GCA Technical Report No. 66-7-N

COMPENDIUM OF WIND DATA FROM THE VAPOR TRAIL TECHNIQUE

John F. Bedinger

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GCA CORPORATION
GCA TECHNOLOGY DIVISION
Bedford, Massachusetts

Prepared for

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
Headquarters
Washington, D. C.

FOREWORD

The vapor trail method of measuring winds in the earth's upper atmosphere has been used by scientists of many countries during the last five years. The data which have been published appear in various forms and in many different places. Some of the data have not been formally published but have been made available through such media as contractual reports, conferences, and private communications. The purpose of this report is to collect the data in one place and in a consistent form. Usually, tabulated datawere not available and often the graphical presentation was replotted. Each wind observation is presented in two separate graphs which display the wind speed and direction of the transport vector. This method of presentation was chosen because most of the data were available in this form and because the plotted quantities are those that were actually measured.

The location of the launch sites and names and addresses of persons from whom additional information may be requested are given in Table I. The local dates on which the observations were made are given in Table II. The launch time is given on each figure as local standard time except for morning or evening twilight launches which are indicated as AM or PM respectively.

This compendium was prepared at the suggestion of Maurice Dubin who aided greatly in the assembling of the data from launch sites outside of the U.S.A.

TABLE I

LAUNCH SITES AND PRINCIPAL CONTACTS

Site	Latitude	Longitude	Contact
Algeria, Hammaguir	31°N	3°W	Prof. J.E. Blamont Centre National de la Recherche Scientifique Service D'Aeronomie Observatorie de Meudon Paris France
Algeria, Reggan	26.7°N	0°	
Argentina, Chamical	30.5°S	66°W	T.M. Tabanera Presidente Comision Nacional De Investigaciones Espaciales Rodriguez Pena 1963 Buenos Aires, Argentina
Australia, Woomera	31°S	137°E	Prof. G.V. Groves University College Gower Street London, W.C. 1, England
Canada, Ft. Churchill	58.8°N	94.3°W	J. Bedinger GCA Technology Division GCA Corporation Burlington Road Bedford, Massachusetts
France, Ile du Levant	43°N	6°E	Prof. J.E. Blamont Centre National de la Recherche Scientifique Service D'Aeronomie Observatoire de Meudon Paris France
India, TERLES	8.5°N	77°E	Dr. P.D. Bhavsar Physical Research Laboratory Navrangpura Ahmedabad 9, India
Italy, Sardinia	39.6°N	9.5°E	Prof. L. Broglio Universita Degli Studi Di Roma Centro Richerche Aerospaziali Via Salaria N.851 Rome, Italy

TABLE I (continued)

Site	Latitude	Longitude	Contact
Pakistan, Sonmiani	26°N	67°E	Dr. M. Rahmatullah, Director Space Science and Research Pakistan Atomic Energy Commission (Suparco-Wing) PAEC Secretariate, PECHES Karachi, Pakistan
U.S., Eglin AFB, Florida	30.4°N	86.7°W	N.W. Rosenberg, Chem. Phy. Br. Space pkg. Lab., AFCRL Bedford, Massachusetts
U.S., Kauai, Hawaii	21.9°N	159.6°W	L.B. Smith Sandia Corporation Albuquerque, New Mexico
U.S., AFB, New Mexico	32.5°N	106.5°W	J. Bedinger
U.S., Wallops Island, Va.	37.8°N	75.5°W	J. Bedinger GCA Technology Division GCA Corporation Burlington Road Bedford, Massachusetts

TABLE II

PLACE AND DATE OR ROCKET LAUNCHES

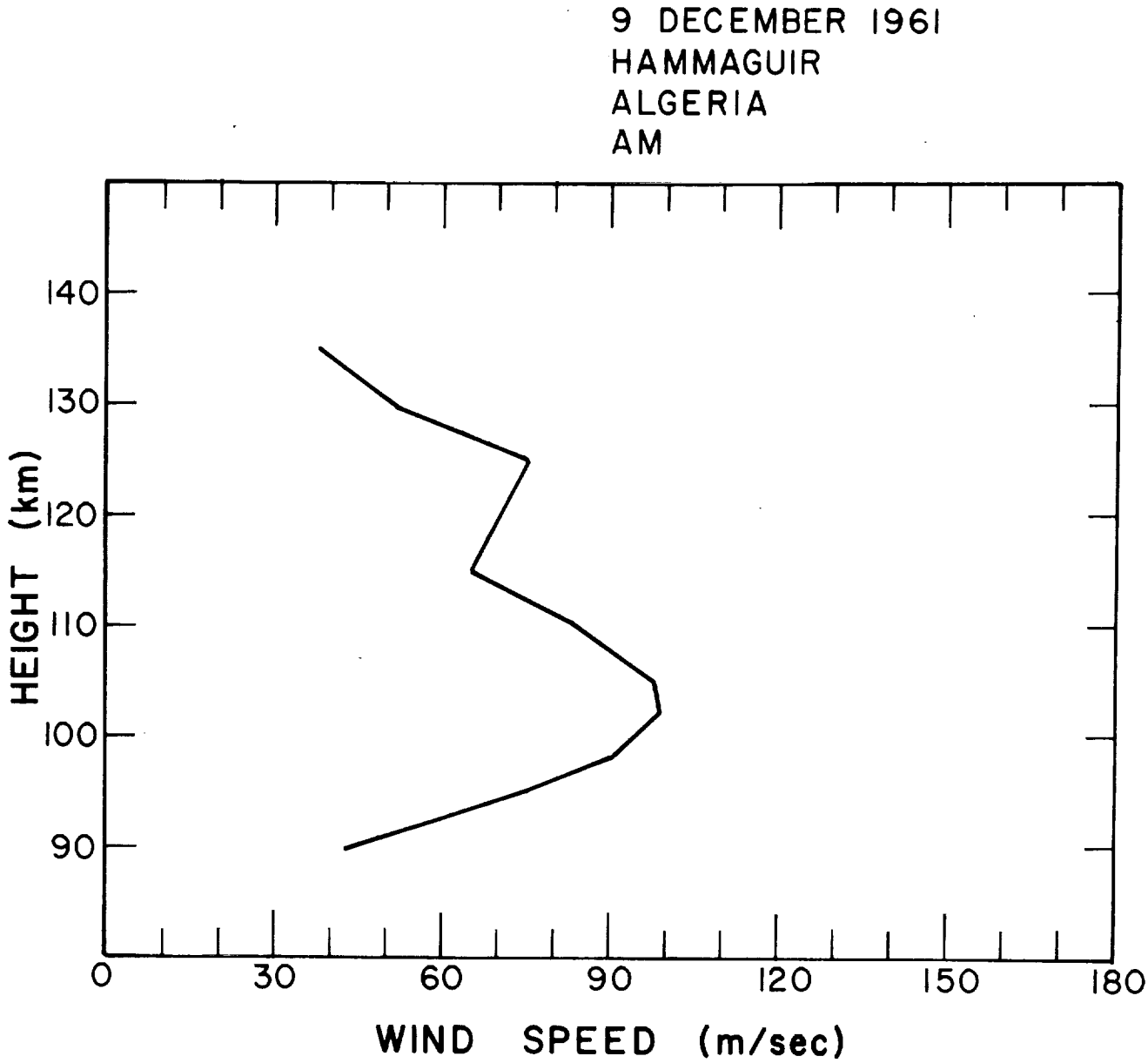
Algeria, Hammaguir (31°N, 3°W)	Page No.
9 Dec 1961	5,6
5 June 1962	7,8
5 June 1962	9,10
28 Nov 1962	11,12
30 Nov 1962	13
1 Dec 1962	14,15
21 May 1963	16,17
Algeria, Reggan (26.7°N, 0°)	
9 Dec 1961	19,20
29 May 1962	21,22
5 June 1962	23,24
5 June 1962	25,26
21 May 1963	27,28
Argentina, Chamical (30.5°S, 66°W)	
27 Nov 1962	29,30
30 Nov 1962	31,32
Australia, Woomera (31°S, 137°E)	
28 Nov 1962	33,34
Canada, Ft. Churchill (58.8°N, 94.3°W)	
21 May 1963	35,36
22 May 1963	37,38
22 May 1963	39,40
1 Nov 1964	41,42
27 Feb 1965	43,44
France, Ile du Levant (43°N, 6°E)	
29 May 1962	45,46
21 May 1963	47,48

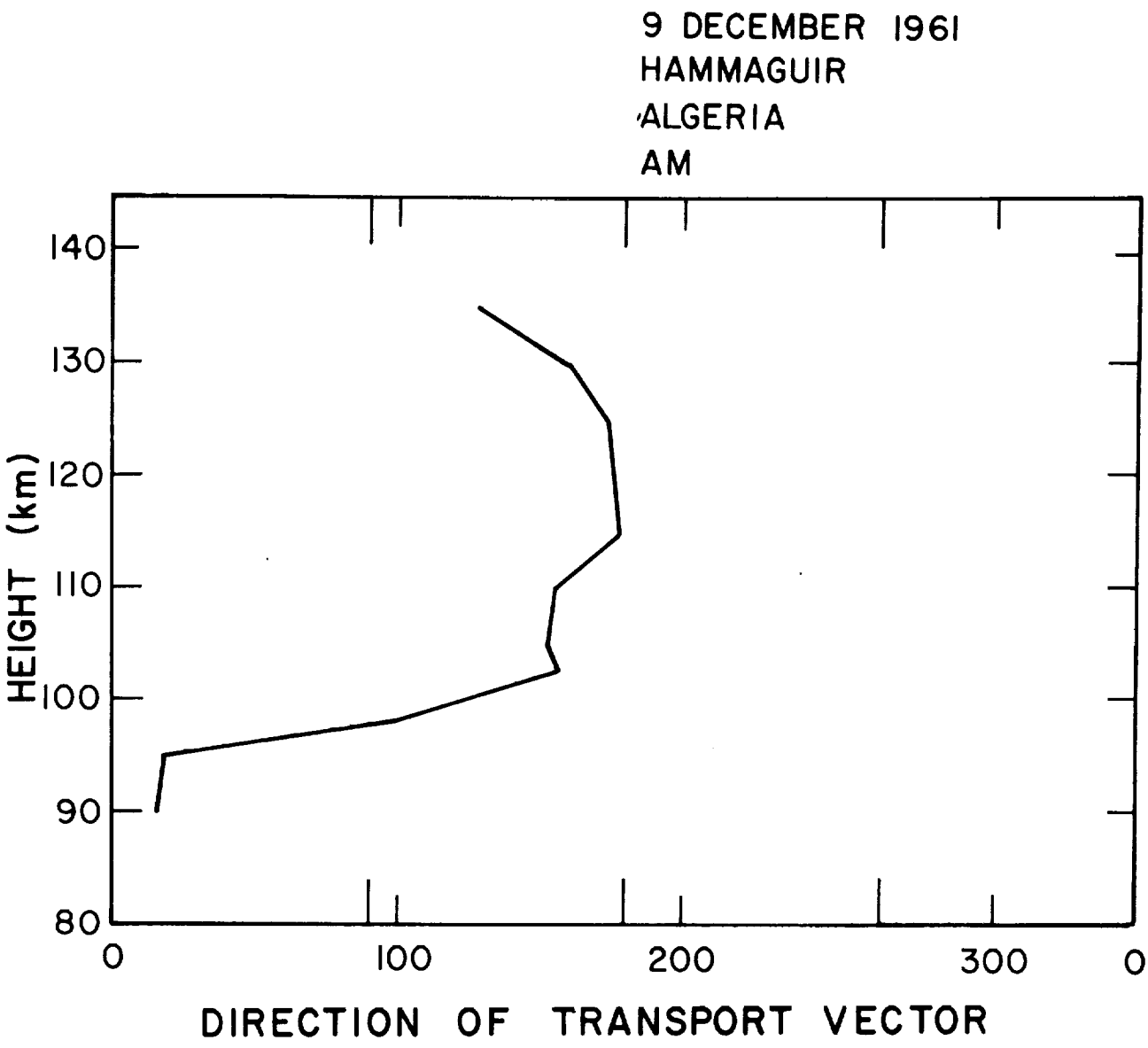
India, TERLES (8.5°N, 77°E)	Page No.
21 Nov 1963	49,50
8 Jan 1964	51,52
12 Jan 1964	53,54
Italy, Sardinia 39.6°N, 9.5°E	
19 Apr 1961	55,56
20 Apr 1961	57,58
7 Sept 1961	59,60
8 Sept 1961	61,62
20 May 1963	63,64
21 May 1963	65,66
21 May 1963	67,68
Pakistan, Sonmiani (26°N, 67°E)	
30 Nov 1964	69,70
1 Dec 1964	71,72
U.S., Eglin (30.4°N, 86.7°W)	
29 Sept 1959	73,74
30 Sept 1959	73,74
1 Oct 1959	73,74
3 Oct 1959	75
1 Aug 1960	73,74
9 Aug 1960	73,74
10 Aug 1960	73,74
16 Aug 1960	76
17 Aug 1960	73,74
18 Aug 1960	73,74
12 Oct 1960	77
3 Dec 1962	78,79
3 Dec 1962	80,81
3 Dec 1962	82,83
3 Dec 1962	84,85
17 May 1963	86,87
17 May 1963	88,89
18 May 1963	90,91
18 May 1963	92,93
21 May 1963	94,95

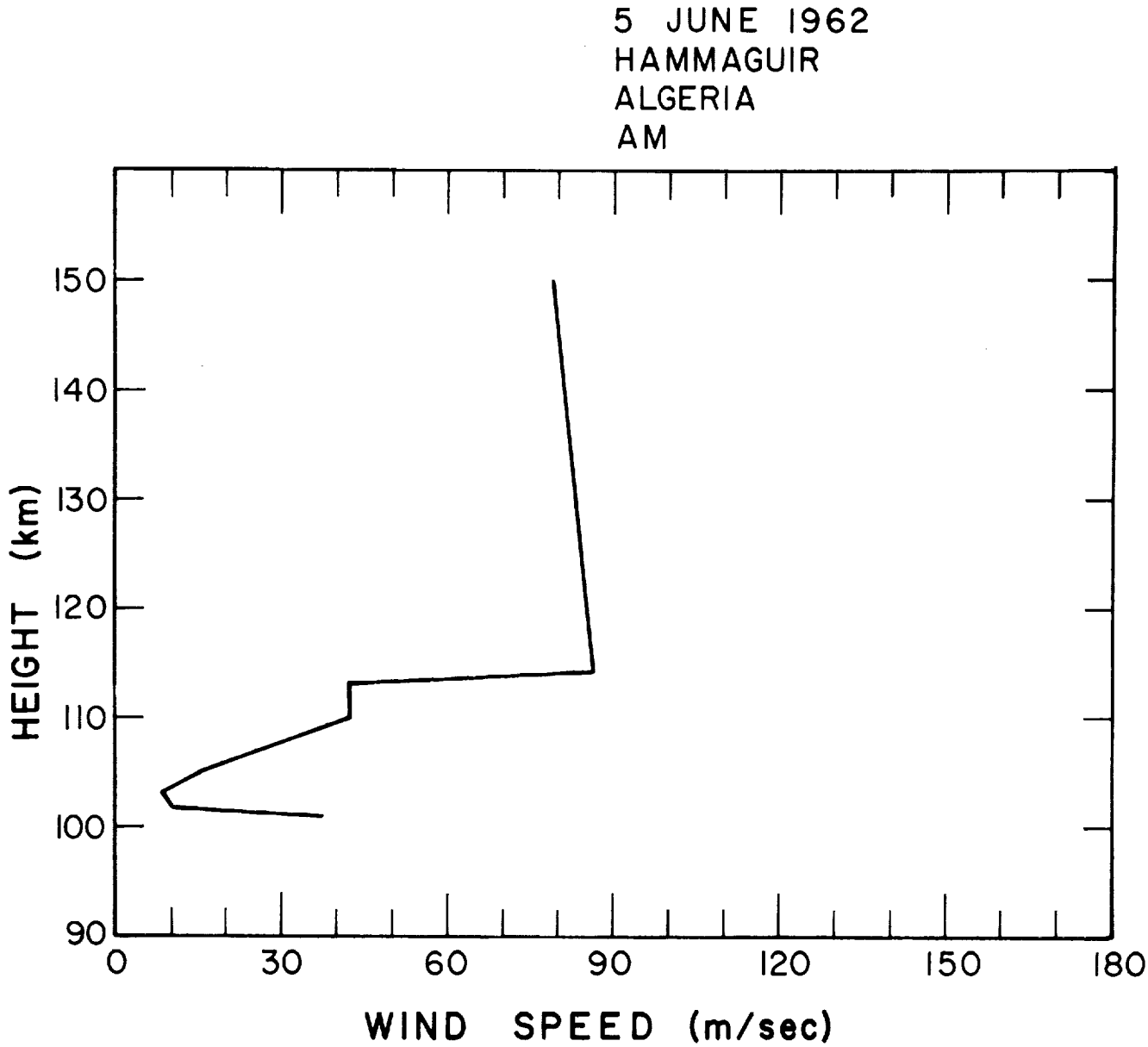
TABLE II (continued)

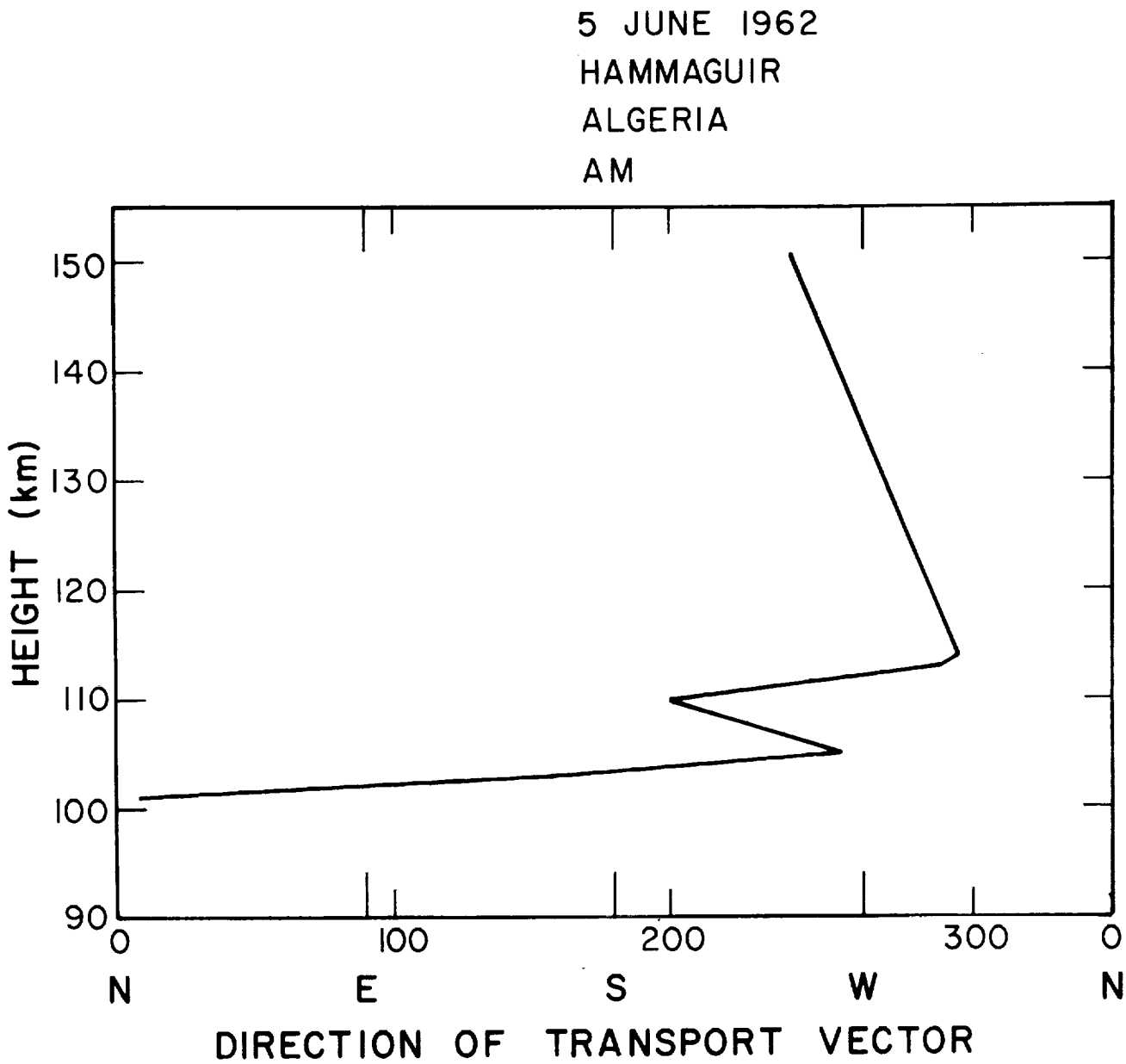
U.S., Hawaii (21.9°N, 159.6°W)	Page No.
11 Oct 1962	96,97
21 Oct 1962	98,99
29 Oct 1962	100,101
U.S., Holloman, AFB New Mexico (32.5°N, 106.5°W)	
11 Apr 1956	102,103
26 Nov 1957	104,105
	106,107
U.S., Wallops Island (37.8°N, 75.5°W)	
17 Aug 1959	109,110
18 Nov 1959	111,112
24 May 1960	113,114
9 Dec 1960	115,116
19 Apr 1961	117,118
20 Apr 1961	119,120
21 Apr 1961	121,122
16 Sept 1961	123,124
17 Sept 1961	125,126
1 Mar 1962	127,128
2 Mar 1962	129,130
23 Mar 1962	131,132
27 Mar 1962	133,134
17 Apr 1962	135,136
6 June 1962	137,138
7 Nov 1962	139,140
30 Nov 1962	141,142

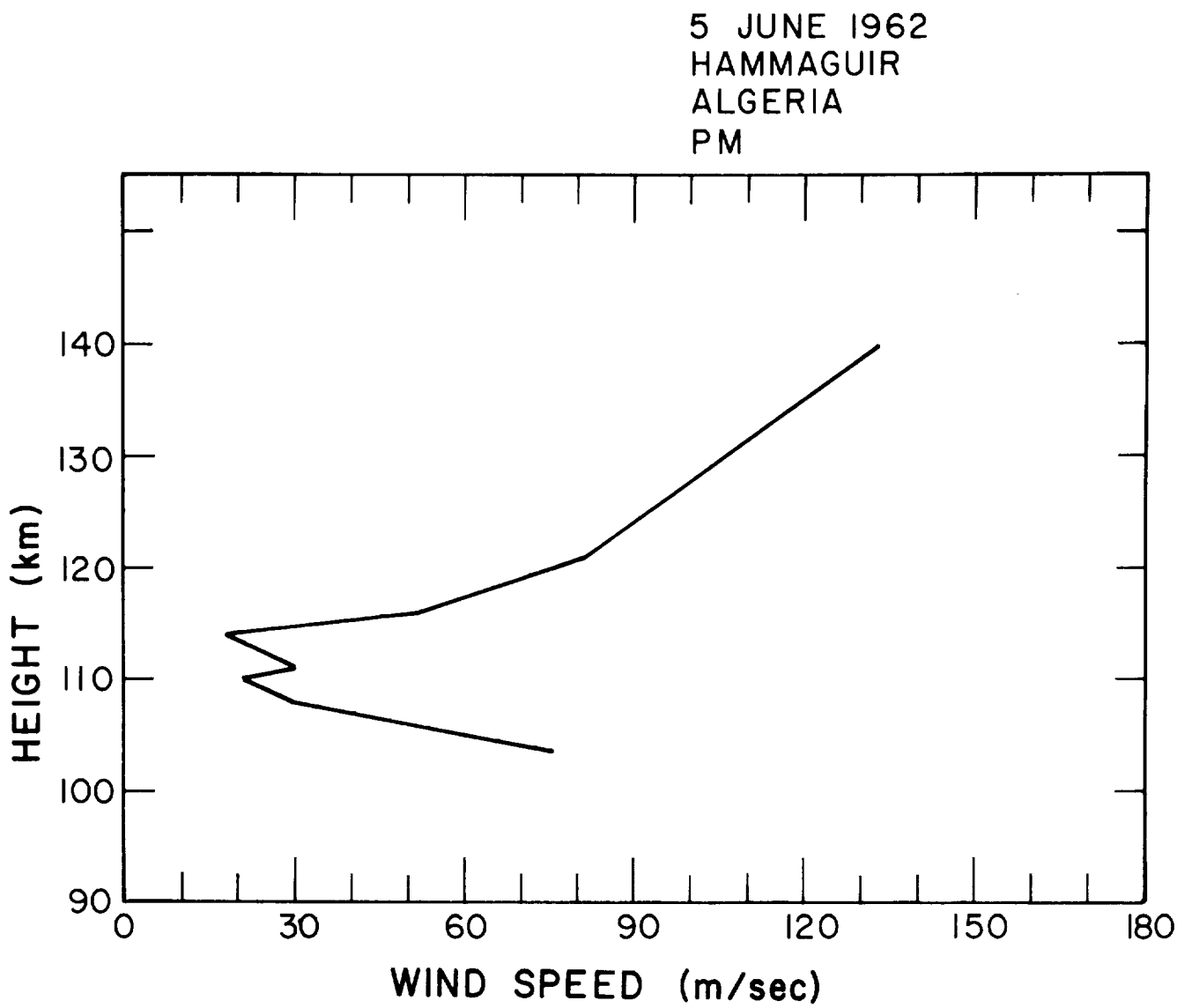
U.S., Wallops Island (37.8°N, 75.5°W) (continued)	Page No.
5 Dec 1962	143,144
20 Feb 1963	145,146
21 Feb 1963	147,148
23 May 1963	149,150
24 May 1963	151,152
15 Jan 1964	153,154
16 Jan 1964	155,156
16 Jan 1964	157,158
14 Jul 1964	159,160
14 Jul 1964	161
15 Jul 1964	162,163
15 Jul 1964	164
7 Oct 1964	165,166
8 Oct 1964	167,168
10 Nov 1964	169,170
11 Nov 1964	171,172
SHIP Near Wallops Island	
Position No. 1 (36.2°N, 74.7°W)	
10 Nov 1964	173,174
Position No. 2 (34.4°N, 74.7°W)	
11 Nov 1964	175,176
Position No. 3 (34.0°N, 76.3°W)	
12 Nov 1964	177,178

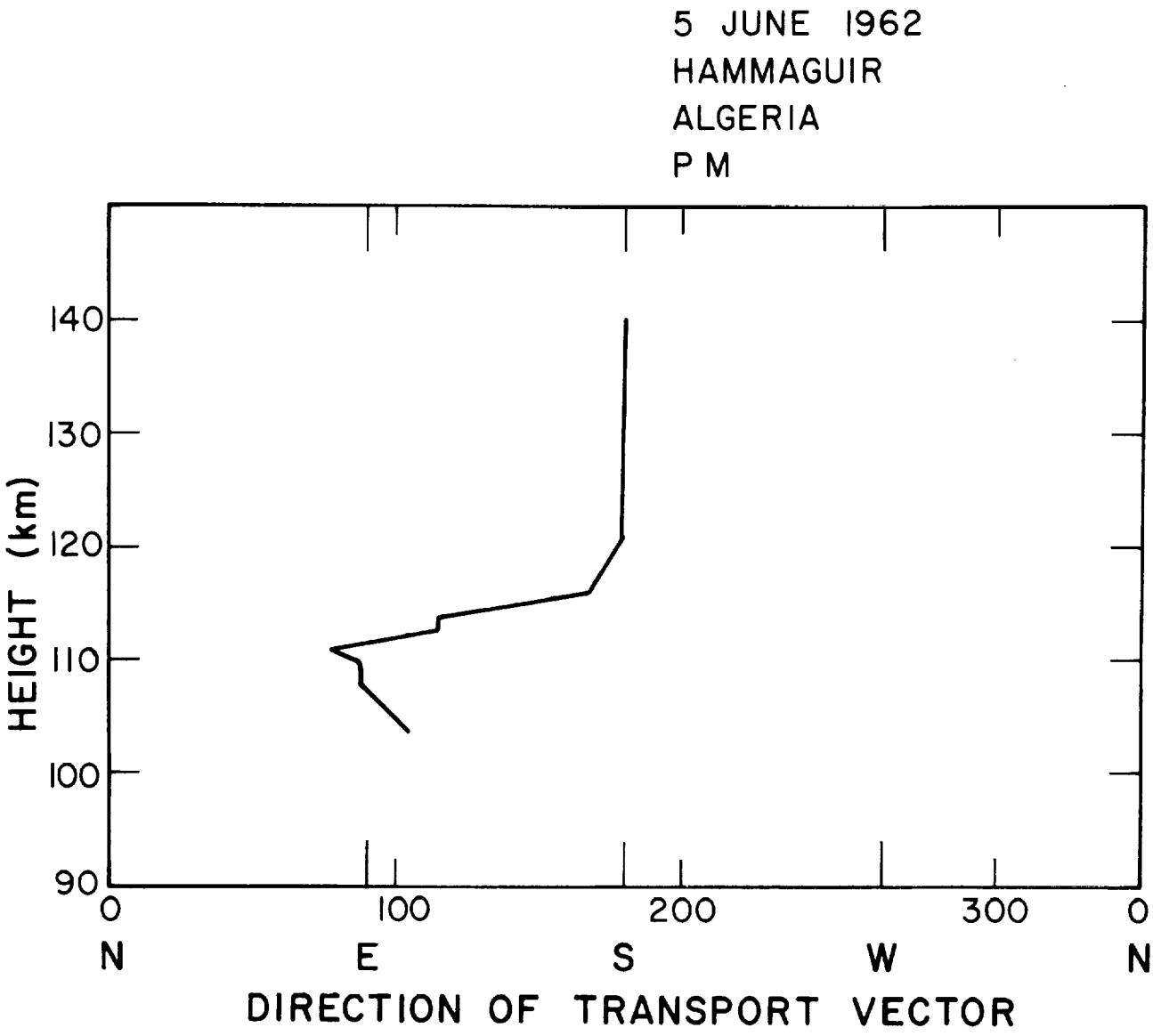

9 DECEMBER 1961
HAMMAGUIR
ALGERIA
AM
HEIGHT (km)
140
130
120
110
100
90
0
30
60
90
120
150
180
WIND SPEED (m/sec)


9 DECEMBER 1961
HAMMAGUIR
ALGERIA
AM
HEIGHT (km)
140
130
120
110
100
90
80
0
100
200
300
0
DIRECTION OF TRANSPORT VECTOR


5 JUNE 1962
HAMMAGUIR
ALGERIA
AM
HEIGHT (km)
150
140
130
120
110
100
90
0
30
60
90
120
150
180
WIND SPEED (m/sec)


5 JUNE 1962
HAMMAGUIR
ALGERIA
AM
HEIGHT (km)
150
140
130
120
110
100
90
0
100
200
300
0
N
E
S
W
N
DIRECTION OF TRANSPORT VECTOR


5 JUNE 1962
HAMMAGUIR
ALGERIA
PM
HEIGHT (km)
140
130
120
110
100
90
0
30
60
90
120
150
180
WIND SPEED (m/sec)


5 JUNE 1962
HAMMAGUIR
ALGERIA
P M
HEIGHT (km)
140
130
120
110
100
90
0
100
200
300
0
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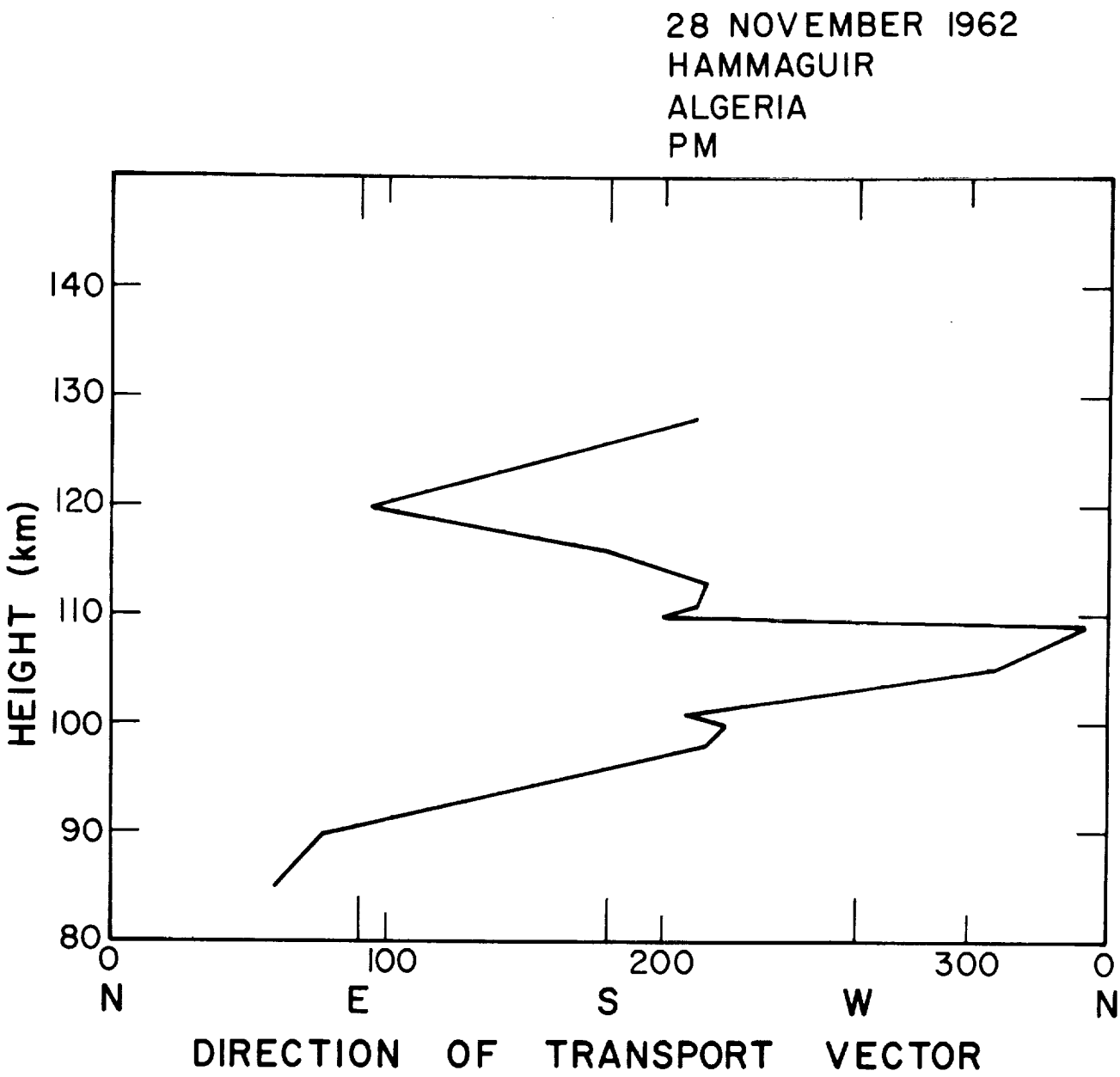
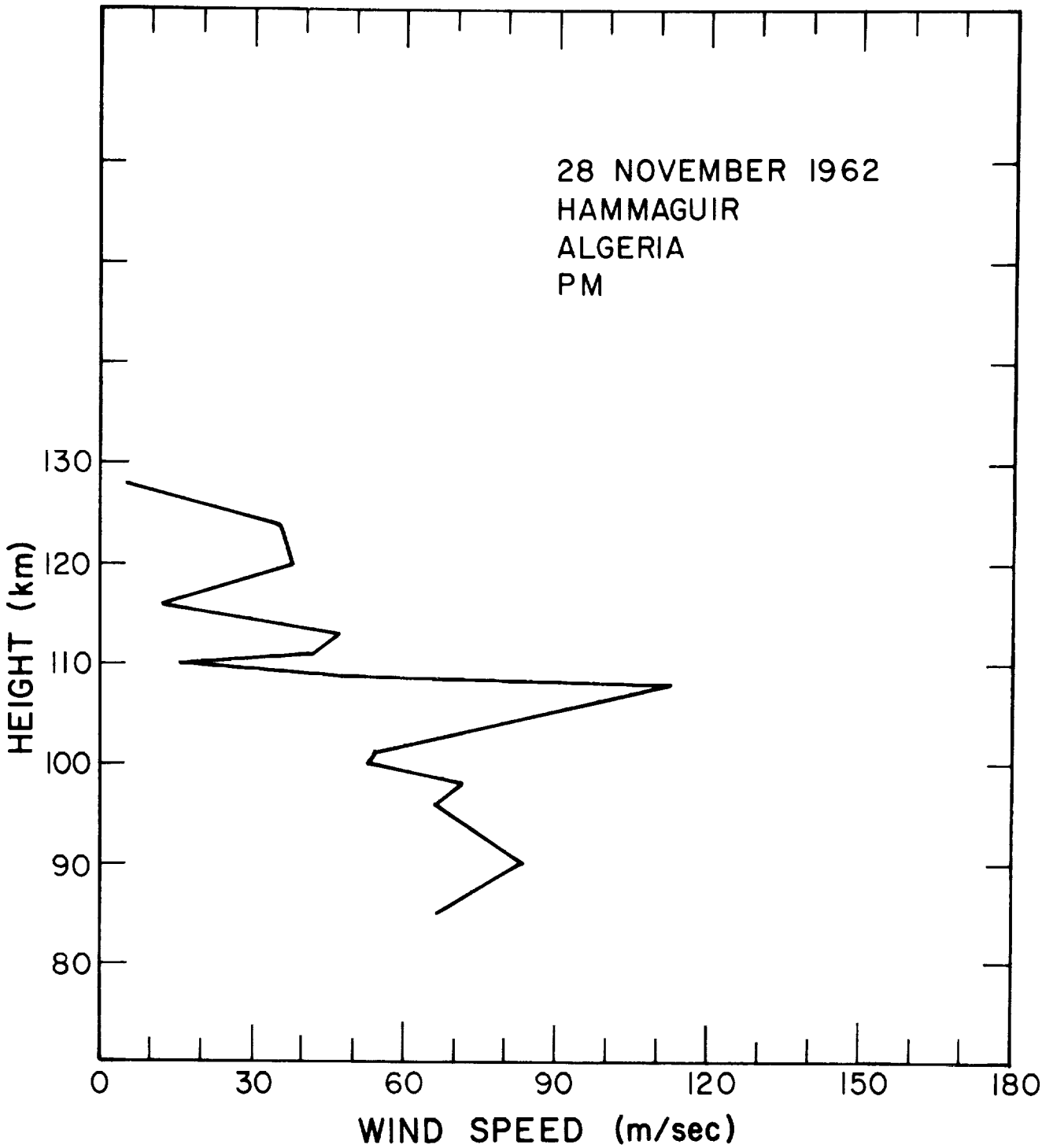
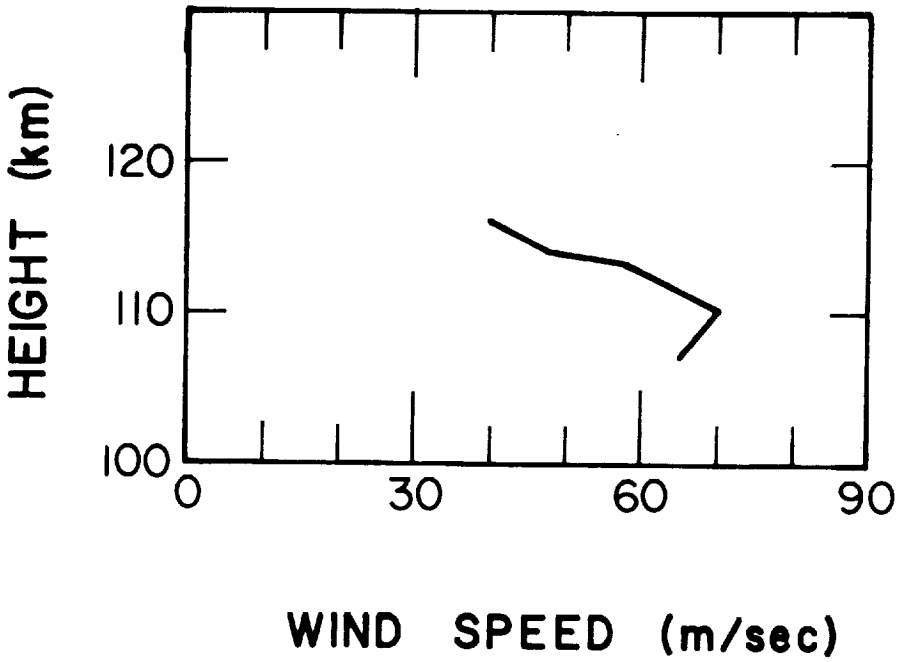
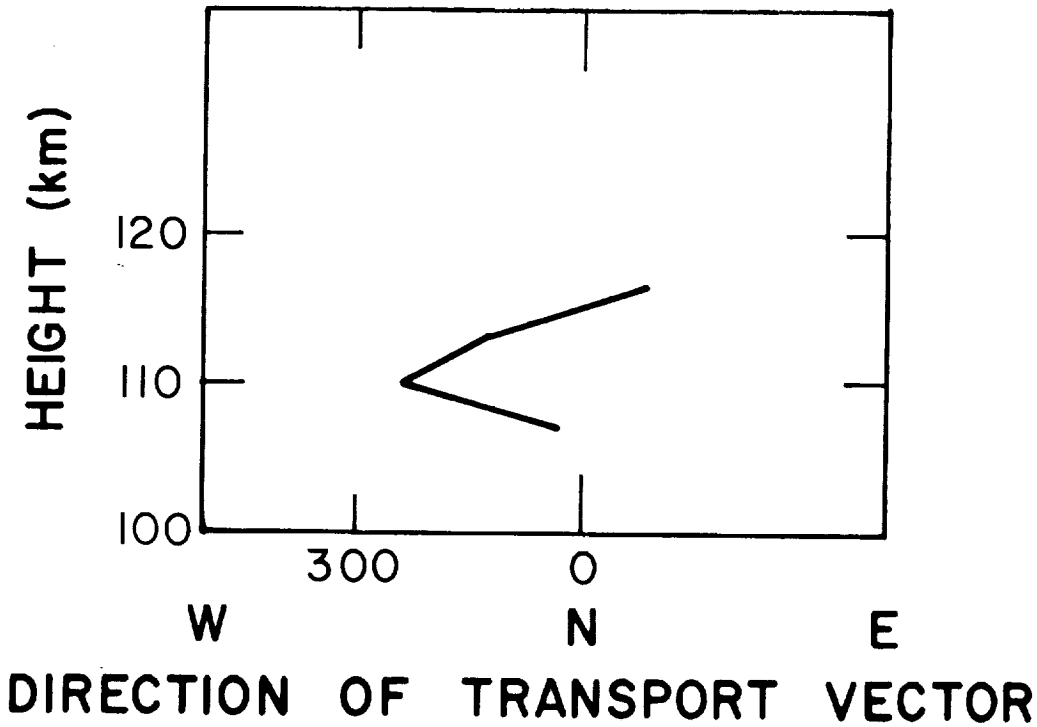
S
W
N
DIRECTION OF TRANSPORT VECTOR

