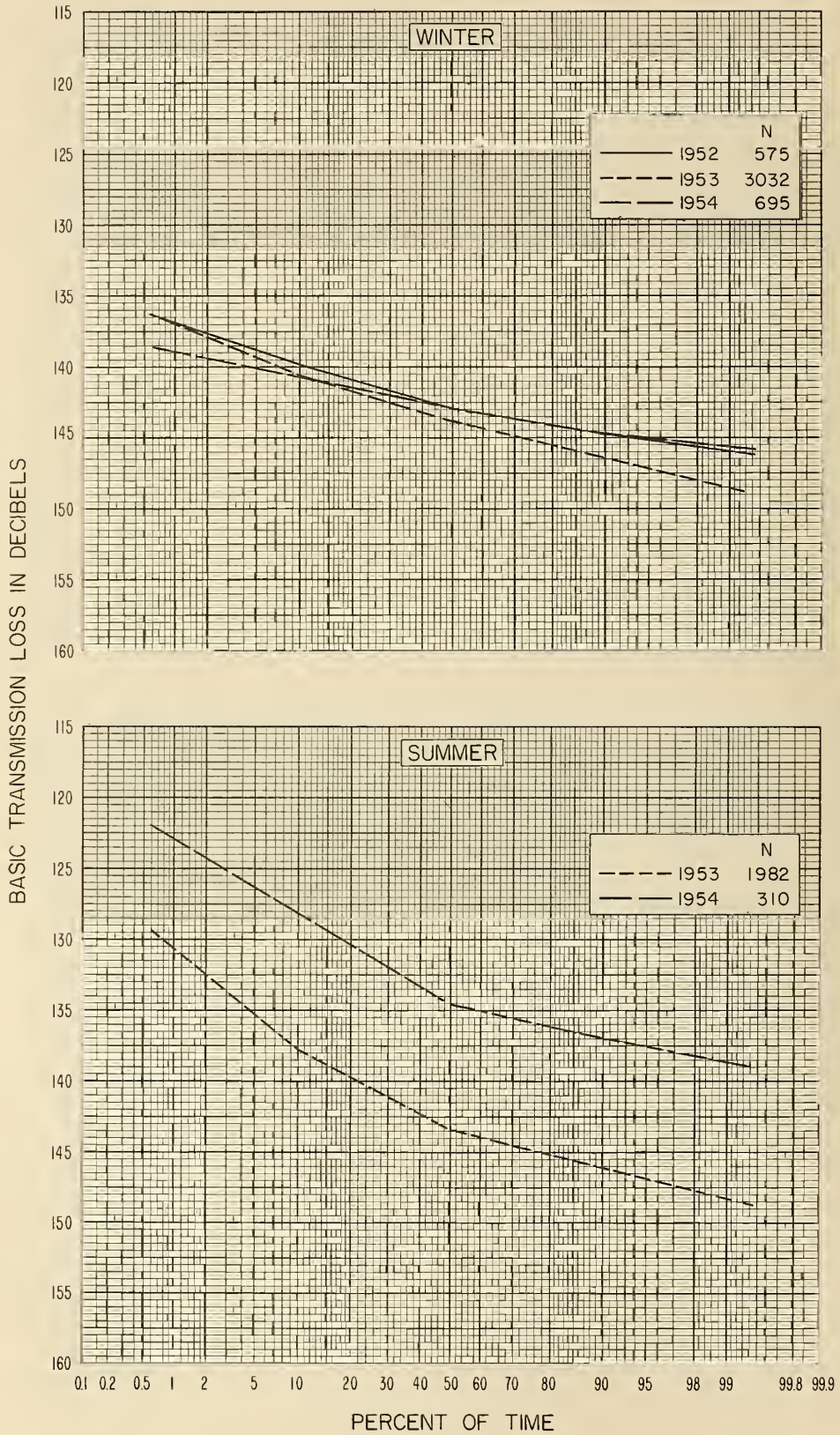

WINTER
N
1952 575
1953 3032
1954 695
SUMMER
N
1953 1982
1954 310
BASIC TRANSMISSION LOSS IN DECIBELS
115
120
125
130
135
140
145
150
155
160
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9
PERCENT OF TIME

Figure 5

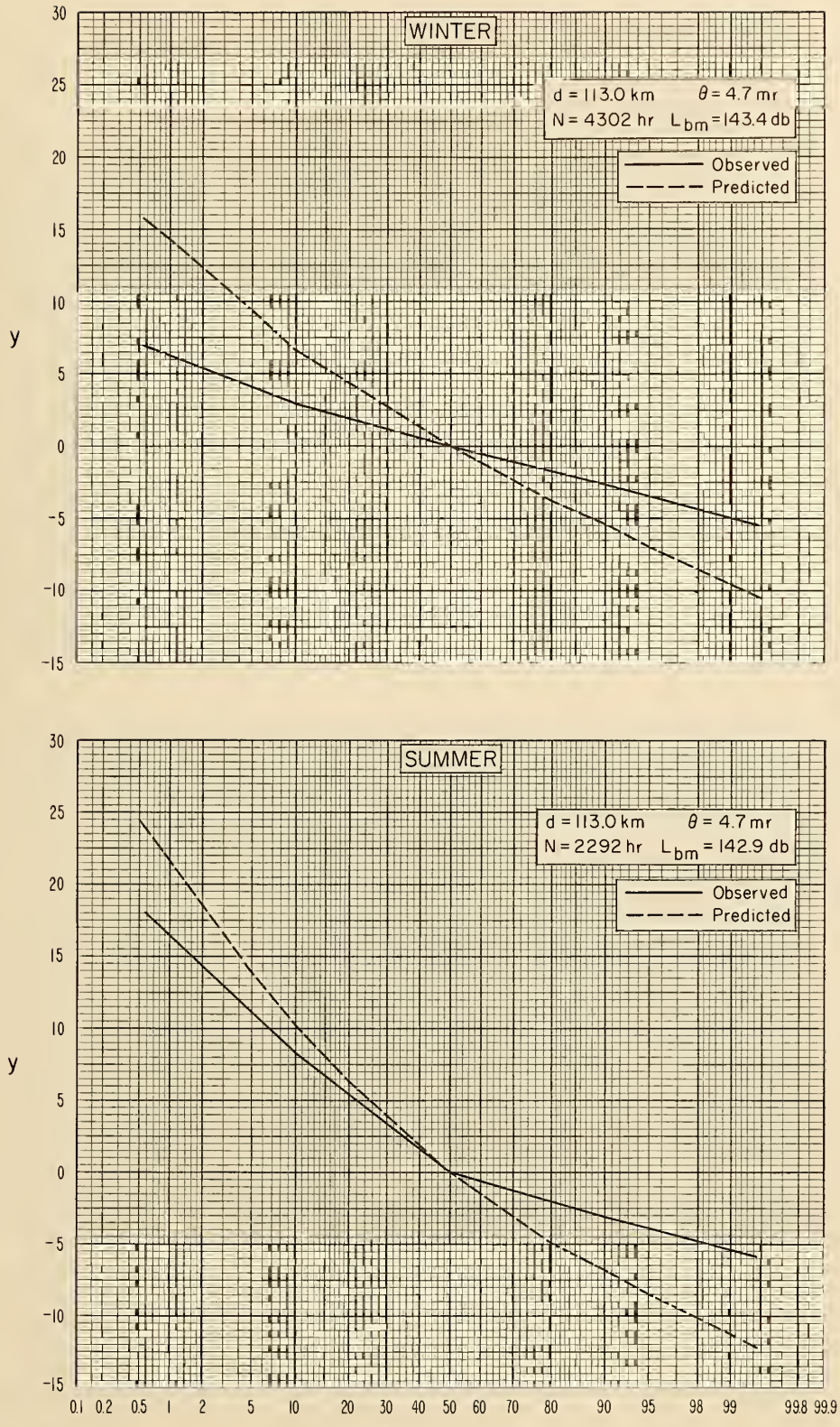

WINTER
d = 113.0 km θ = 4.7 mr
N = 4302 hr L bm = 143.4 db
Observed
Predicted
SUMMER
d = 113.0 km θ = 4.7 mr
N = 2292 hr L bm = 142.9 db
Observed
Predicted
y
30
25
20
15
10
5
0
-5
-10
-15
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9
PERCENT OF TIME

Figure 6

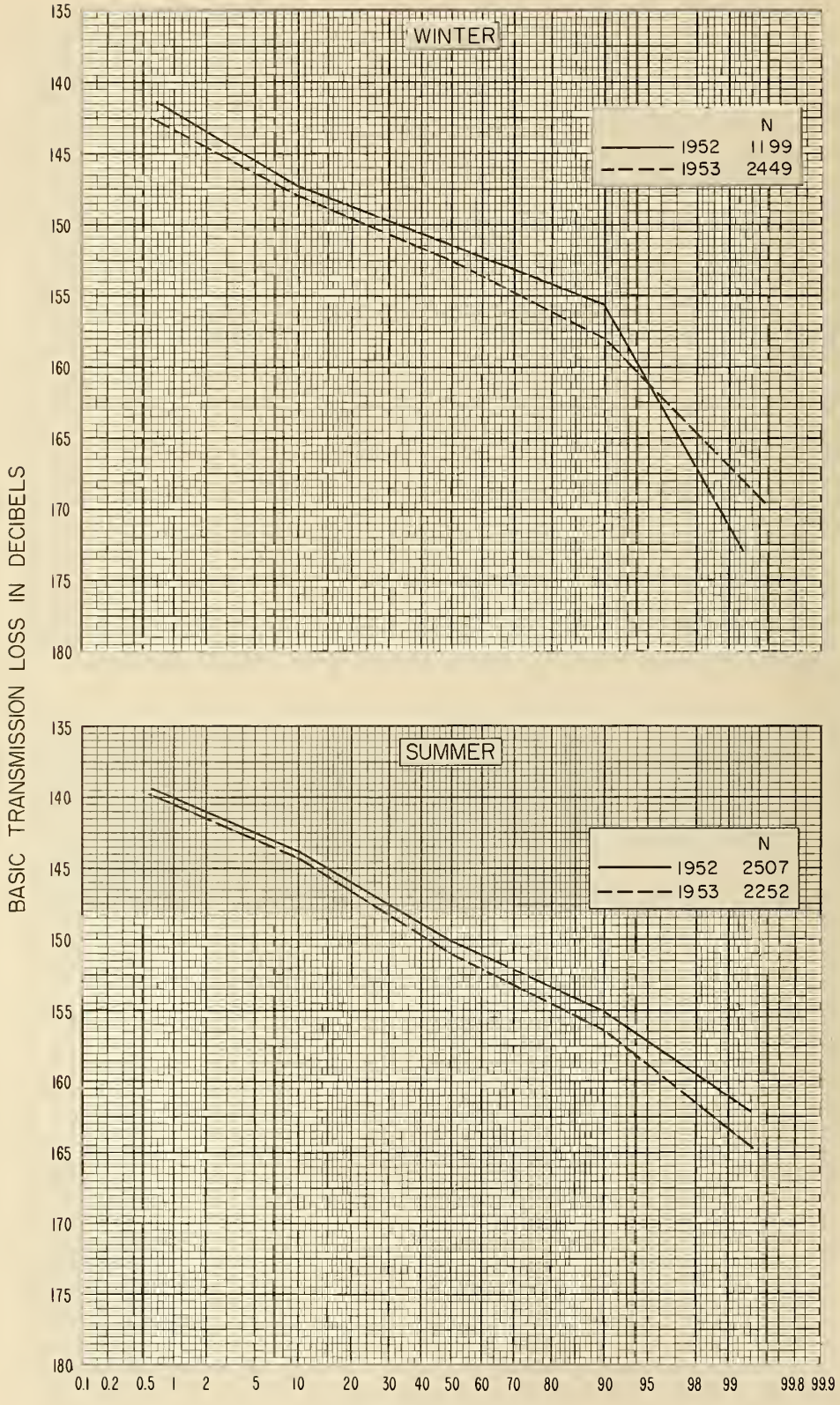

WINTER
N
1952 1199
1953 2449
SUMMER
N
1952 2507
1953 2252
BASIC TRANSMISSION LOSS IN DECIBELS
135
140
145
150
155
160
165
170
175
180
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9
PERCENT OF TIME

Figure 7

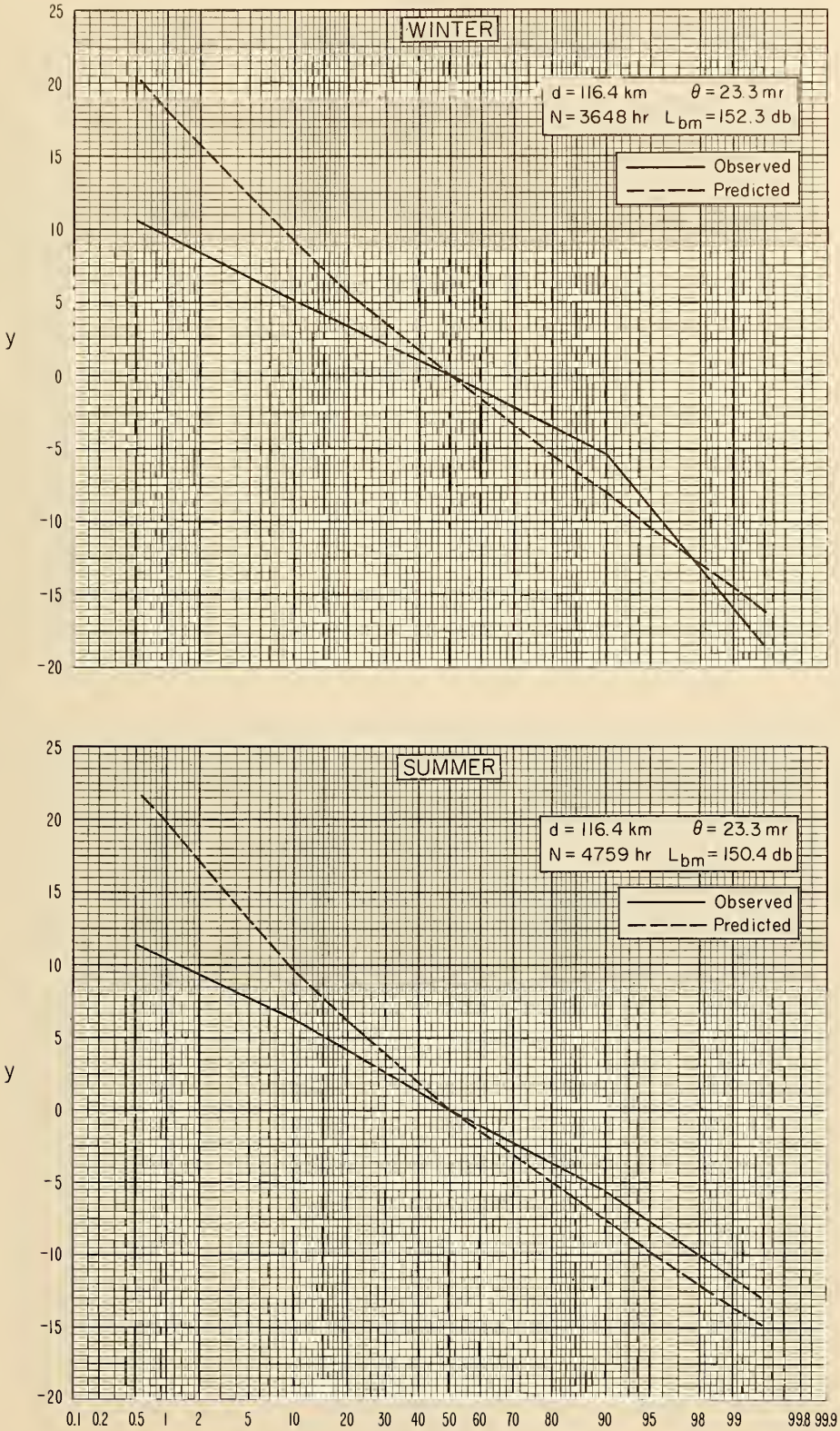

WINTER
d = 116.4 km θ = 23.3 mr
N = 3648 hr L_{bm} = 152.3 db
Observed
Predicted
SUMMER
d = 116.4 km θ = 23.3 mr
N = 4759 hr L_{bm} = 150.4 db
Observed
Predicted
y
25
20
15
10
5
0
-5
-10
-15
-20
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9
PERCENT OF TIME

Figure 8

NBS PATH 6

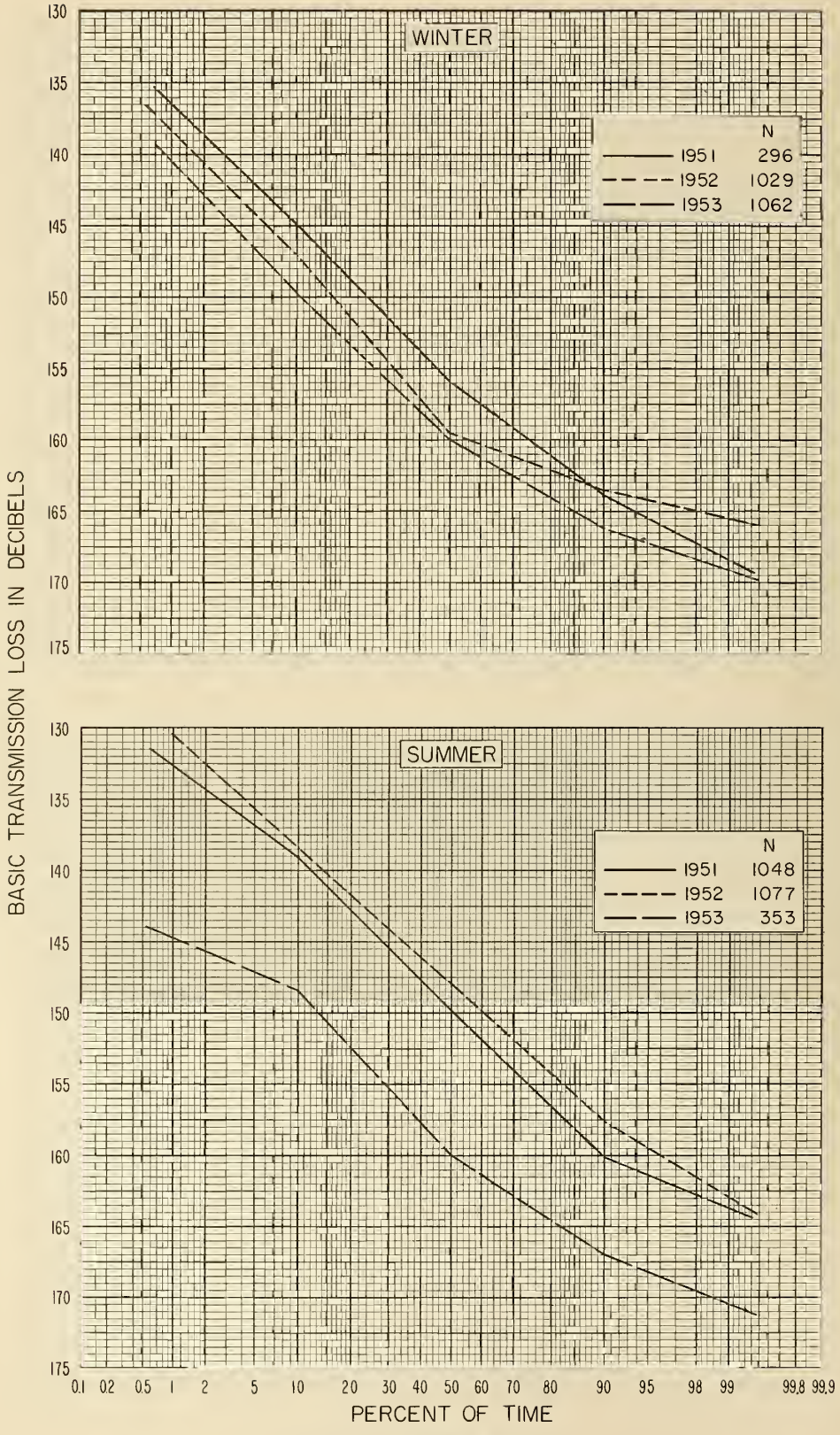


Figure 9

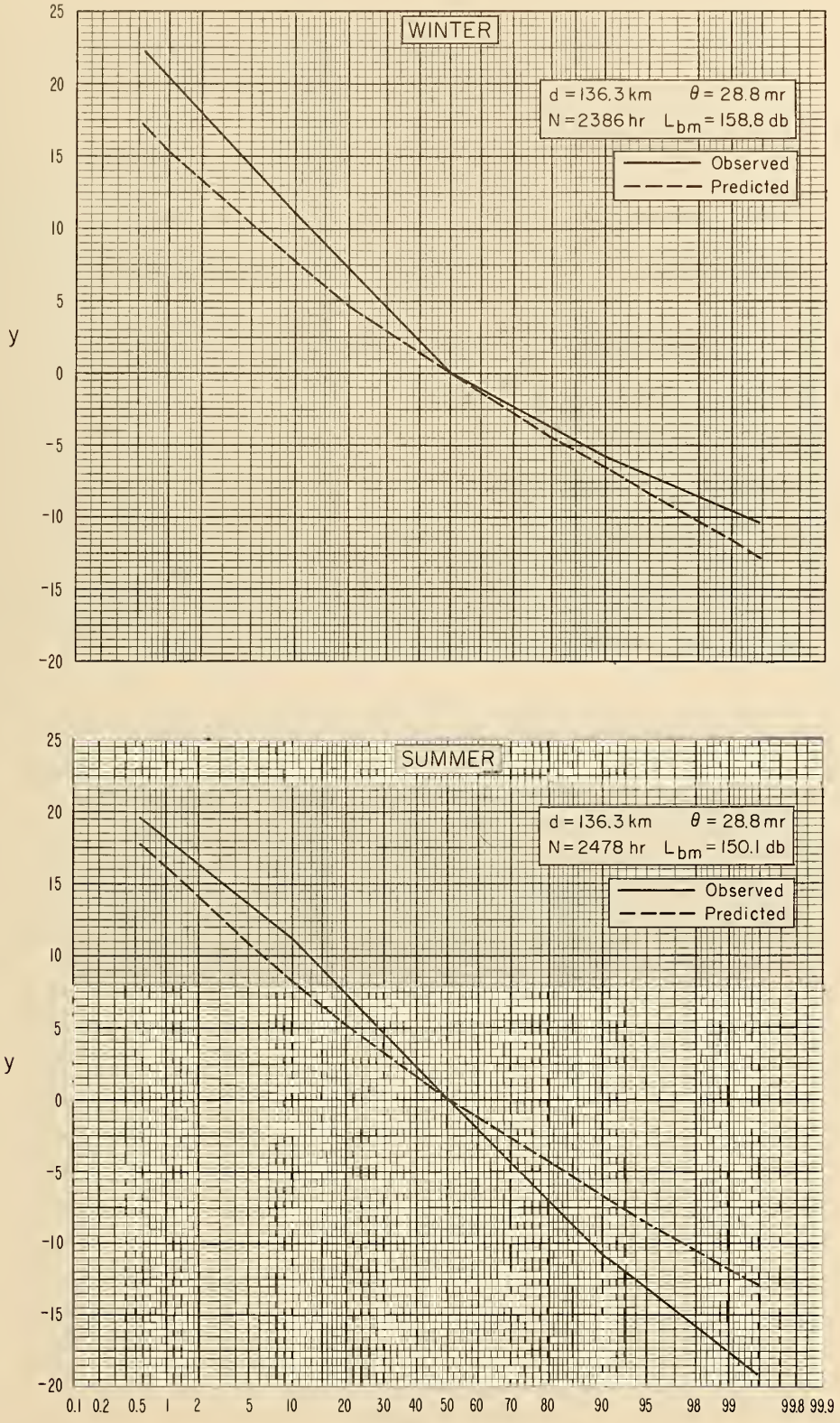

WINTER
d = 136.3 km θ = 28.8 mr
N = 2386 hr L_{bm} = 158.8 db
Observed
Predicted
SUMMER
d = 136.3 km θ = 28.8 mr
N = 2478 hr L_{bm} = 150.1 db
Observed
Predicted
y
25
20
15
10
5
0
-5
-10
-15
-20
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9
PERCENT OF TIME

Figure 10

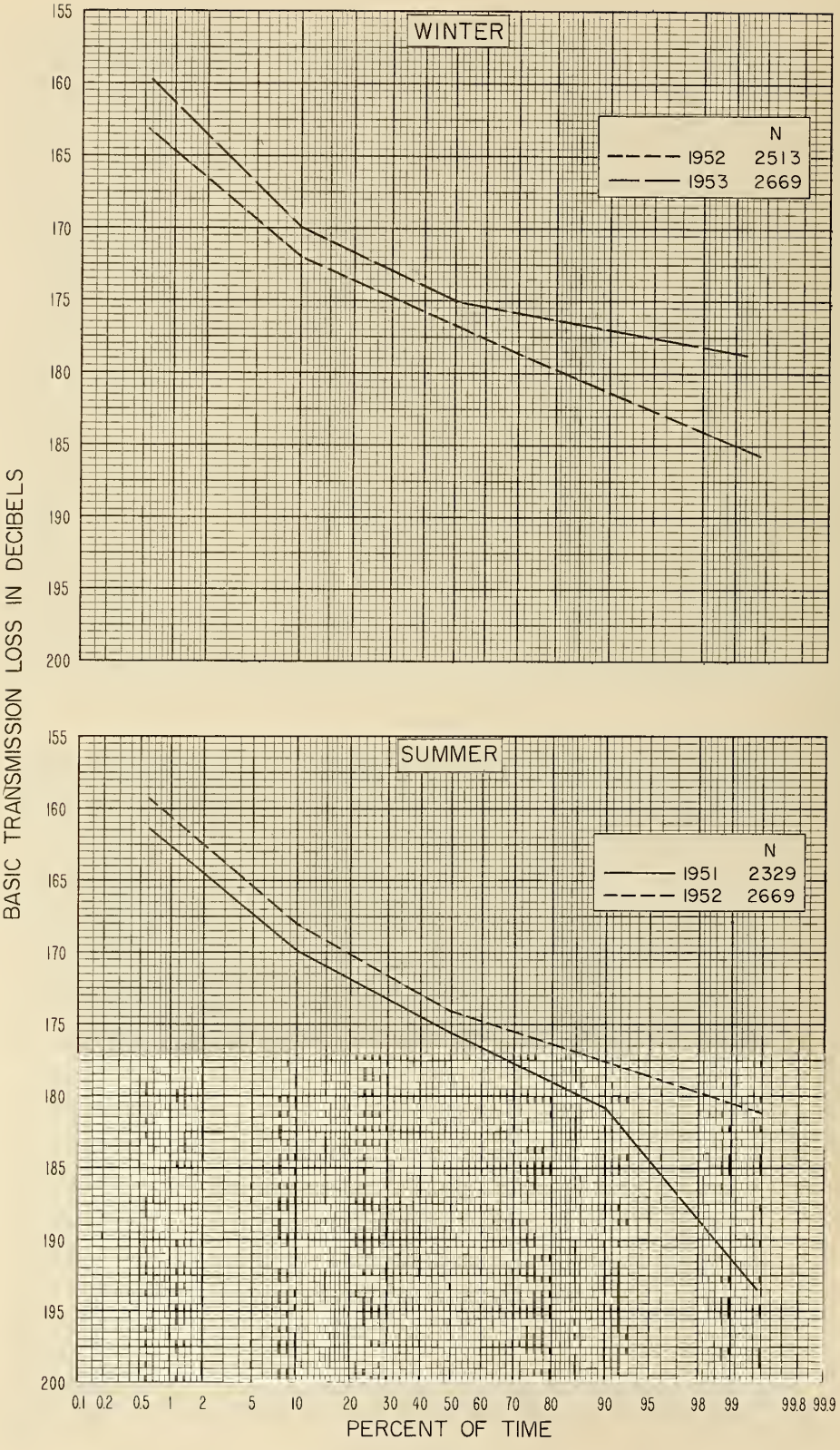

WINTER
N
1952 2513
1953 2669
SUMMER
N
1951 2329
1952 2669
BASIC TRANSMISSION LOSS IN DECIBELS
155
160
165
170
175
180
185
190
195
200
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9
PERCENT OF TIME

Figure 11

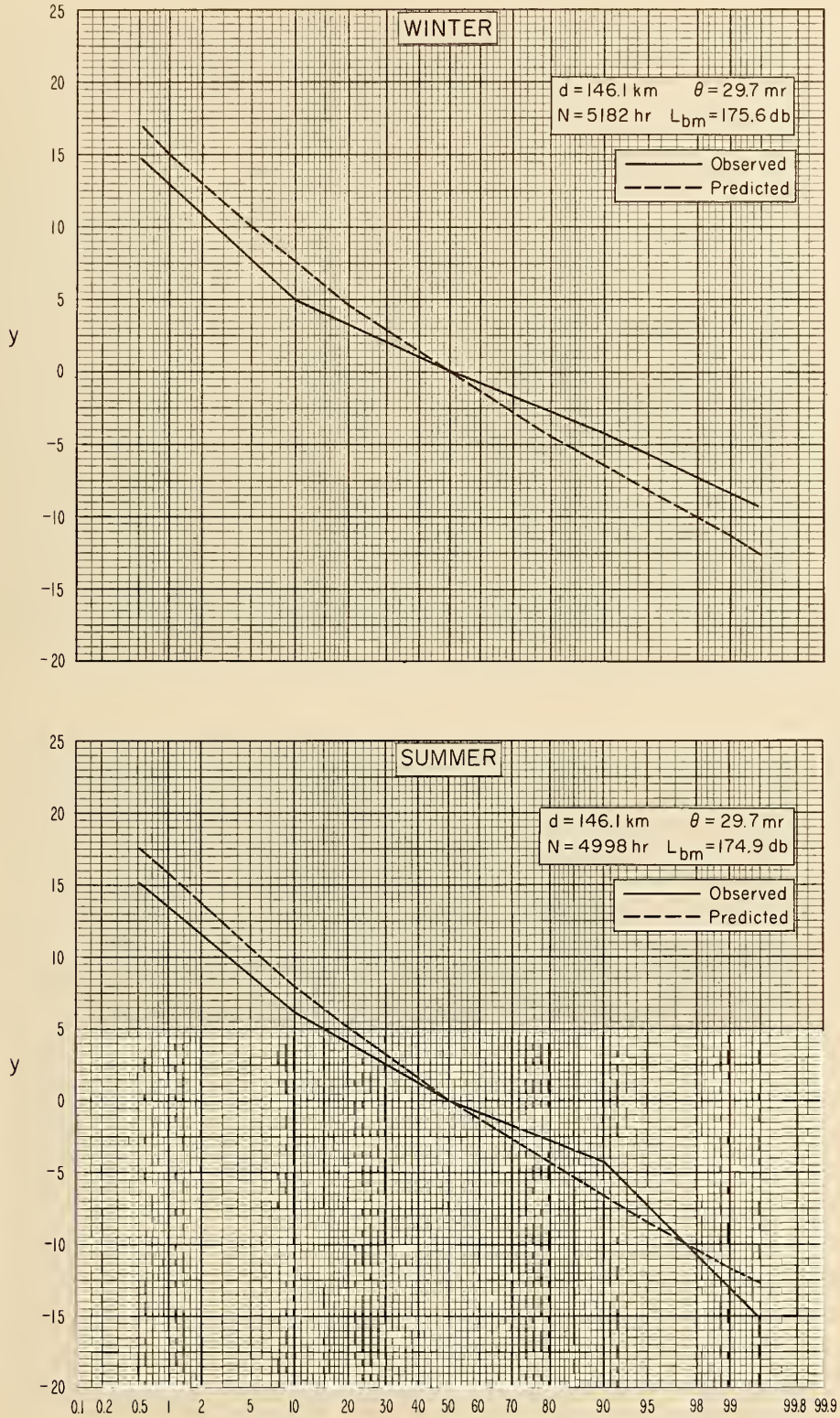

WINTER
d = 146.1 km θ = 29.7 mr
N = 5182 hr L_{bm} = 175.6 db
Observed
Predicted
SUMMER
d = 146.1 km θ = 29.7 mr
N = 4998 hr L_{bm} = 174.9 db
Observed
Predicted
y
25
20
15
10
5
0
-5
-10
-15
-20
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9
PERCENT OF TIME

Figure 12

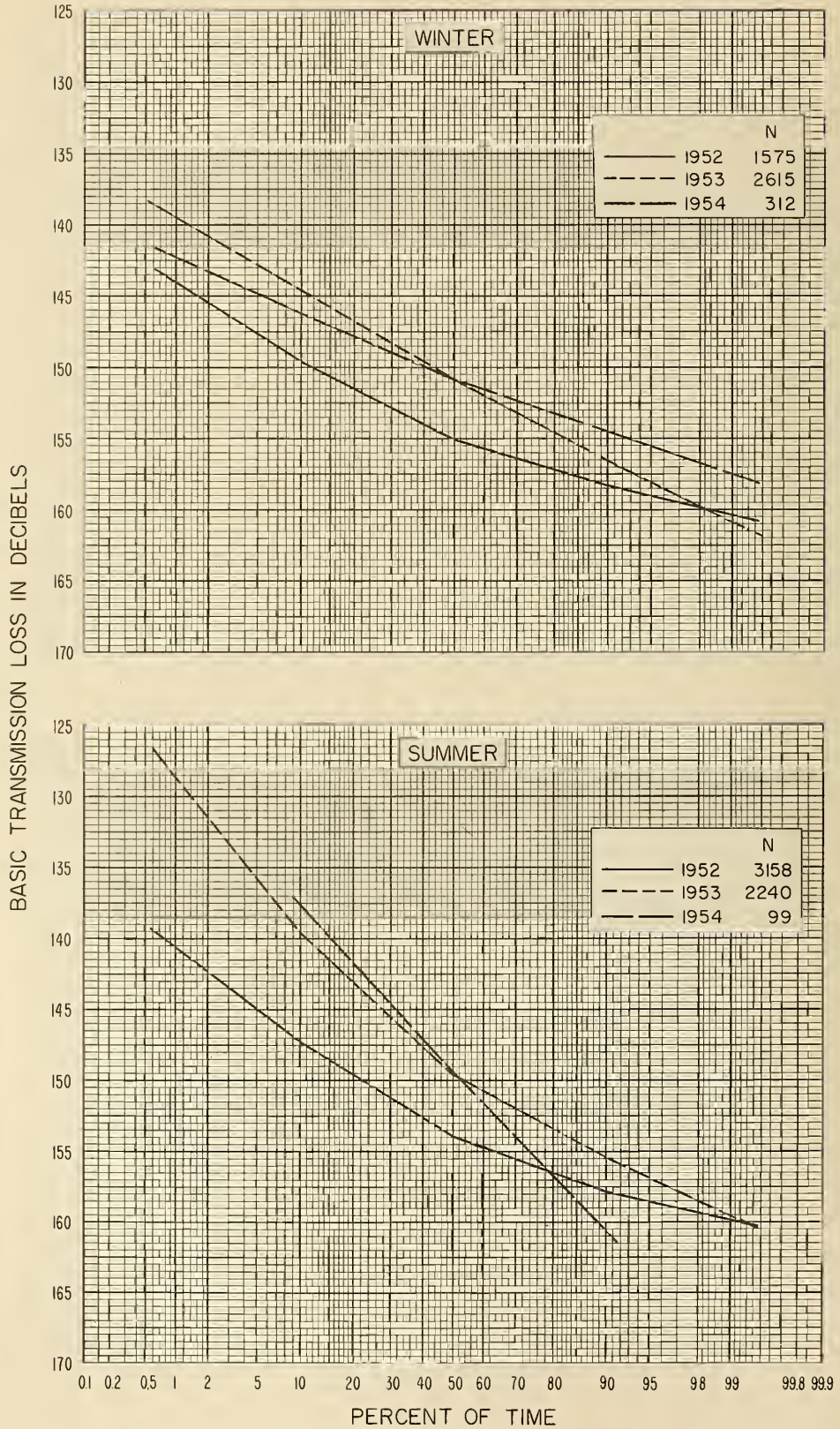

WINTER
N
1952 1575
1953 2615
1954 312
SUMMER
N
1952 3158
1953 2240
1954 99
BASIC TRANSMISSION LOSS IN DECIBELS
125
130
135
140
145
150
155
160
165
170
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9
PERCENT OF TIME

Figure 13

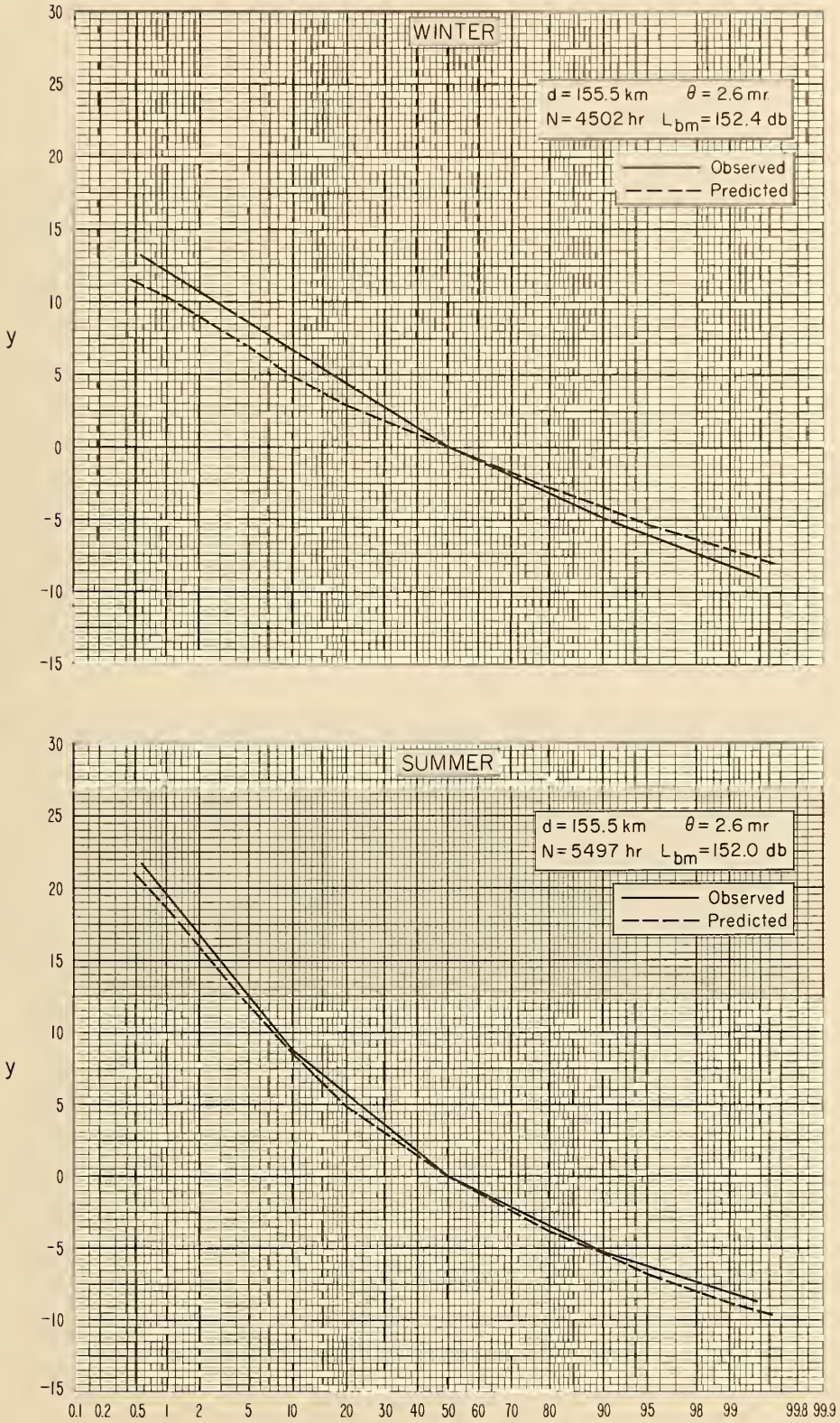

WINTER
d = 155.5 km θ = 2.6 mr
N = 4502 hr L_{bm} = 152.4 db
Observed
Predicted
SUMMER
d = 155.5 km θ = 2.6 mr
N = 5497 hr L_{bm} = 152.0 db
Observed
Predicted
y
30
25
20
15
10
5
0
-5
-10
-15
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9
PERCENT OF TIME

Figure 14

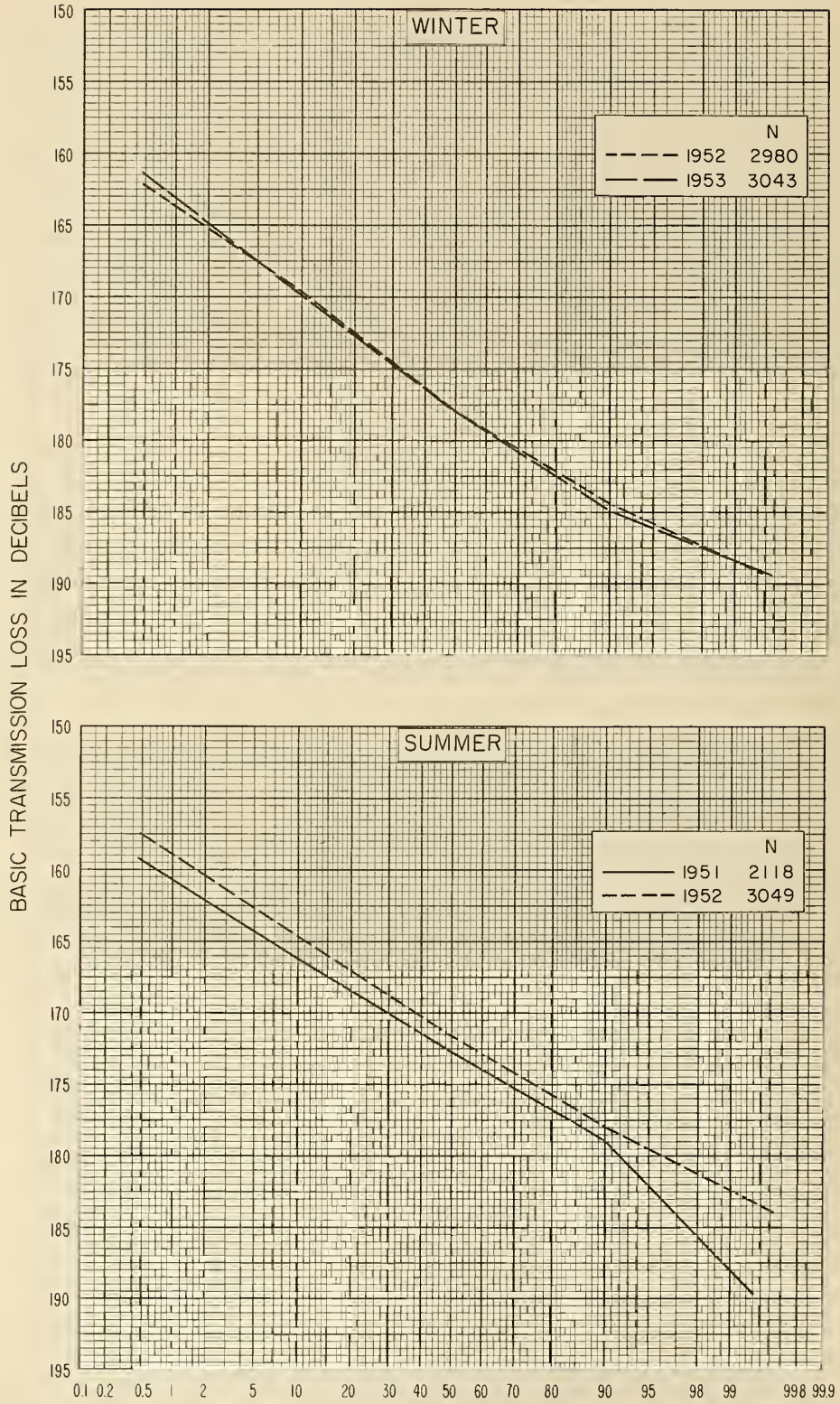

WINTER
N
1952 2980
1953 3043
SUMMER
N
1951 2118
1952 3049
BASIC TRANSMISSION LOSS IN DECIBELS
150
155
160
165
170
175
180
185
190
195
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9
PERCENT OF TIME

Figure 15

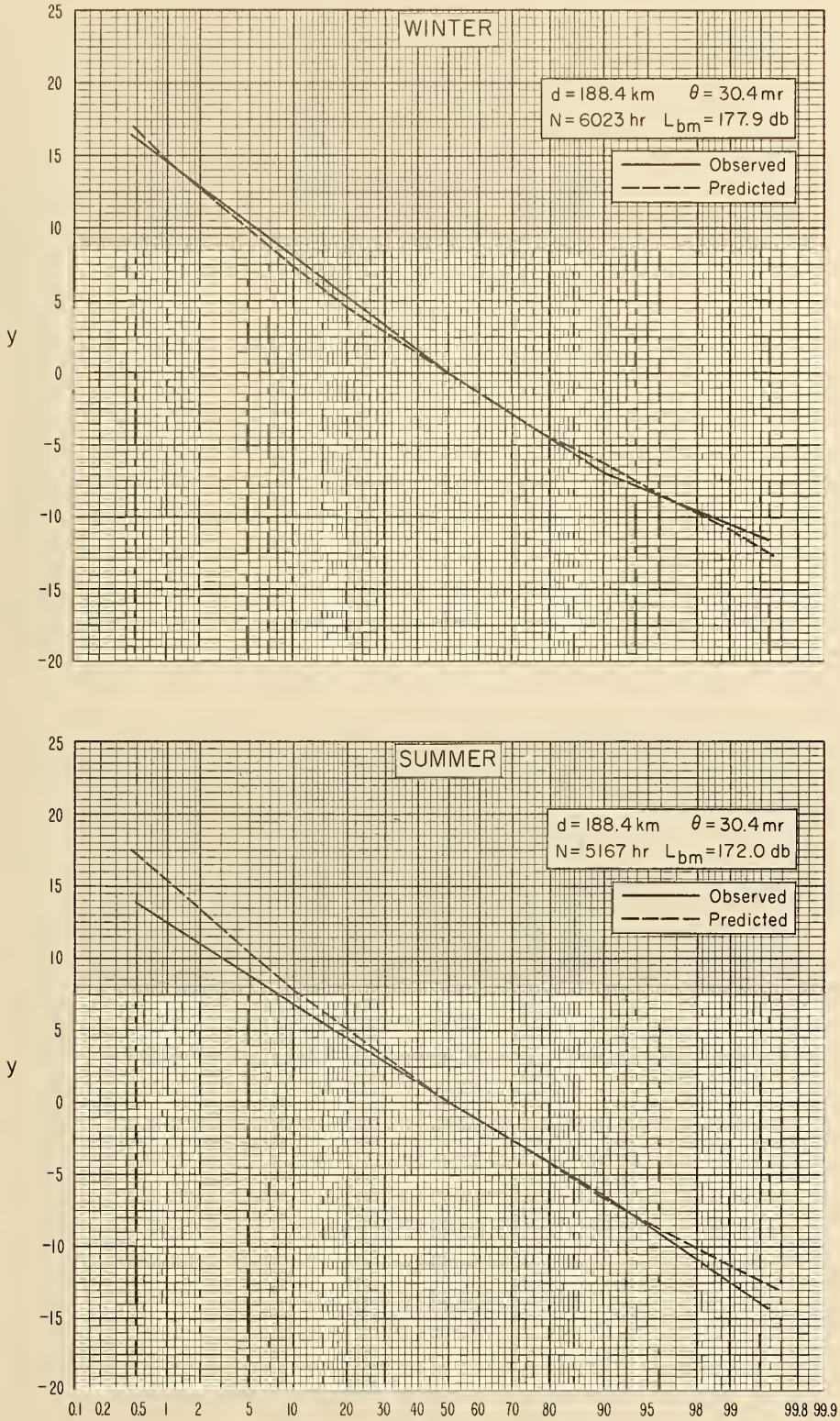

WINTER
d = 188.4 km θ = 30.4 mr
N = 6023 hr Lbm = 177.9 db
Observed
Predicted
SUMMER
d = 188.4 km θ = 30.4 mr
N = 5167 hr Lbm = 172.0 db
Observed
Predicted
y
25
20
15
10
5
0
-5
-10
-15
-20
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9
PERCENT OF TIME

Figure 16

NBS PATH 36

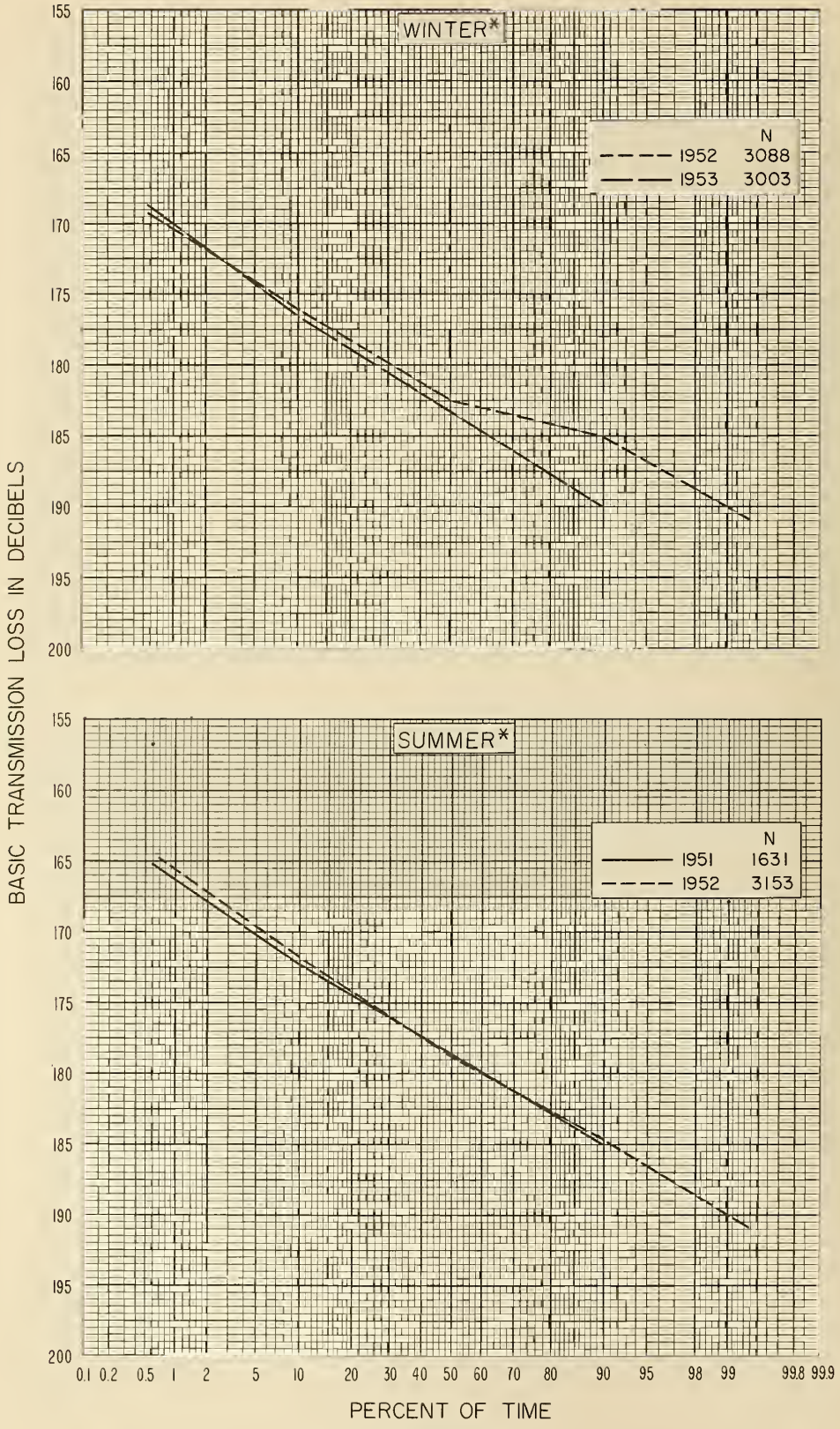


Figure 17

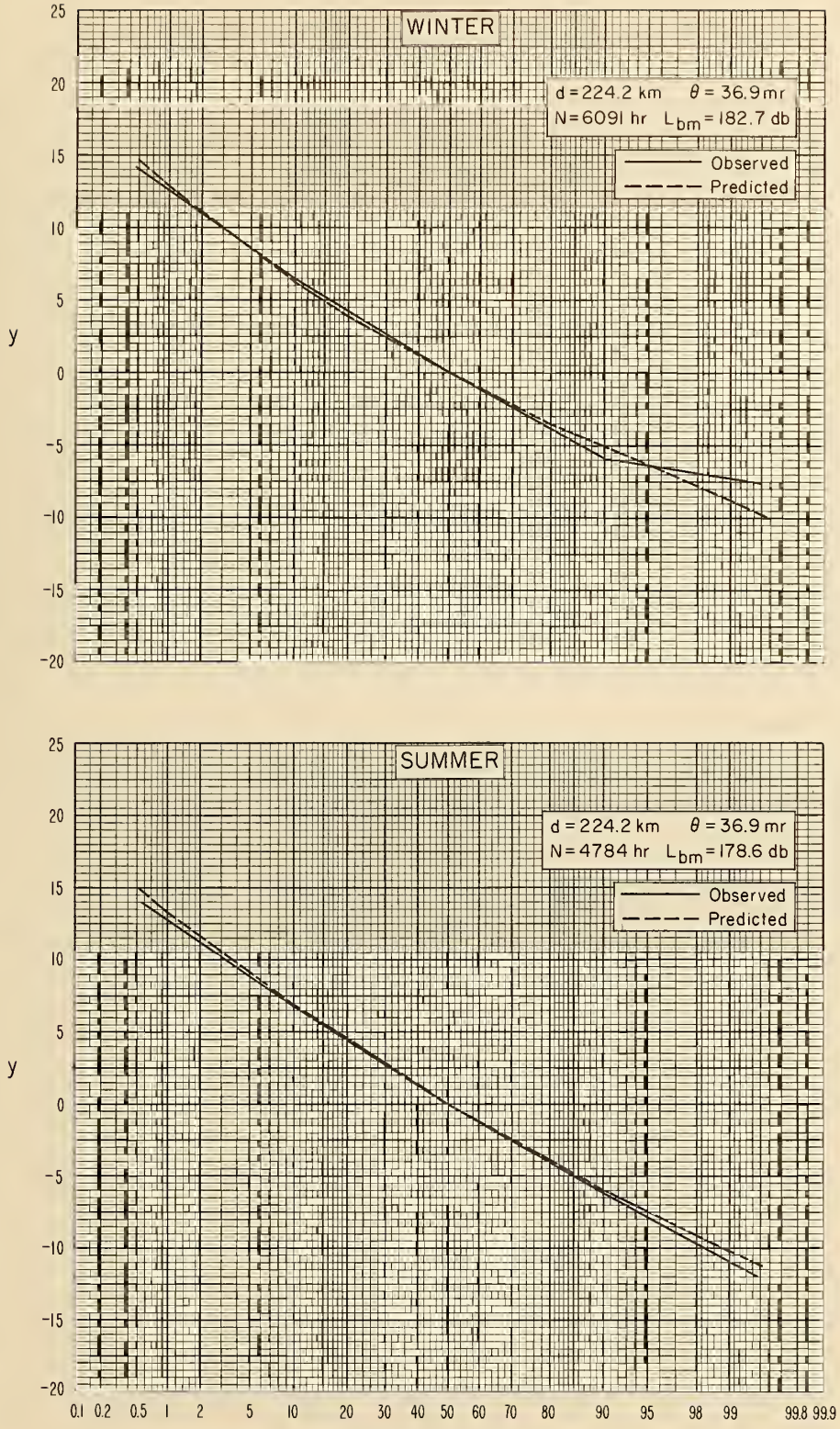

WINTER
d = 224.2 km θ = 36.9 mr
N = 6091 hr L_{bm} = 182.7 db
Observed
Predicted
SUMMER
d = 224.2 km θ = 36.9 mr
N = 4784 hr L_{bm} = 178.6 db
Observed
Predicted
y
25
20
15
10
5
0
-5
-10
-15
-20
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9
PERCENT OF TIME

Figure 18

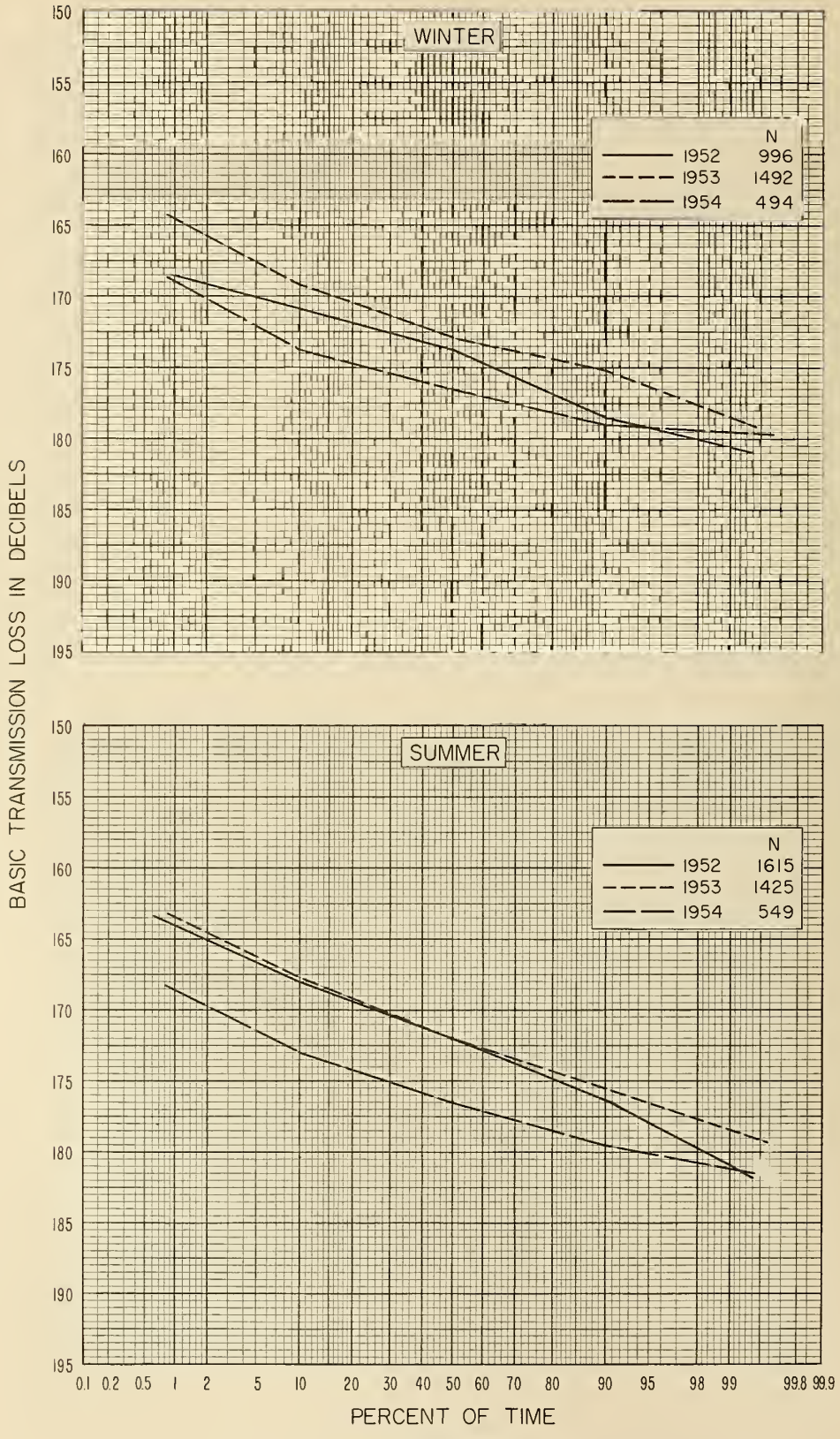

WINTER
N
1952 996
1953 1492
1954 494
SUMMER
N
1952 1615
1953 1425
1954 549
BASIC TRANSMISSION LOSS IN DECIBELS
150
155
160
165
170
175
180
185
190
195
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9
PERCENT OF TIME

Figure 19

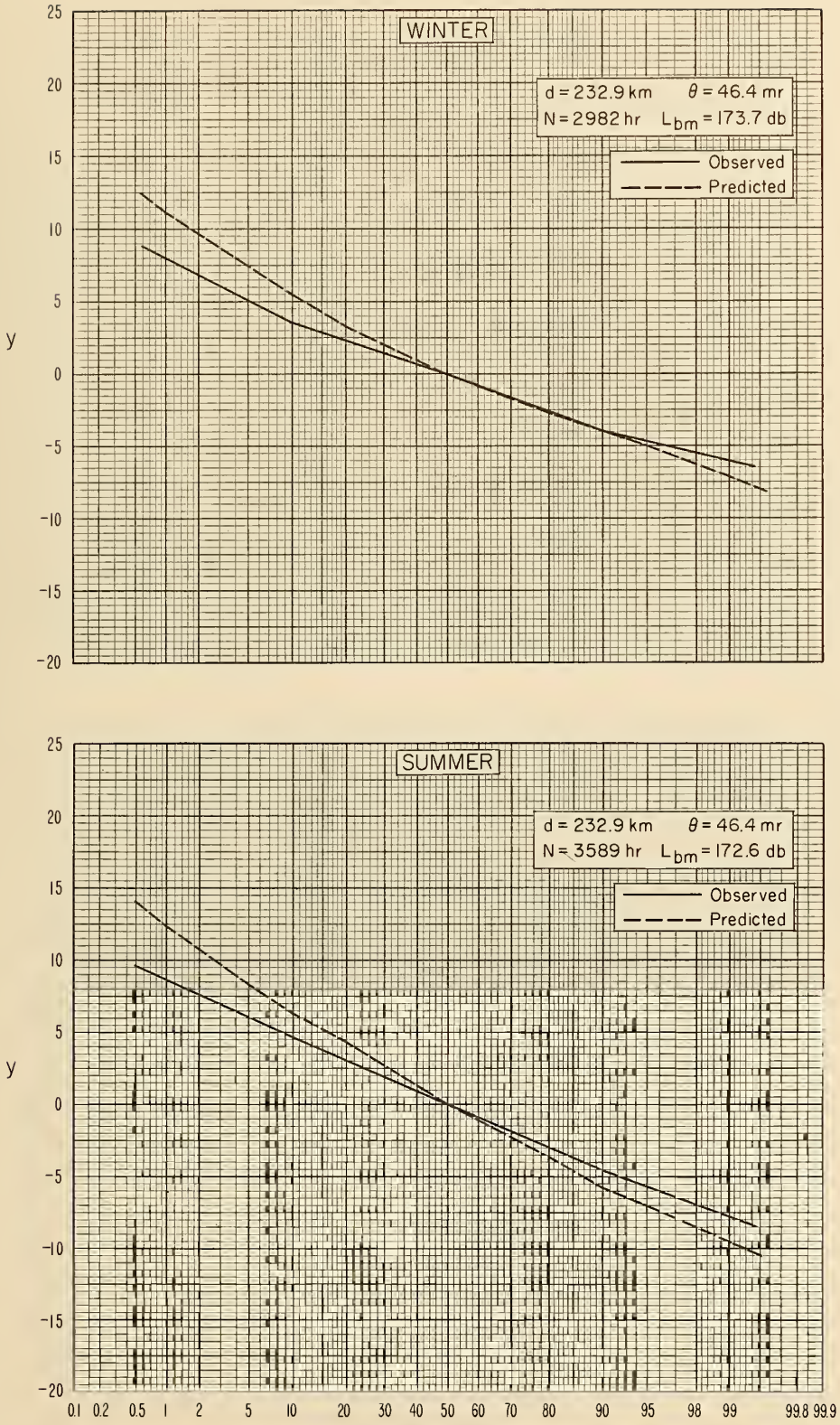

WINTER
d = 232.9 km θ = 46.4 mr
N = 2982 hr L_{bm} = 173.7 db
Observed
Predicted
SUMMER
d = 232.9 km θ = 46.4 mr
N = 3589 hr L_{bm} = 172.6 db
Observed
Predicted
y
25
20
15
10
5
0
-5
-10
-15
-20
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9
PERCENT OF TIME

Figure 20

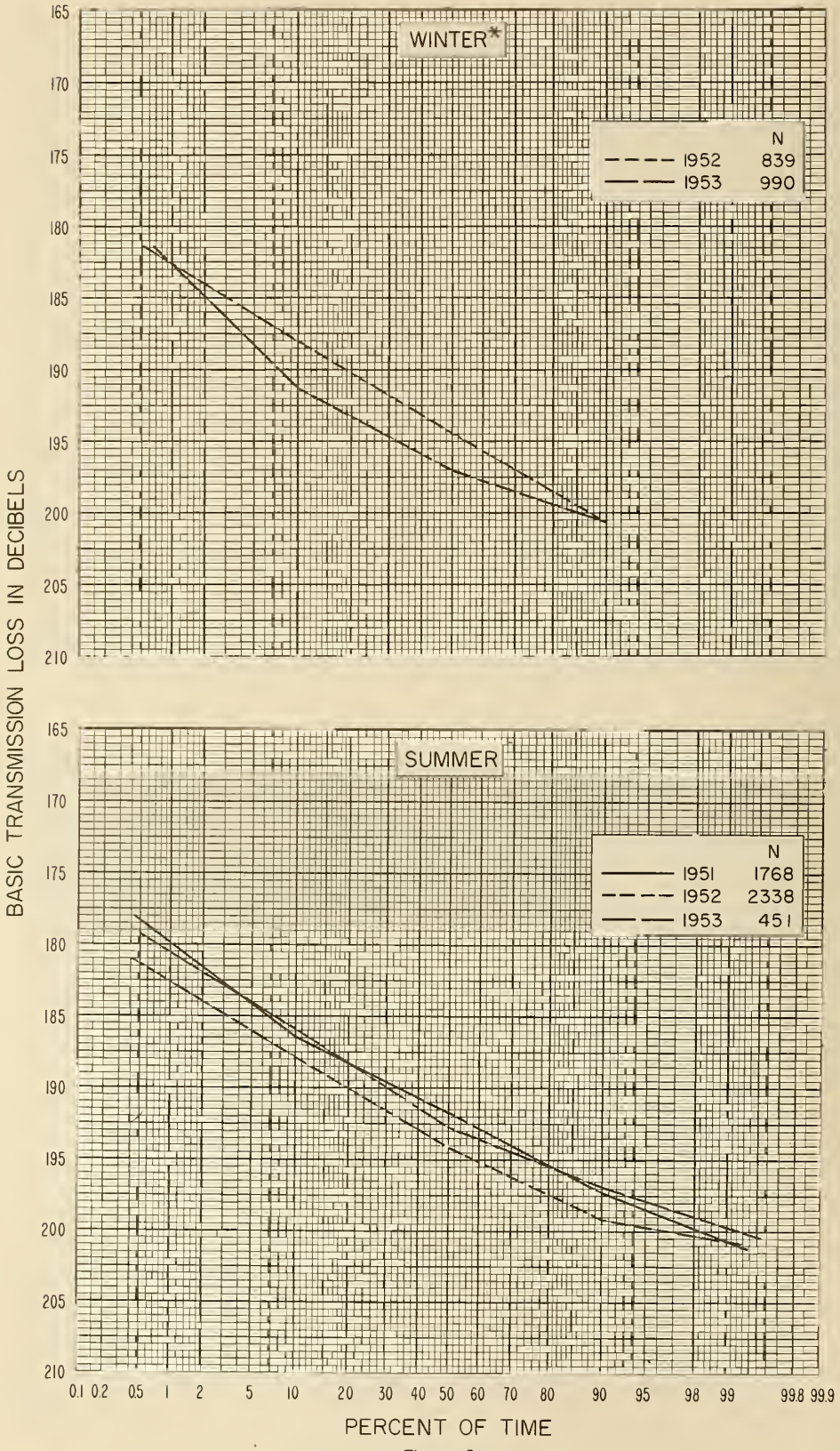

WINTER*
N
1952 839
1953 990
SUMMER
N
1951 1768
1952 2338
1953 451
BASIC TRANSMISSION LOSS IN DECIBELS
165
170
175
180
185
190
195
200
205
210
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9
PERCENT OF TIME