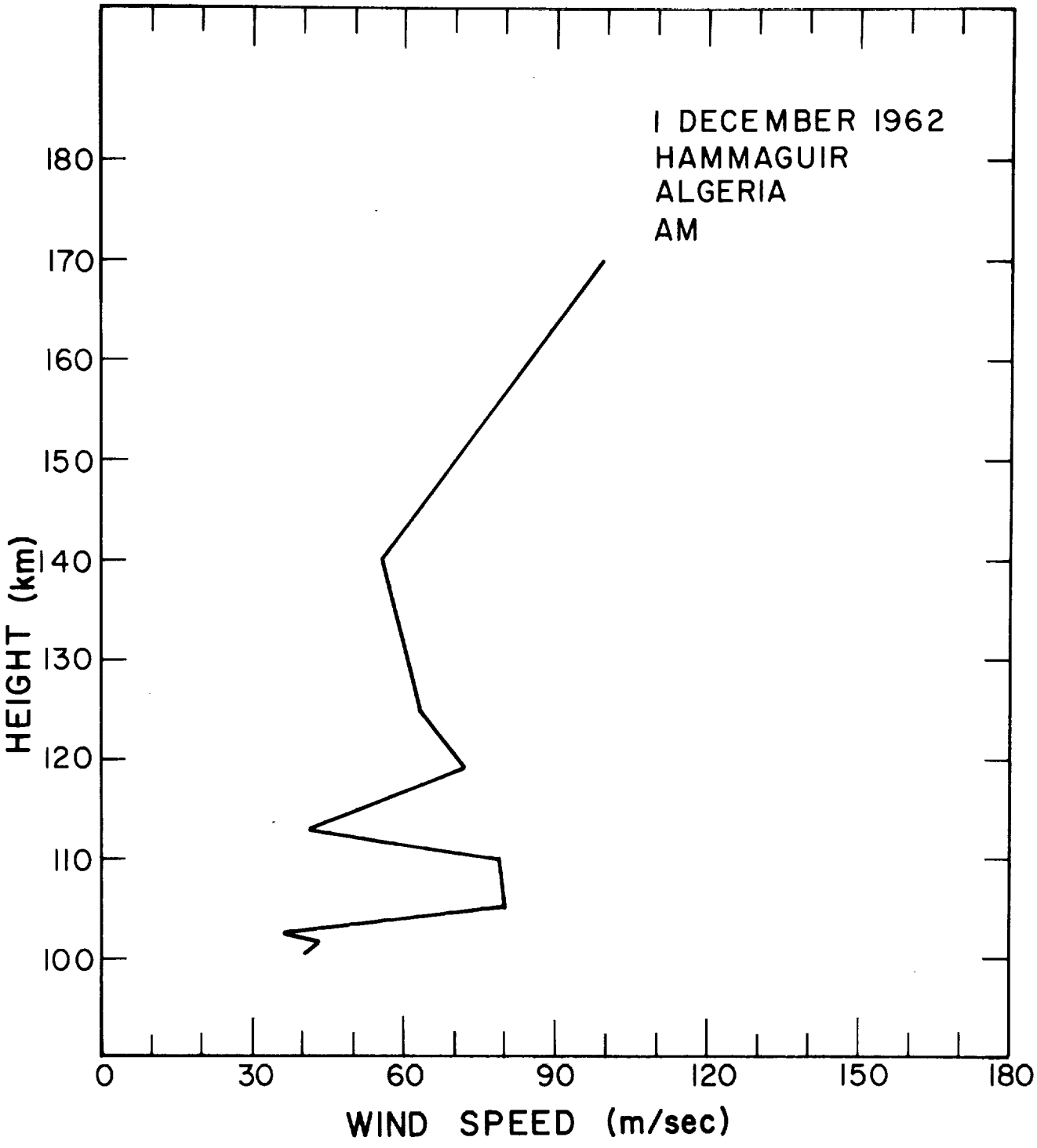

28 NOVEMBER 1962
HAMMAGUIR
ALGERIA
PM
HEIGHT (km)
140
130
120
110
100
90
80
0
100
200
300
0
N
E
S
W
N
DIRECTION OF TRANSPORT VECTOR

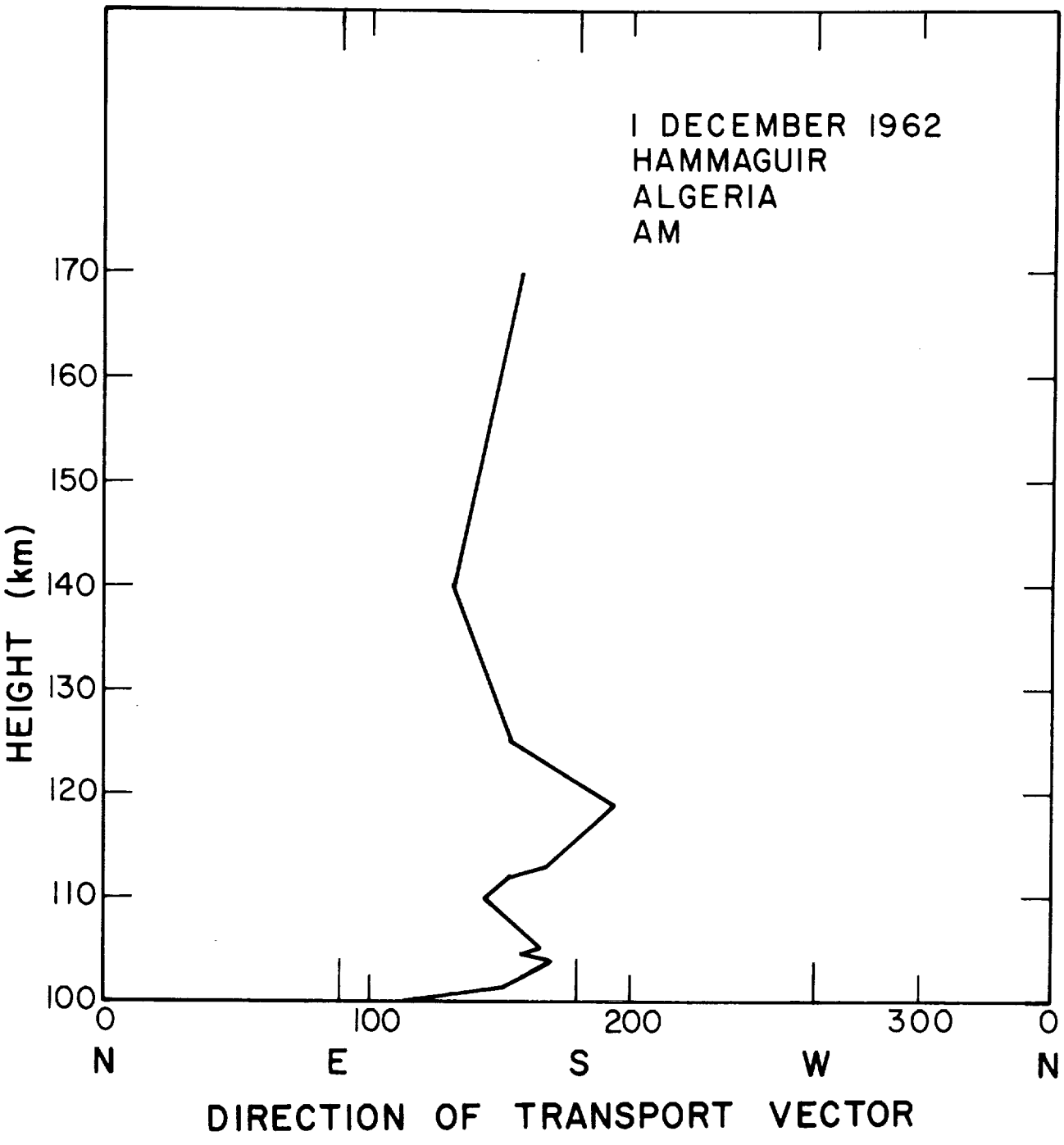

28 NOVEMBER 1962
HAMMAGUIR
ALGERIA
PM
HEIGHT (km)
130
120
110
100
90
80
0
30
60
90
120
150
180
WIND SPEED (m/sec)

30 NOVEMBER 1962
HAMMAGUIR
ALGERIA






1 DECEMBER 1962
HAMMAGUIR
ALGERIA
AM
HEIGHT (km)
180
170
160
150
140
130
120
110
100
0
30
60
90
120
150
180
WIND SPEED (m/sec)


1 DECEMBER 1962
HAMMAGUIR
ALGERIA
AM
HEIGHT (km)
170
160
150
140
130
120
110
100
0
100
200
300
0
N
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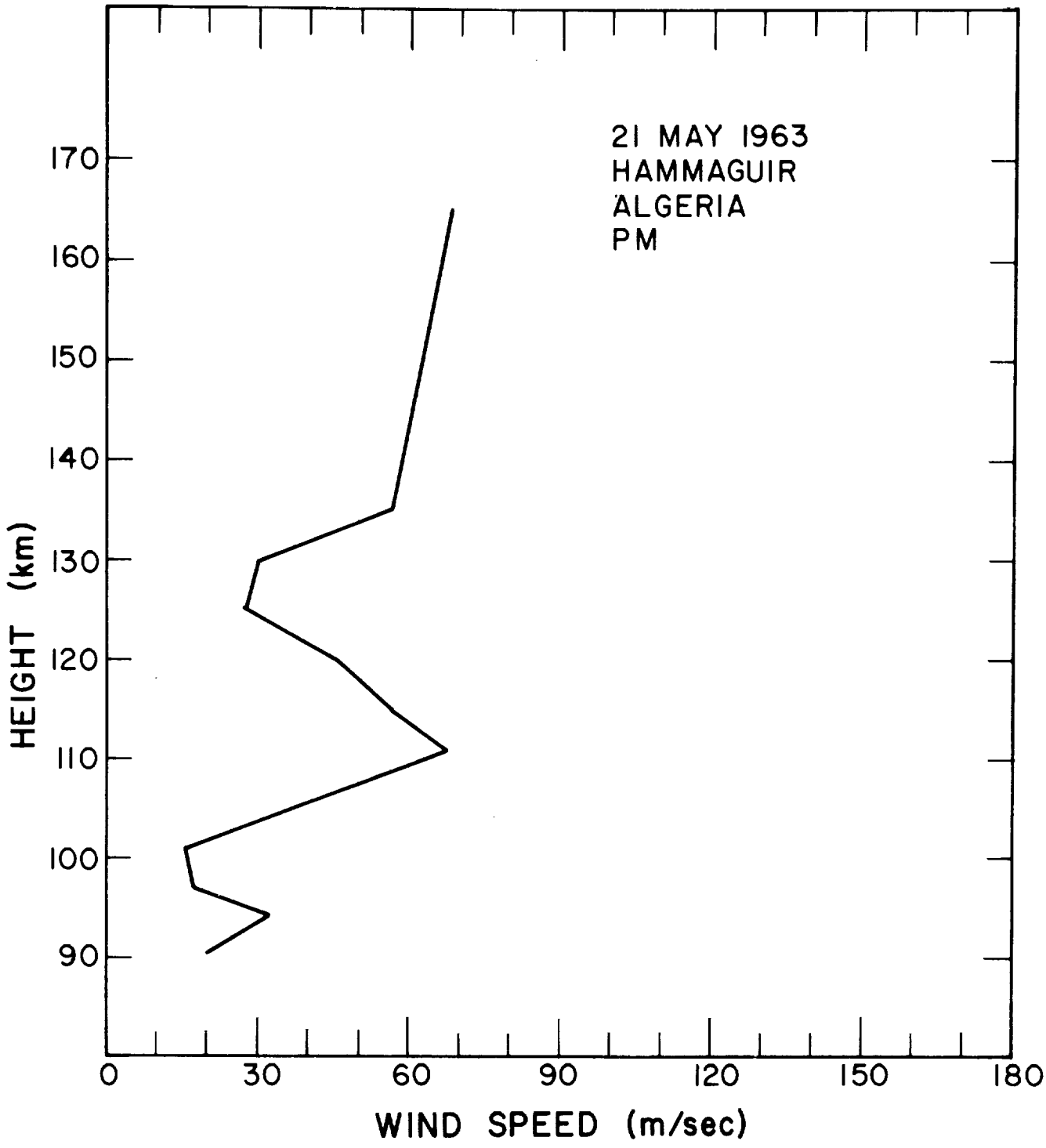
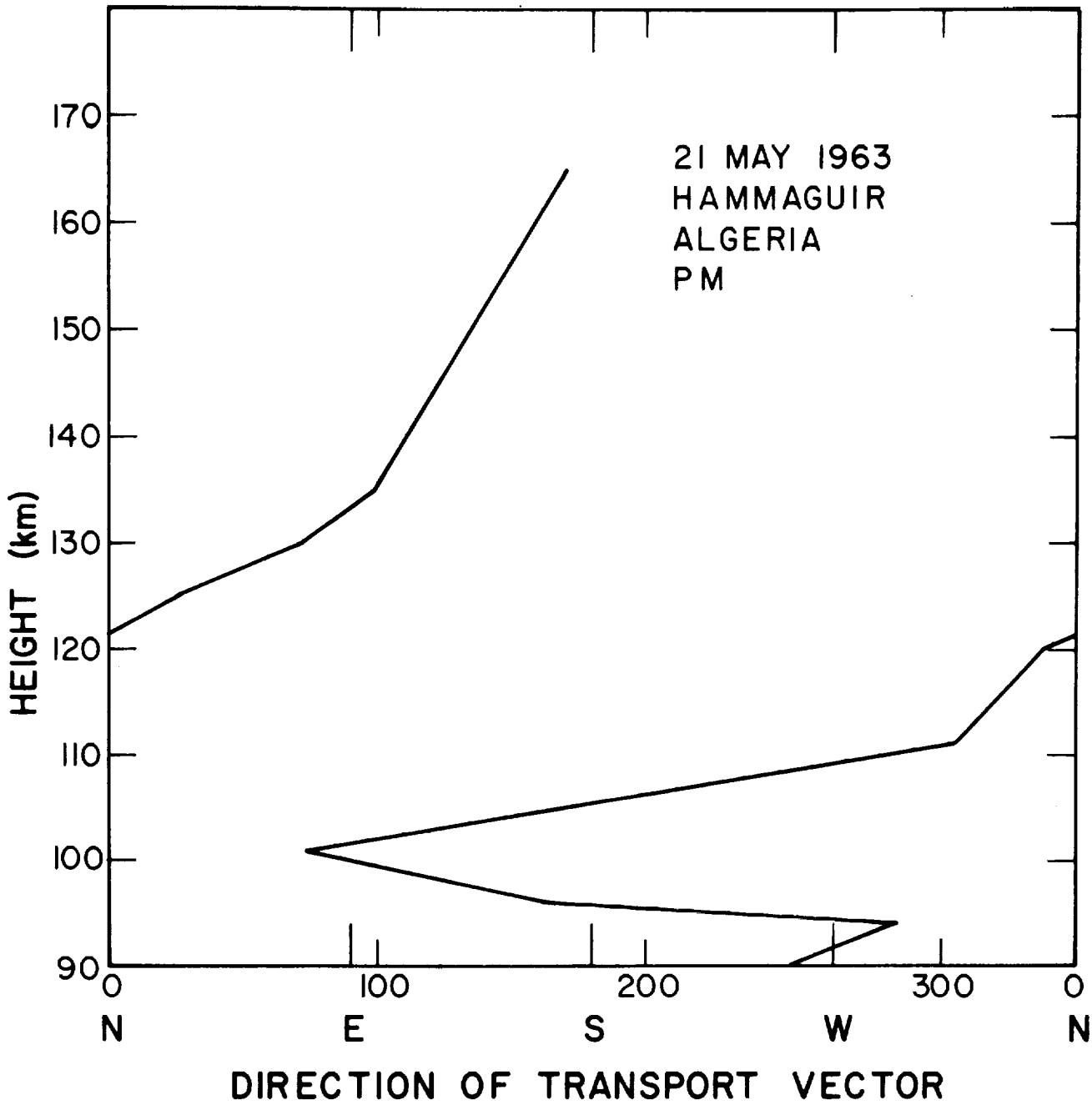
DIRECTION OF TRANSPORT VECTOR


21 MAY 1963
HAMMAGUIR
ALGERIA
PM
HEIGHT (km)
170
160
150
140
130
120
110
100
90
0
30
60
90
120
150
180
WIND SPEED (m/sec)


21 MAY 1963
HAMMAGUIR
ALGERIA
PM
HEIGHT (km)
170
160
150
140
130
120
110
100
90
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100
200
300
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N
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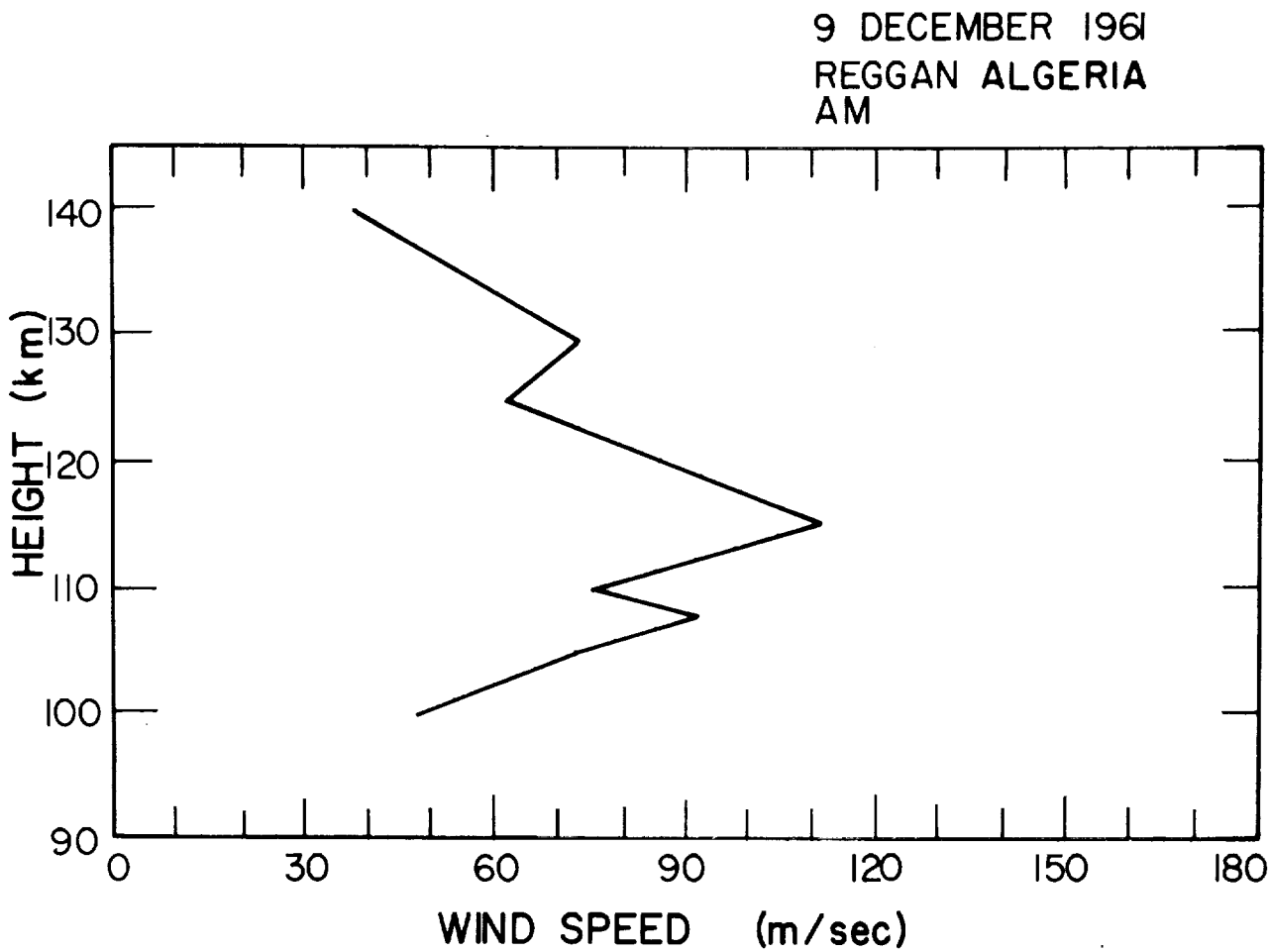
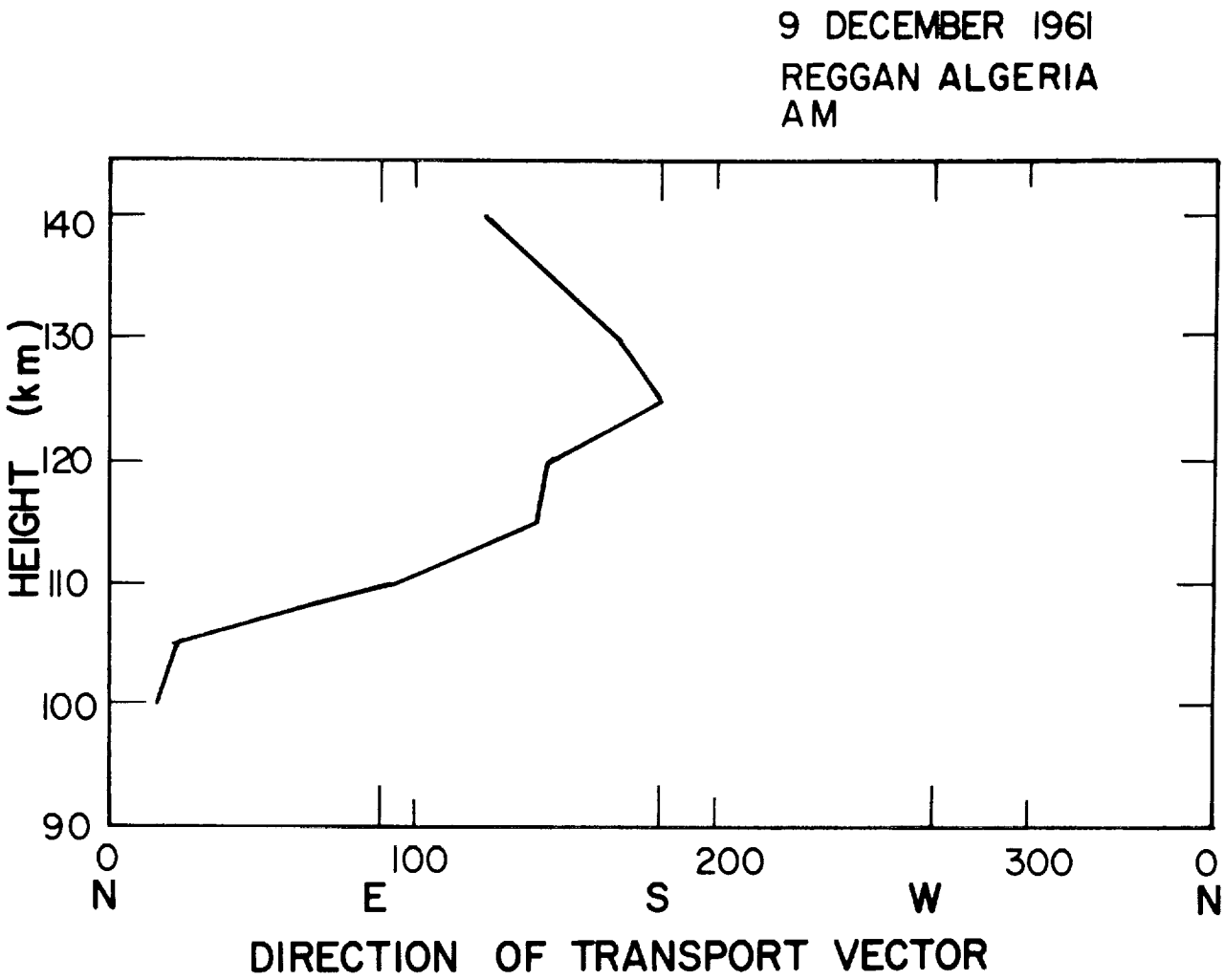
N
DIRECTION OF TRANSPORT VECTOR


9 DECEMBER 1961
REGGAN ALGERIA
AM
HEIGHT (km)
140
130
120
110
100
90
0
30
60
90
120
150
180
WIND SPEED (m/sec)


9 DECEMBER 1961
REGGAN ALGERIA
AM
HEIGHT (km)
140
130
120
110
100
90
0
100
200
300
0
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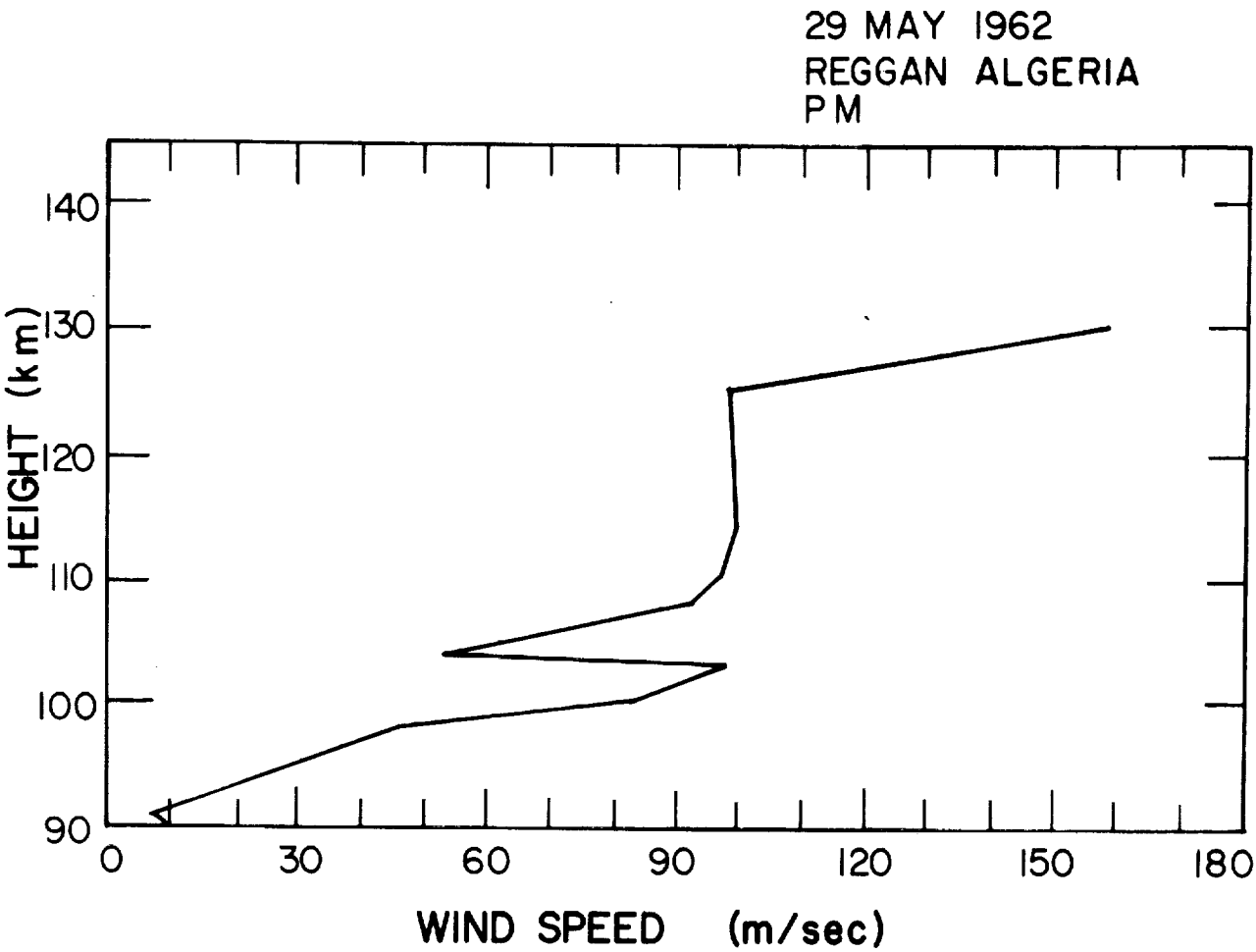
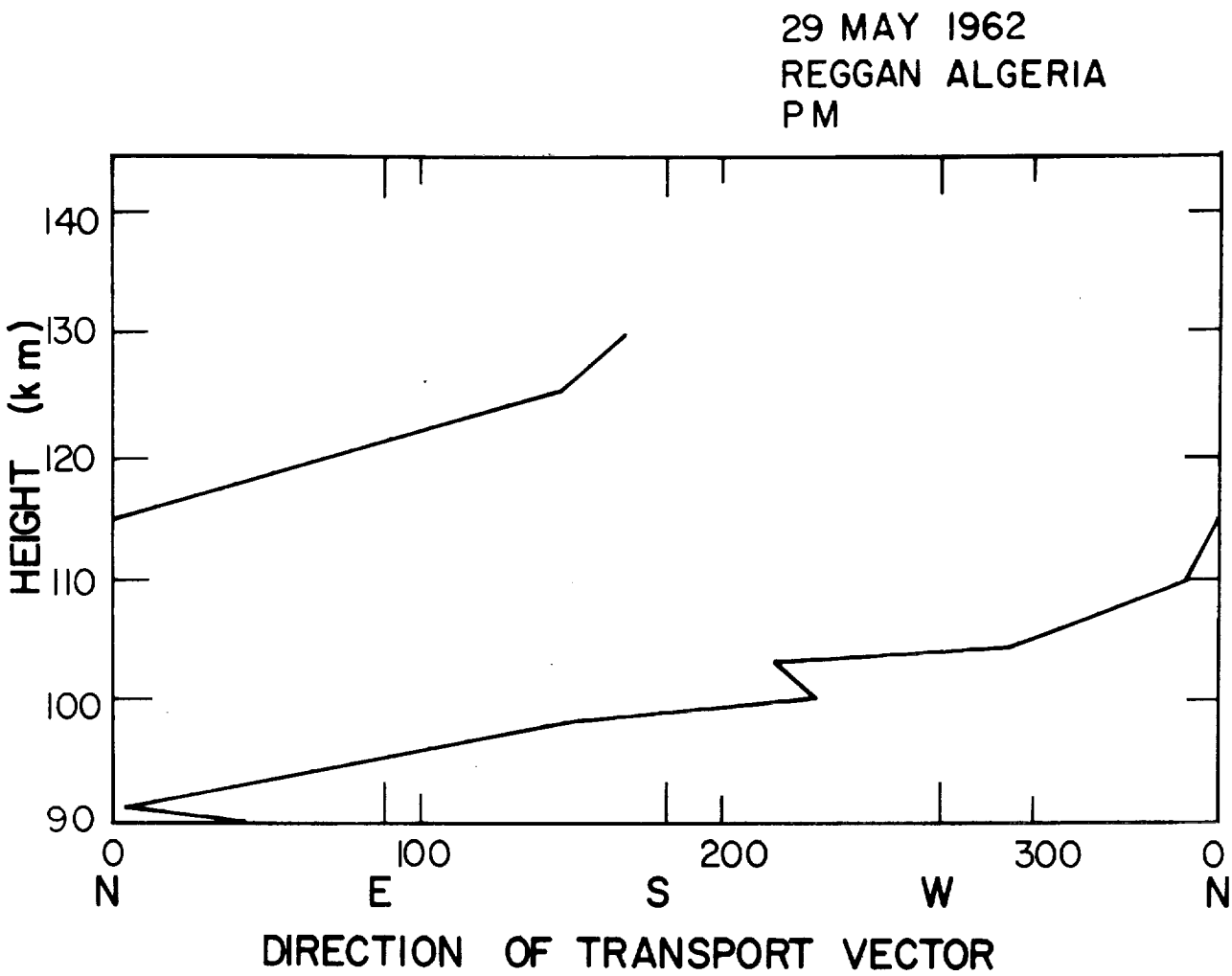
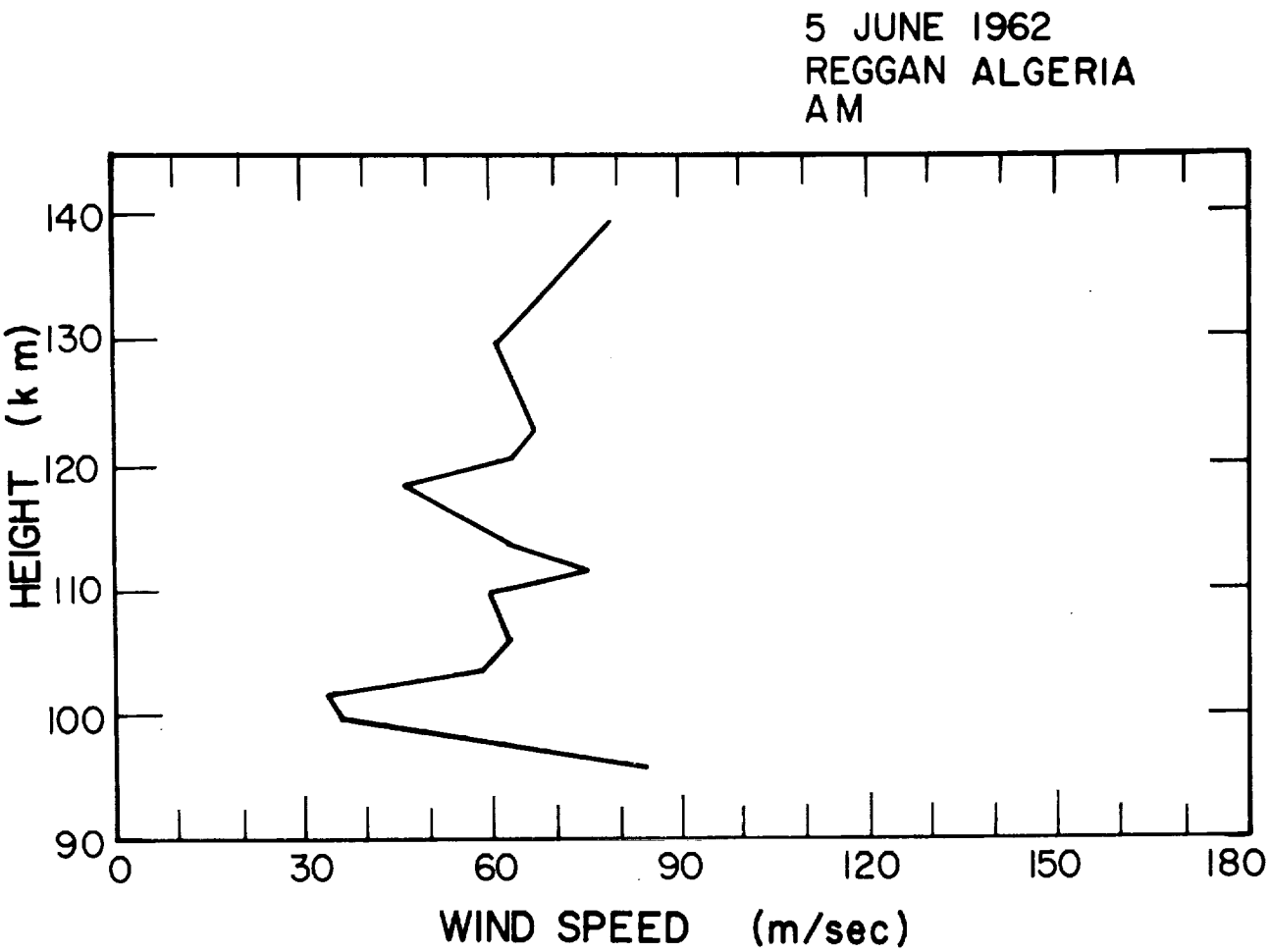
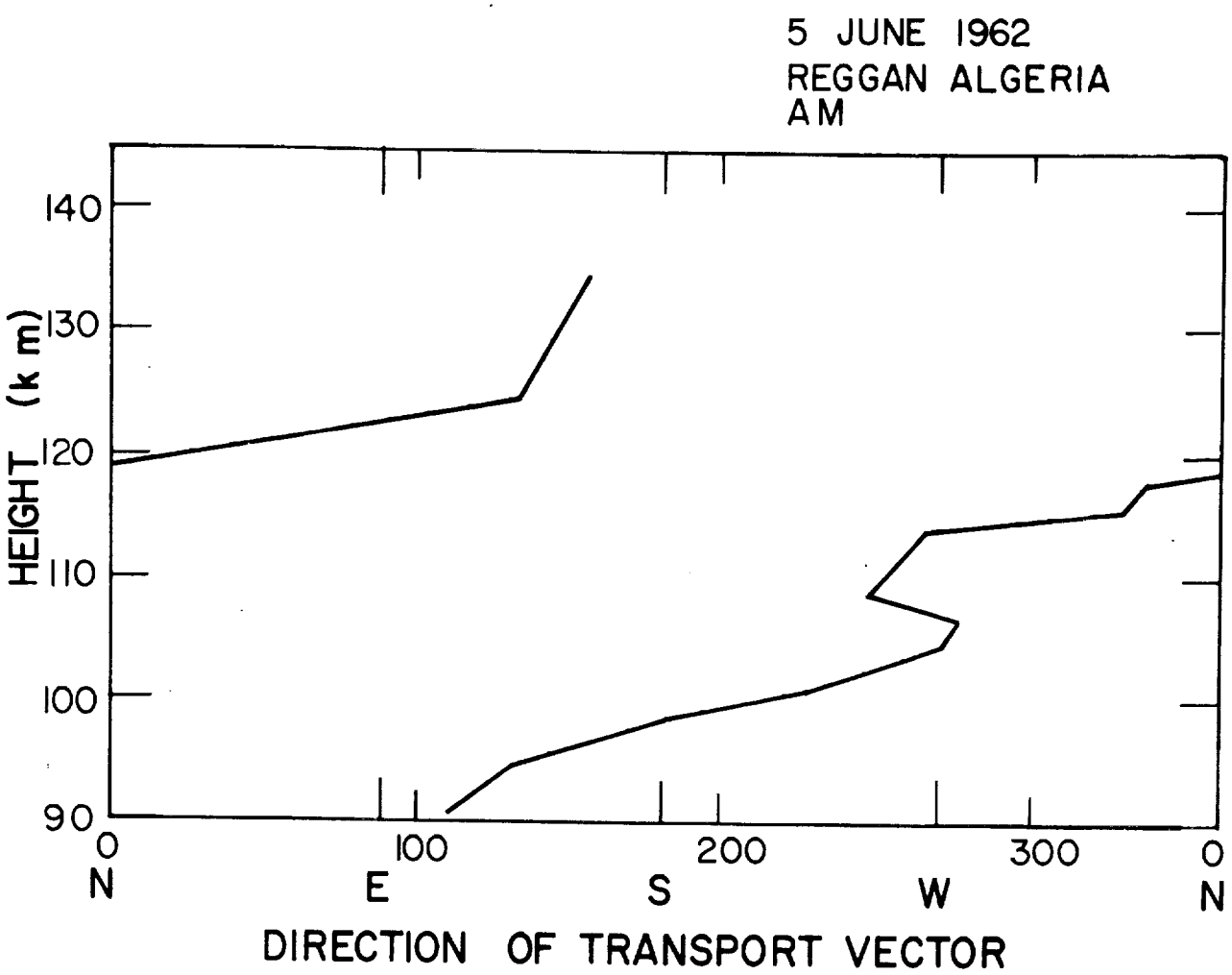
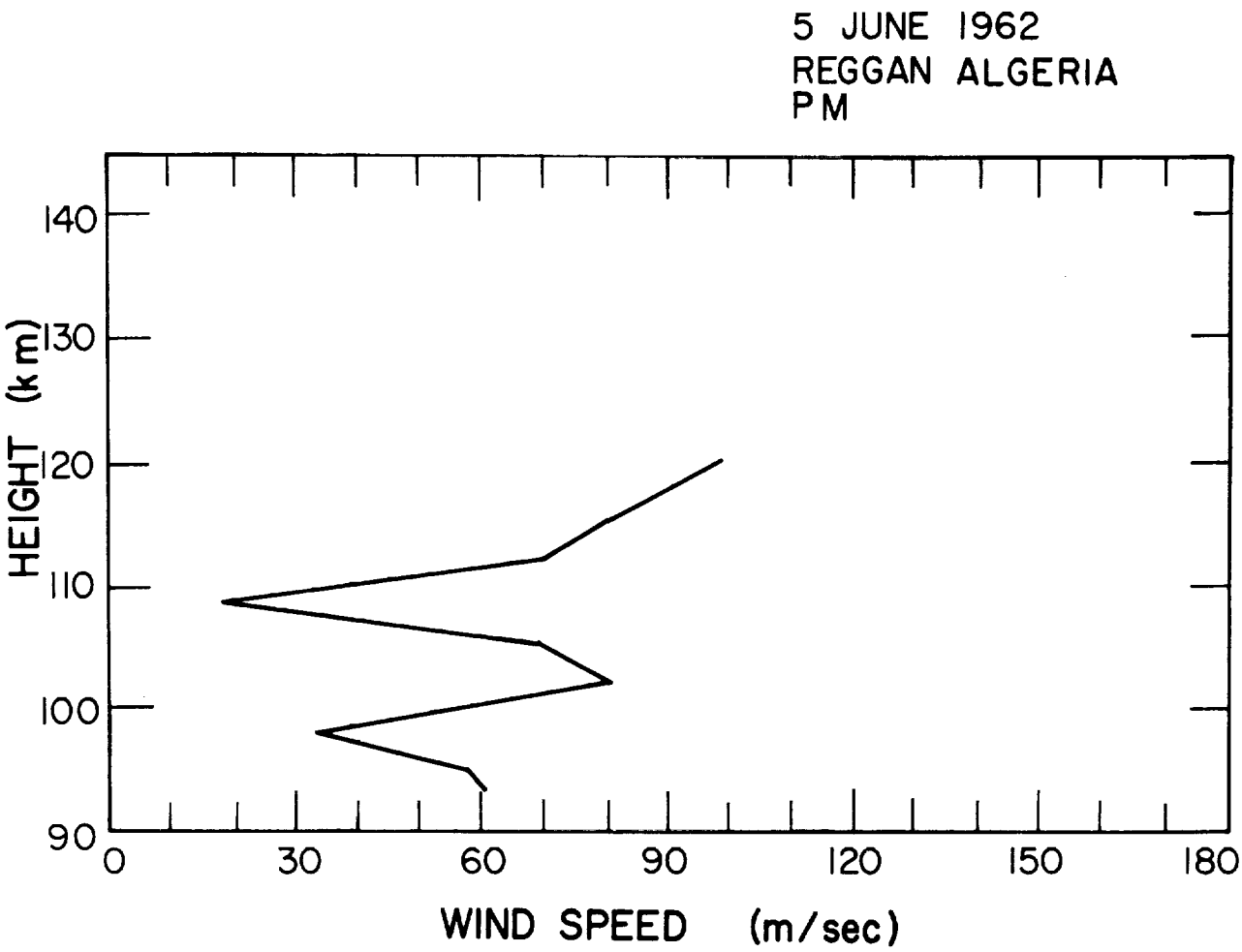
N
DIRECTION OF TRANSPORT VECTOR