Figure 21

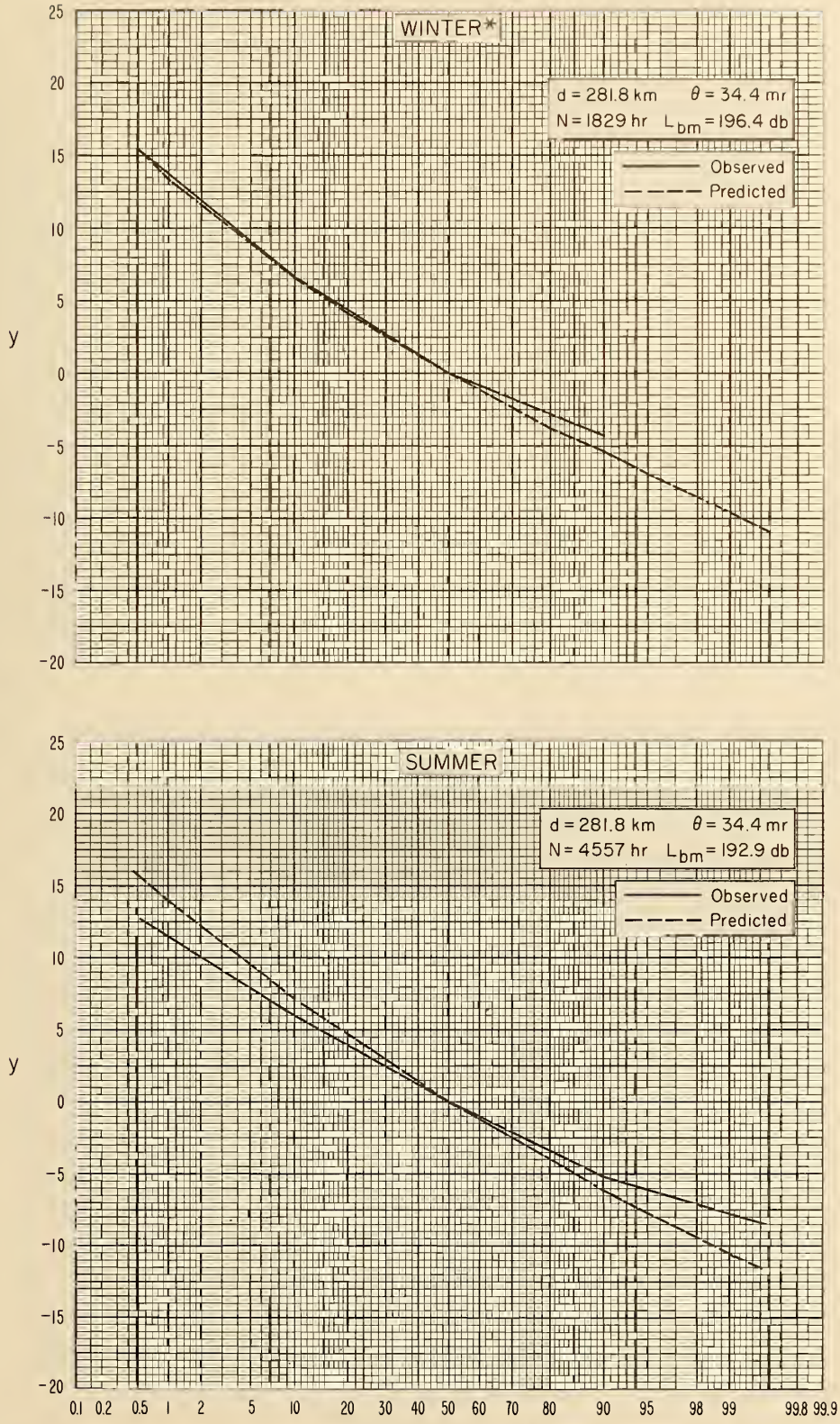

WINTER*
d = 281.8 km θ = 34.4 mr
N = 1829 hr L bm = 196.4 db
Observed
Predicted
SUMMER
d = 281.8 km θ = 34.4 mr
N = 4557 hr L bm = 192.9 db
Observed
Predicted
y
25
20
15
10
5
0
-5
-10
-15
-20
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9
PERCENT OF TIME

Figure 22

NBS PATH 8

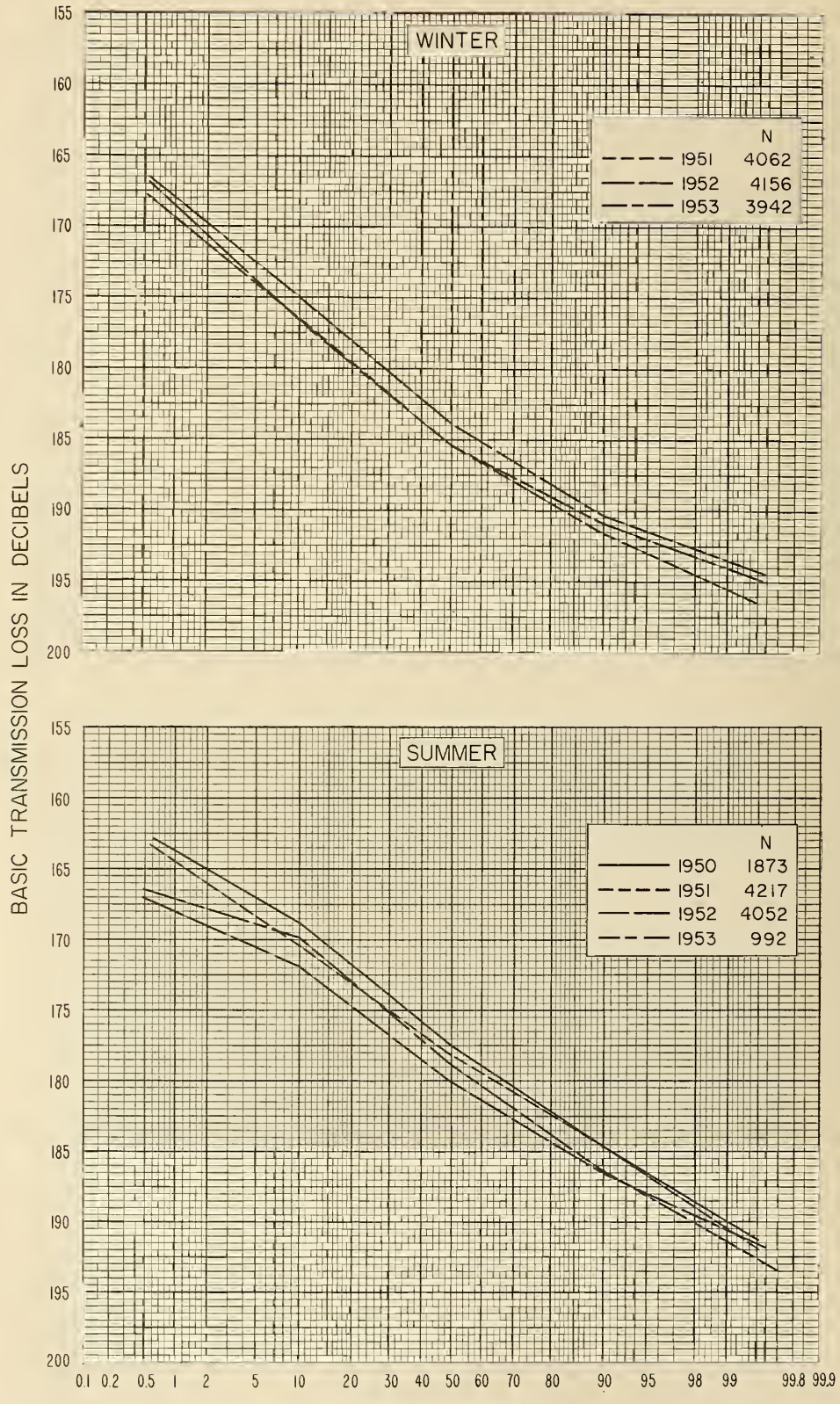


Figure 23

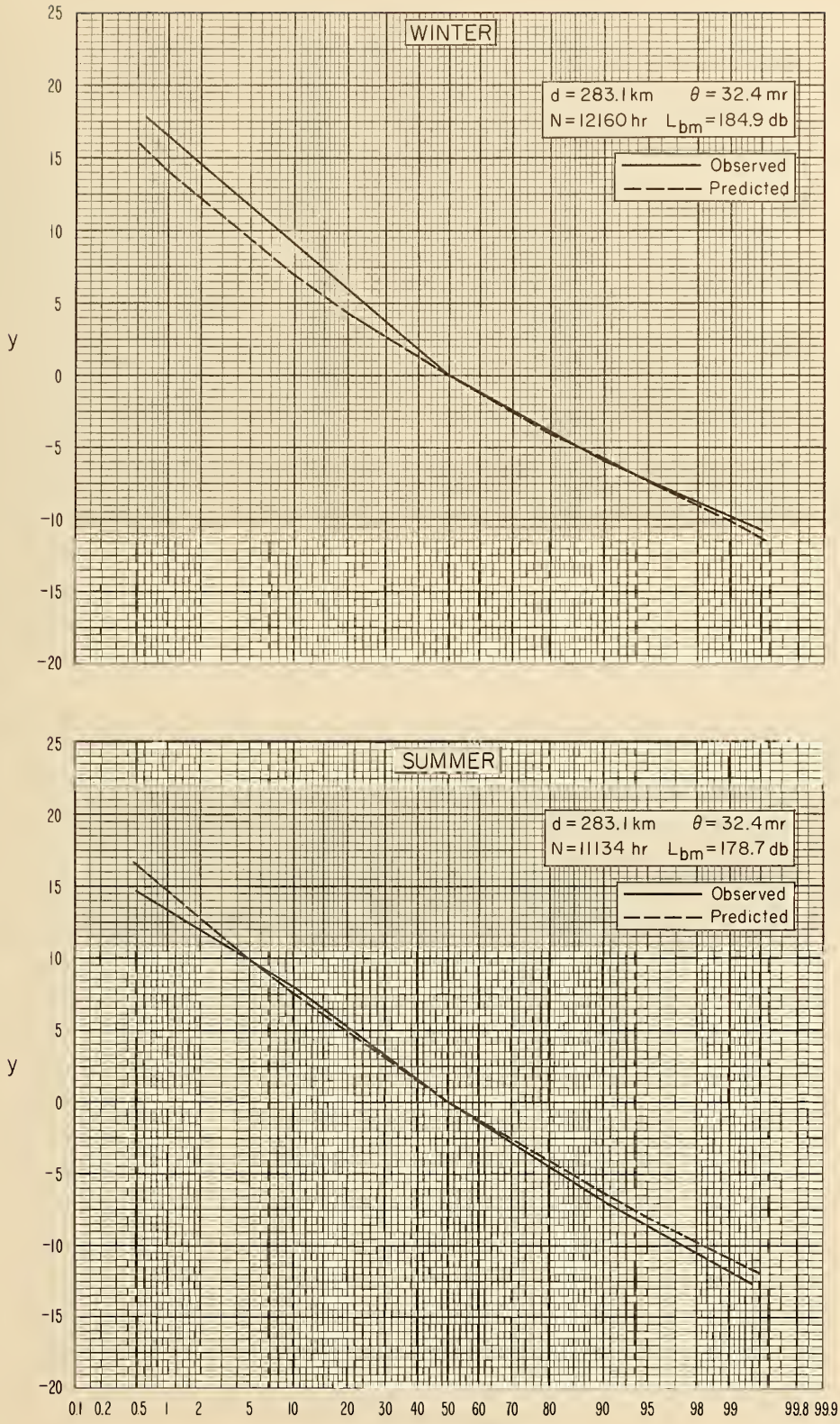

WINTER
d = 283.1 km θ = 32.4 mr
N = 12160 hr Lbm = 184.9 db
Observed
Predicted
SUMMER
d = 283.1 km θ = 32.4 mr
N = 11134 hr Lbm = 178.7 db
Observed
Predicted
y
25
20
15
10
5
0
-5
-10
-15
-20
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9
PERCENT OF TIME

Figure 24

NBS PATH 9

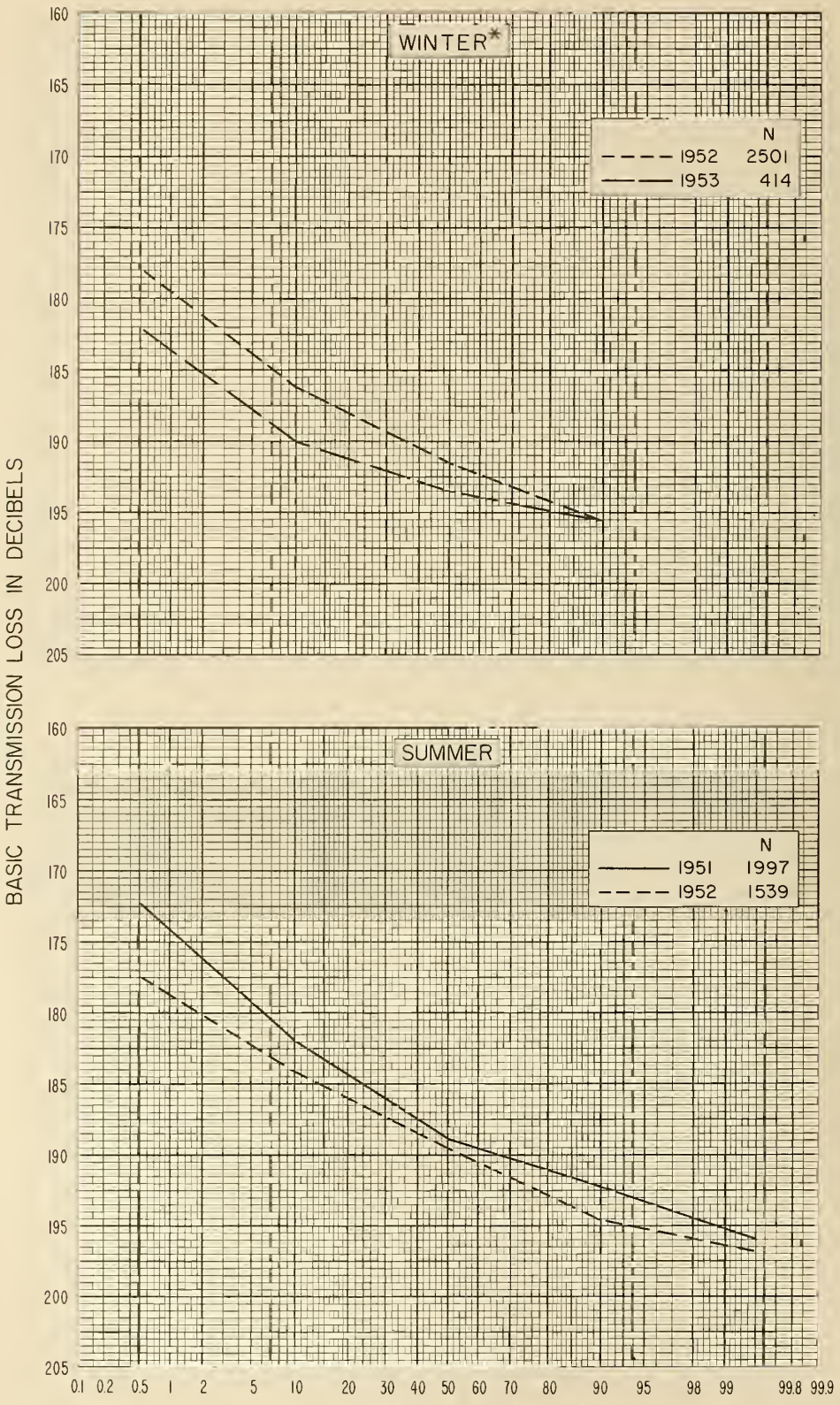


Figure 25

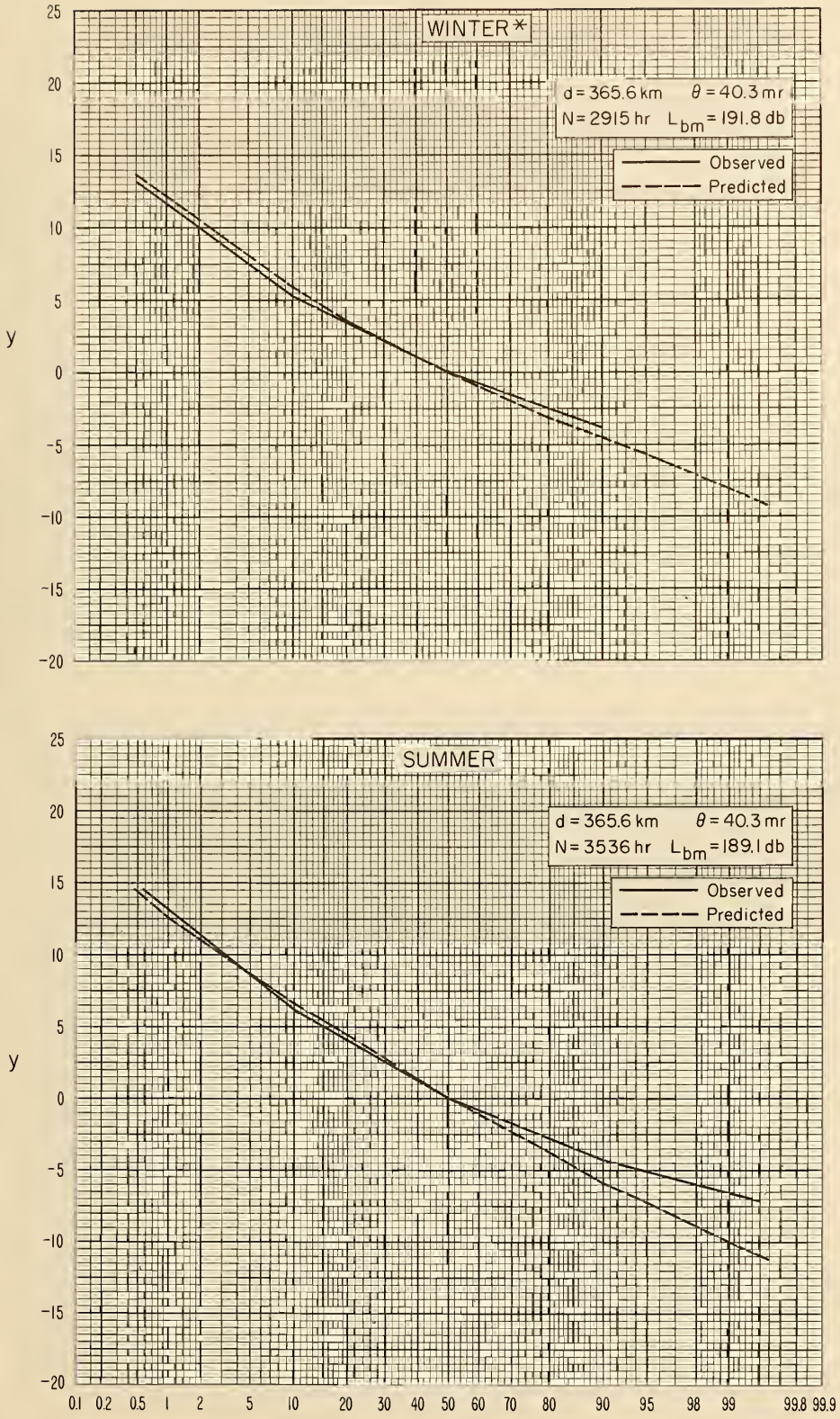

WINTER*
d = 365.6 km θ = 40.3 mr
N = 2915 hr L_{bm} = 191.8 db
Observed
Predicted
SUMMER
d = 365.6 km θ = 40.3 mr
N = 3536 hr L_{bm} = 189.1 db
Observed
Predicted
y
25
20
15
10
5
0
-5
-10
-15
-20
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9
PERCENT OF TIME

Figure 26

NBS PATH 18

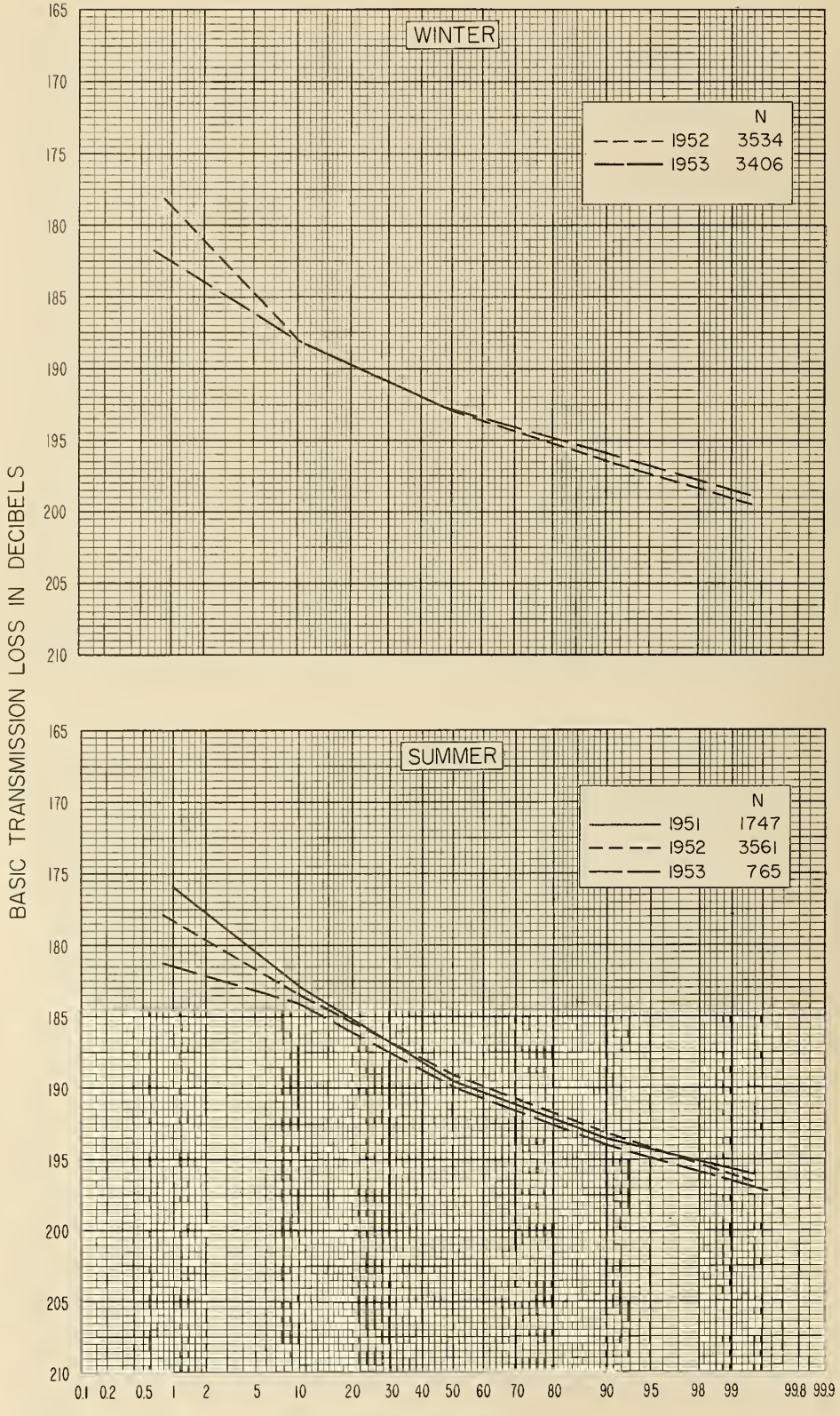


Figure 27

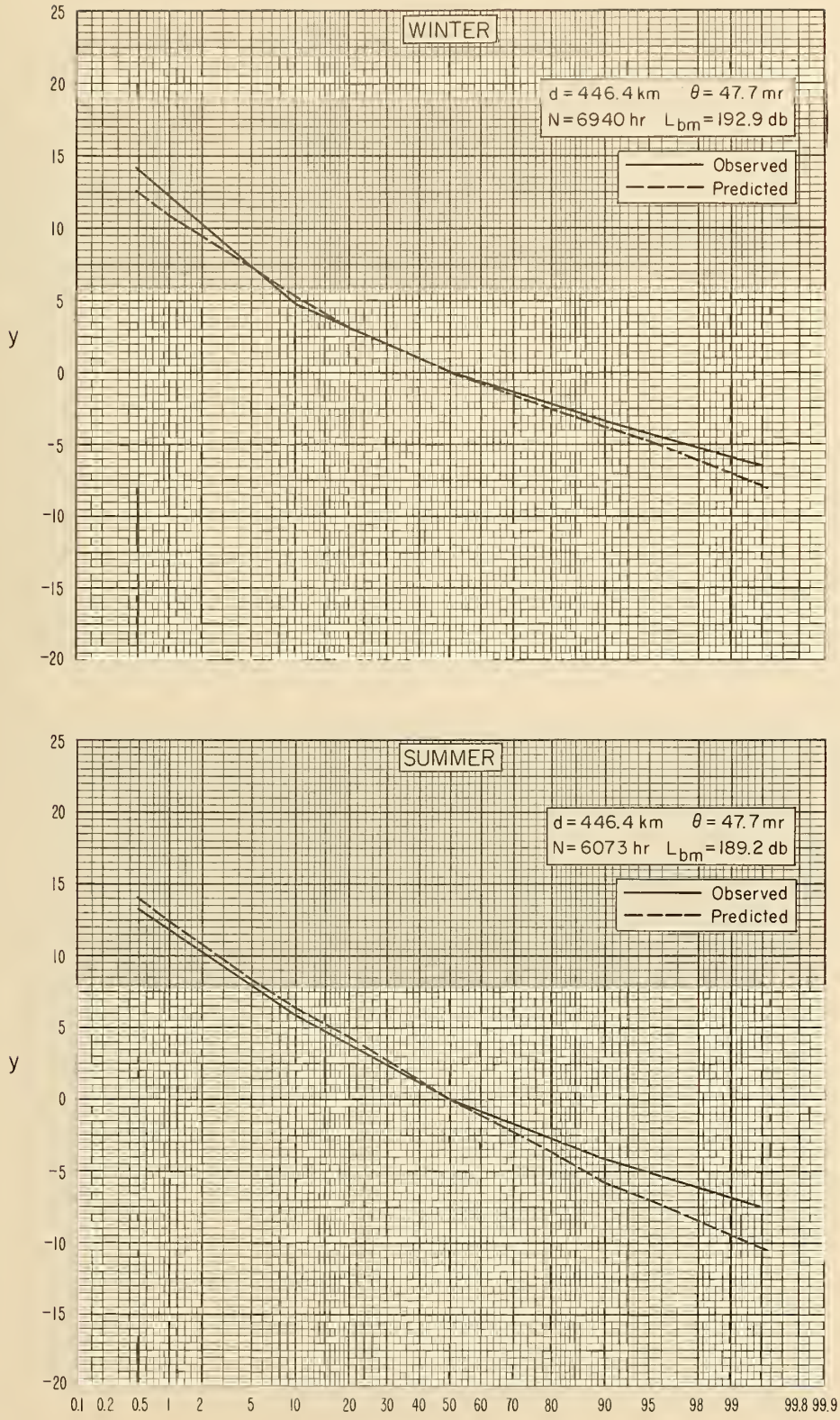

WINTER
d = 446.4 km θ = 47.7 mr
N = 6940 hr L_{bm} = 192.9 db
Observed
Predicted
SUMMER
d = 446.4 km θ = 47.7 mr
N = 6073 hr L_{bm} = 189.2 db
Observed
Predicted
y
25
20
15
10
5
0
-5
-10
-15
-20
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9
PERCENT OF TIME

Figure 28

NBS PATH 5

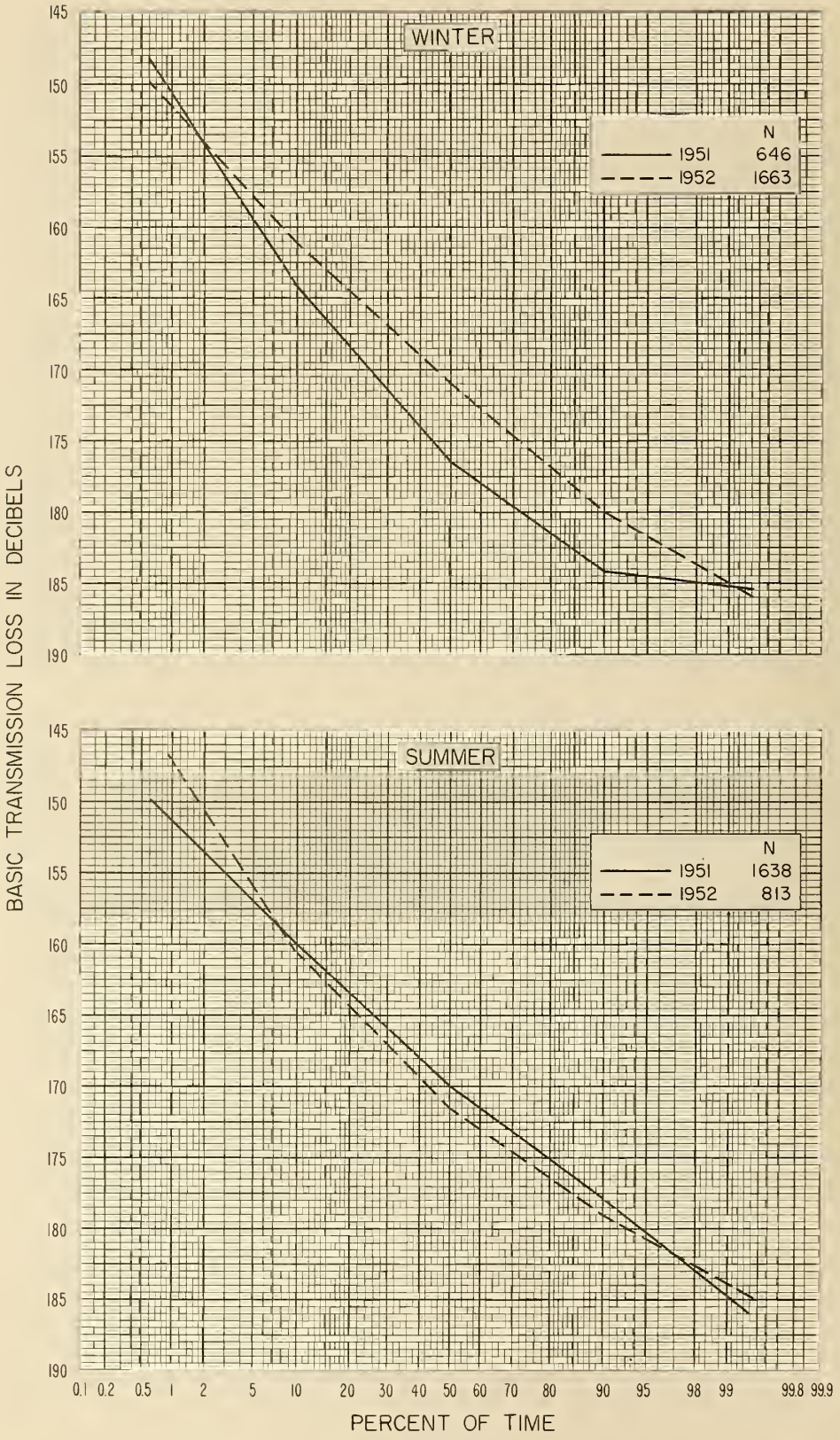
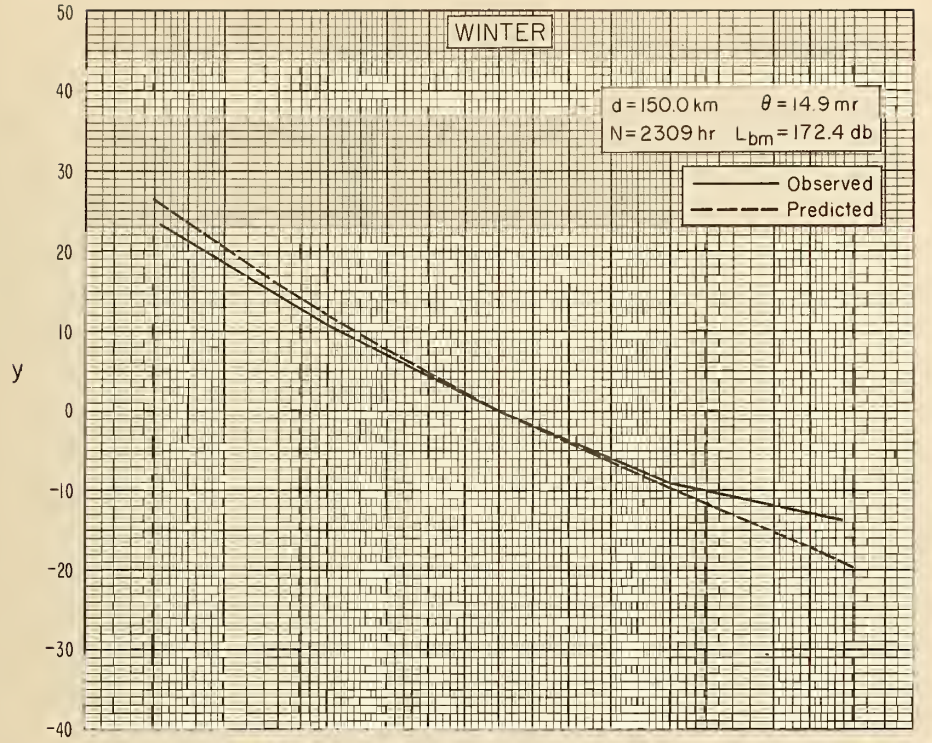


Figure 29


WINTER
d = 150.0 km θ = 14.9 mr
N = 2309 hr L_{bm} = 172.4 db
Observed
Predicted
y
50
40
30
20
10
0
-10
-20
-30
-40

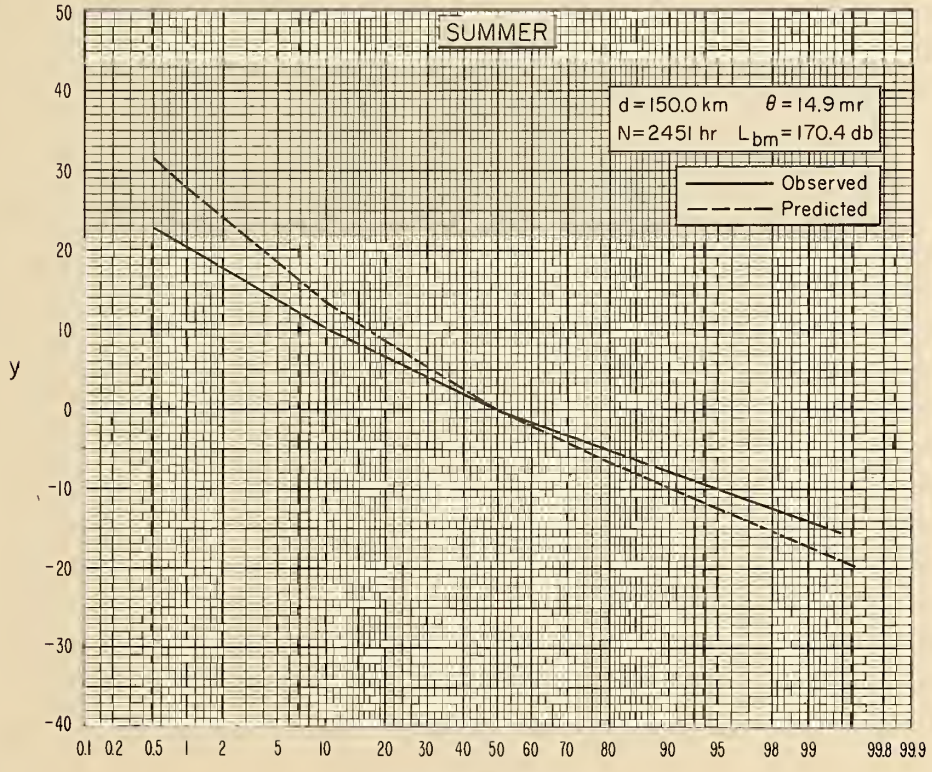

SUMMER
d = 150.0 km θ = 14.9 mr
N = 2451 hr L_{bm} = 170.4 db
Observed
Predicted
y
50
40
30
20
10
0
-10
-20
-30
-40
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9
PERCENT OF TIME

Figure 30

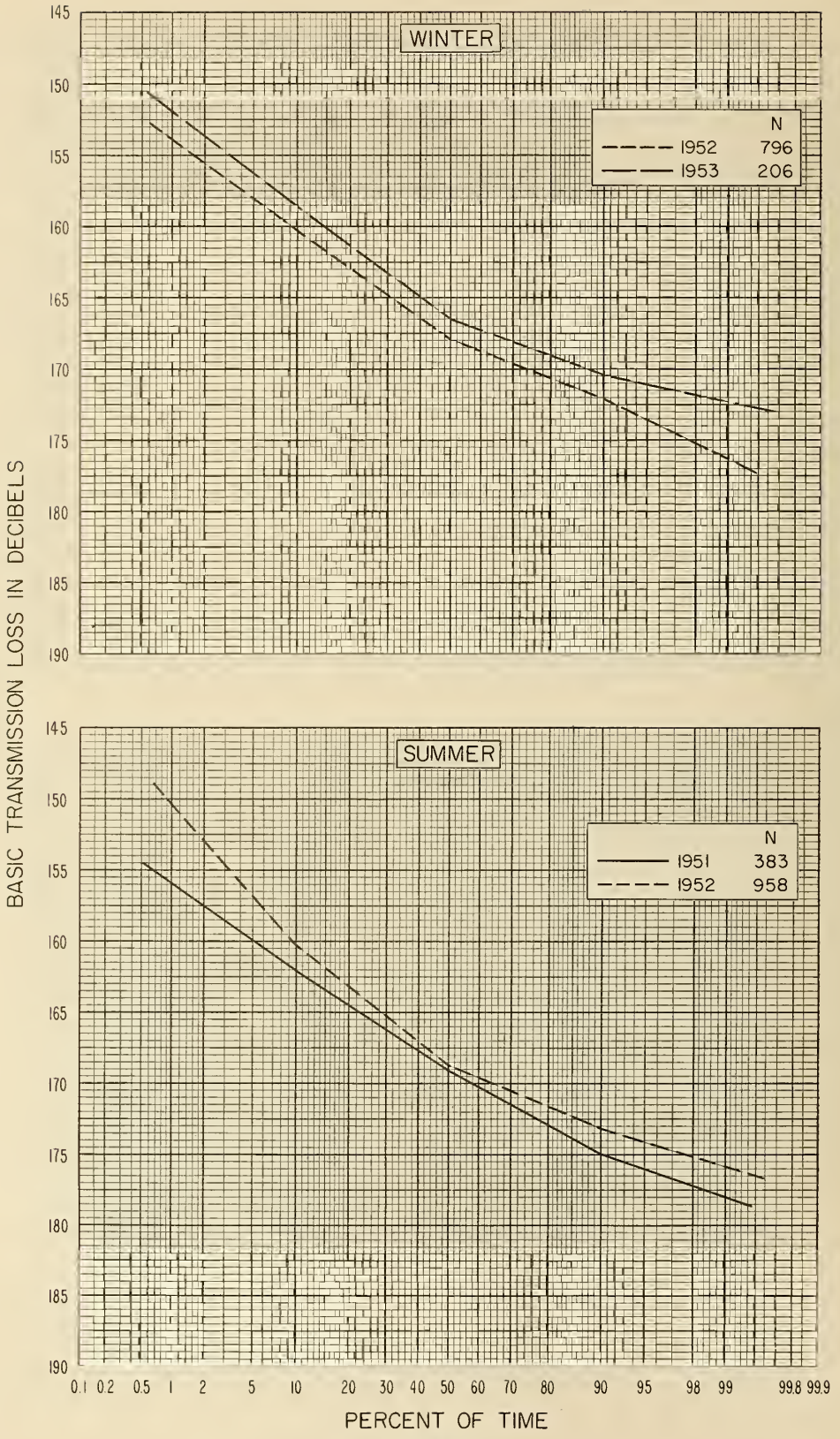

WINTER
N
1952 796
1953 206
SUMMER
N
1951 383
1952 958
BASIC TRANSMISSION LOSS IN DECIBELS
145
150
155
160
165
170
175
180
185
190
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9
PERCENT OF TIME

Figure 31

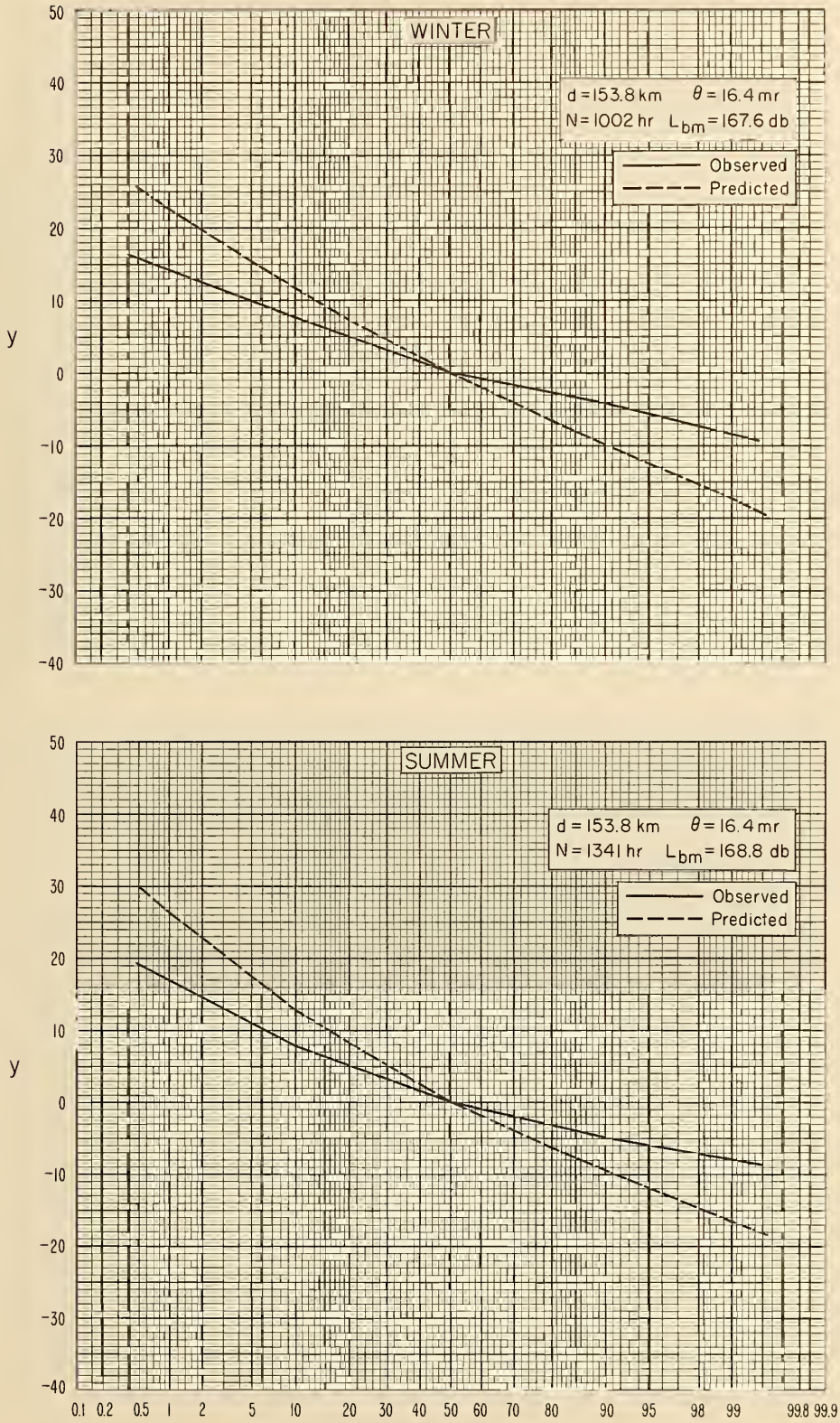

WINTER
d = 153.8 km θ = 16.4 mr
N = 1002 hr L_{bm} = 167.6 db
Observed
Predicted
SUMMER
d = 153.8 km θ = 16.4 mr
N = 1341 hr L_{bm} = 168.8 db
Observed
Predicted
y
50
40
30
20
10
0
-10
-20
-30
-40
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9
PERCENT OF TIME

Figure 32

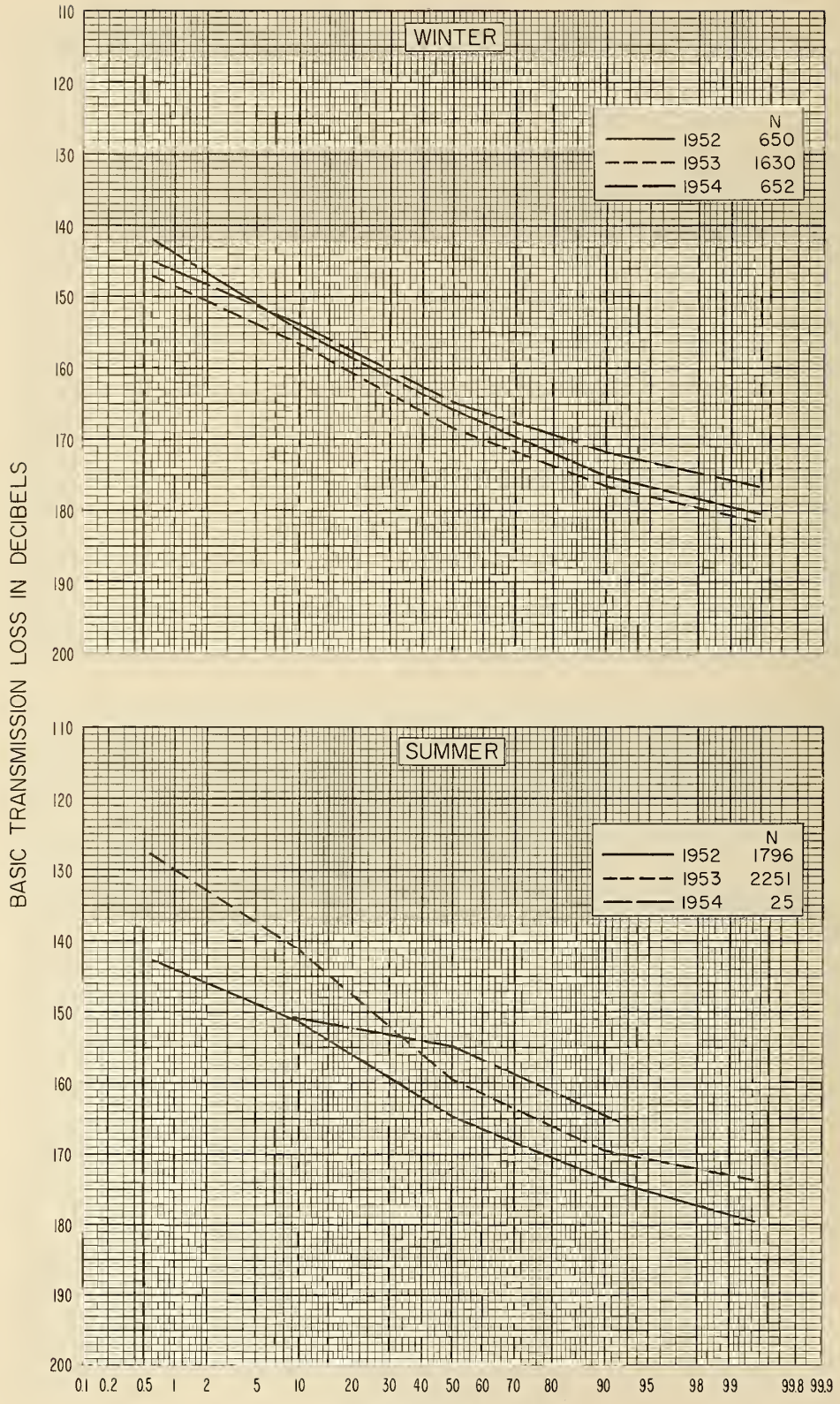

WINTER
N
1952 650
1953 1630
1954 652
SUMMER
N
1952 1796
1953 2251
1954 25
BASIC TRANSMISSION LOSS IN DECIBELS
110
120
130
140
150
160
170
180
190
200
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9
PERCENT OF TIME

Figure 33

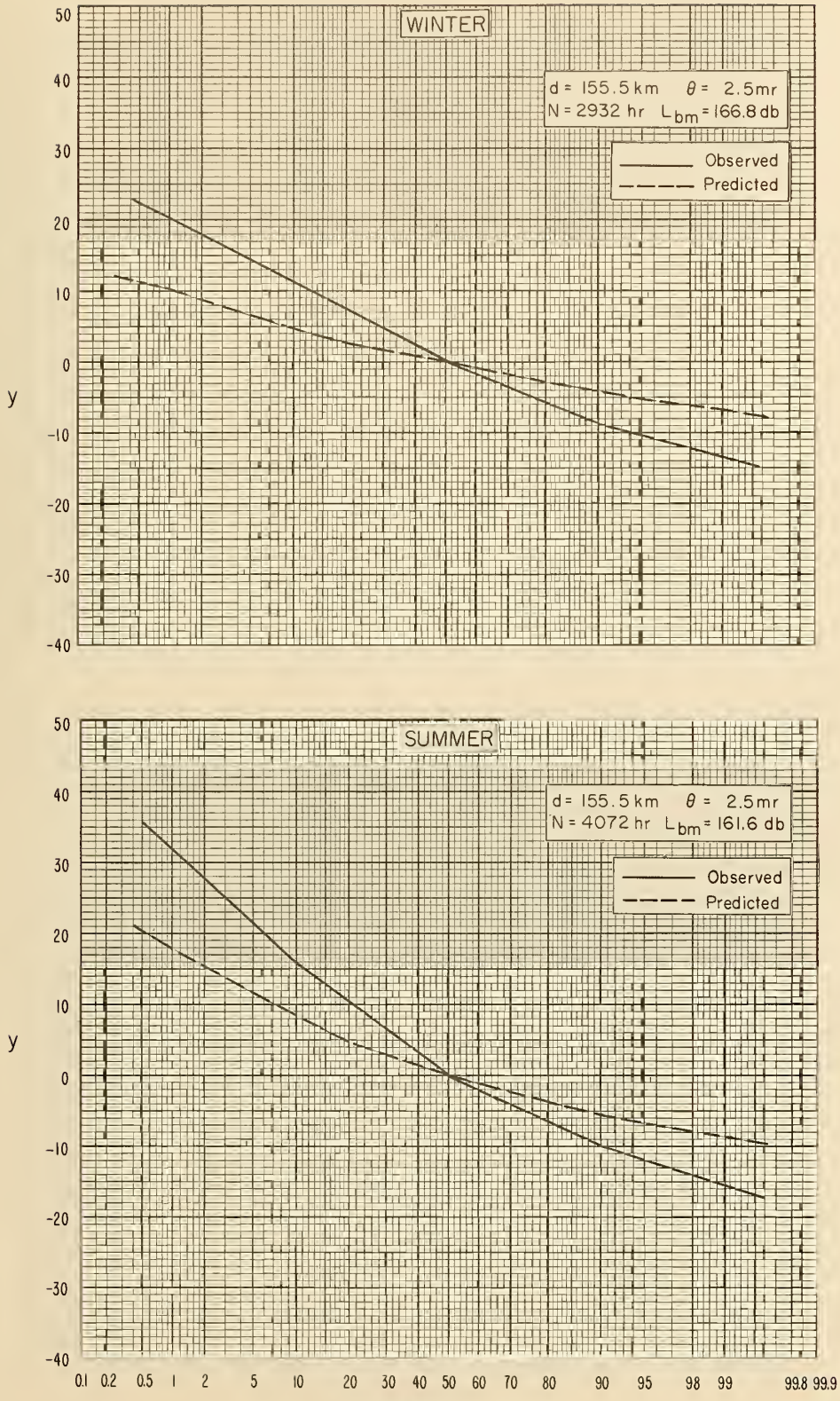

WINTER
d = 155.5 km θ = 2.5mr
N = 2932 hr L_{bm} = 166.8 db
Observed
Predicted
SUMMER
d = 155.5 km θ = 2.5mr
N = 4072 hr L_{bm} = 161.6 db
Observed
Predicted
y
50
40
30
20
10
0
-10
-20
-30
-40
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9
PERCENT OF TIME

Figure 34

NBS PATH 3

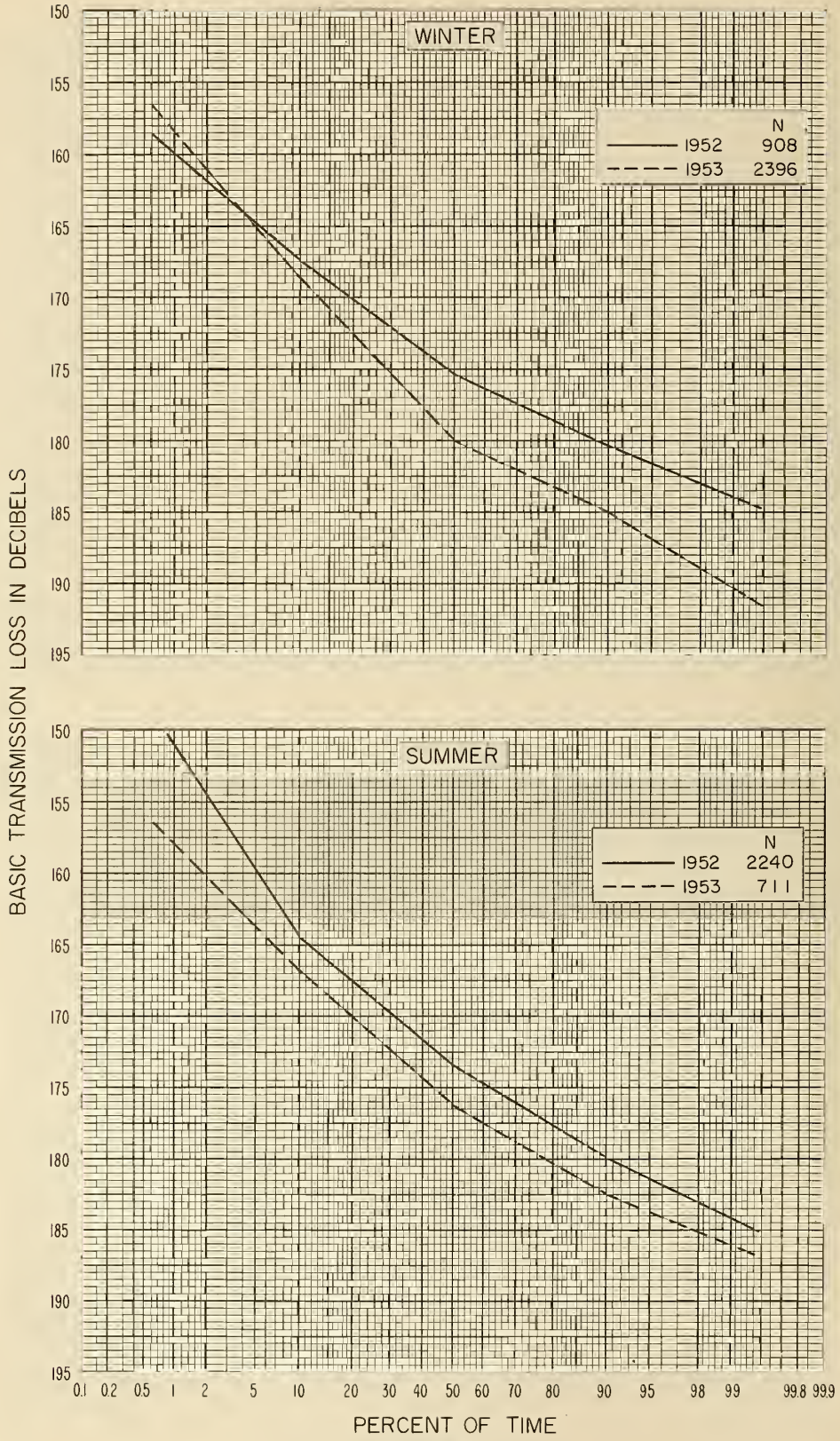


Figure 35

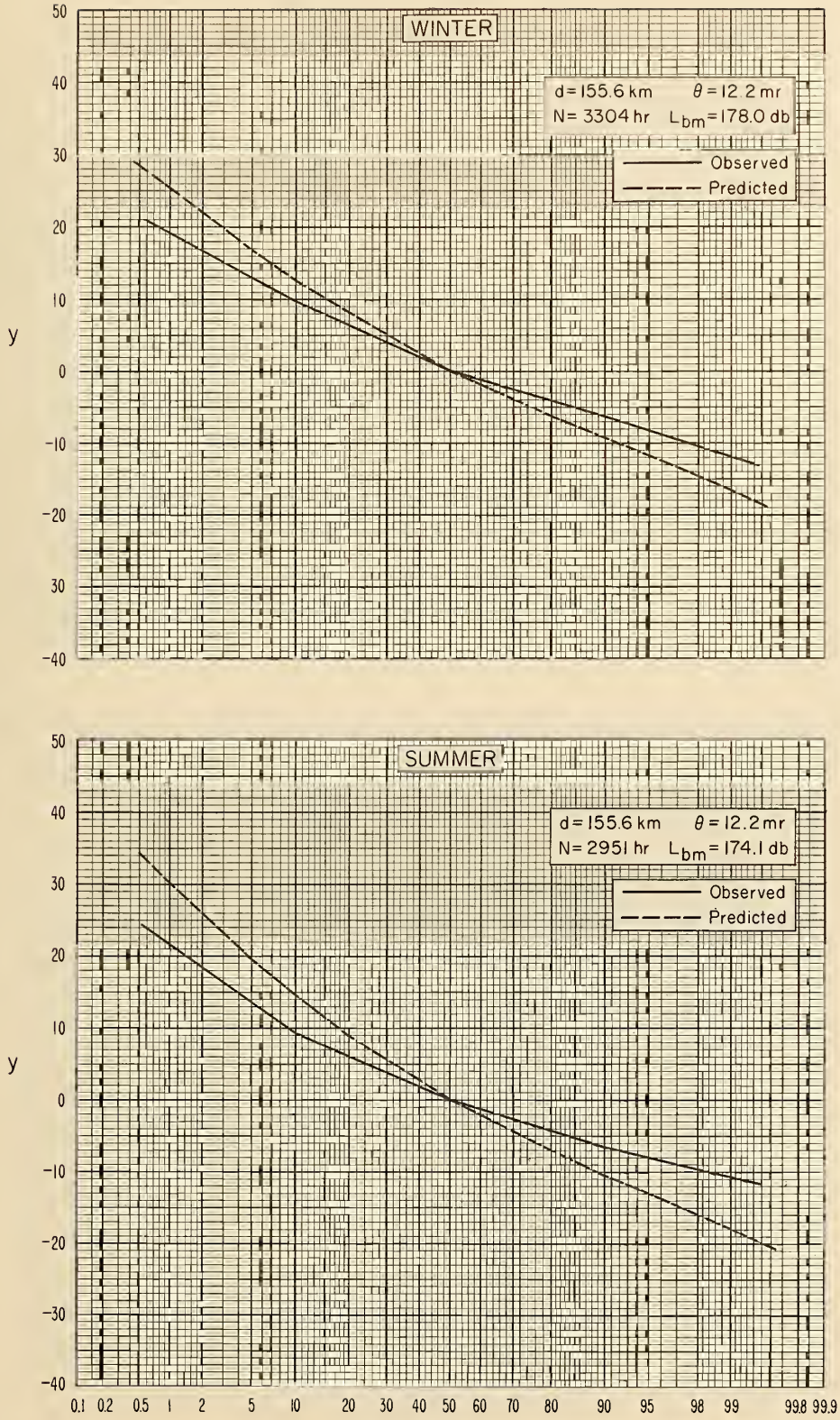

WINTER
d = 155.6 km θ = 12.2 mr
N = 3304 hr L_{bm} = 178.0 db
Observed
Predicted
SUMMER
d = 155.6 km θ = 12.2 mr
N = 2951 hr L_{bm} = 174.1 db
Observed
Predicted
y
50
40
30
20
10
0
-10
-20
-30
-40
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9
PERCENT OF TIME

Figure 36

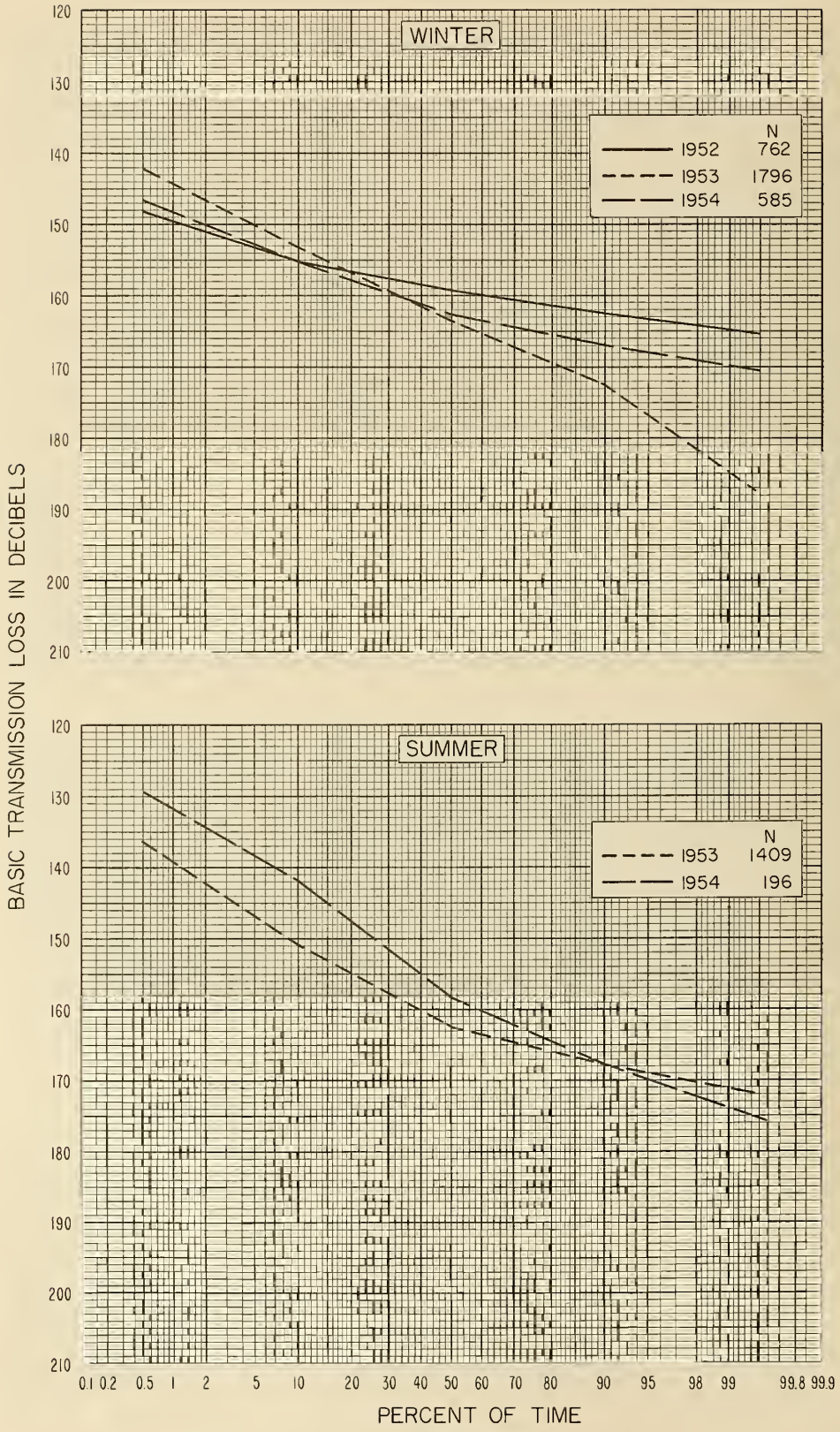

WINTER
N
1952 762
1953 1796
1954 585
SUMMER
N
1953 1409
1954 196
BASIC TRANSMISSION LOSS IN DECIBELS
120
130
140
150
160
170
180
190
200
210
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9
PERCENT OF TIME

Figure 37

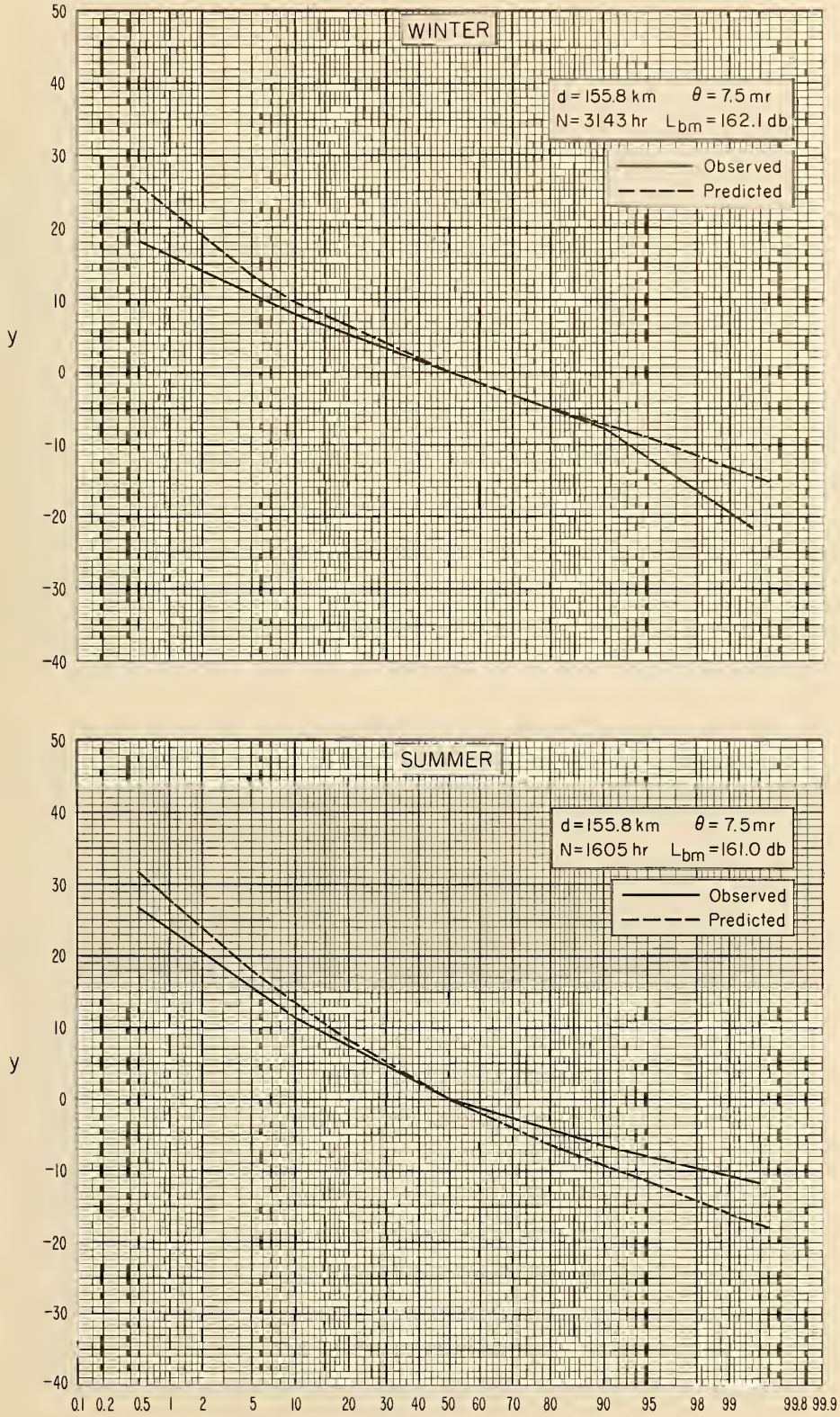

WINTER
d = 155.8 km θ = 7.5 mr
N = 3143 hr Lbm = 162.1 db
Observed
Predicted
SUMMER
d = 155.8 km θ = 7.5 mr
N = 1605 hr Lbm = 161.0 db
Observed
Predicted
y
50
40
30
20
10
0
-10
-20
-30
-40
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9
PERCENT OF TIME

Figure 38

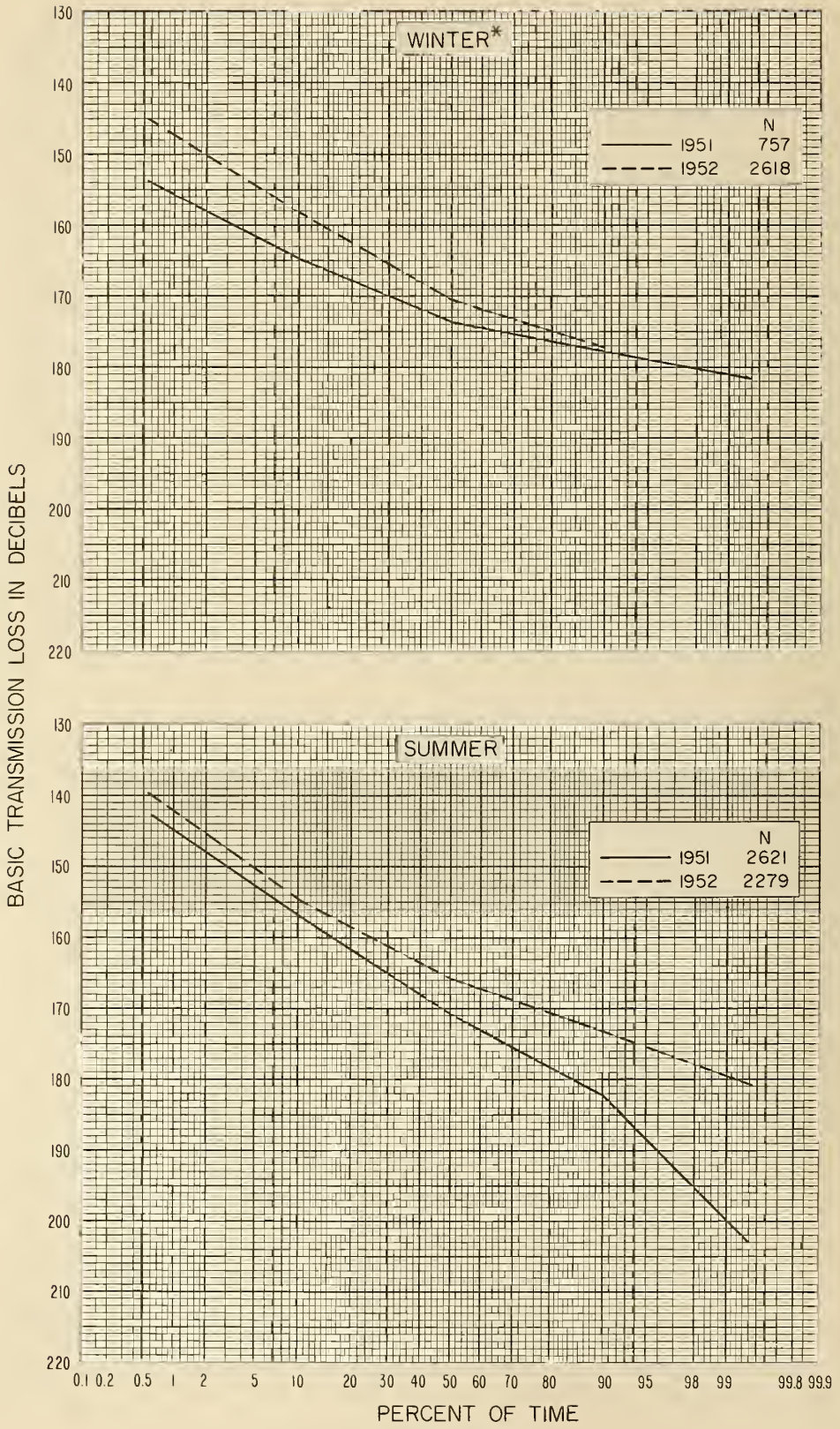

WINTER*
N
1951 757
1952 2618
SUMMER
N
1951 2621
1952 2279
BASIC TRANSMISSION LOSS IN DECIBELS
130
140
150
160
170
180
190
200
210
220
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9
PERCENT OF TIME

Figure 39

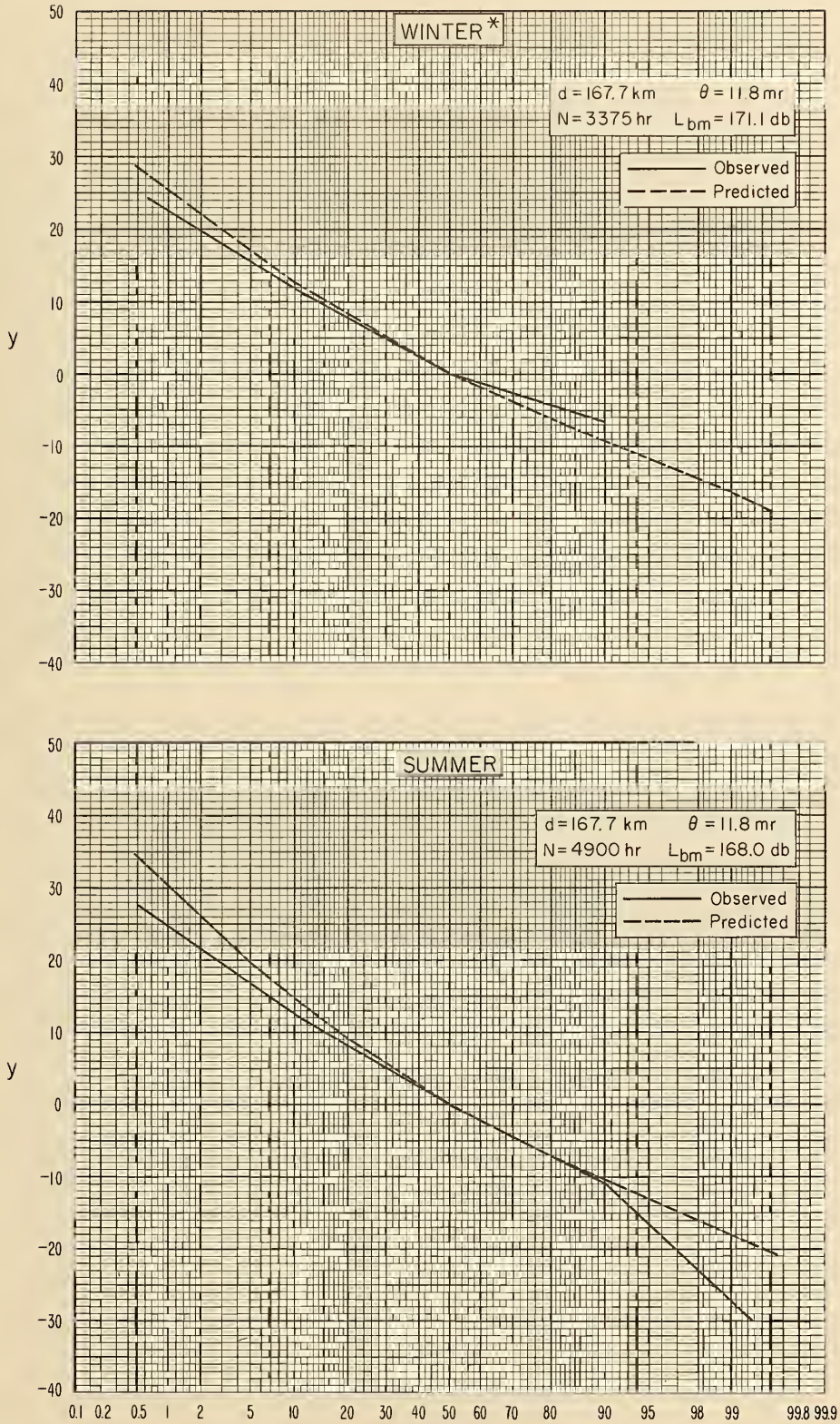

WINTER*
d = 167.7 km θ = 11.8 mr
N = 3375 hr L bm = 171.1 db
Observed
Predicted
SUMMER
d = 167.7 km θ = 11.8 mr
N = 4900 hr L bm = 168.0 db
Observed
Predicted
y
50
40
30
20
10
0
-10
-20
-30
-40
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9
PERCENT OF TIME

Figure 40

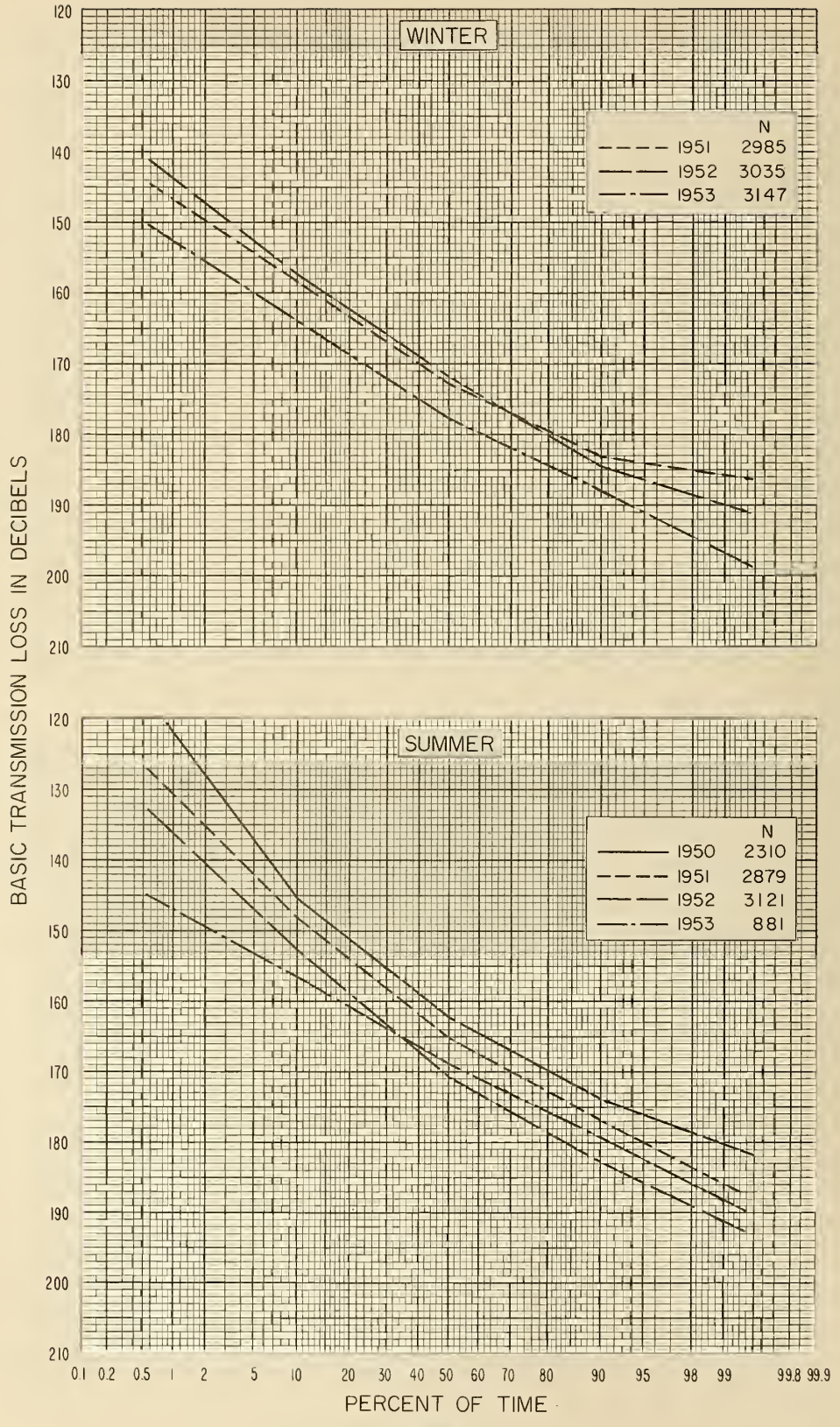

WINTER
N
1951 2985
1952 3035
1953 3147
SUMMER
N
1950 2310
1951 2879
1952 3121
1953 881
BASIC TRANSMISSION LOSS IN DECIBELS
120
130
140
150
160
170
180
190
200
210
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9
PERCENT OF TIME

Figure 41

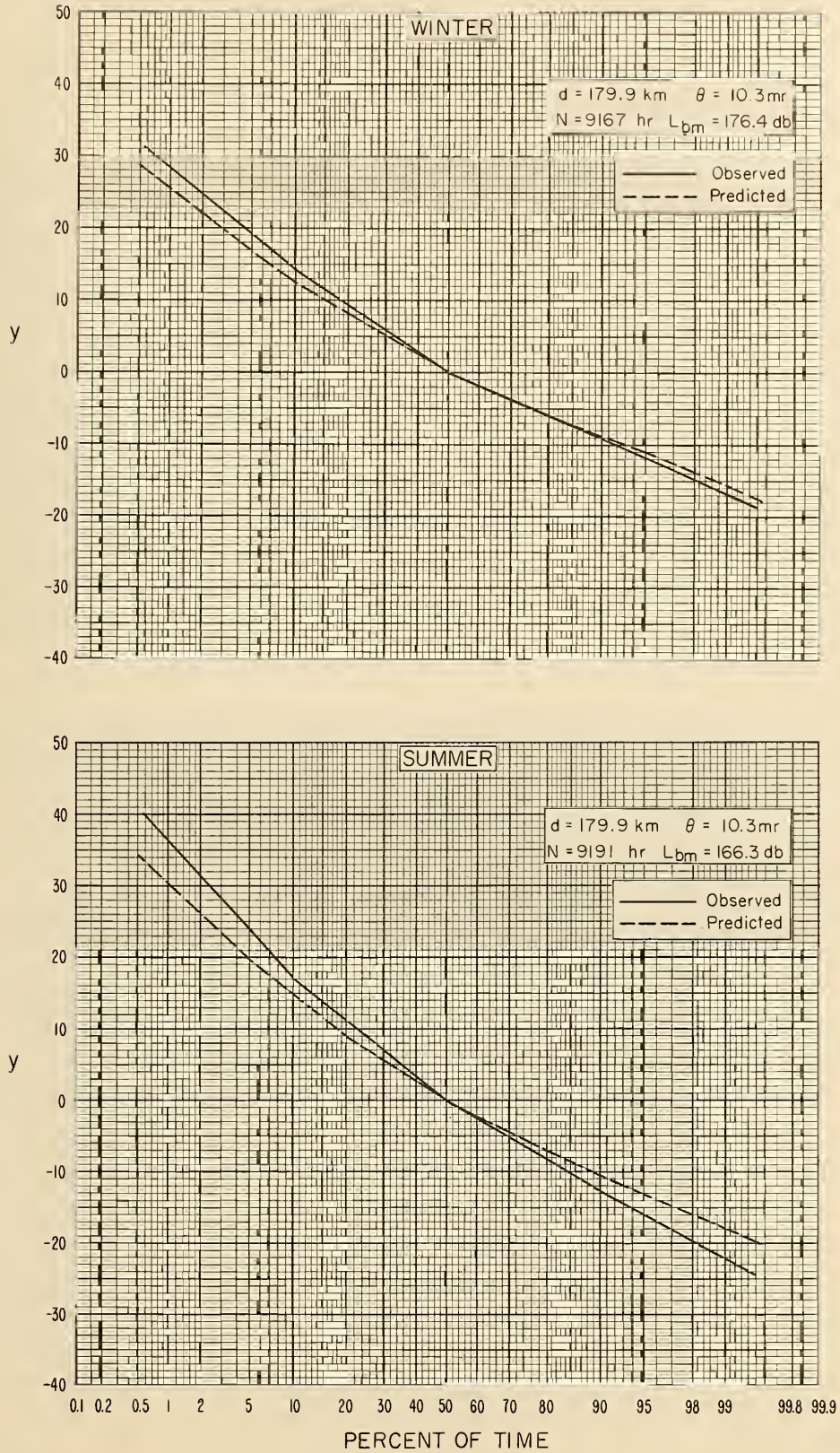

WINTER
d = 179.9 km θ = 10.3mr
N = 9167 hr Lbm = 176.4 db
Observed
Predicted
SUMMER
d = 179.9 km θ = 10.3mr
N = 9191 hr Lbm = 166.3 db
Observed
Predicted
y
50
40
30
20
10
0
-10
-20
-30
-40
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9
PERCENT OF TIME

Figure 42

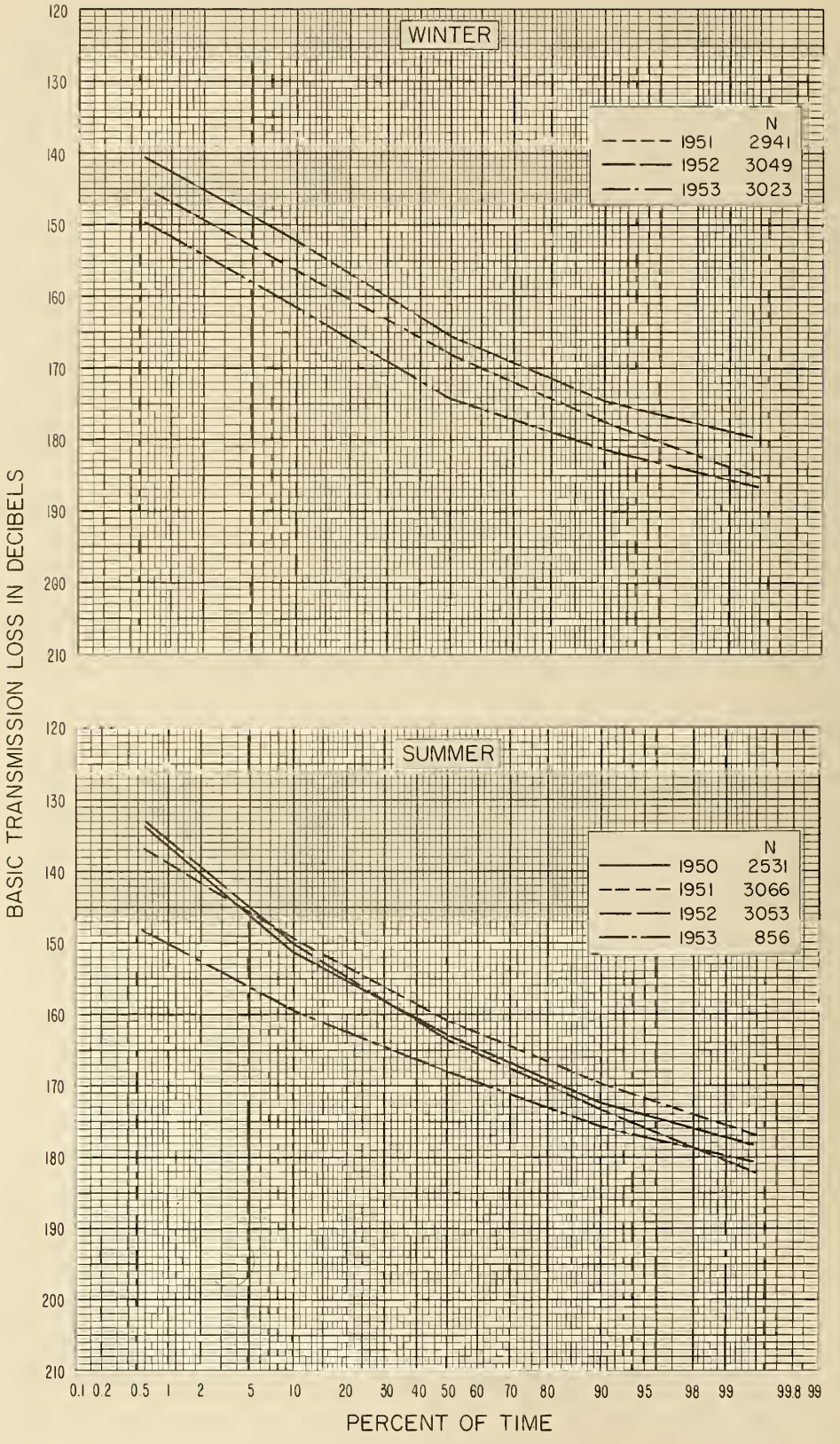

WINTER
N
1951 2941
1952 3049
1953 3023
SUMMER
N
1950 2531
1951 3066
1952 3053
1953 856
BASIC TRANSMISSION LOSS IN DECIBELS
120
130
140
150
160
170
180
190
200
210
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99
PERCENT OF TIME

Figure 43

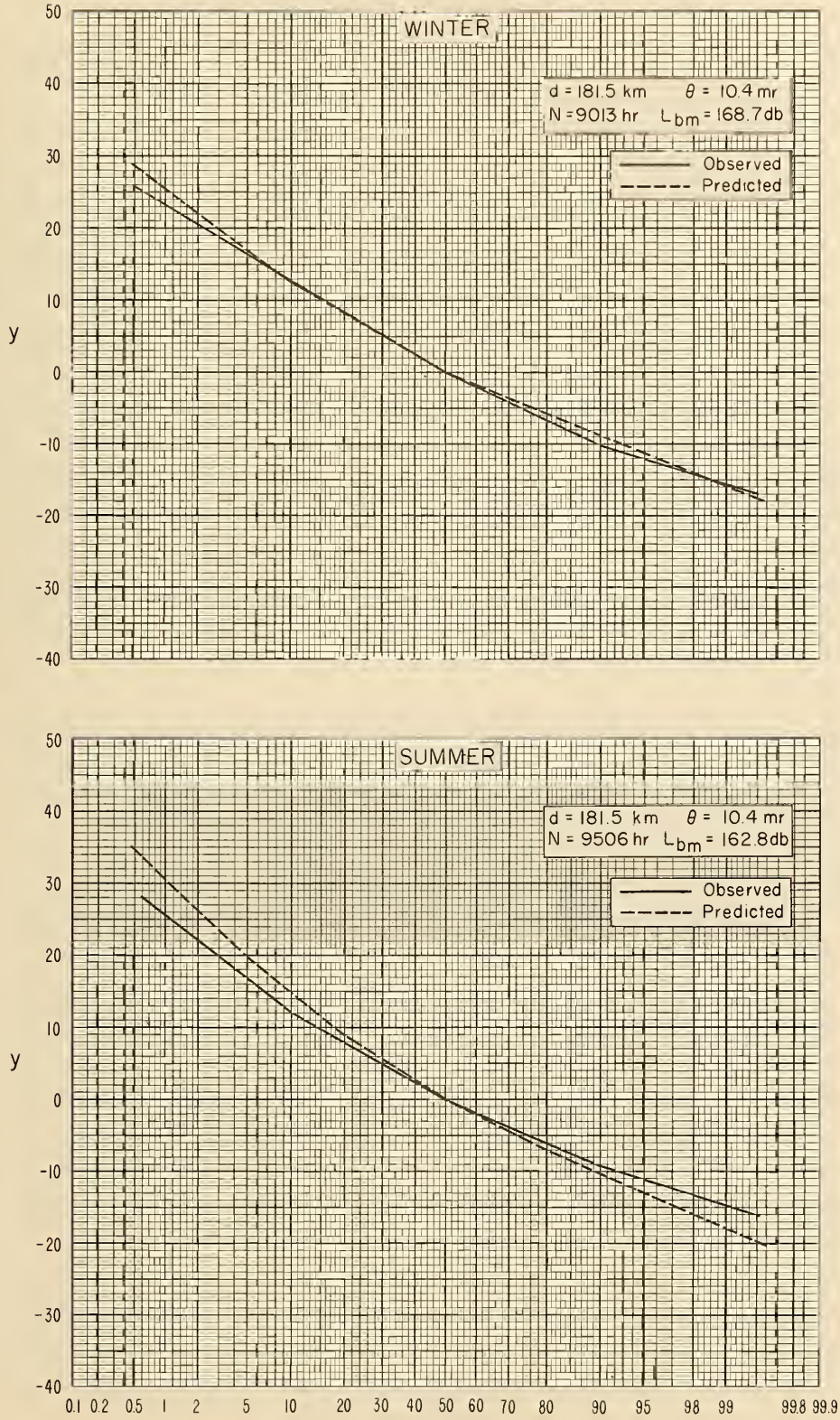

WINTER
d = 181.5 km θ = 10.4 mr
N = 9013 hr Lbm = 168.7db
Observed
Predicted
SUMMER
d = 181.5 km θ = 10.4 mr
N = 9506 hr Lbm = 162.8db
Observed
Predicted
y
50
40
30
20
10
0
-10
-20
-30
-40
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9
PERCENT OF TIME

Figure 44

NBS PATH 29

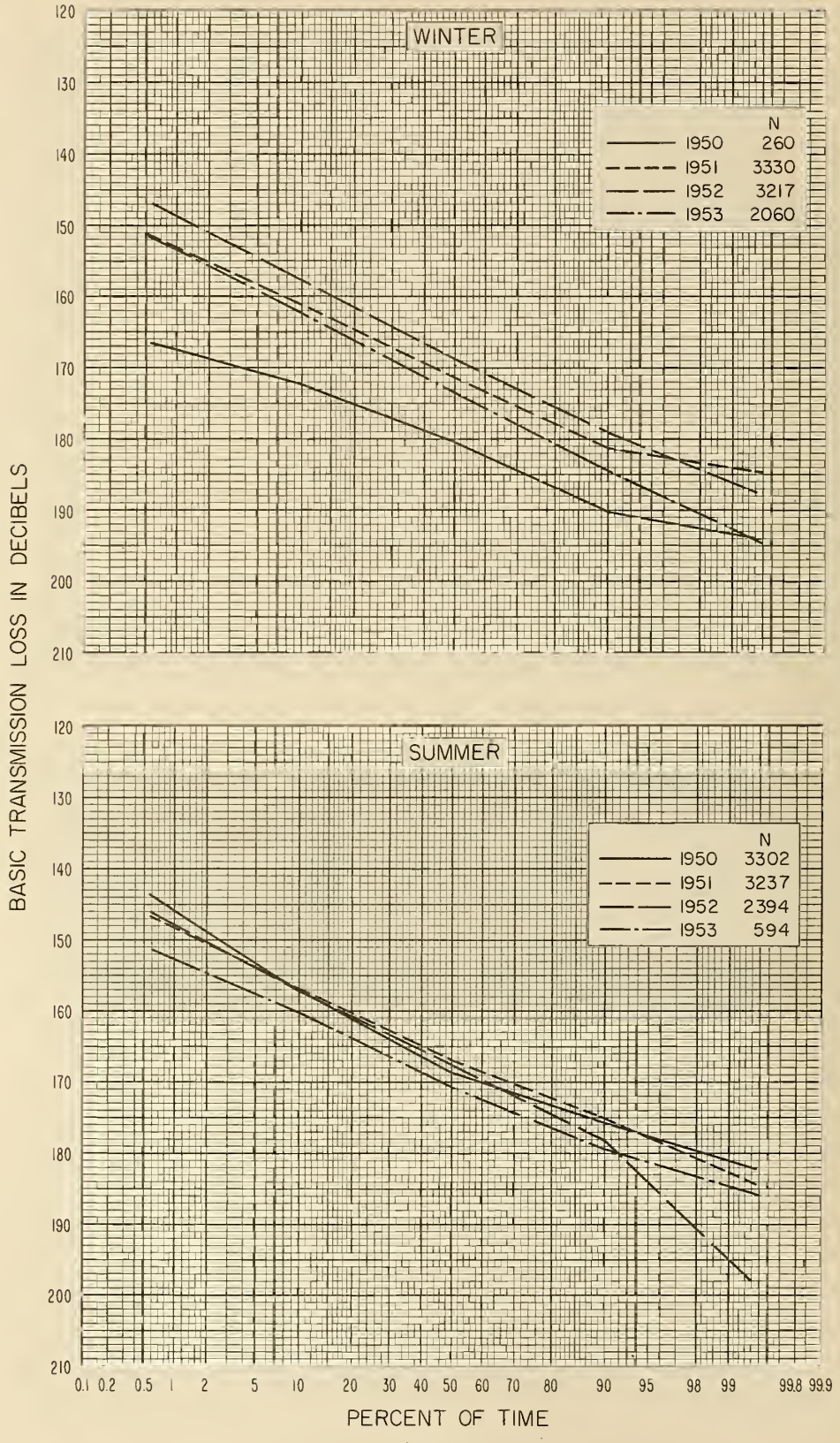


Figure 45

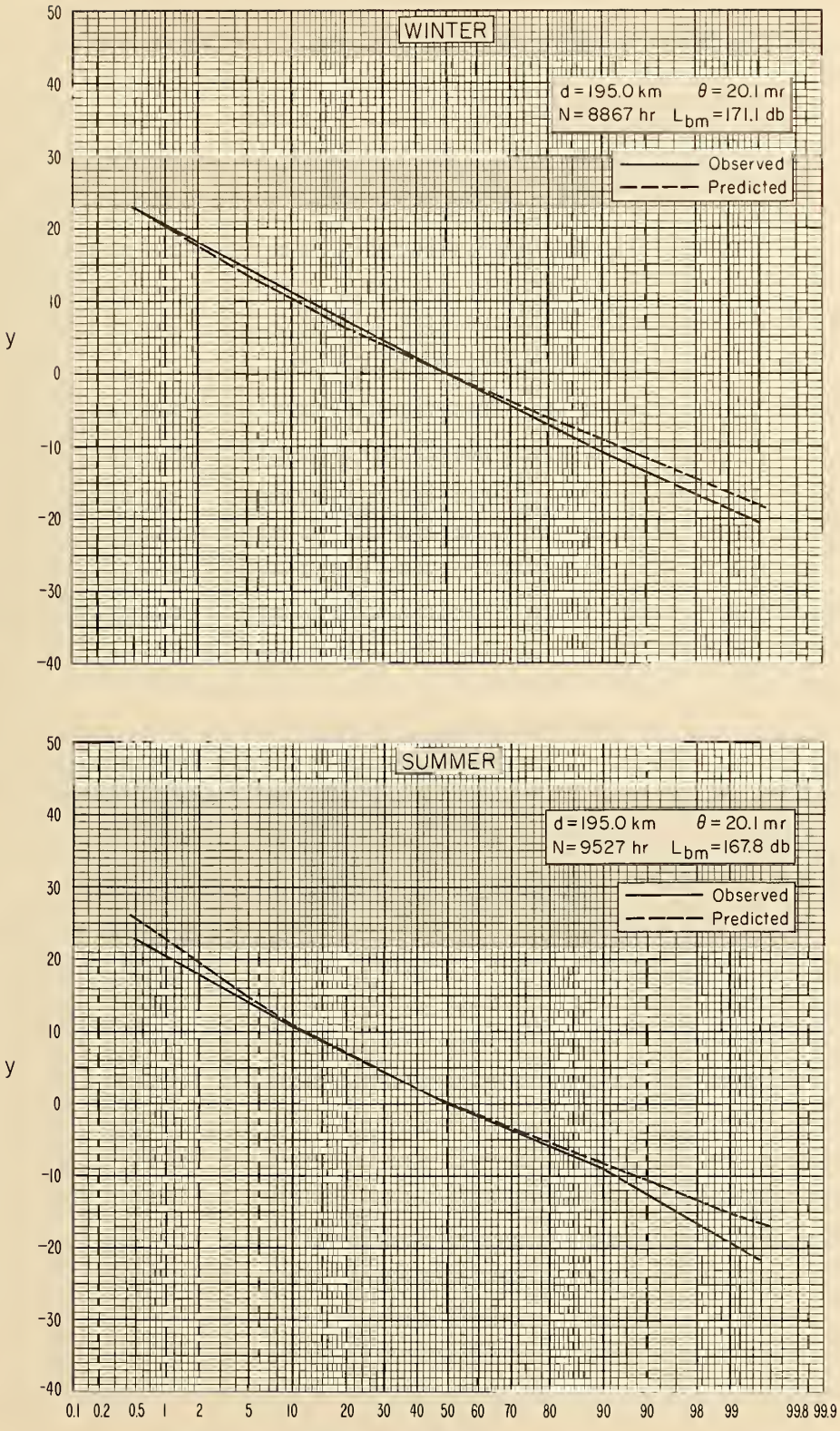

WINTER
d = 195.0 km θ = 20.1 mr
N = 8867 hr L_{bm} = 171.1 db
Observed
Predicted
SUMMER
d = 195.0 km θ = 20.1 mr
N = 9527 hr L_{bm} = 167.8 db
Observed
Predicted
y
50
40
30
20
10
0
-10
-20
-30
-40
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 90 98 99 99.8 99.9
PERCENT OF TIME

Figure 46

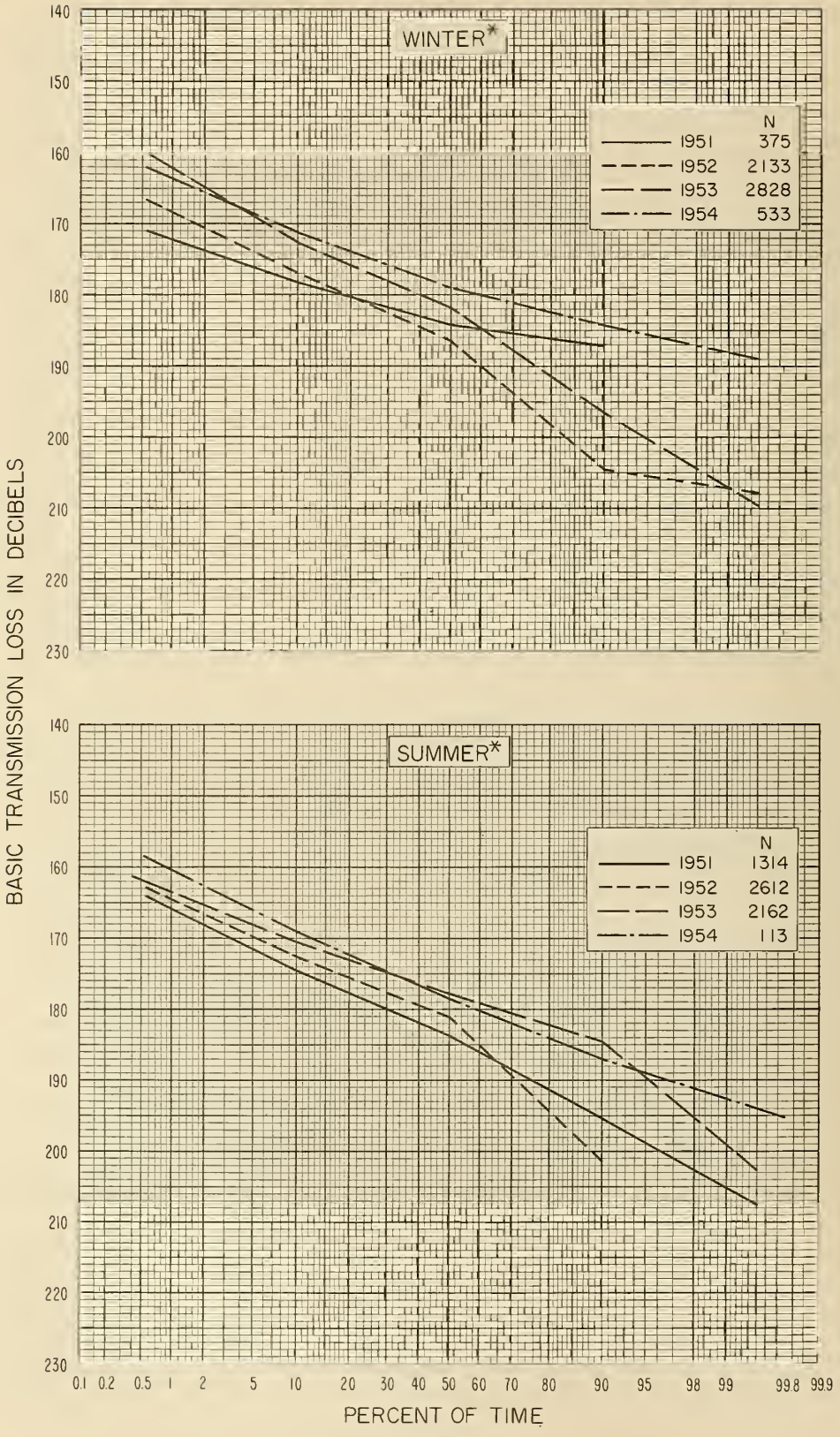

WINTER*
N
1951 375
1952 2133
1953 2828
1954 533
SUMMER*
N
1951 1314
1952 2612
1953 2162
1954 113
BASIC TRANSMISSION LOSS IN DECIBELS
140
150
160
170
180
190
200
210
220
230
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9
PERCENT OF TIME

Figure 47

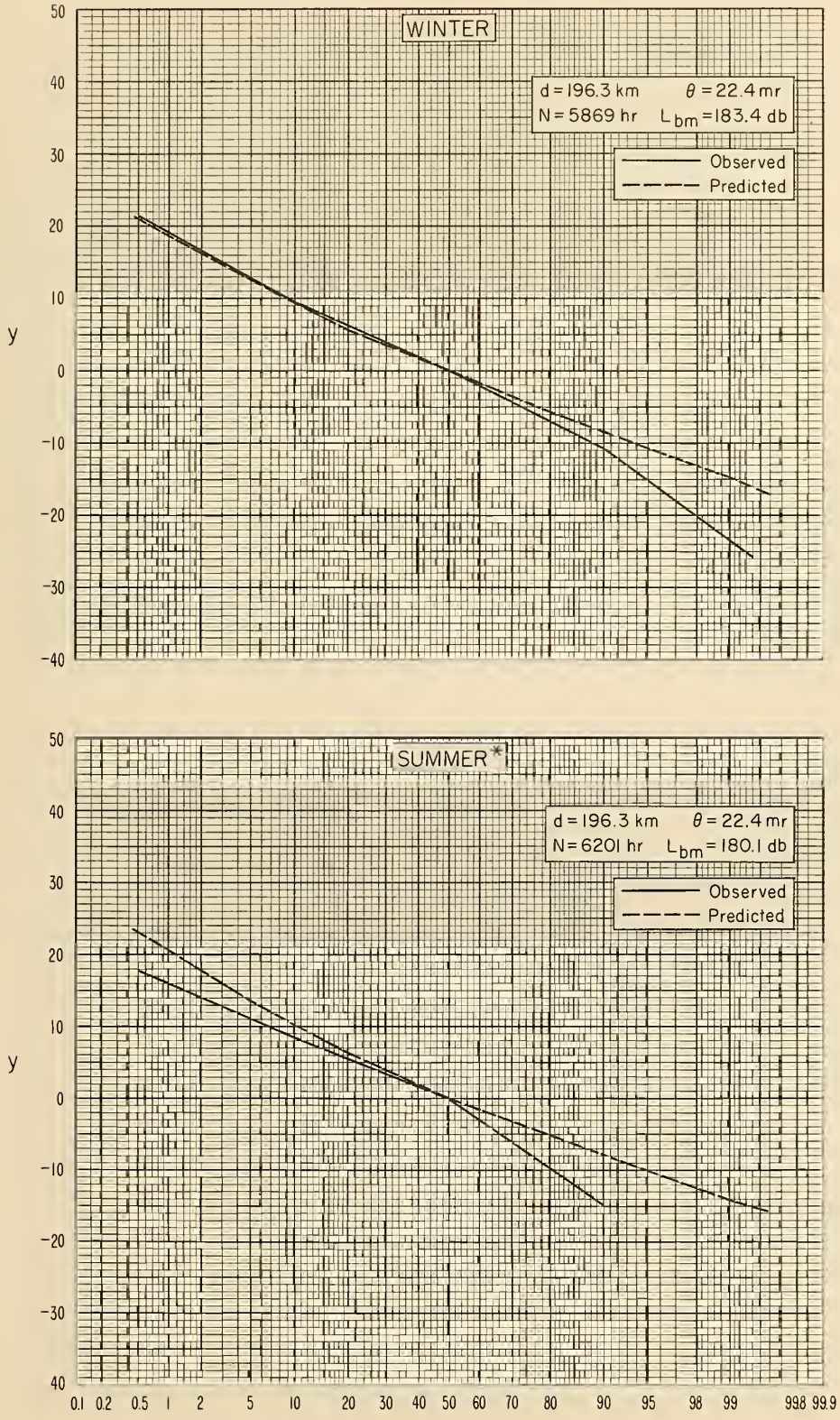

WINTER
d = 196.3 km θ = 22.4 mr
N = 5869 hr L bm = 183.4 db
Observed
Predicted
SUMMER*
d = 196.3 km θ = 22.4 mr
N = 6201 hr L bm = 180.1 db
Observed
Predicted
y
50
40
30
20
10
0
-10
-20
-30
-40
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9
PERCENT OF TIME

Figure 48

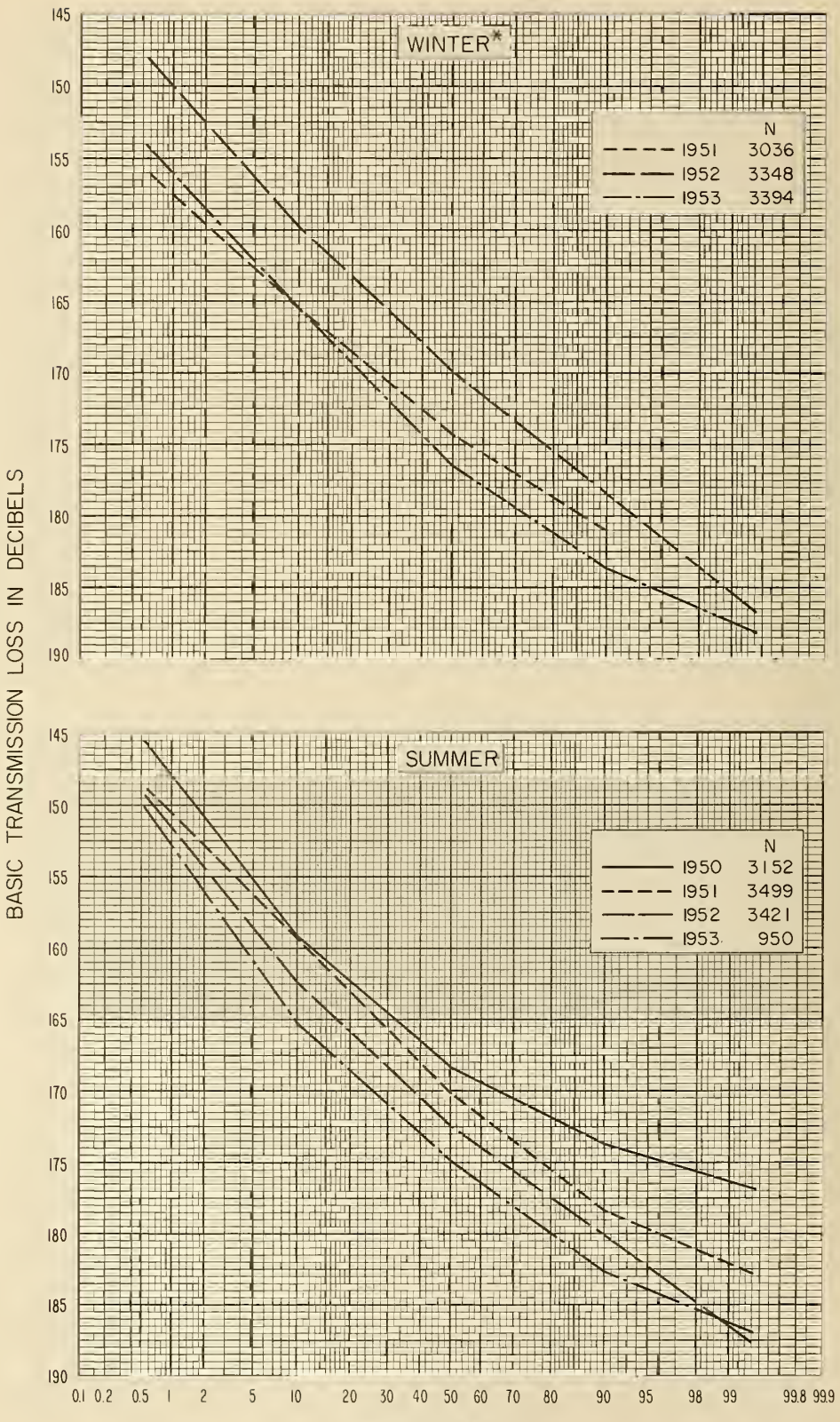

WINTER*
N
1951 3036
1952 3348
1953 3394
SUMMER
N
1950 3152
1951 3499
1952 3421
1953 950
BASIC TRANSMISSION LOSS IN DECIBELS
145
150
155
160
165
170
175
180
185
190
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9
PERCENT OF TIME

Figure 49

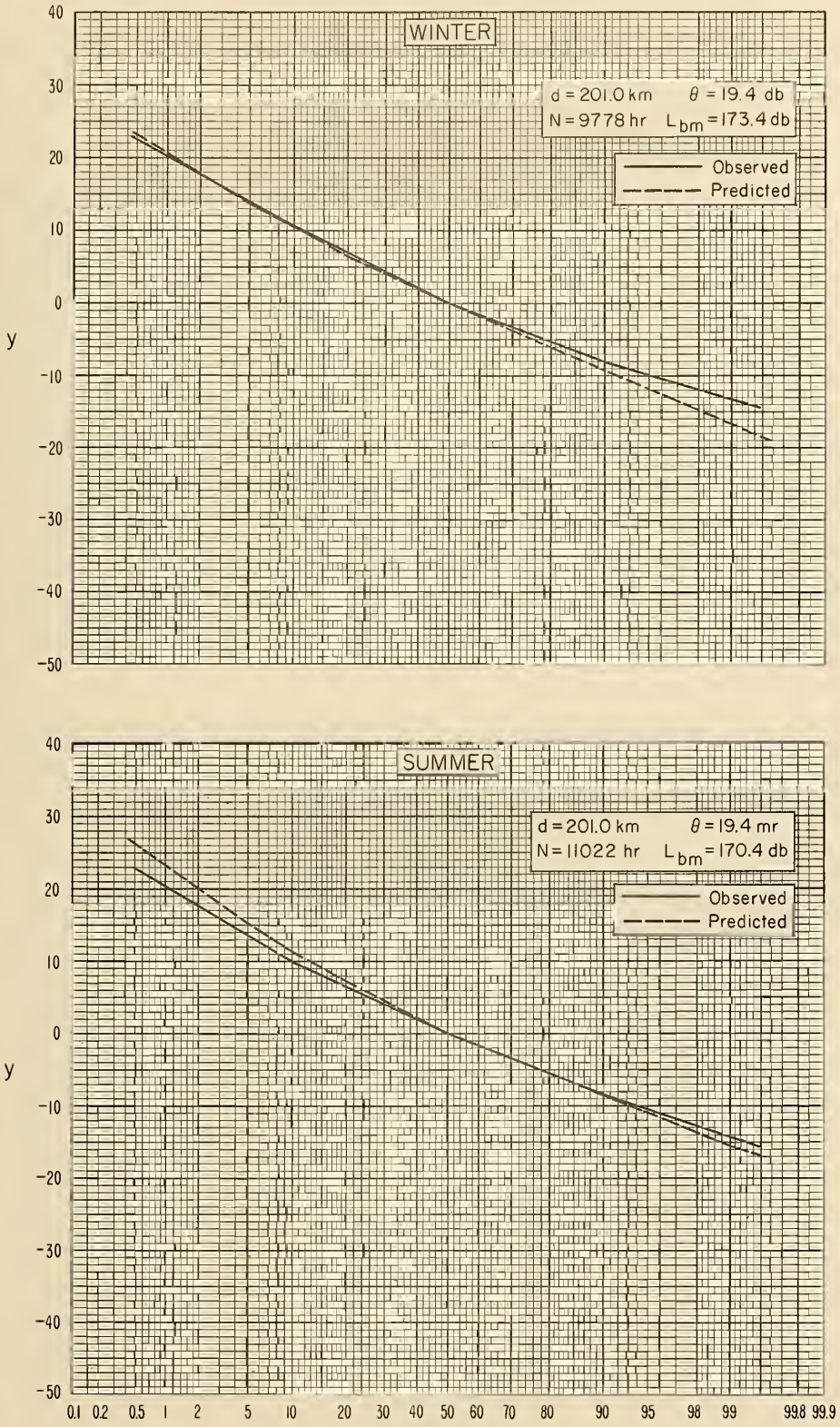

WINTER
d = 201.0 km θ = 19.4 db
N = 9778 hr L bm = 173.4 db
Observed
Predicted
SUMMER
d = 201.0 km θ = 19.4 mr
N = 11022 hr L bm = 170.4 db
Observed
Predicted
y
40
30
20
10
0
-10
-20
-30
-40
-50
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9
PERCENT OF TIME

Figure 50

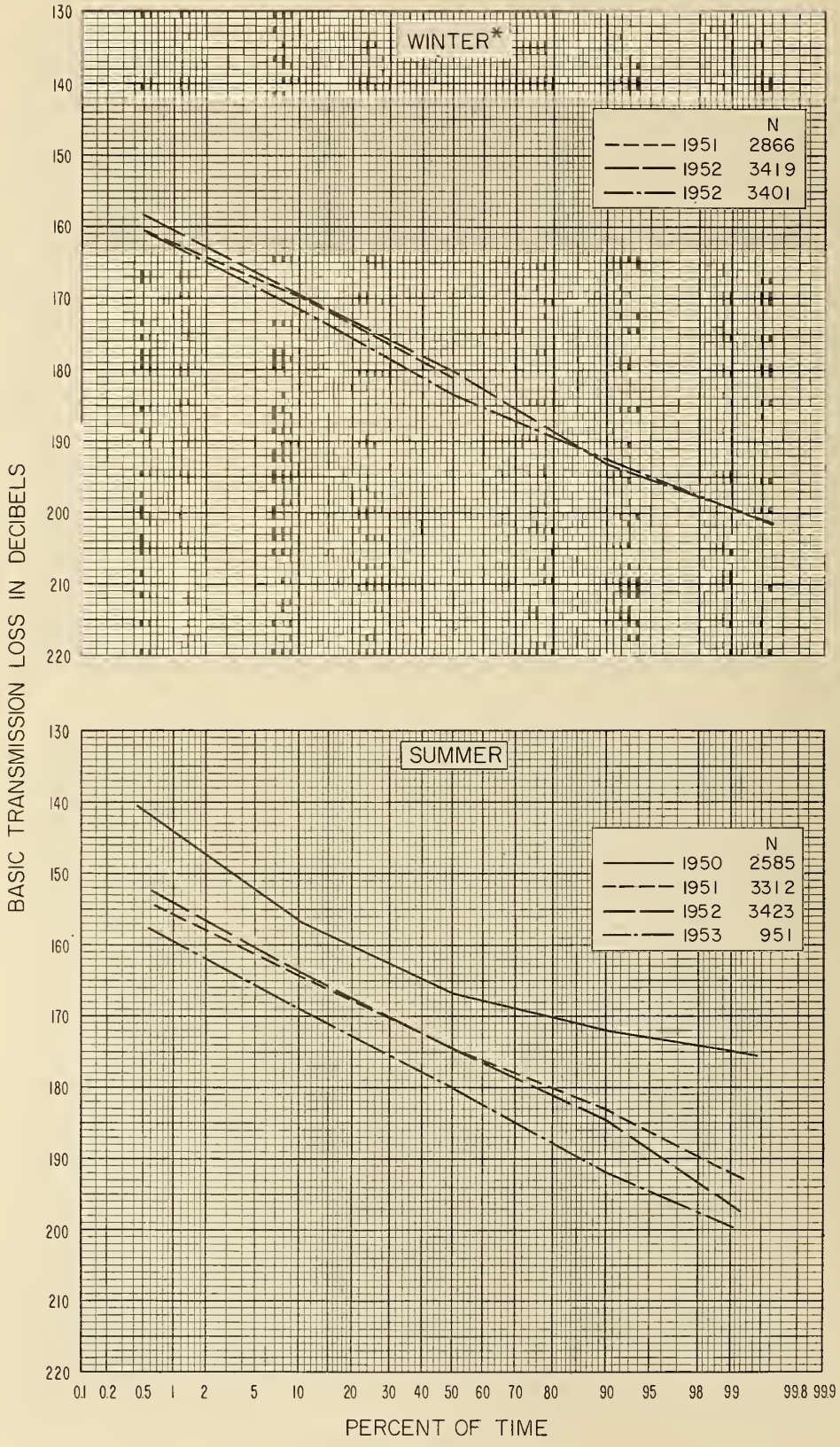

WINTER*
N
1951 2866
1952 3419
1952 3401
SUMMER
N
1950 2585
1951 3312
1952 3423
1953 951
BASIC TRANSMISSION LOSS IN DECIBELS
130
140
150
160
170
180
190
200
210
220
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9
PERCENT OF TIME

Figure 51

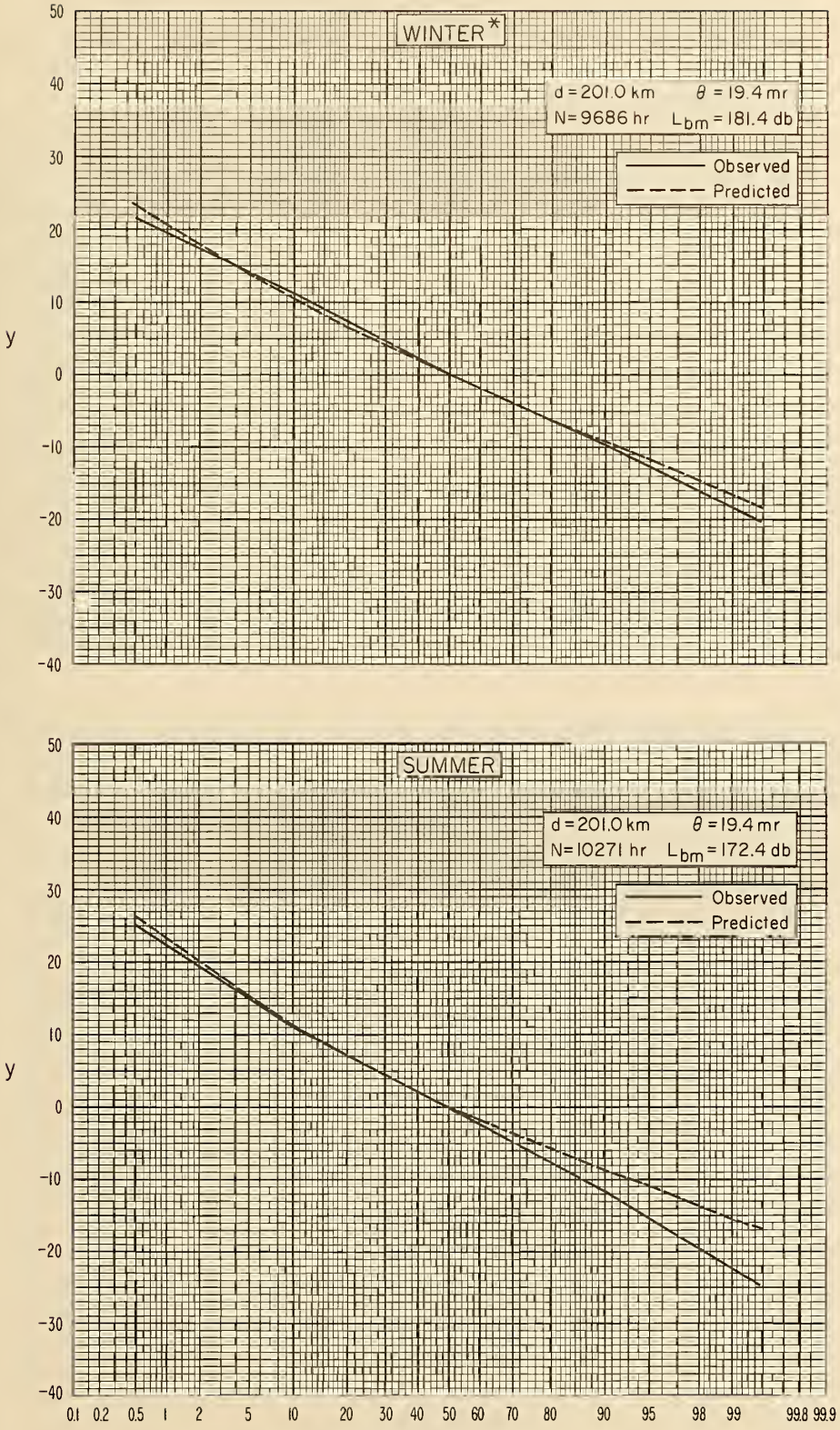

WINTER*
d = 201.0 km θ = 19.4 mr
N = 9686 hr L_{bm} = 181.4 db
Observed
Predicted
SUMMER
d = 201.0 km θ = 19.4 mr
N = 10271 hr L_{bm} = 172.4 db
Observed
Predicted
y
50
40
30
20
10
0
-10
-20
-30
-40
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9
PERCENT OF TIME

Figure 52

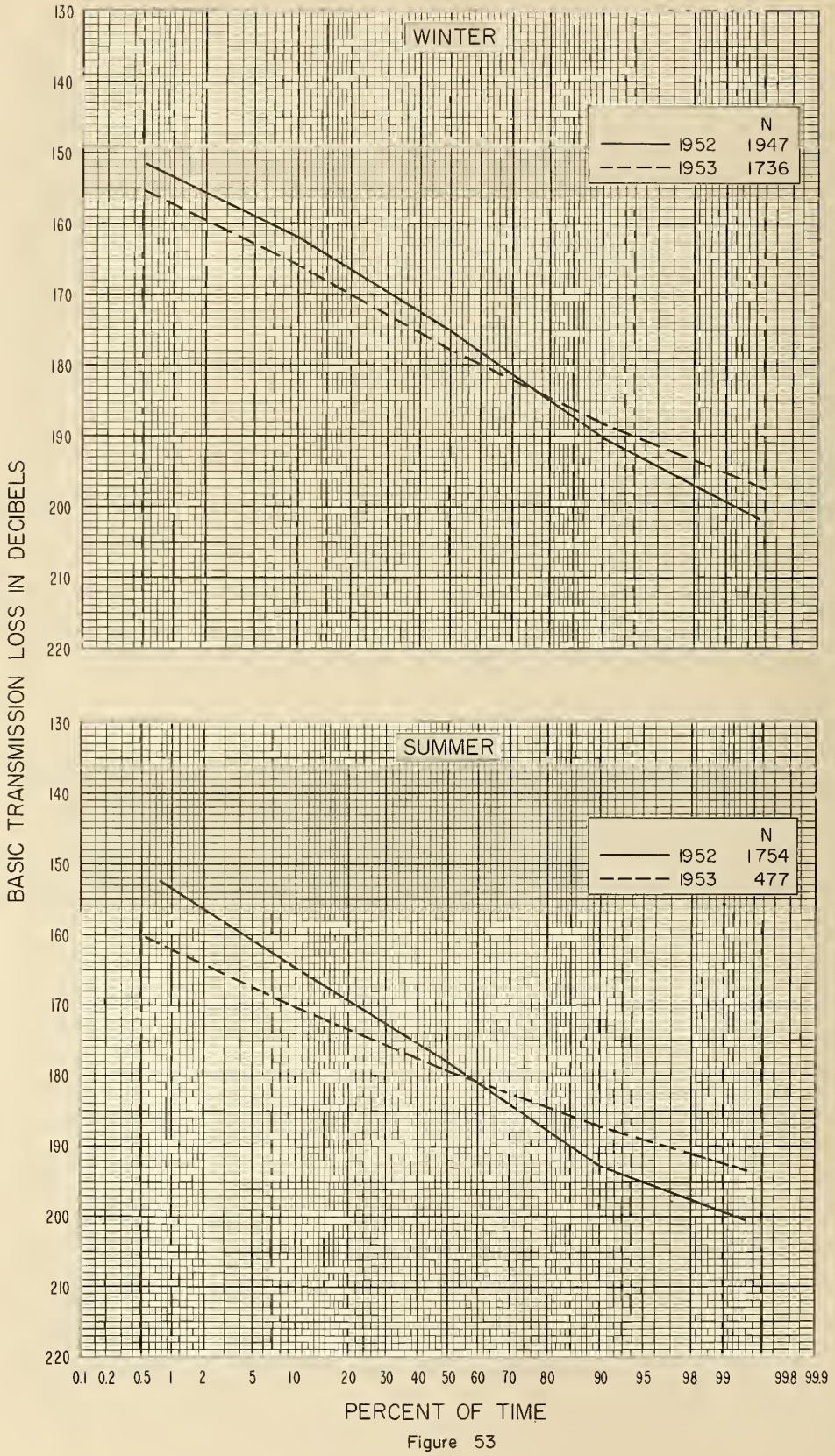

WINTER
N
1952 1947
1953 1736
SUMMER
N
1952 1754
1953 477
BASIC TRANSMISSION LOSS IN DECIBELS
130
140
150
160
170
180
190
200
210
220
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9
PERCENT OF TIME

Figure 53

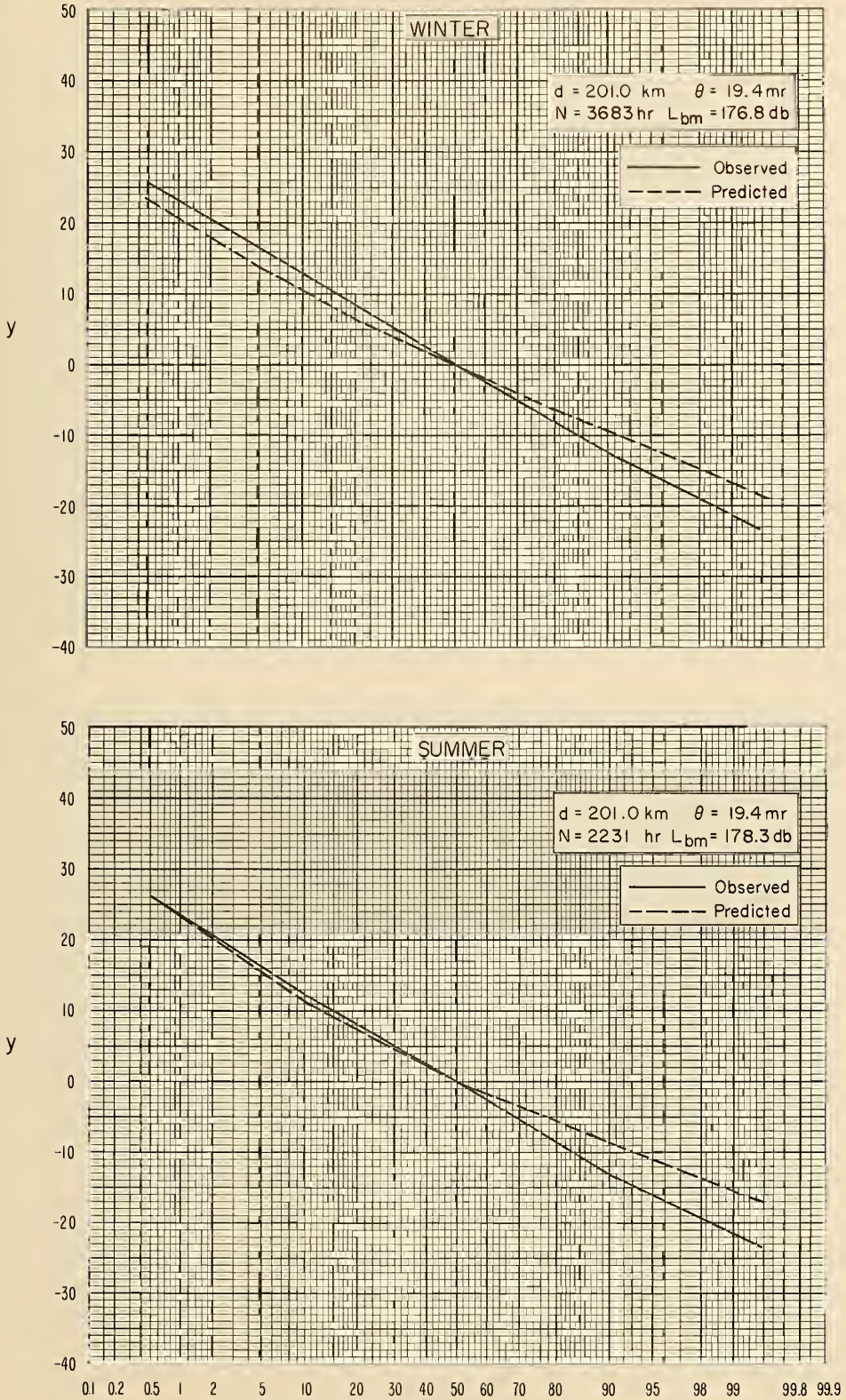

WINTER
d = 201.0 km θ = 19.4 mr
N = 3683 hr L_{bm} = 176.8 db
Observed
Predicted
SUMMER
d = 201.0 km θ = 19.4 mr
N = 2231 hr L_{bm} = 178.3 db
Observed
Predicted
y
50
40
30
20
10
0
-10
-20
-30
-40
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9
PERCENT OF TIME

Figure 54

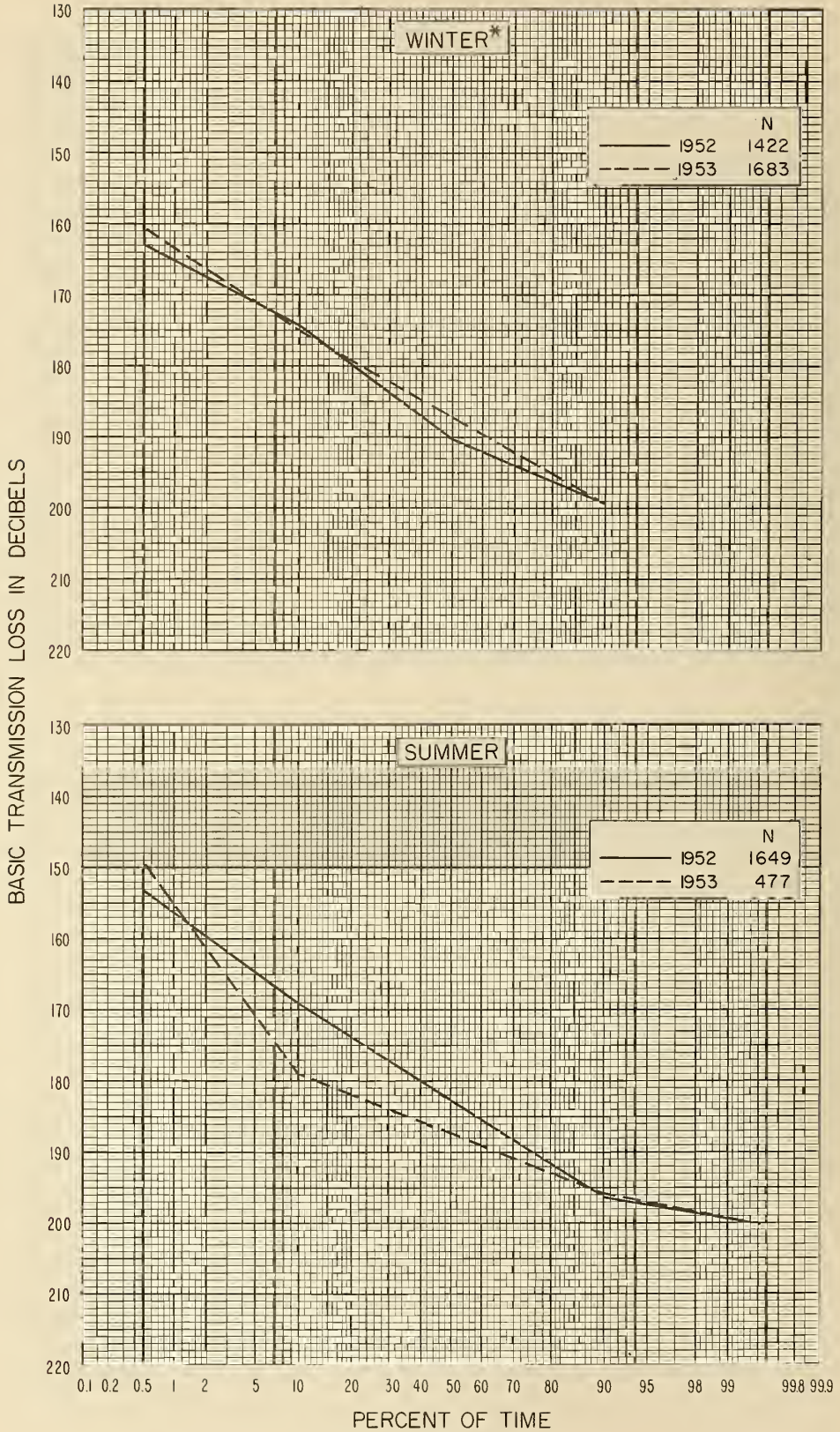

WINTER*
N
1952 1422
1953 1683
SUMMER
N
1952 1649
1953 477
BASIC TRANSMISSION LOSS IN DECIBELS
130
140
150
160
170
180
190
200
210
220
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9
PERCENT OF TIME