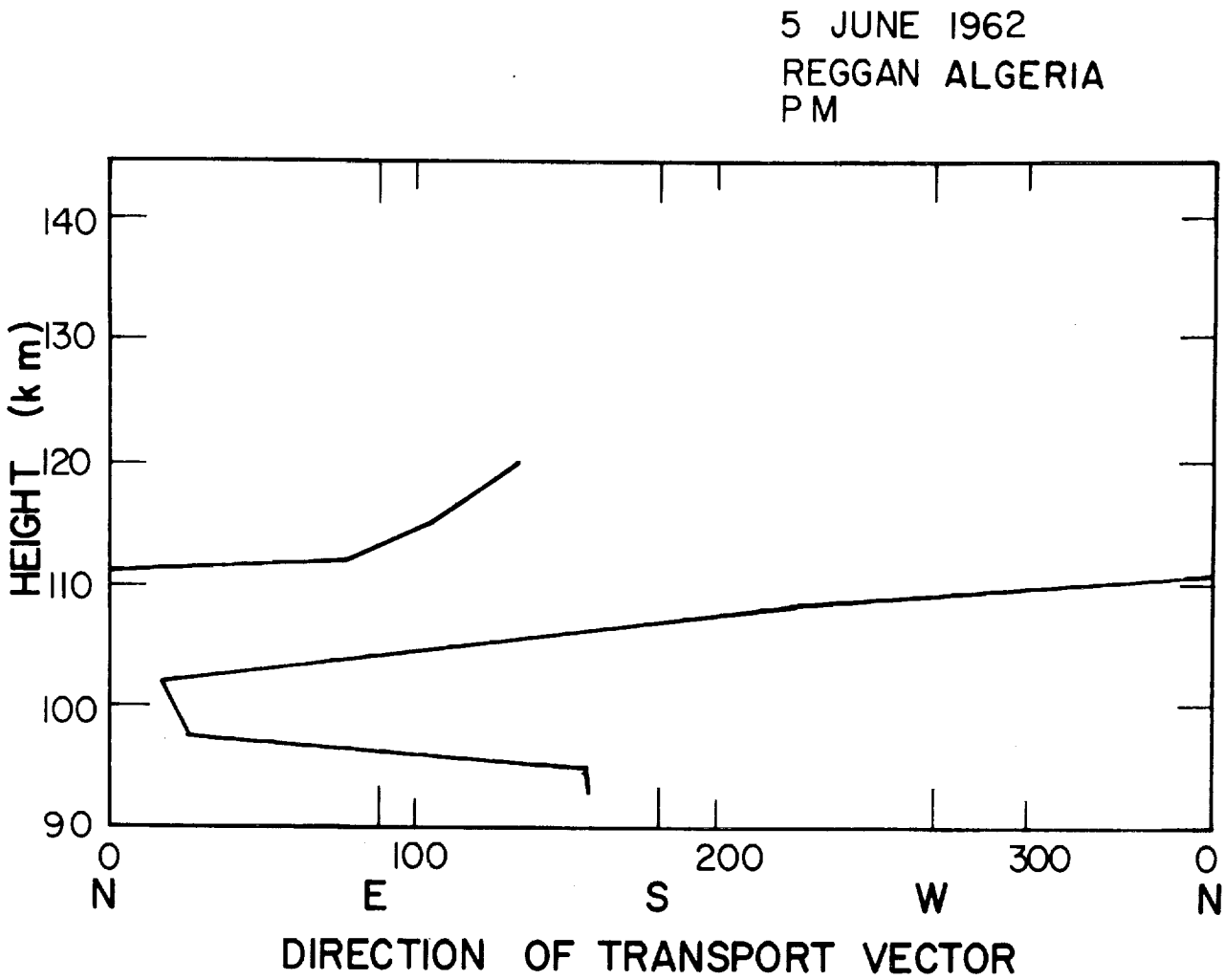

29 MAY 1962
REGGAN ALGERIA
PM
HEIGHT (km)
140
130
120
110
100
90
0
30
60
90
120
150
180
WIND SPEED (m/sec)

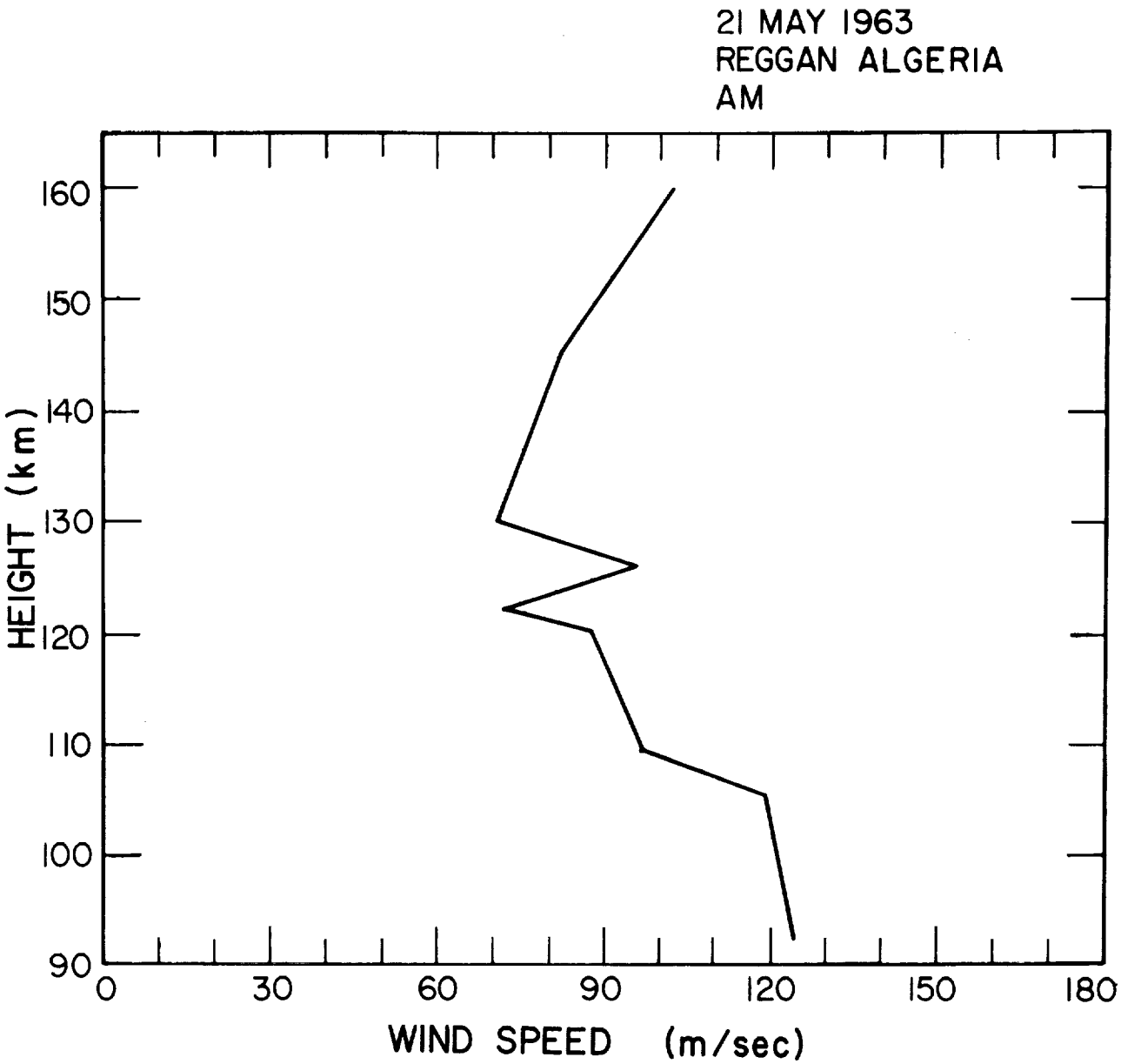

29 MAY 1962
REGGAN ALGERIA
PM
HEIGHT (km)
140
130
120
110
100
90
0
100
200
300
0
N
E
S
W
N
DIRECTION OF TRANSPORT VECTOR

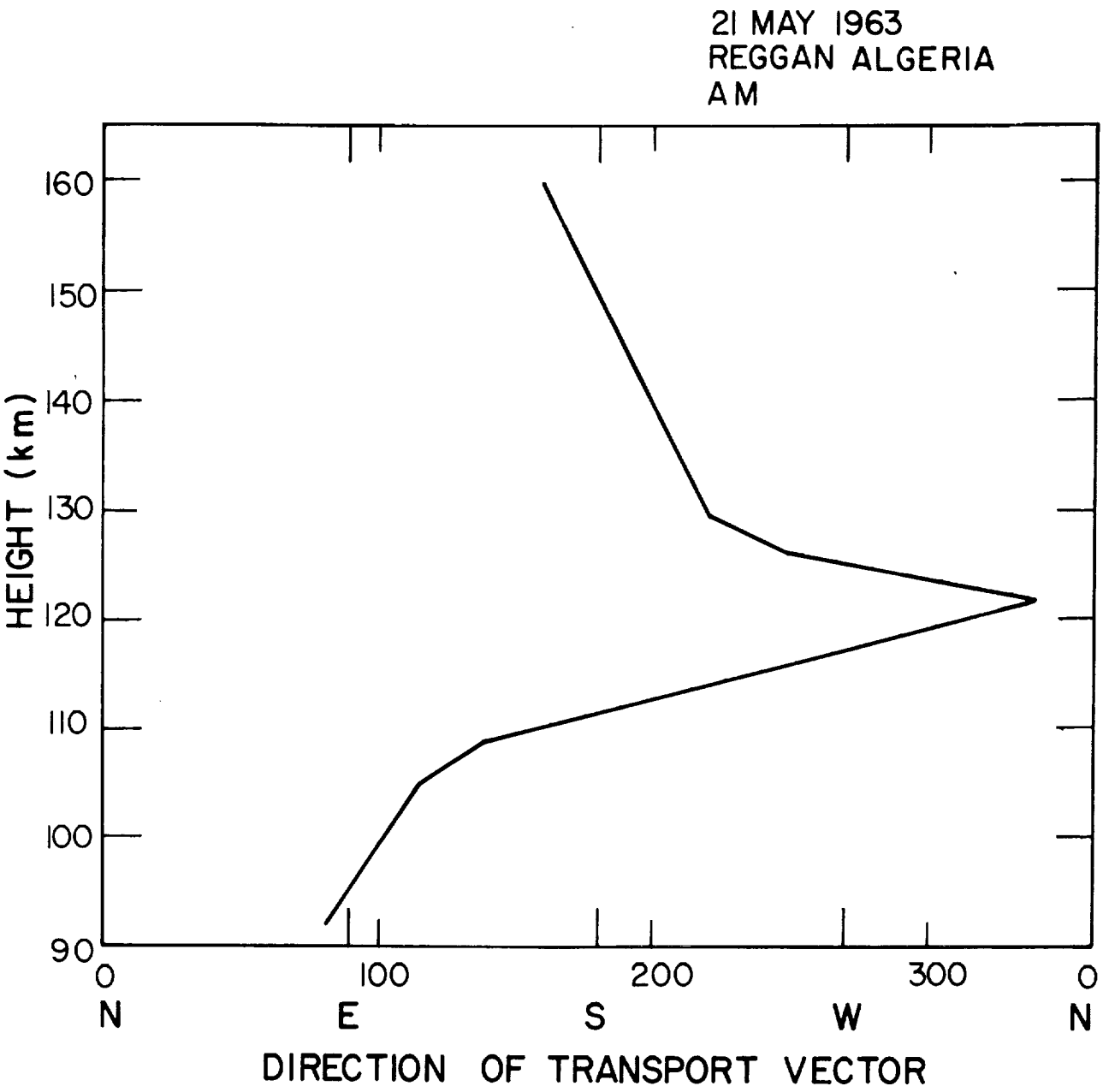

5 JUNE 1962
REGGAN ALGERIA
AM
HEIGHT (km)
140
130
120
110
100
90
0
30
60
90
120
150
180
WIND SPEED (m/sec)

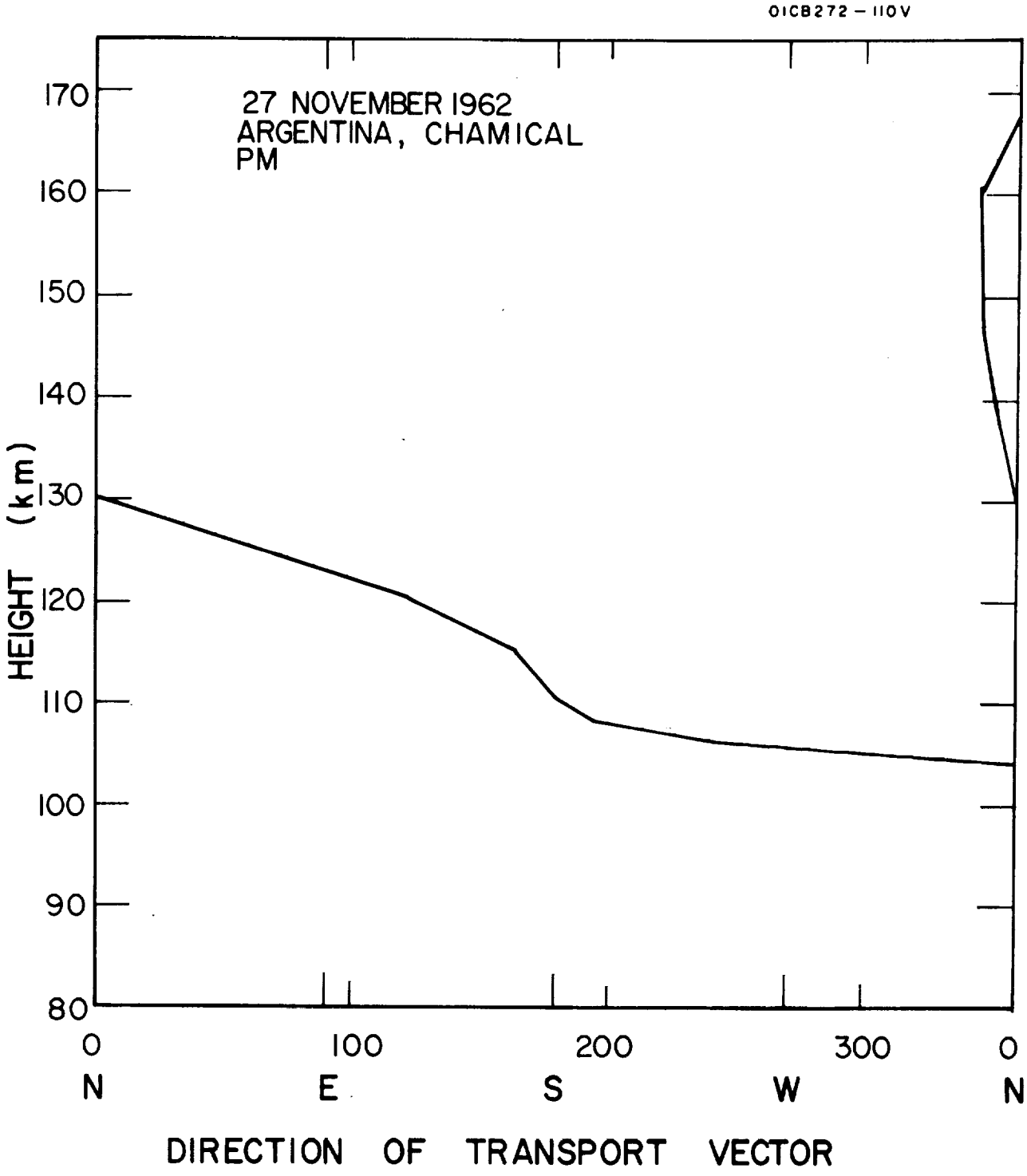

5 JUNE 1962
REGGAN ALGERIA
AM
HEIGHT (k m)
140
130
120
110
100
90
0
100
200
300
0
N
E
S
W
N
DIRECTION OF TRANSPORT VECTOR

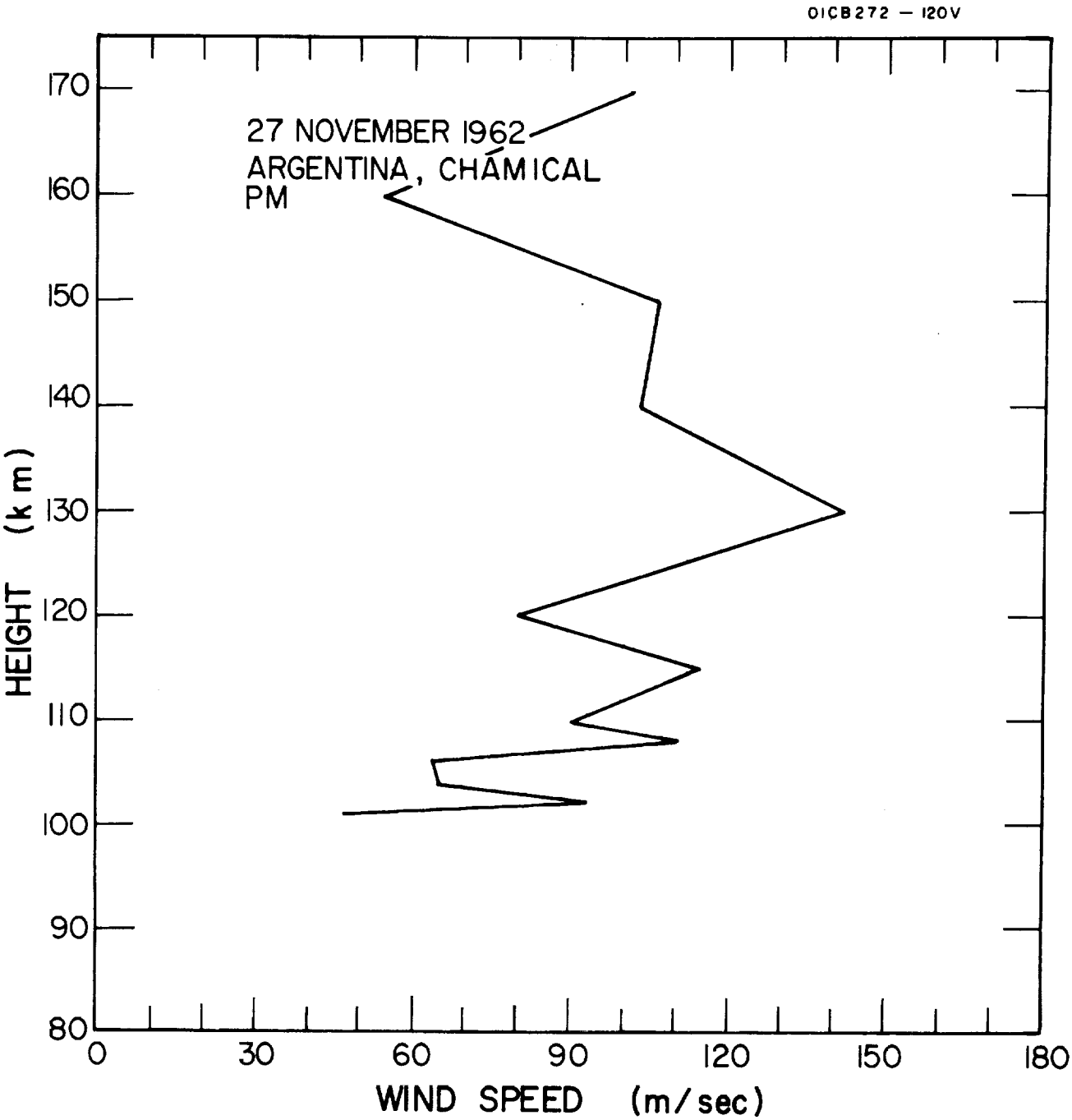

5 JUNE 1962
REGGAN ALGERIA
PM
HEIGHT (km)
140
130
120
110
100
90
0
30
60
90
120
150
180
WIND SPEED (m/sec)

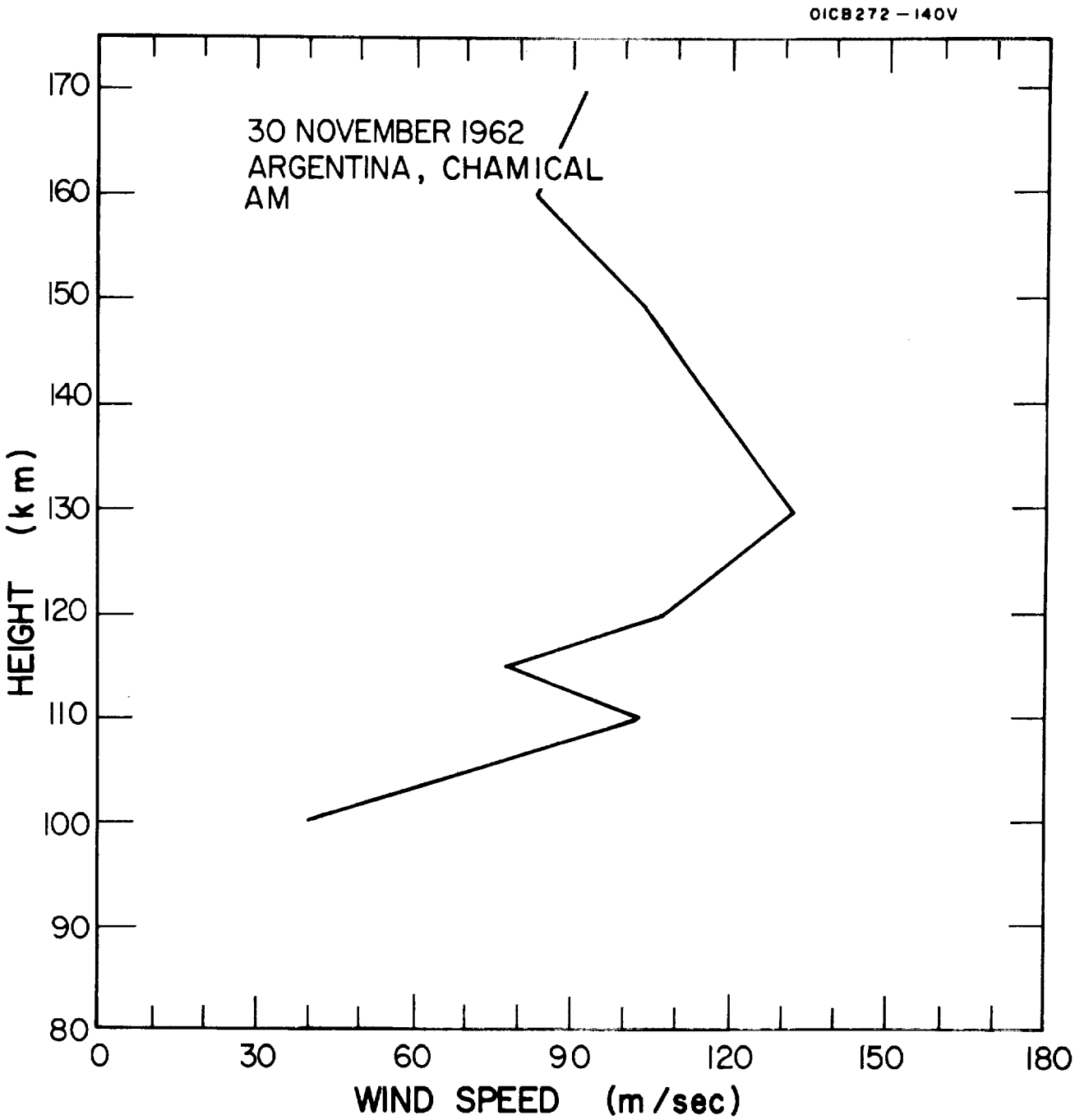

5 JUNE 1962
REGGAN ALGERIA
PM
HEIGHT (km)
140
130
120
110
100
90
0
100
200
300
0
N
E
S
W
N
DIRECTION OF TRANSPORT VECTOR

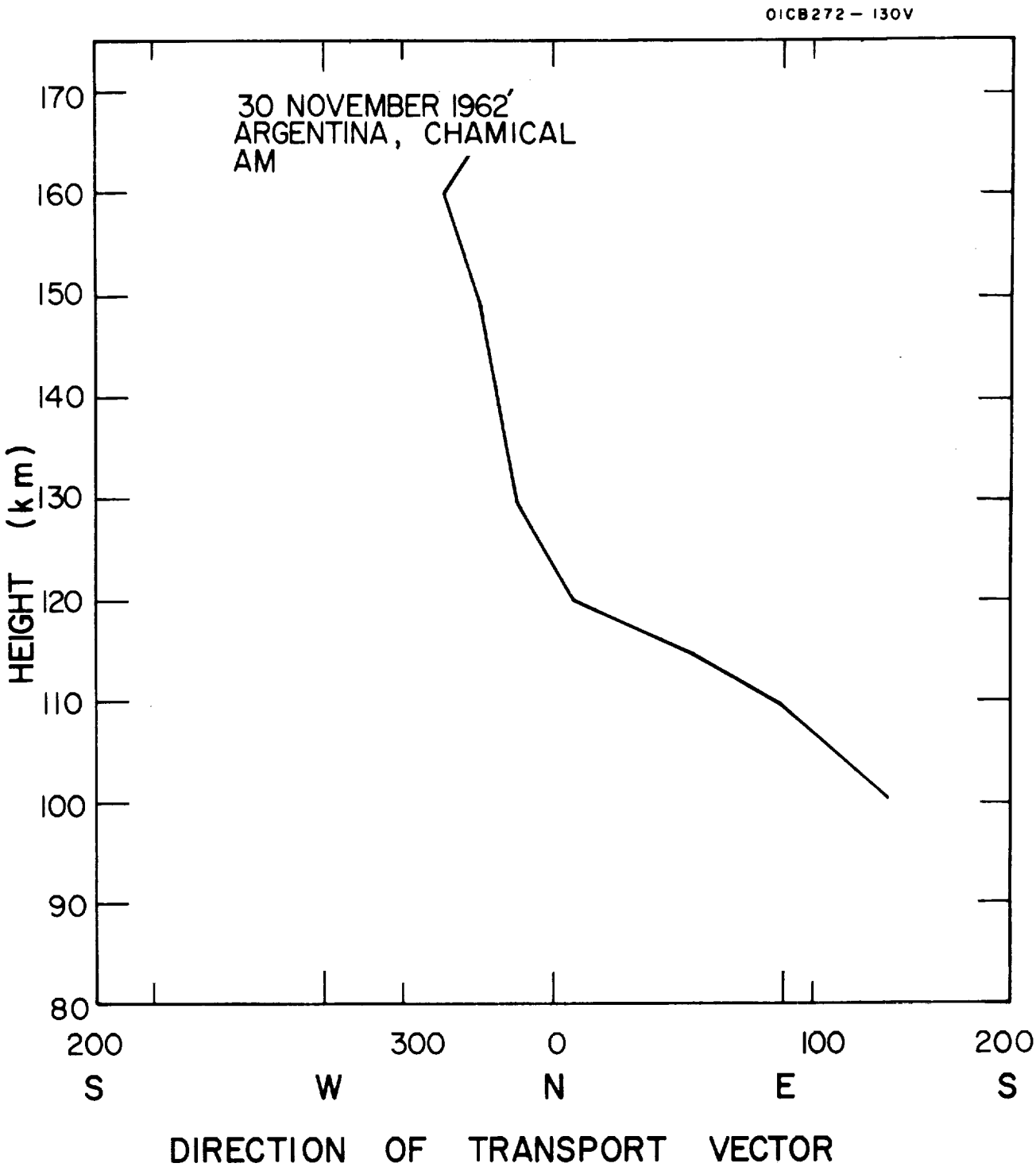

21 MAY 1963
REGGAN ALGERIA
AM
HEIGHT (km)
160
150
140
130
120
110
100
90
0
30
60
90
120
150
180
WIND SPEED (m/sec)

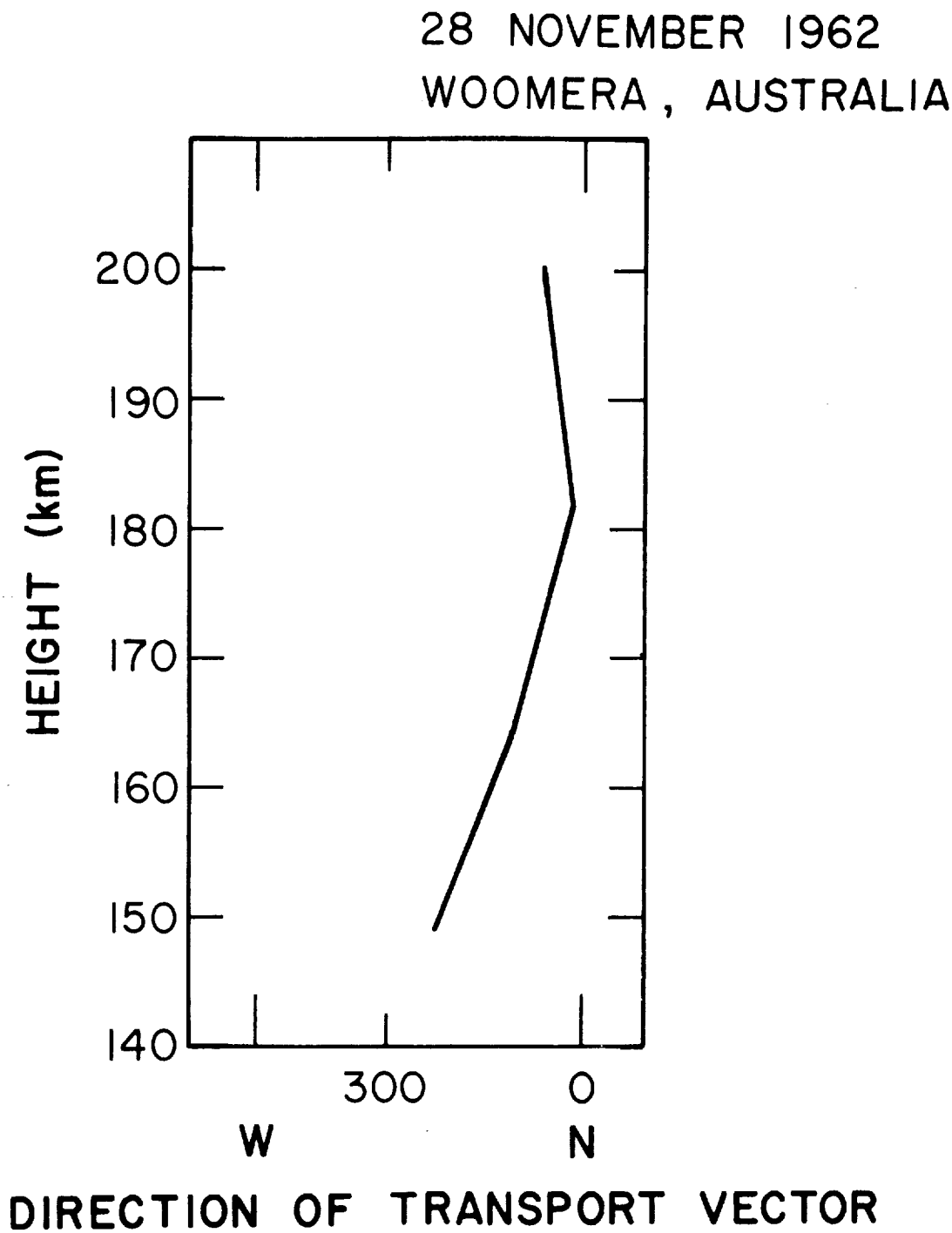

21 MAY 1963
REGGAN ALGERIA
AM
HEIGHT (km)
160
150
140
130
120
110
100
90
0
100
200
300
0
N
E
S
W
N
DIRECTION OF TRANSPORT VECTOR

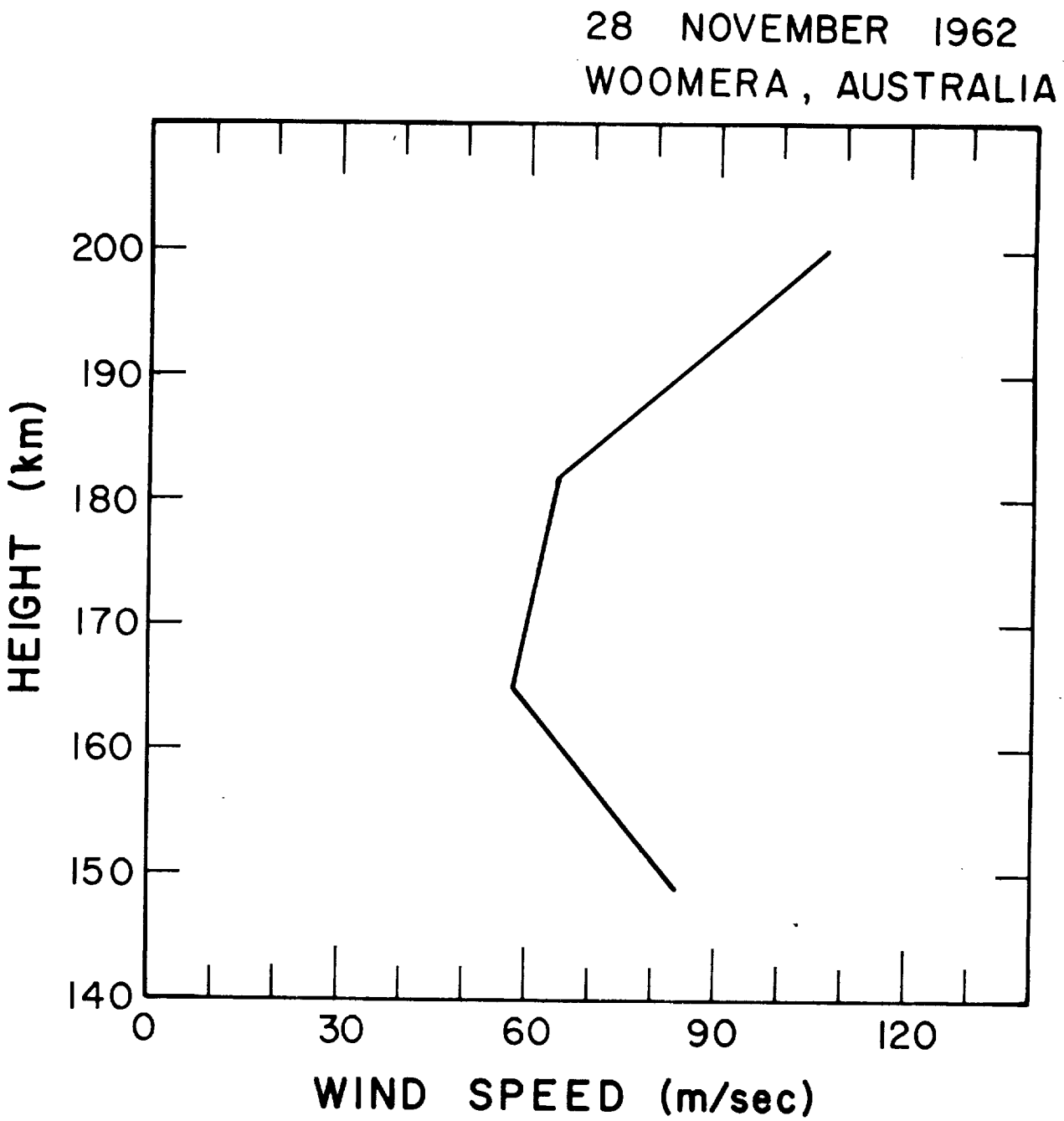

01CB272 – 110V
27 NOVEMBER 1962
ARGENTINA, CHAMICAL
PM
HEIGHT (km)
170
160
150
140
130
120
110
100
90
80
0
100
200
300
0
N
E
S
W
N
DIRECTION OF TRANSPORT VECTOR