Figure 55

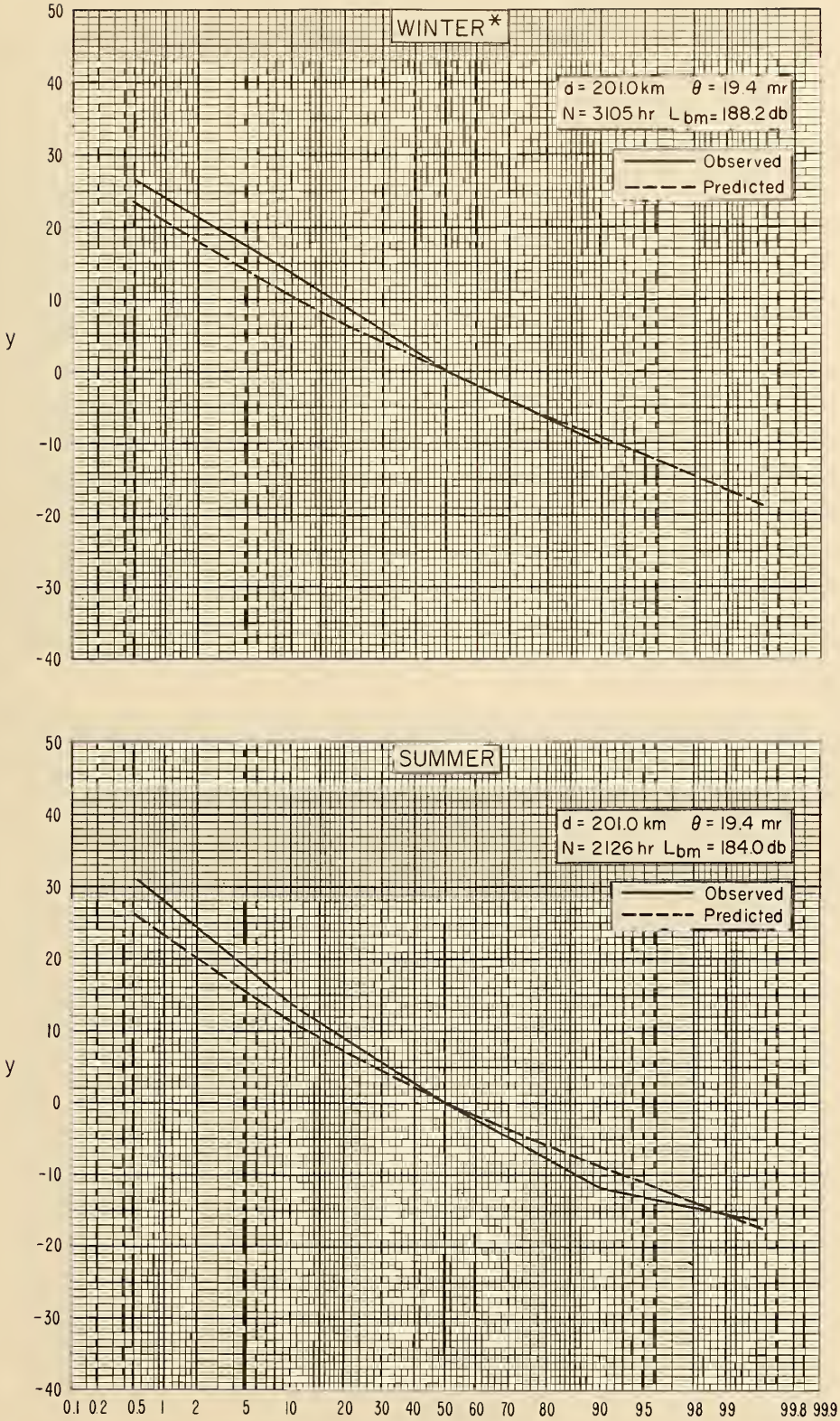

WINTER*
d = 201.0 km θ = 19.4 mr
N = 3105 hr Lbm = 188.2 db
Observed
Predicted
SUMMER
d = 201.0 km θ = 19.4 mr
N = 2126 hr Lbm = 184.0 db
Observed
Predicted
y
50
40
30
20
10
0
-10
-20
-30
-40
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9
PERCENT OF TIME

Figure 56

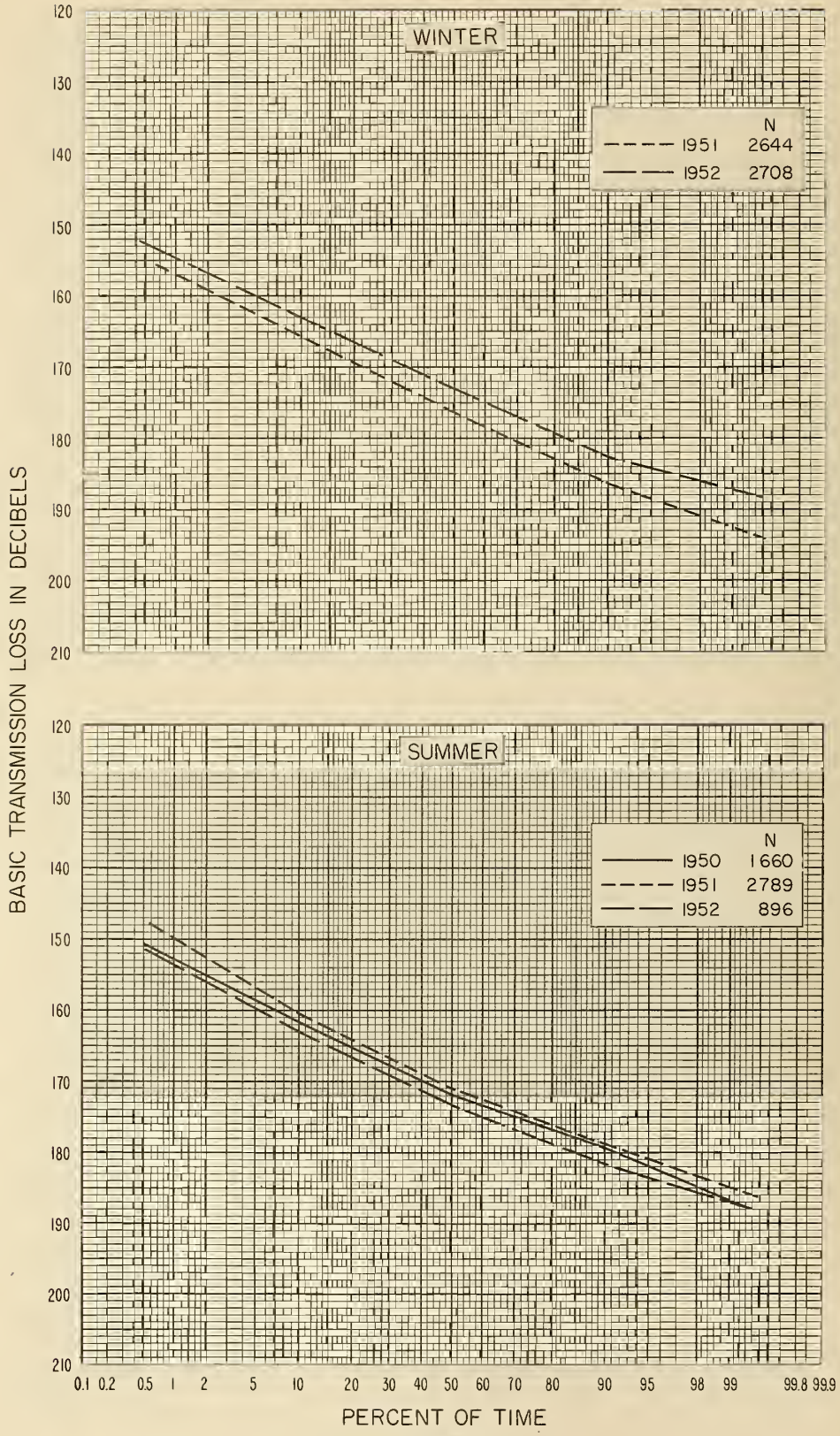

WINTER
N
1951 2644
1952 2708
SUMMER
N
1950 1660
1951 2789
1952 896
BASIC TRANSMISSION LOSS IN DECIBELS
120
130
140
150
160
170
180
190
200
210
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9
PERCENT OF TIME

Figure 57

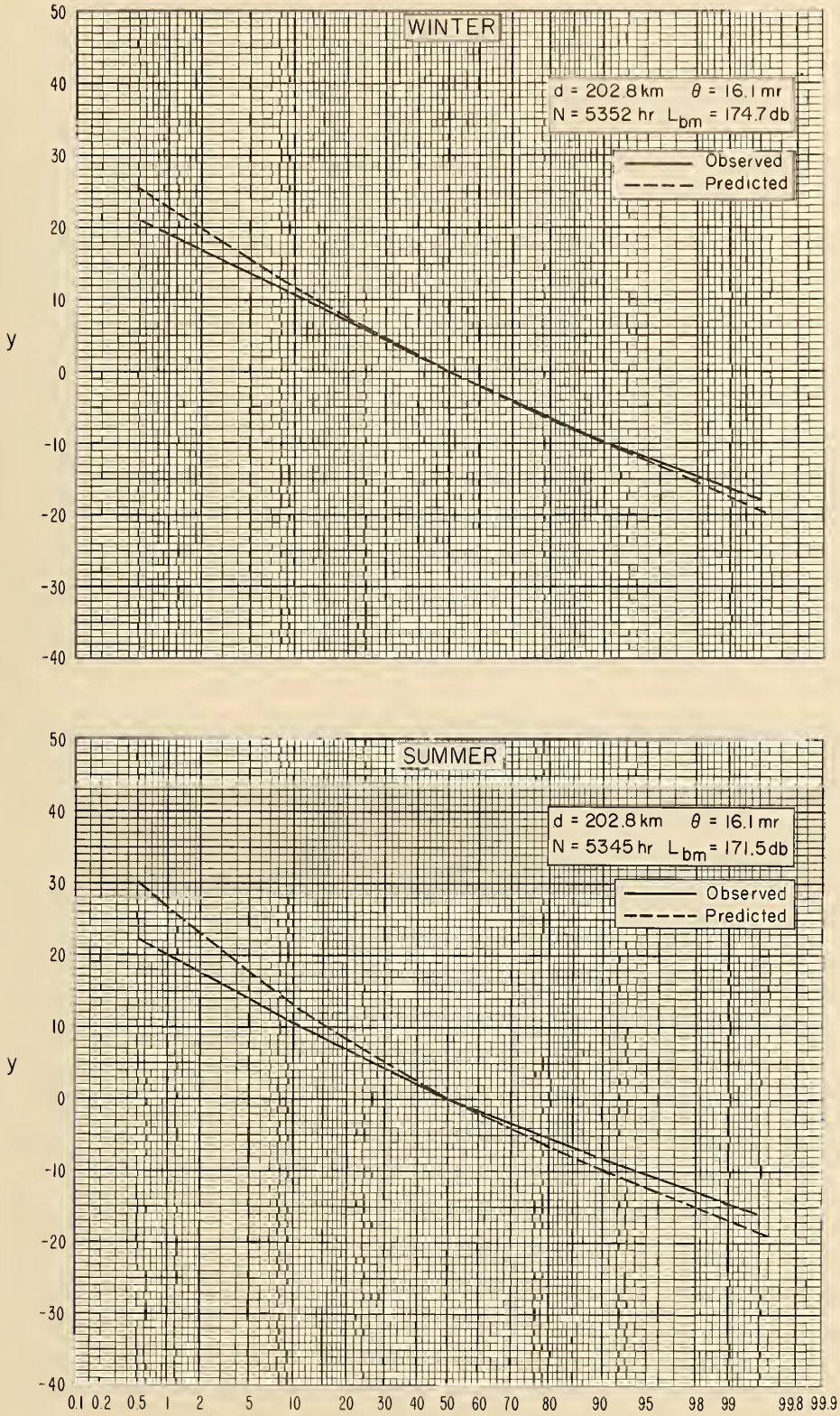

WINTER
d = 202.8 km θ = 16.1 mr
N = 5352 hr L_{bm} = 174.7 db
Observed
Predicted
SUMMER
d = 202.8 km θ = 16.1 mr
N = 5345 hr L_{bm} = 171.5 db
Observed
Predicted
y
50
40
30
20
10
0
-10
-20
-30
-40
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9
PERCENT OF TIME

Figure 58

NBS PATH 210

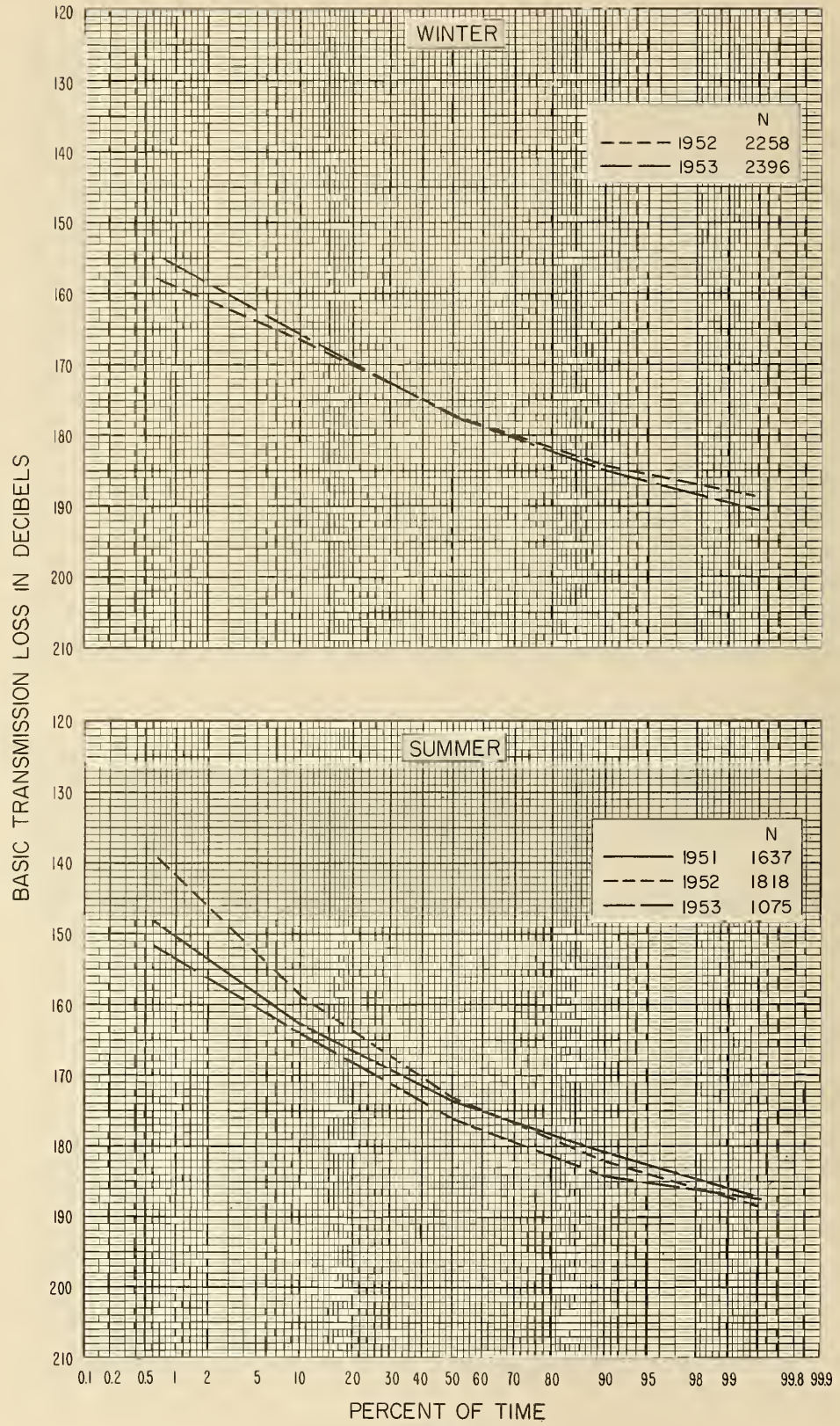


Figure 59

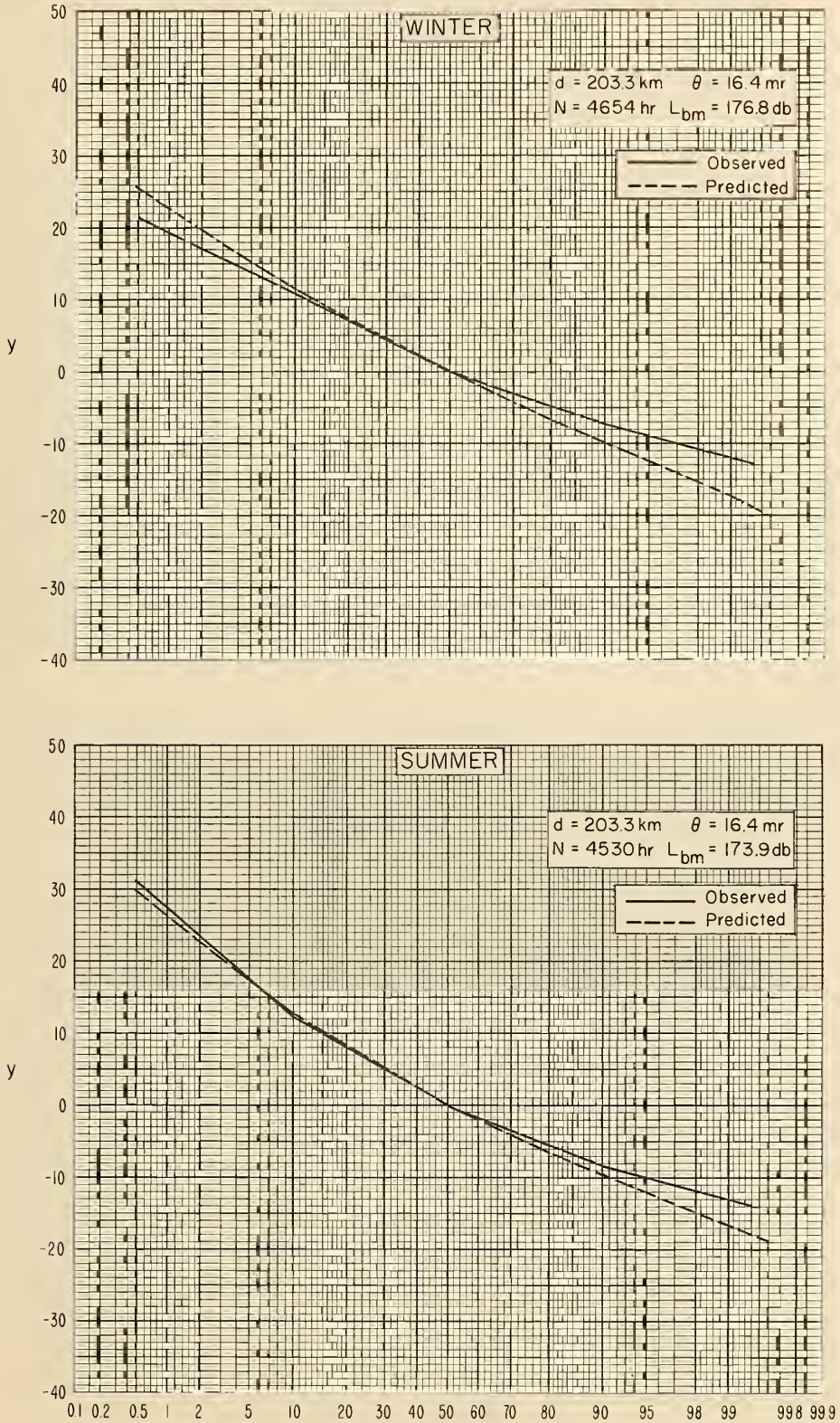

WINTER
d = 203.3 km θ = 16.4 mr
N = 4654 hr L_{bm} = 176.8 db
Observed
Predicted
SUMMER
d = 203.3 km θ = 16.4 mr
N = 4530 hr L_{bm} = 173.9 db
Observed
Predicted
y
50
40
30
20
10
0
-10
-20
-30
-40
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9
PERCENT OF TIME

Figure 60

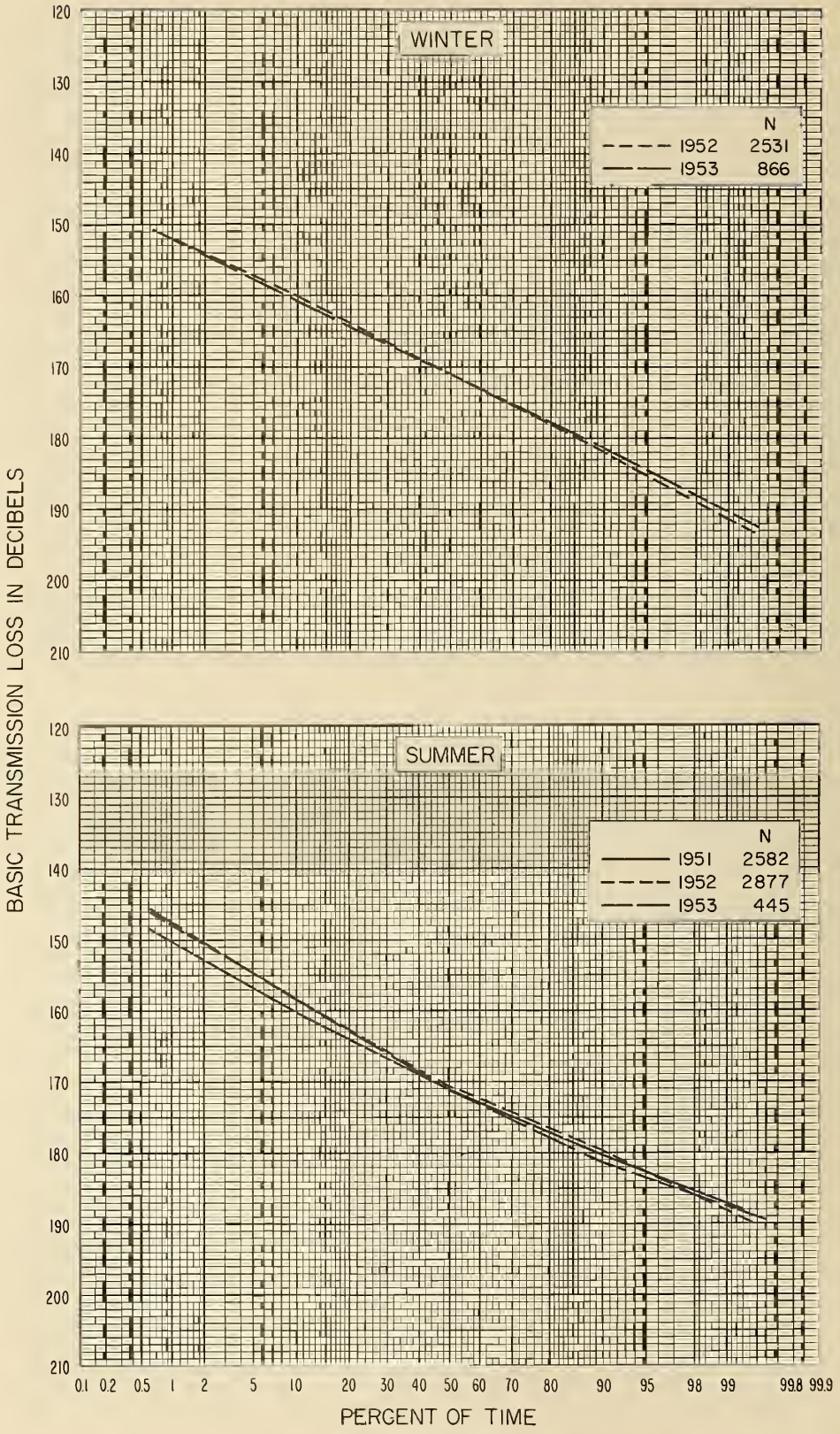

WINTER
N
1952 2531
1953 866
SUMMER
N
1951 2582
1952 2877
1953 445
BASIC TRANSMISSION LOSS IN DECIBELS
120
130
140
150
160
170
180
190
200
210
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9
PERCENT OF TIME

Figure 61

NBS PATH 206

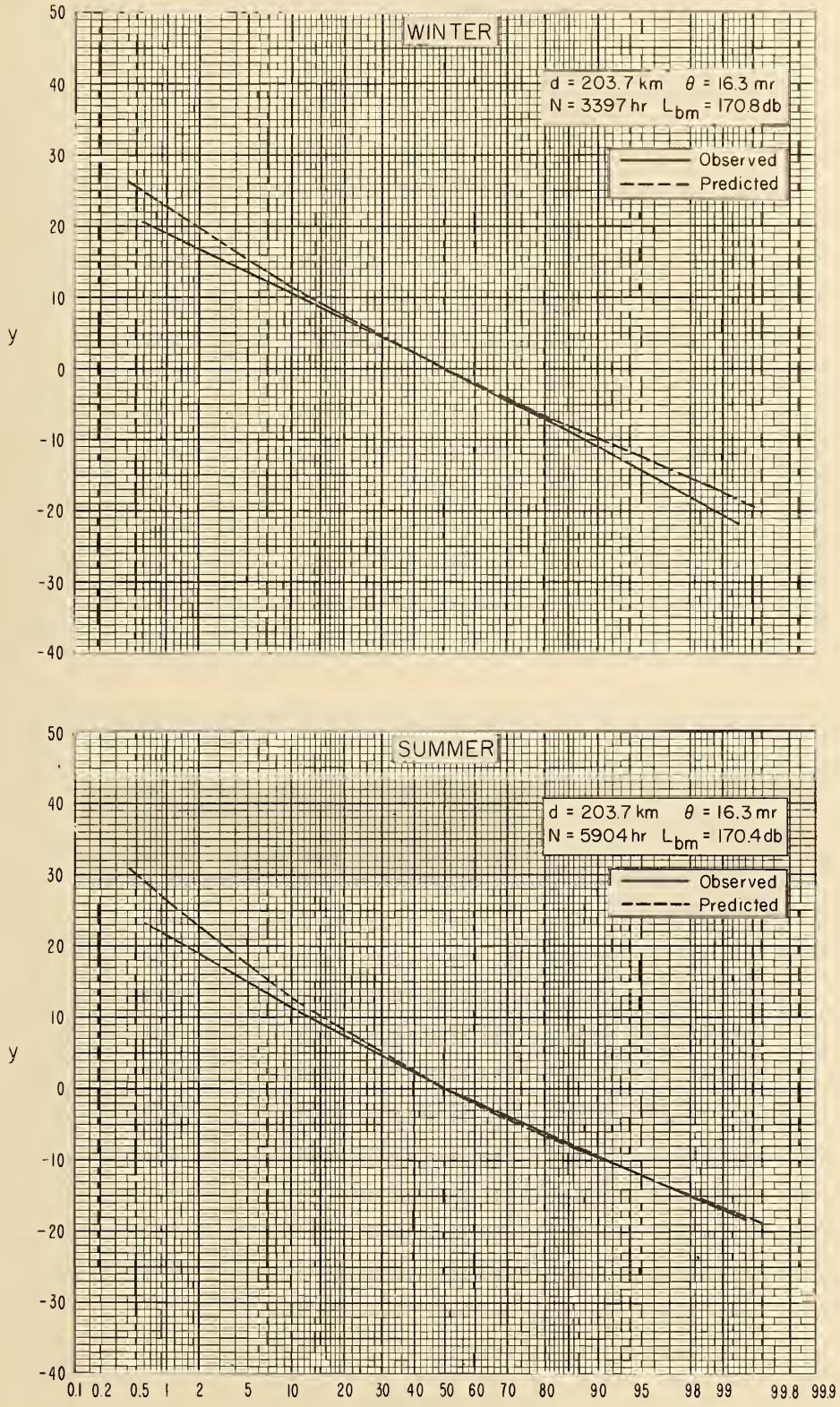


Figure 62

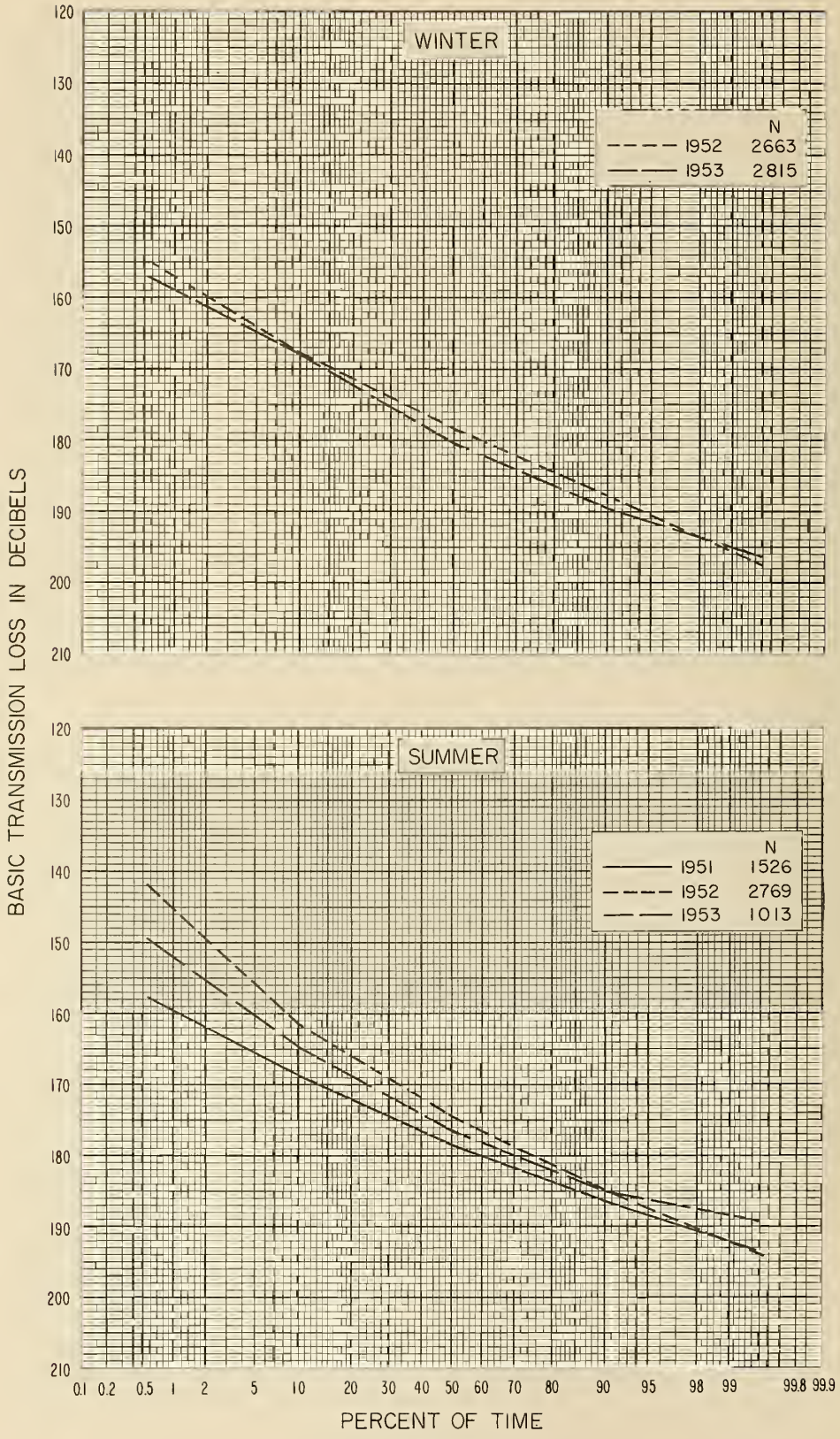

WINTER
N
1952 2663
1953 2815
SUMMER
N
1951 1526
1952 2769
1953 1013
BASIC TRANSMISSION LOSS IN DECIBELS
120
130
140
150
160
170
180
190
200
210
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9
PERCENT OF TIME

Figure 63

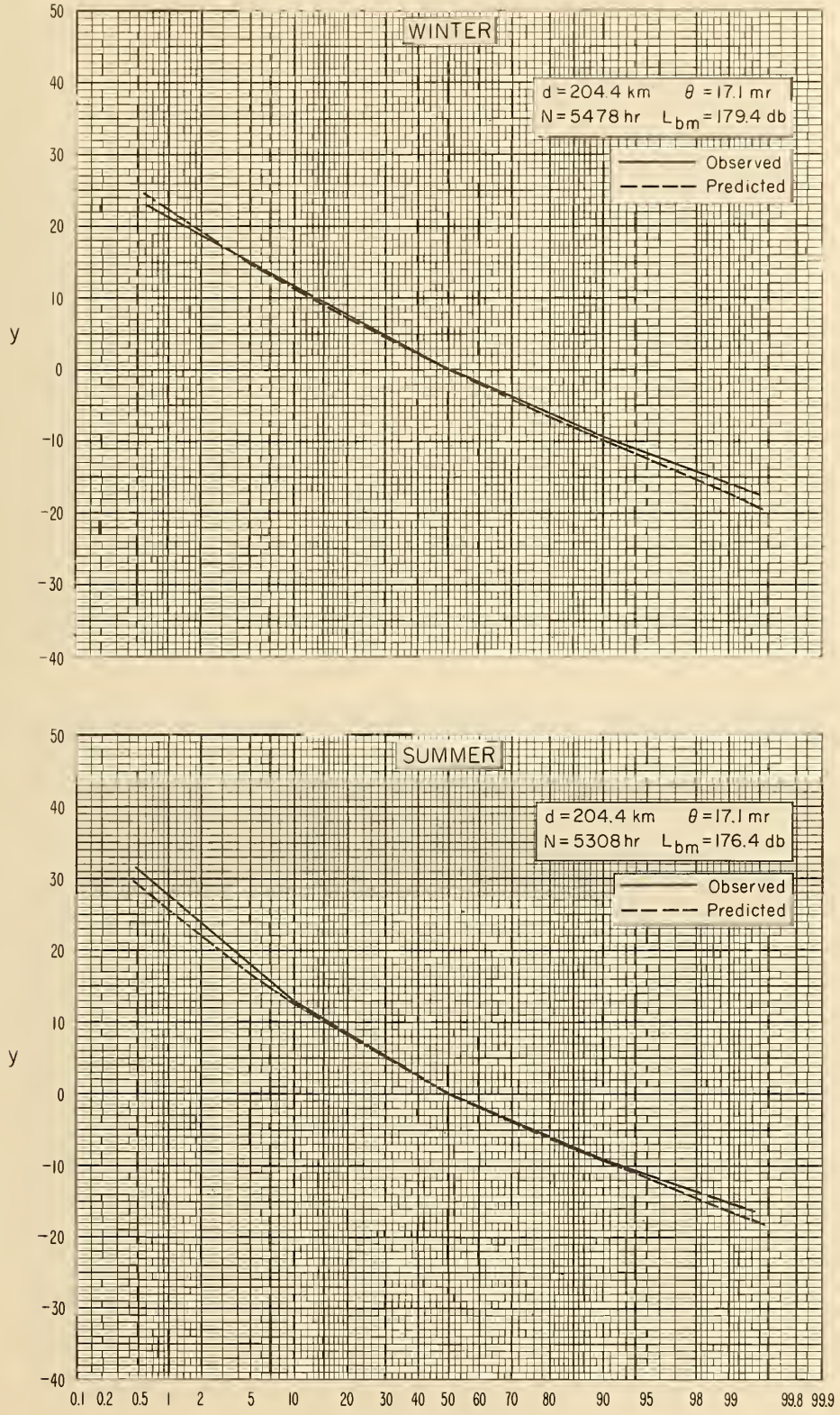

WINTER
d = 204.4 km θ = 17.1 mr
N = 5478 hr L bm = 179.4 db
Observed
Predicted
SUMMER
d = 204.4 km θ = 17.1 mr
N = 5308 hr L bm = 176.4 db
Observed
Predicted
y
50
40
30
20
10
0
-10
-20
-30
-40
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9
PERCENT OF TIME

Figure 64

NBS PATH 214

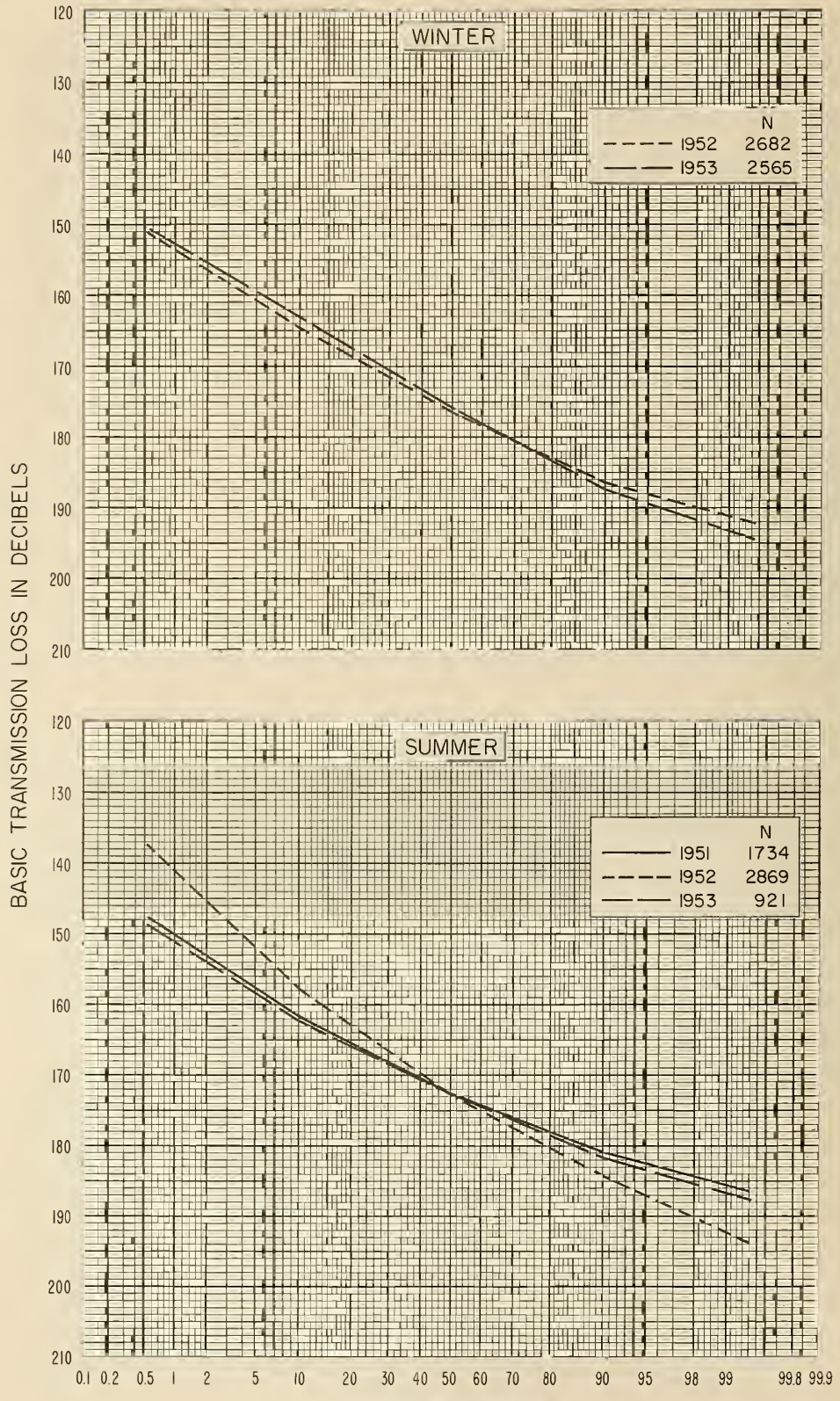


Figure 65

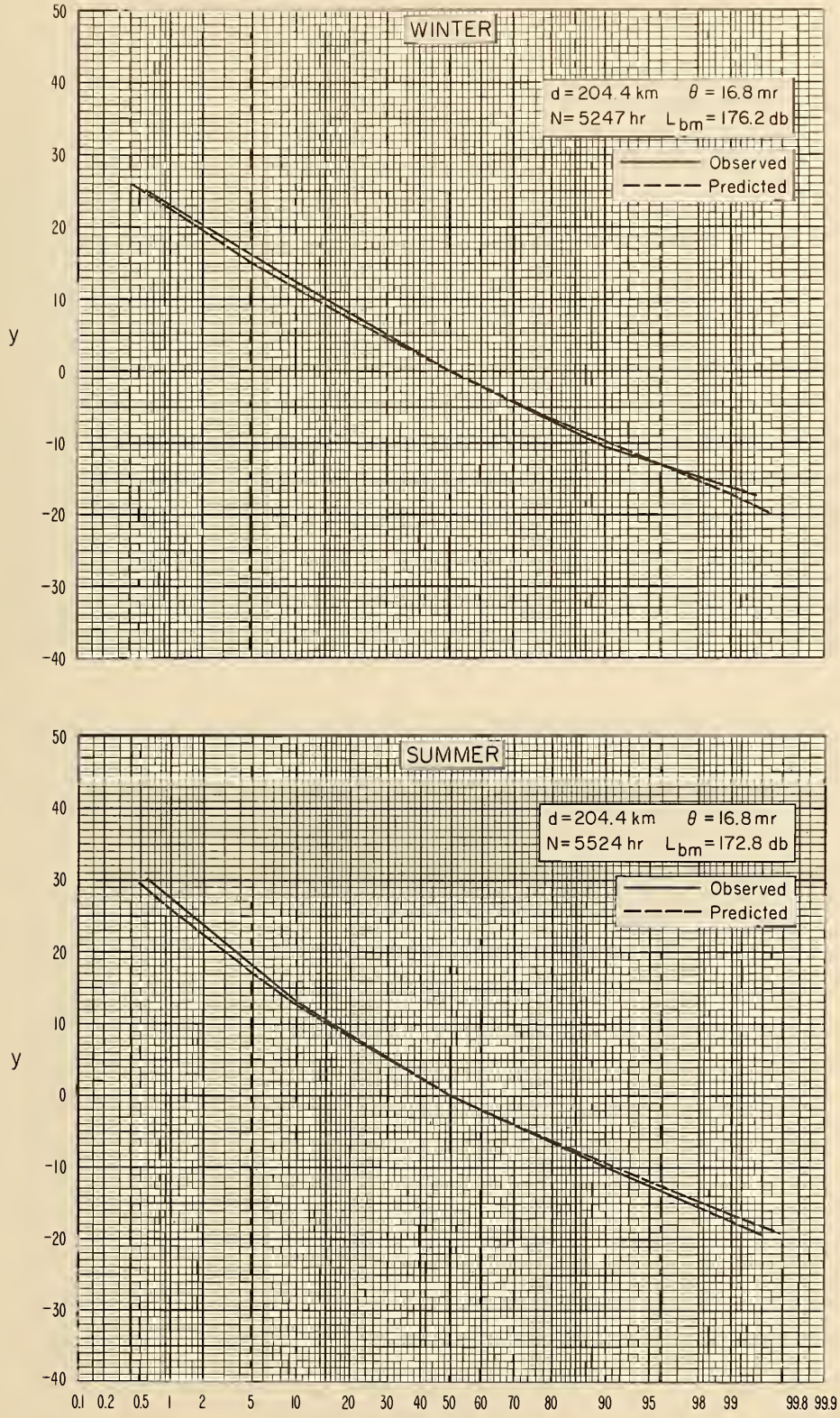

WINTER
d = 204.4 km θ = 16.8 mr
N = 5247 hr L bm = 176.2 db
Observed
Predicted
SUMMER
d = 204.4 km θ = 16.8 mr
N = 5524 hr L bm = 172.8 db
Observed
Predicted
y
50
40
30
20
10
0
-10
-20
-30
-40
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9
PERCENT OF TIME

Figure 66

NBS PATH 215

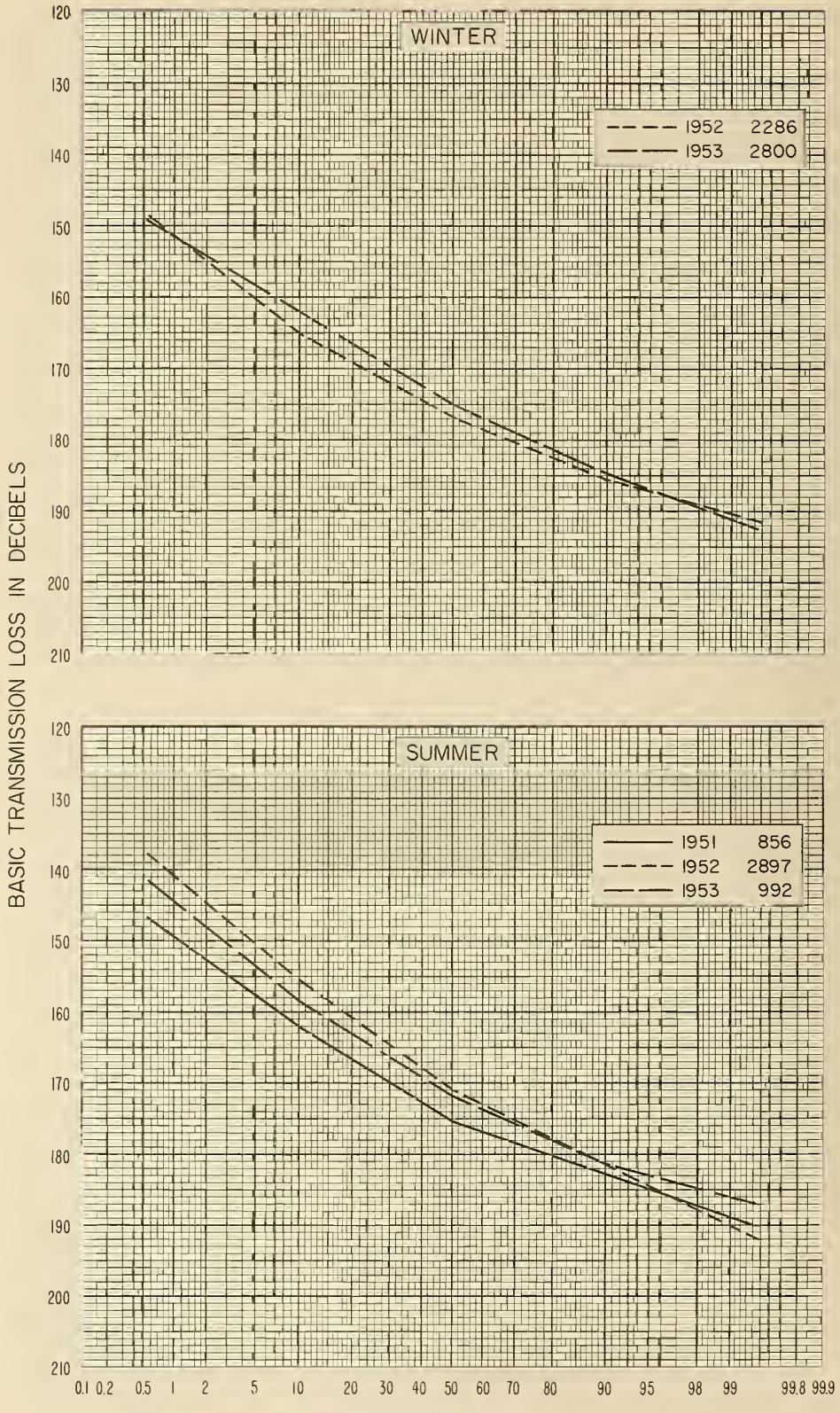


Figure 67

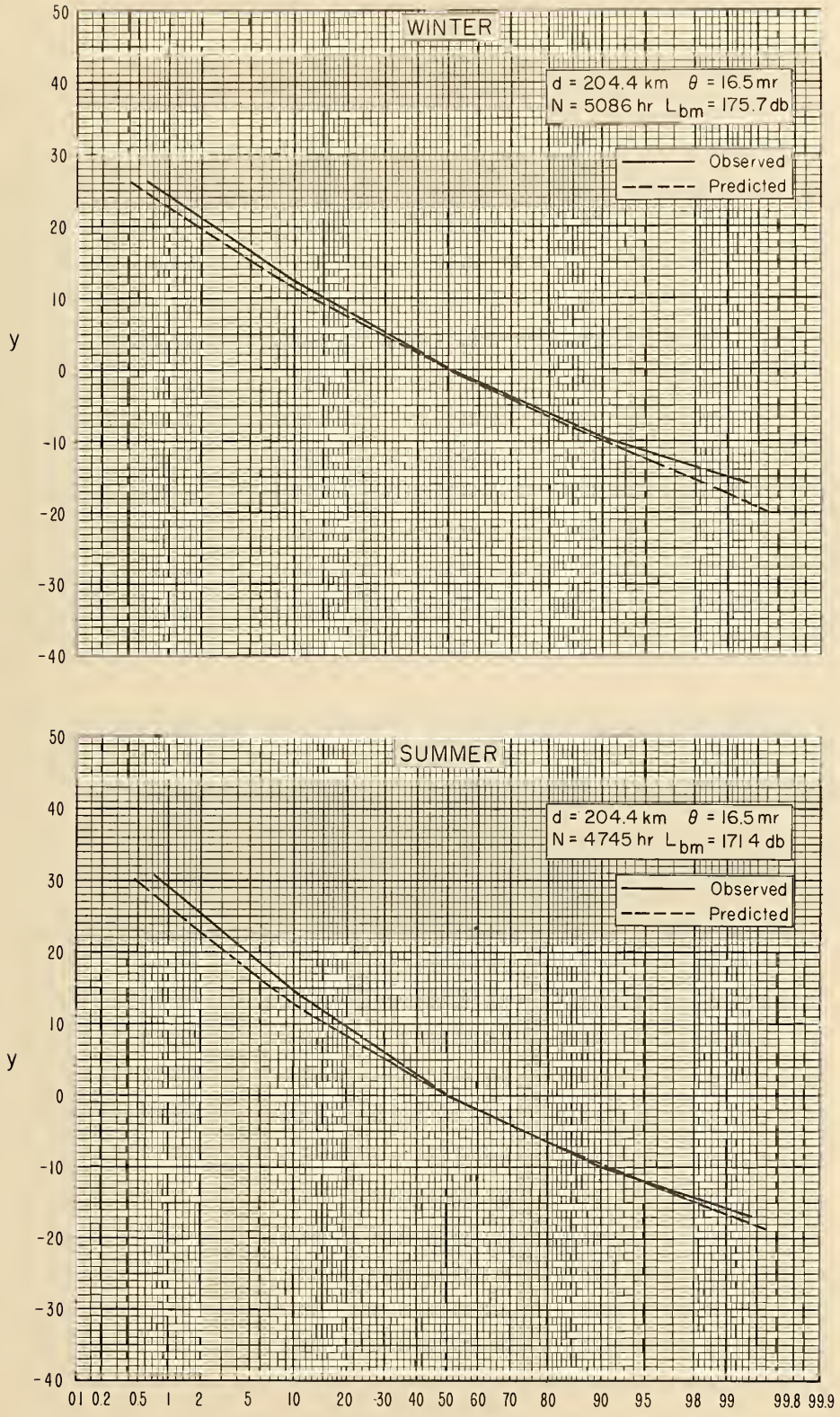

WINTER
d = 204.4 km θ = 16.5 mr
N = 5086 hr L_bm = 175.7 db
Observed
Predicted
SUMMER
d = 204.4 km θ = 16.5 mr
N = 4745 hr L_bm = 171.4 db
Observed
Predicted
y
50
40
30
20
10
0
-10
-20
-30
-40
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9
PERCENT OF TIME

Figure 68

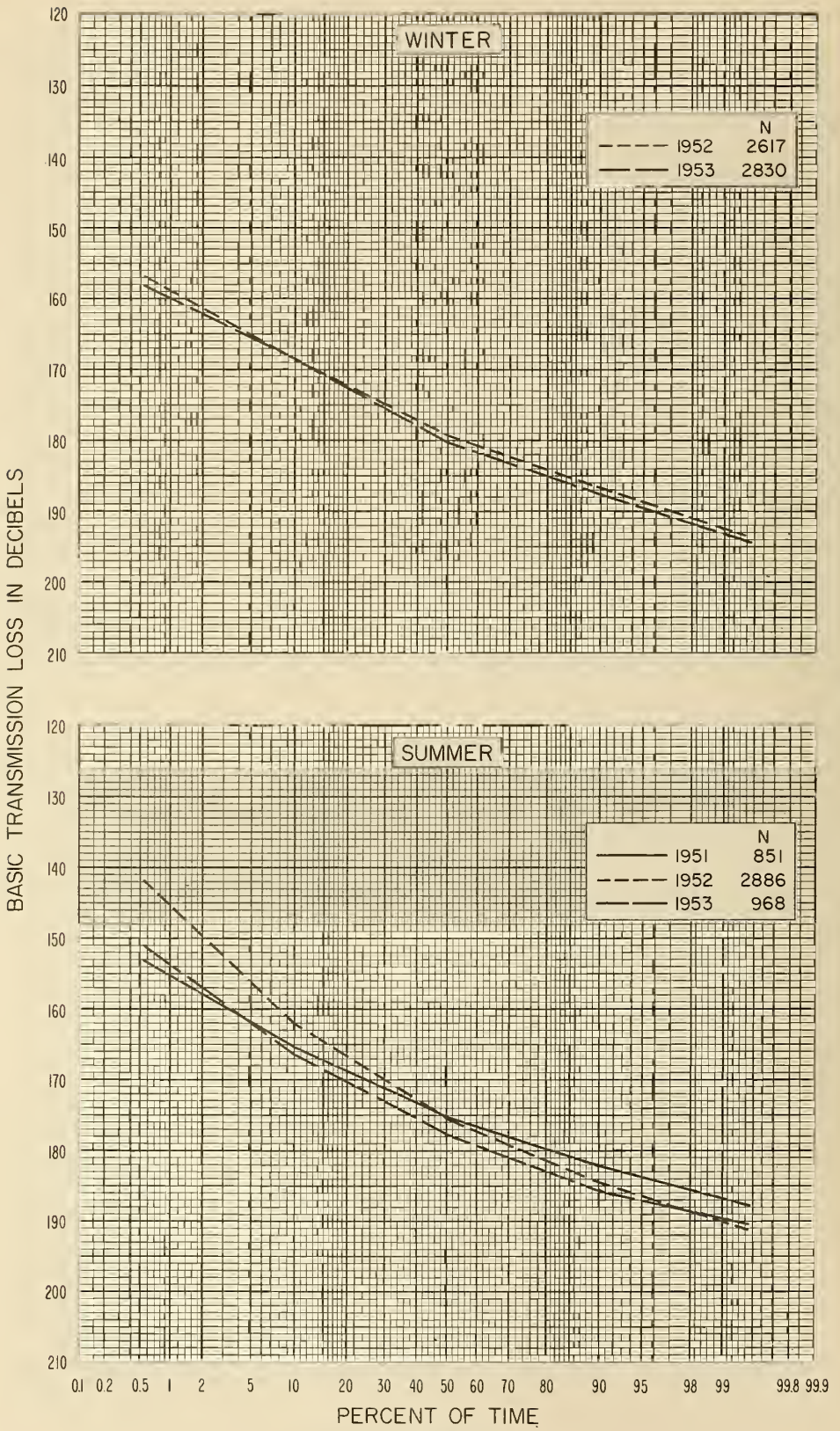

WINTER
N
1952 2617
1953 2830
SUMMER
N
1951 851
1952 2886
1953 968
BASIC TRANSMISSION LOSS IN DECIBELS
120
130
140
150
160
170
180
190
200
210
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9
PERCENT OF TIME

Figure 69

NBS PATH 216

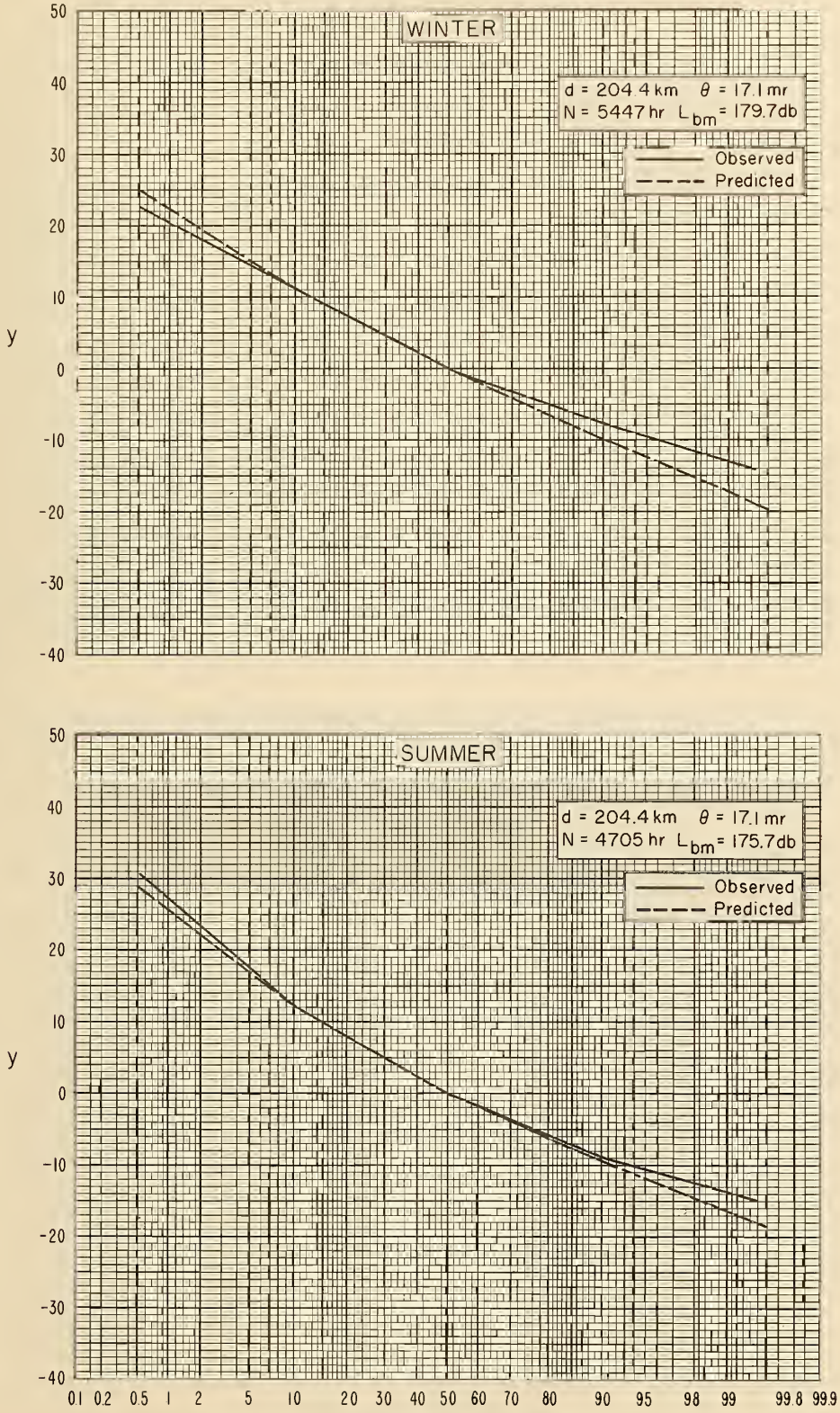


Figure 70

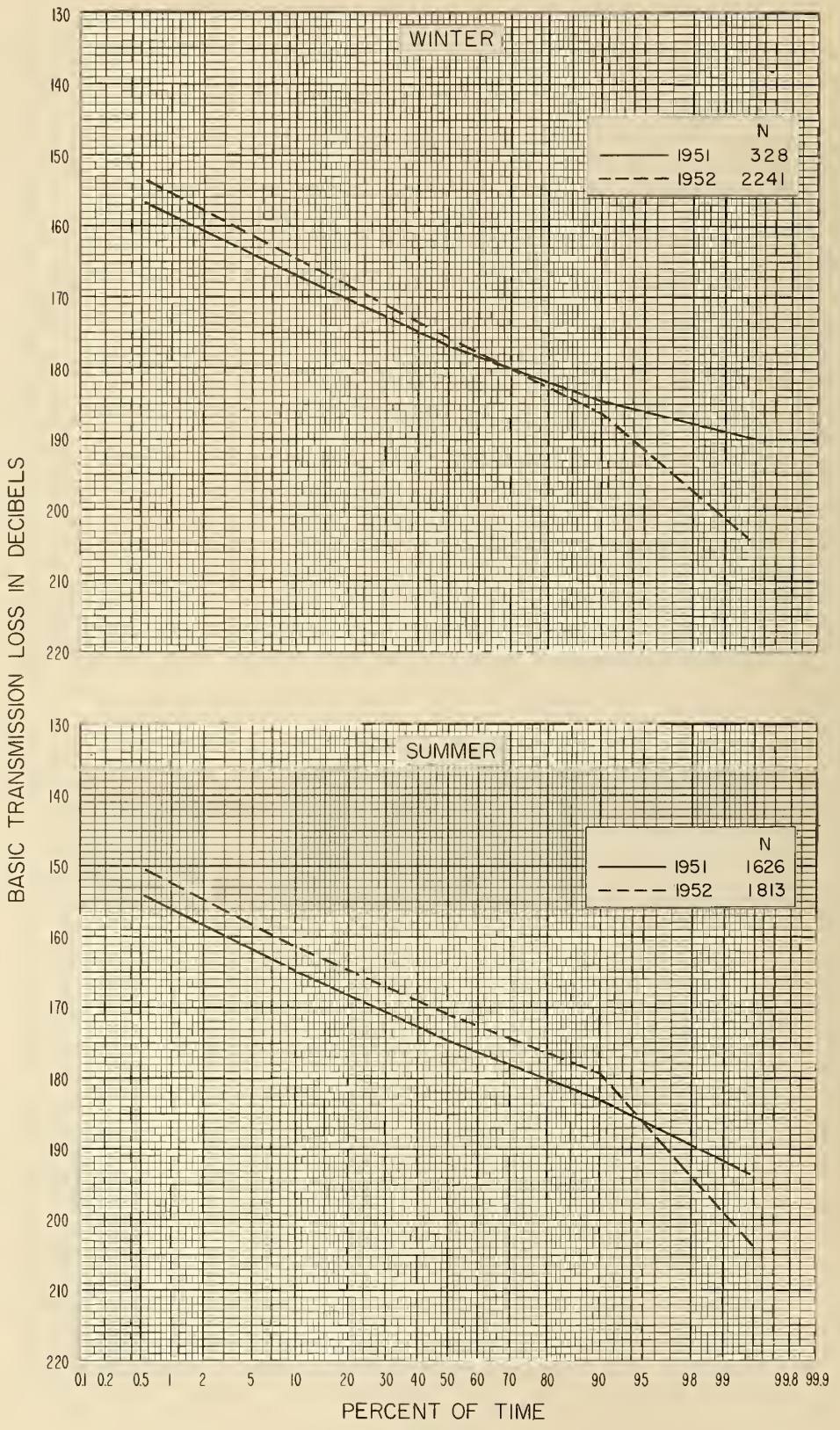

WINTER
N
1951 328
1952 2241
SUMMER
N
1951 1626
1952 1813
BASIC TRANSMISSION LOSS IN DECIBELS
130
140
150
160
170
180
190
200
210
220
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9
PERCENT OF TIME

Figure 71

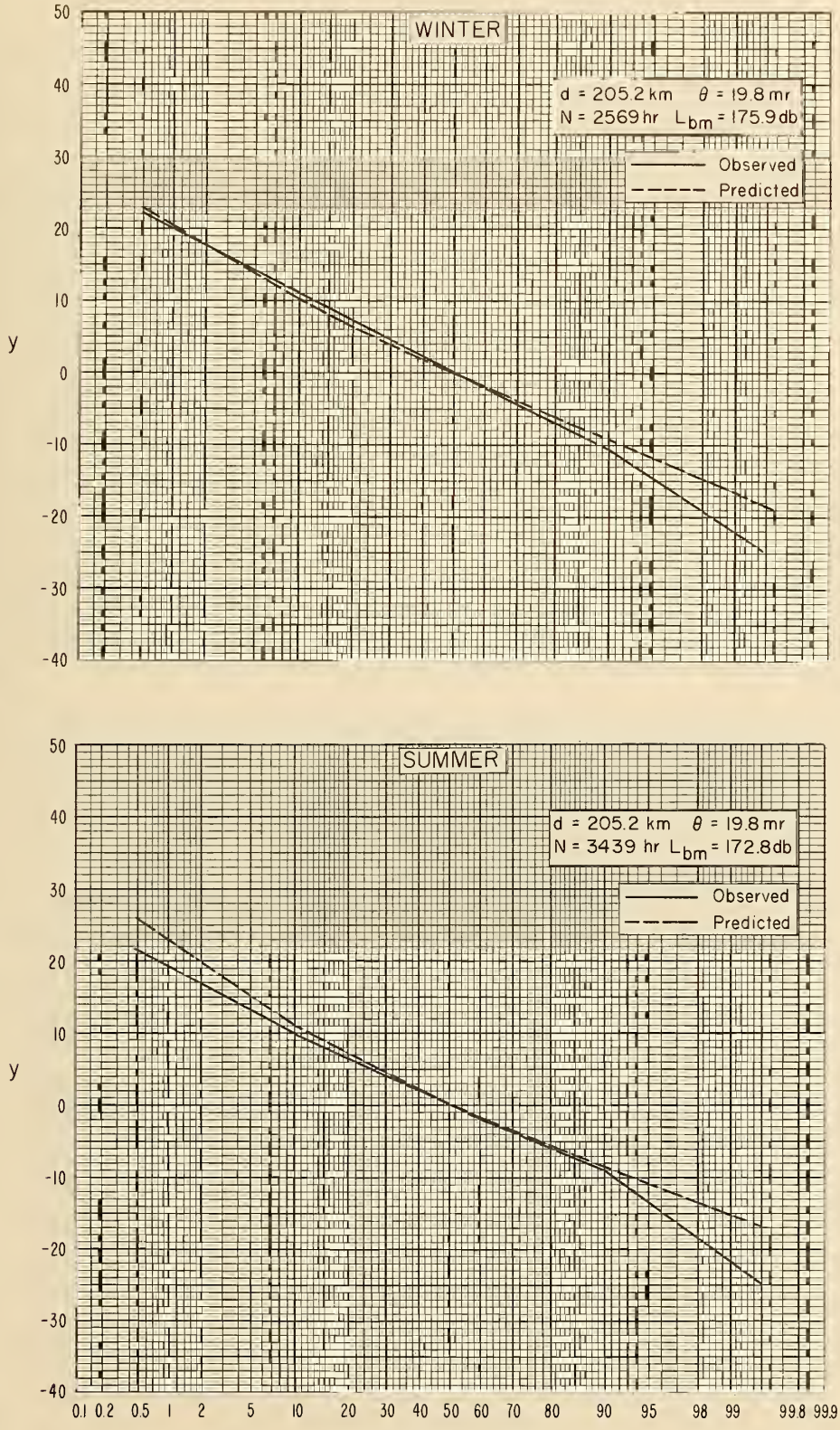

WINTER
d = 205.2 km θ = 19.8 mr
N = 2569 hr L_{bm} = 175.9 db
Observed
Predicted
SUMMER
d = 205.2 km θ = 19.8 mr
N = 3439 hr L_{bm} = 172.8 db
Observed
Predicted
y
50
40
30
20
10
0
-10
-20
-30
-40
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9
PERCENT OF TIME