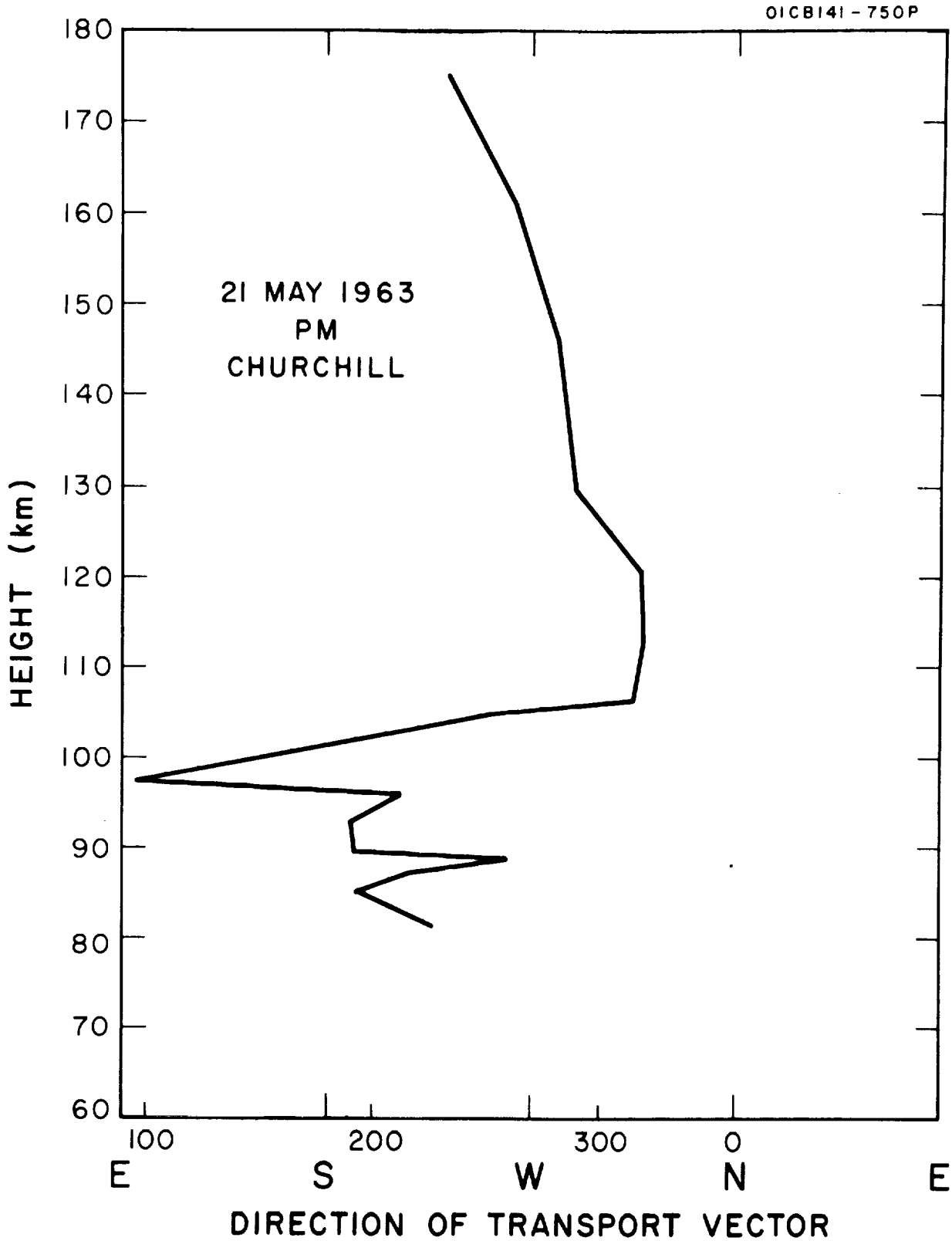

01CB272 — 120V
27 NOVEMBER 1962
ARGENTINA, CHAMICAL
PM
HEIGHT (km)
170
160
150
140
130
120
110
100
90
80
0
30
60
90
120
150
180
WIND SPEED (m/sec)

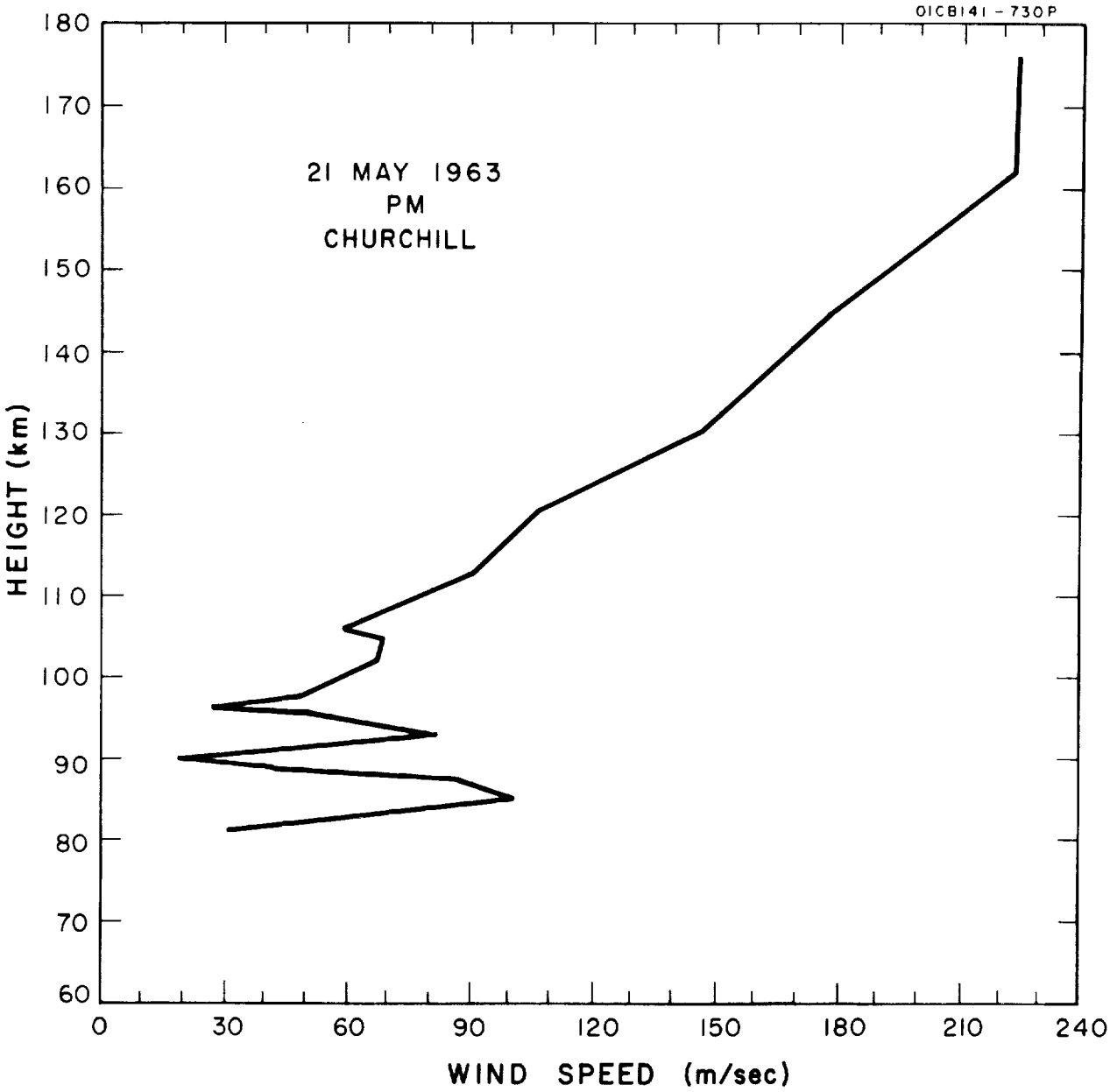

01CB272 — 140V
30 NOVEMBER 1962
ARGENTINA, CHAMICAL
AM
HEIGHT (km)
170
160
150
140
130
120
110
100
90
80
0
30
60
90
120
150
180
WIND SPEED (m/sec)

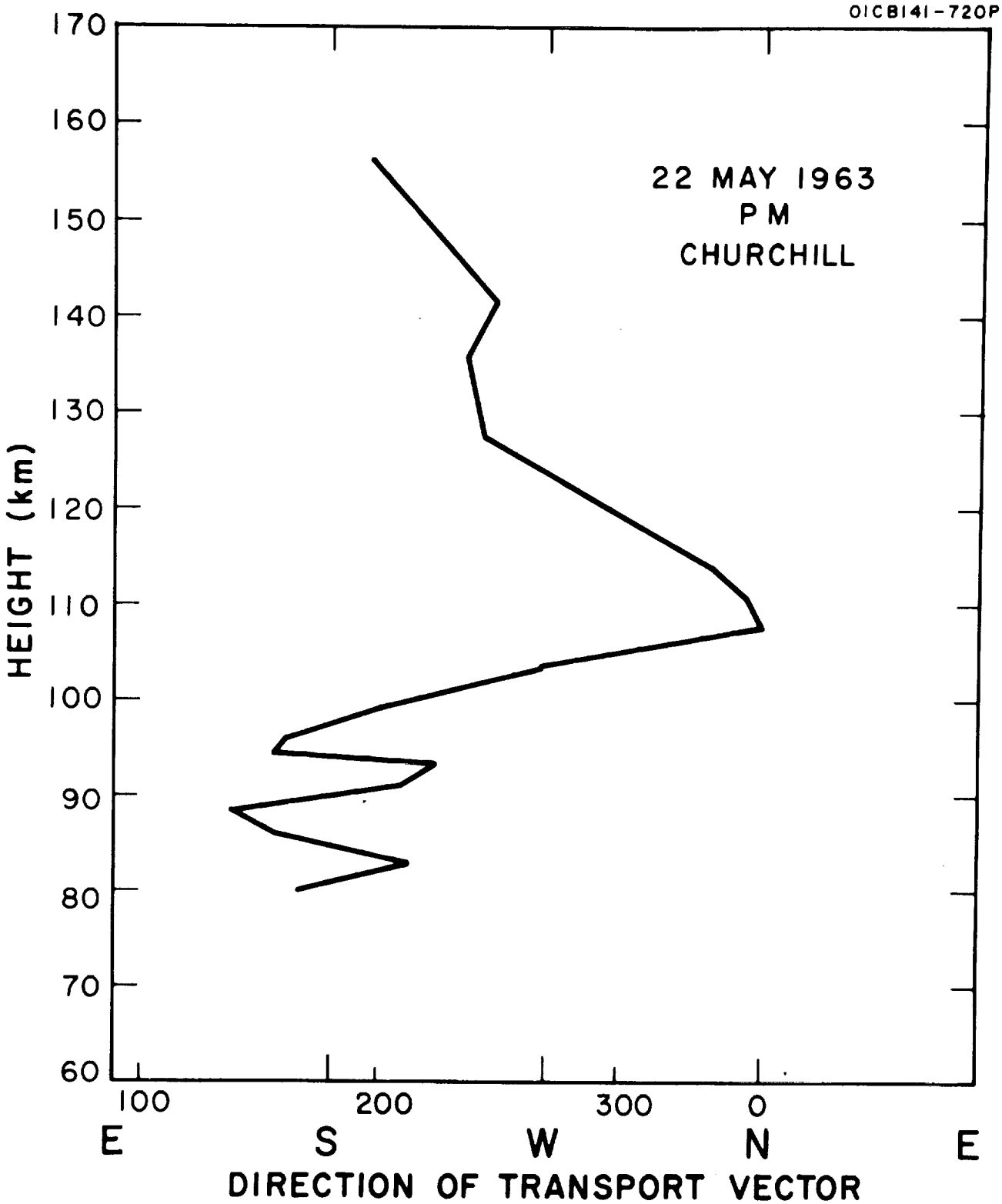

01CB272 — 130V
30 NOVEMBER 1962
ARGENTINA, CHAMICAL
AM
HEIGHT (km)
170
160
150
140
130
120
110
100
90
80
200
300
0
100
200
S
W
N
E
S
DIRECTION OF TRANSPORT VECTOR

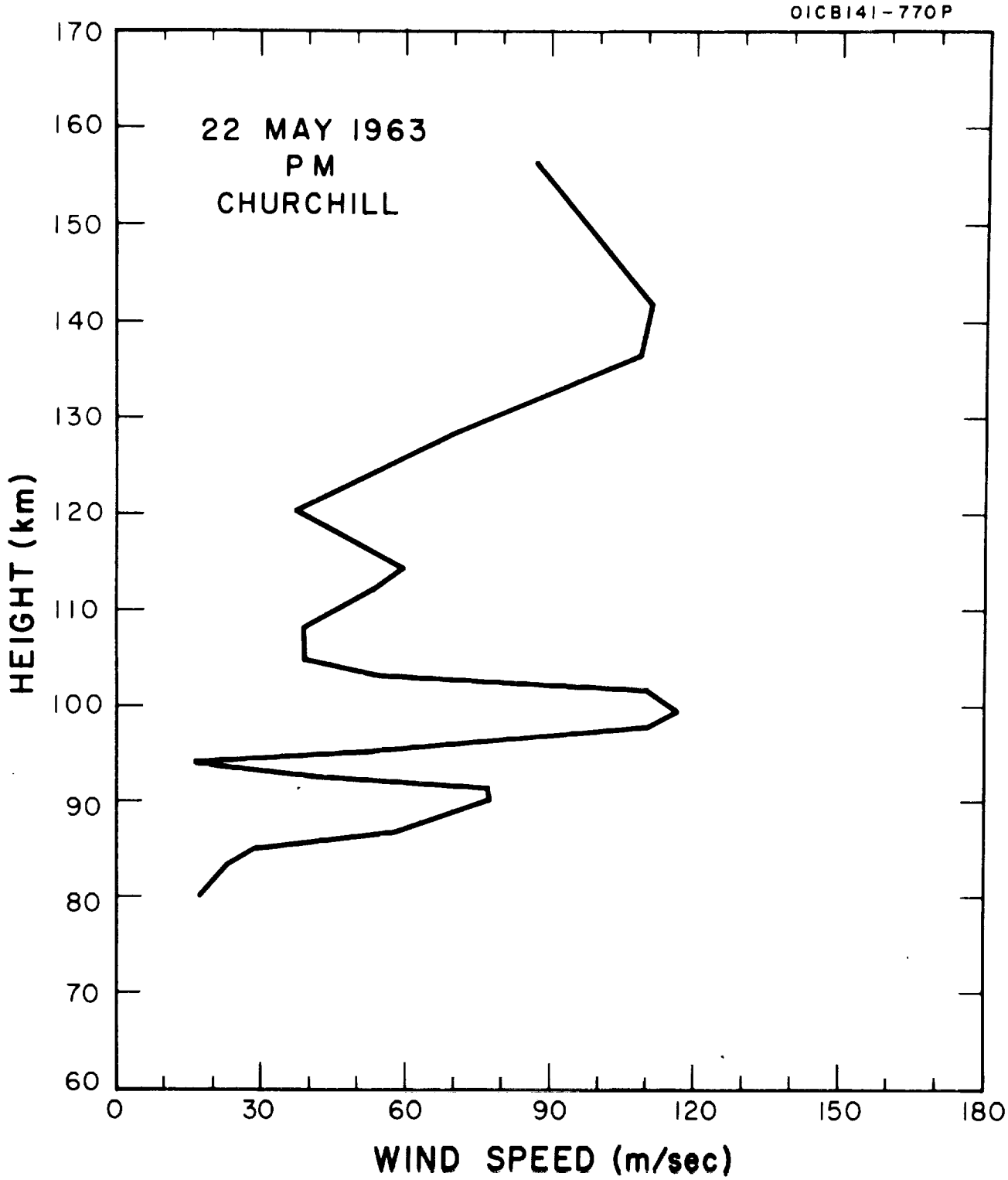

28 NOVEMBER 1962
WOOMERA, AUSTRALIA
HEIGHT (km)
200
190
180
170
160
150
140
300
0
W
N
DIRECTION OF TRANSPORT VECTOR

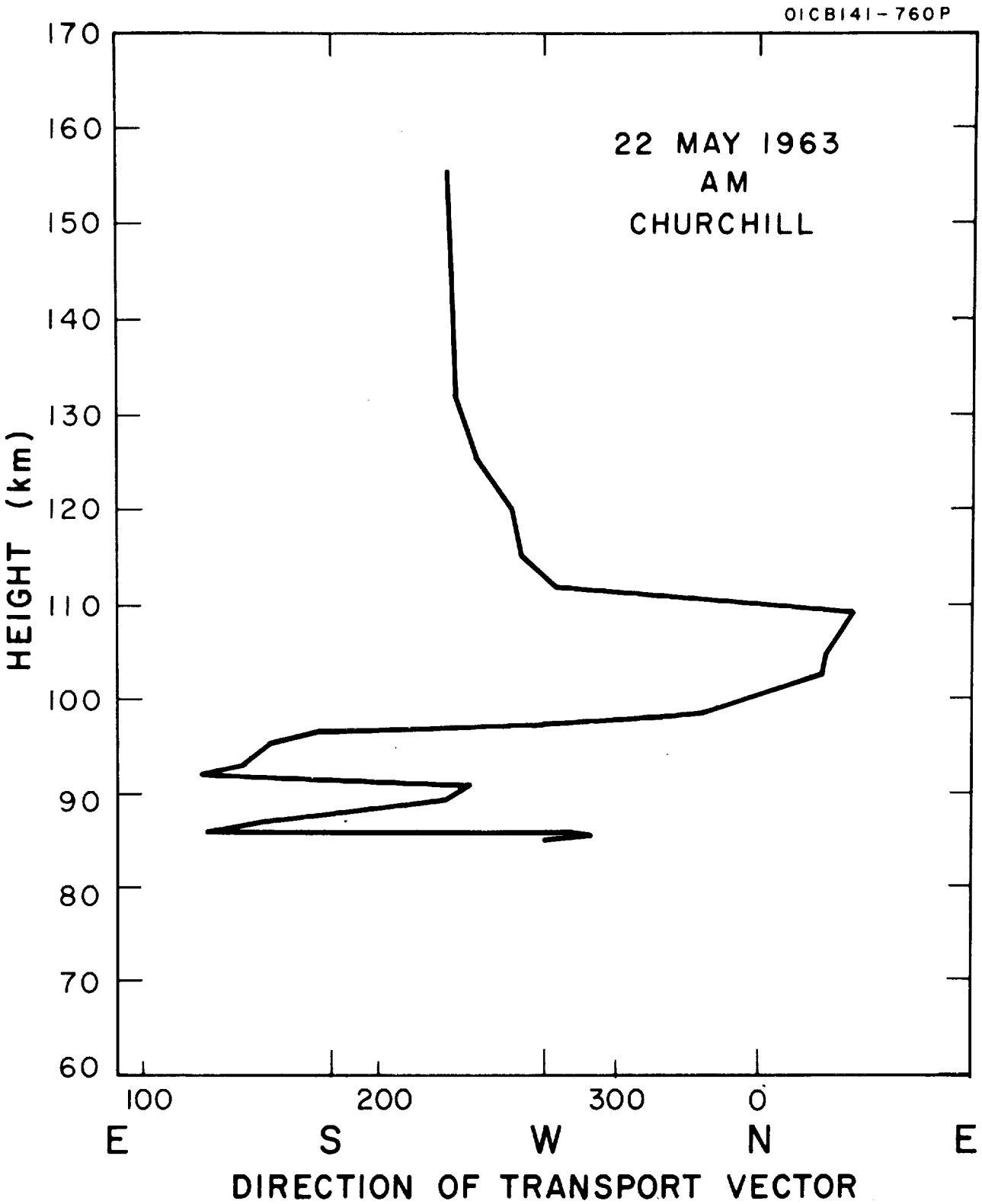

28 NOVEMBER 1962
WOOMERA, AUSTRALIA
HEIGHT (km)
200
190
180
170
160
150
140
0
30
60
90
120
WIND SPEED (m/sec)

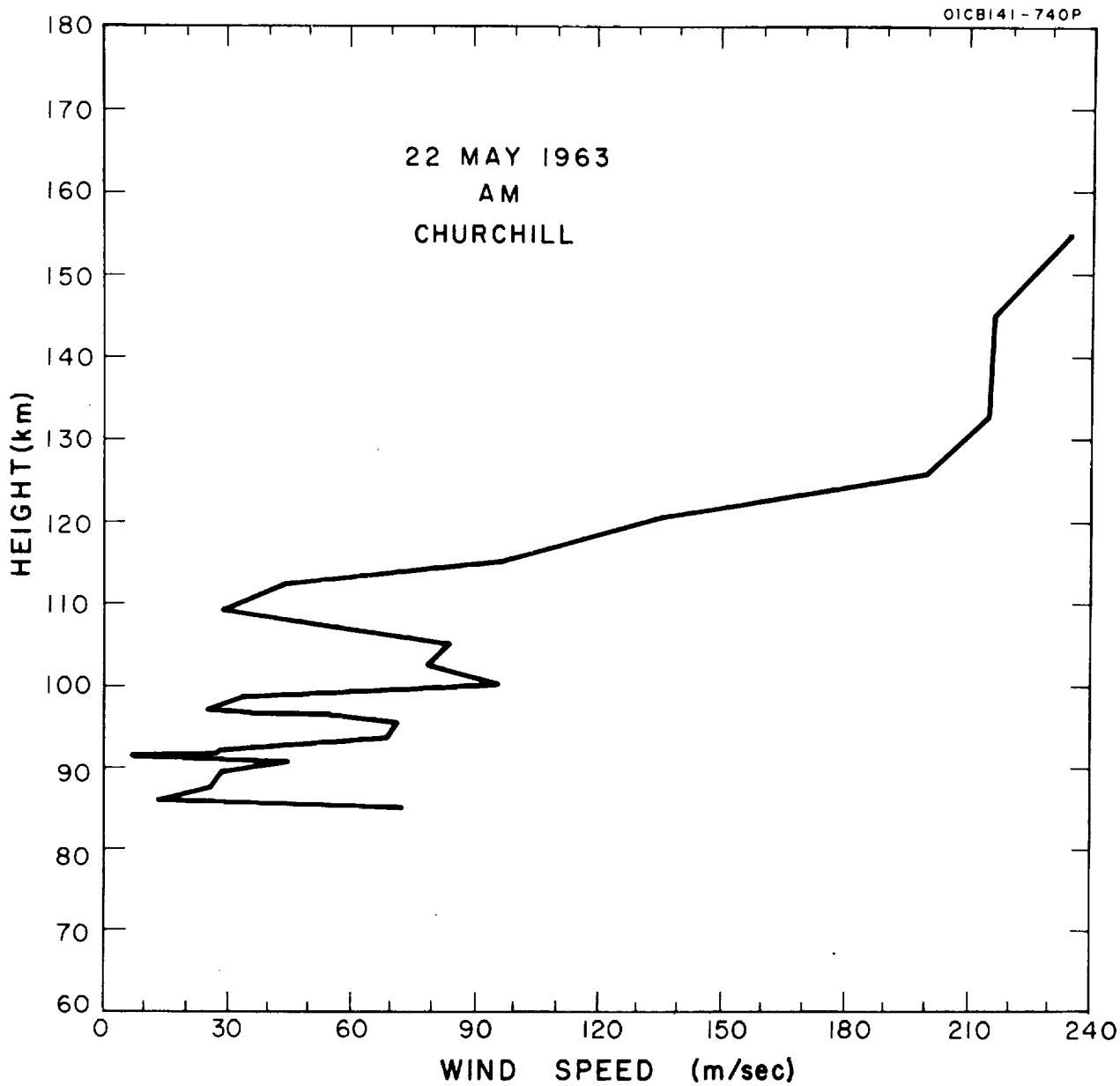

01CB141-750P
21 MAY 1963
PM
CHURCHILL
HEIGHT (km)
180
170
160
150
140
130
120
110
100
90
80
70
60
100
200
300
0
E
S
W
N
E
DIRECTION OF TRANSPORT VECTOR

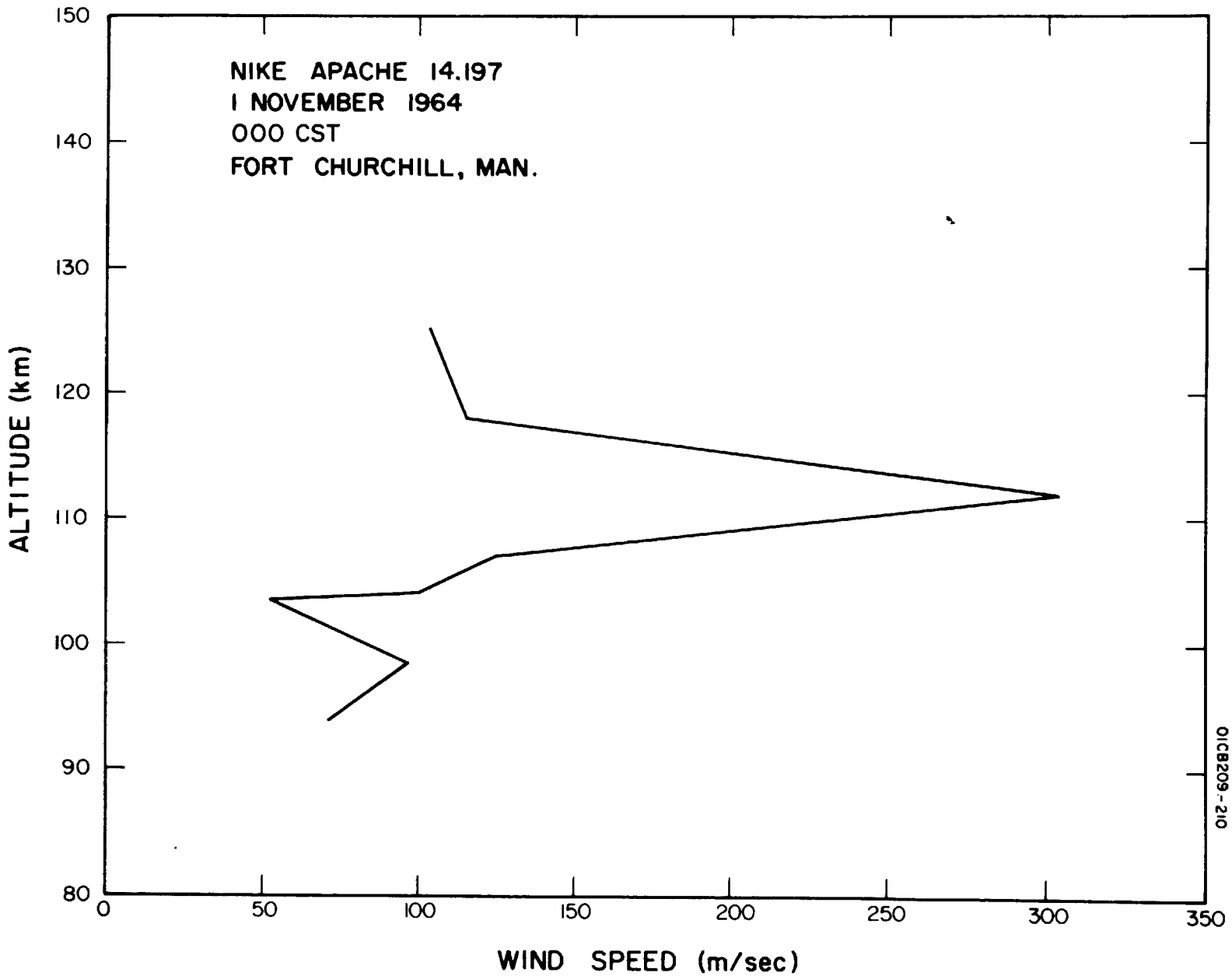

01CB141 - 730P
21 MAY 1963
PM
CHURCHILL
HEIGHT (km)
180
170
160
150
140
130
120
110
100
90
80
70
60
0
30
60
90
120
150
180
210
240
WIND SPEED (m/sec)


01CB141-720P
22 MAY 1963
PM
CHURCHILL
HEIGHT (km)
170
160
150
140
130
120
110
100
90
80
70
60
100
200
300
0
E
S
W
N
E
DIRECTION OF TRANSPORT VECTOR

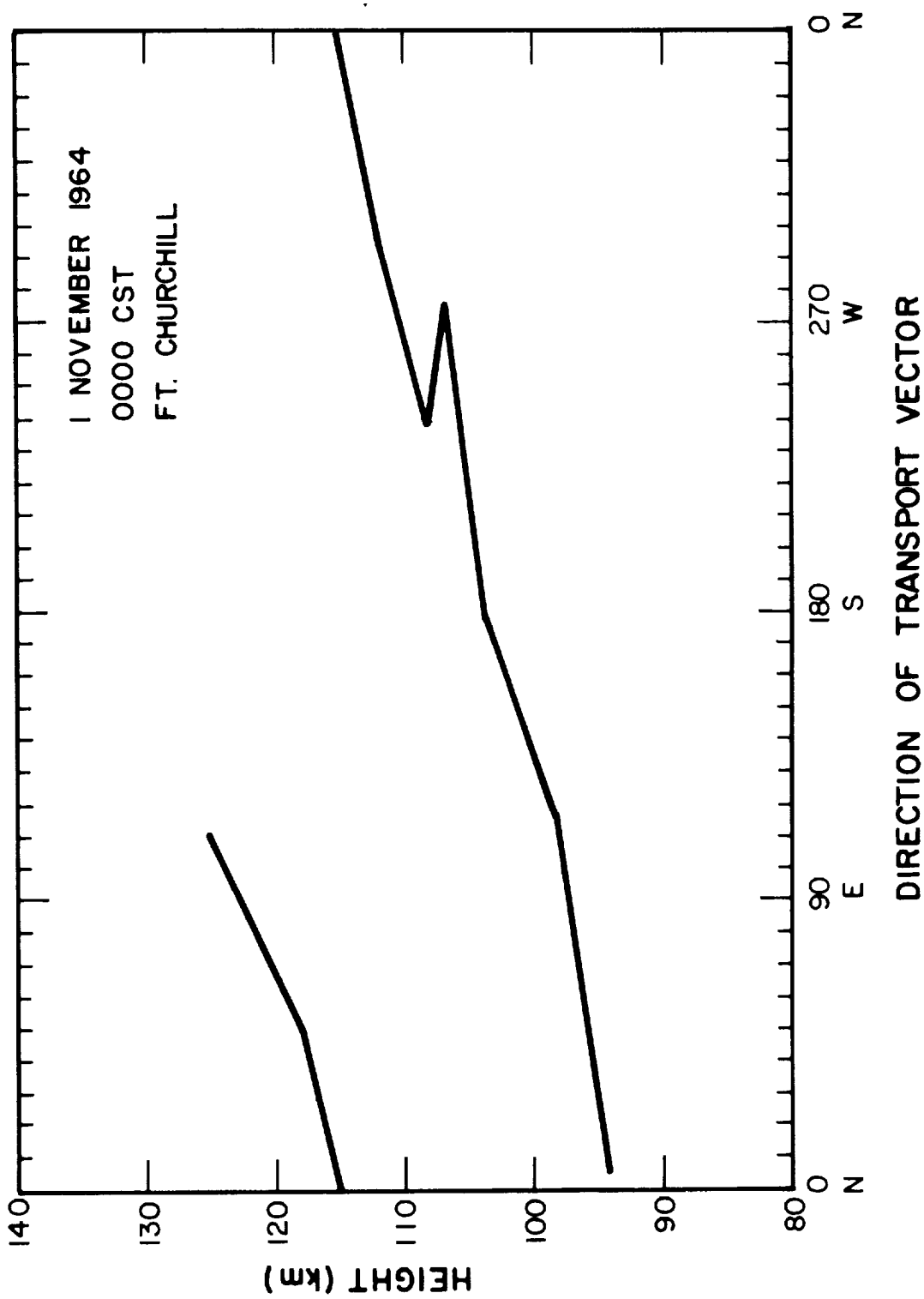

01CB141-770P
22 MAY 1963
PM
CHURCHILL
HEIGHT (km)
170
160
150
140
130
120
110
100
90
80
70
60
0
30
60
90
120
150
180
WIND SPEED (m/sec)

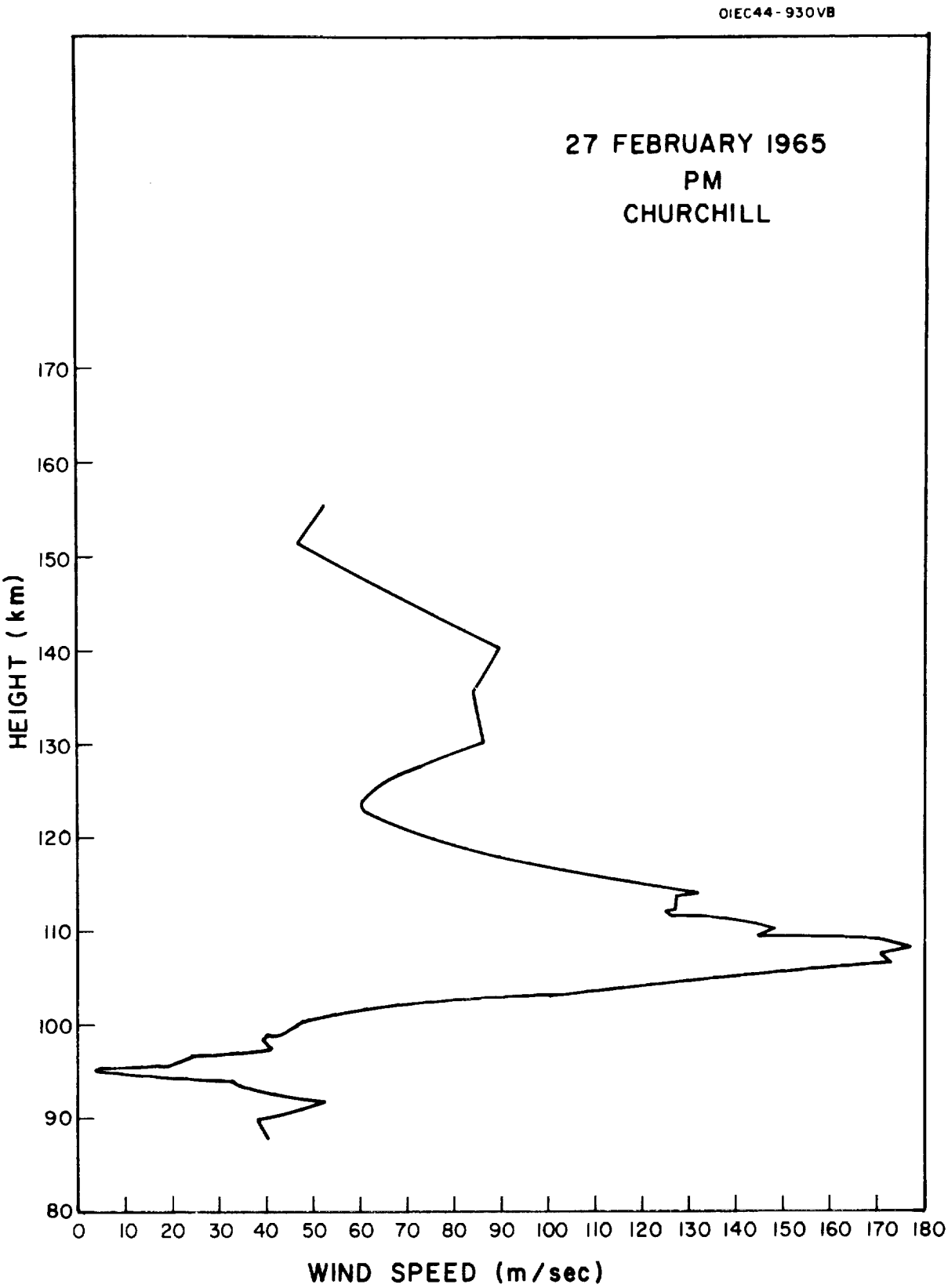

01CB141-760P
22 MAY 1963
AM
CHURCHILL
HEIGHT (km)
170
160
150
140
130
120
110
100
90
80
70
60
100
200
300
0
E
S
W
N
E
DIRECTION OF TRANSPORT VECTOR

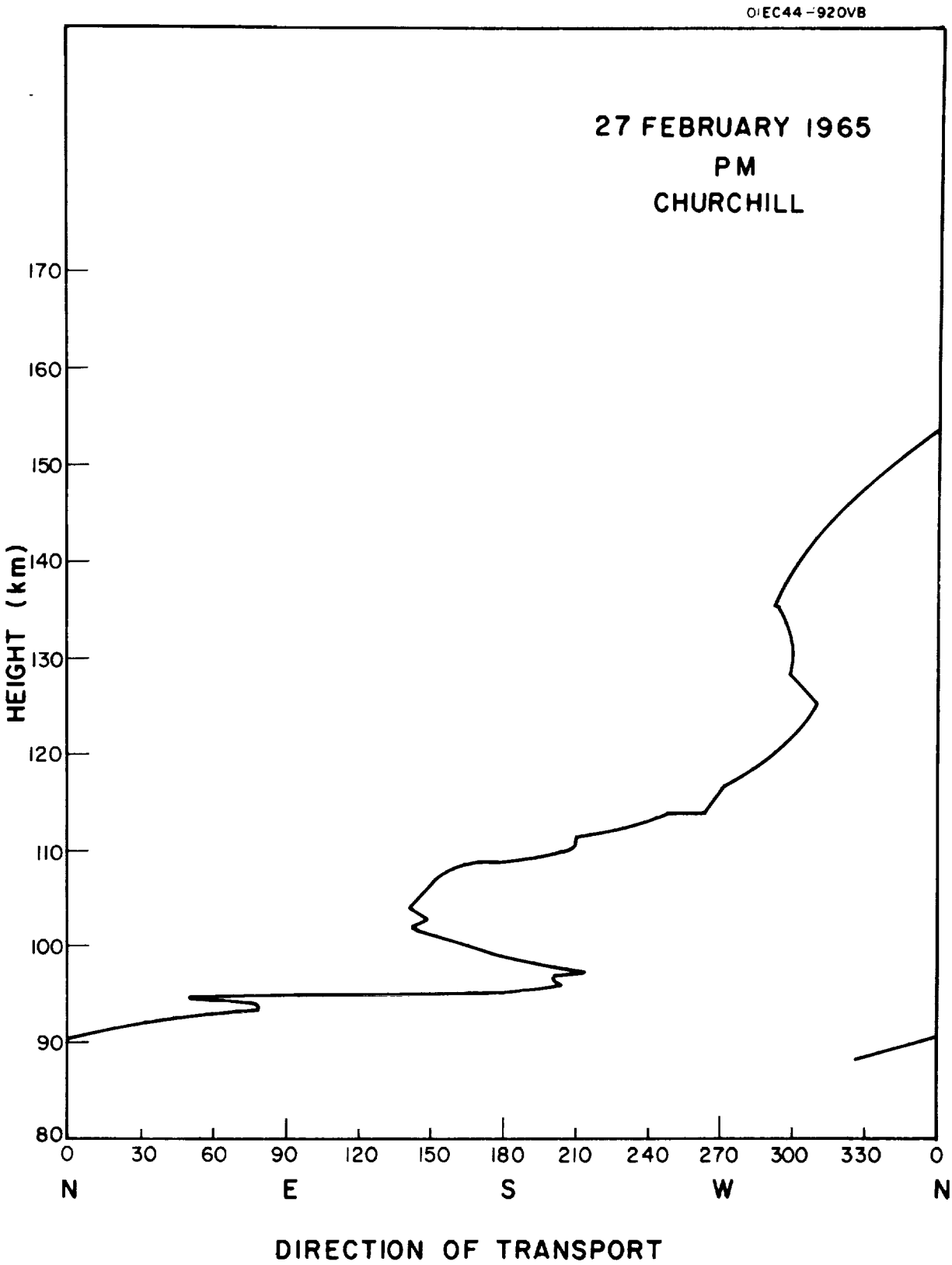

01CB141-740P
22 MAY 1963
AM
CHURCHILL
HEIGHT (km)
180
170
160
150
140
130
120
110
100
90
80
70
60
0
30
60
90
120
150
180
210
240
WIND SPEED (m/sec)