Figure 72

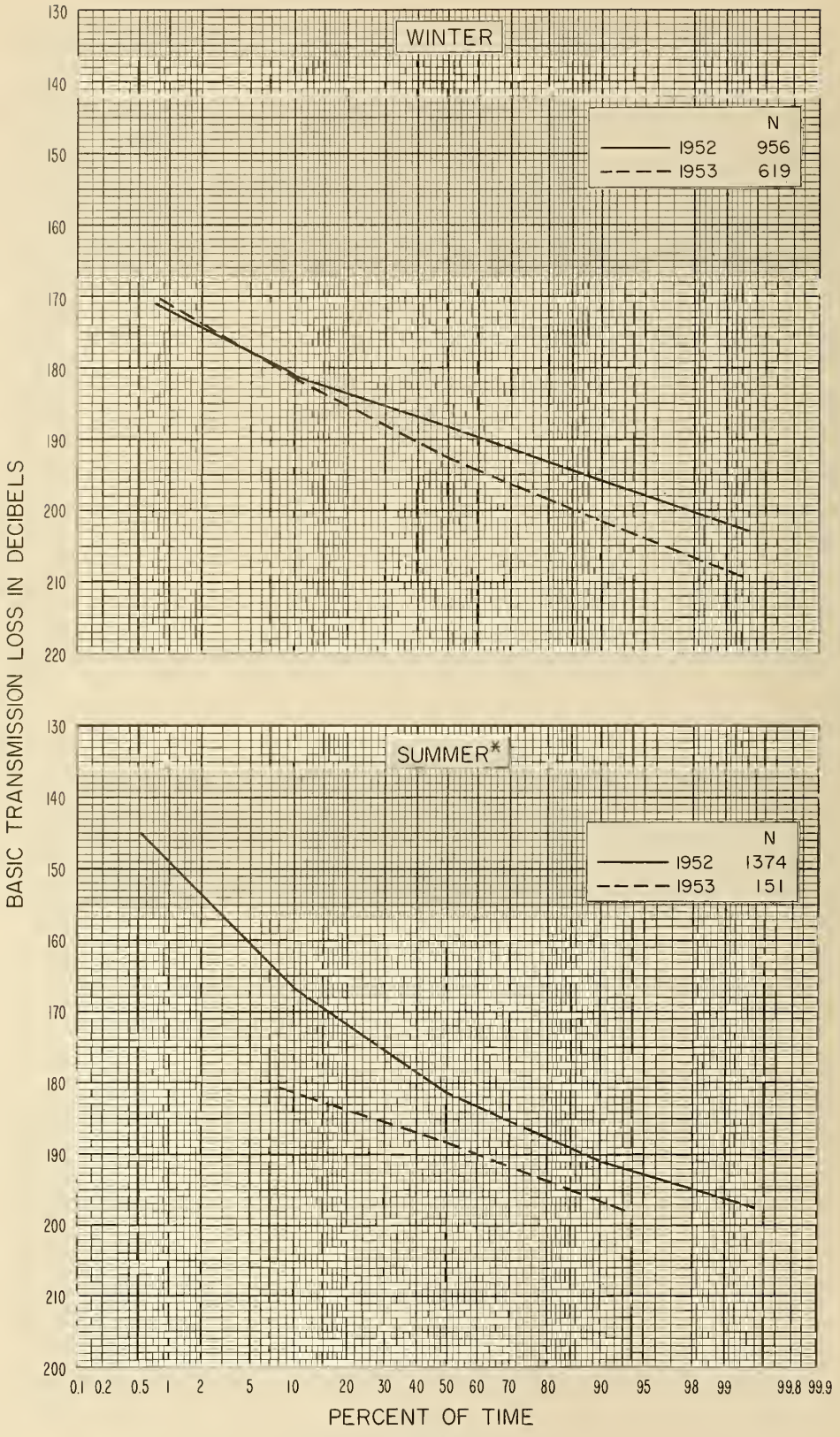

WINTER
N
1952 956
1953 619
SUMMER*
N
1952 1374
1953 151
BASIC TRANSMISSION LOSS IN DECIBELS
130
140
150
160
170
180
190
200
210
220
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9
PERCENT OF TIME

Figure 73

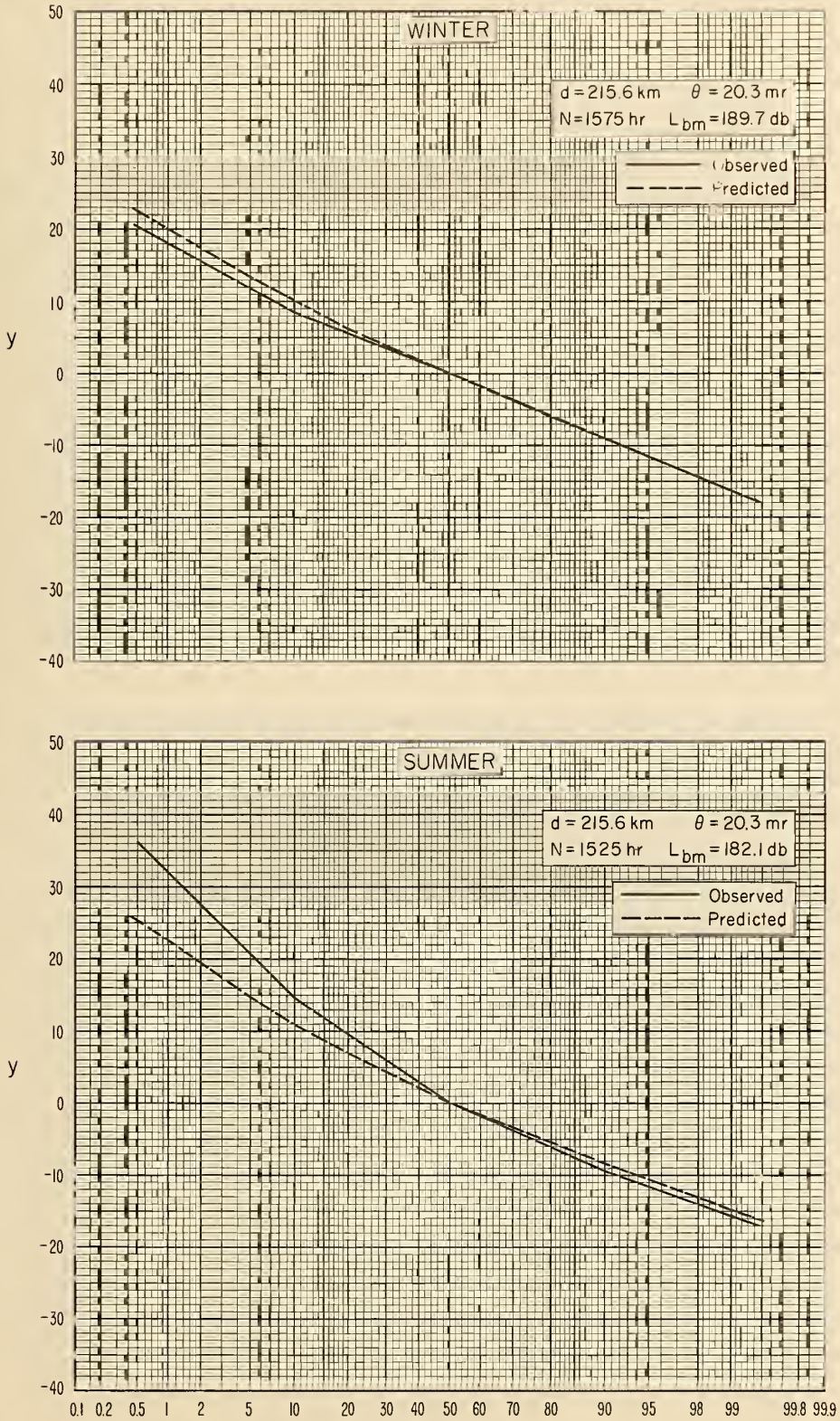

WINTER
d = 215.6 km θ = 20.3 mr
N = 1575 hr L bm = 189.7 db
Observed
Predicted
SUMMER
d = 215.6 km θ = 20.3 mr
N = 1525 hr L bm = 182.1 db
Observed
Predicted
y
50
40
30
20
10
0
-10
-20
-30
-40
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9
PERCENT OF TIME

Figure 74

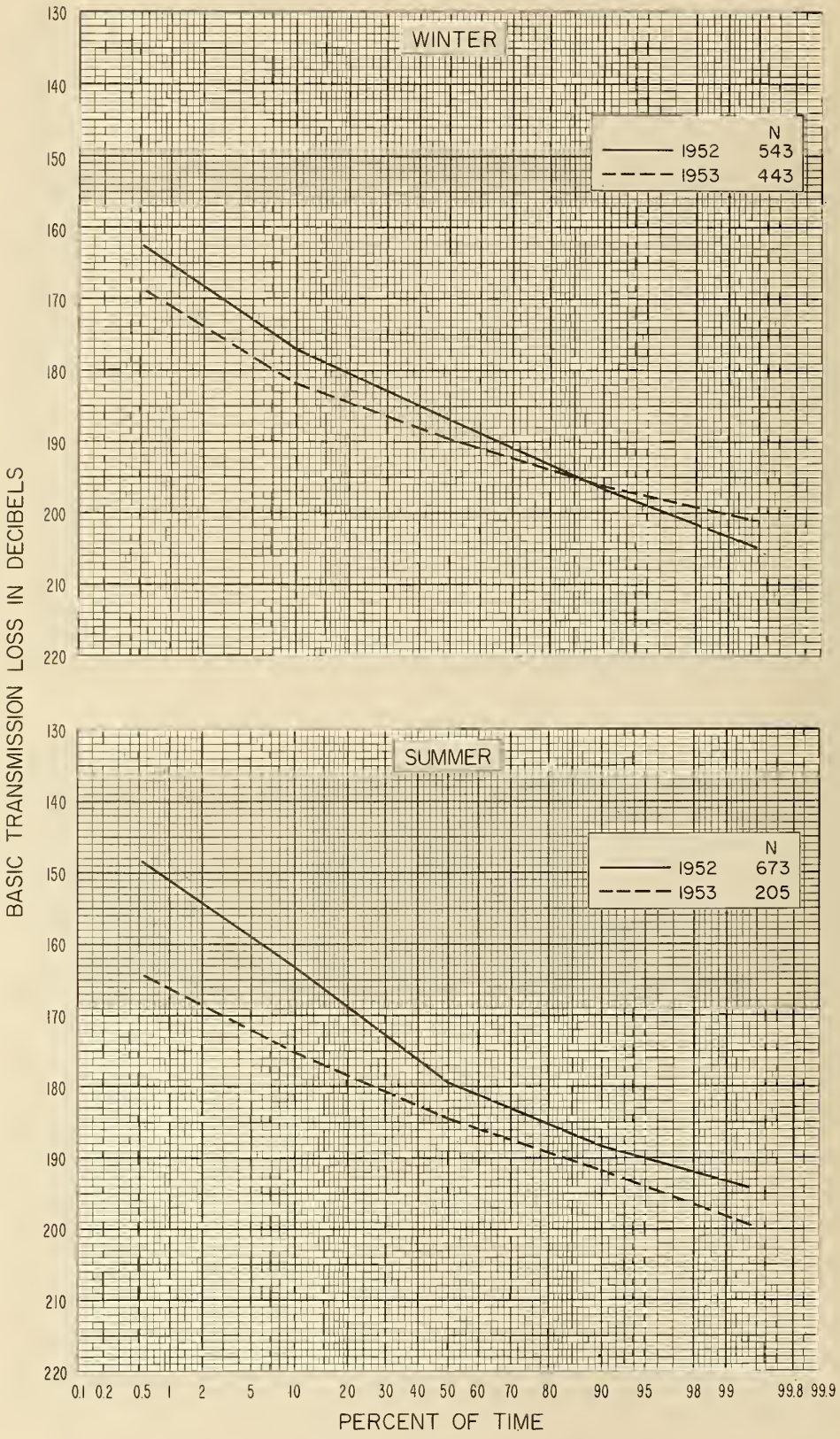

WINTER
N
1952 543
1953 443
SUMMER
N
1952 673
1953 205
BASIC TRANSMISSION LOSS IN DECIBELS
130
140
150
160
170
180
190
200
210
220
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9
PERCENT OF TIME

Figure 75

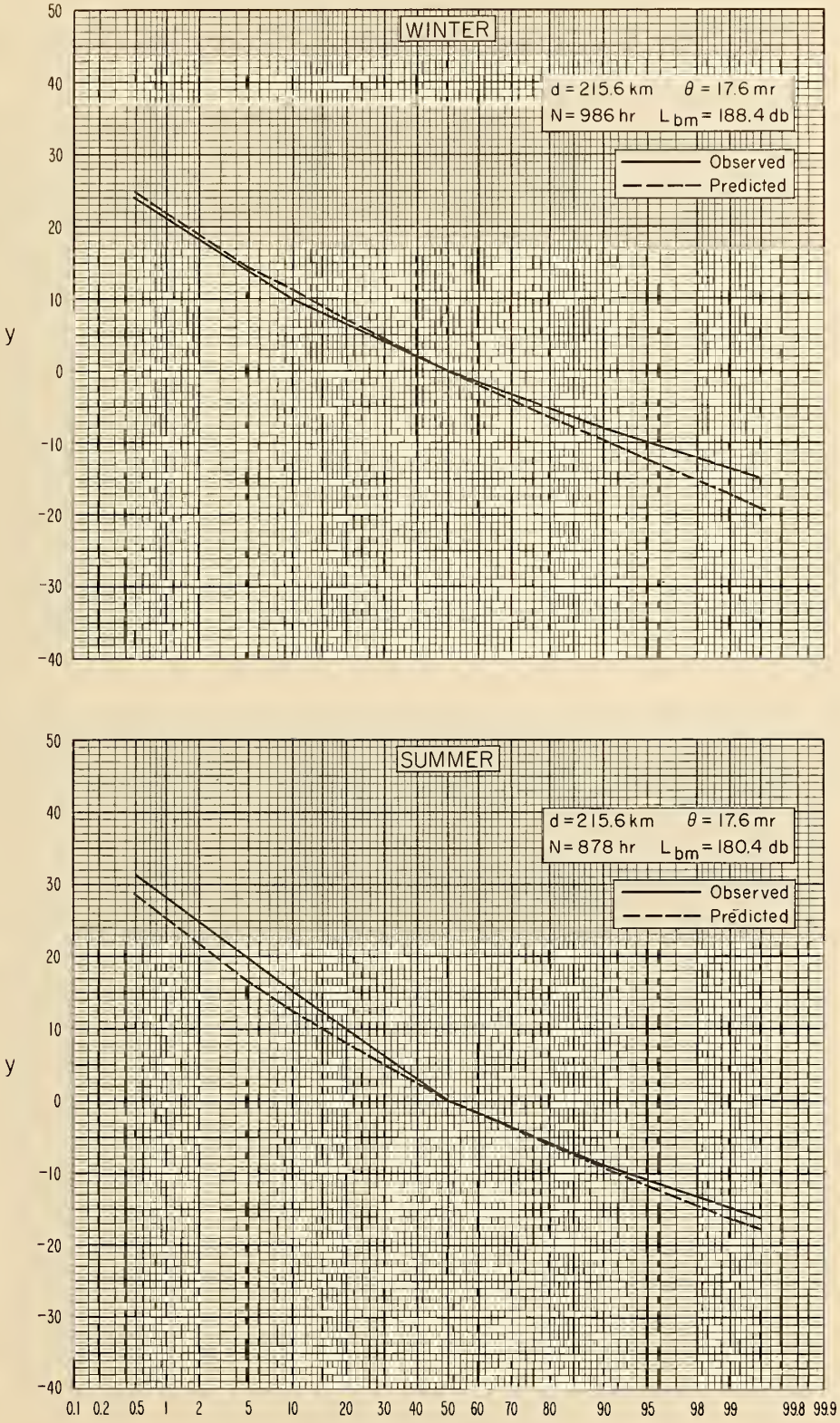

WINTER
d = 215.6 km θ = 17.6 mr
N = 986 hr L bm = 188.4 db
Observed
Predicted
SUMMER
d = 215.6 km θ = 17.6 mr
N = 878 hr L bm = 180.4 db
Observed
Predicted
y
50
40
30
20
10
0
-10
-20
-30
-40
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9
PERCENT OF TIME

Figure 76

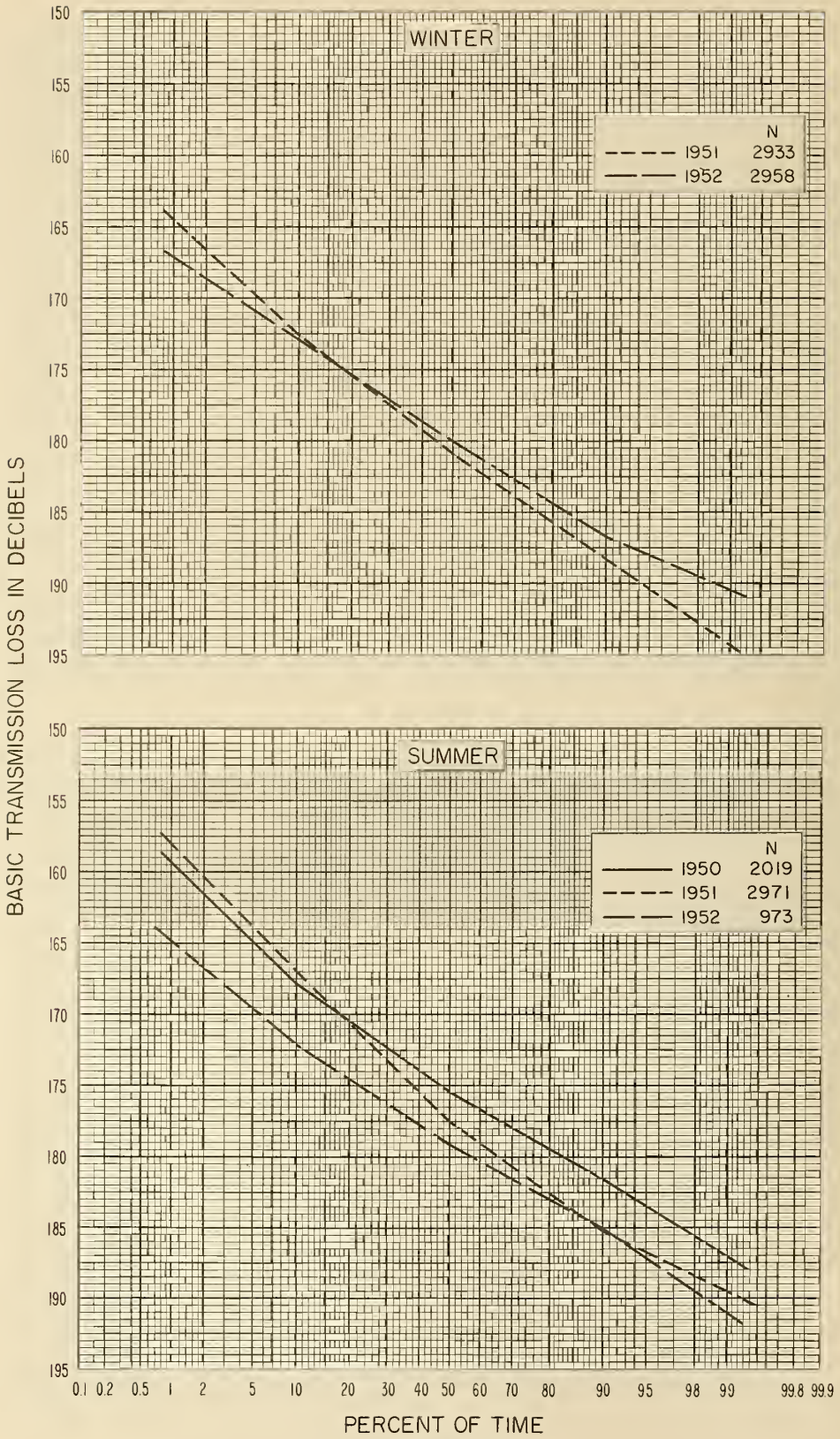
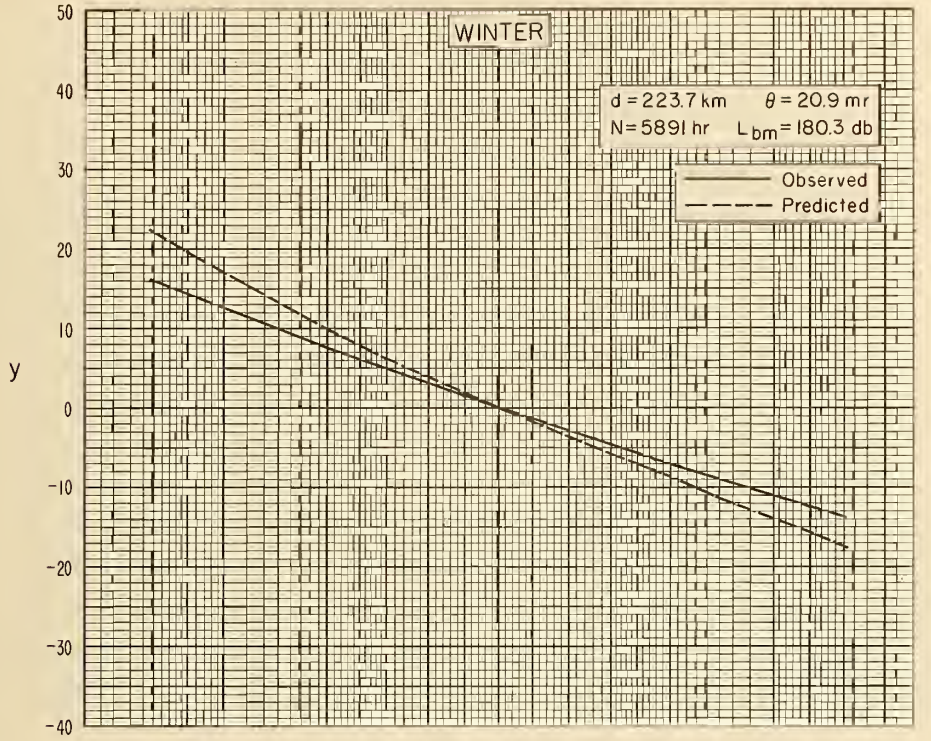

WINTER
N
1951 2933
1952 2958
SUMMER
N
1950 2019
1951 2971
1952 973
BASIC TRANSMISSION LOSS IN DECIBELS
150
155
160
165
170
175
180
185
190
195
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9
PERCENT OF TIME

Figure 77


WINTER
d = 223.7 km θ = 20.9 mr
N = 5891 hr L_{bm} = 180.3 db
Observed
Predicted
y
50
40
30
20
10
0
-10
-20
-30
-40

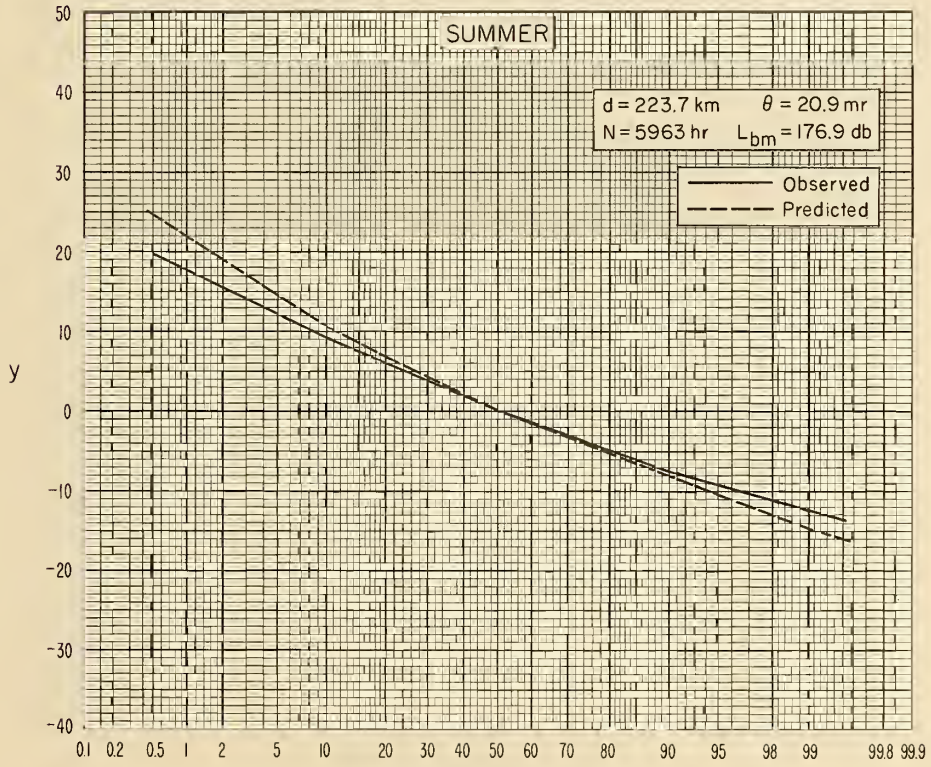

SUMMER
d = 223.7 km θ = 20.9 mr
N = 5963 hr L_{bm} = 176.9 db
Observed
Predicted
y
50
40
30
20
10
0
-10
-20
-30
-40
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9
PERCENT OF TIME

Figure 78

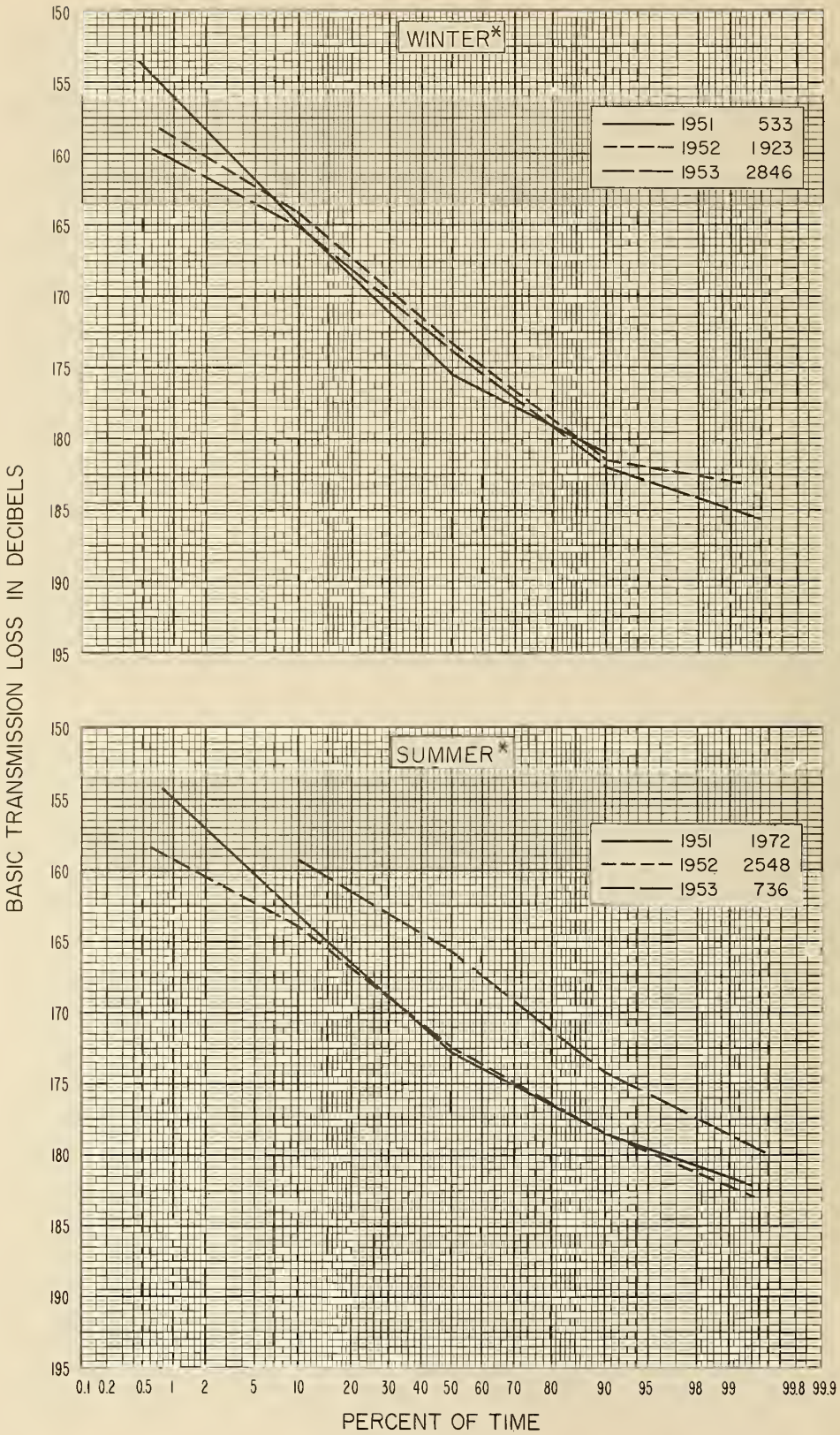
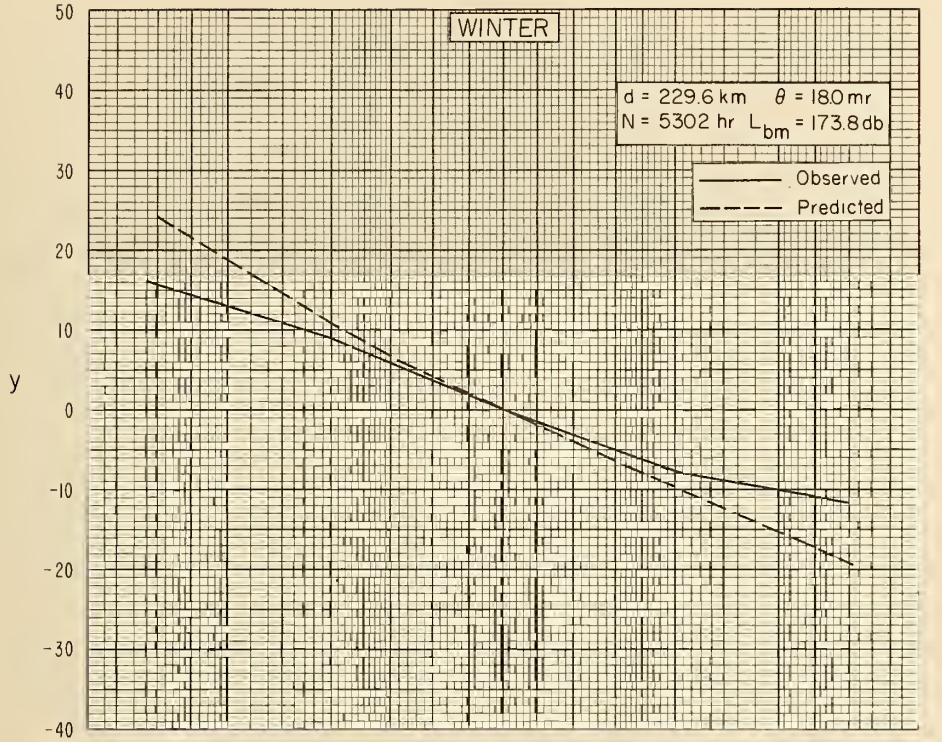
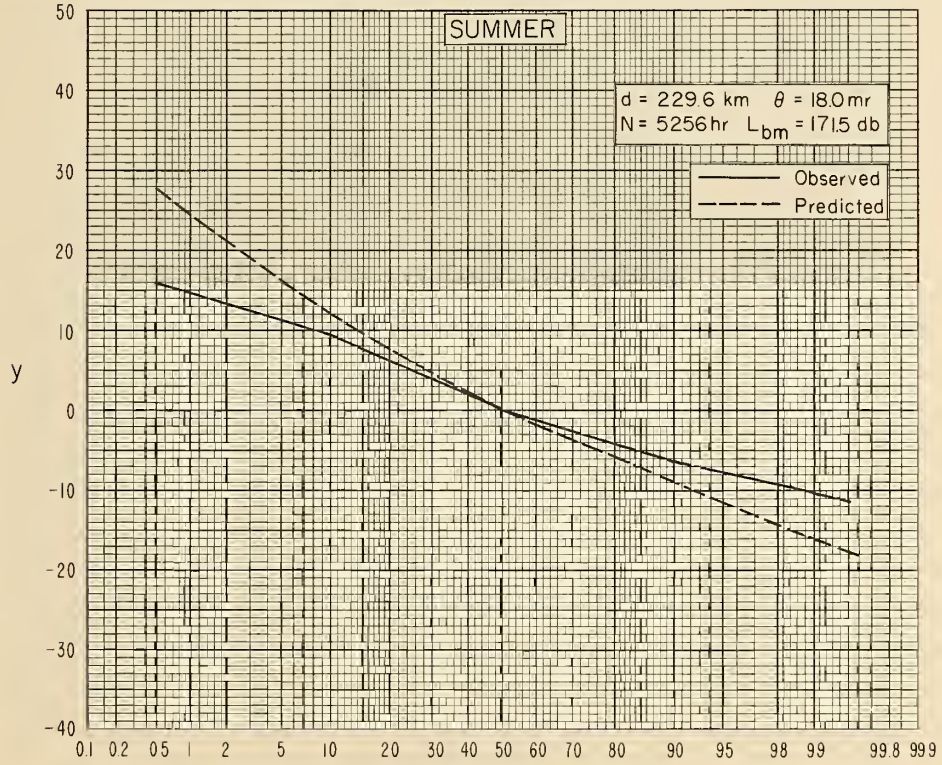
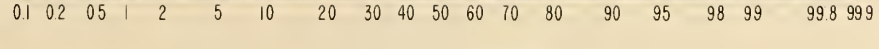

WINTER*
1951 533
1952 1923
1953 2846
SUMMER*
1951 1972
1952 2548
1953 736
BASIC TRANSMISSION LOSS IN DECIBELS
150
155
160
165
170
175
180
185
190
195
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9
PERCENT OF TIME

Figure 79

NBS PATH 203







PERCENT OF TIME

Figure 80

NBS PATH 19

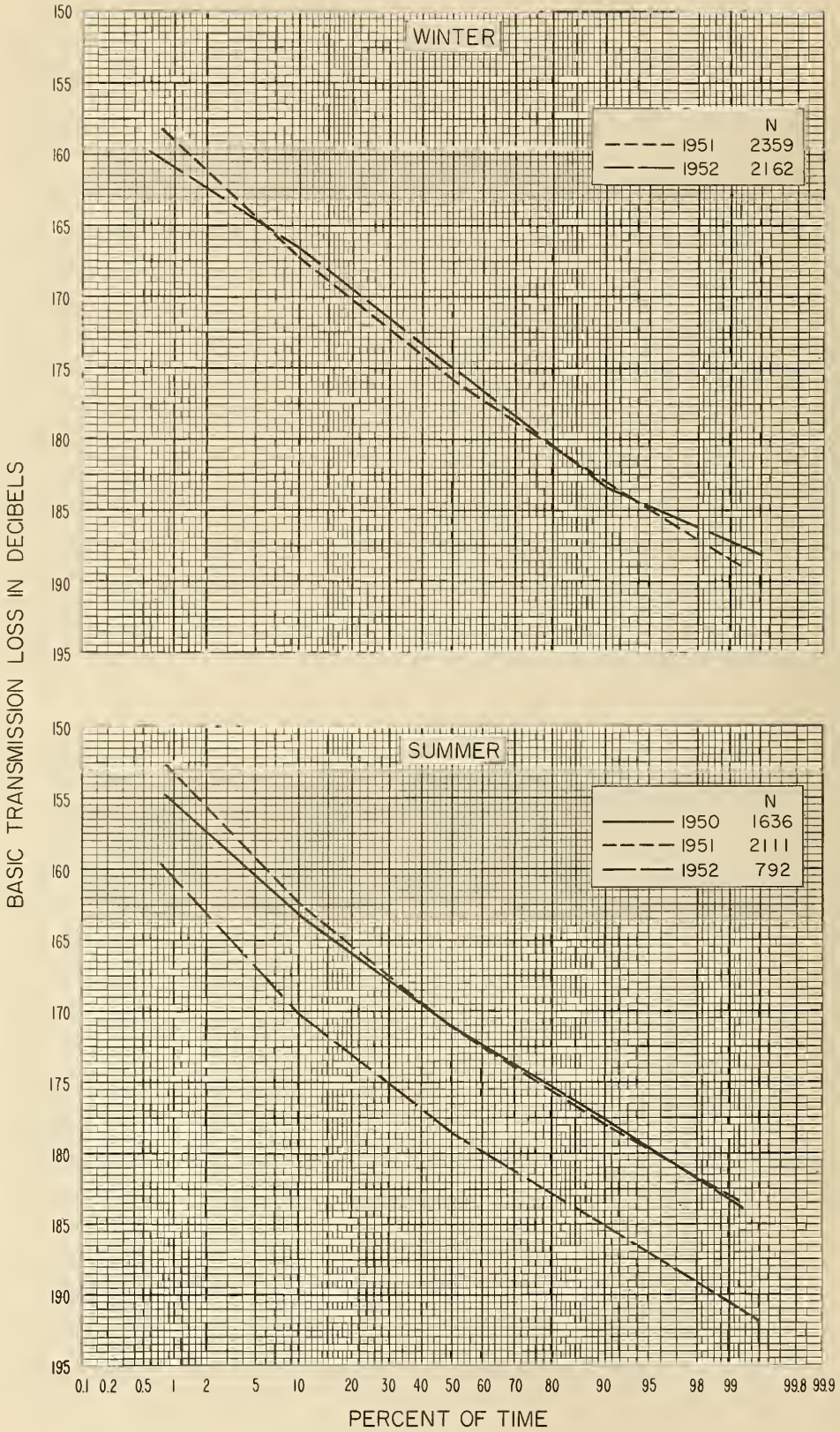


Figure 81

NBS PATH 19

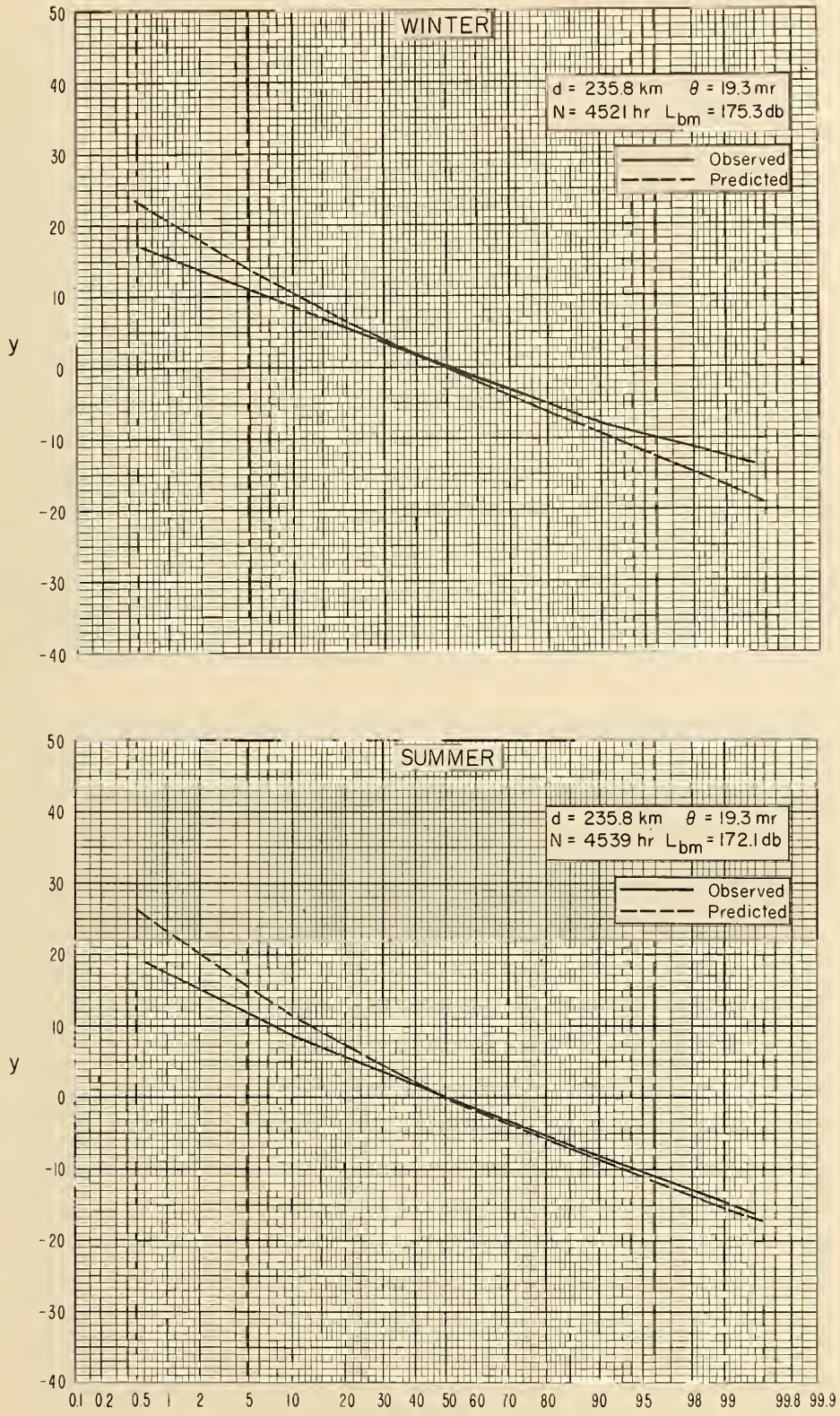


Figure 82

NBS PATH 13

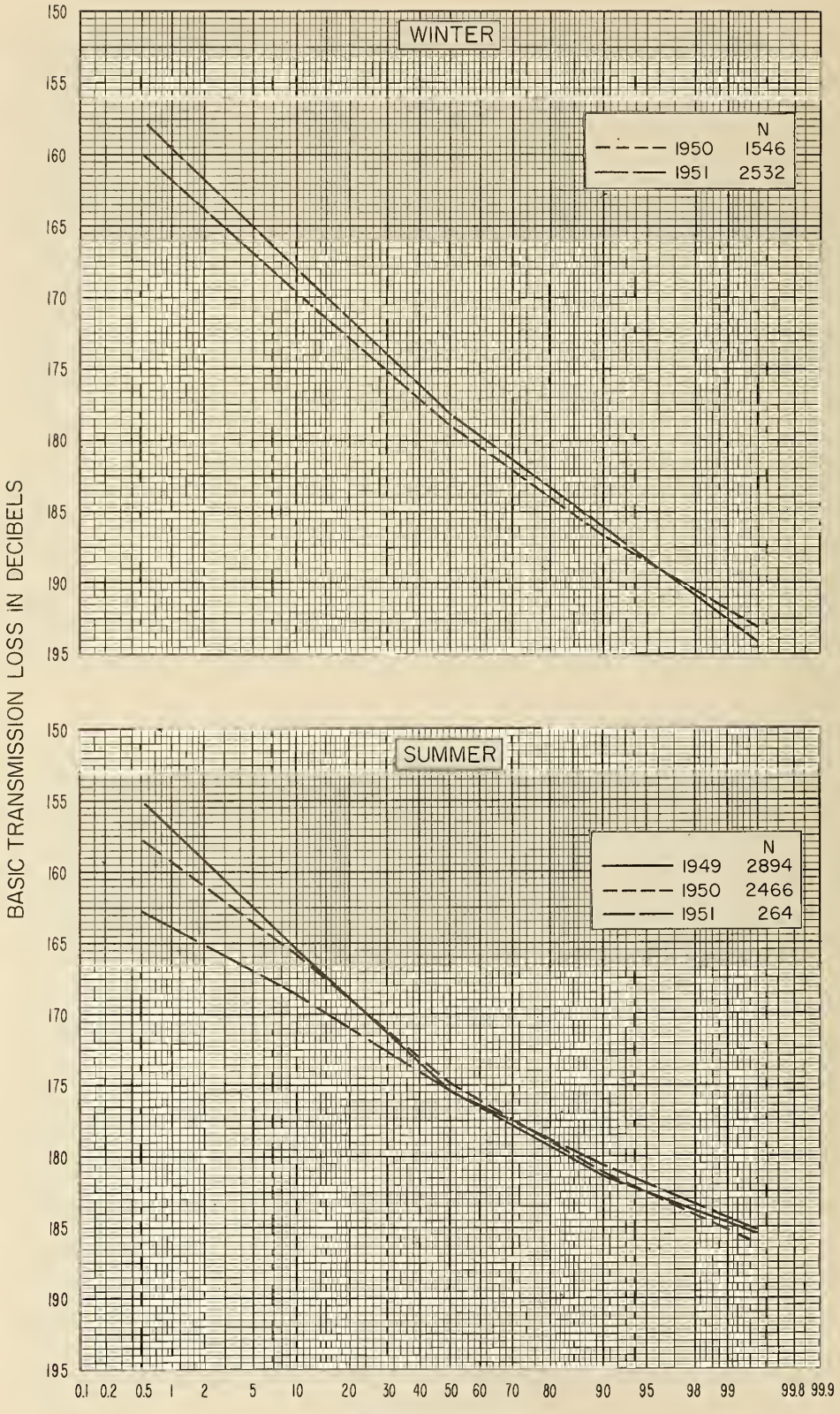


Figure 83

NBS PATH 13

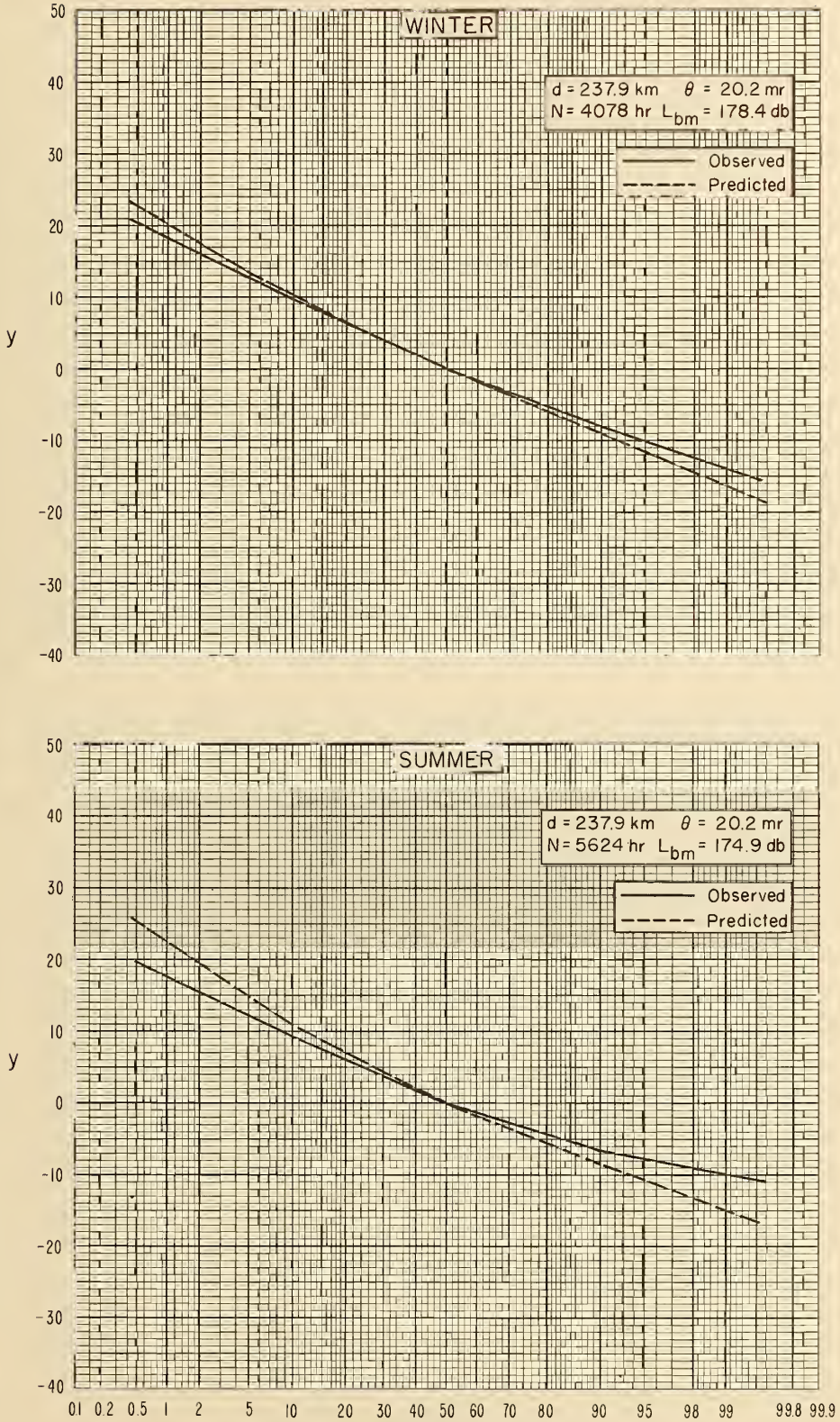


Figure 84

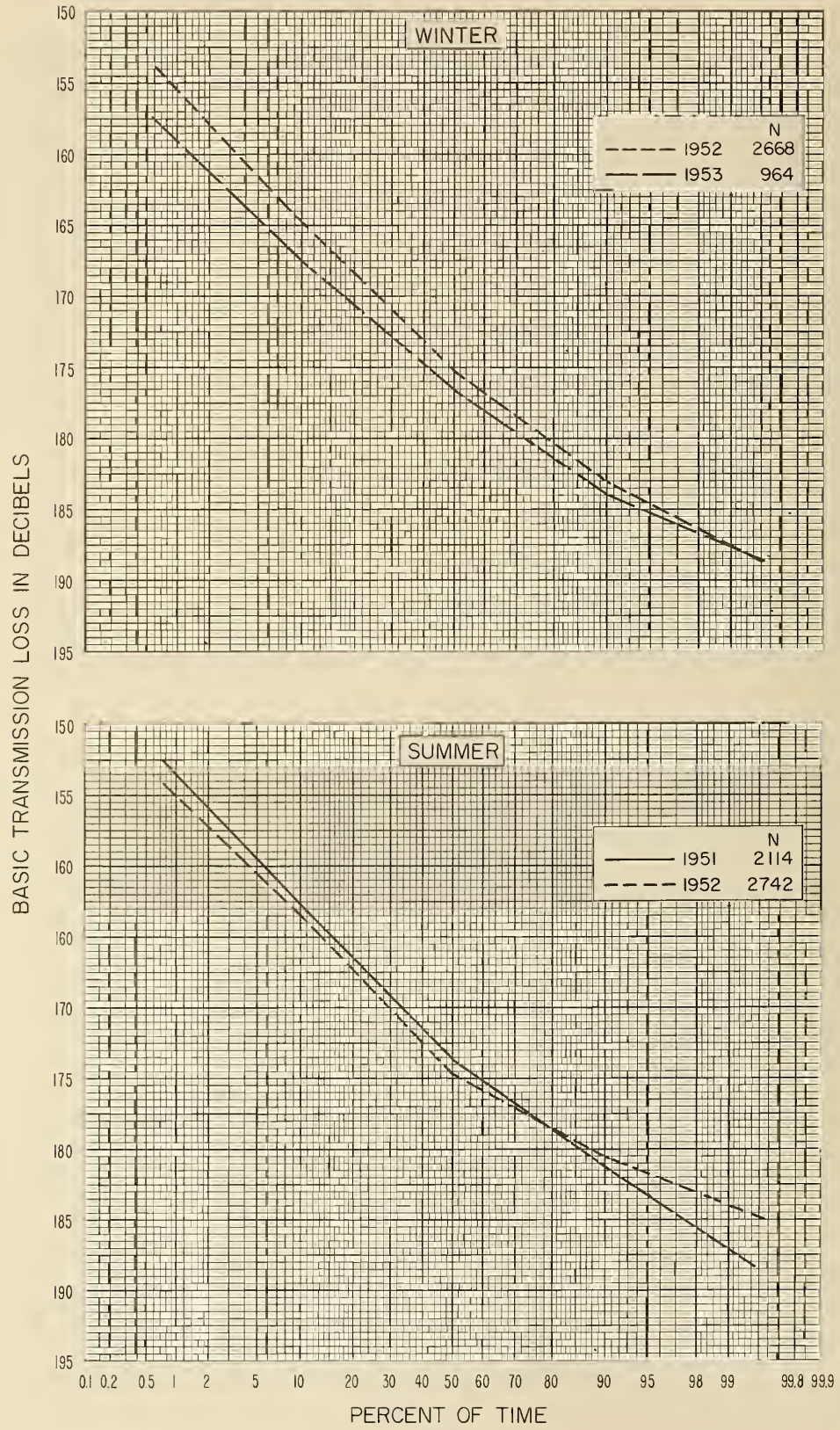

WINTER
N
1952 2668
1953 964
SUMMER
N
1951 2114
1952 2742
BASIC TRANSMISSION LOSS IN DECIBELS
150
155
160
165
170
175
180
185
190
195
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9
PERCENT OF TIME

Figure 85

NBS PATH 20

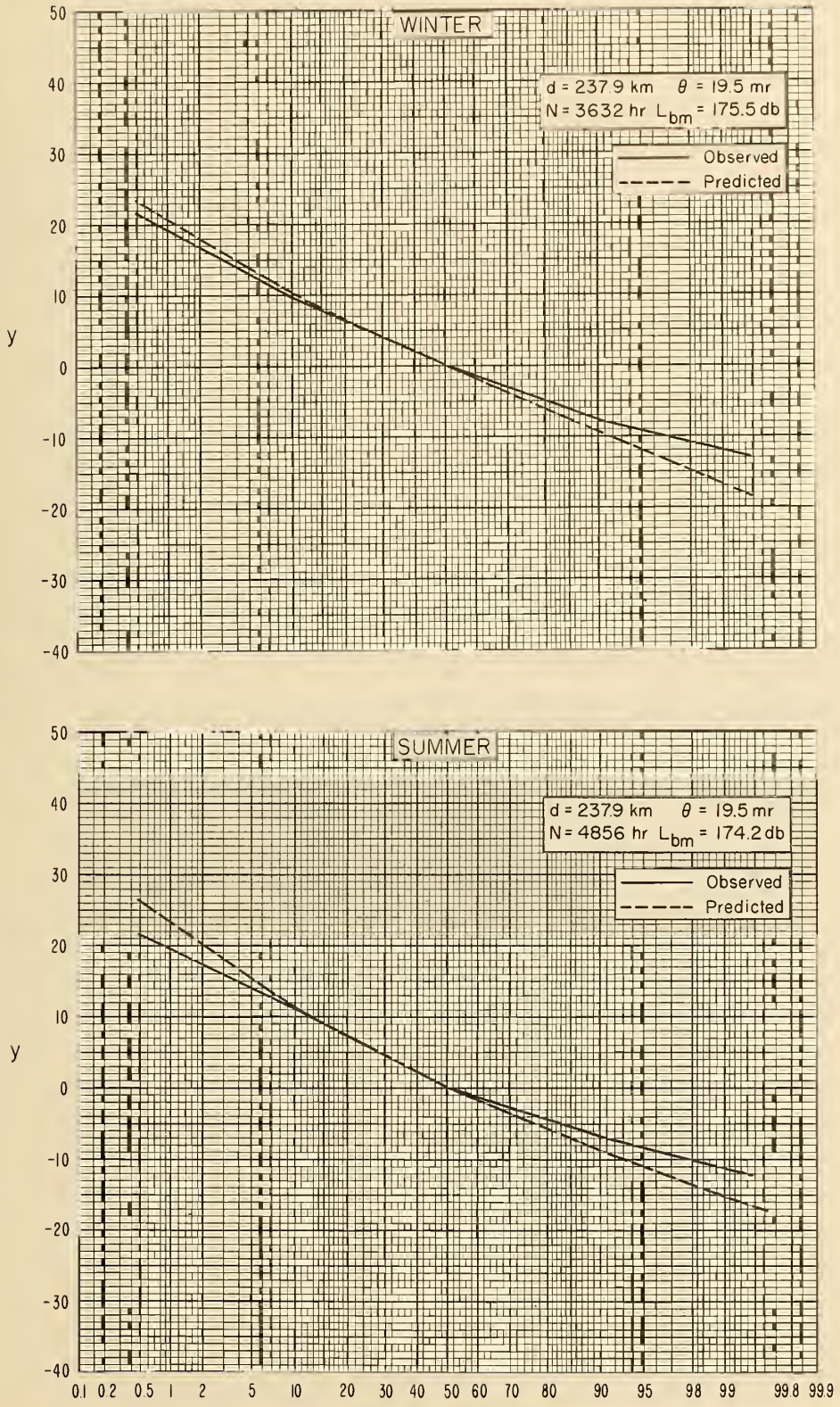


Figure 86

PART II

(Figures 87 through 121)

Cumulative distributions - winter and summer - of paths for which more than one season of recording is available.

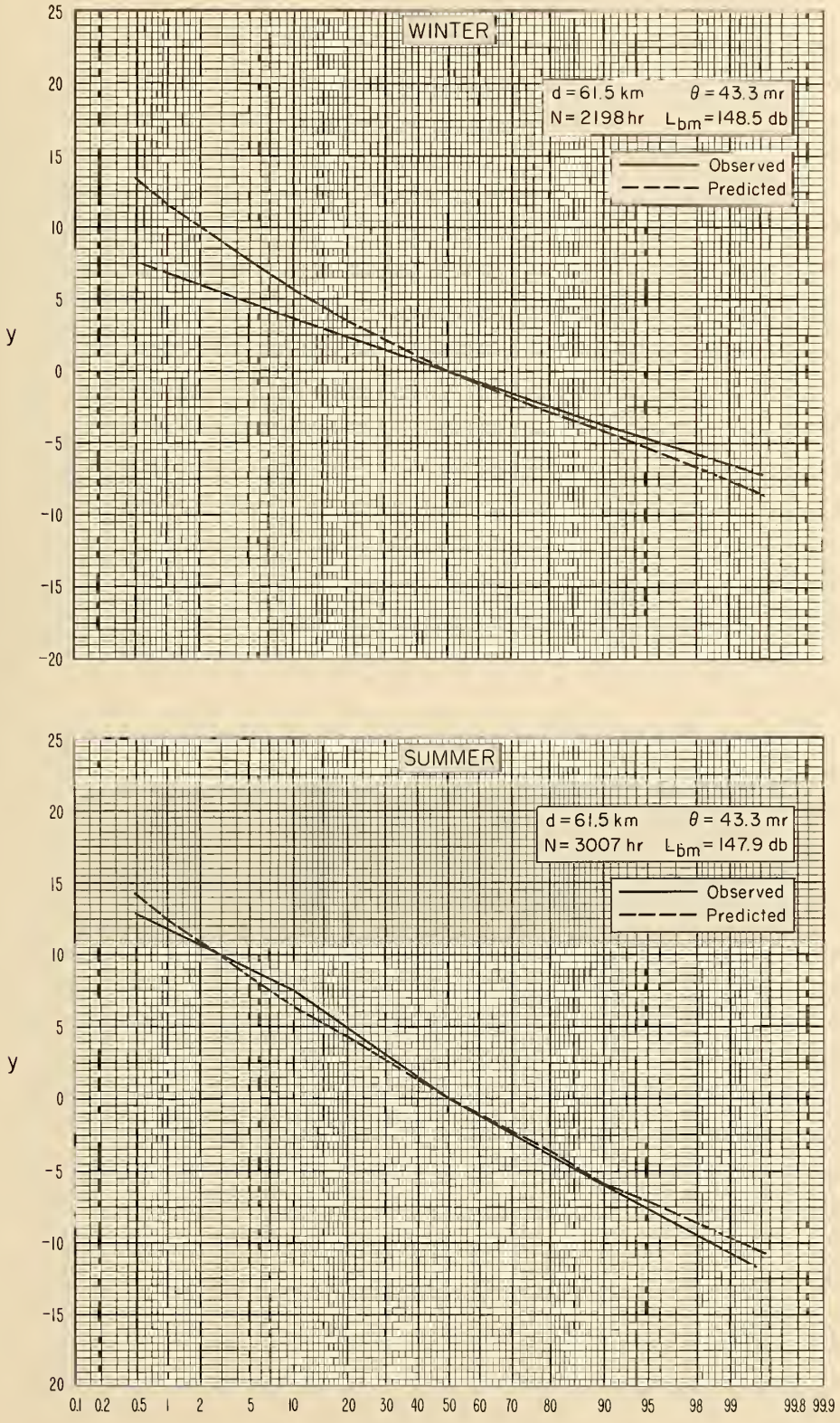

WINTER
d = 61.5 km
θ = 43.3 mr
N = 2198 hr
L_{bm} = 148.5 db
Observed
Predicted
SUMMER
d = 61.5 km
θ = 43.3 mr
N = 3007 hr
L_{bm} = 147.9 db
Observed
Predicted
y
25
20
15
10
5
0
-5
-10
-15
-20
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9
PERCENT OF TIME

Figure 87

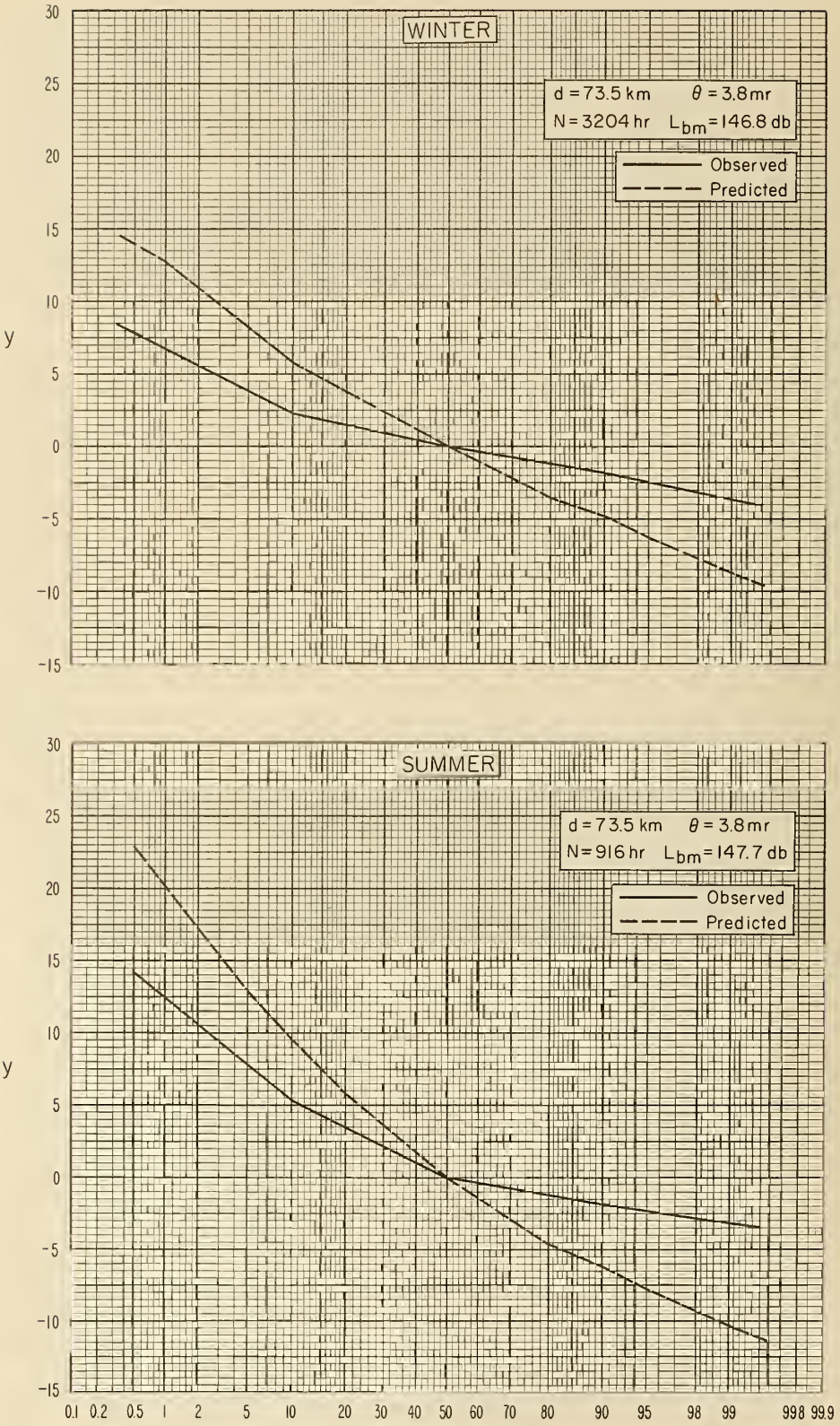

WINTER
d = 73.5 km θ = 3.8 mr
N = 3204 hr Lbm = 146.8 db
Observed
Predicted
SUMMER
d = 73.5 km θ = 3.8 mr
N = 916 hr Lbm = 147.7 db
Observed
Predicted
y
30
25
20
15
10
5
0
-5
-10
-15
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9
PERCENT OF TIME

Figure 88

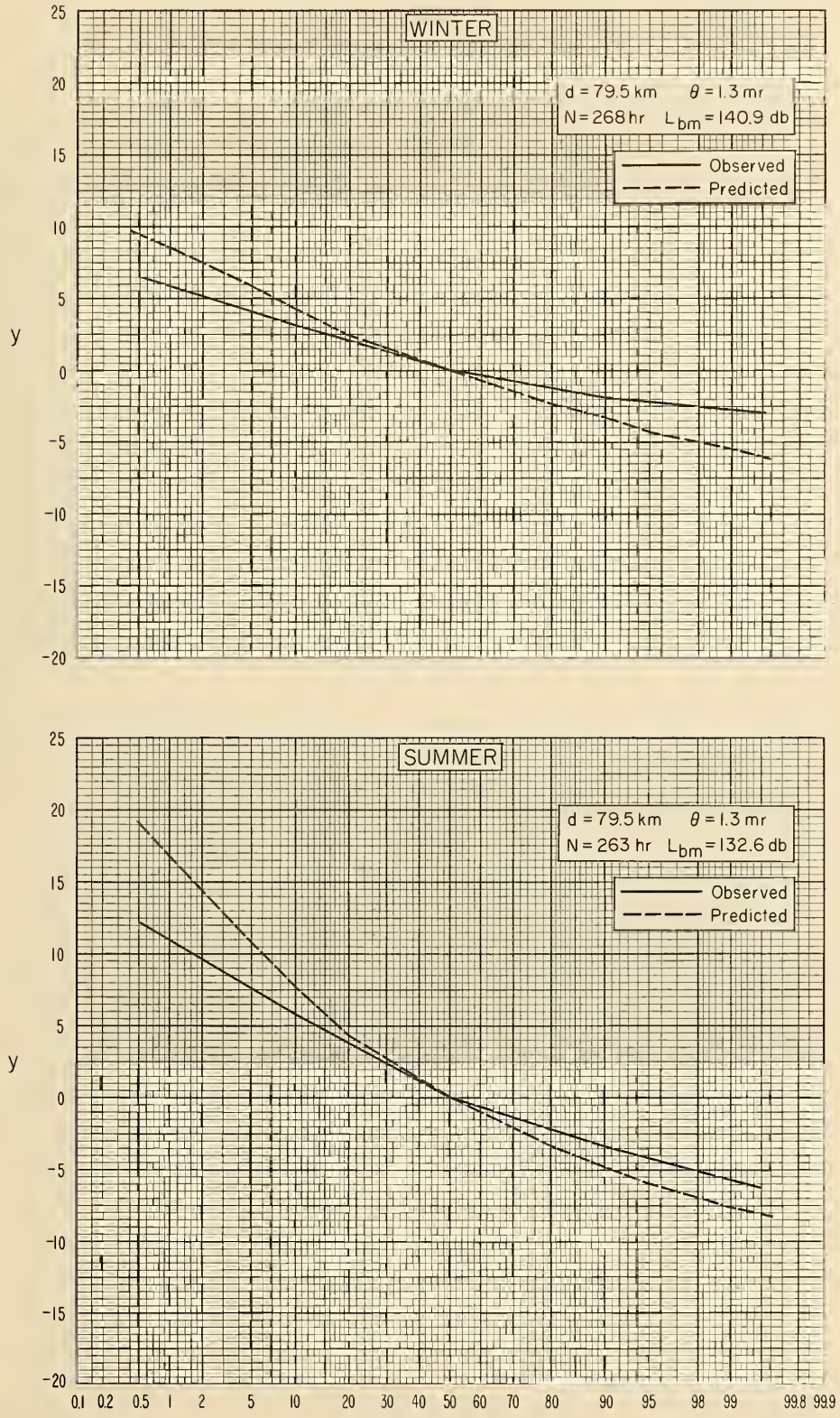

WINTER
d = 79.5 km θ = 1.3 mr
N = 268 hr L bm = 140.9 db
Observed
Predicted
SUMMER
d = 79.5 km θ = 1.3 mr
N = 263 hr L bm = 132.6 db
Observed
Predicted
y
25
20
15
10
5
0
-5
-10
-15
-20
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9
PERCENT OF TIME

Figure 89

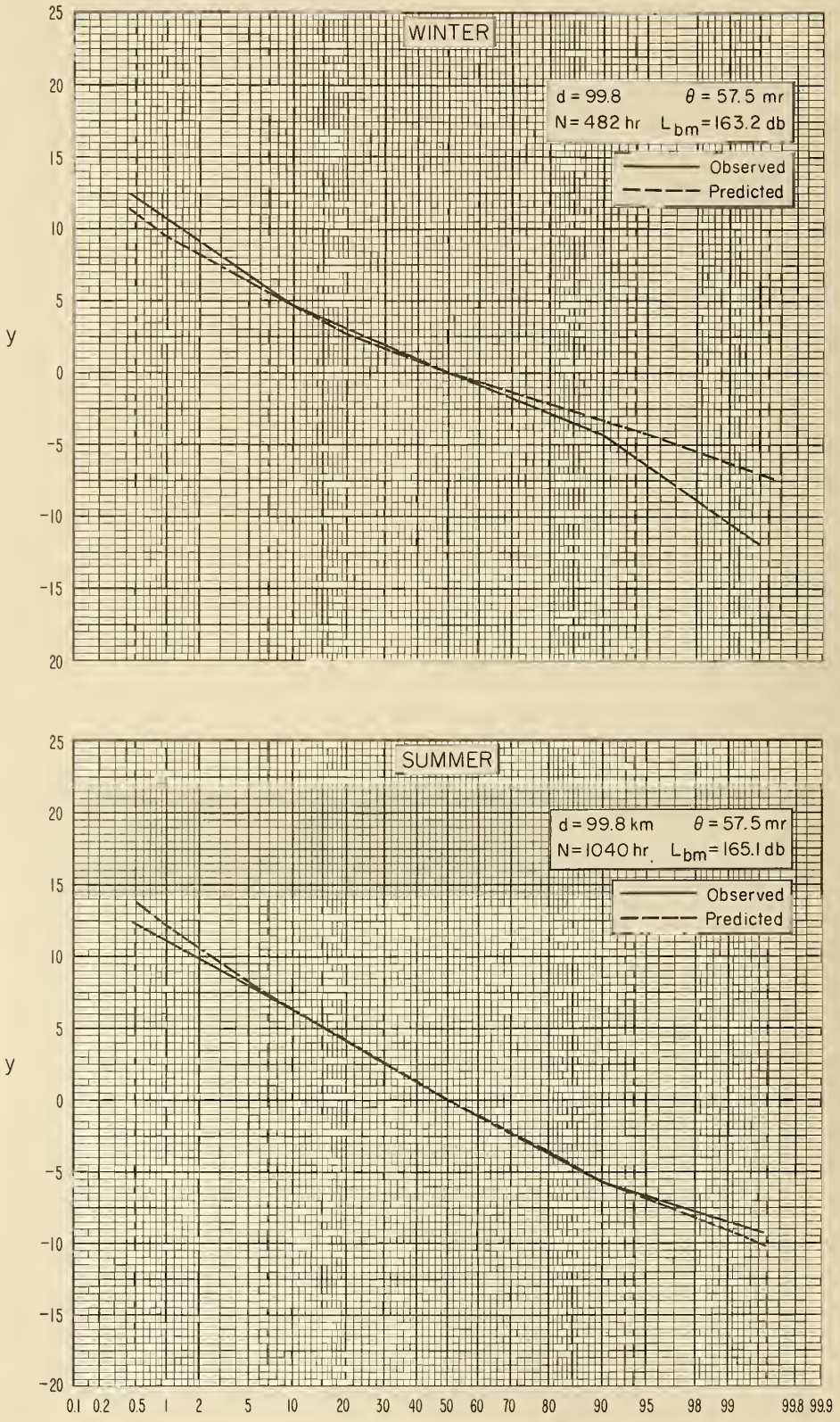

WINTER
d = 99.8
θ = 57.5 mr
N = 482 hr
L_bm = 163.2 db
Observed
Predicted
SUMMER
d = 99.8 km
θ = 57.5 mr
N = 1040 hr
L_bm = 165.1 db
Observed
Predicted
y
25
20
15
10
5
0
-5
-10
-15
-20
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9
PERCENT OF TIME

Figure 90

NBS PATH 2

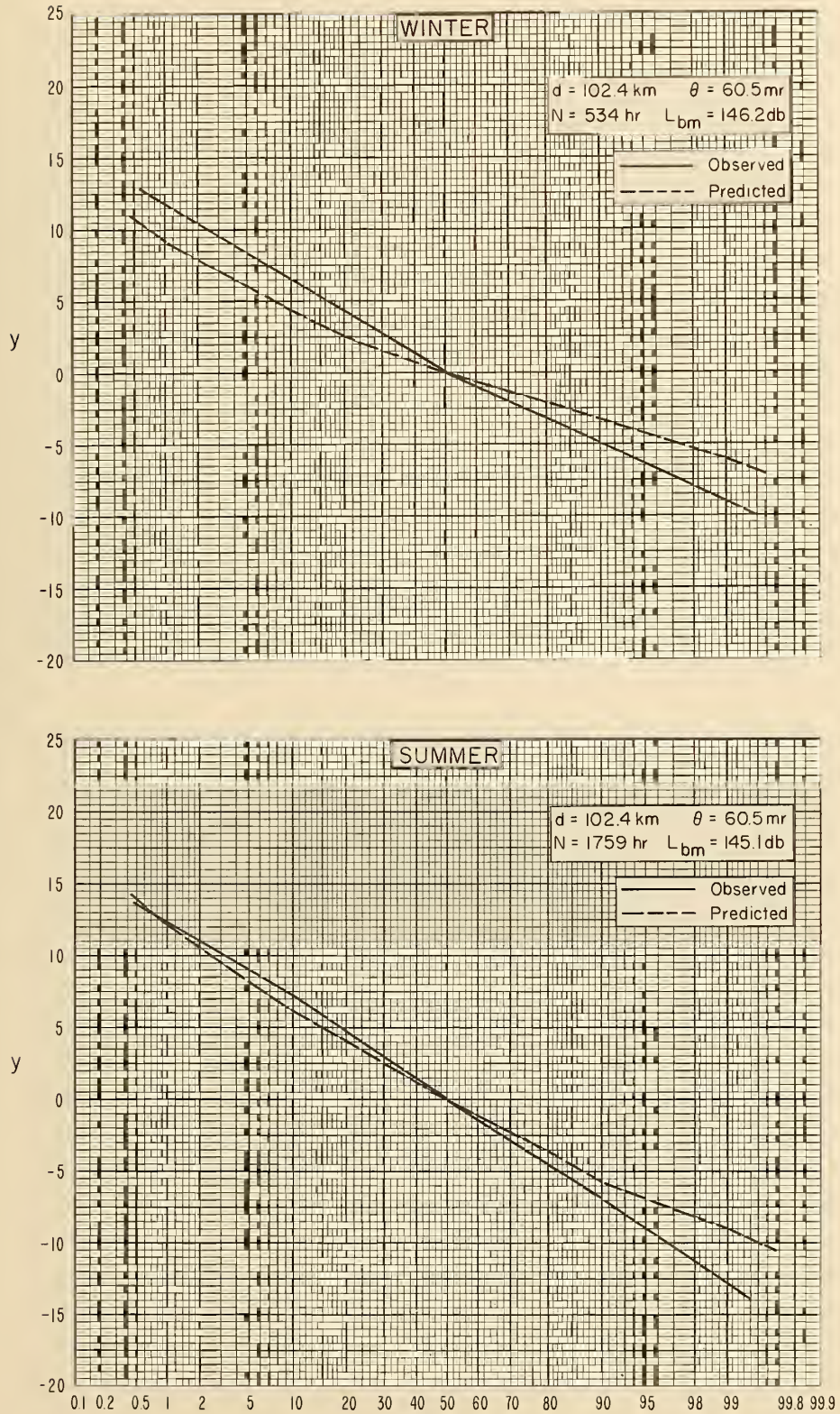


Figure 91

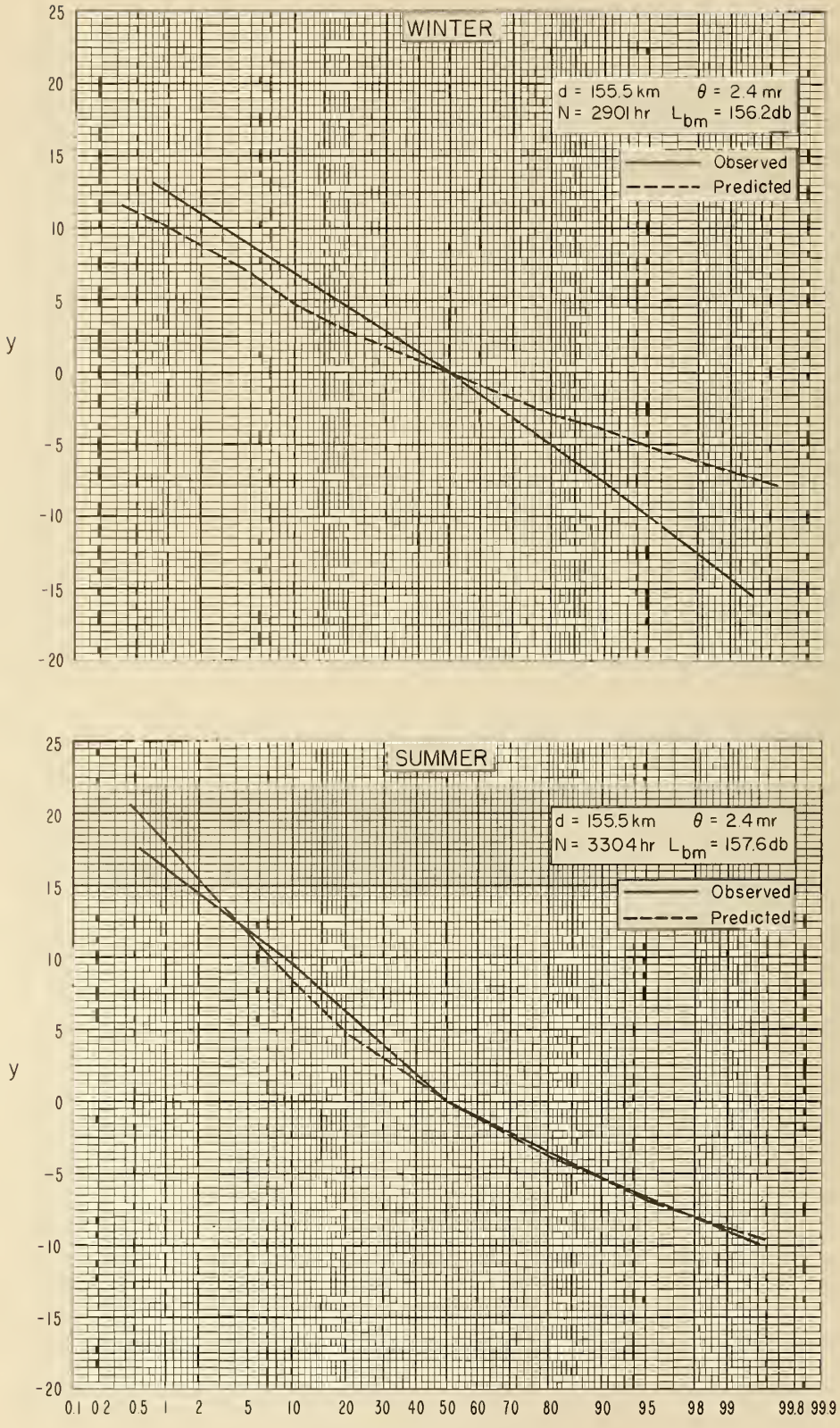

WINTER
d = 155.5 km θ = 2.4 mr
N = 2901 hr L_{bm} = 156.2db
Observed
Predicted
SUMMER
d = 155.5 km θ = 2.4 mr
N = 3304 hr L_{bm} = 157.6db
Observed
Predicted
y
25
20
15
10
5
0
-5
-10
-15
-20
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9
PERCENT OF TIME

Figure 92

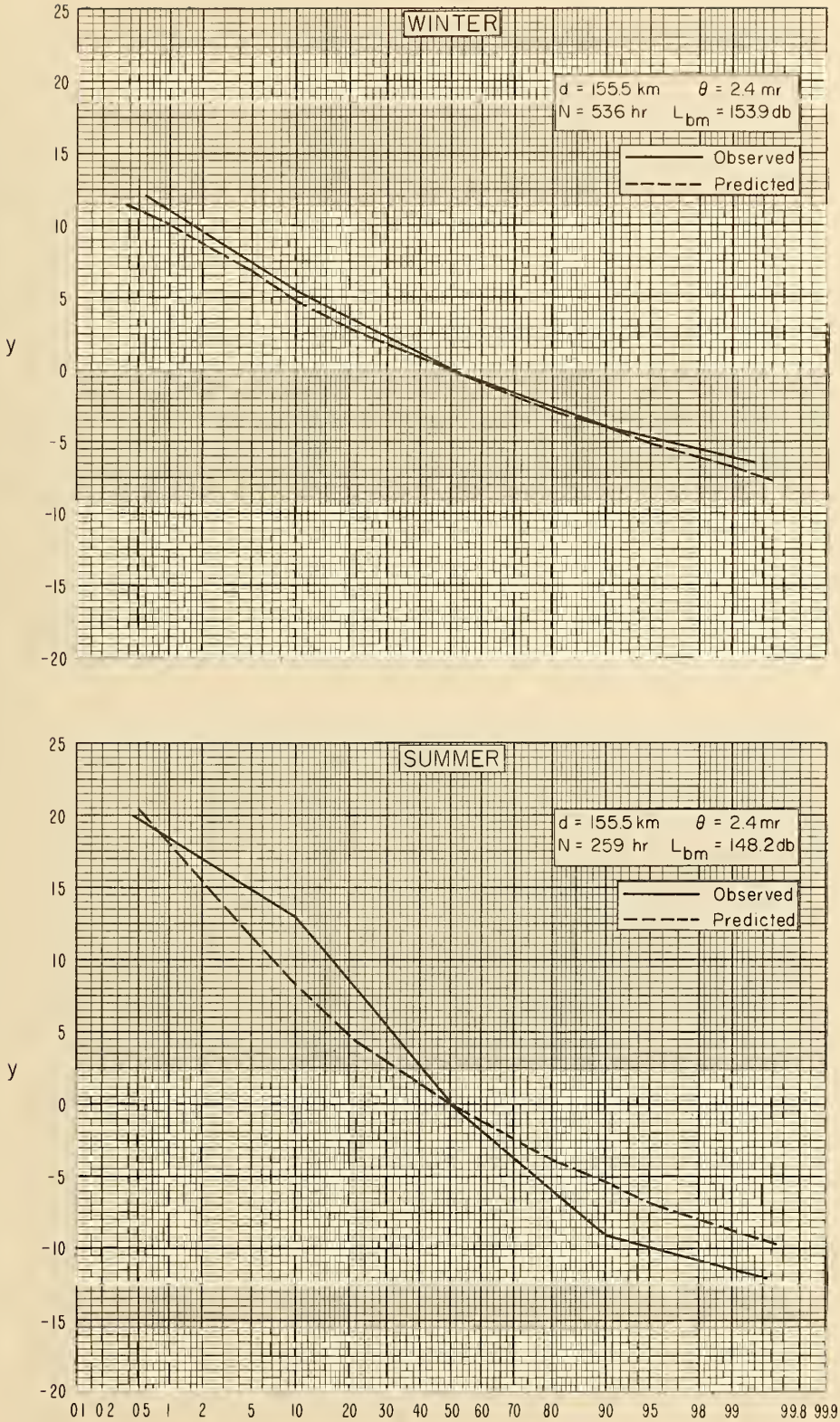

WINTER
d = 155.5 km θ = 2.4 mr
N = 536 hr L_{bm} = 153.9 db
Observed
Predicted
SUMMER
d = 155.5 km θ = 2.4 mr
N = 259 hr L_{bm} = 148.2 db
Observed
Predicted
y
25
20
15
10
5
0
-5
-10
-15
-20
01 02 05 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9
PERCENT OF TIME

Figure 93

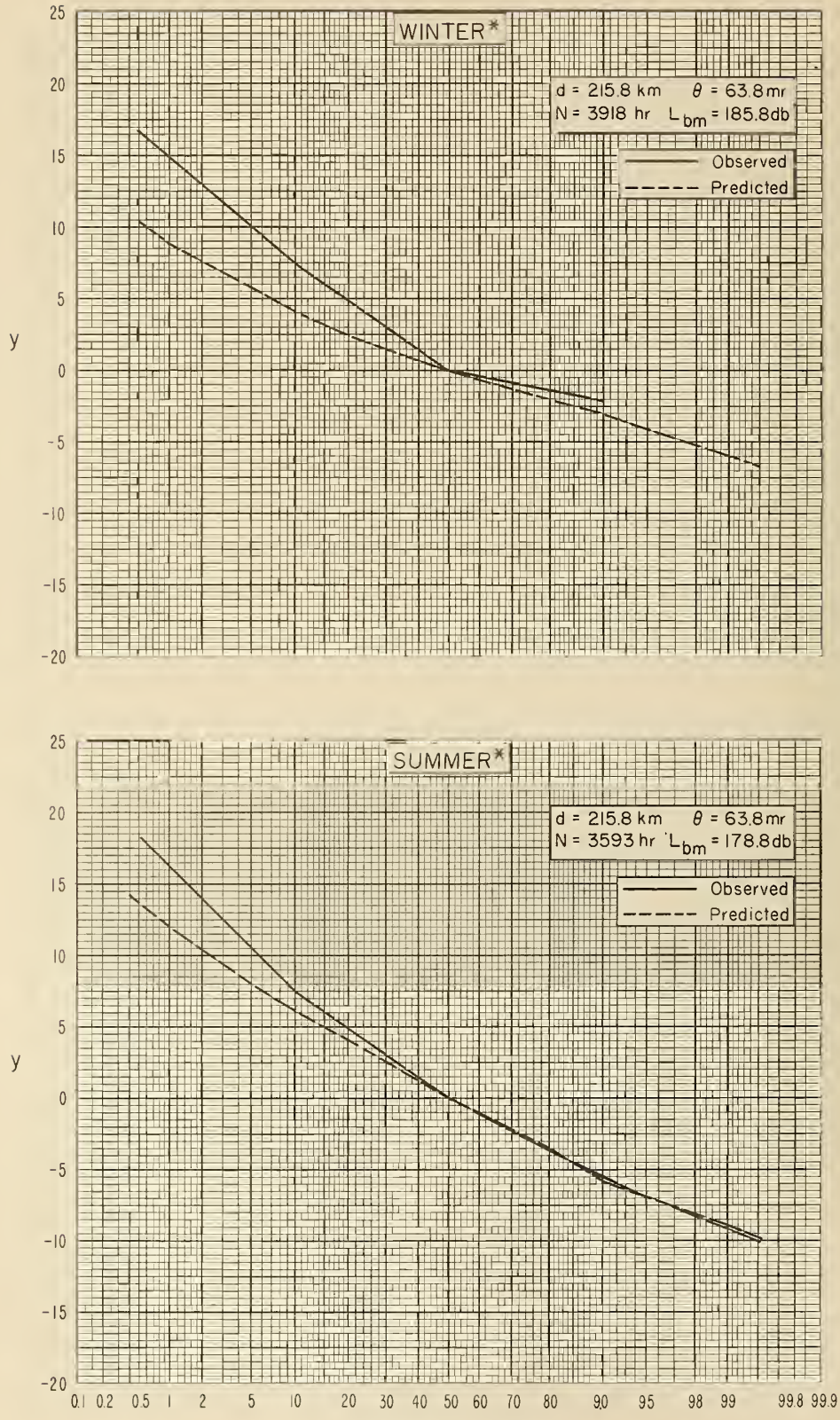

WINTER*
d = 215.8 km θ = 63.8mr
N = 3918 hr L bm = 185.8db
Observed
Predicted
SUMMER*
d = 215.8 km θ = 63.8mr
N = 3593 hr L bm = 178.8db
Observed
Predicted
y
25
20
15
10
5
0
-5
-10
-15
-20
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9
PERCENT OF TIME

Figure 94

NBS PATH 61

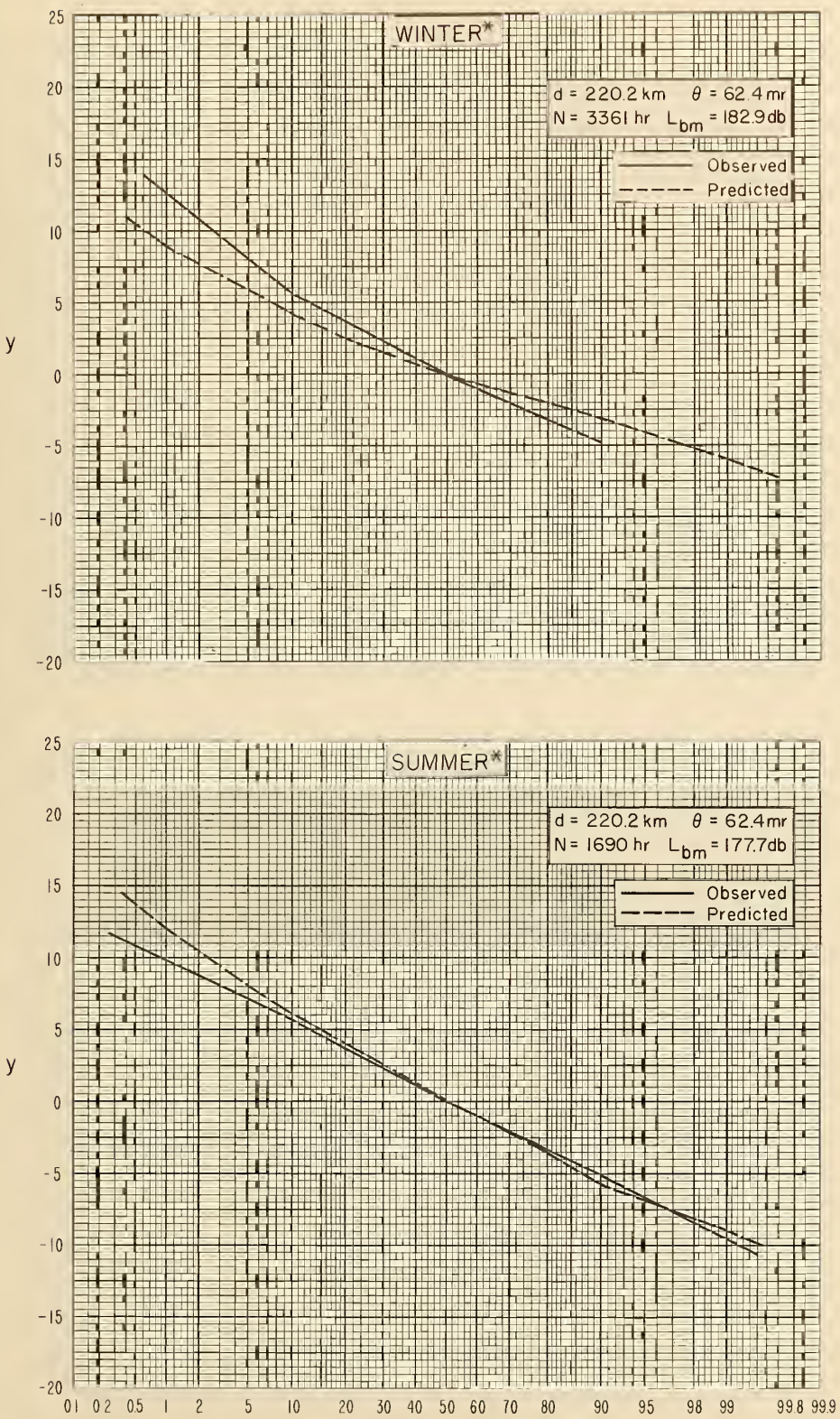


Figure 95

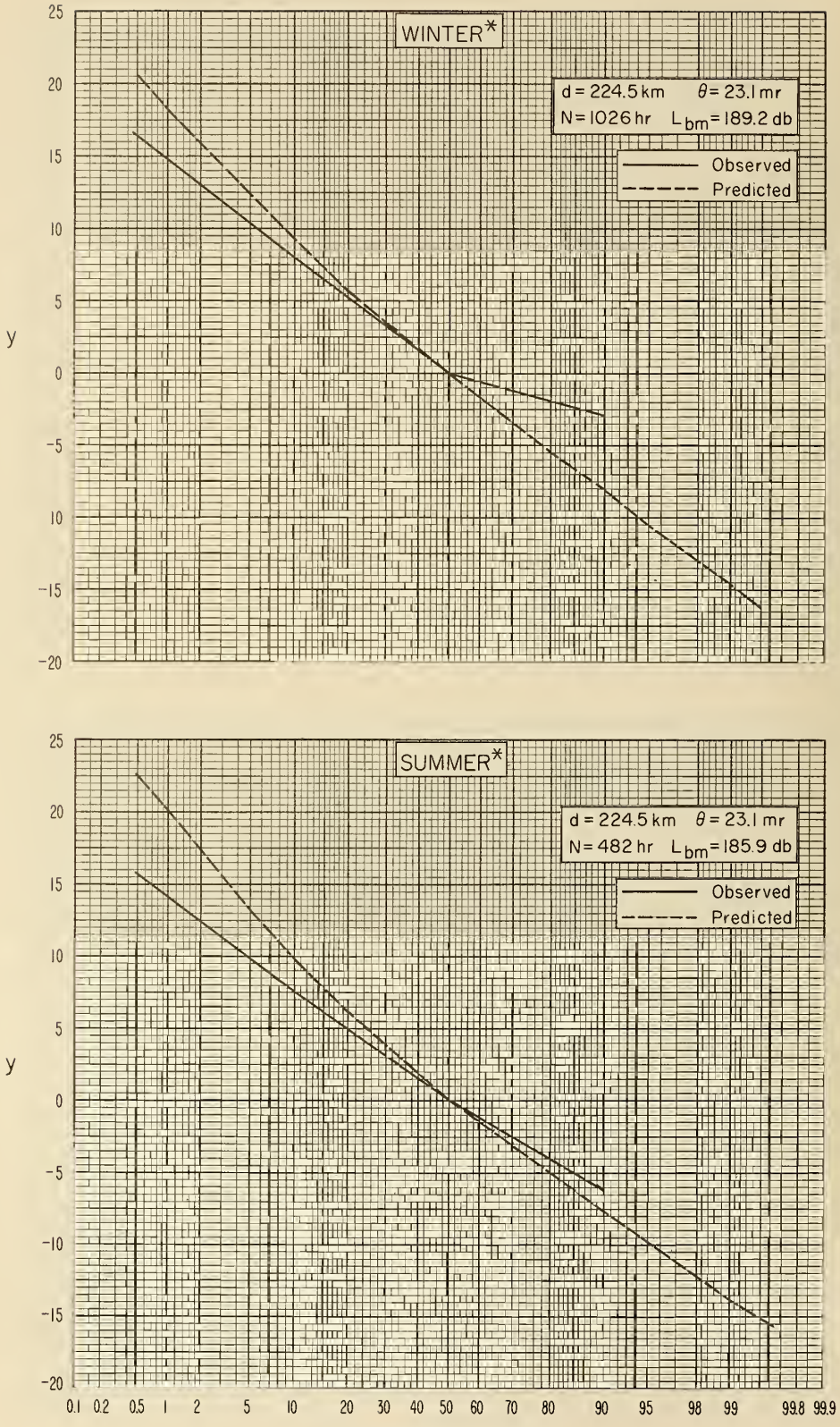

WINTER*
d = 224.5 km θ = 23.1 mr
N = 1026 hr L bm = 189.2 db
Observed
Predicted
SUMMER*
d = 224.5 km θ = 23.1 mr
N = 482 hr L bm = 185.9 db
Observed
Predicted
y
25
20
15
10
5
0
-5
-10
-15
-20
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9
PERCENT OF TIME

Figure 96

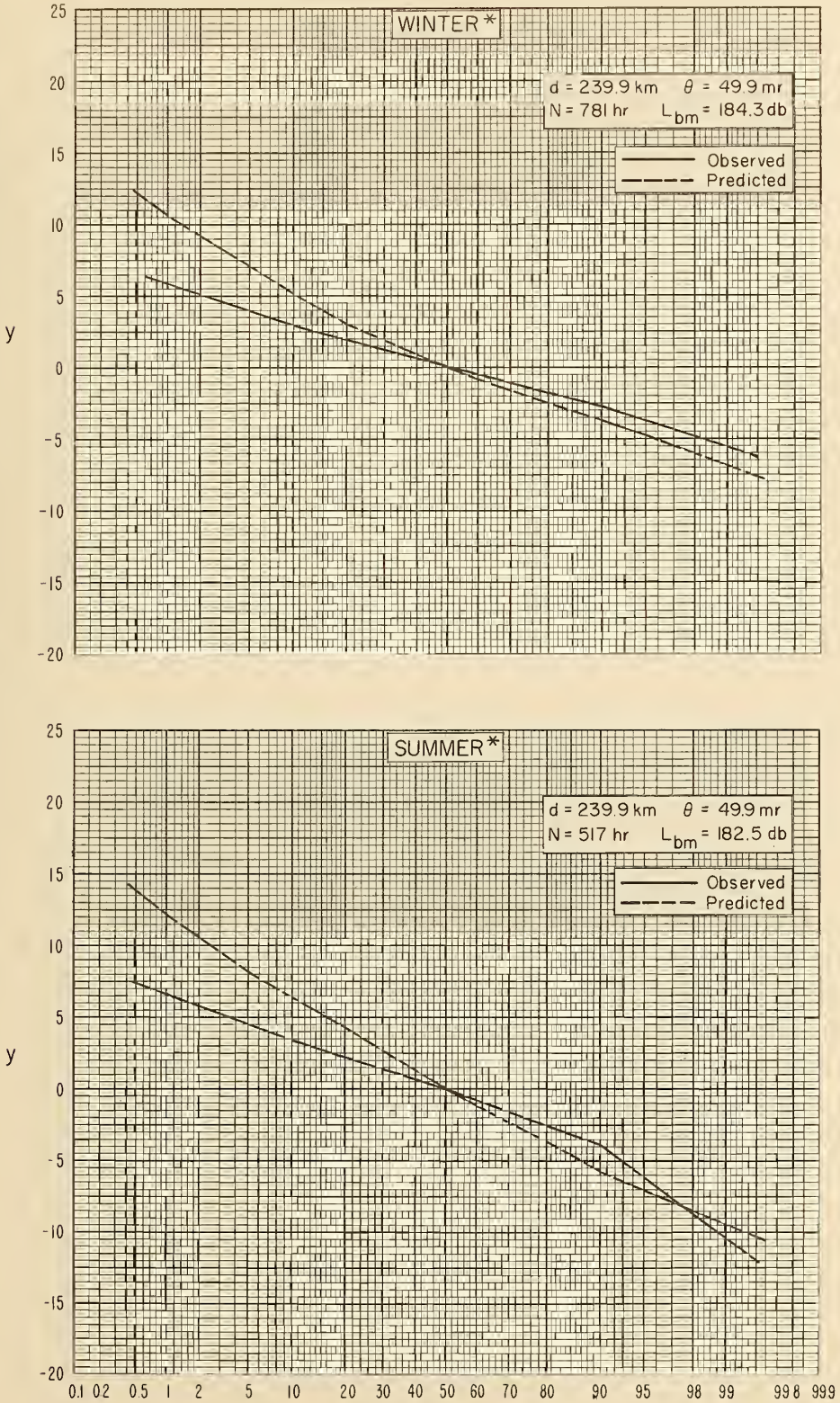

WINTER*
d = 239.9 km θ = 49.9 mr
N = 781 hr L_{bm} = 184.3 db
Observed
Predicted
SUMMER*
d = 239.9 km θ = 49.9 mr
N = 517 hr L_{bm} = 182.5 db
Observed
Predicted
y
25
20
15
10
5
0
-5
-10
-15
-20
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9
PERCENT OF TIME

Figure 97

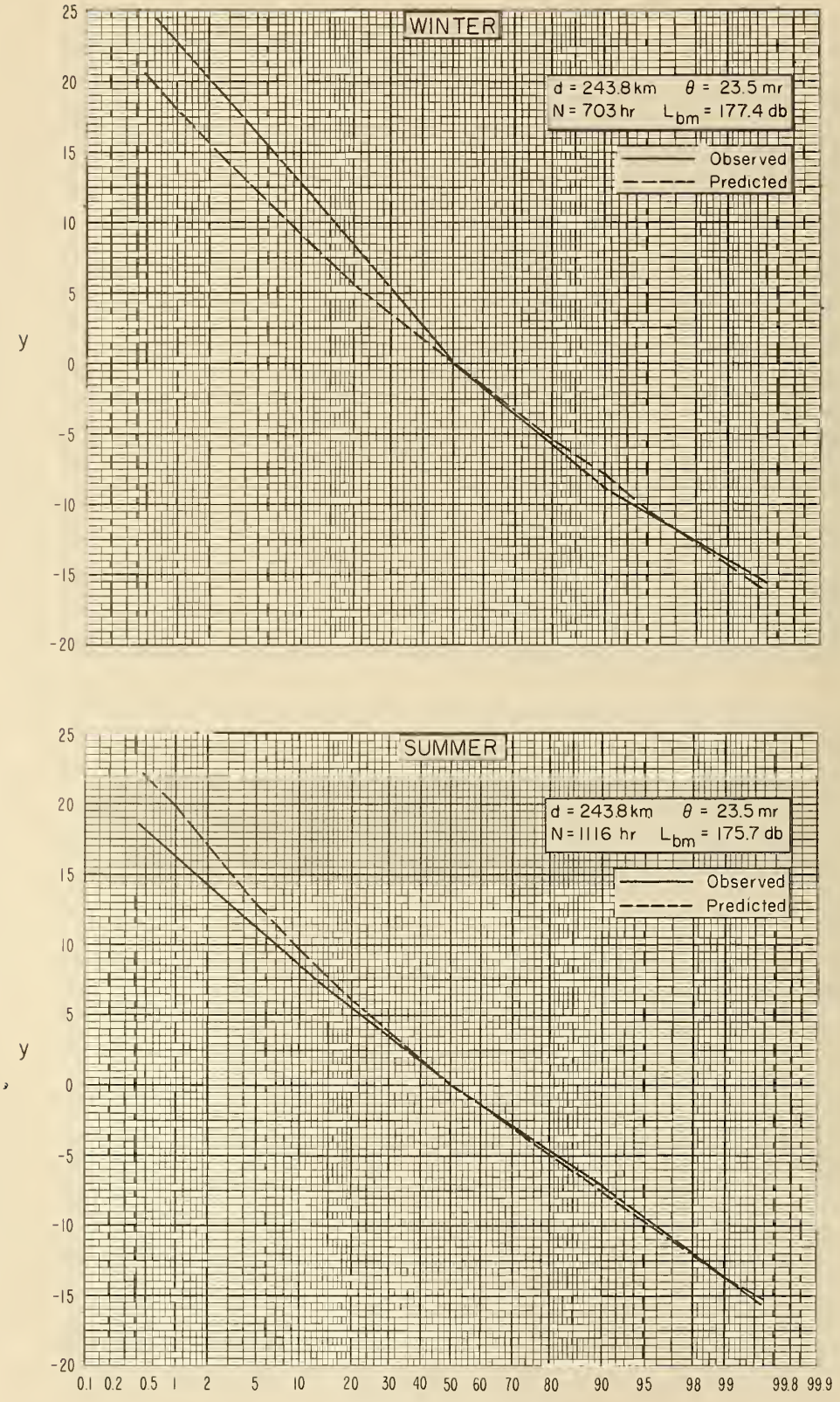

WINTER
d = 243.8 km θ = 23.5 mr
N = 703 hr Lbm = 177.4 db
Observed
Predicted
SUMMER
d = 243.8 km θ = 23.5 mr
N = 1116 hr Lbm = 175.7 db
Observed
Predicted
y
25
20
15
10
5
0
-5
-10
-15
-20
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9
PERCENT OF TIME

Figure 98

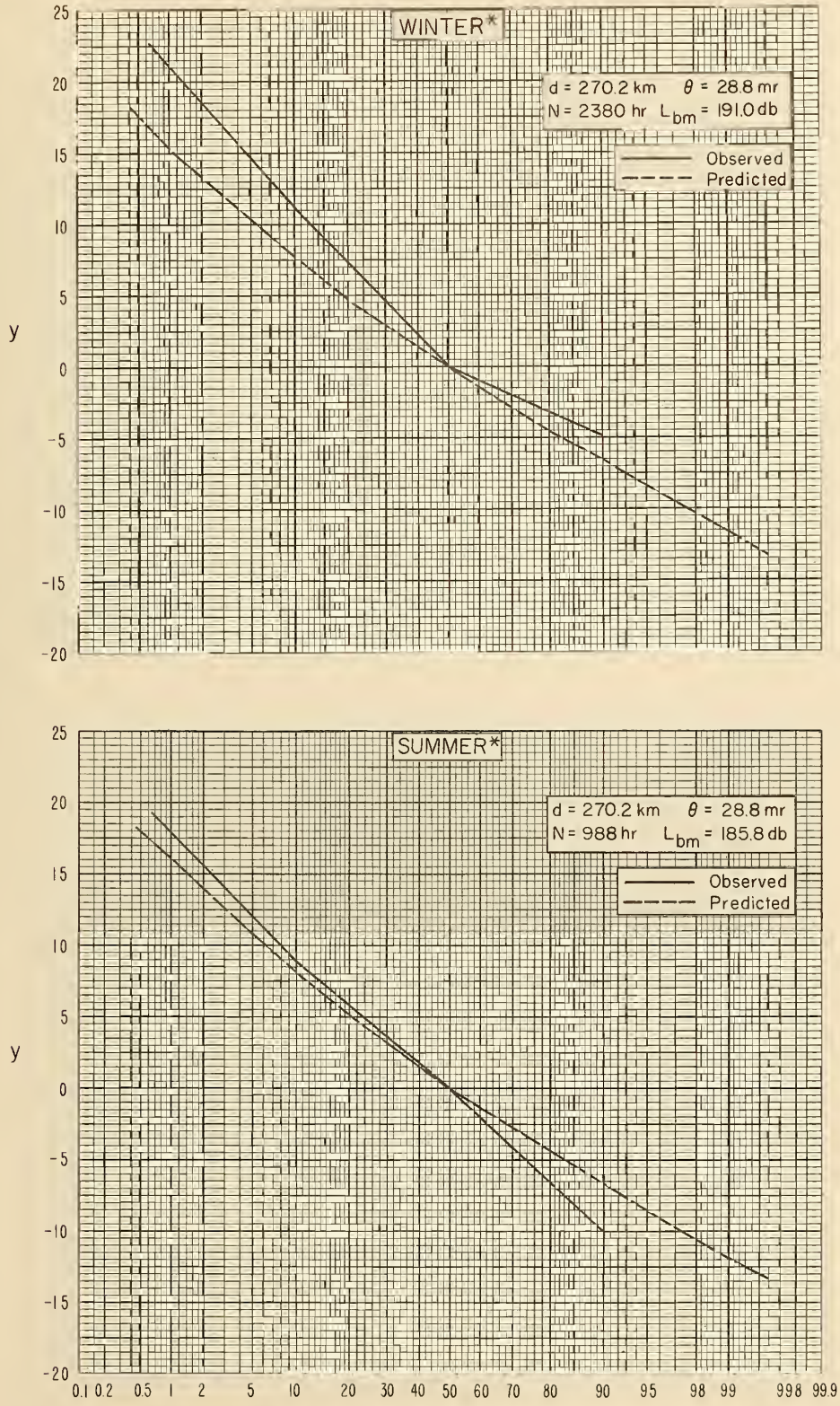

WINTER*
d = 270.2 km θ = 28.8 mr
N = 2380 hr L_{bm} = 191.0 db
Observed
Predicted
SUMMER*
d = 270.2 km θ = 28.8 mr
N = 988 hr L_{bm} = 185.8 db
Observed
Predicted
y
25
20
15
10
5
0
-5
-10
-15
-20
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9
PERCENT OF TIME

Figure 99

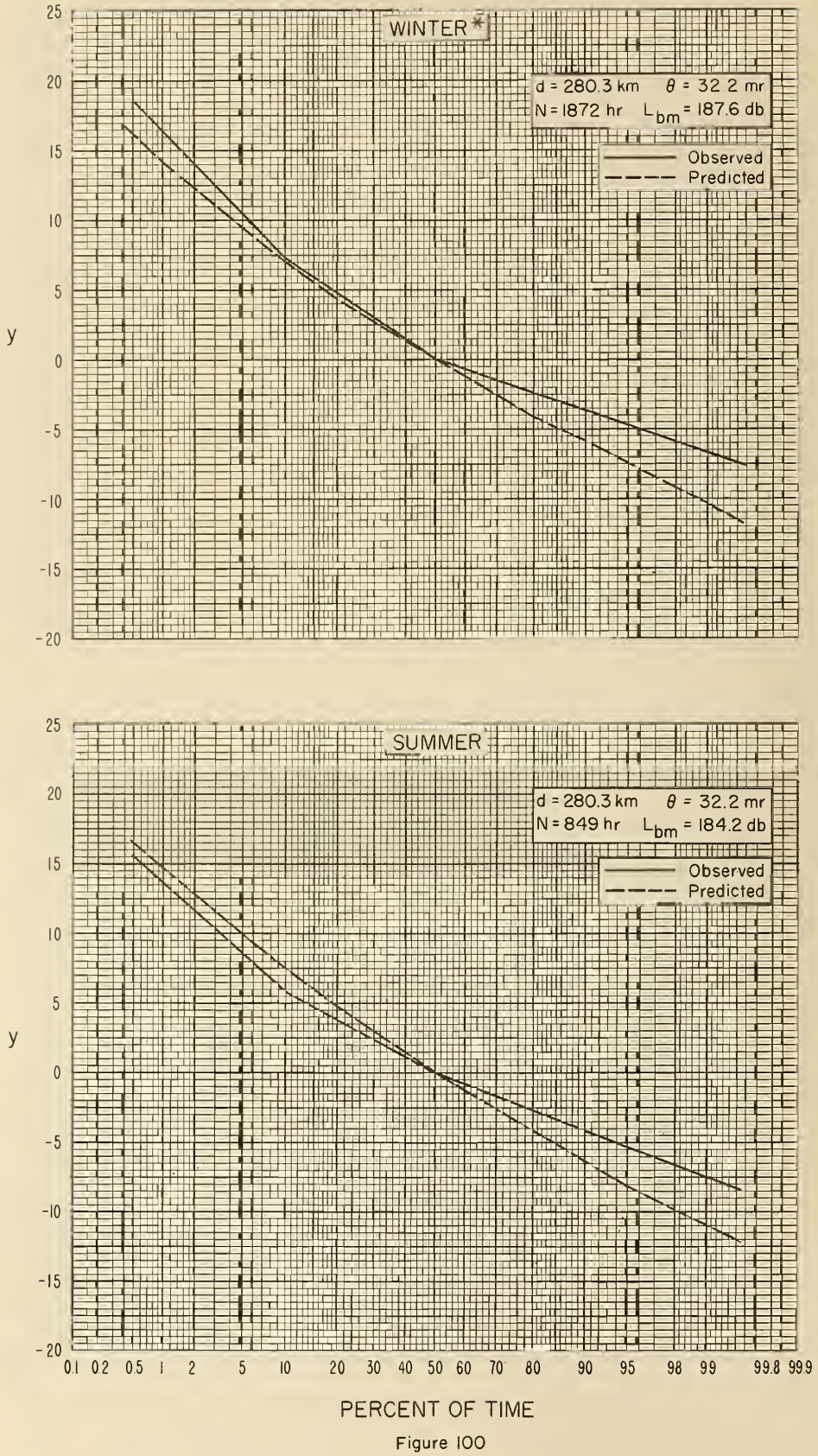

WINTER*
d = 280.3 km θ = 32.2 mr
N = 1872 hr L_{bm} = 187.6 db
Observed
Predicted
SUMMER
d = 280.3 km θ = 32.2 mr
N = 849 hr L_{bm} = 184.2 db
Observed
Predicted
y
25
20
15
10
5
0
-5
-10
-15
-20
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9
PERCENT OF TIME

Figure 100

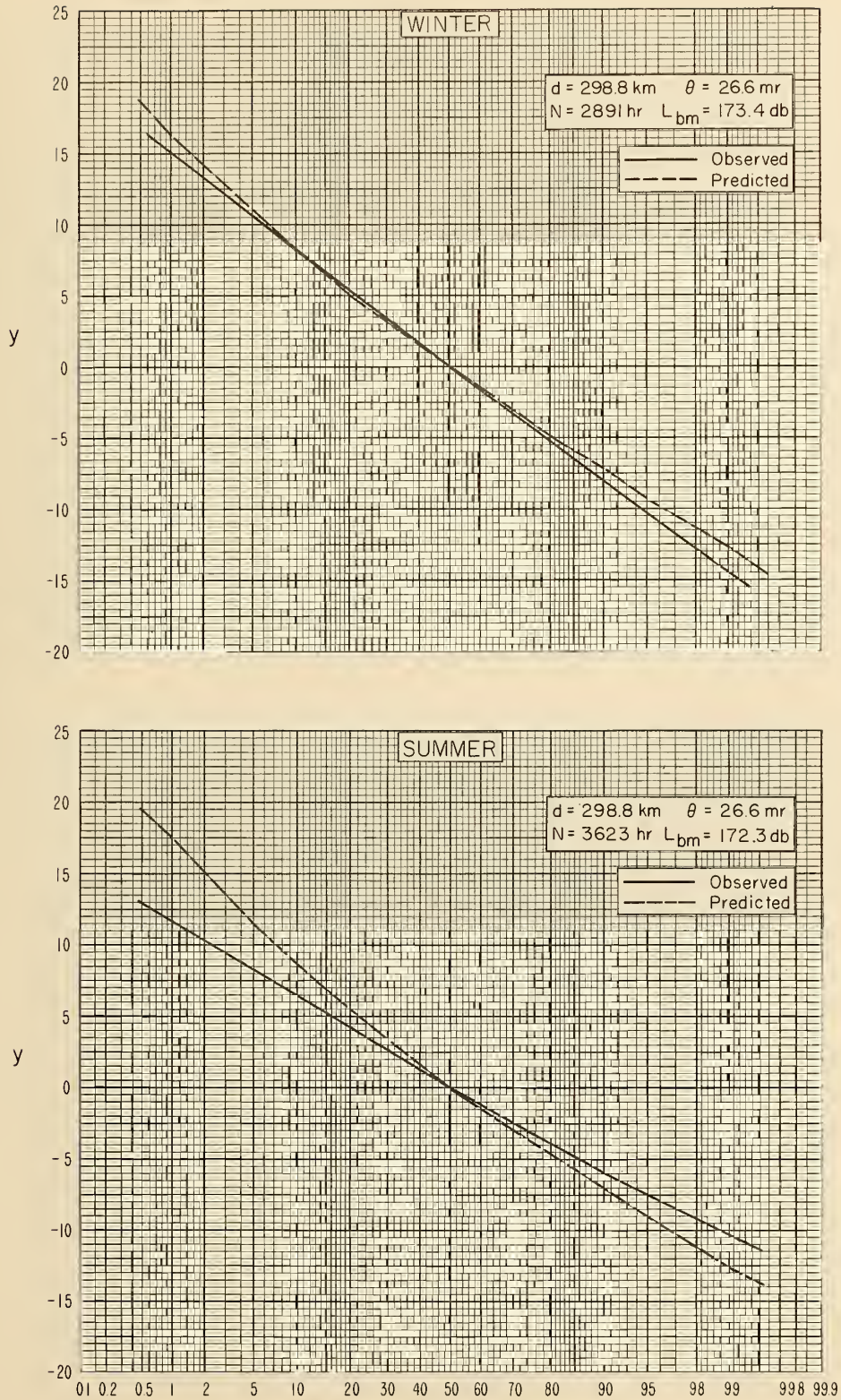

WINTER
d = 298.8 km θ = 26.6 mr
N = 2891 hr L bm = 173.4 db
Observed
Predicted
SUMMER
d = 298.8 km θ = 26.6 mr
N = 3623 hr L bm = 172.3 db
Observed
Predicted
y
25
20
15
10
5
0
-5
-10
-15
-20
01 02 05 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 998 999
PERCENT OF TIME

Figure 101

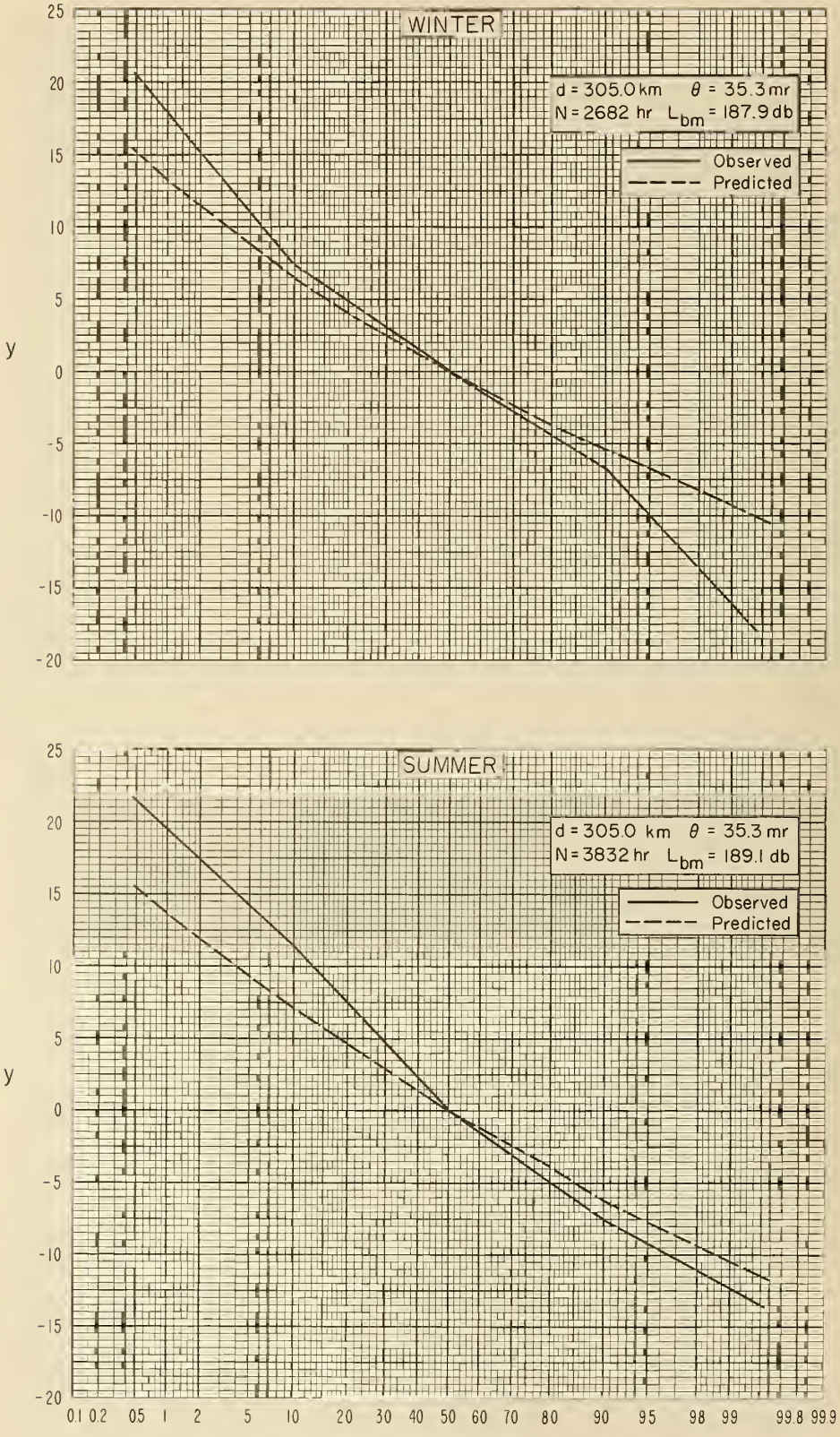

WINTER
d = 305.0 km θ = 35.3 mr
N = 2682 hr L_{bm} = 187.9 db
Observed
Predicted
SUMMER
d = 305.0 km θ = 35.3 mr
N = 3832 hr L_{bm} = 189.1 db
Observed
Predicted
y
25
20
15
10
5
0
-5
-10
-15
-20
0.1 0.2 05 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9
PERCENT OF TIME

Figure 102

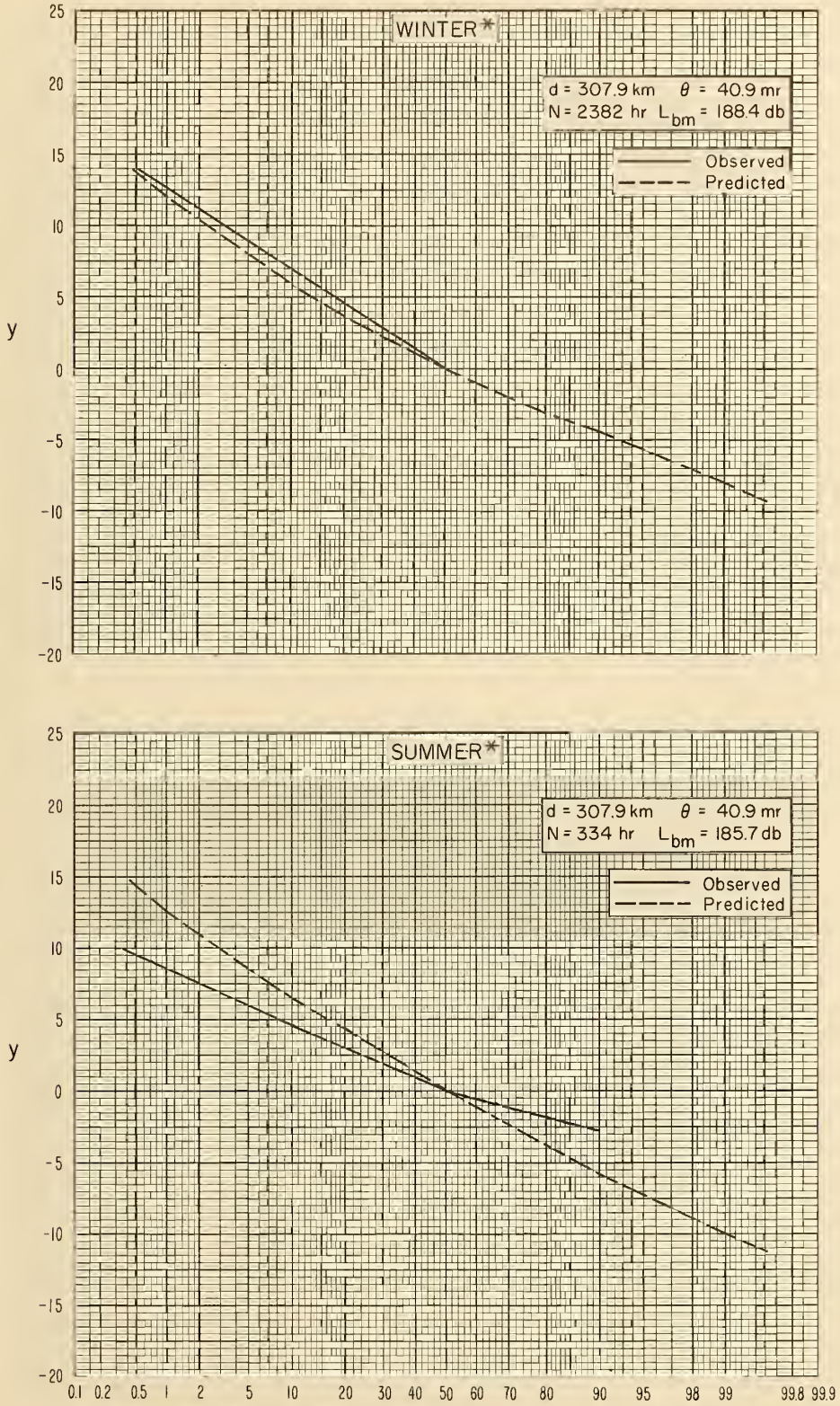

WINTER*
d = 307.9 km θ = 40.9 mr
N = 2382 hr L_{bm} = 188.4 db
Observed
Predicted
SUMMER*
d = 307.9 km θ = 40.9 mr
N = 334 hr L_{bm} = 185.7 db
Observed
Predicted
y
25
20
15
10
5
0
-5
-10
-15
-20
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9
PERCENT OF TIME

Figure 103

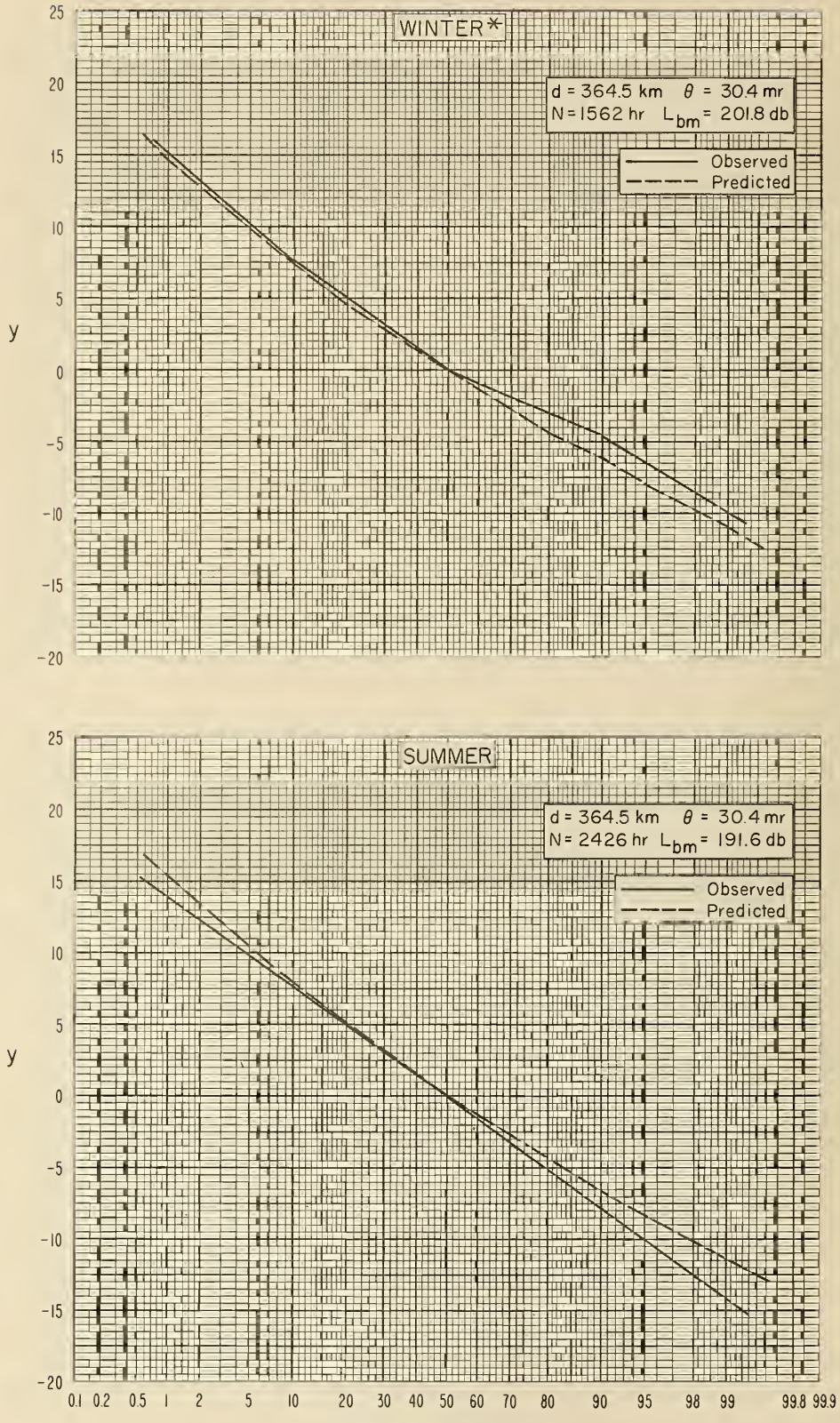
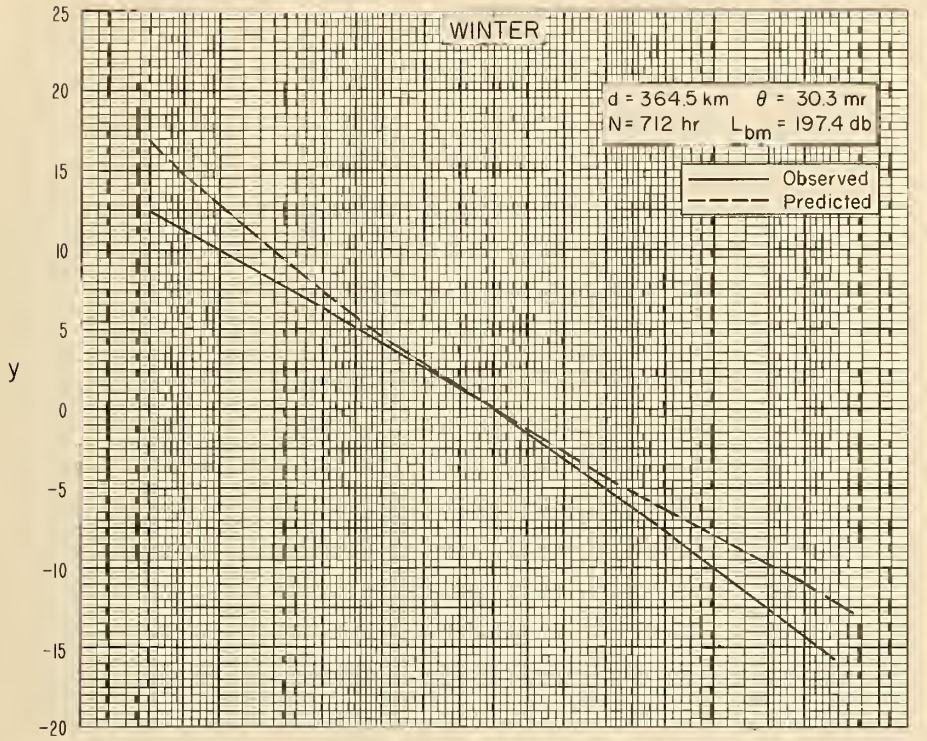

WINTER*
d = 364.5 km θ = 30.4 mr
N = 1562 hr L_{bm} = 201.8 db
Observed
Predicted
SUMMER
d = 364.5 km θ = 30.4 mr
N = 2426 hr L_{bm} = 191.6 db
Observed
Predicted
y
25
20
15
10
5
0
-5
-10
-15
-20
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9
PERCENT OF TIME

Figure 104


WINTER
d = 364.5 km θ = 30.3 mr
N = 712 hr L_{bm} = 197.4 db
Observed
Predicted
y
25
20
15
10
5
0
-5
-10
-15
-20

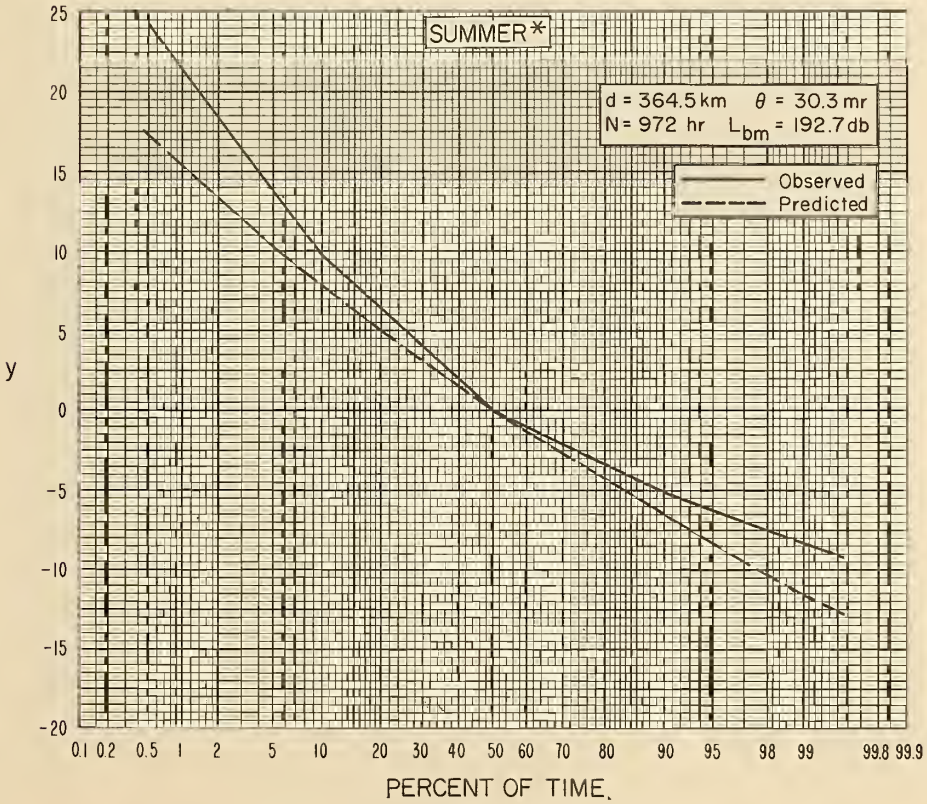

SUMMER*
d = 364.5 km θ = 30.3 mr
N = 972 hr L_{bm} = 192.7 db
Observed
Predicted
y
25
20
15
10
5
0
-5
-10
-15
-20
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9
PERCENT OF TIME.