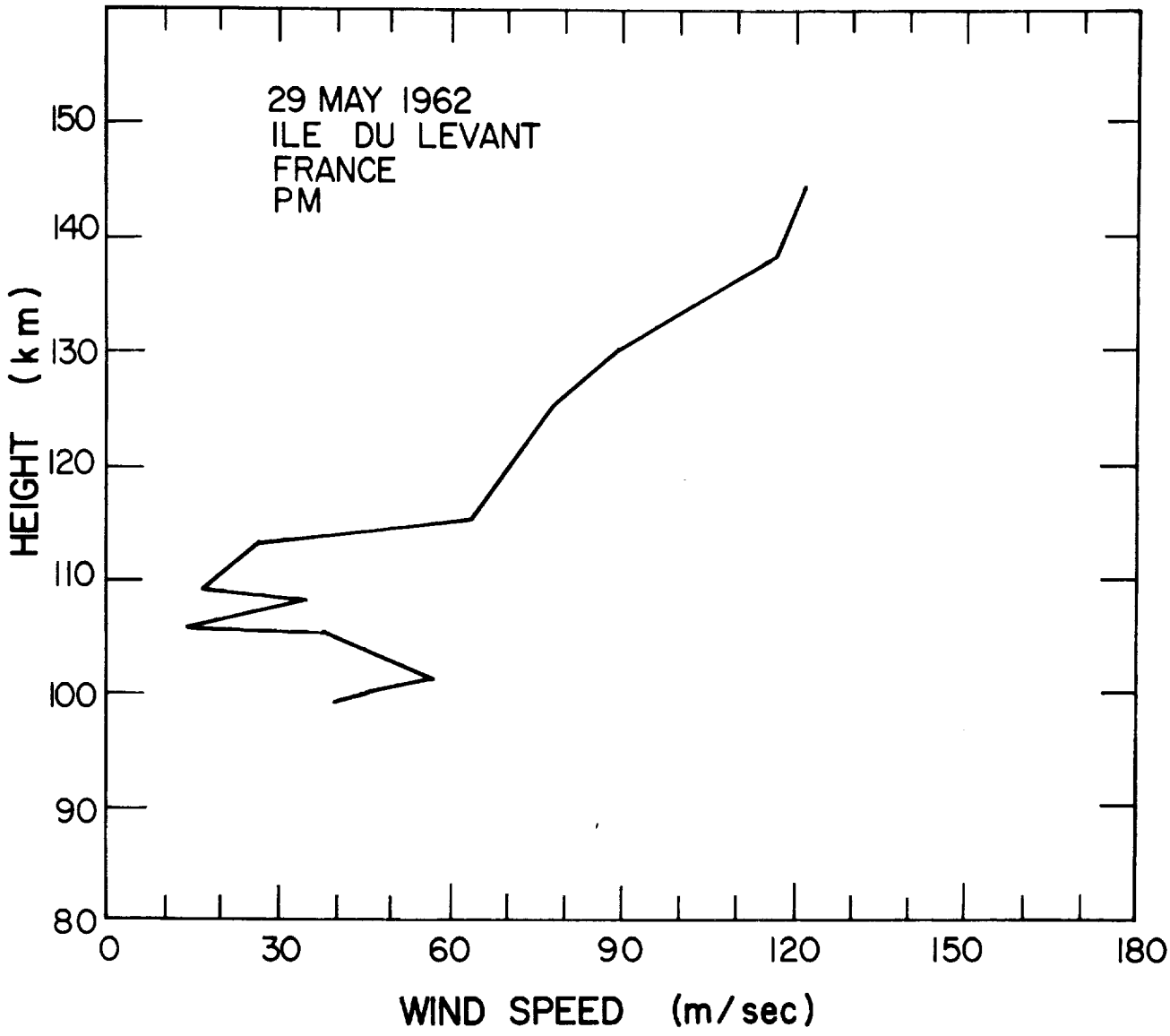

NIKE APACHE 14.197
1 NOVEMBER 1964
000 CST
FORT CHURCHILL, MAN.
ALTITUDE (km)
150
140
130
120
110
100
90
80
0
50
100
150
200
250
300
350
WIND SPEED (m/sec)

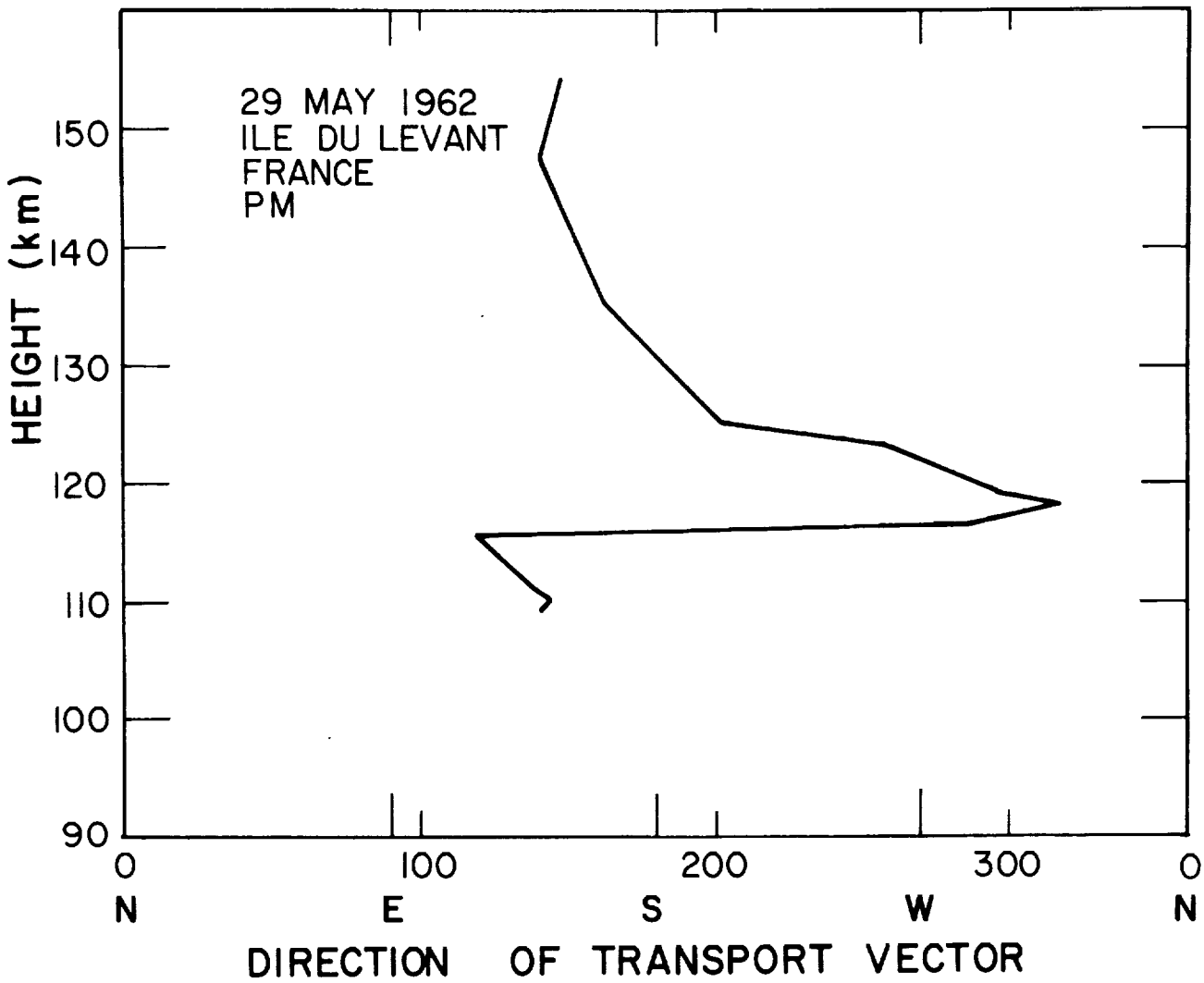
01CB209-210

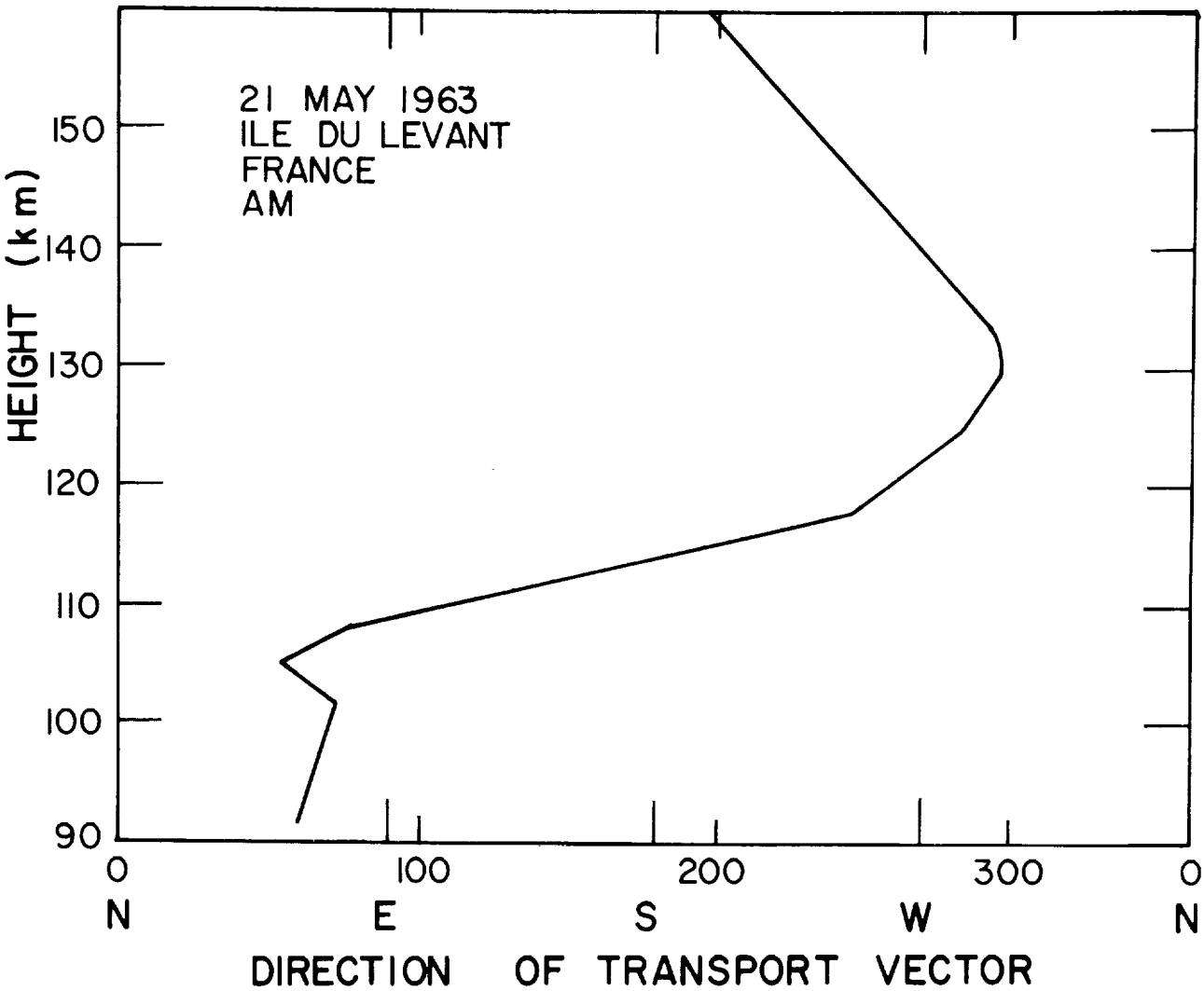

1 NOVEMBER 1964
0000 CST
FT. CHURCHILL
HEIGHT (km)
140
130
120
110
100
90
80
0 N
90 E
180 S
270 W
0 N
DIRECTION OF TRANSPORT VECTOR

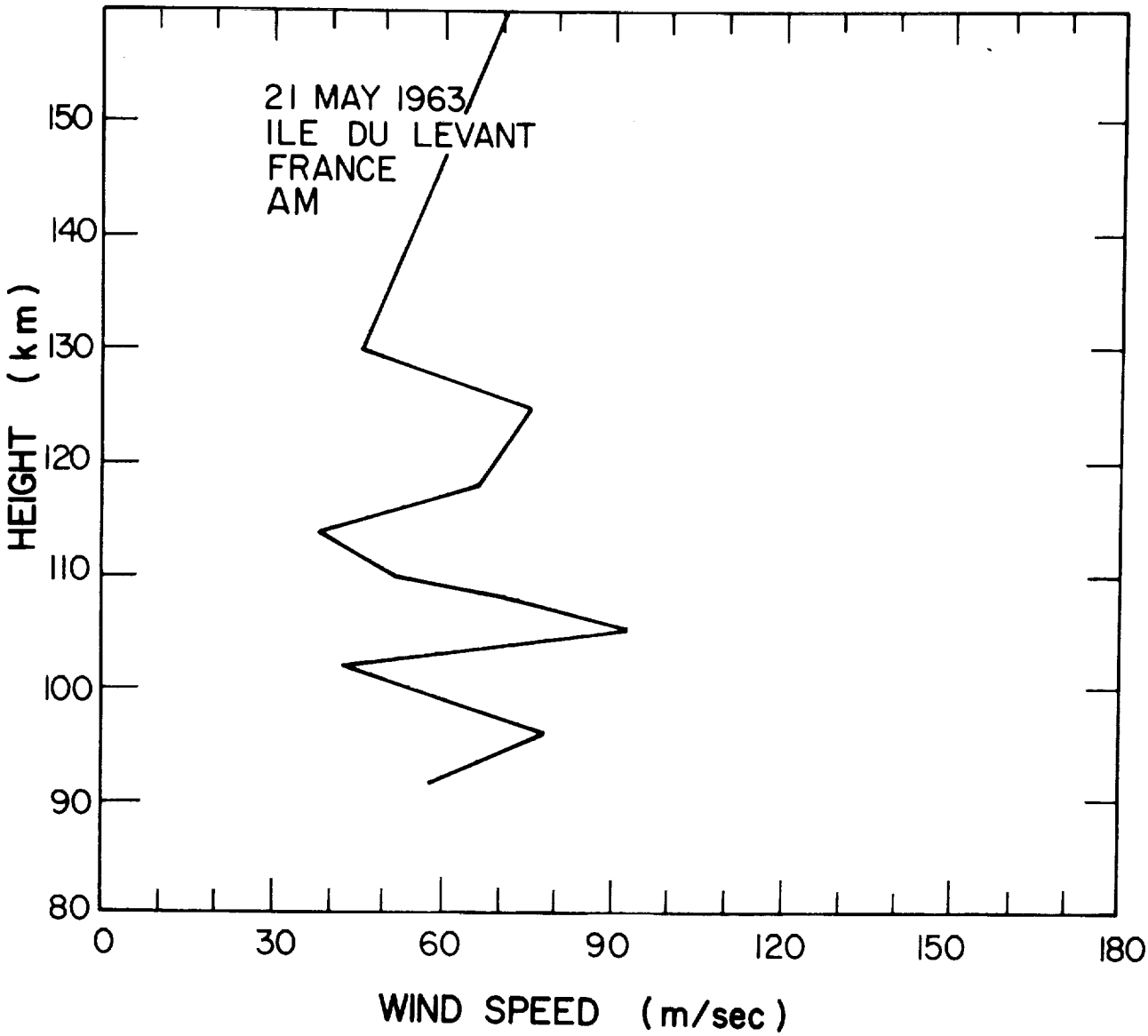

01EC44-930VB
27 FEBRUARY 1965
PM
CHURCHILL
HEIGHT (km)
170
160
150
140
130
120
110
100
90
80
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180
WIND SPEED (m/sec)

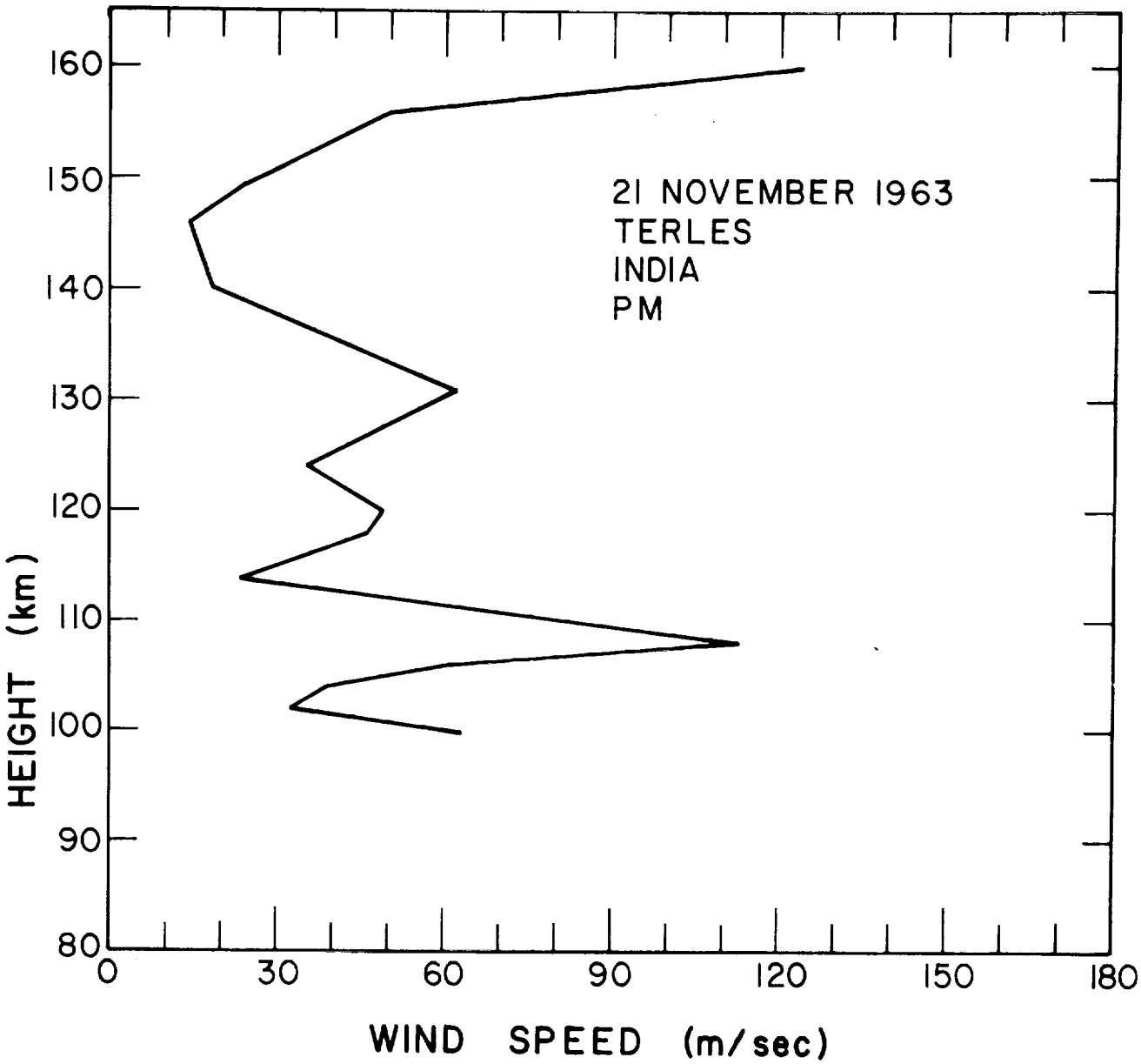

01EC44-920VB
27 FEBRUARY 1965
PM
CHURCHILL
HEIGHT (km)
170
160
150
140
130
120
110
100
90
80
0
30
60
90
120
150
180
210
240
270
300
330
0
N
E
S
W
N
DIRECTION OF TRANSPORT

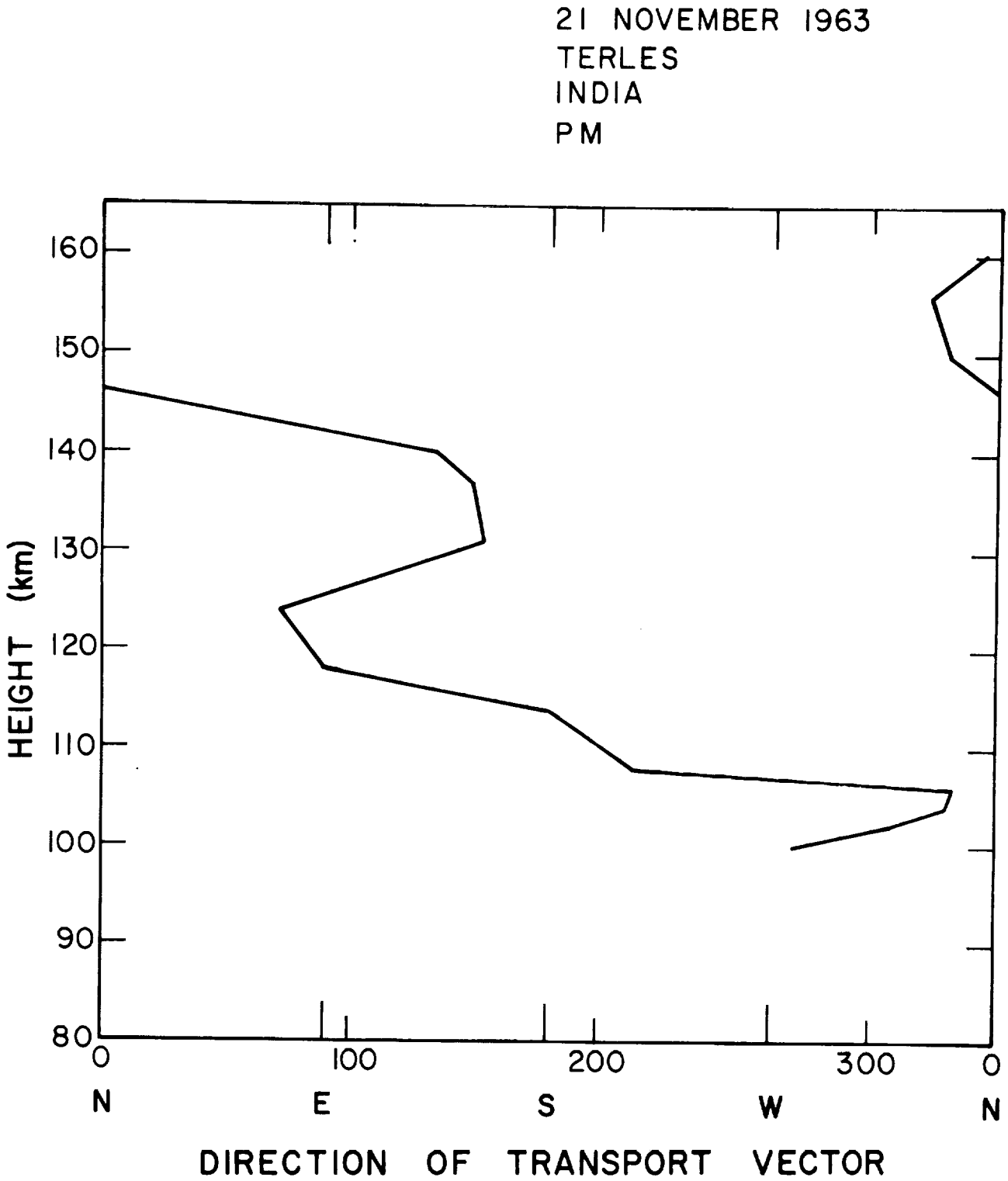

29 MAY 1962
ILE DU LEVANT
FRANCE
PM
HEIGHT (km)
150
140
130
120
110
100
90
80
0
30
60
90
120
150
180
WIND SPEED (m/sec)

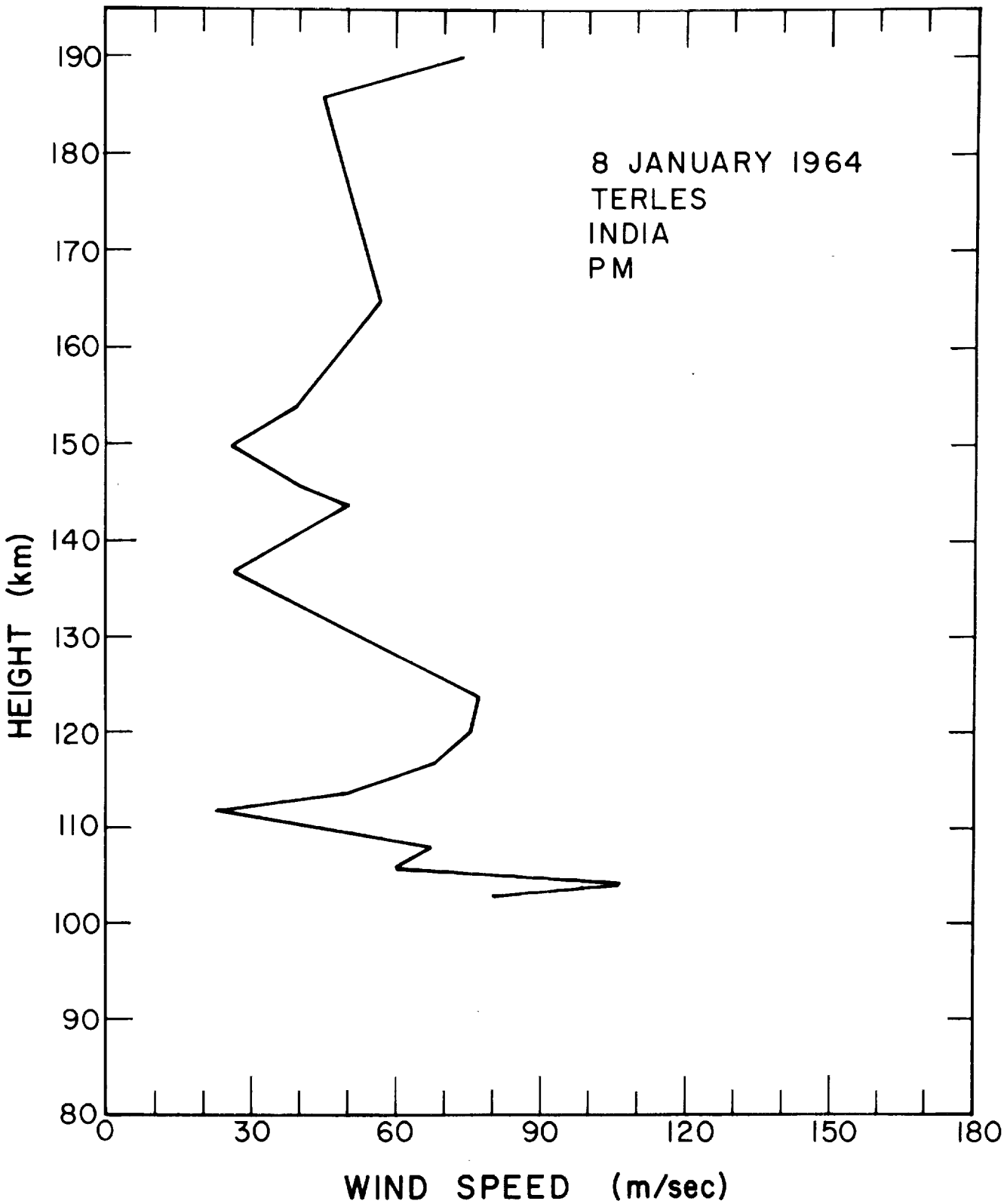

29 MAY 1962
ILE DU LEVANT
FRANCE
PM
HEIGHT (km)
150
140
130
120
110
100
90
0
100
200
300
0
N
E
S
W
N
DIRECTION OF TRANSPORT VECTOR

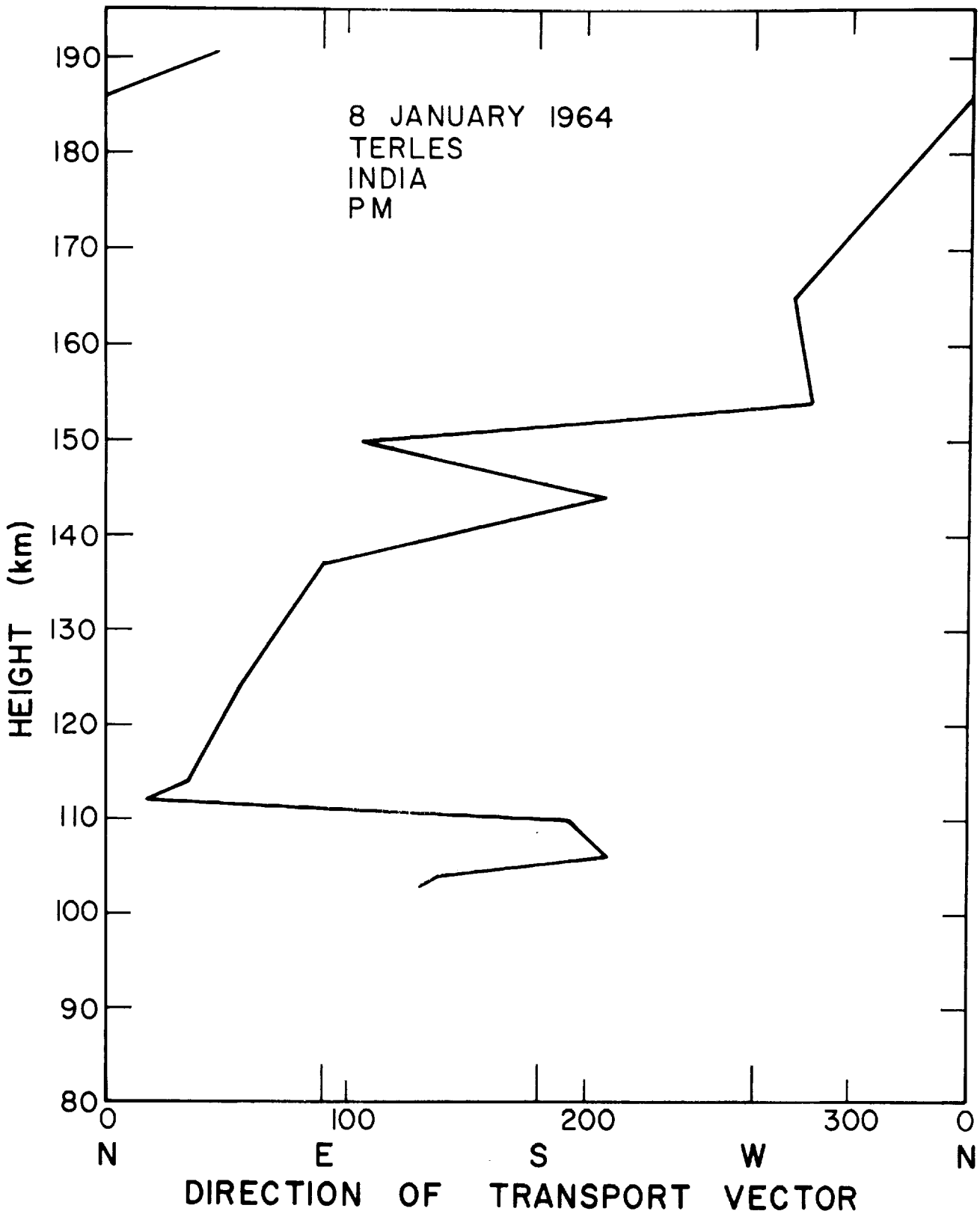

21 MAY 1963
ILE DU LEVANT
FRANCE
AM
HEIGHT (km)
150
140
130
120
110
100
90
0
100
200
300
0
N
E
S
W
N
DIRECTION OF TRANSPORT VECTOR

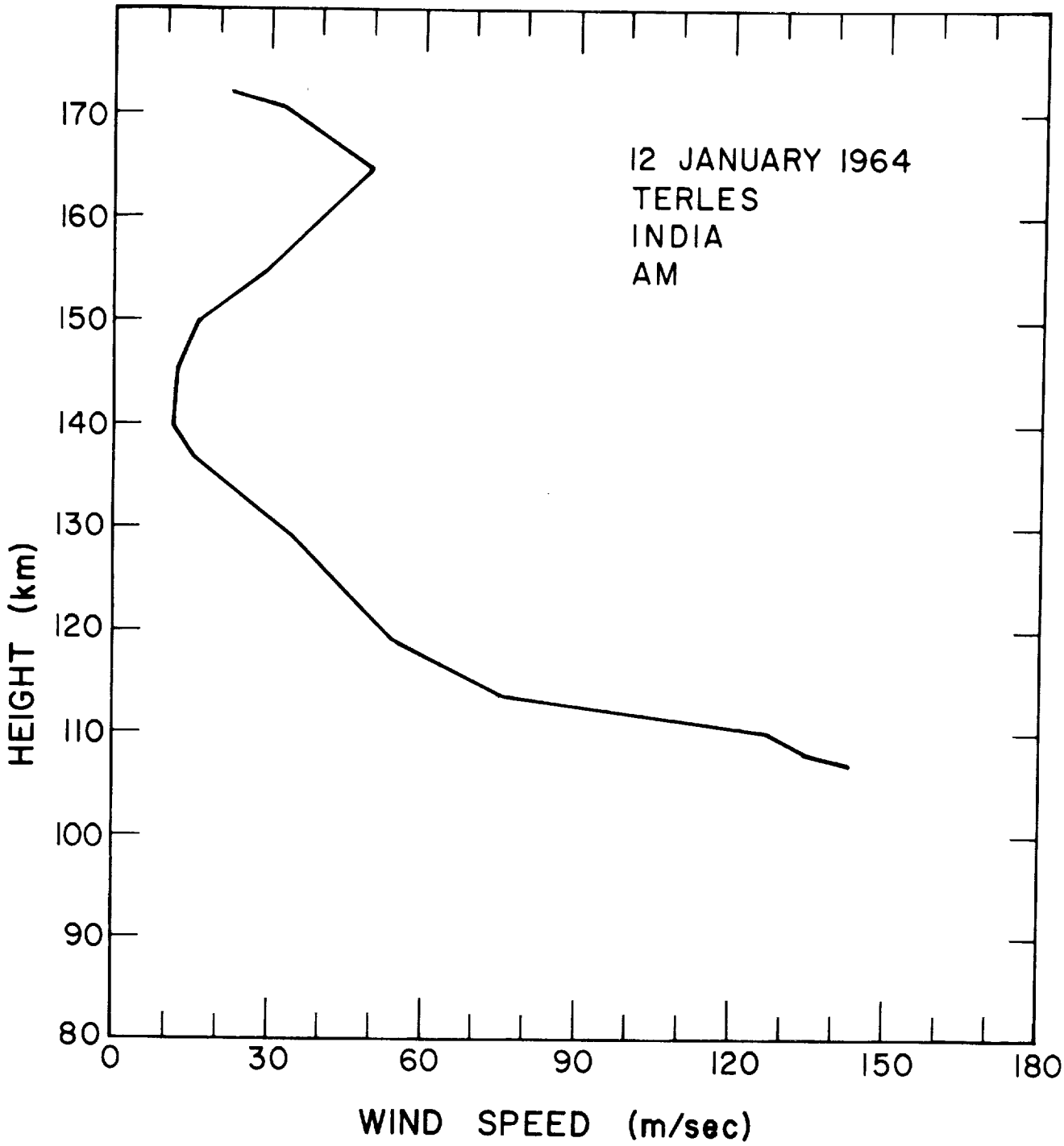

21 MAY 1963
ILE DU LEVANT
FRANCE
AM
HEIGHT (km)
150
140
130
120
110
100
90
80
0
30
60
90
120
150
180
WIND SPEED (m/sec)

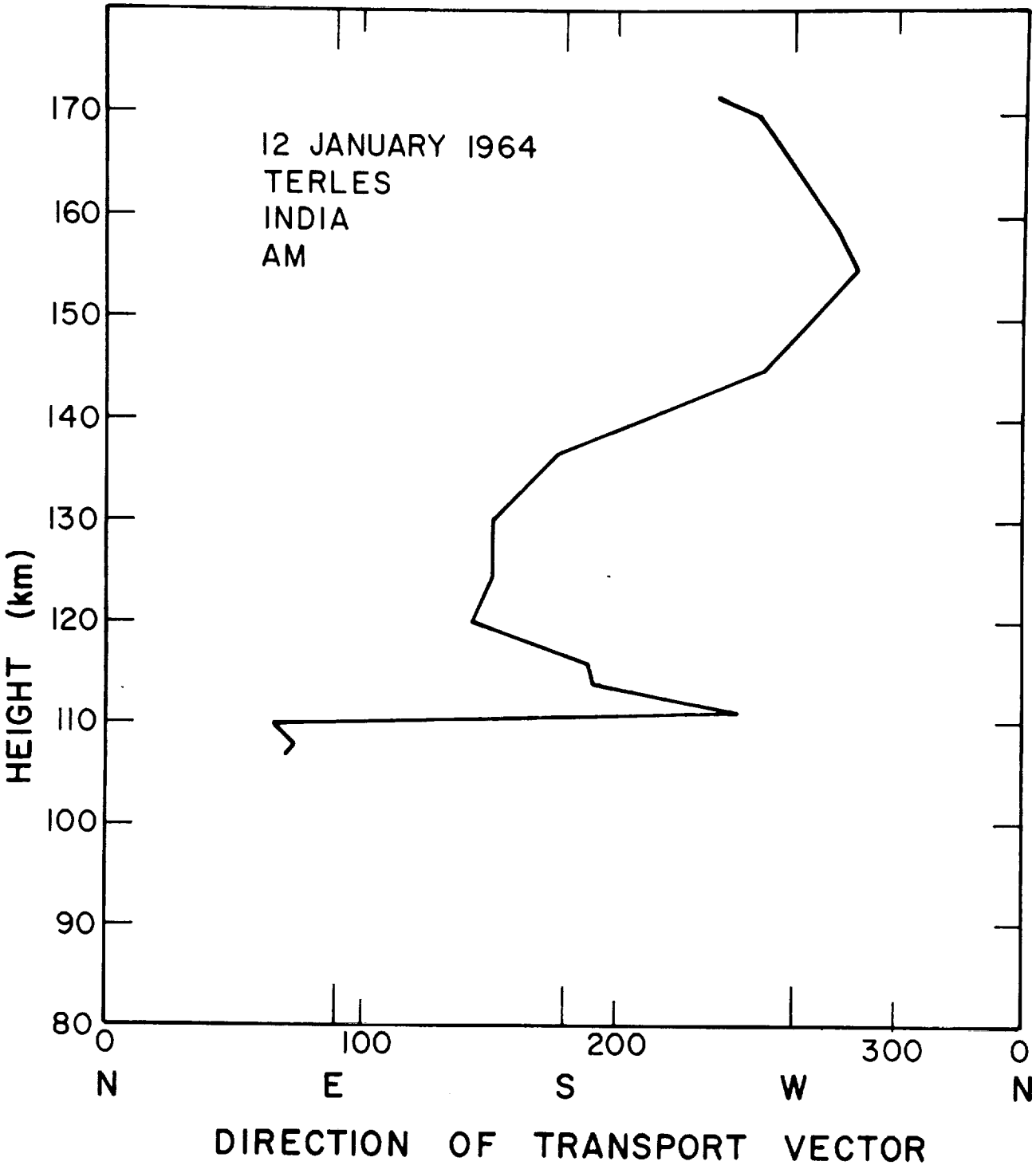

21 NOVEMBER 1963
TERLES
INDIA
PM
HEIGHT (km)
160
150
140
130
120
110
100
90
80
0
30
60
90
120
150
180
WIND SPEED (m/sec)

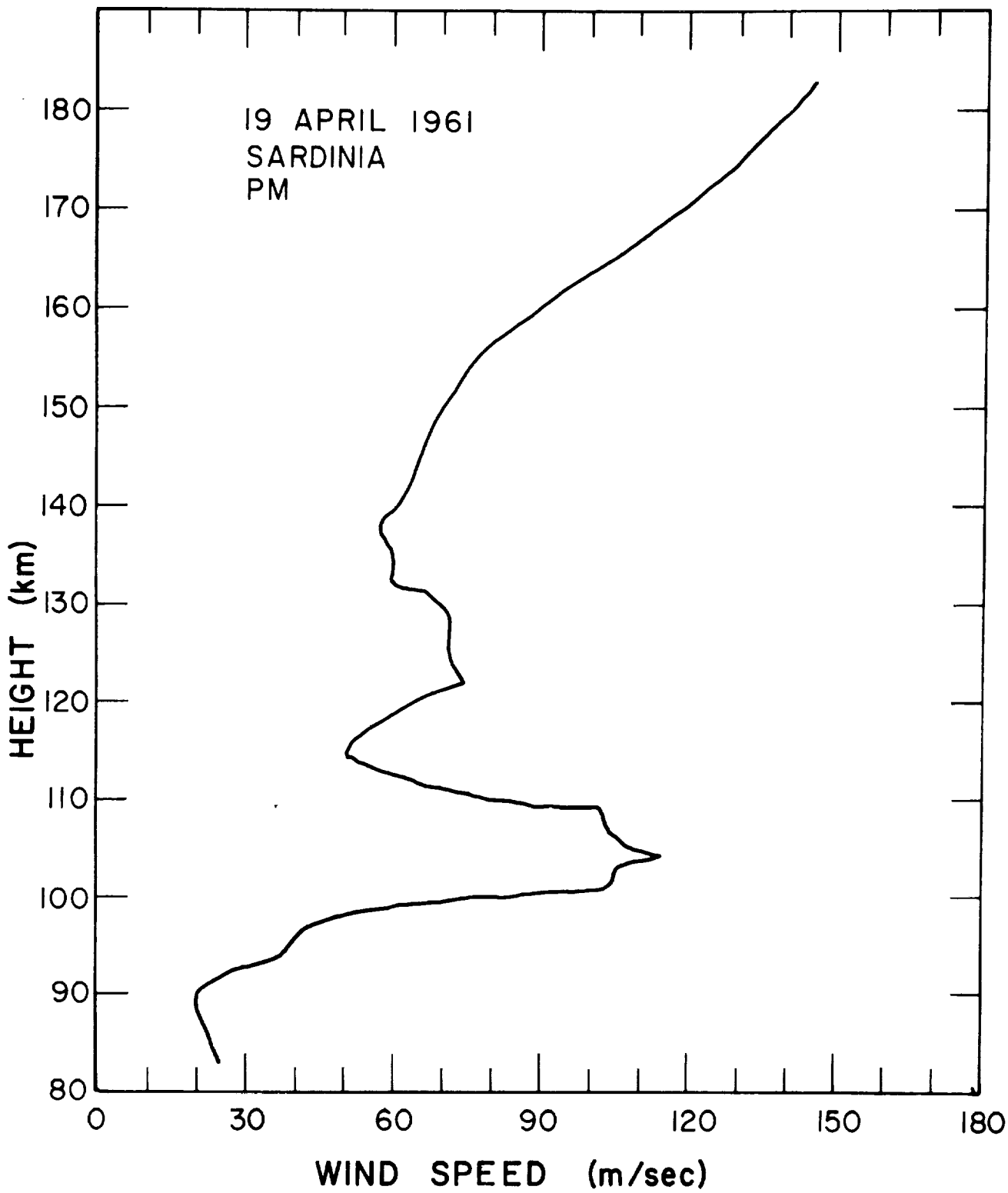

21 NOVEMBER 1963
TERLES
INDIA
PM
HEIGHT (km)
160
150
140
130
120
110
100
90
80
0
100
200
300
0
N
E
S
W
N
DIRECTION OF TRANSPORT VECTOR