Figure 105

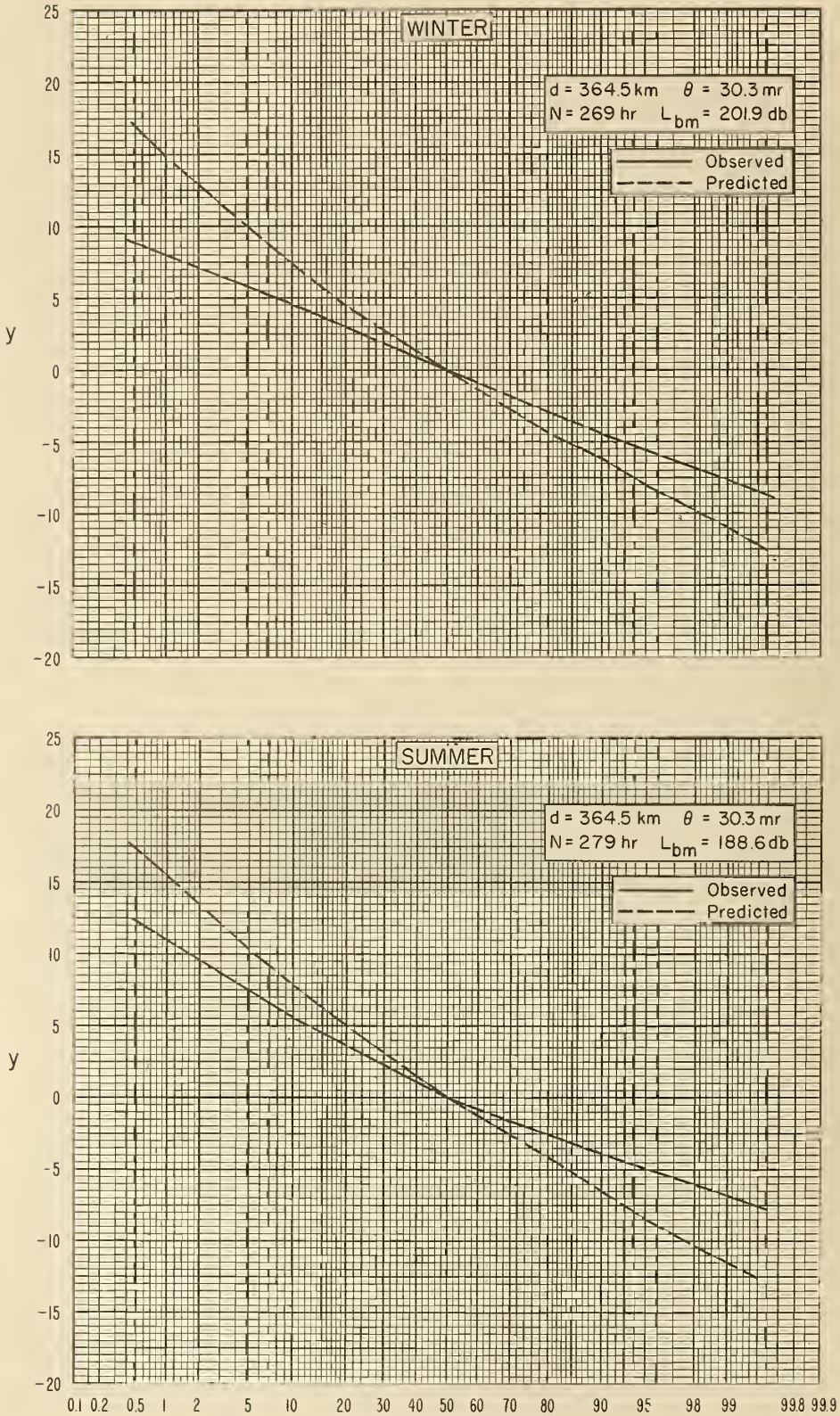

WINTER
d = 364.5 km θ = 30.3 mr
N = 269 hr L_{bm} = 201.9 db
Observed
Predicted
SUMMER
d = 364.5 km θ = 30.3 mr
N = 279 hr L_{bm} = 188.6 db
Observed
Predicted
y
25
20
15
10
5
0
-5
-10
-15
-20
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9
PERCENT OF TIME

Figure 106

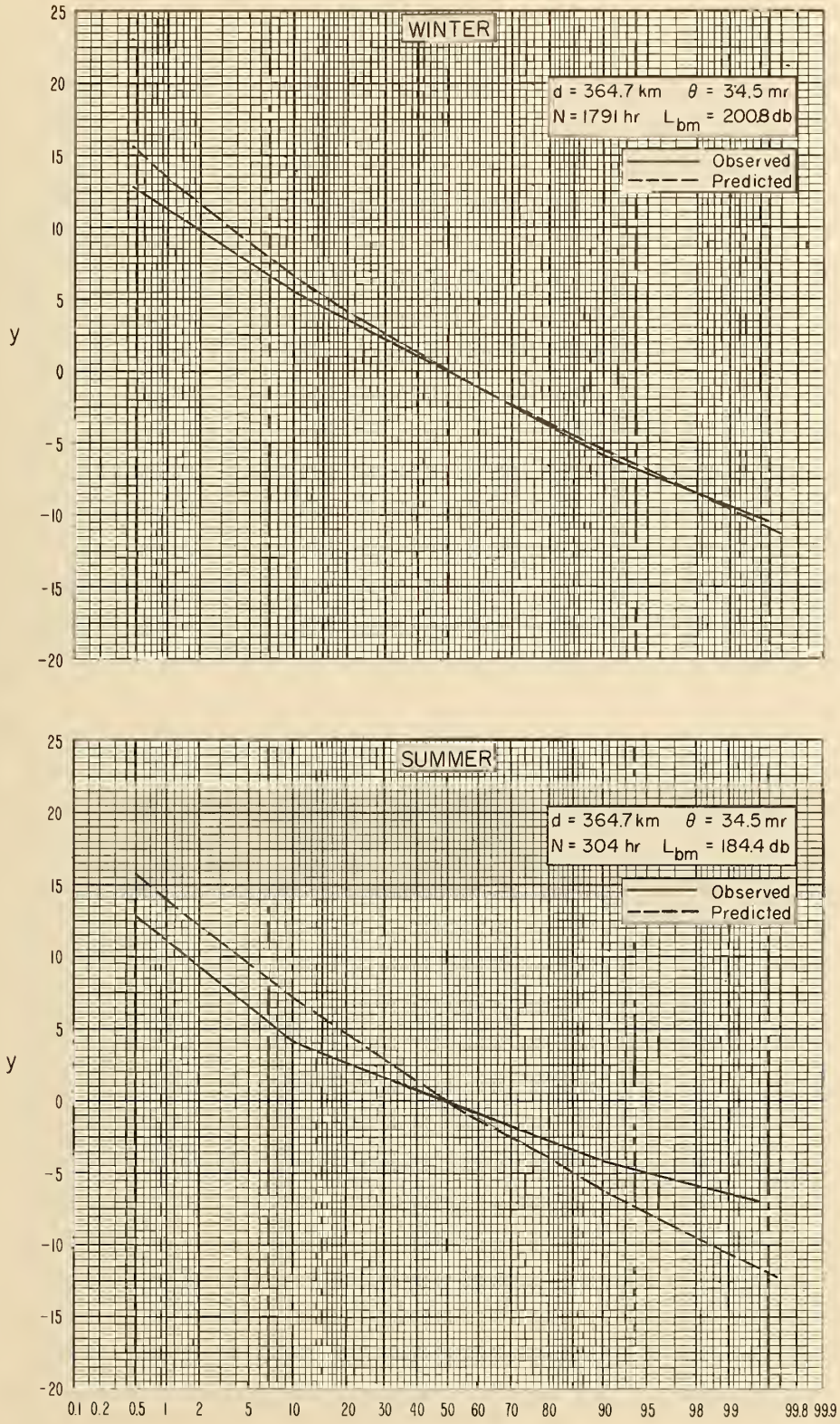
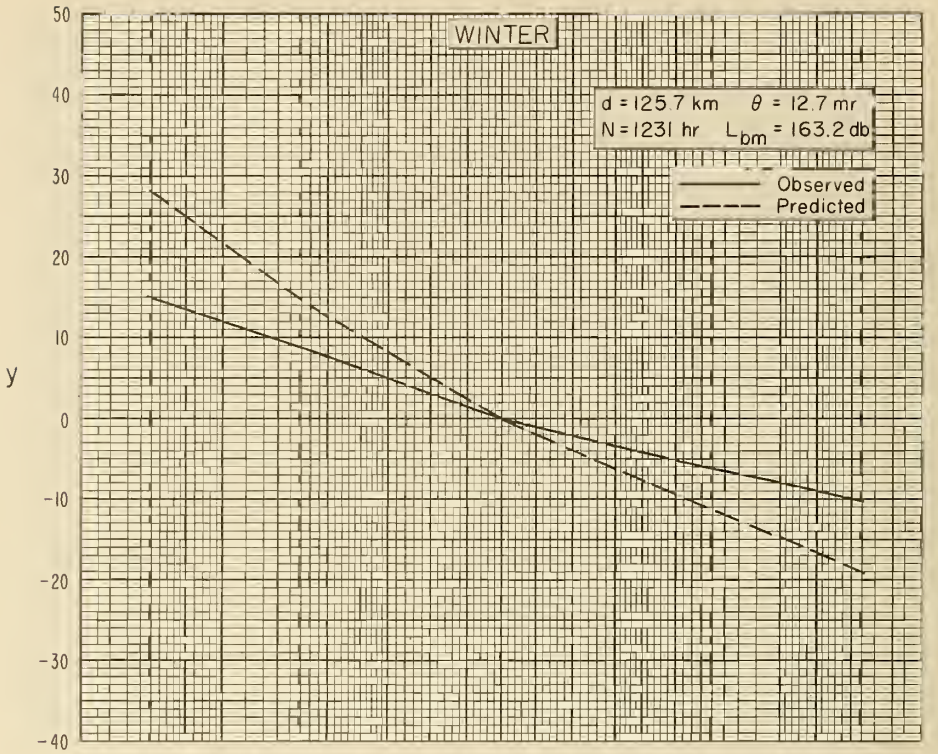

WINTER
d = 364.7 km θ = 34.5 mr
N = 1791 hr L_{bm} = 200.8 db
Observed
Predicted
SUMMER
d = 364.7 km θ = 34.5 mr
N = 304 hr L_{bm} = 184.4 db
Observed
Predicted
y
25
20
15
10
5
0
-5
-10
-15
-20
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9
PERCENT OF TIME

Figure 107


WINTER
d = 125.7 km θ = 12.7 mr
N = 1231 hr L_{bm} = 163.2 db
Observed
Predicted
y
50
40
30
20
10
0
-10
-20
-30
-40

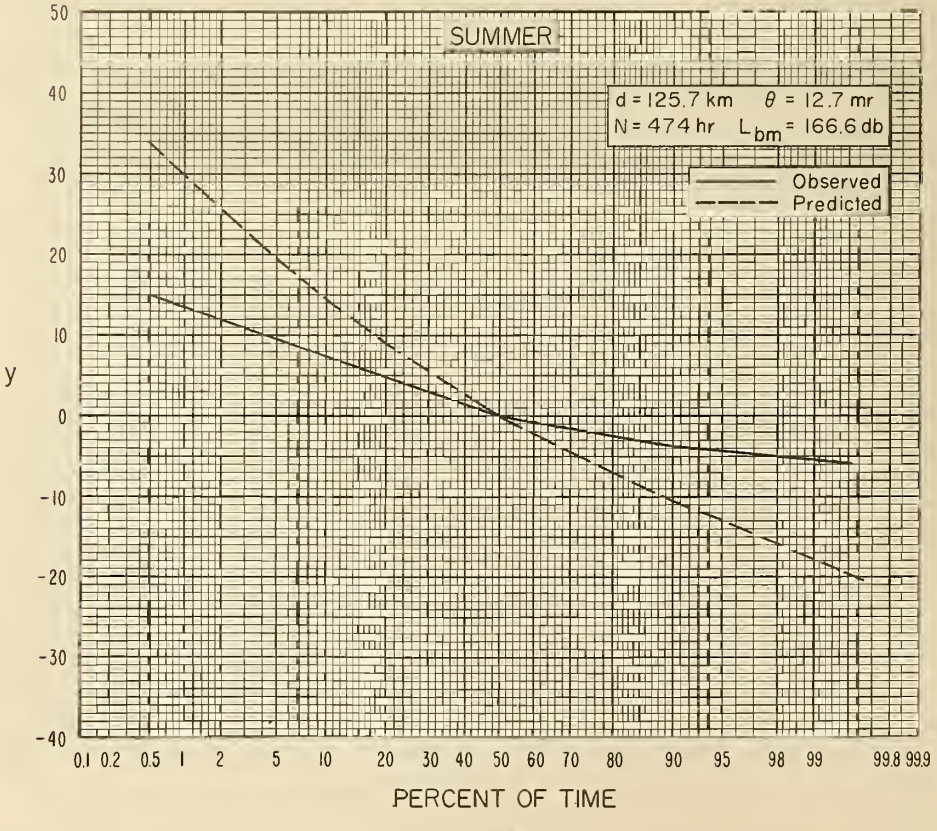

SUMMER
d = 125.7 km θ = 12.7 mr
N = 474 hr L_{bm} = 166.6 db
Observed
Predicted
y
50
40
30
20
10
0
-10
-20
-30
-40
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9
PERCENT OF TIME

Figure 108

NBS PATH 60

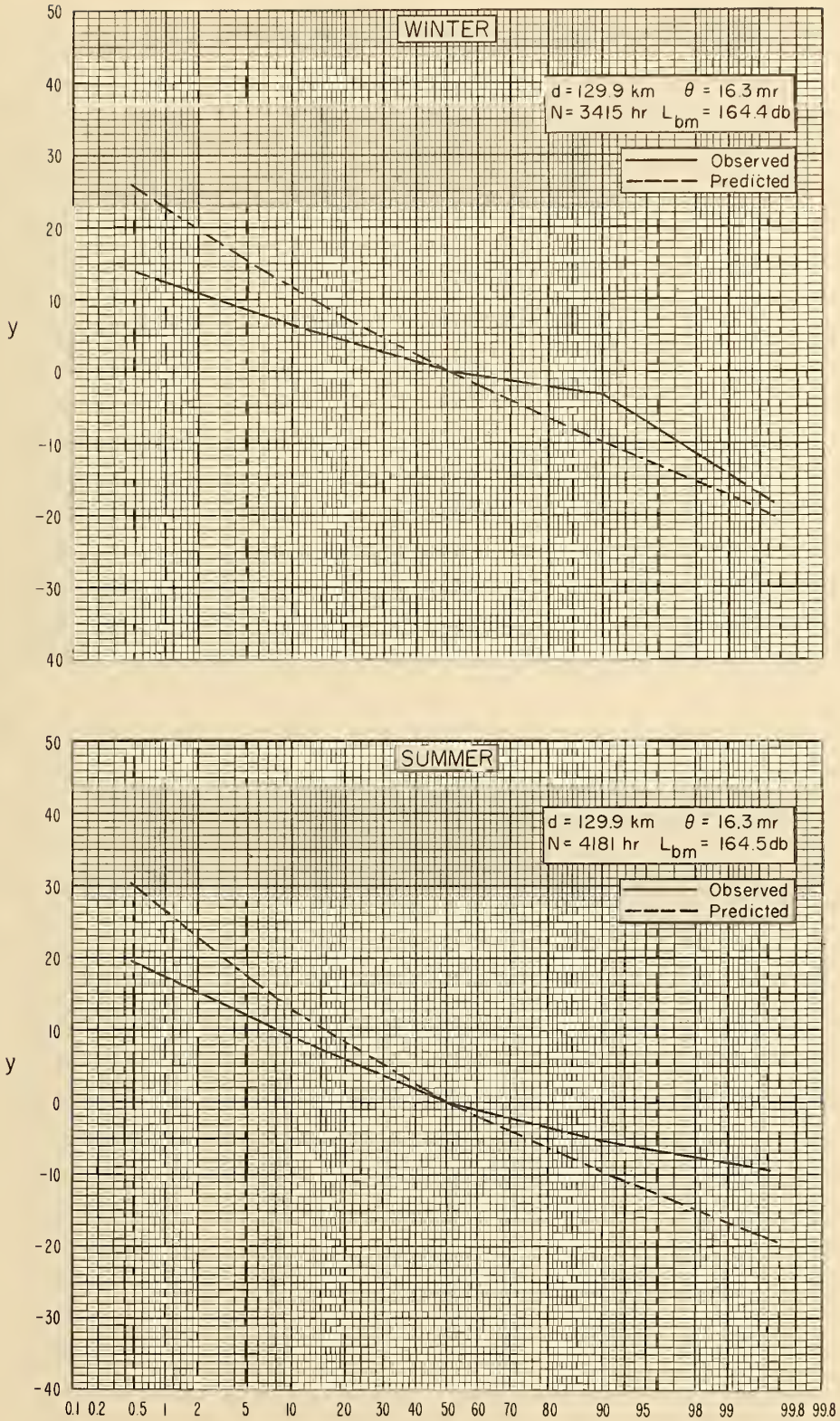


Figure 109

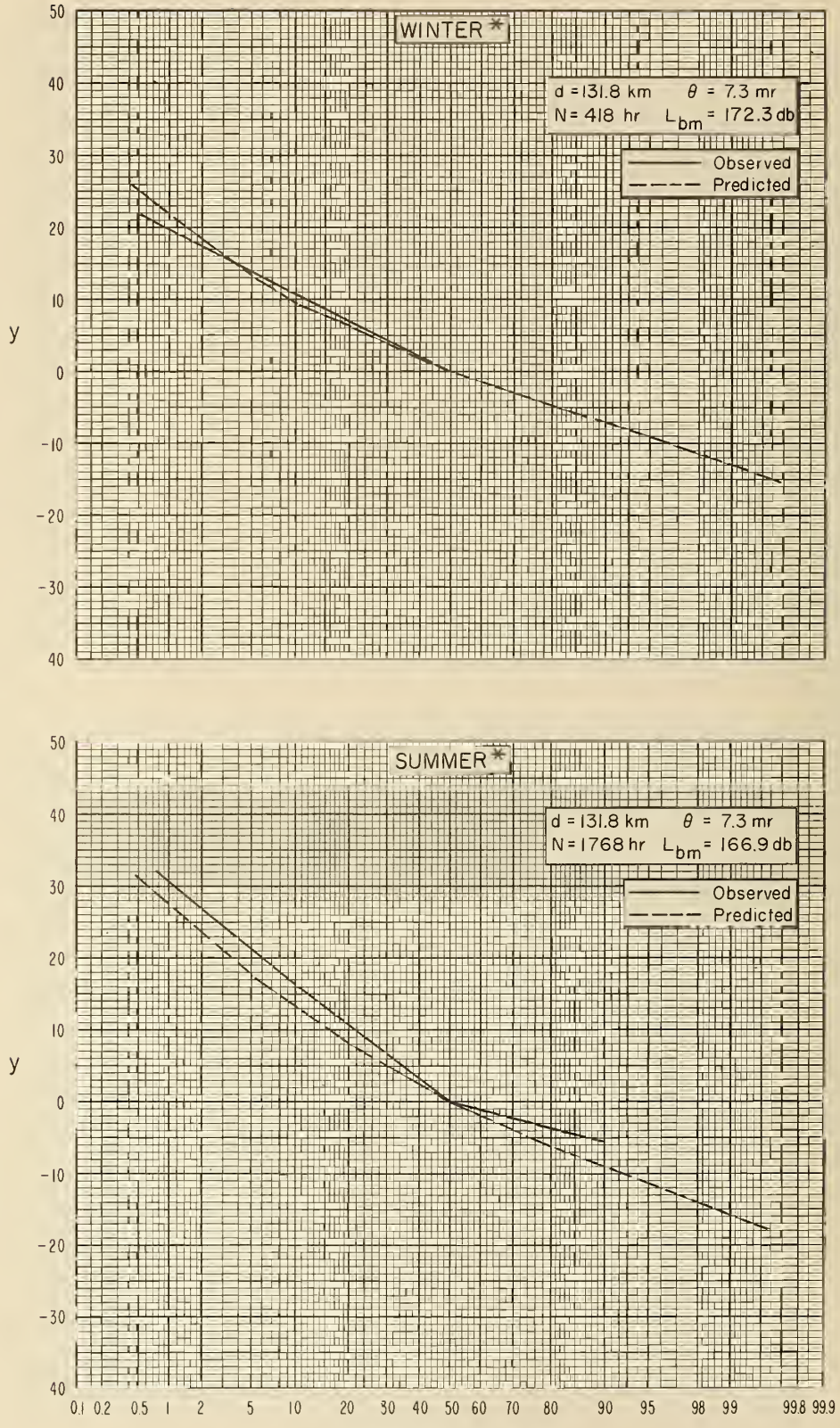

WINTER *
d = 131.8 km θ = 7.3 mr
N = 418 hr L_{bm} = 172.3 db
Observed
Predicted
SUMMER *
d = 131.8 km θ = 7.3 mr
N = 1768 hr L_{bm} = 166.9 db
Observed
Predicted
y
50
40
30
20
10
0
-10
-20
-30
40
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9
PERCENT OF TIME

Figure 110

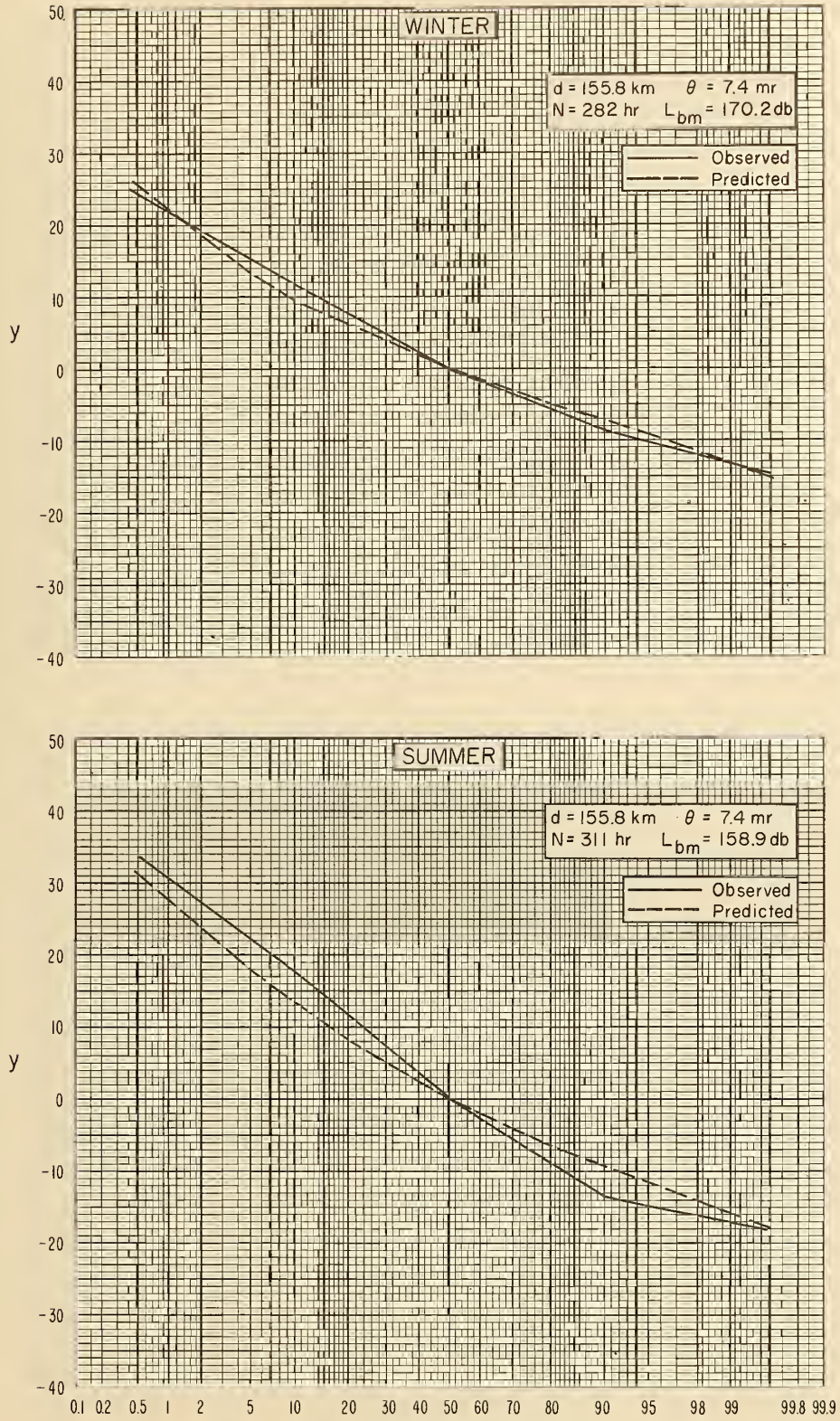

WINTER
d = 155.8 km θ = 7.4 mr
N = 282 hr L_{bm} = 170.2 db
Observed
Predicted
SUMMER
d = 155.8 km θ = 7.4 mr
N = 311 hr L_{bm} = 158.9 db
Observed
Predicted
y
50
40
30
20
10
0
-10
-20
-30
-40
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9
PERCENT OF TIME

Figure 111

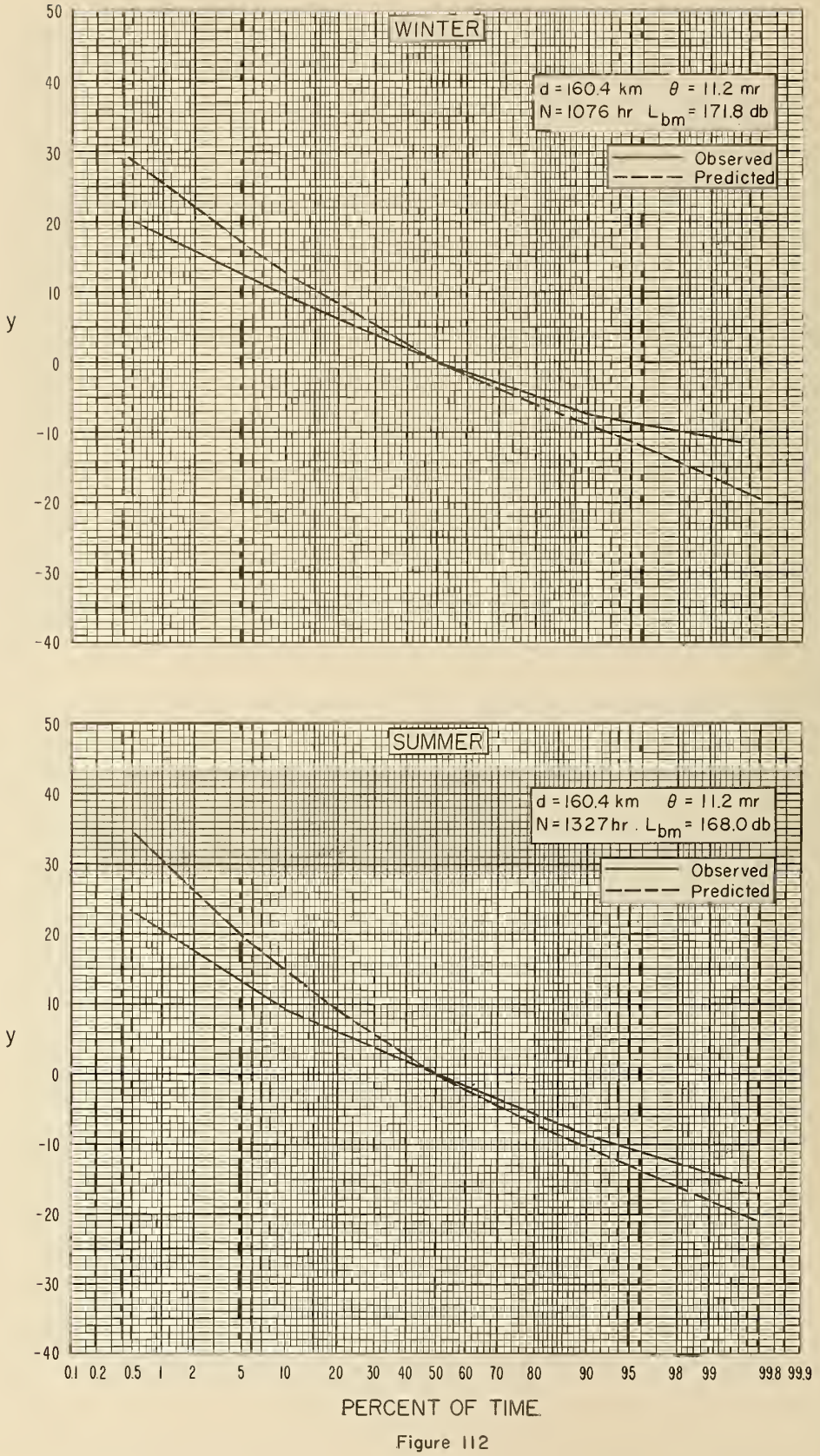

WINTER
d = 160.4 km θ = 11.2 mr
N = 1076 hr L_bm = 171.8 db
Observed
Predicted
SUMMER
d = 160.4 km θ = 11.2 mr
N = 1327 hr L_bm = 168.0 db
Observed
Predicted
y
50
40
30
20
10
0
-10
-20
-30
-40
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9
PERCENT OF TIME

Figure 112

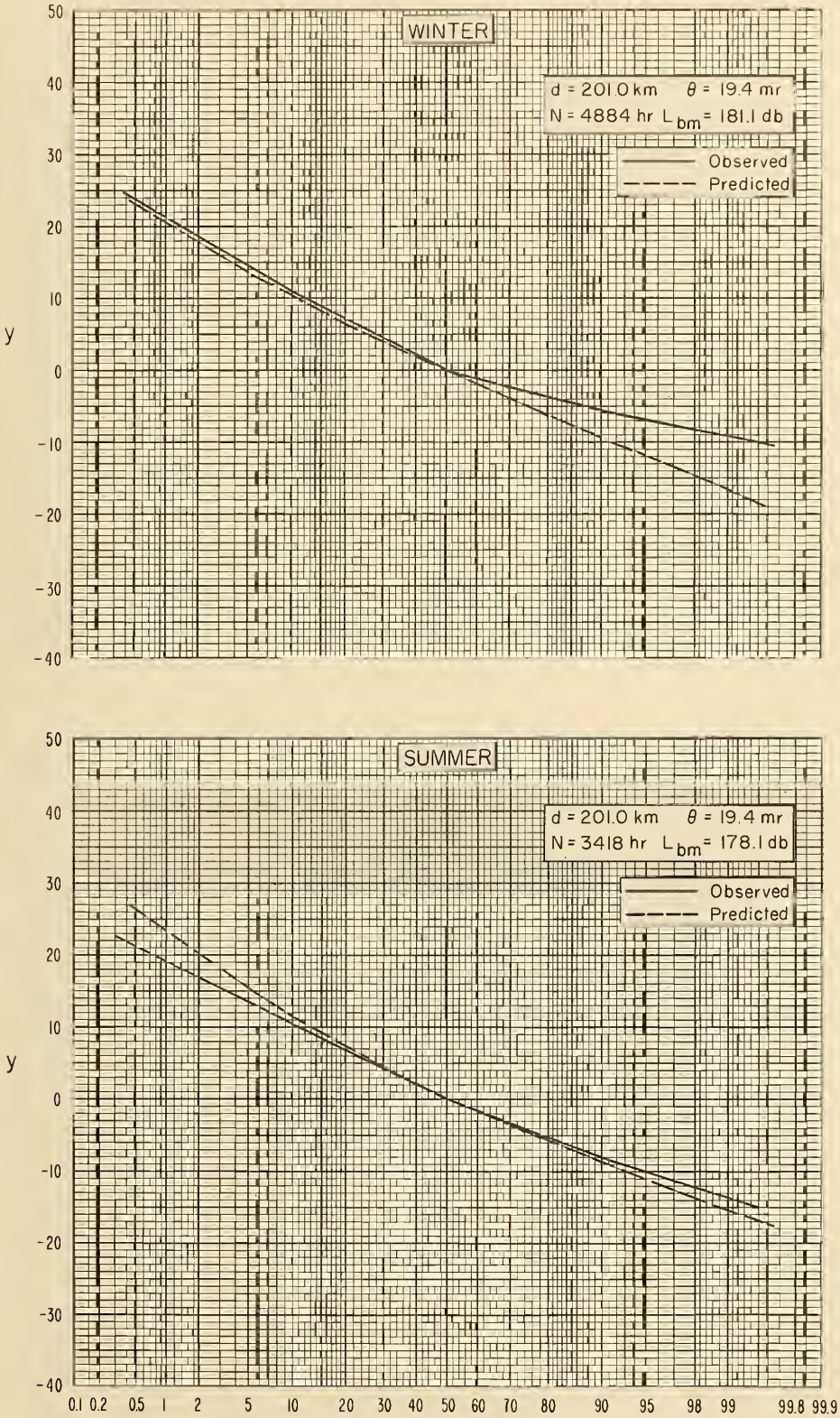

WINTER
d = 201.0 km θ = 19.4 mr
N = 4884 hr L bm = 181.1 db
Observed
Predicted
SUMMER
d = 201.0 km θ = 19.4 mr
N = 3418 hr L bm = 178.1 db
Observed
Predicted
y
50
40
30
20
10
0
-10
-20
-30
-40
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9
PERCENT OF TIME

Figure 113

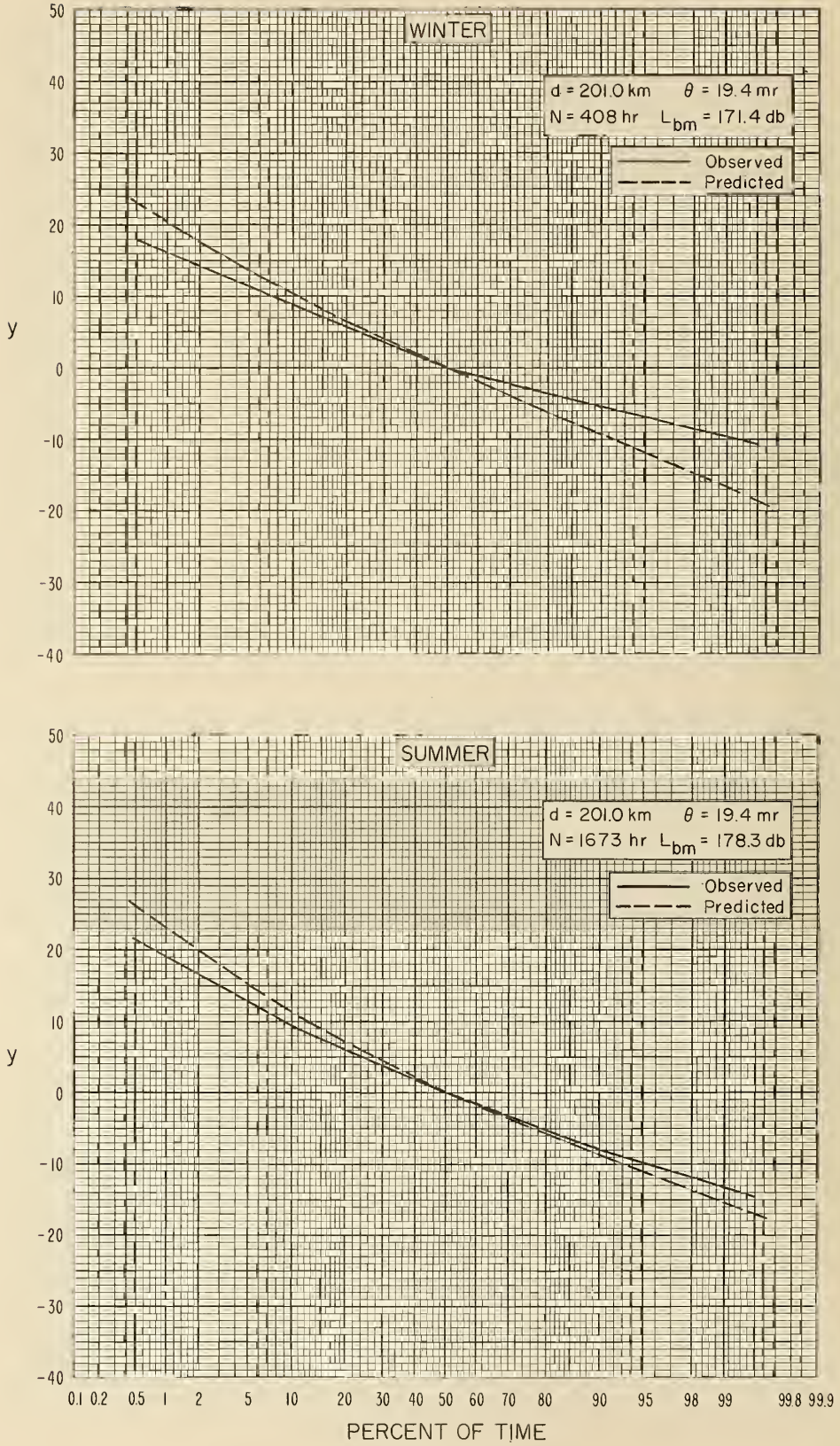

WINTER
d = 201.0 km θ = 19.4 mr
N = 408 hr Lbm = 171.4 db
Observed
Predicted
SUMMER
d = 201.0 km θ = 19.4 mr
N = 1673 hr Lbm = 178.3 db
Observed
Predicted
y
50
40
30
20
10
0
-10
-20
-30
-40
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9
PERCENT OF TIME

Figure 114

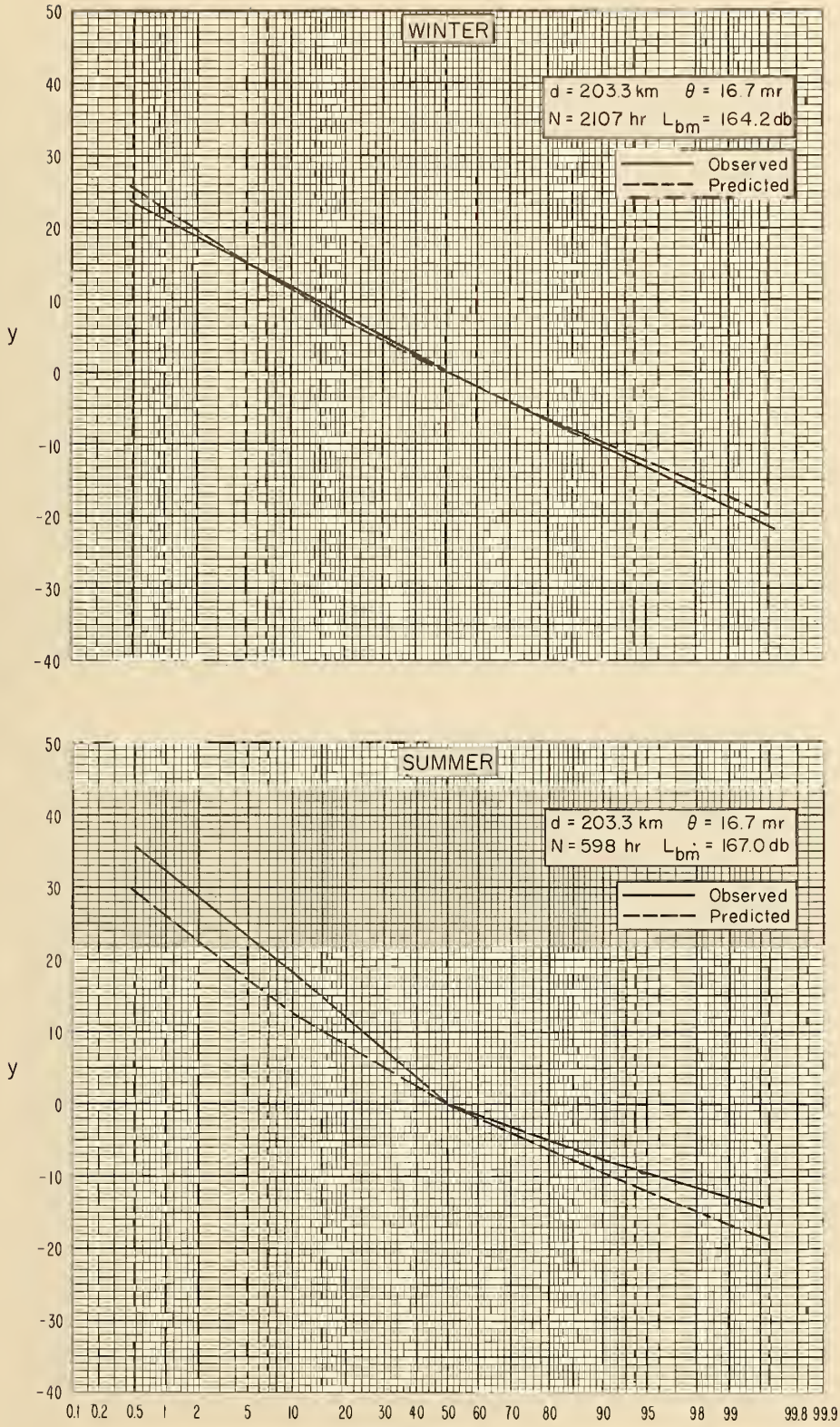

WINTER
d = 203.3 km θ = 16.7 mr
N = 2107 hr L_{bm} = 164.2 db
Observed
Predicted
SUMMER
d = 203.3 km θ = 16.7 mr
N = 598 hr L_{bm} = 167.0 db
Observed
Predicted
y
50
40
30
20
10
0
-10
-20
-30
-40
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9
PERCENT OF TIME

Figure 115

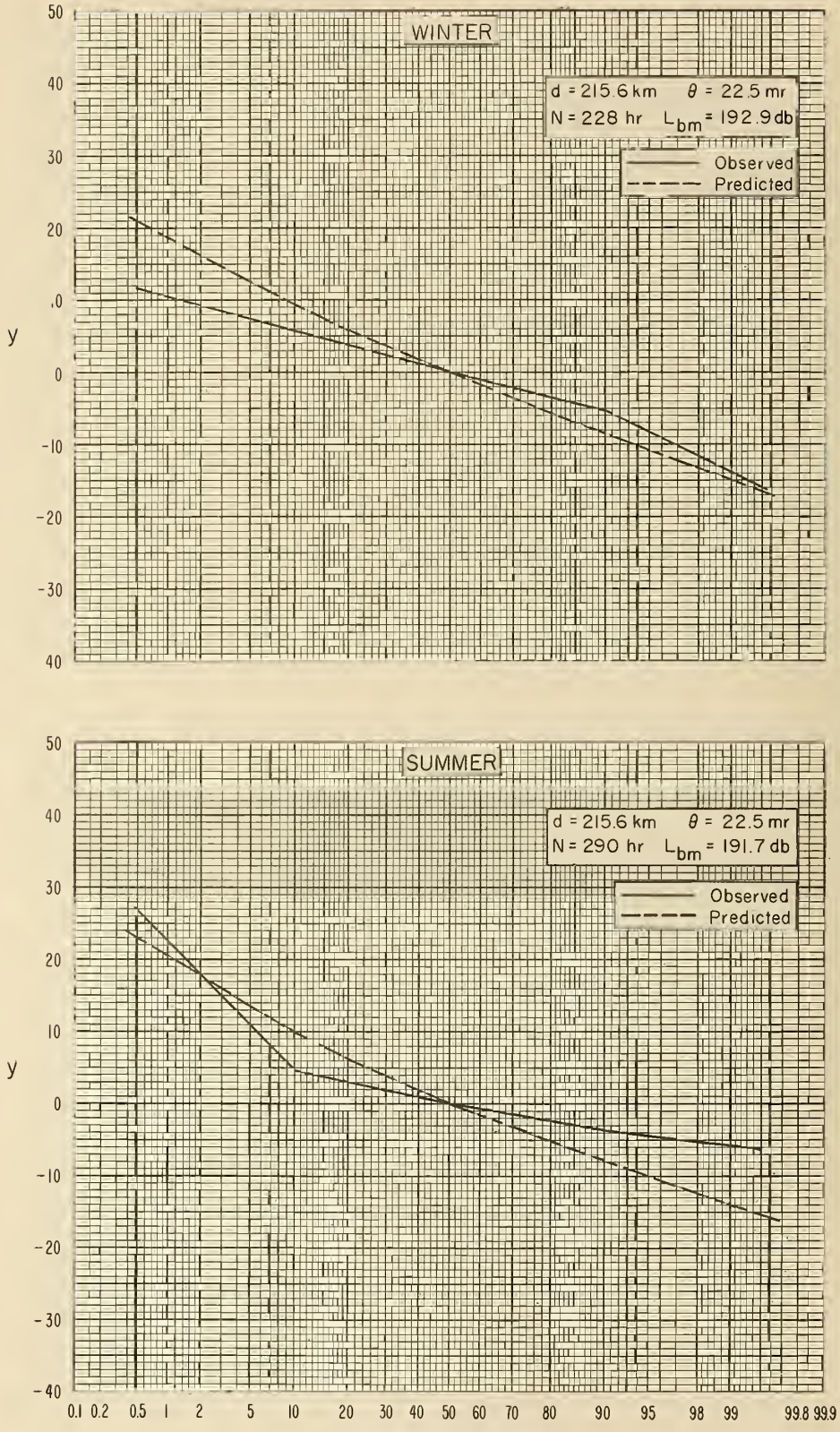

WINTER
d = 215.6 km θ = 22.5 mr
N = 228 hr Lbm = 192.9 db
Observed
Predicted
SUMMER
d = 215.6 km θ = 22.5 mr
N = 290 hr Lbm = 191.7 db
Observed
Predicted
y
50
40
30
20
10
0
-10
-20
-30
-40
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9
PERCENT OF TIME

Figure 116

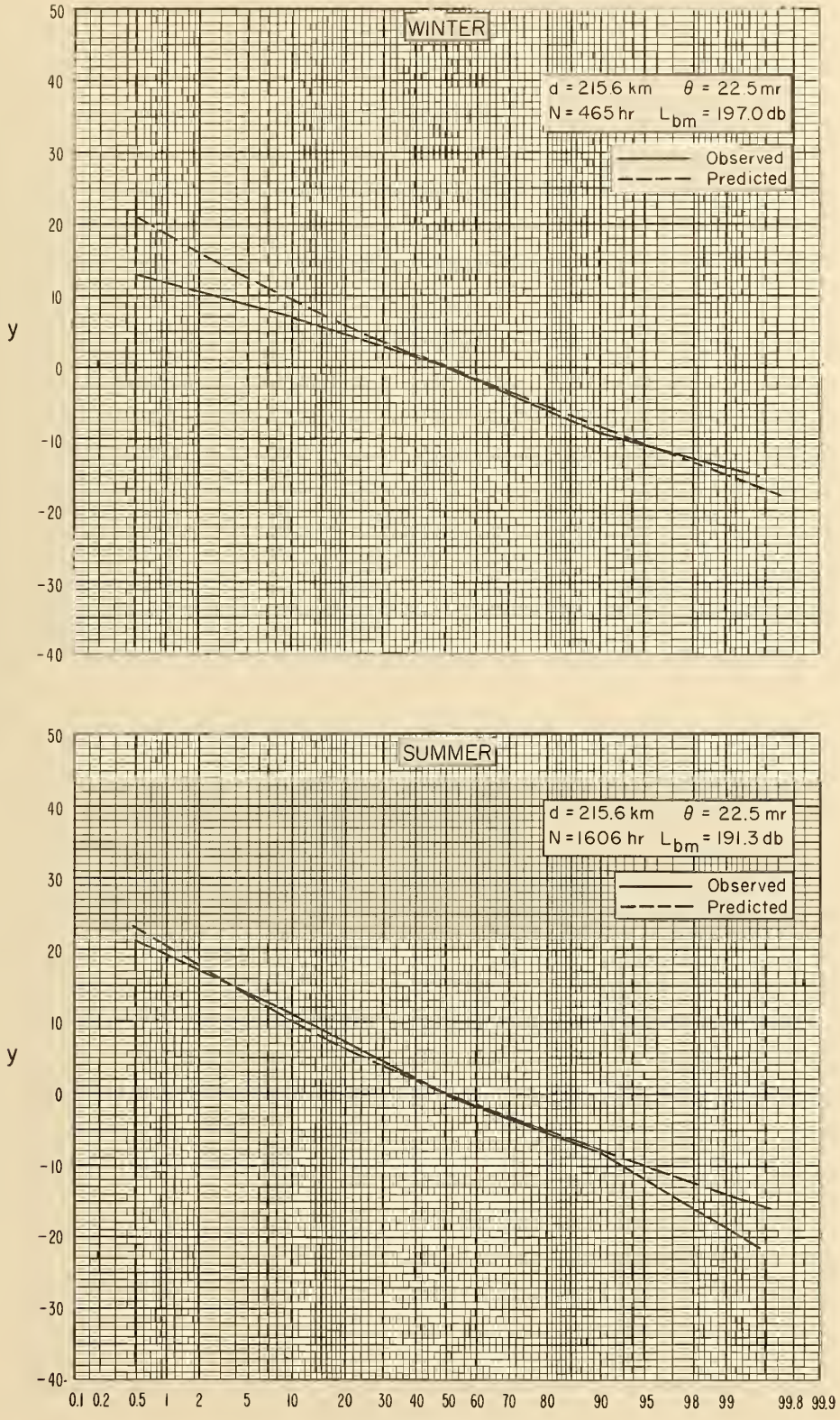

WINTER
d = 215.6 km θ = 22.5 mr
N = 465 hr L_{bm} = 197.0 db
Observed
Predicted
SUMMER
d = 215.6 km θ = 22.5 mr
N = 1606 hr L_{bm} = 191.3 db
Observed
Predicted
y
50
40
30
20
10
0
-10
-20
-30
-40
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9
PERCENT OF TIME

Figure 117

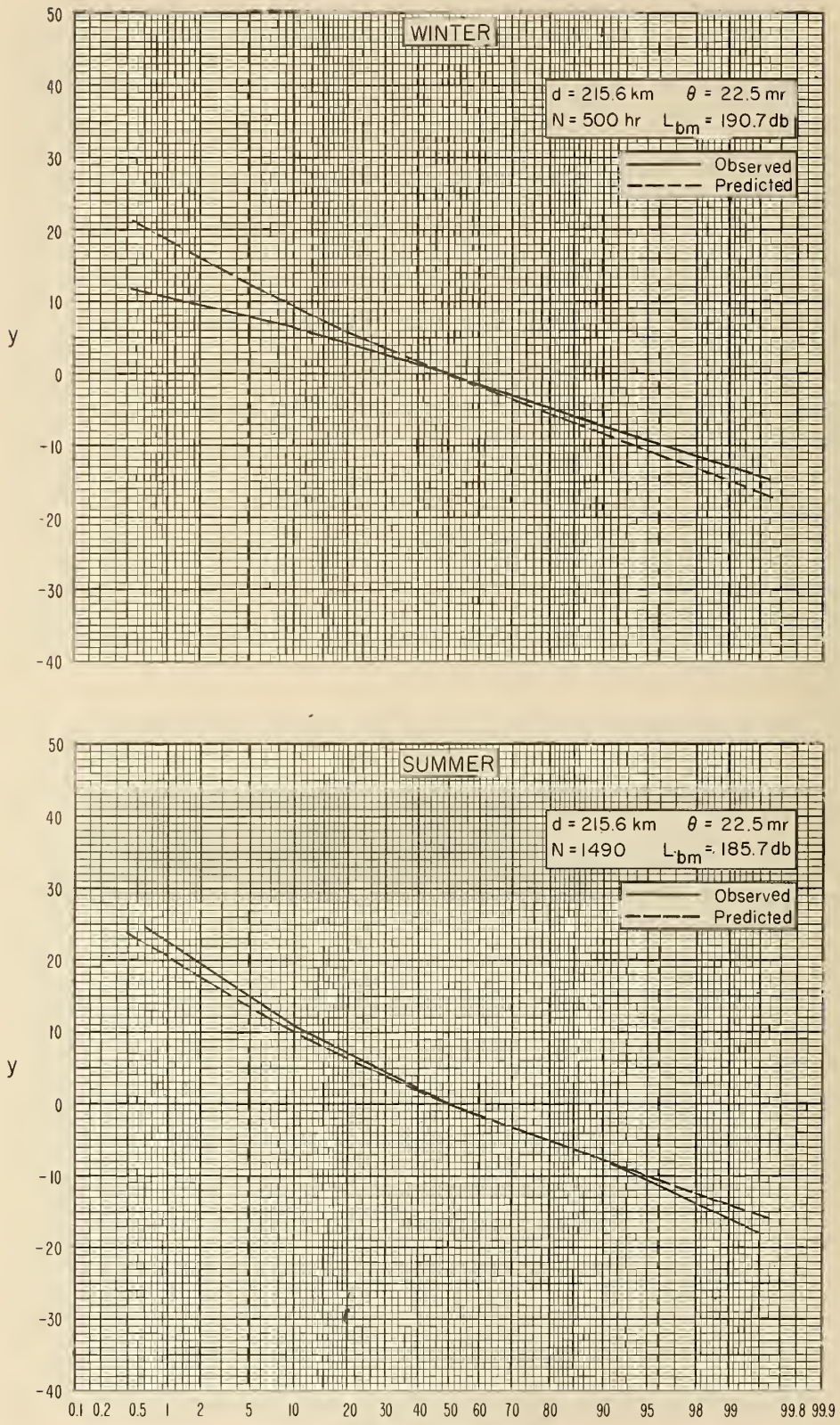

WINTER
d = 215.6 km θ = 22.5 mr
N = 500 hr L_{bm} = 190.7 db
Observed
Predicted
SUMMER
d = 215.6 km θ = 22.5 mr
N = 1490 L_{bm} = 185.7 db
Observed
Predicted
y
50
40
30
20
10
0
-10
-20
-30
-40
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9
PERCENT OF TIME

Figure 118

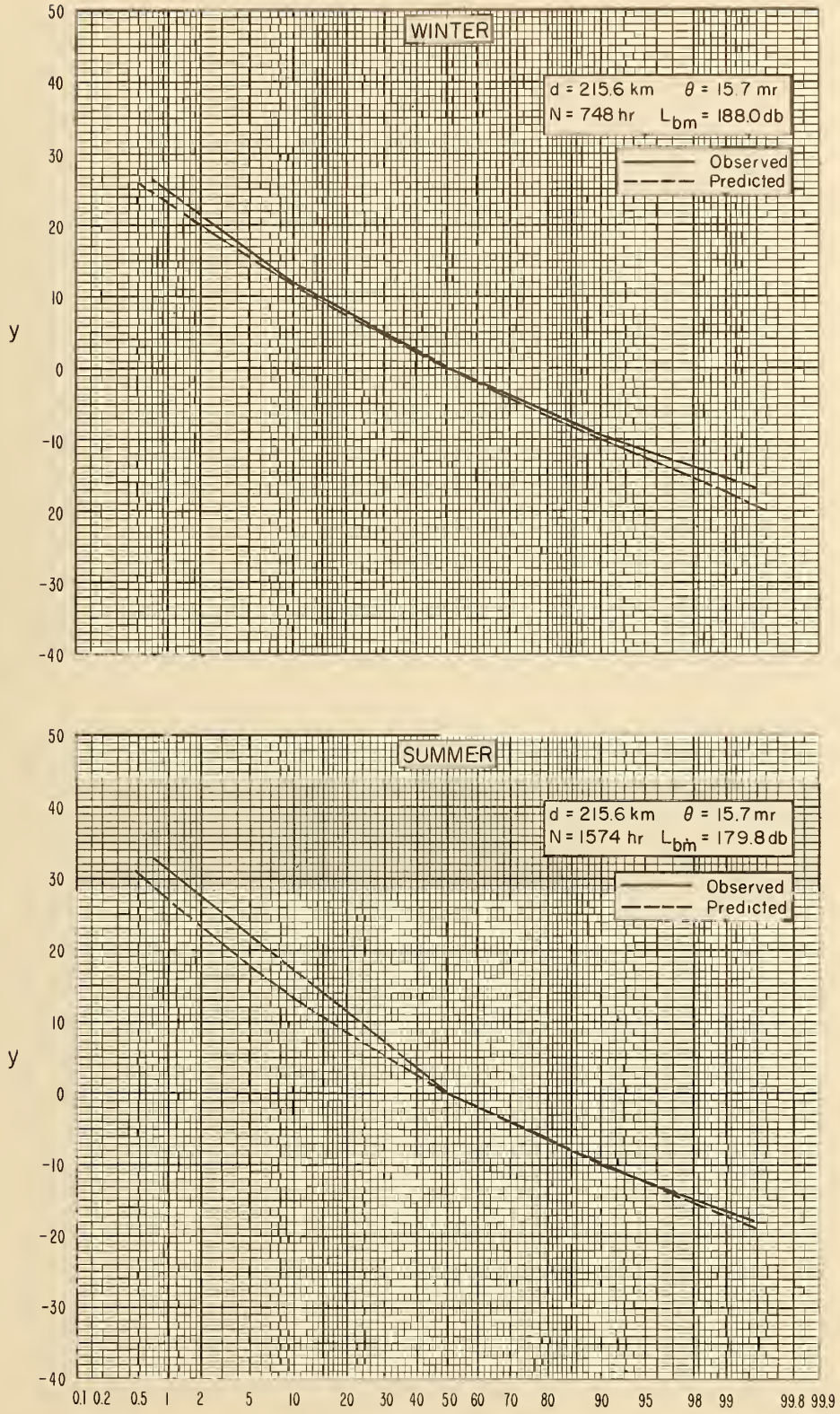

WINTER
d = 215.6 km θ = 15.7 mr
N = 748 hr Lbm = 188.0 db
Observed
Predicted
SUMMER
d = 215.6 km θ = 15.7 mr
N = 1574 hr Lbm = 179.8 db
Observed
Predicted
y
50
40
30
20
10
0
-10
20
-30
-40
-20
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9
PERCENT OF TIME

Figure 119

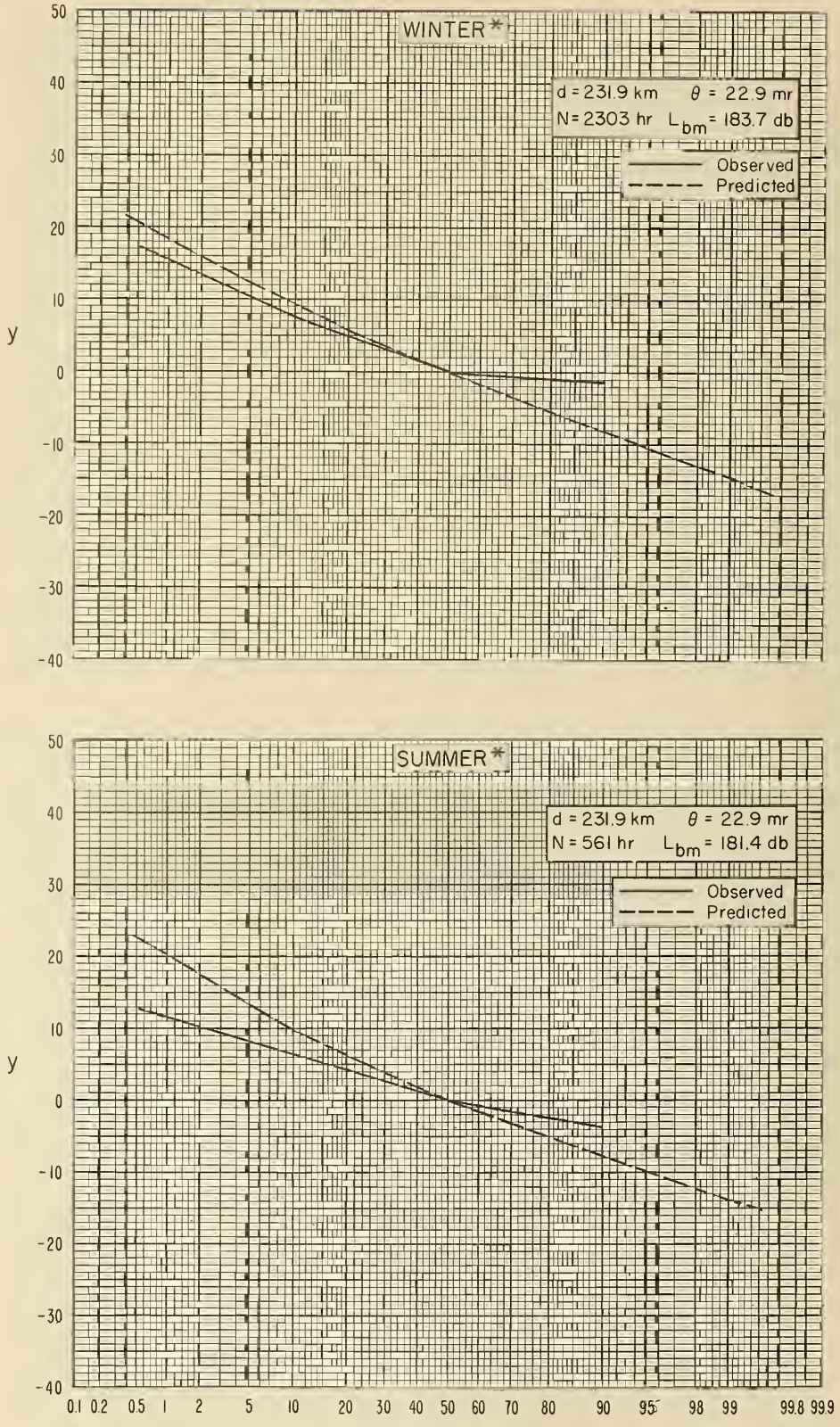

WINTER*
d = 231.9 km θ = 22.9 mr
N = 2303 hr L_{bm} = 183.7 db
Observed
Predicted
SUMMER*
d = 231.9 km θ = 22.9 mr
N = 561 hr L_{bm} = 181.4 db
Observed
Predicted
y
50
40
30
20
10
0
-10
-20
-30
-40
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9
PERCENT OF TIME

Figure 120

NBS PATH 51

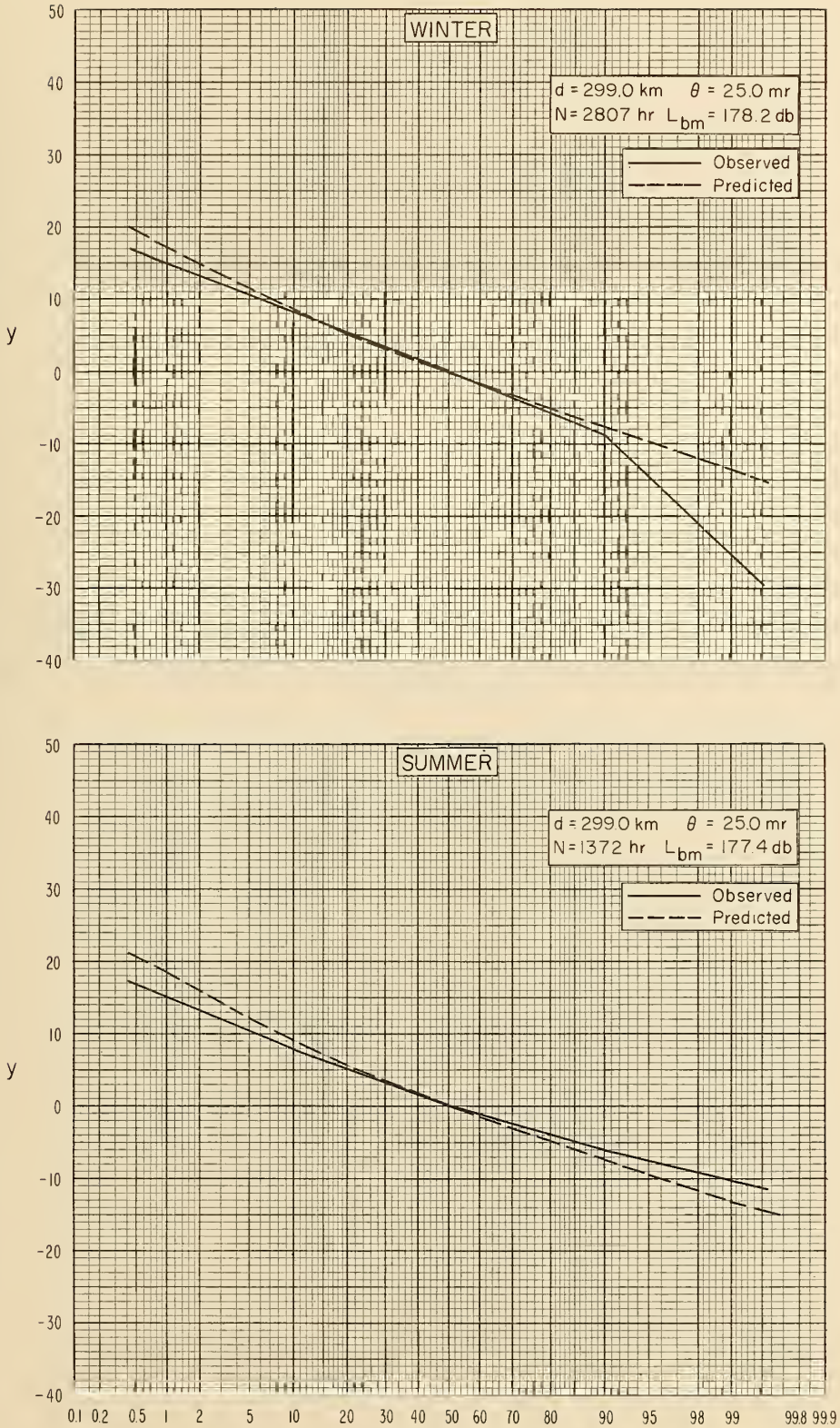


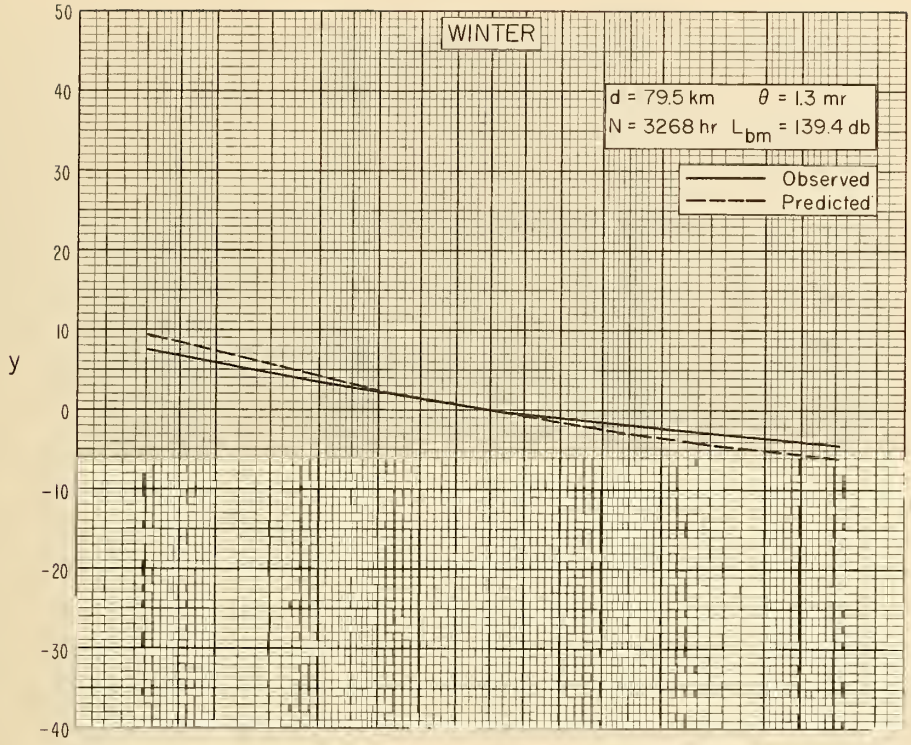
Figure 121

PART III

(Figures 122 through 135)

Cumulative distributions - winter or summer - of paths for which only one season of recording is available.

NBS PATH 350



NBS PATH 352

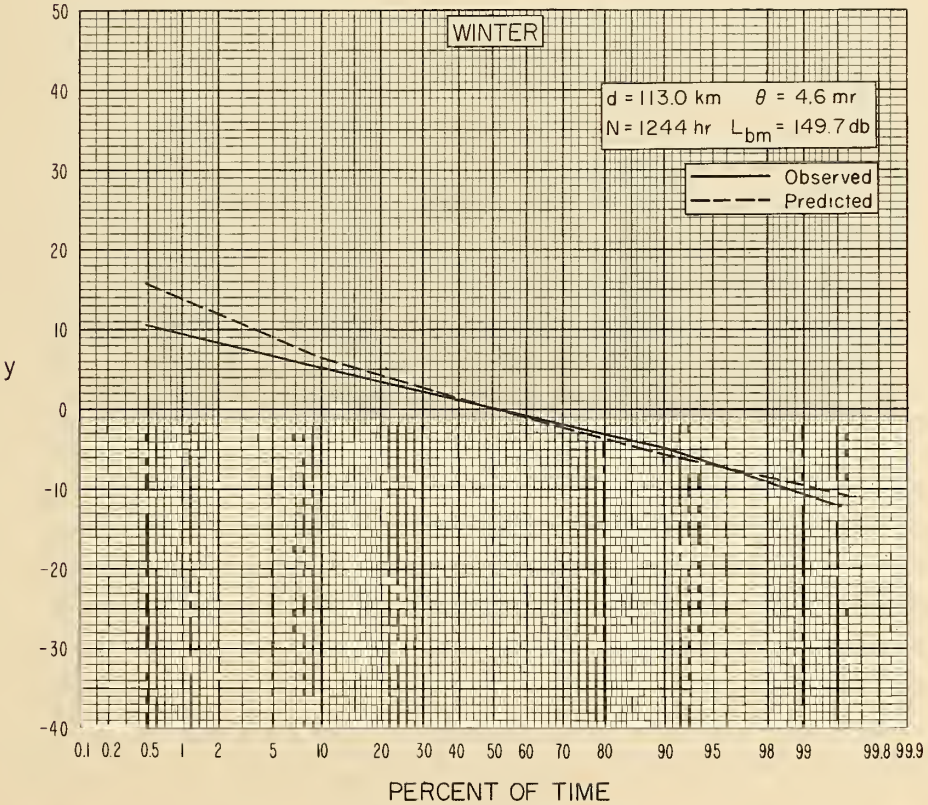
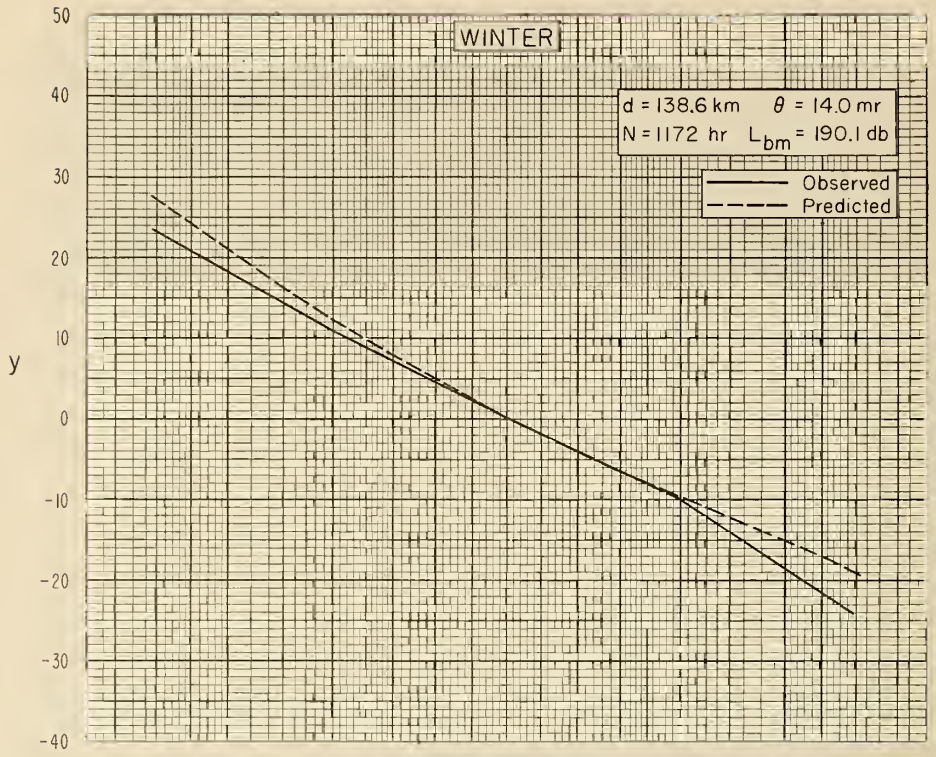


Figure 122

NBS PATH 450



NBS PATH 354

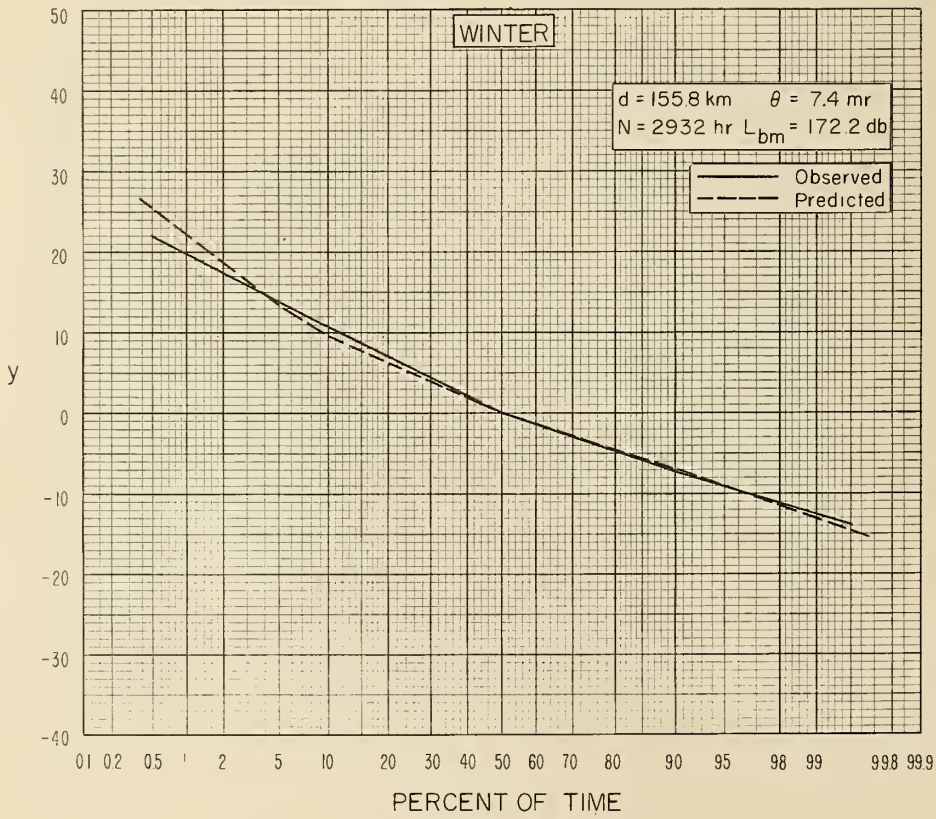
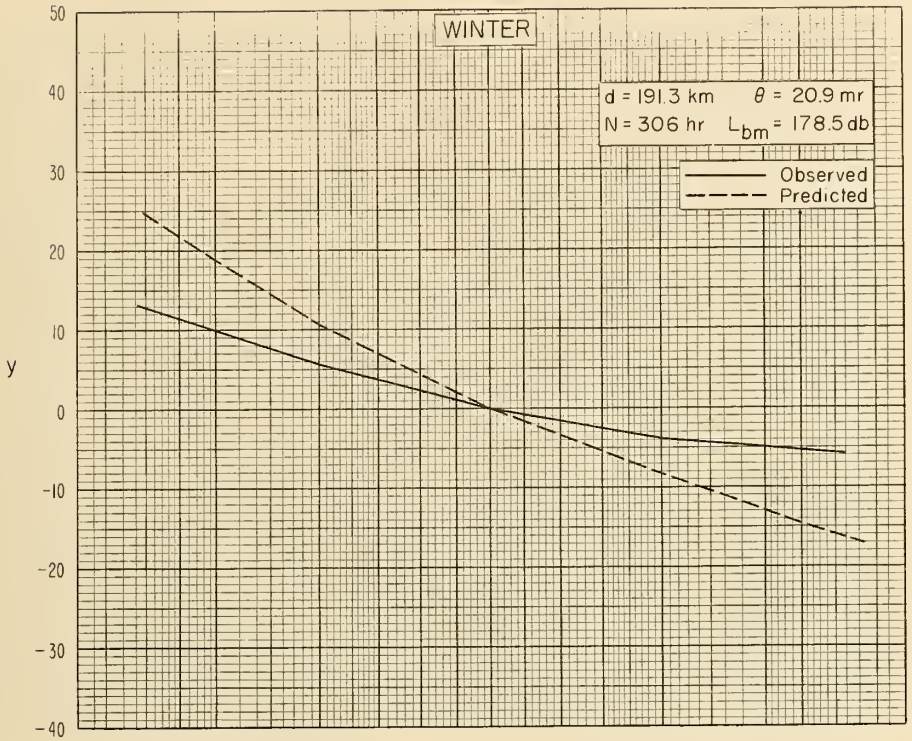


Figure 123

NBS PATH 63



NBS PATH 45

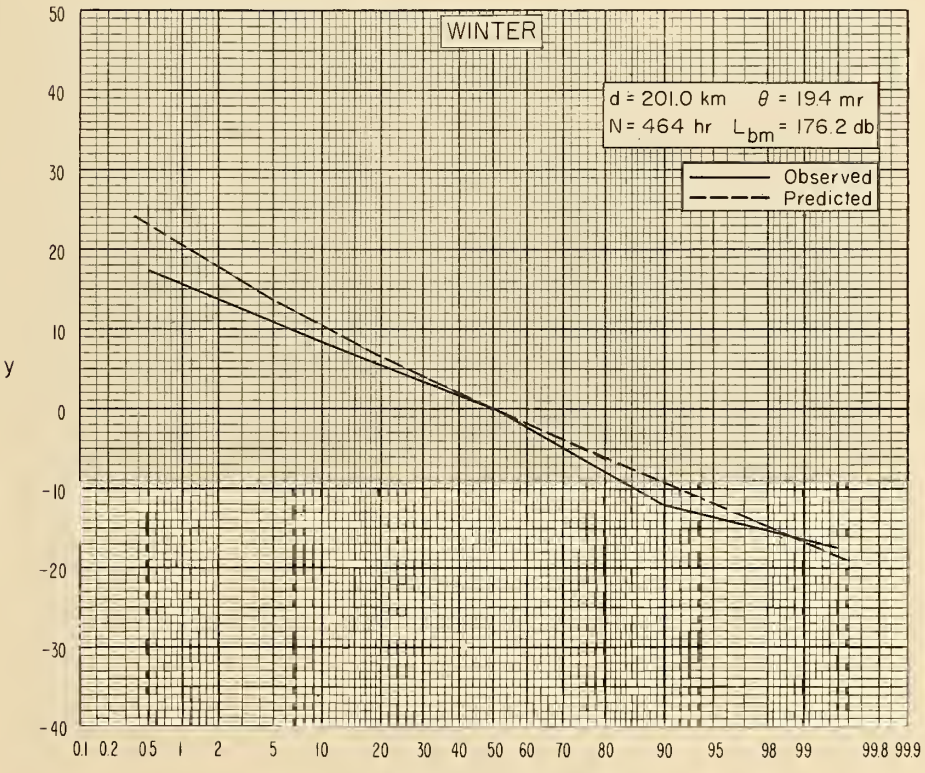
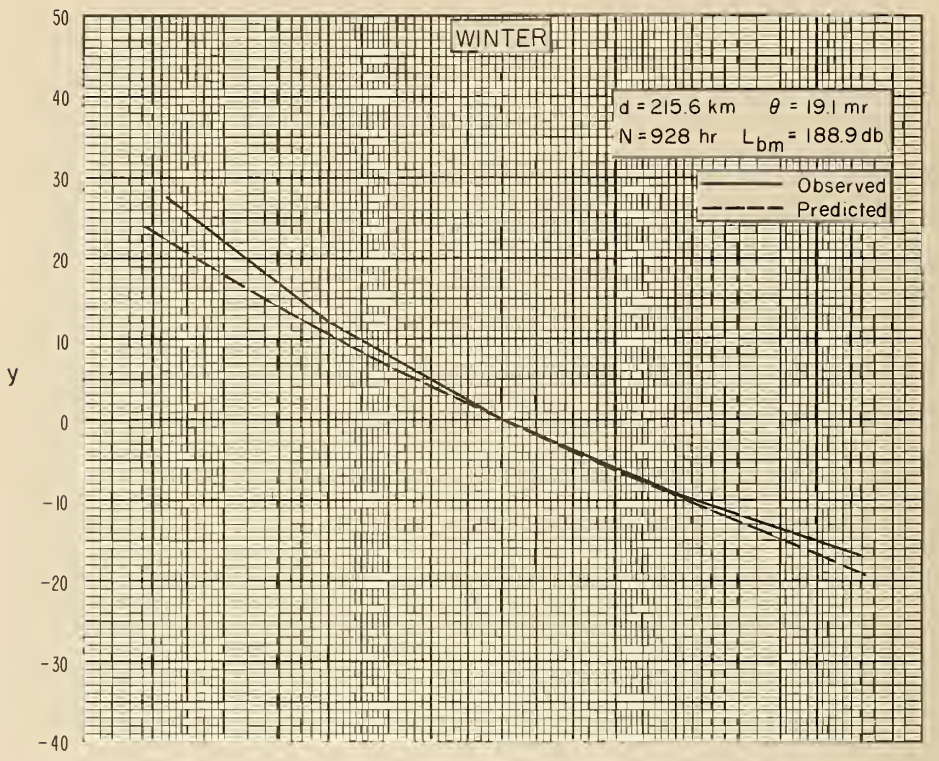


Figure 124

NBS PATH 458



NBS PATH 461

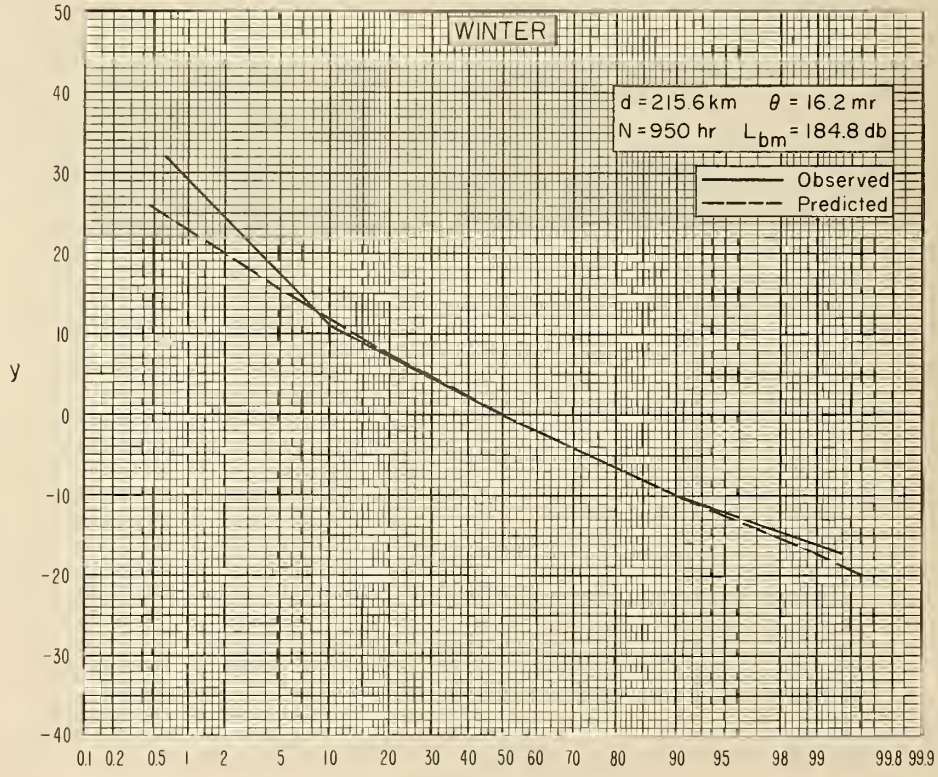
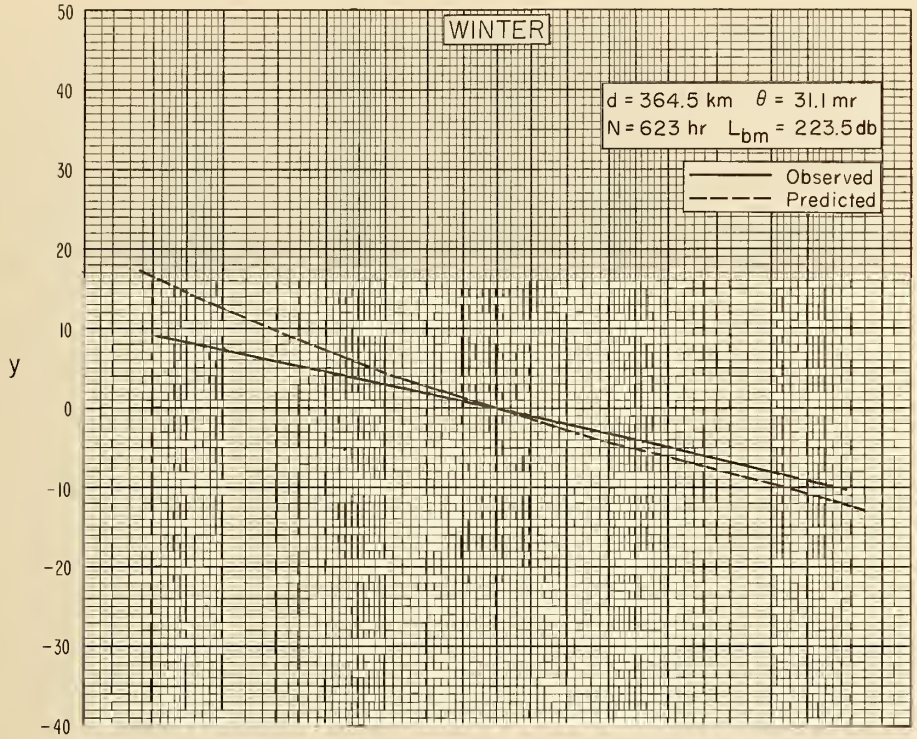


Figure 125

NBS PATH 317



NBS PATH 356

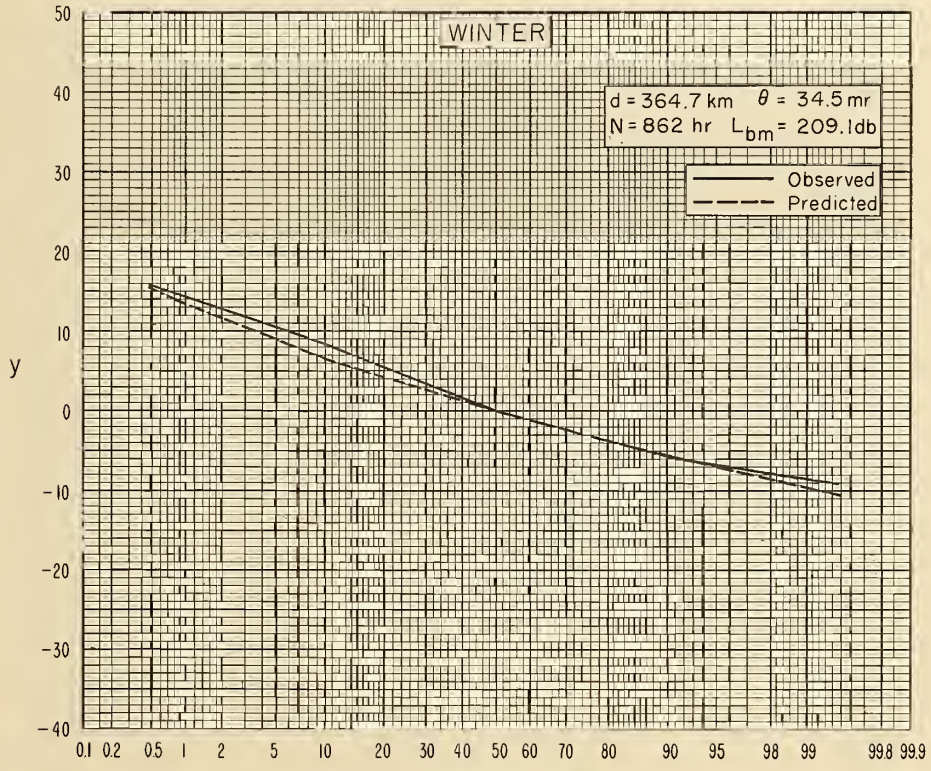
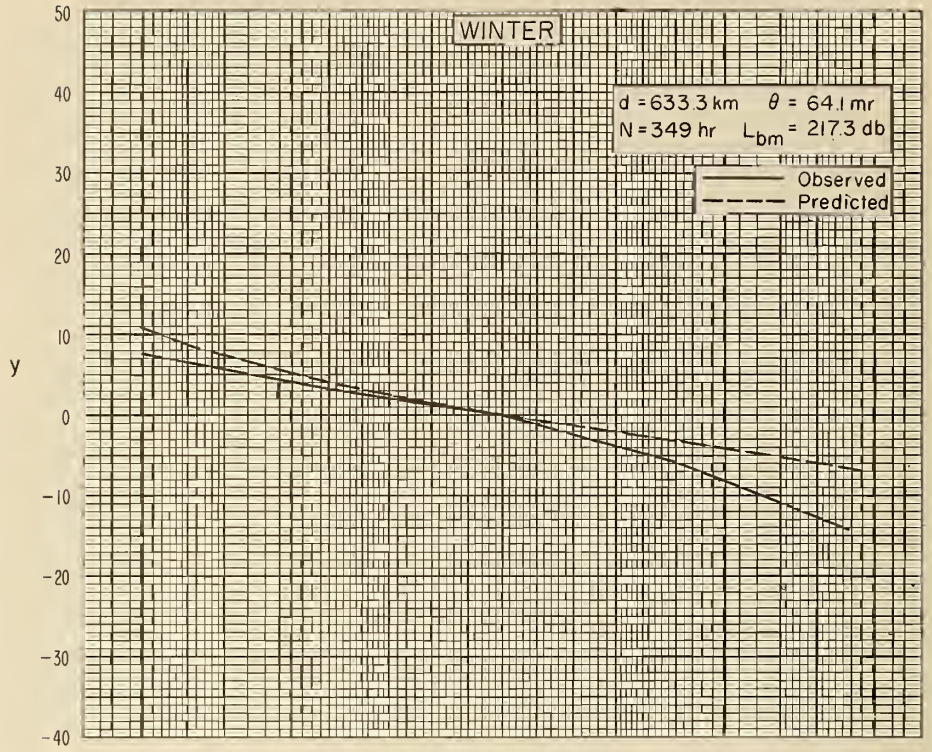


Figure 126

NBS PATH 258



NBS PATH 264

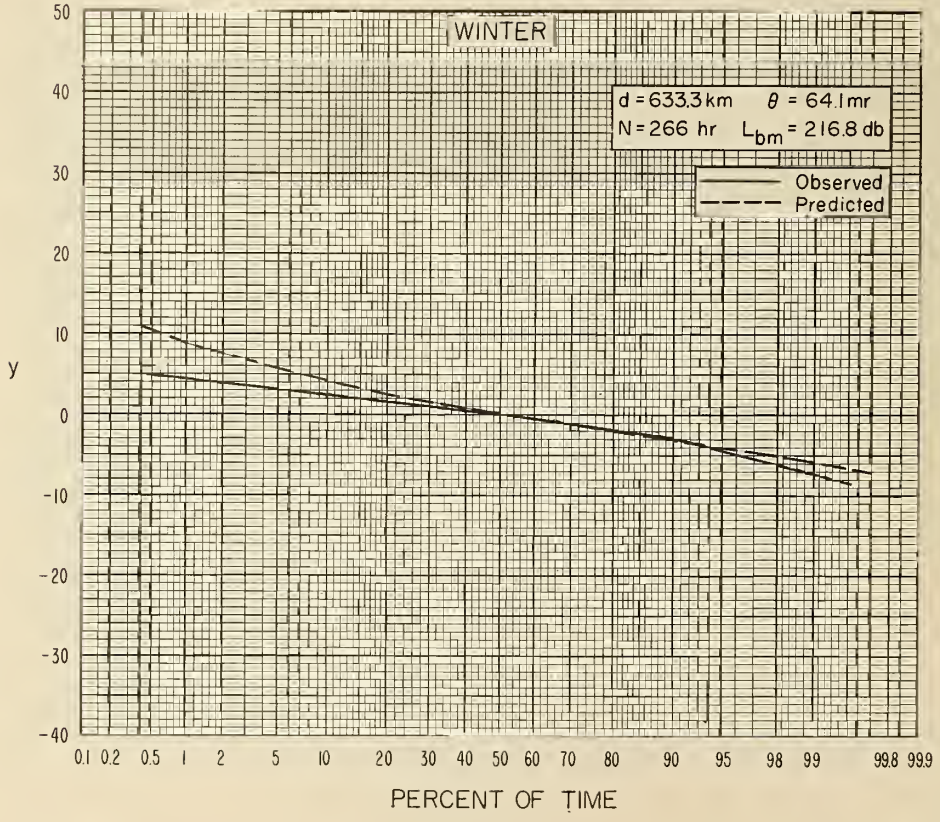
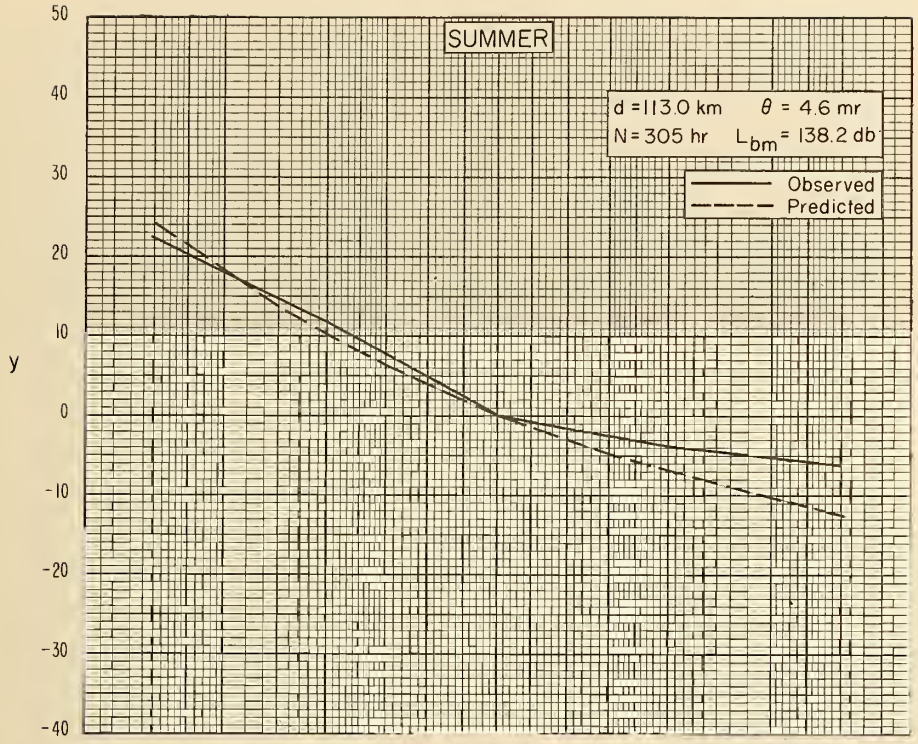


Figure 127

NBS PATH 372



NBS PATH 23

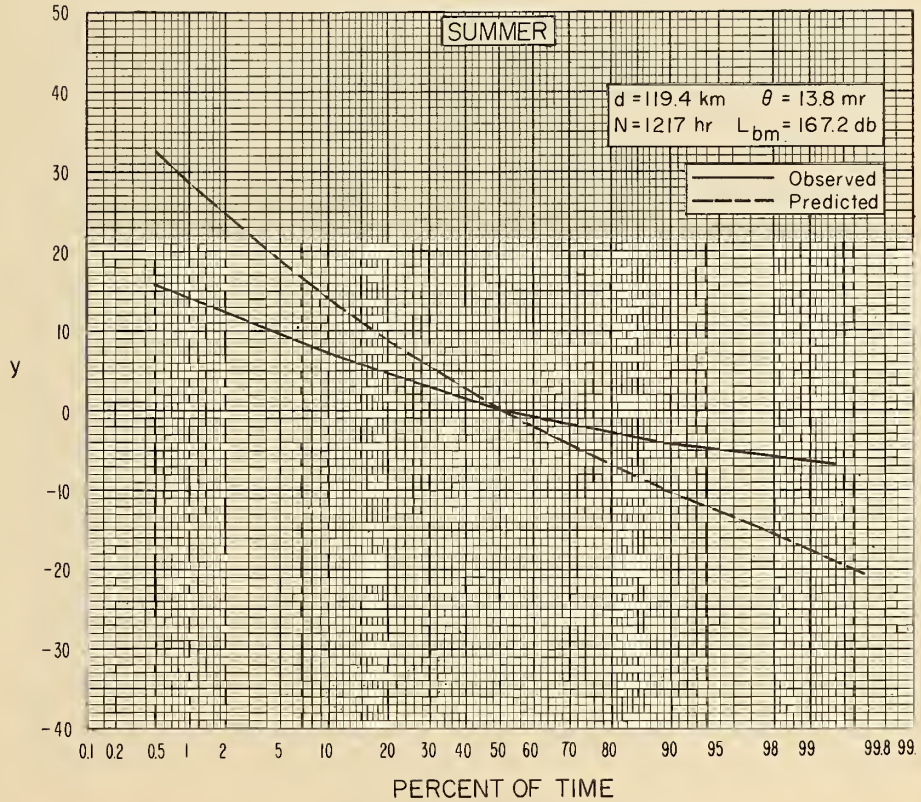
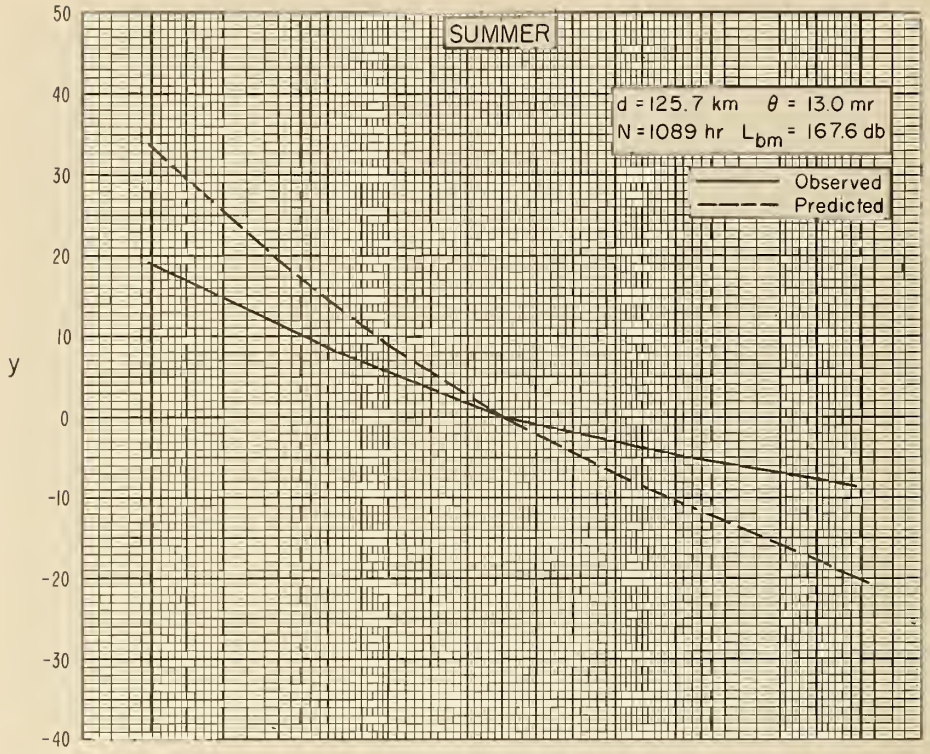


Figure 128

NBS PATH 21



NBS PATH 228

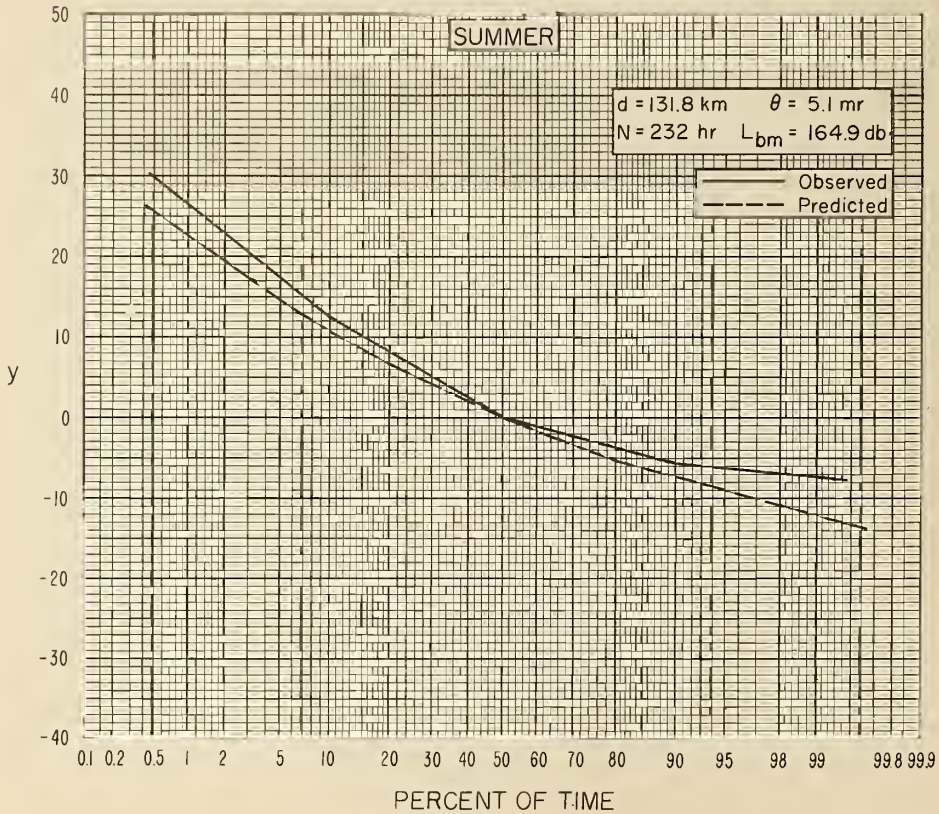
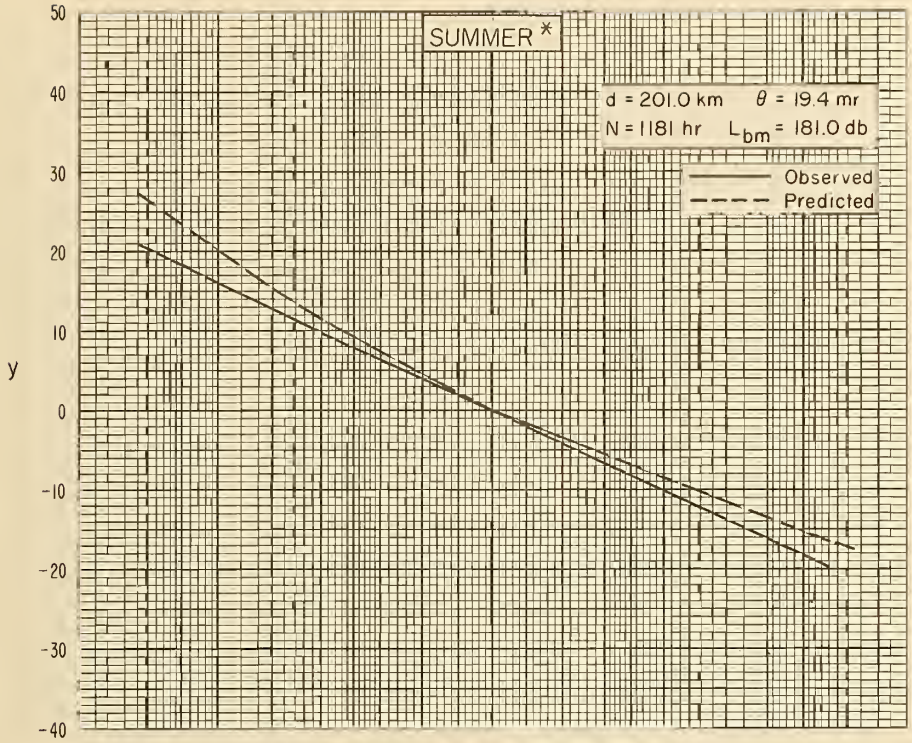


Figure 129

NBS PATH 43



NBS PATH 222

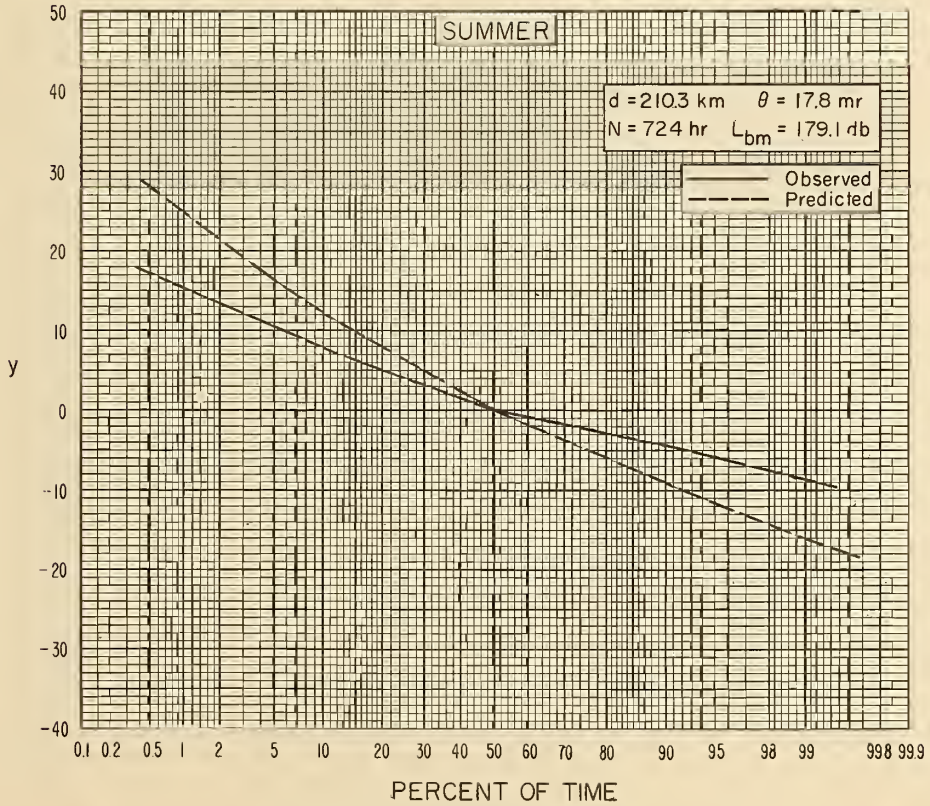
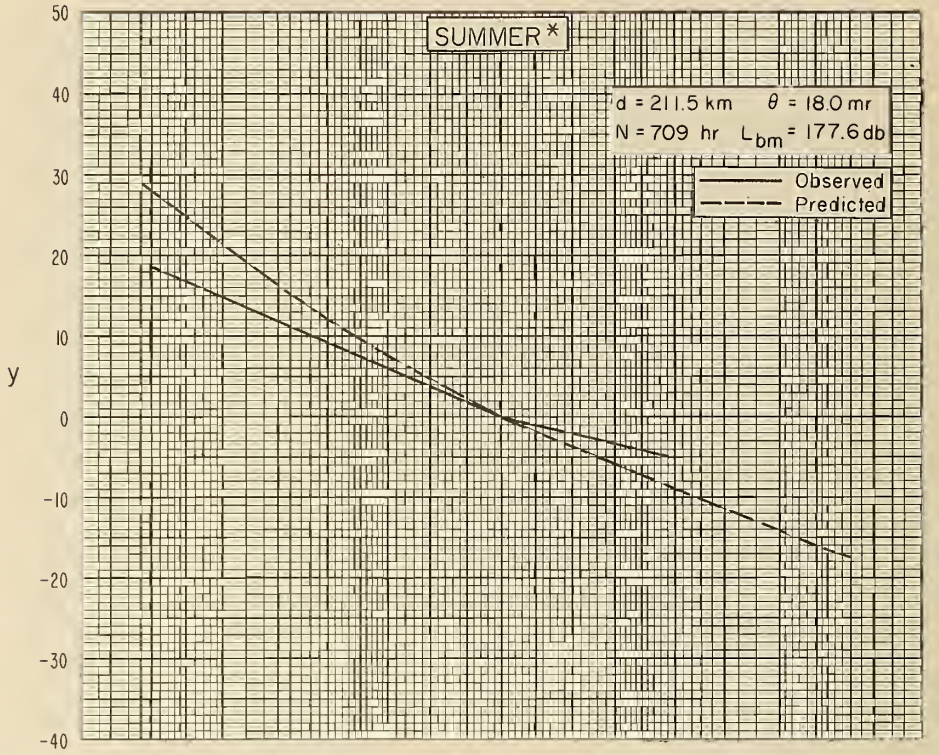


Figure 130

NBS PATH 202



NBS PATH 16

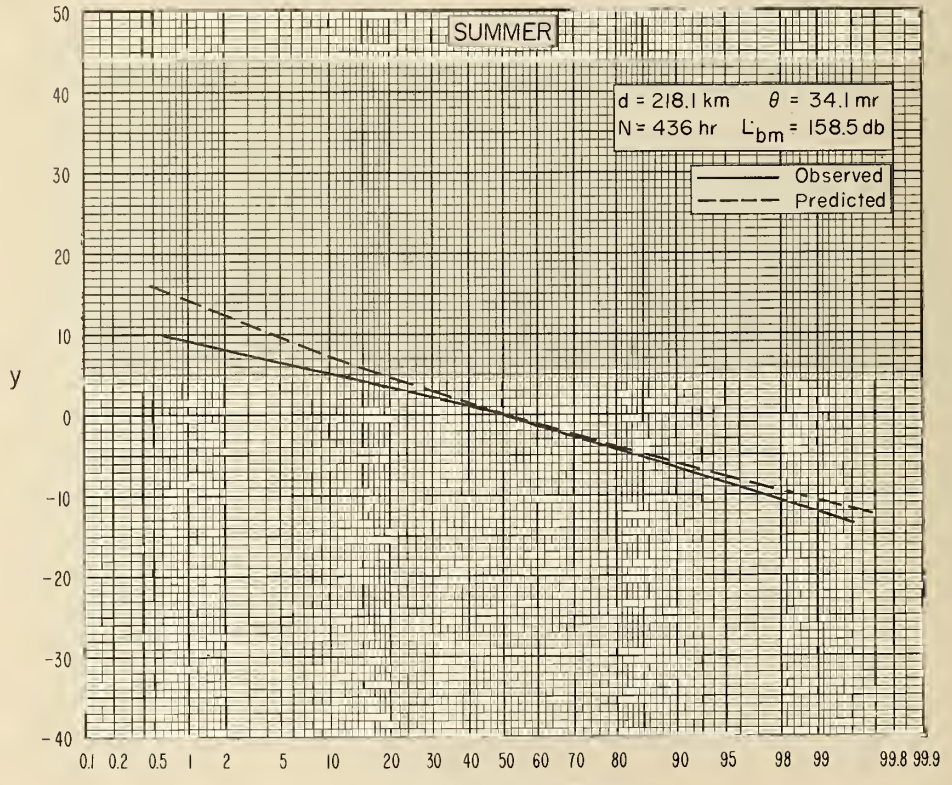
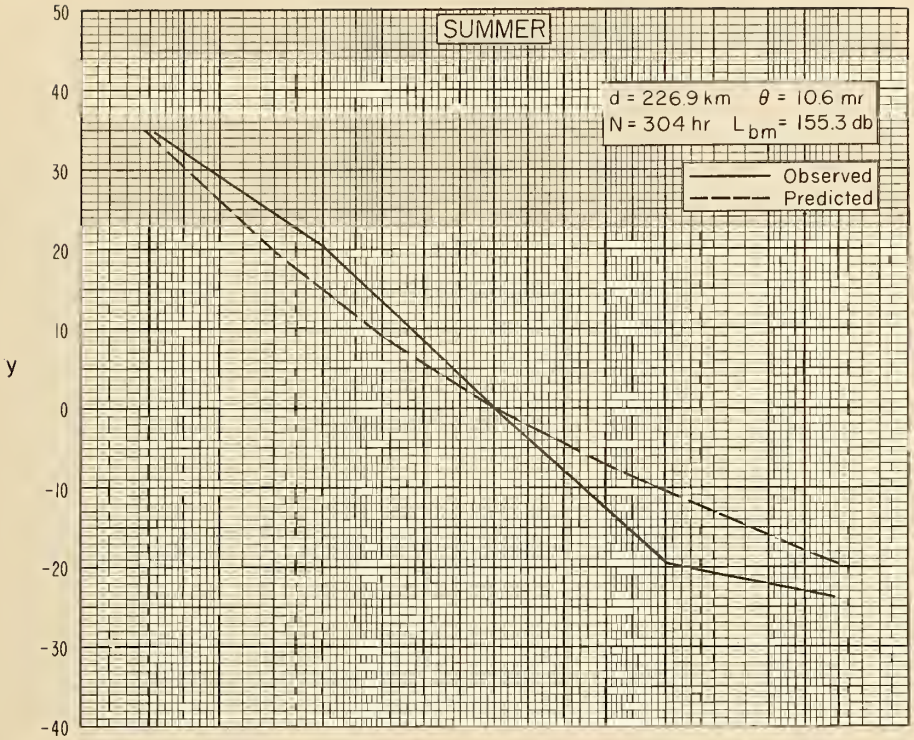


Figure 131

NBS PATH 302



NBS PATH 342

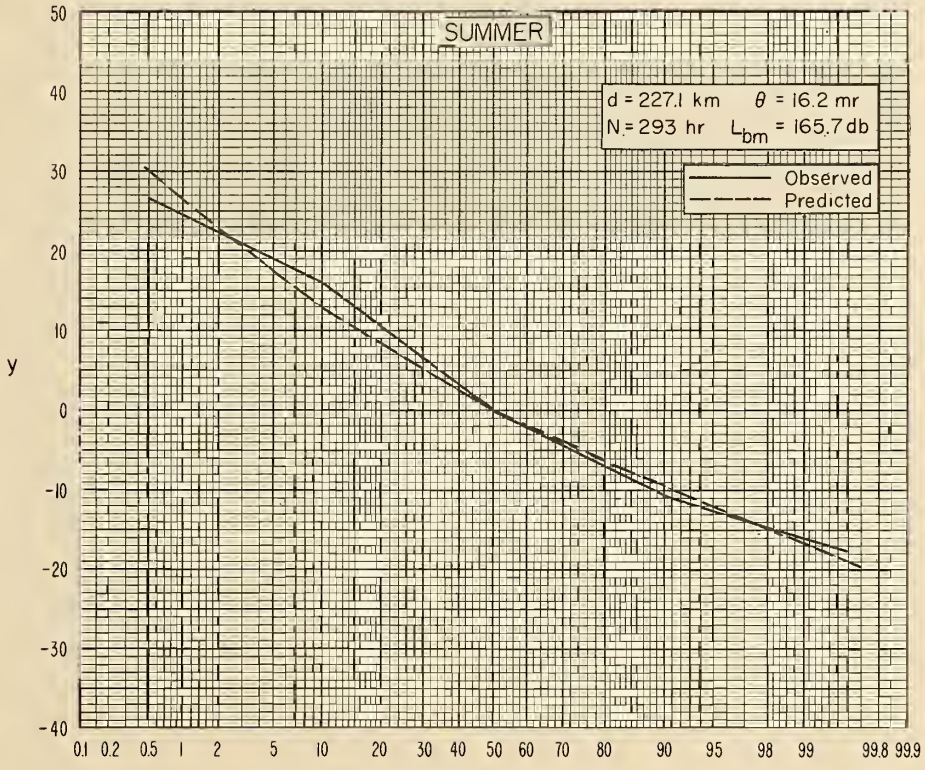
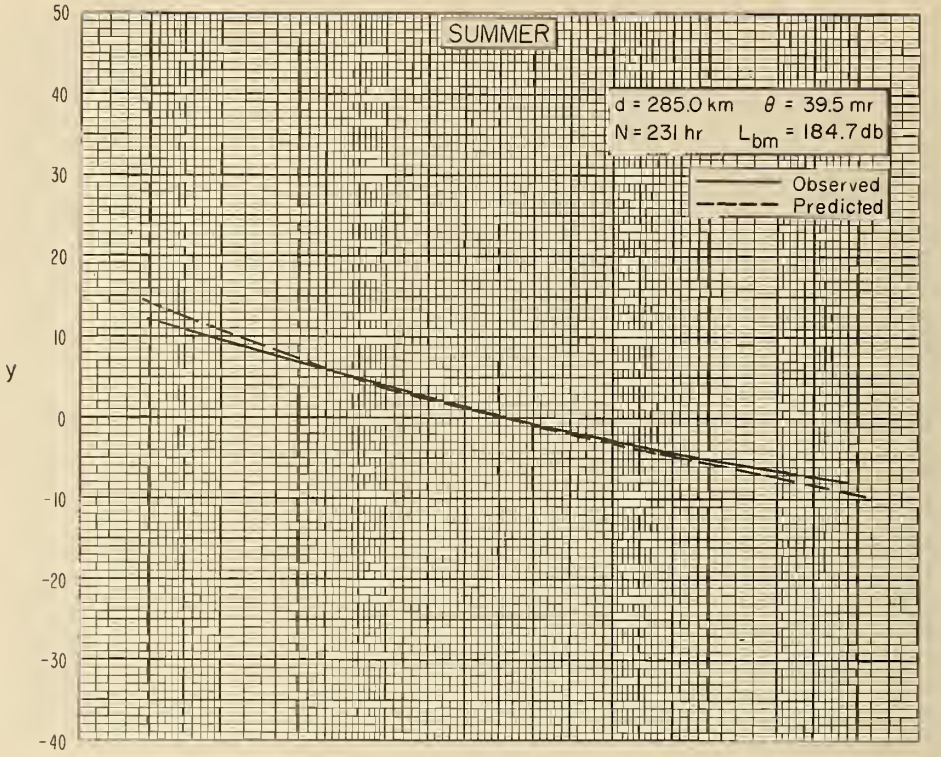


Figure 132

NBS PATH 15



NBS PATH 71

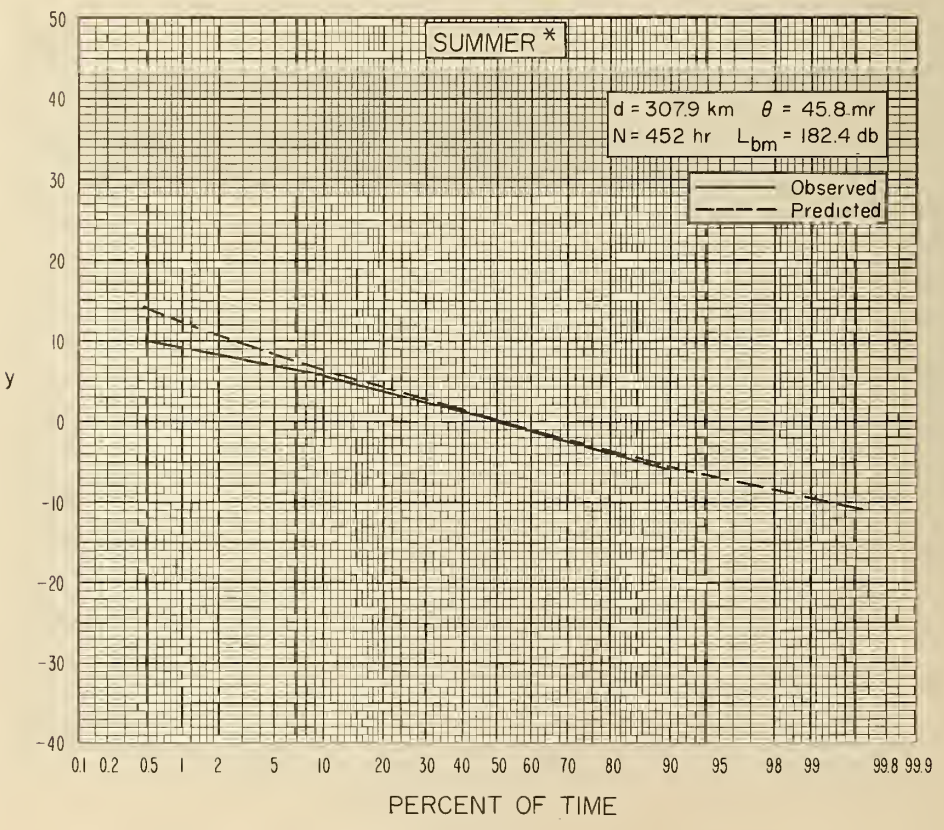
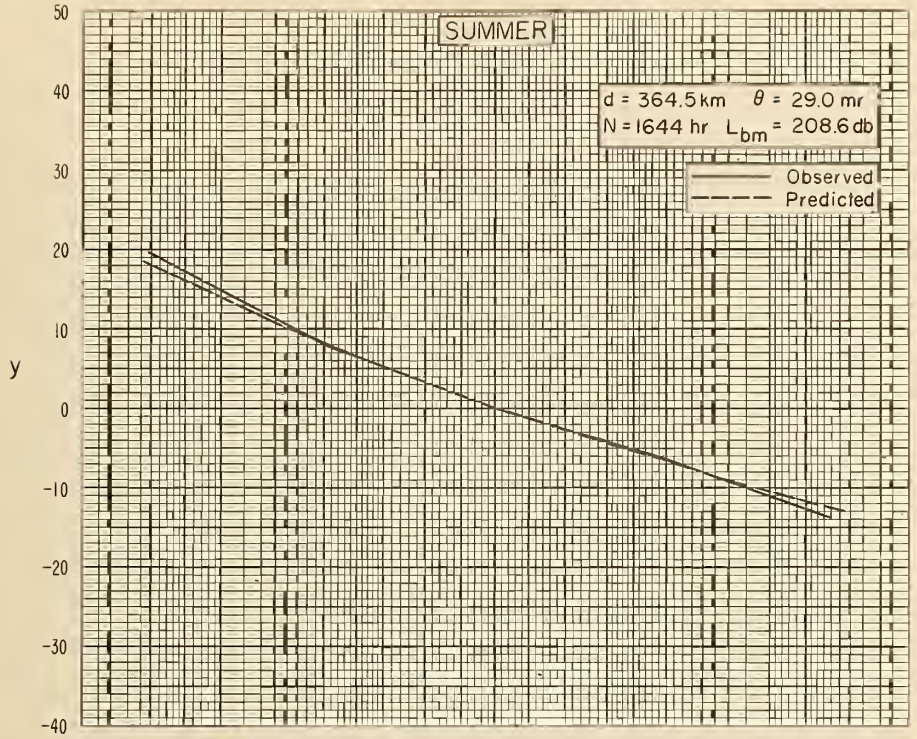


Figure 133

NBS PATH 316



NBS PATH 376

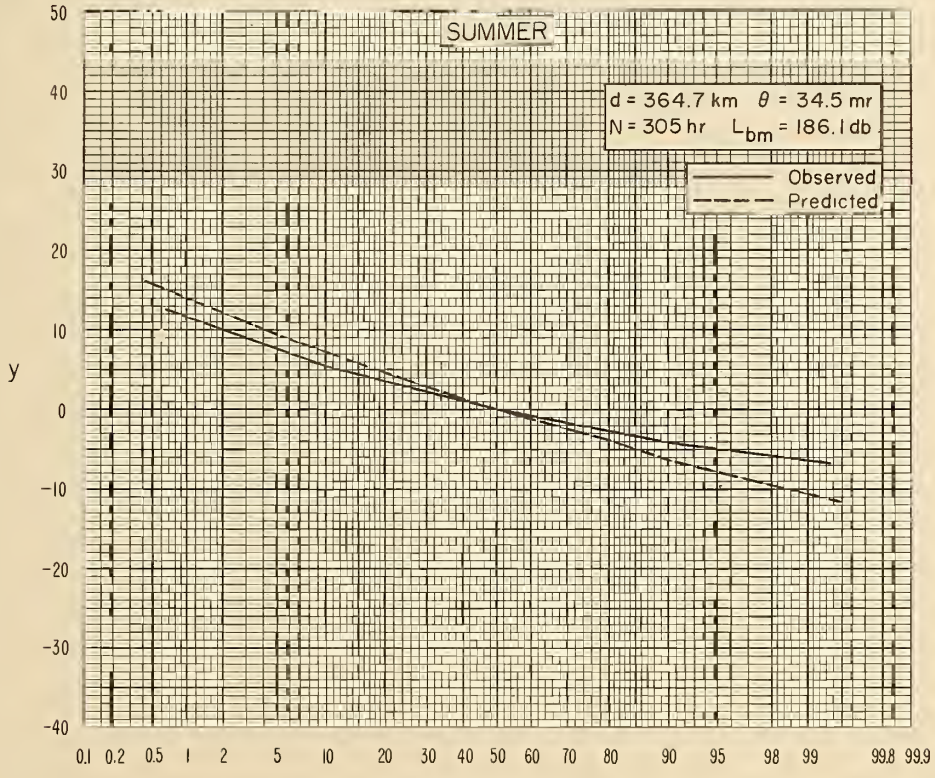


Figure 134

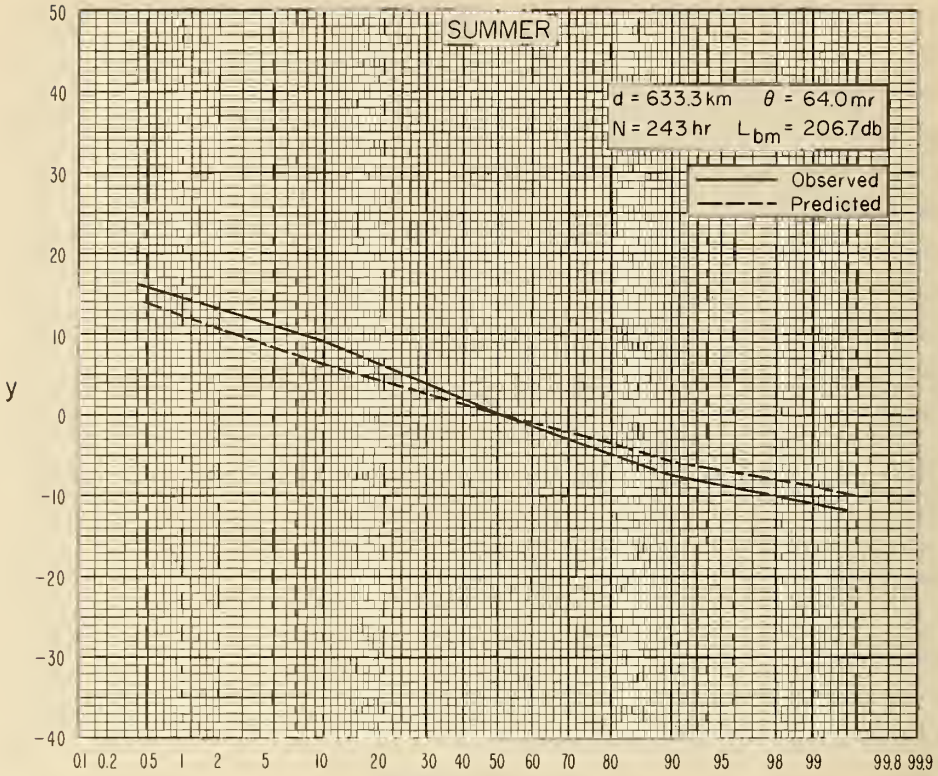

SUMMER
d = 633.3 km θ = 64.0 mr
N = 243 hr L_{bm} = 206.7 db
Observed
Predicted
y
50
40
30
20
10
0
-10
-20
-30
-40
0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9
PERCENT OF TIME

Figure 135

Curves for Predicting Long-Term Variability

$y(p, \theta)$ for Winter and Summer

(Figures 136 and 137)

Readings from these graphs are the basis for all prediction curves appearing on the cululative distributions.

VARIABILITY, $y(p,\theta)$, OF WINTER HOURLY MEDIANS RELATIVE TO THE LONG-TERM WINTER MEDIAN

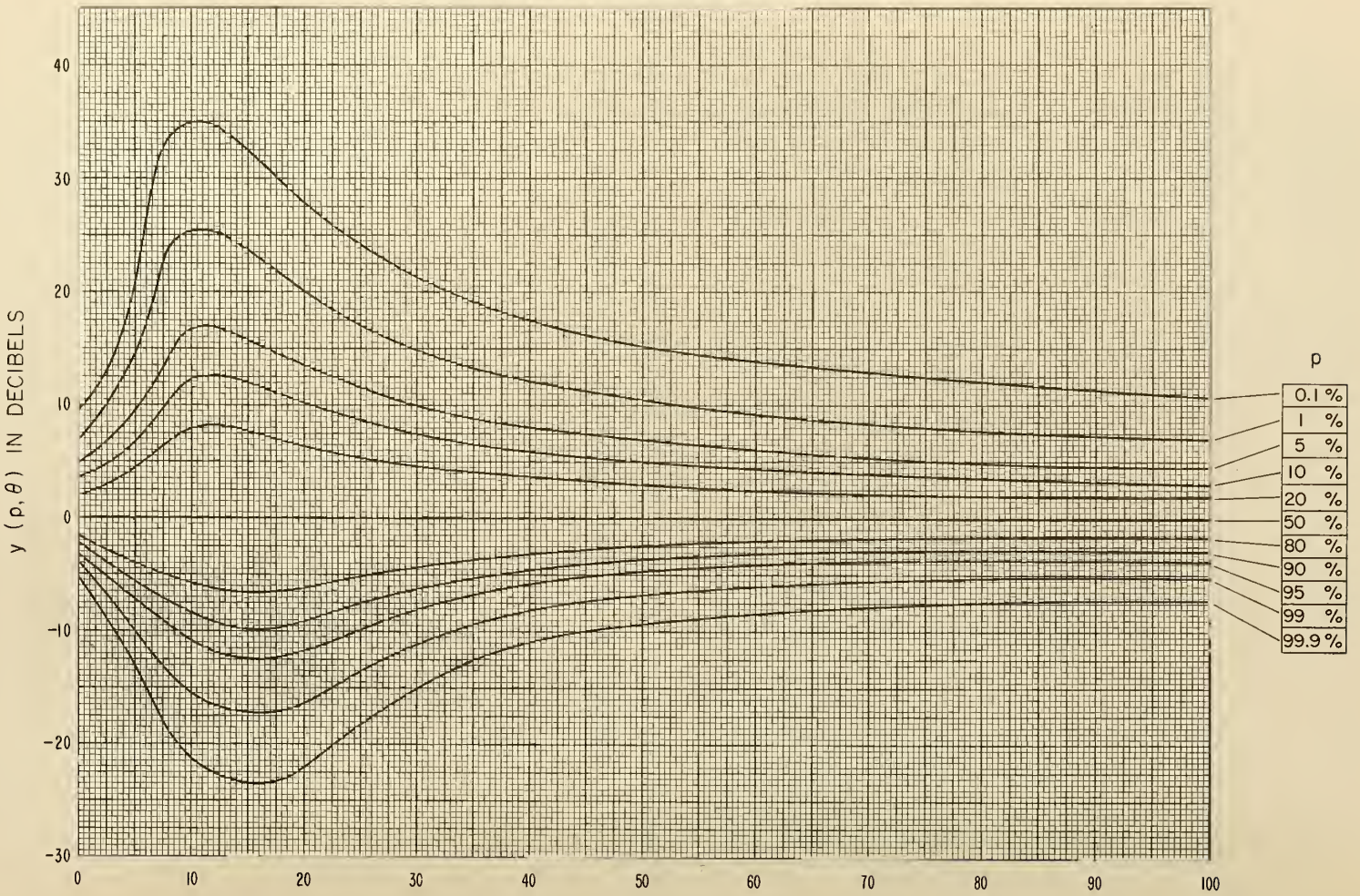


Figure 136

VARIABILITY, $y(p,\theta)$, OF SUMMER HOURLY MEDIANS RELATIVE TO THE LONG-TERM SUMMER MEDIAN

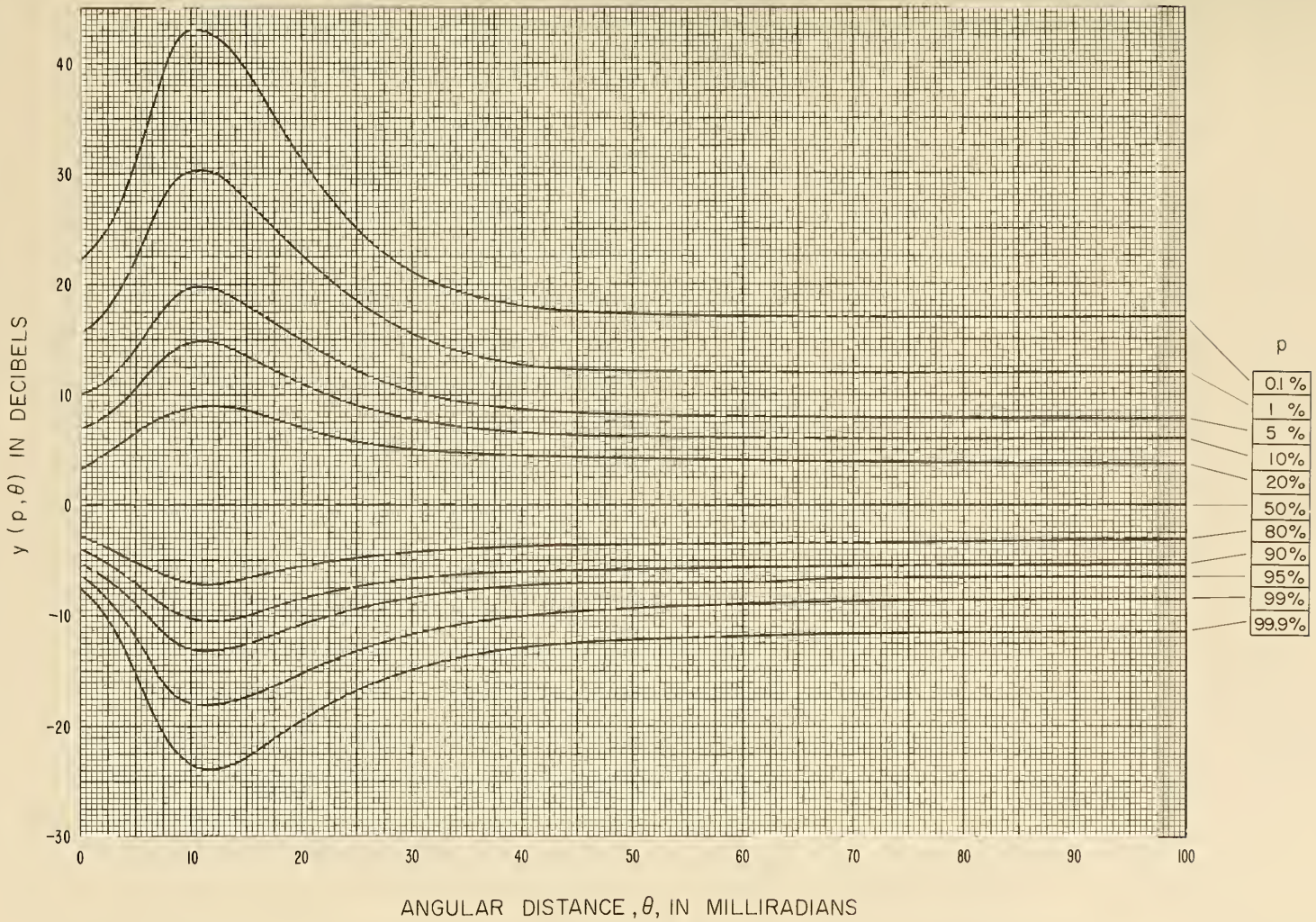


Figure 137

U.S. DEPARTMENT OF COMMERCE
Frederick H. Mueller, *Secretary*

NATIONAL BUREAU OF STANDARDS
A. V. Astin, *Director*

THE NATIONAL BUREAU OF STANDARDS

The scope of activities of the National Bureau of Standards at its major laboratories in Washington, D.C., and Boulder, Colorado, is suggested in the following listing of the divisions and sections engaged in technical work. In general, each section carries out specialized research, development, and engineering in the field indicated by its title. A brief description of the activities, and of the resultant publications, appears on the inside of the front cover.

WASHINGTON, D.C.

Electricity and Electronics. Resistance and Reactance. Electron Devices. Electrical Instruments. Magnetic Measurements. Dielectrics. Engineering Electronics. Electronic Instrumentation. Electrochemistry.

Optics and Metrology. Photometry and Colorimetry. Photographic Technology. Length. Engineering Metrology.

Heat. Temperature Physics. Thermodynamics. Cryogenic Physics. Rheology. Molecular Kinetics. Free Radicals Research.

Atomic and Radiation Physics. Spectroscopy. Radiometry. Mass Spectrometry. Solid State Physics. Electron Physics. Atomic Physics. Neutron Physics. Radiation Theory. Radioactivity. X-rays. High Energy Radiation. Nucleonic Instrumentation. Radiological Equipment.

Chemistry. Organic Coatings. Surface Chemistry. Organic Chemistry. Analytical Chemistry. Inorganic Chemistry. Electrodeposition. Molecular Structure and Properties of Gases. Physical Chemistry. Thermochemistry. Spectrochemistry. Pure Substances.

Mechanics. Sound. Mechanical Instruments. Fluid Mechanics. Engineering Mechanics. Mass and Scale. Capacity, Density, and Fluid Meters. Combustion Controls.

Organic and Fibrous Materials. Rubber. Textiles. Paper. Leather. Testing and Specifications. Polymer Structure. Plastics. Dental Research.

Metallurgy. Thermal Metallurgy. Chemical Metallurgy. Mechanical Metallurgy. Corrosion. Metal Physics.

Mineral Products. Engineering Ceramics. Glass. Refractories. Enameled Metals. Constitution and Microstructure.

Building Technology. Structural Engineering. Fire Protection. Air Conditioning, Heating, and Refrigeration. Floor, Roof, and Wall Coverings. Codes and Safety Standards. Heat Transfer. Concreting Materials.

Applied Mathematics. Numerical Analysis. Computation. Statistical Engineering. Mathematical Physics.

Data Processing Systems. SEAC Engineering Group. Components and Techniques. Digital Circuitry. Digital Systems. Analog Systems. Application Engineering.

• Office of Basic Instrumentation.

• Office of Weights and Measures.

BOULDER, COLORADO

Cryogenic Engineering. Cryogenic Equipment. Cryogenic Processes. Properties of Materials. Gas Liquefaction.

Radio Propagation Physics. Upper Atmosphere Research. Ionospheric Research. Regular Propagation Services. Sun-Earth Relationships. VHF Research. Radio Warning Services. Airglow and Aurora. Radio Astronomy and Arctic Propagation.

Radio Propagation Engineering. Data Reduction Instrumentation. Modulation Research. Radio Noise. Tropospheric Measurements. Tropospheric Analysis. Propagation Obstacles Engineering. Radio-Meteorology. Lower Atmosphere Physics.

Radio Standards. High Frequency Electrical Standards. Radio Broadcast Service. High Frequency Impedance Standards. Electronic Calibration Center. Microwave Physics. Microwave Circuit Standards.

Radio Communication and Systems. Low Frequency and Very Low Frequency Research. High Frequency and Very High Frequency Research. Ultra High Frequency and Super High Frequency Research. Modulation Research. Antenna Research. Navigation Systems. Systems Analysis. Field Operations.


NBS