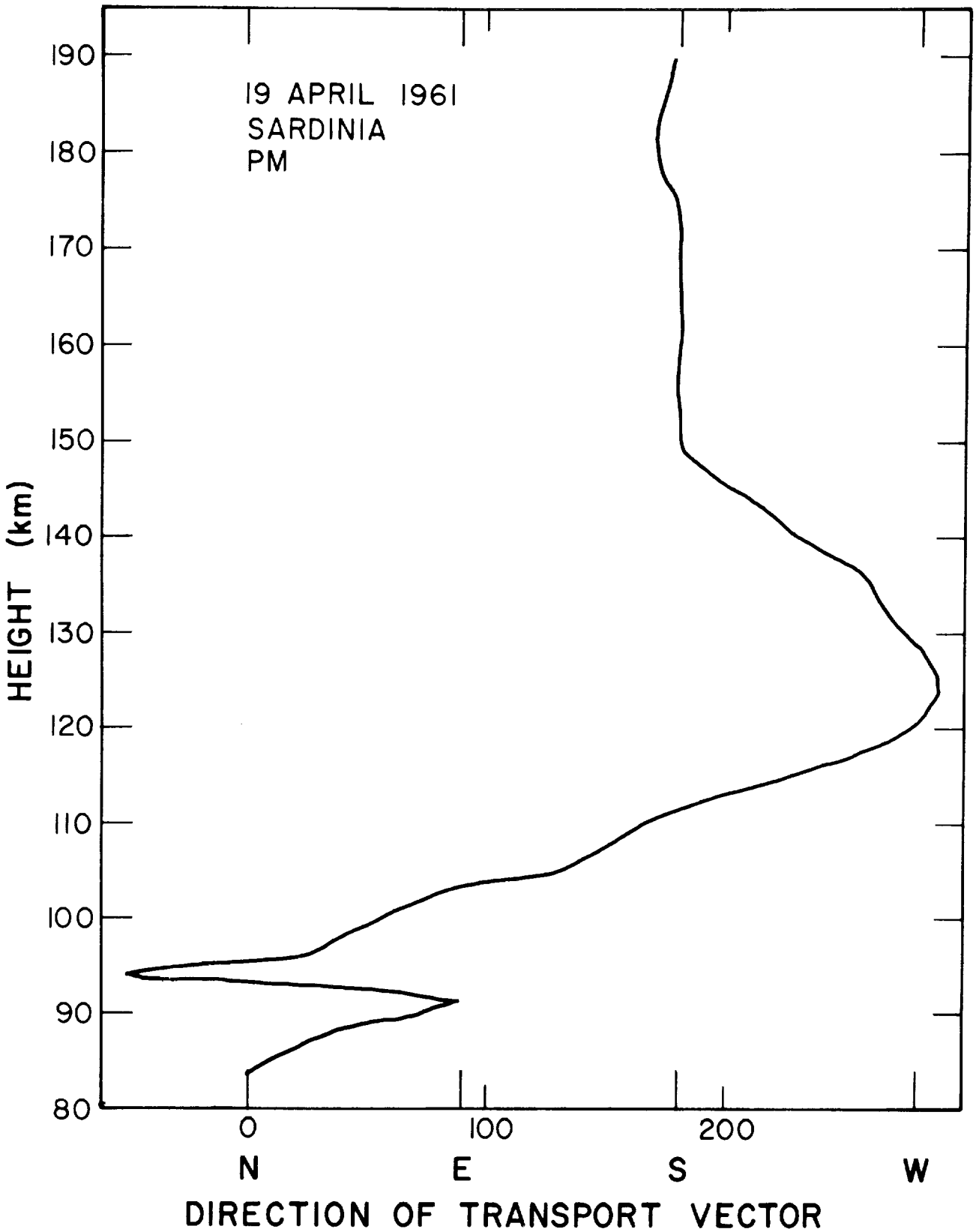

8 JANUARY 1964
TERLES
INDIA
PM
HEIGHT (km)
190
180
170
160
150
140
130
120
110
100
90
80
0
30
60
90
120
150
180
WIND SPEED (m/sec)

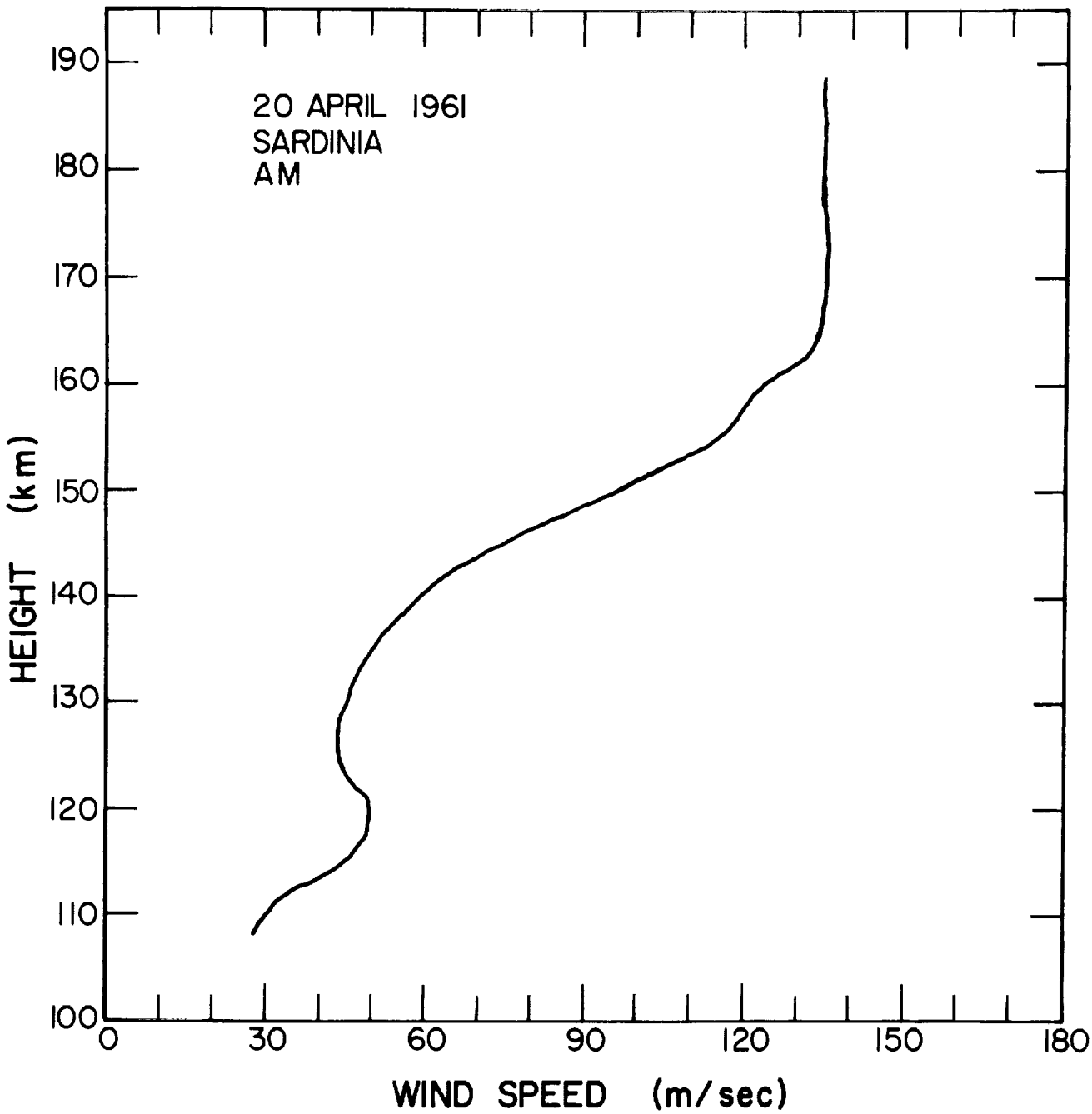

8 JANUARY 1964
TERLES
INDIA
PM
HEIGHT (km)
190
180
170
160
150
140
130
120
110
100
90
80
0
100
200
300
0
N
E
S
W
N
DIRECTION OF TRANSPORT VECTOR

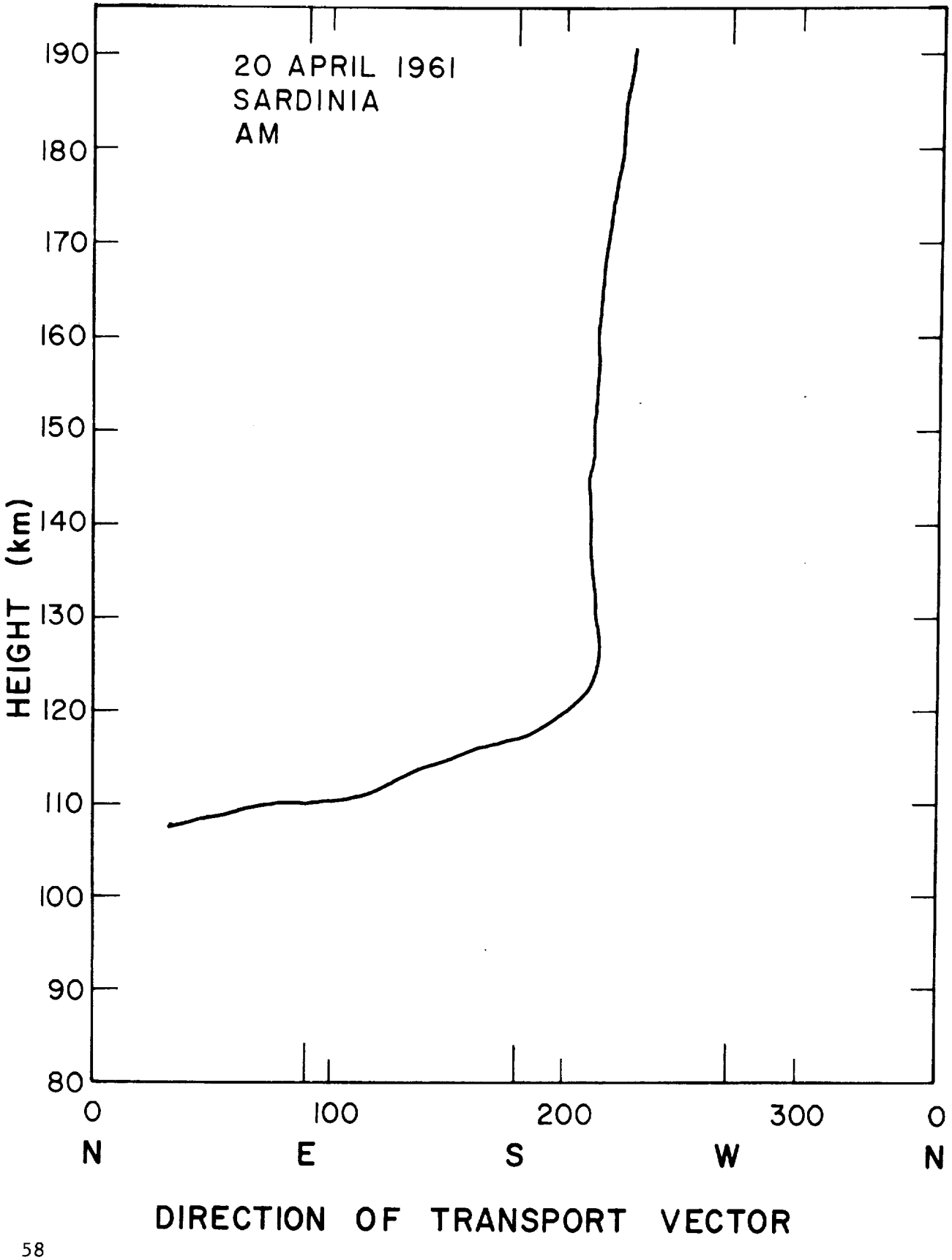

12 JANUARY 1964
TERLES
INDIA
AM
HEIGHT (km)
170
160
150
140
130
120
110
100
90
80
0
30
60
90
120
150
180
WIND SPEED (m/sec)

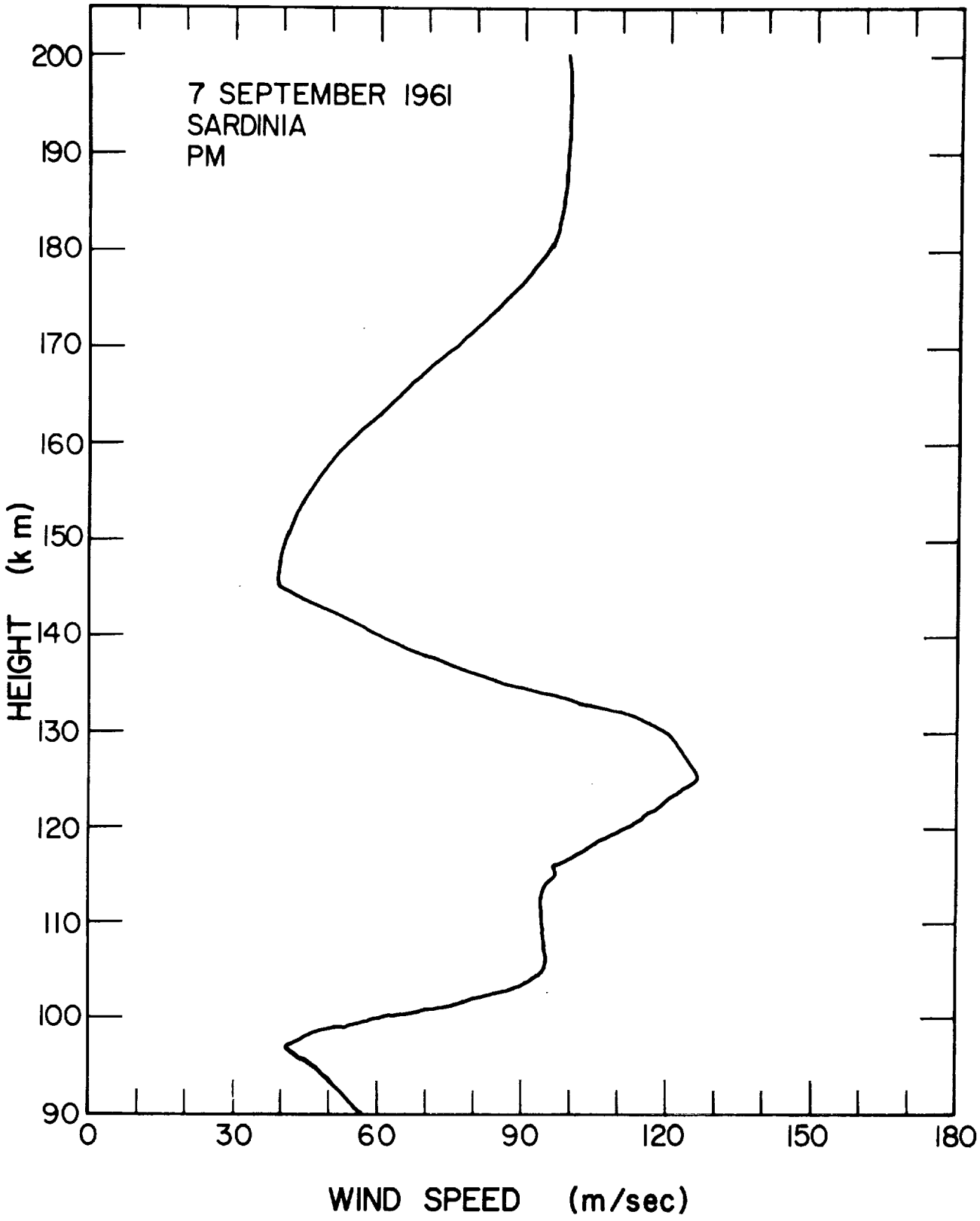

12 JANUARY 1964
TERLES
INDIA
AM
HEIGHT (km)
170
160
150
140
130
120
110
100
90
80
0
100
200
300
0
N
E
S
W
N
DIRECTION OF TRANSPORT VECTOR

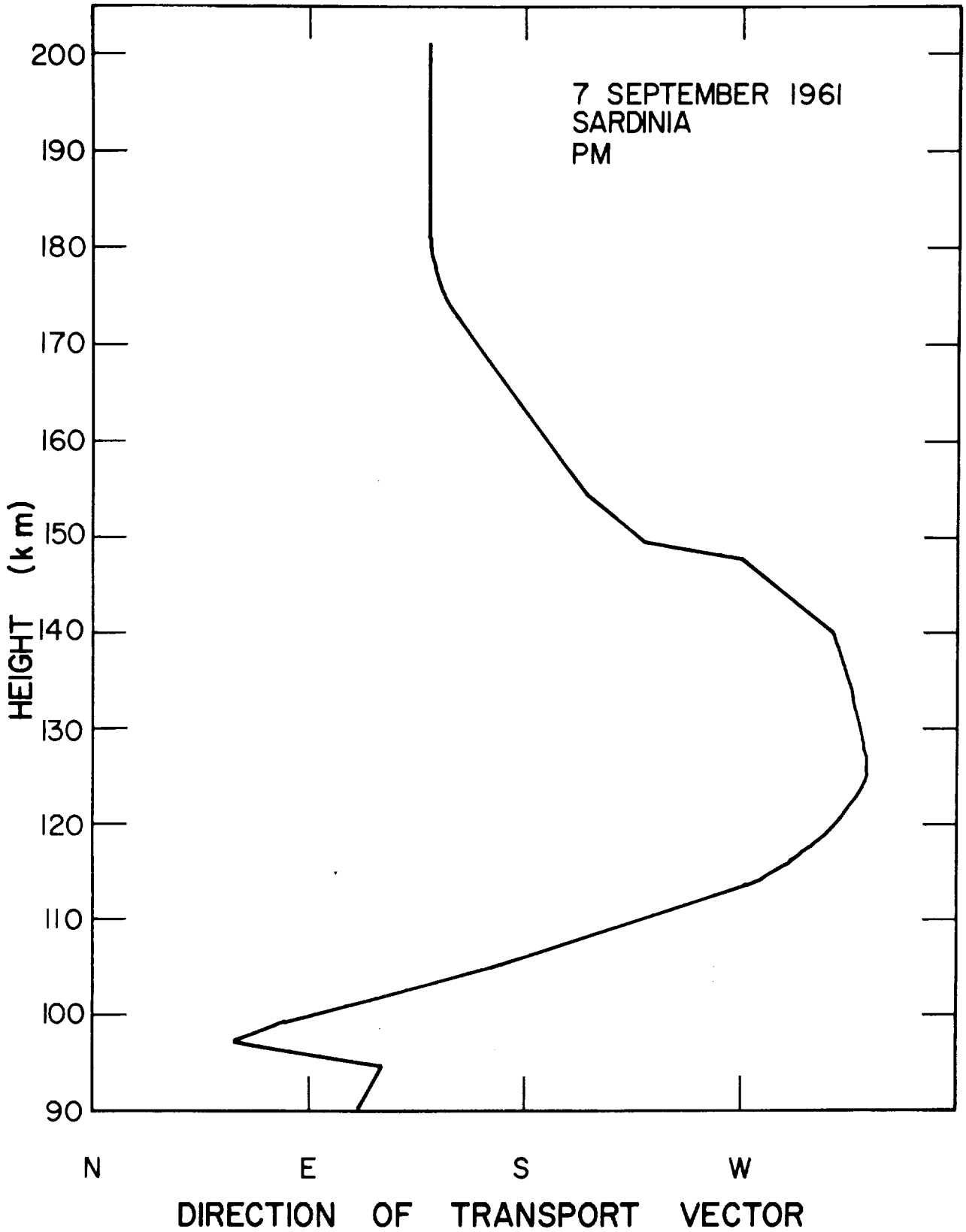

19 APRIL 1961
SARDINIA
PM
HEIGHT (km)
180
170
160
150
140
130
120
110
100
90
80
0
30
60
90
120
150
180
WIND SPEED (m/sec)

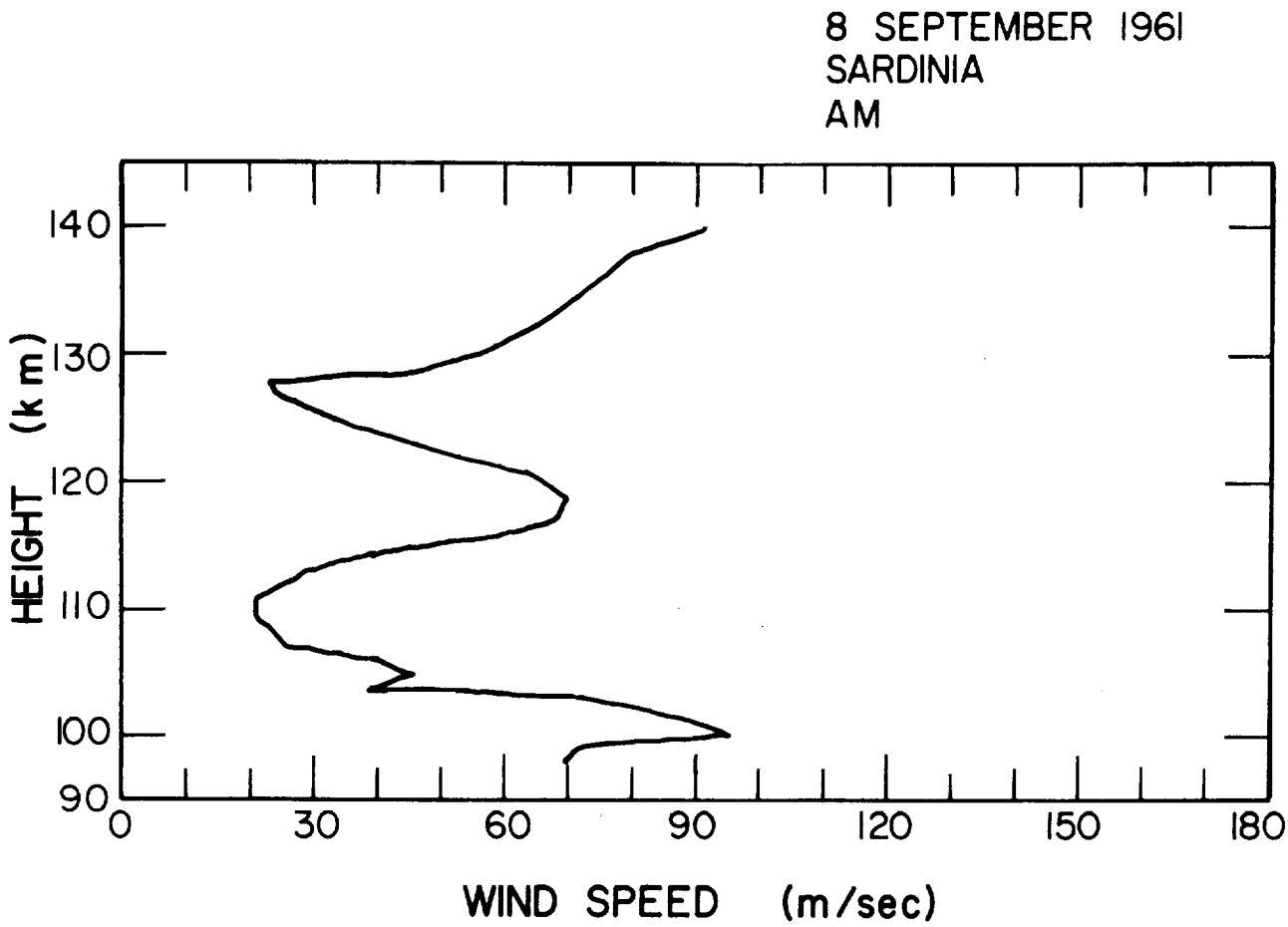

19 APRIL 1961
SARDINIA
PM
HEIGHT (km)
190
180
170
160
150
140
130
120
110
100
90
80
0
100
200
N
E
S
W
DIRECTION OF TRANSPORT VECTOR

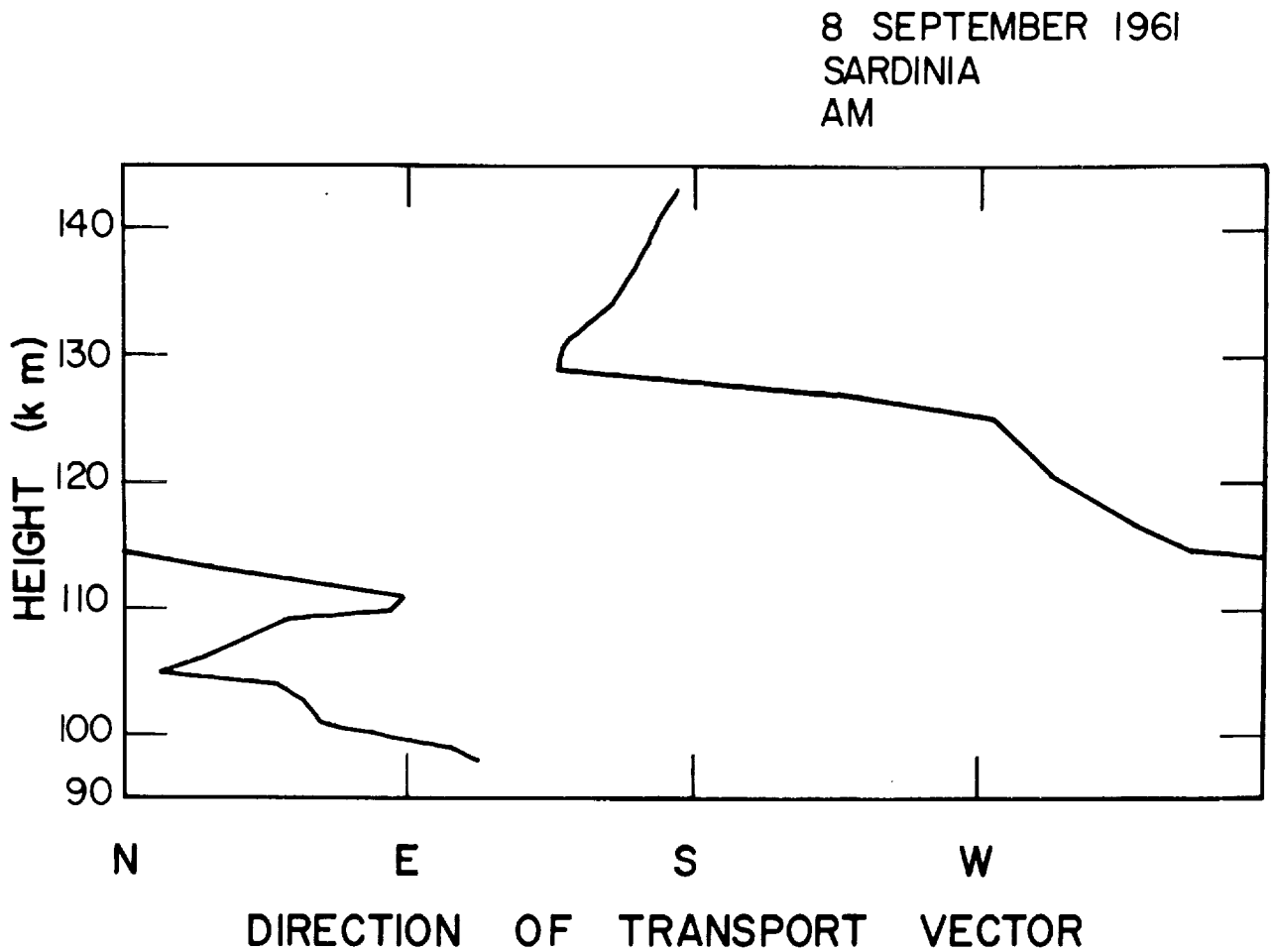

20 APRIL 1961
SARDINIA
AM
HEIGHT (km)
190
180
170
160
150
140
130
120
110
100
0
30
60
90
120
150
180
WIND SPEED (m/sec)

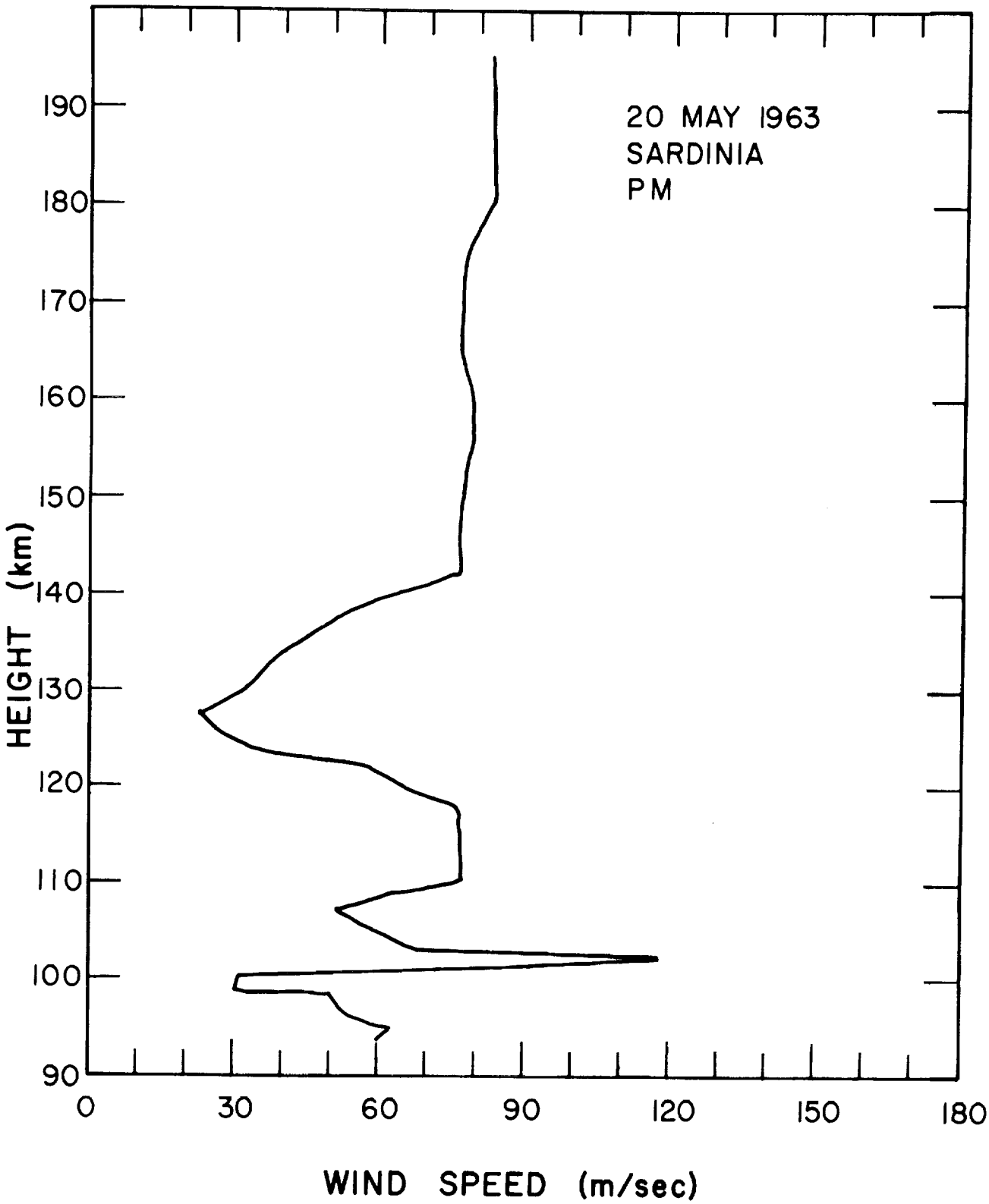

20 APRIL 1961
SARDINIA
AM
HEIGHT (km)
190
180
170
160
150
140
130
120
110
100
90
80
0
100
200
300
0
N
E
S
W
N
DIRECTION OF TRANSPORT VECTOR

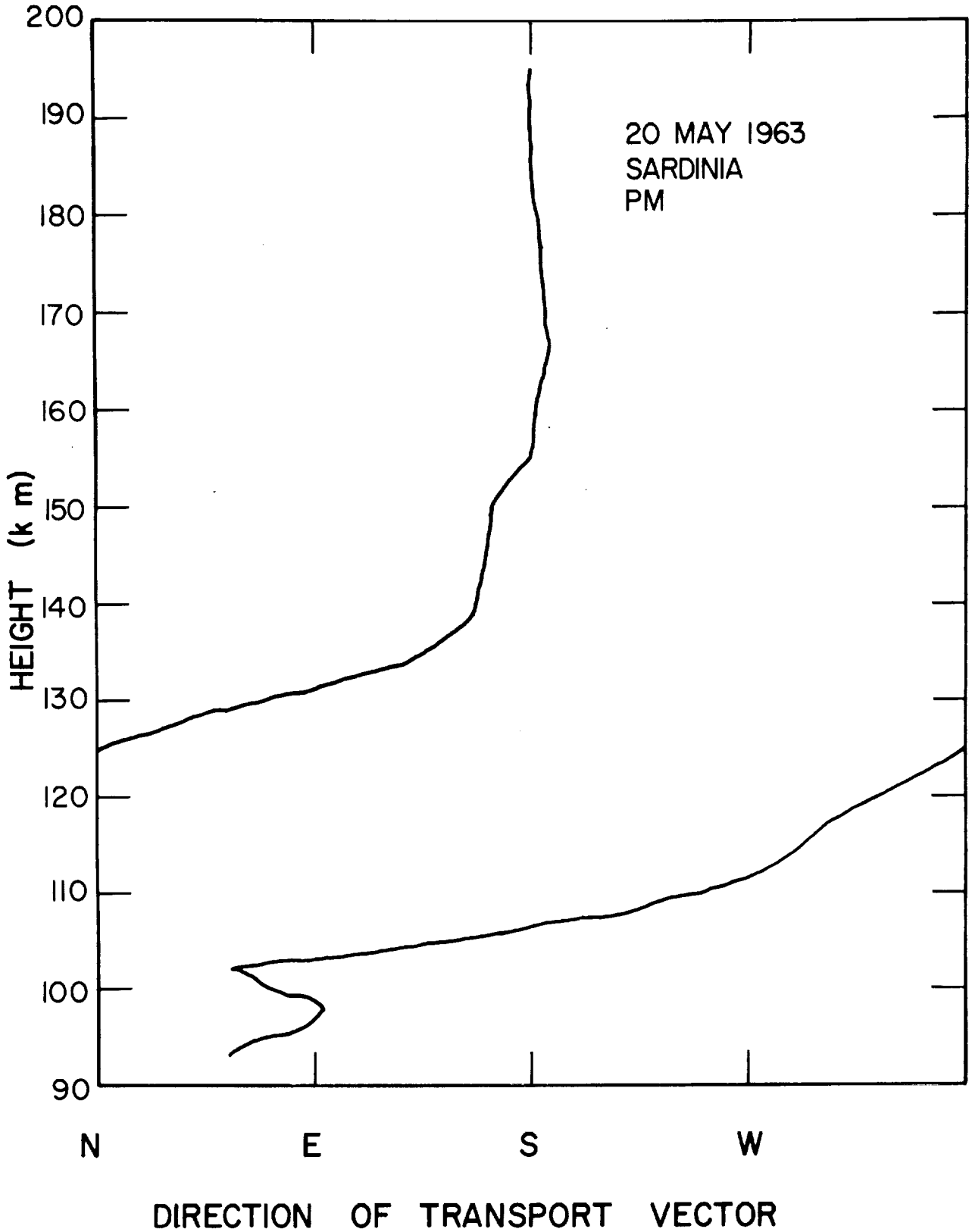

7 SEPTEMBER 1961
SARDINIA
PM
HEIGHT (k m)
200
190
180
170
160
150
140
130
120
110
100
90
0
30
60
90
120
150
180
WIND SPEED (m/sec)

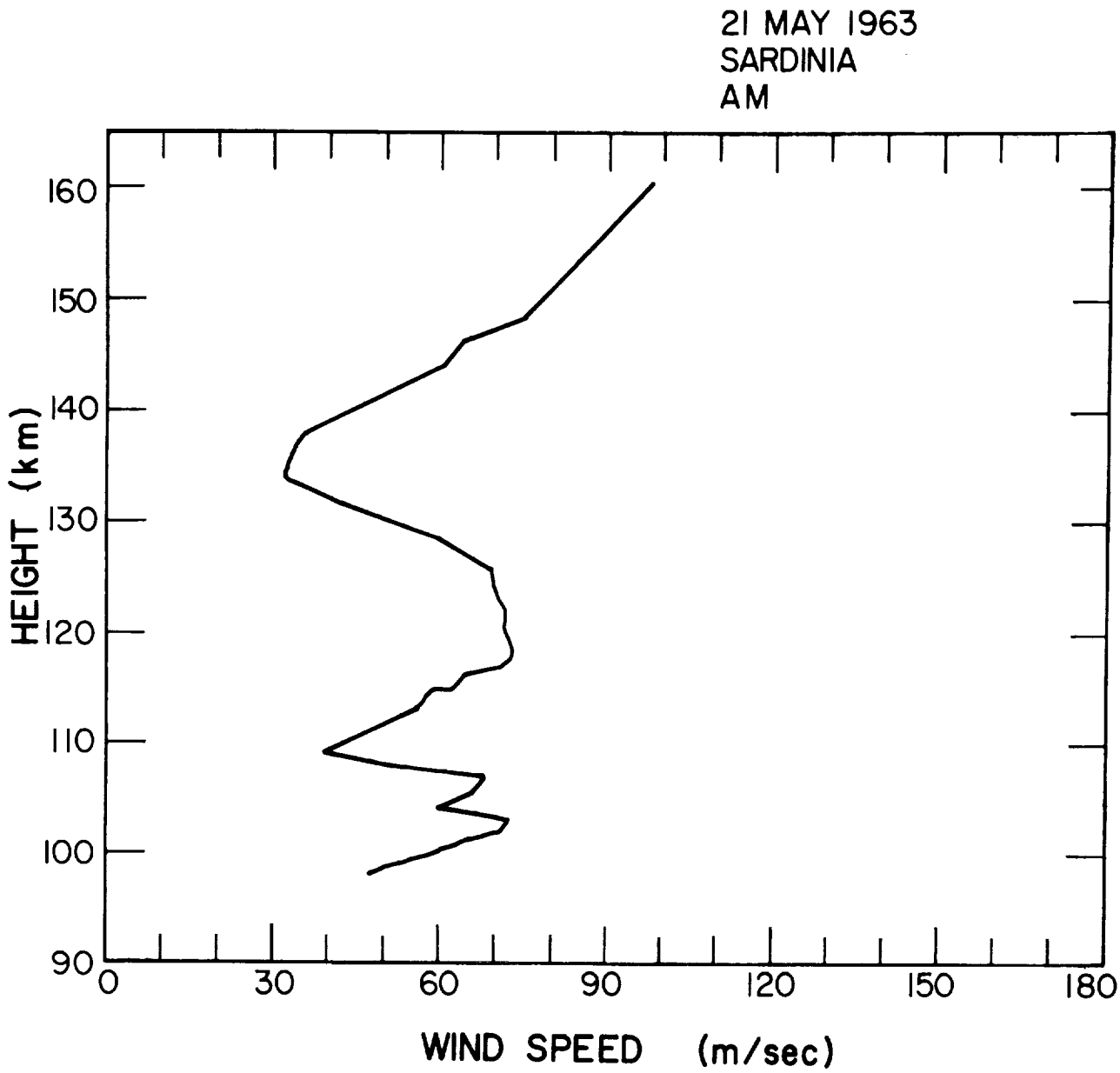

7 SEPTEMBER 1961
SARDINIA
PM
HEIGHT (km)
200
190
180
170
160
150
140
130
120
110
100
90
N
E
S
W
DIRECTION OF TRANSPORT VECTOR

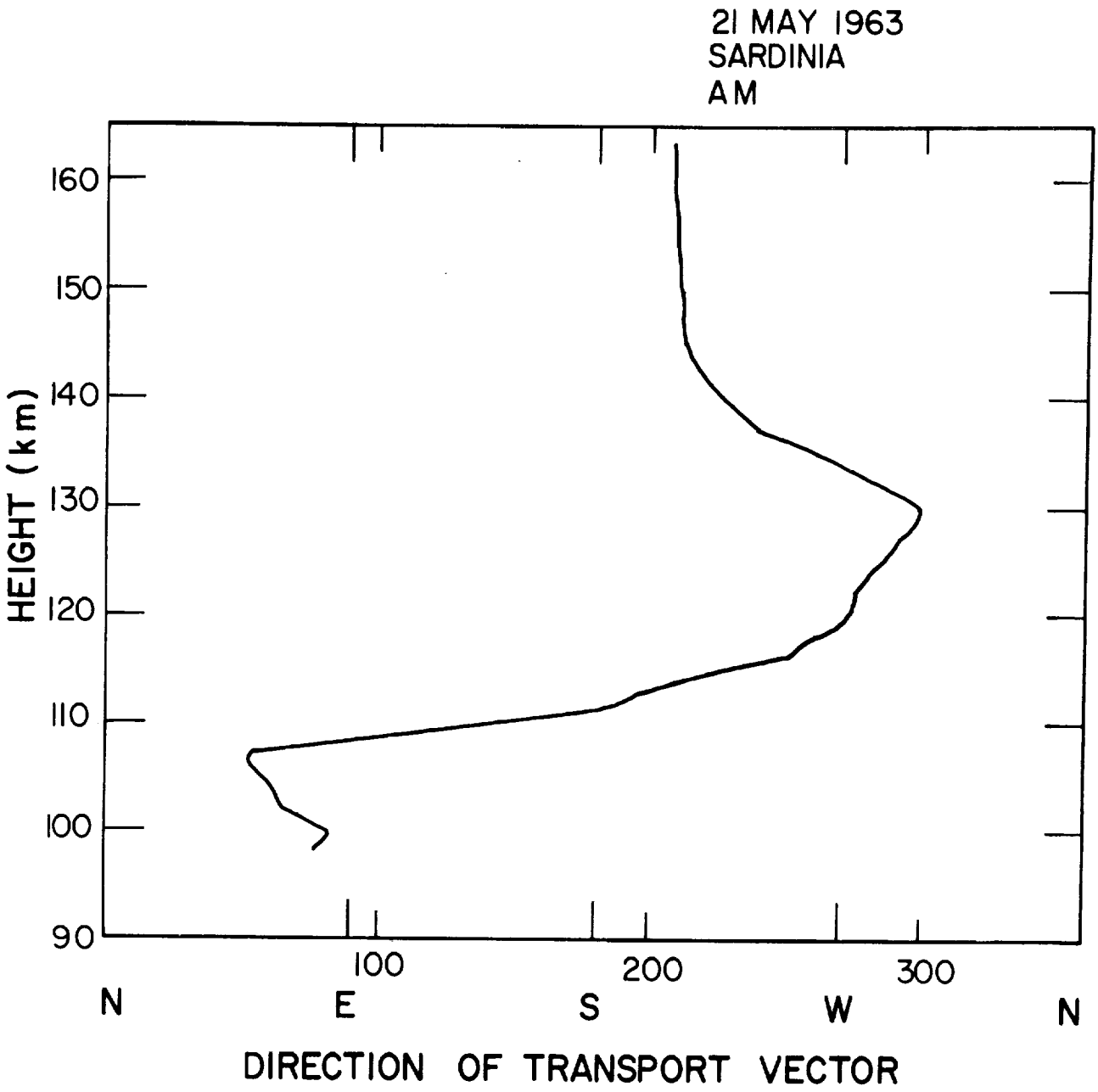

8 SEPTEMBER 1961
SARDINIA
AM
HEIGHT (km)
140
130
120
110
100
90
0
30
60
90
120
150
180
WIND SPEED (m/sec)

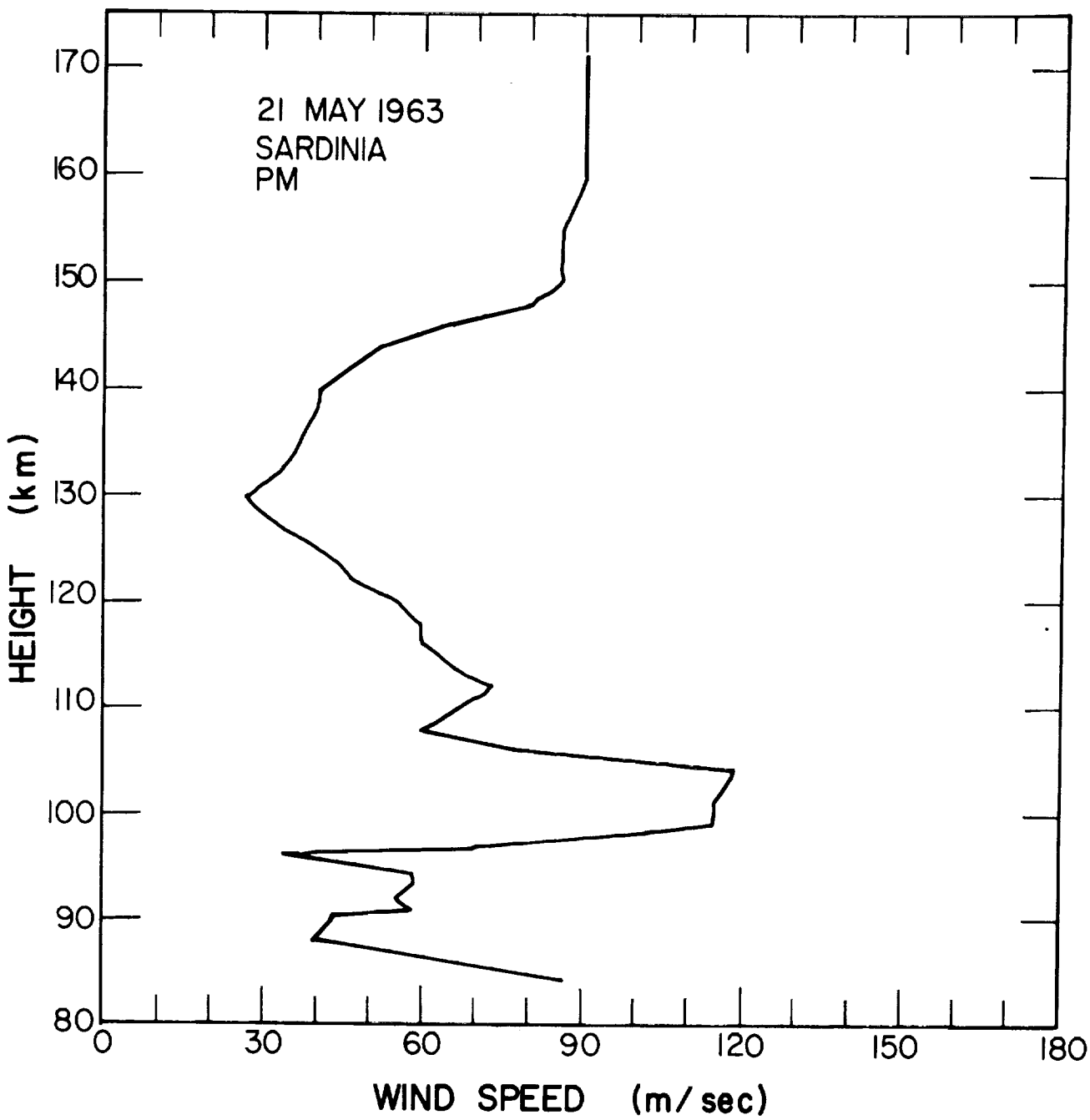

8 SEPTEMBER 1961
SARDINIA
AM
HEIGHT (k m)
140
130
120
110
100
90
N
E
S
W
DIRECTION OF TRANSPORT VECTOR

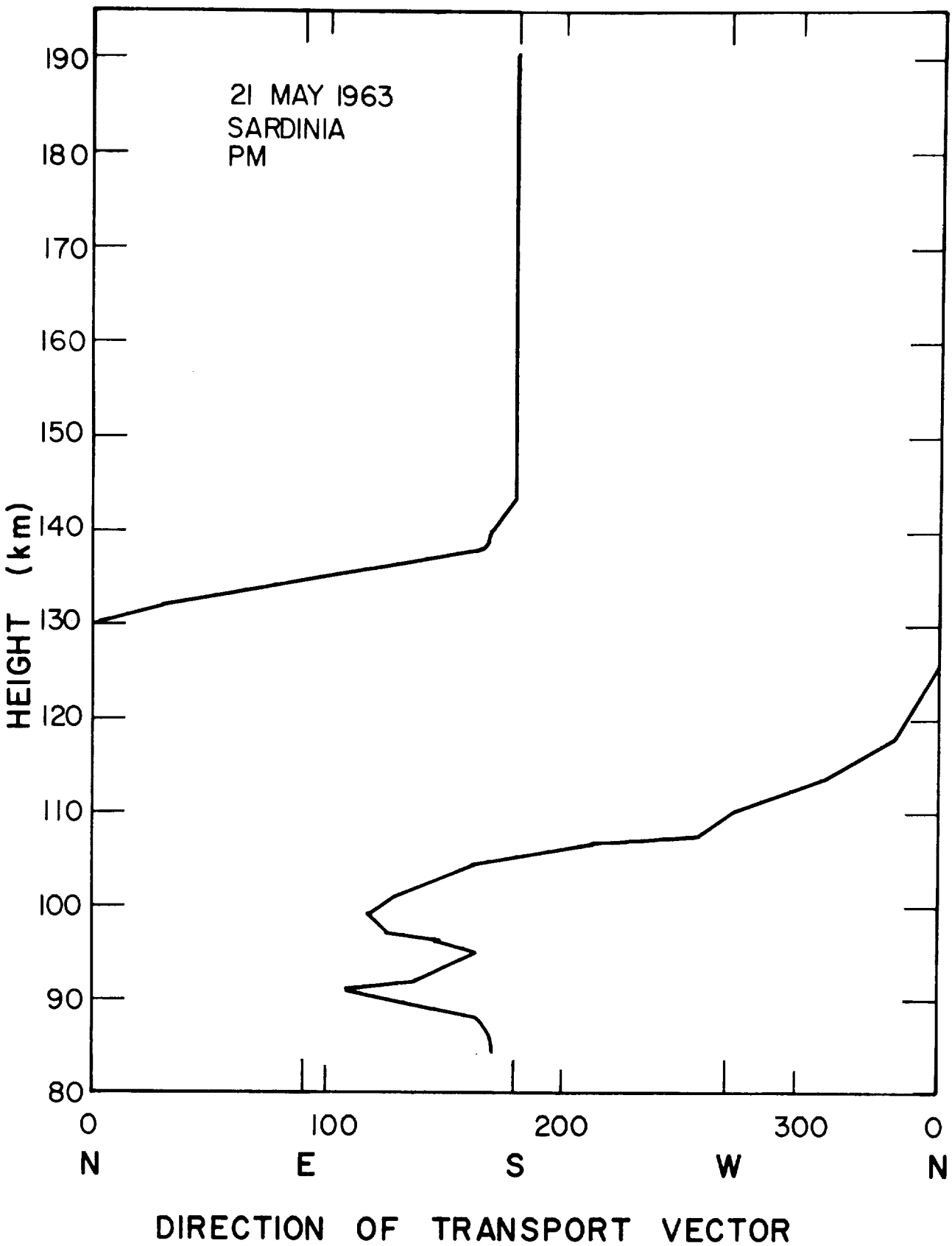

20 MAY 1963
SARDINIA
PM
HEIGHT (km)
190
180
170
160
150
140
130
120
110
100
90
0
30
60
90
120
150
180
WIND SPEED (m/sec)

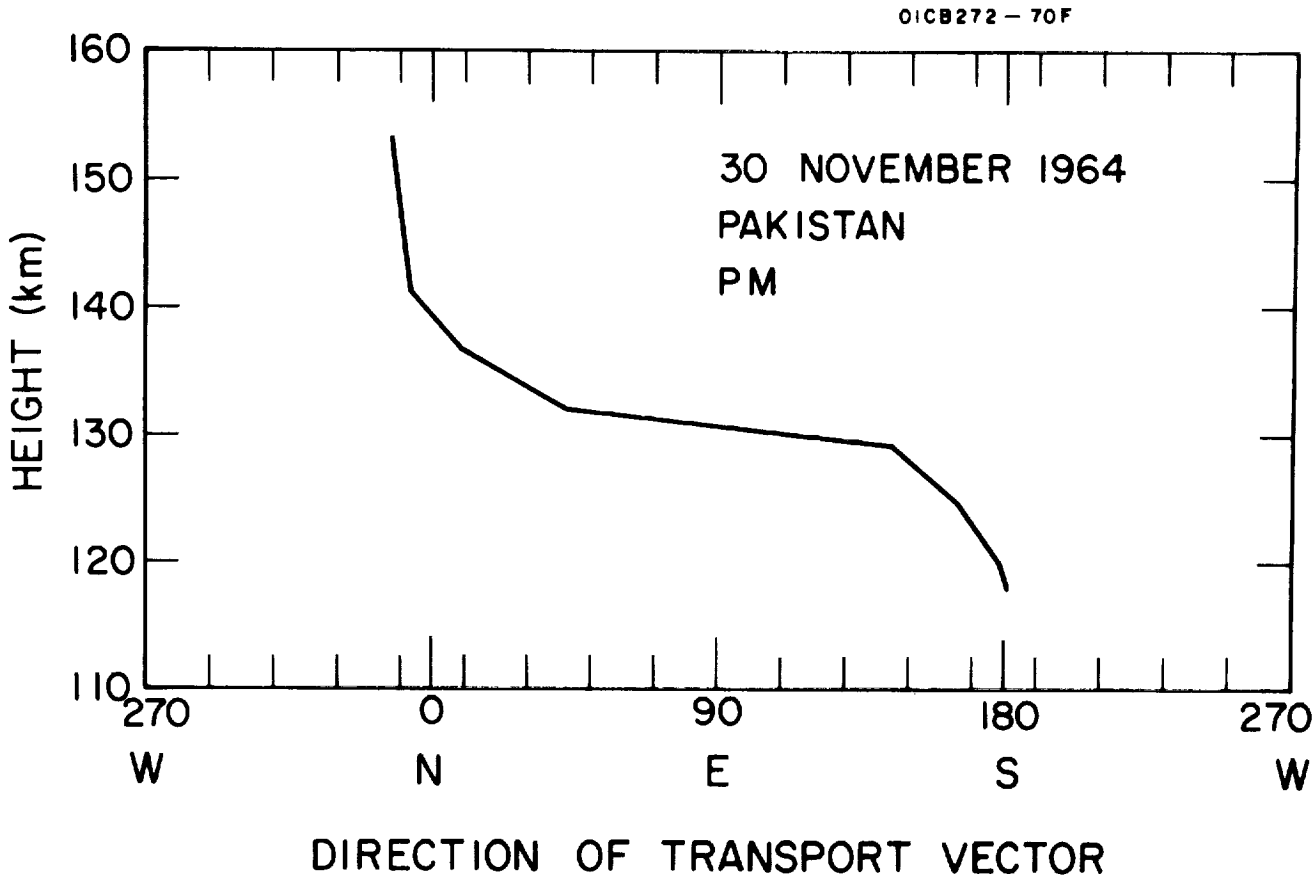

200
190
180
170
160
150
140
130
120
110
100
90
HEIGHT (k m)
20 MAY 1963
SARDINIA
PM
N
E
S
W
DIRECTION OF TRANSPORT VECTOR

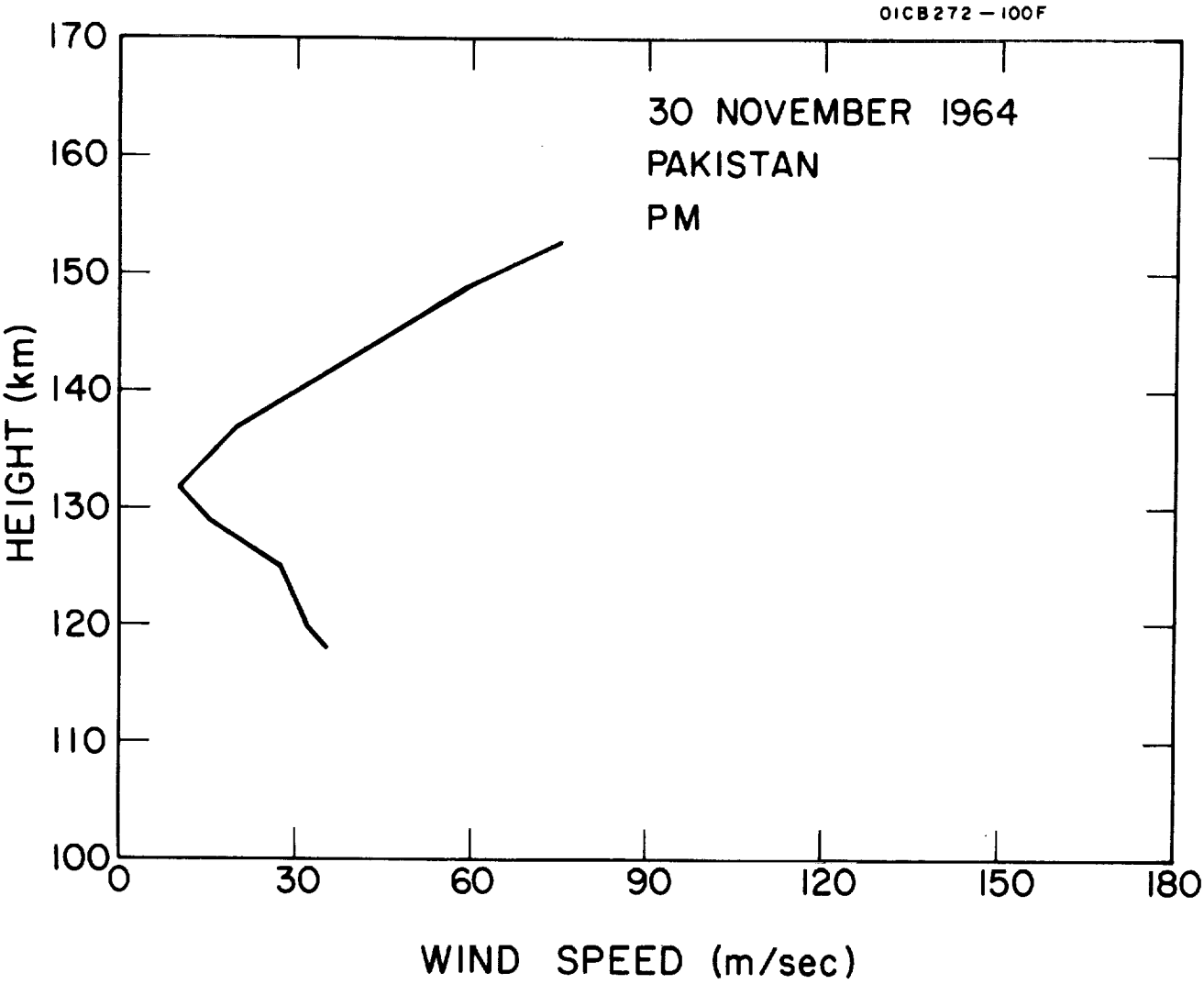

21 MAY 1963
SARDINIA
AM
HEIGHT (km)
160
150
140
130
120
110
100
90
0
30
60
90
120
150
180
WIND SPEED (m/sec)

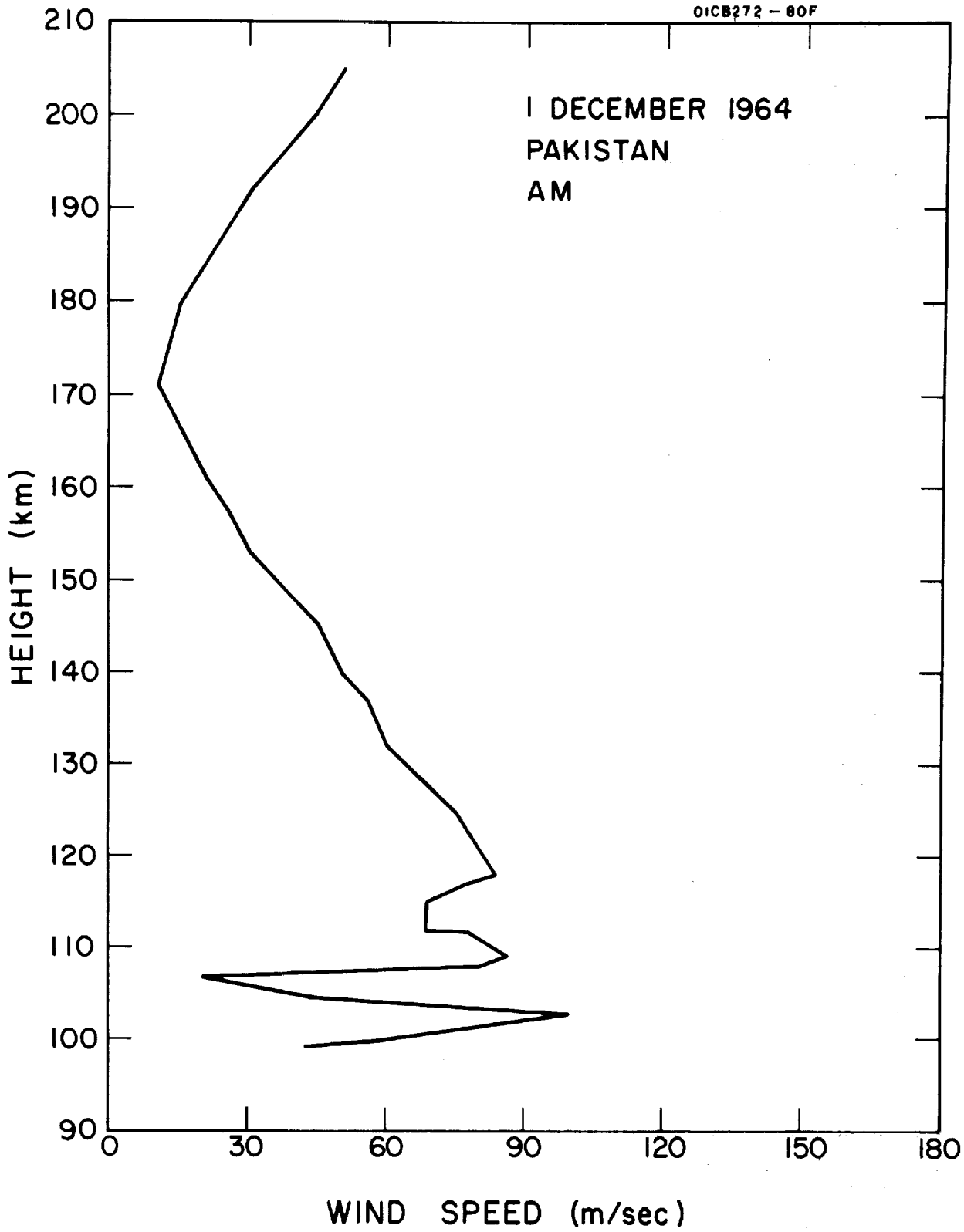

21 MAY 1963
SARDINIA
AM
HEIGHT (km)
160
150
140
130
120
110
100
90
100
200
300
N
E
S
W
N
DIRECTION OF TRANSPORT VECTOR

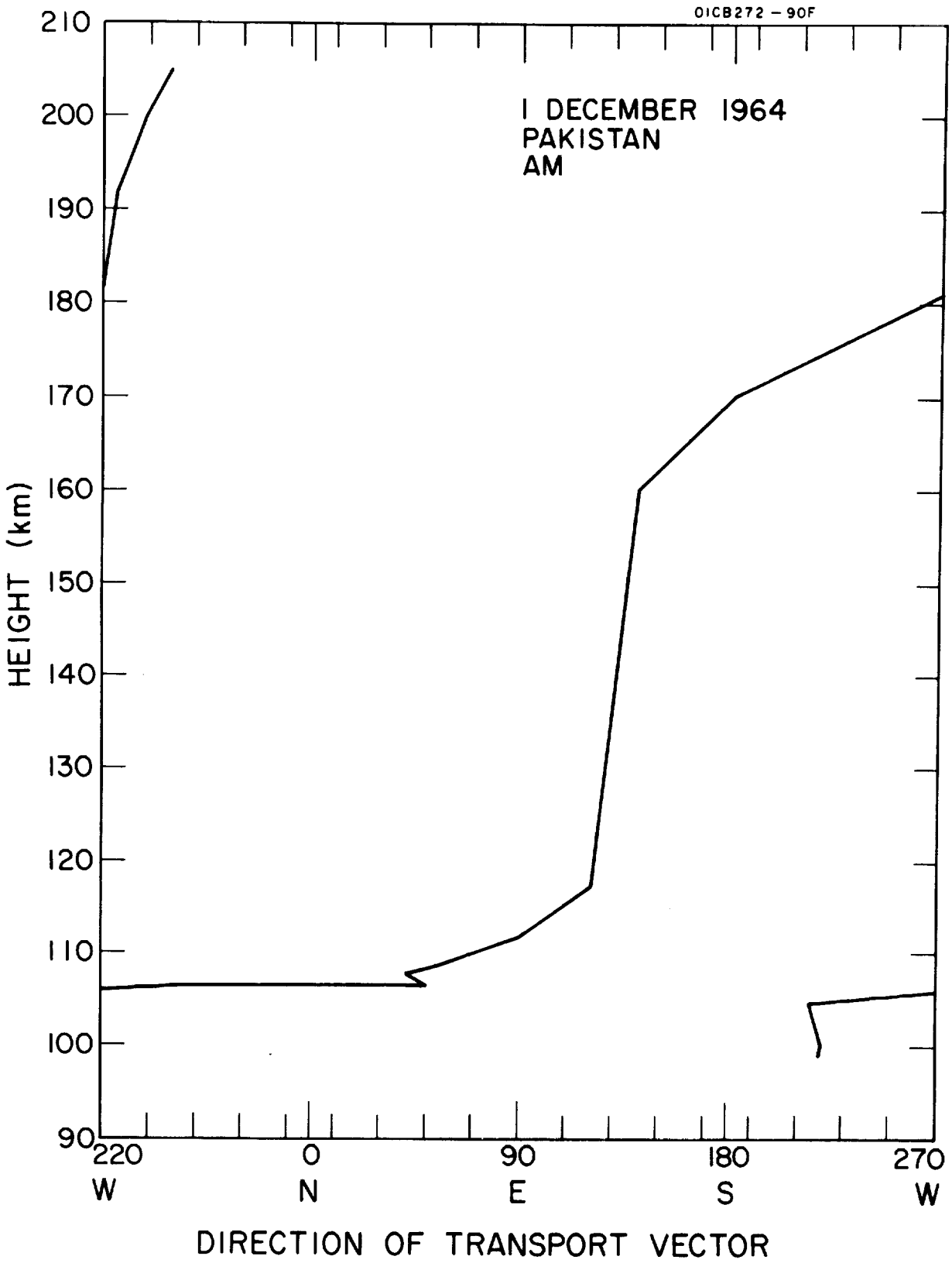

21 MAY 1963
SARDINIA
PM
HEIGHT (km)
170
160
150
140
130
120
110
100
90
80
0
30
60
90
120
150
180
WIND SPEED (m/sec)

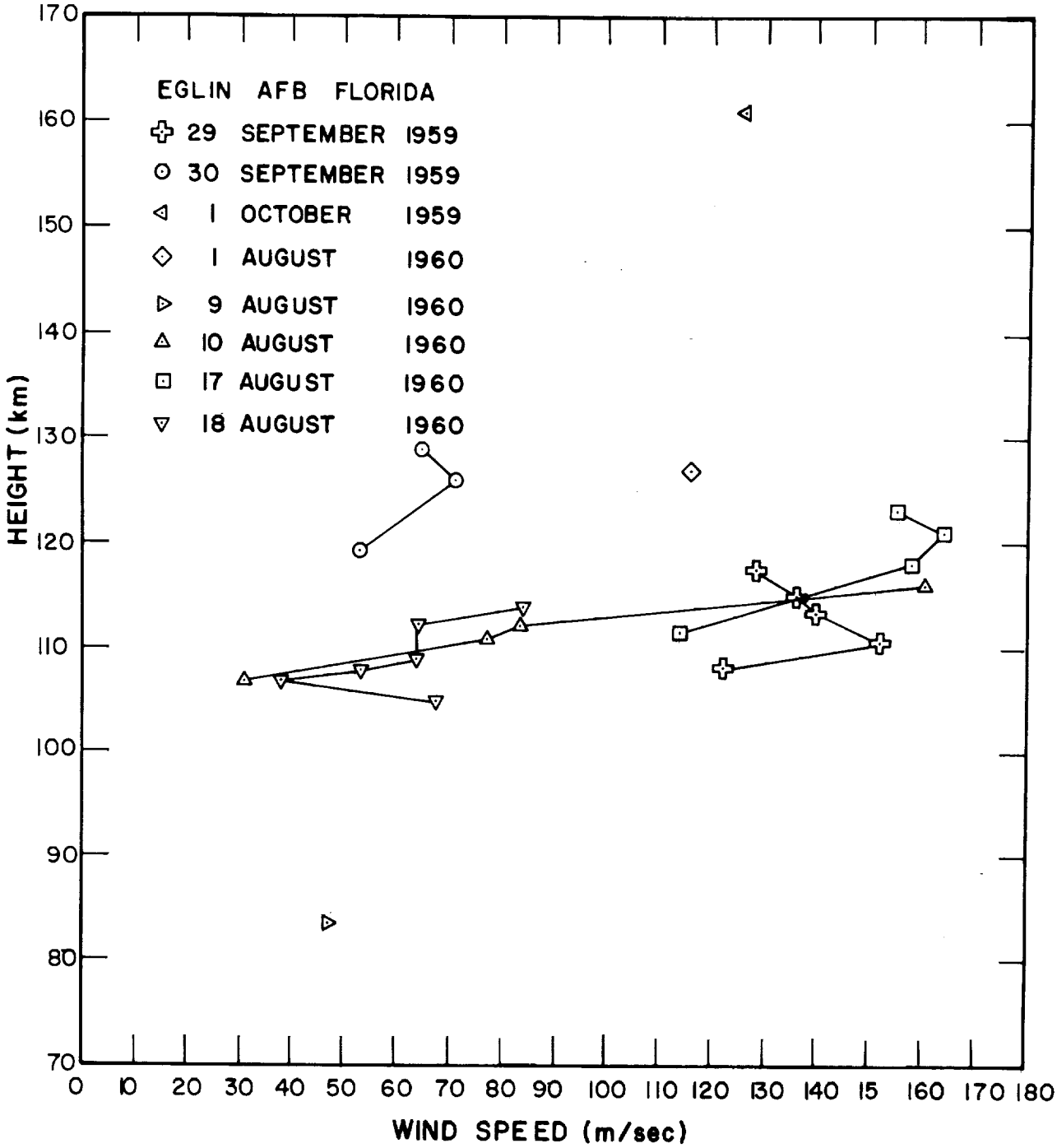

21 MAY 1963
SARDINIA
PM
HEIGHT (km)
190
180
170
160
150
140
130
120
110
100
90
80
0
100
200
300
0
N
E
S
W
N
DIRECTION OF TRANSPORT VECTOR

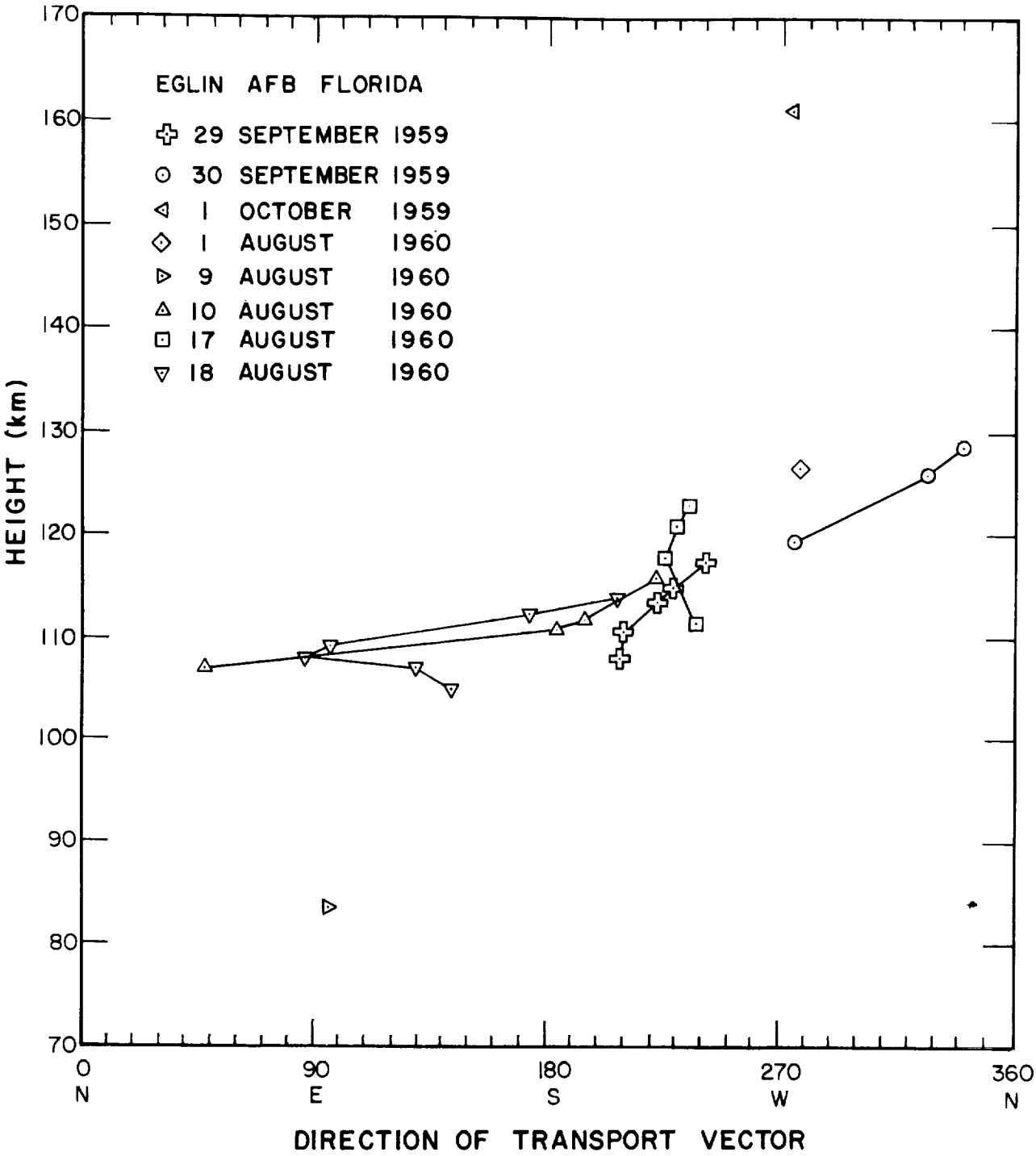

01CB272 – 70F
160
150
140
130
120
110
HEIGHT (km)
30 NOVEMBER 1964
PAKISTAN
PM
270
0
90
180
270
W
N
E
S
W
DIRECTION OF TRANSPORT VECTOR

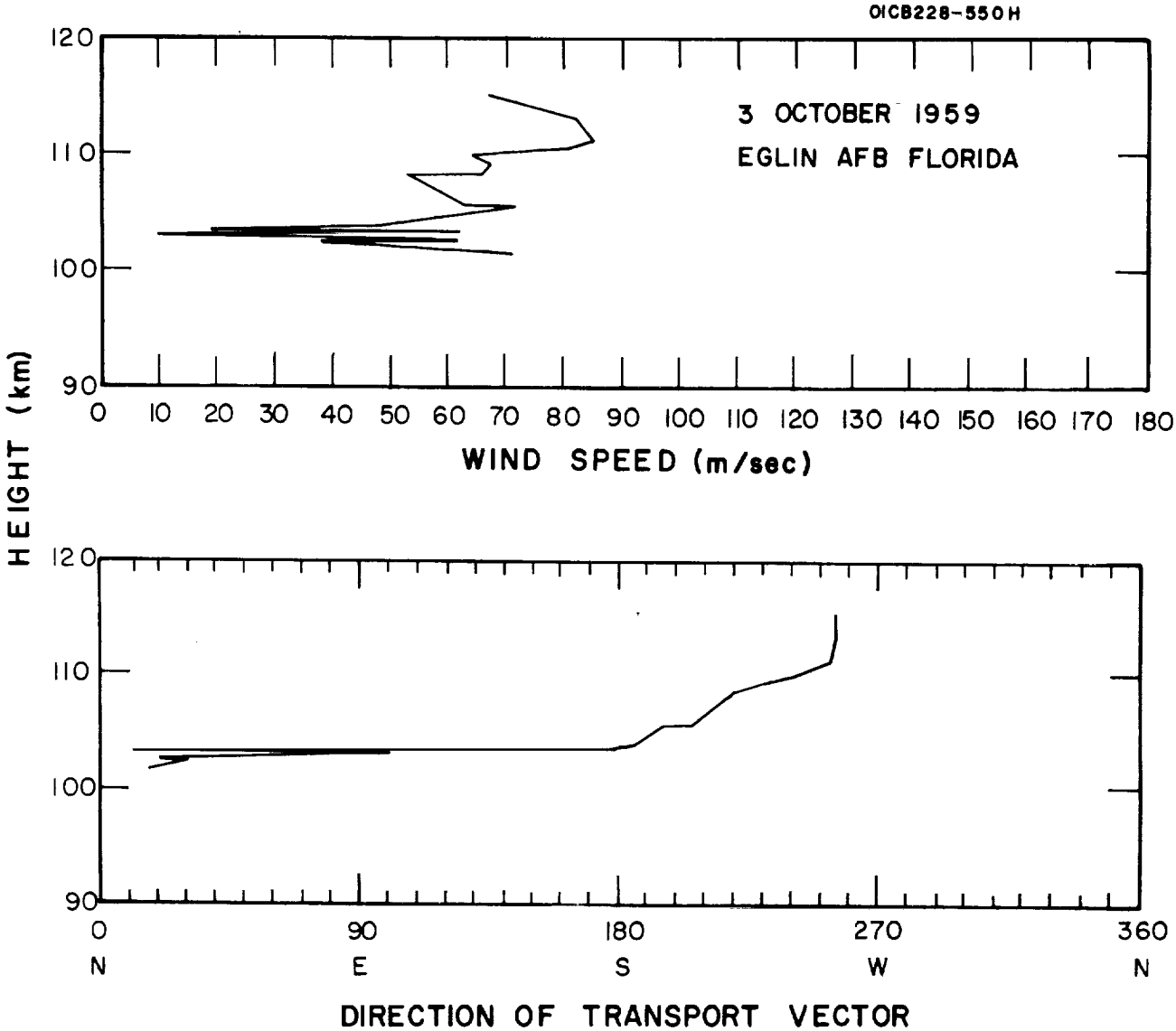

01CB272 — 100F
30 NOVEMBER 1964
PAKISTAN
PM
HEIGHT (km)
170
160
150
140
130
120
110
100
0
30
60
90
120
150
180
WIND SPEED (m/sec)

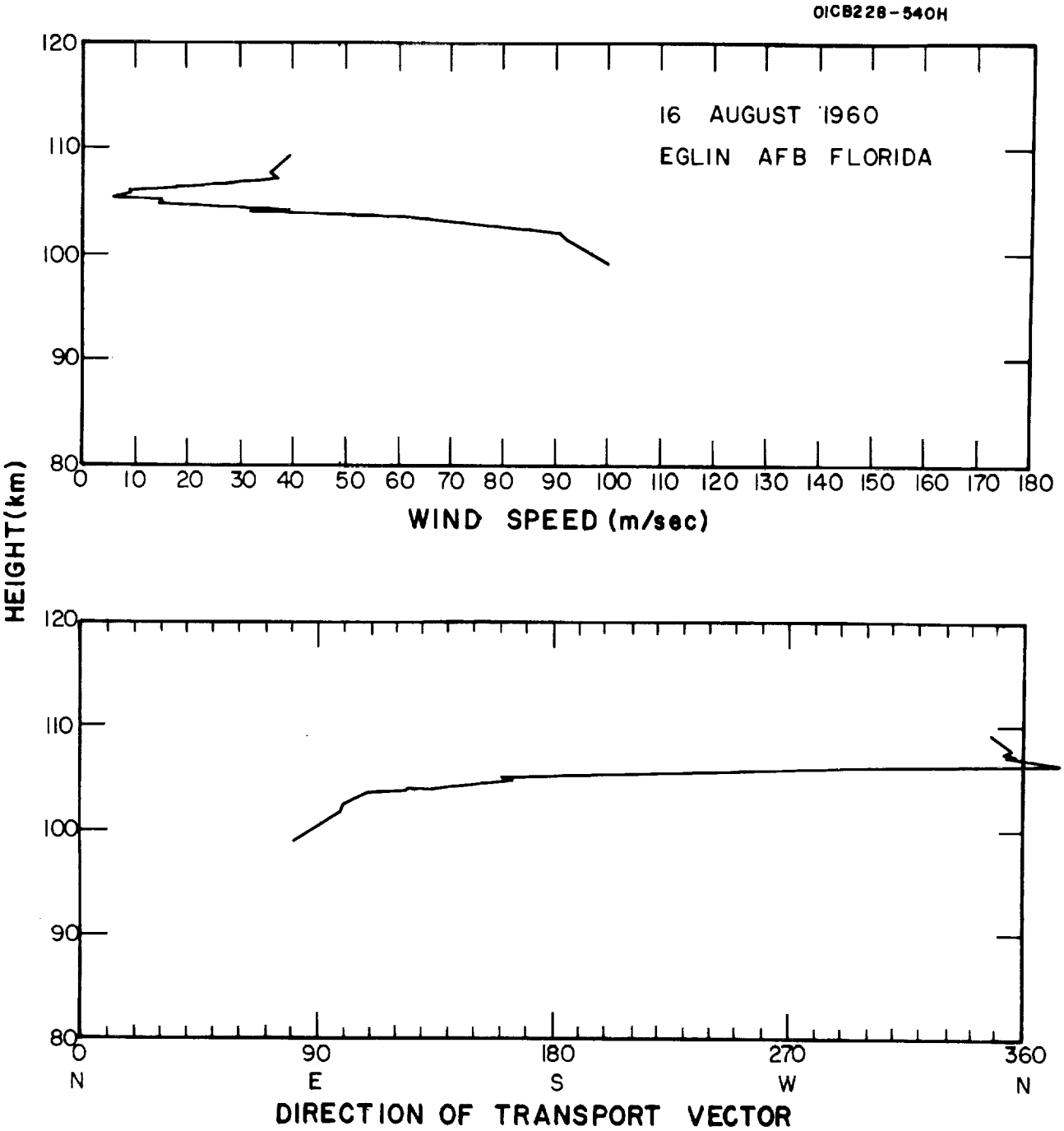

01CB272 – 80F
1 DECEMBER 1964
PAKISTAN
AM
HEIGHT (km)
210
200
190
180
170
160
150
140
130
120
110
100
90
0
30
60
90
120
150
180
WIND SPEED (m/sec)

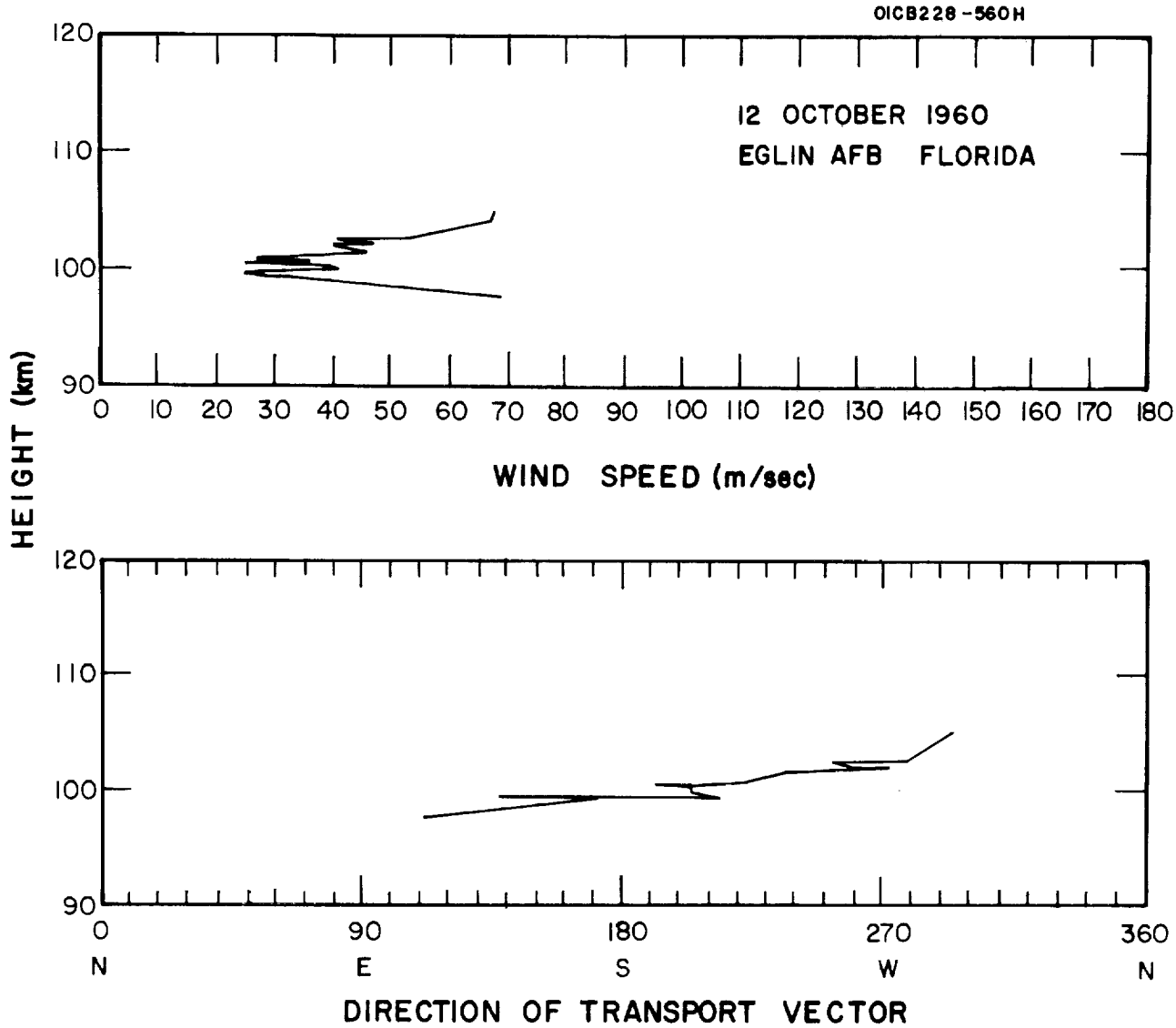

01CB272 – 90F
1 DECEMBER 1964
PAKISTAN
AM
HEIGHT (km)
210
200
190
180
170
160
150
140
130
120
110
100
90
220
W
0
N
90
E
180
S
270
W
DIRECTION OF TRANSPORT VECTOR

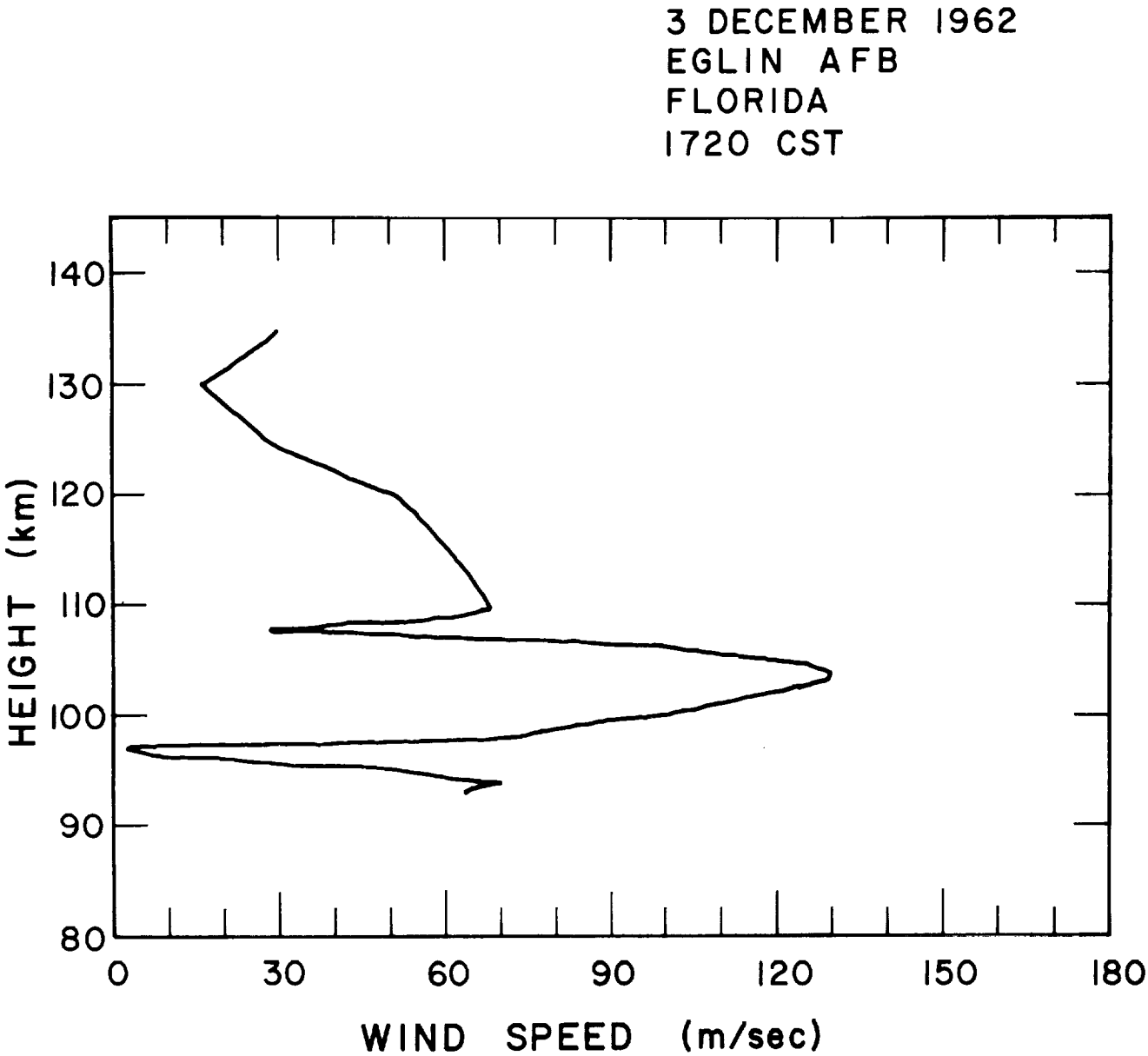

EGLIN AFB FLORIDA
29 SEPTEMBER 1959
30 SEPTEMBER 1959
1 OCTOBER 1959
1 AUGUST 1960
9 AUGUST 1960
10 AUGUST 1960
17 AUGUST 1960
18 AUGUST 1960
HEIGHT (km)
170
160
150
140
130
120
110
100
90
80
70
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 15 160 170 180
WIND SPEED (m/sec)


EGLIN AFB FLORIDA
29 SEPTEMBER 1959
30 SEPTEMBER 1959
1 OCTOBER 1959
1 AUGUST 1960
9 AUGUST 1960
10 AUGUST 1960
17 AUGUST 1960
18 AUGUST 1960
HEIGHT (km)
170
160
150
140
130
120
110
100
90
80
70
0
N
90
E
180
S
270
W
360
N
DIRECTION OF TRANSPORT VECTOR

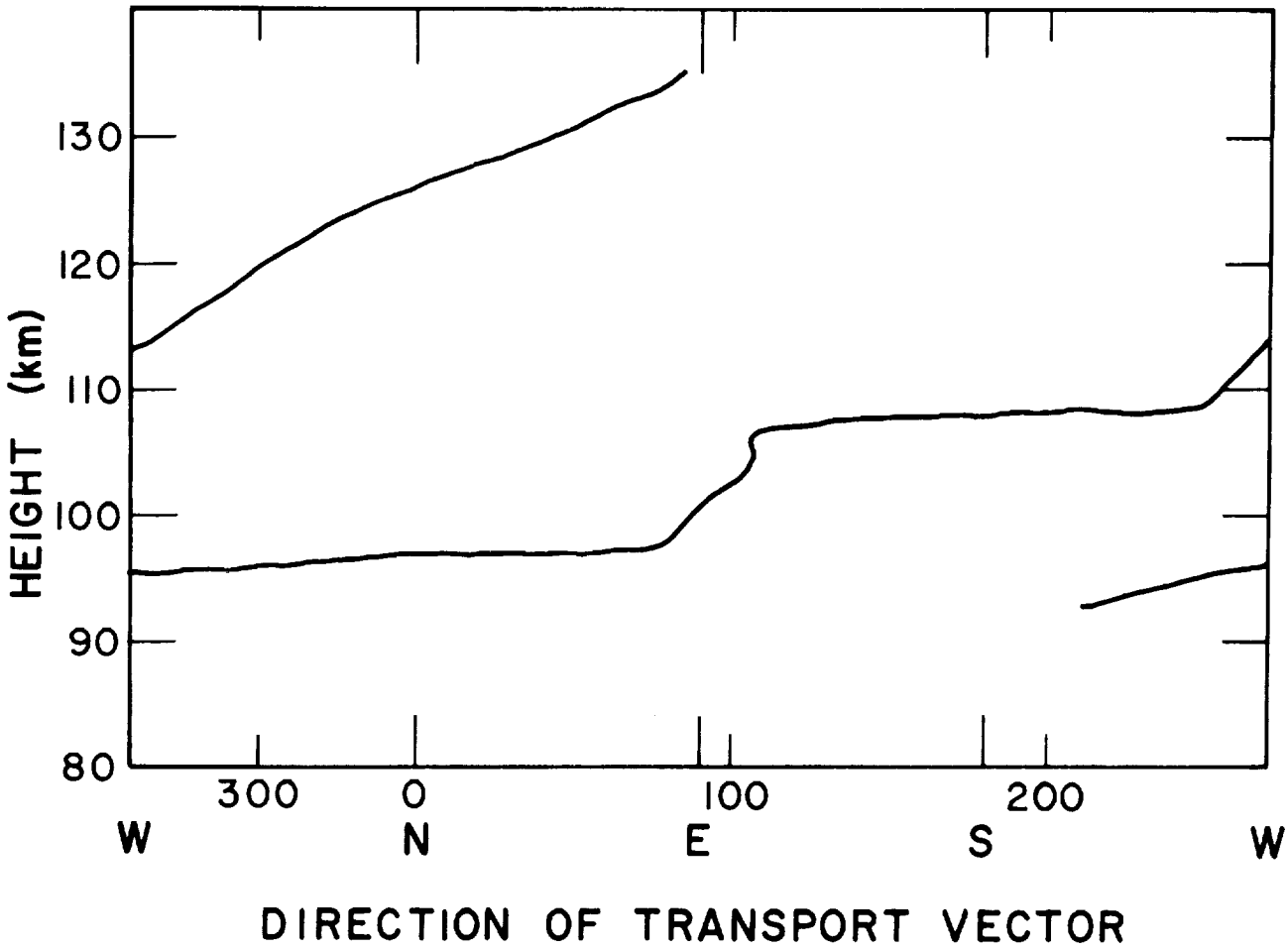

01CB228-550H
3 OCTOBER 1959
EGLIN AFB FLORIDA
HEIGHT (km)
120
110
100
90
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180
WIND SPEED (m/sec)
120
110
100
90
0 90 180 270 360
N E S W N
DIRECTION OF TRANSPORT VECTOR

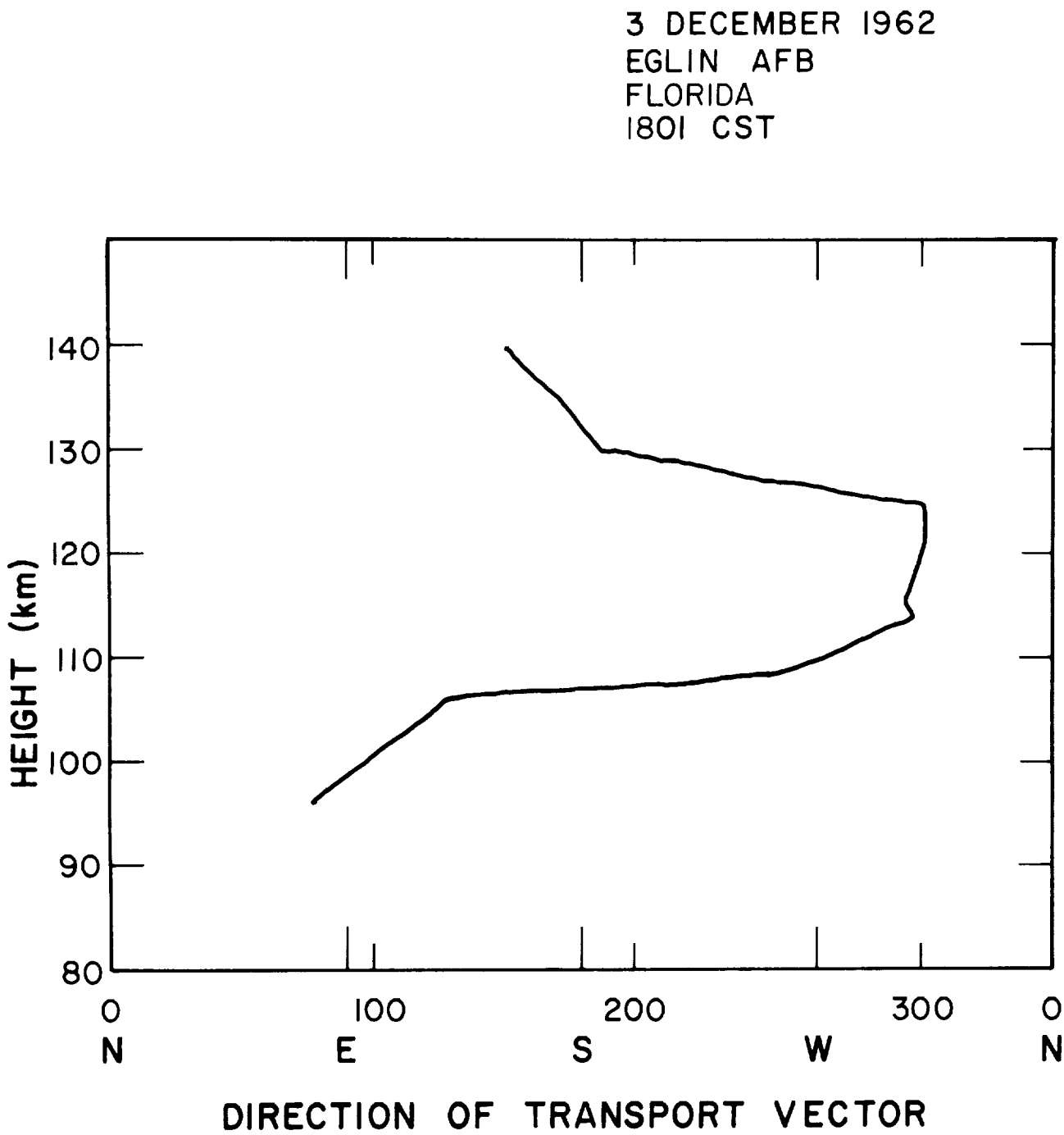

01CB228-540H
16 AUGUST 1960
EGLIN AFB FLORIDA
HEIGHT(km)
120
110
100
90
80
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180
WIND SPEED (m/sec)
120
110
100
90
80
0 90 180 270 360
N E S W N
DIRECTION OF TRANSPORT VECTOR

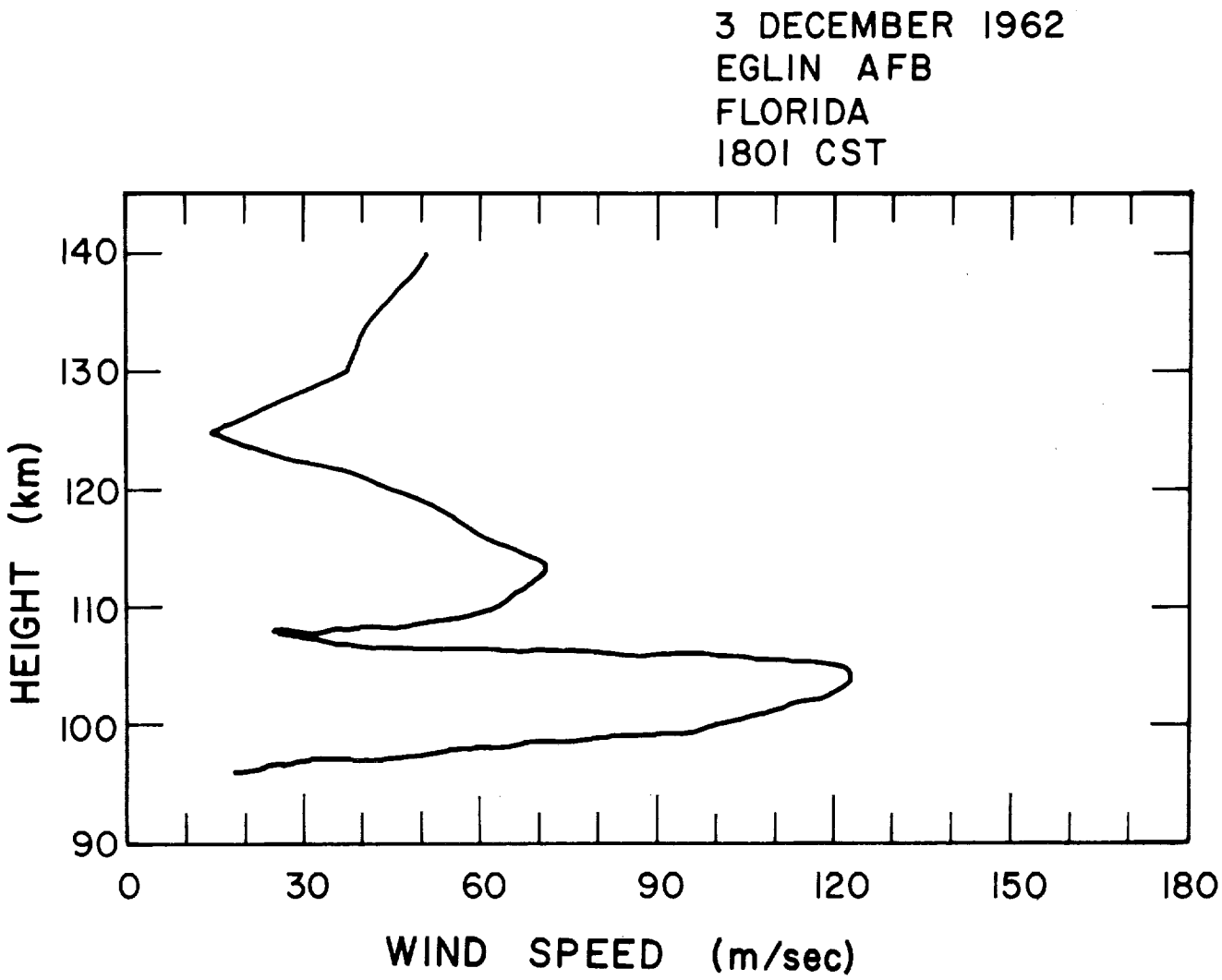

01CB228-560H
12 OCTOBER 1960
EGLIN AFB FLORIDA
HEIGHT (km)
120
110
100
90
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180
WIND SPEED (m/sec)
120
110
100
90
0 90 180 270 360
N E S W N
DIRECTION OF TRANSPORT VECTOR

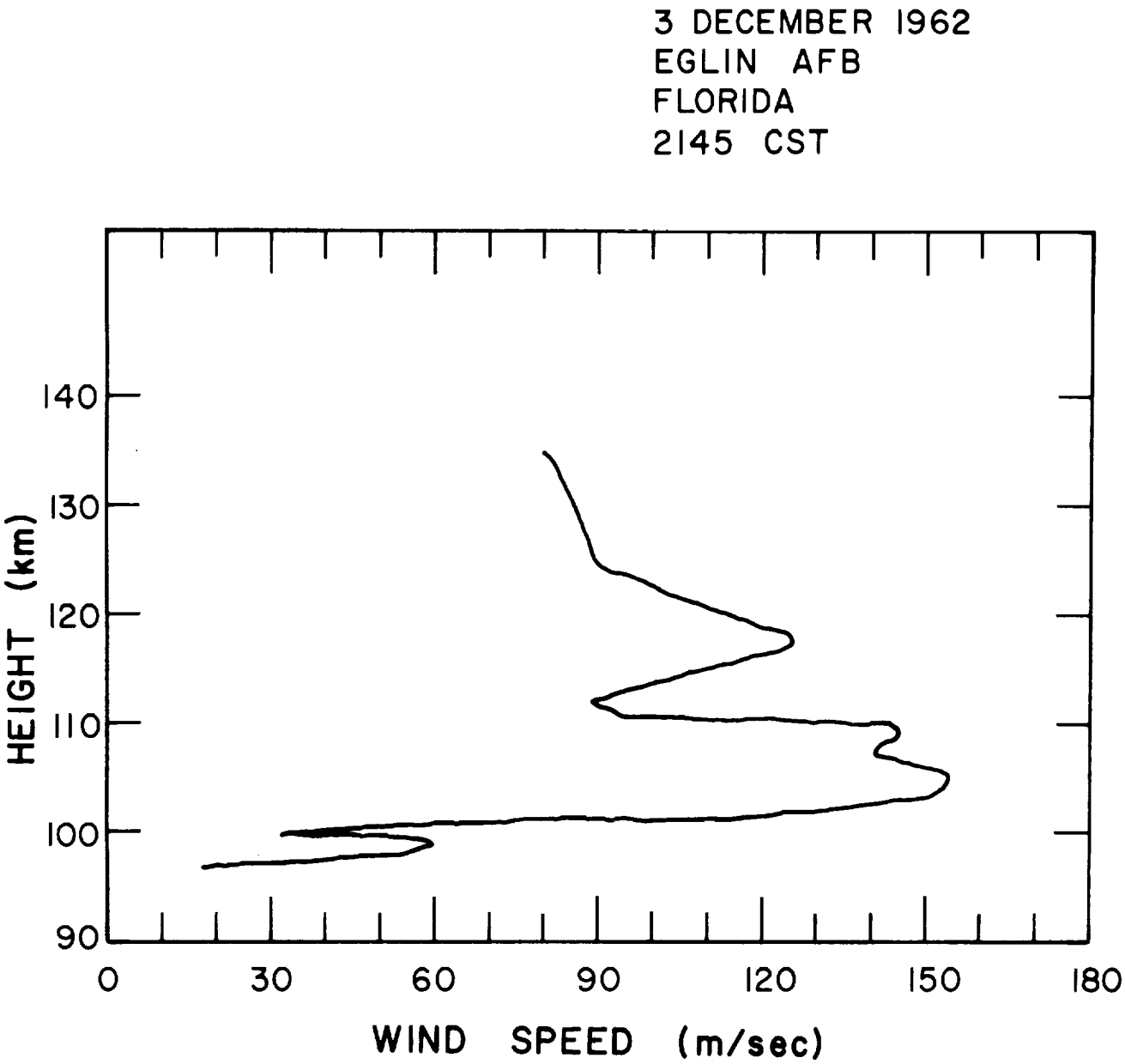

3 DECEMBER 1962
EGLIN AFB
FLORIDA
1720 CST
HEIGHT (km)
140
130
120
110
100
90
80
0
30
60
90
120
150
180
WIND SPEED (m/sec)

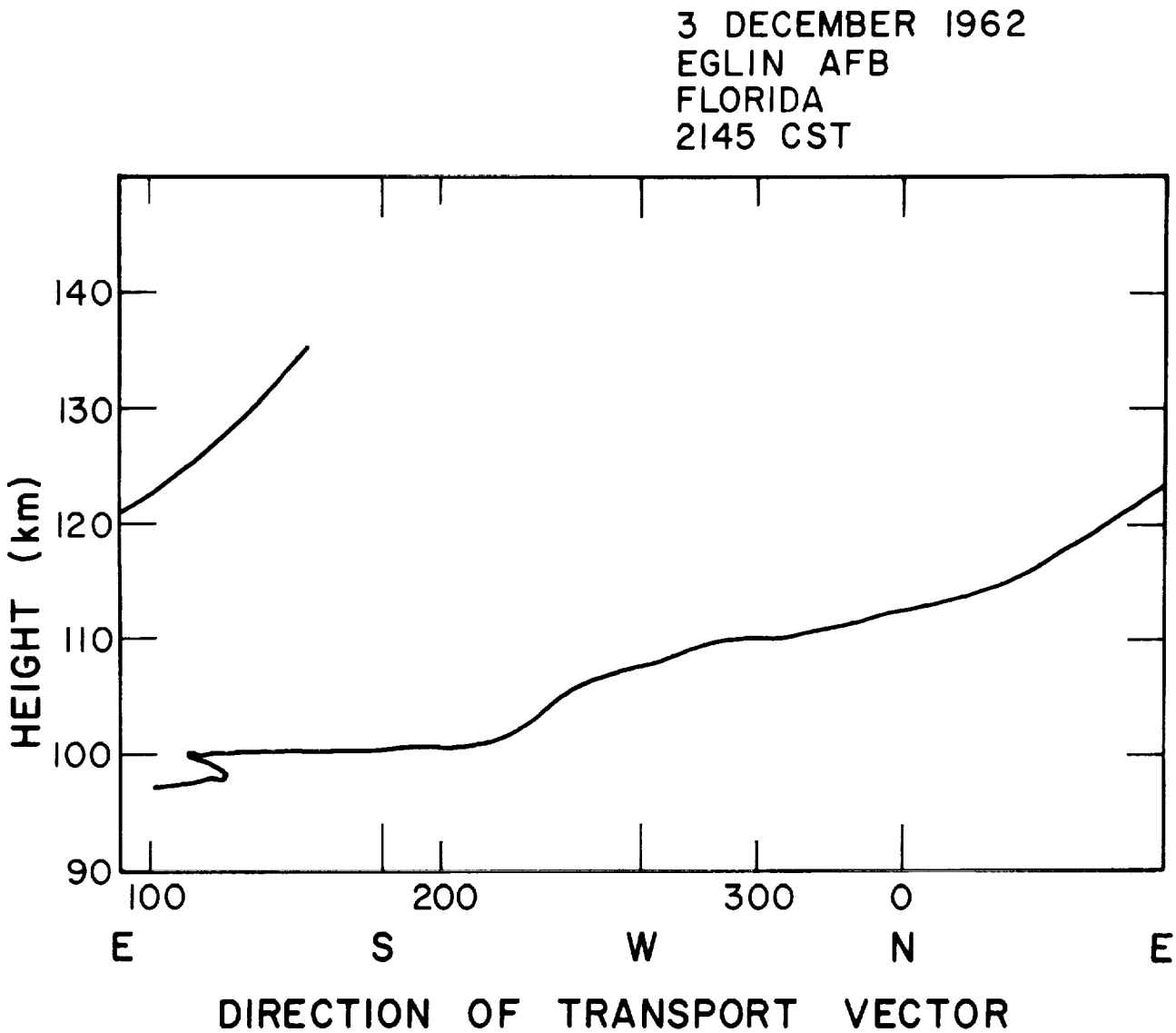
3 DECEMBER 1962
EGLIN AFB
FLORIDA
1720 CST

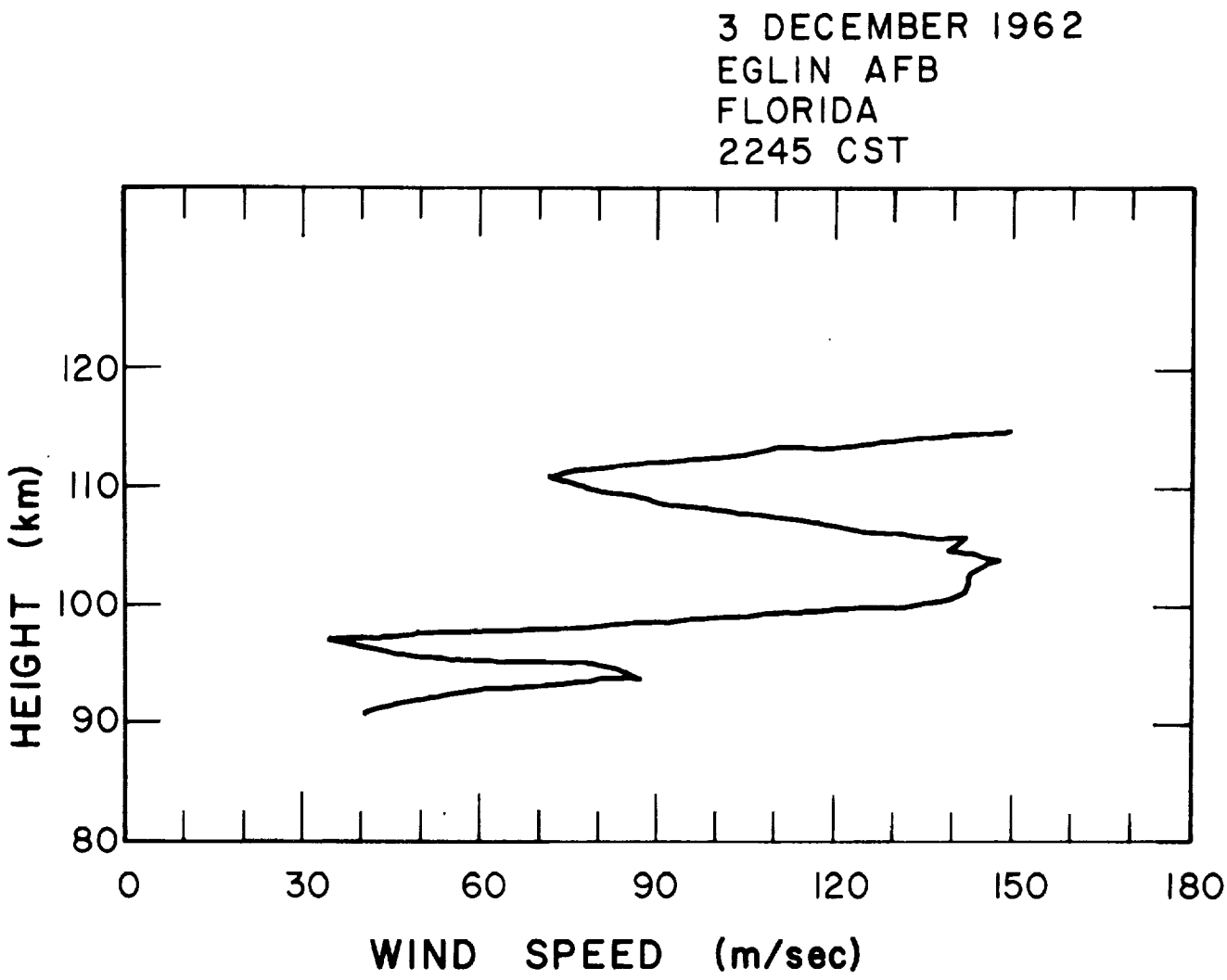


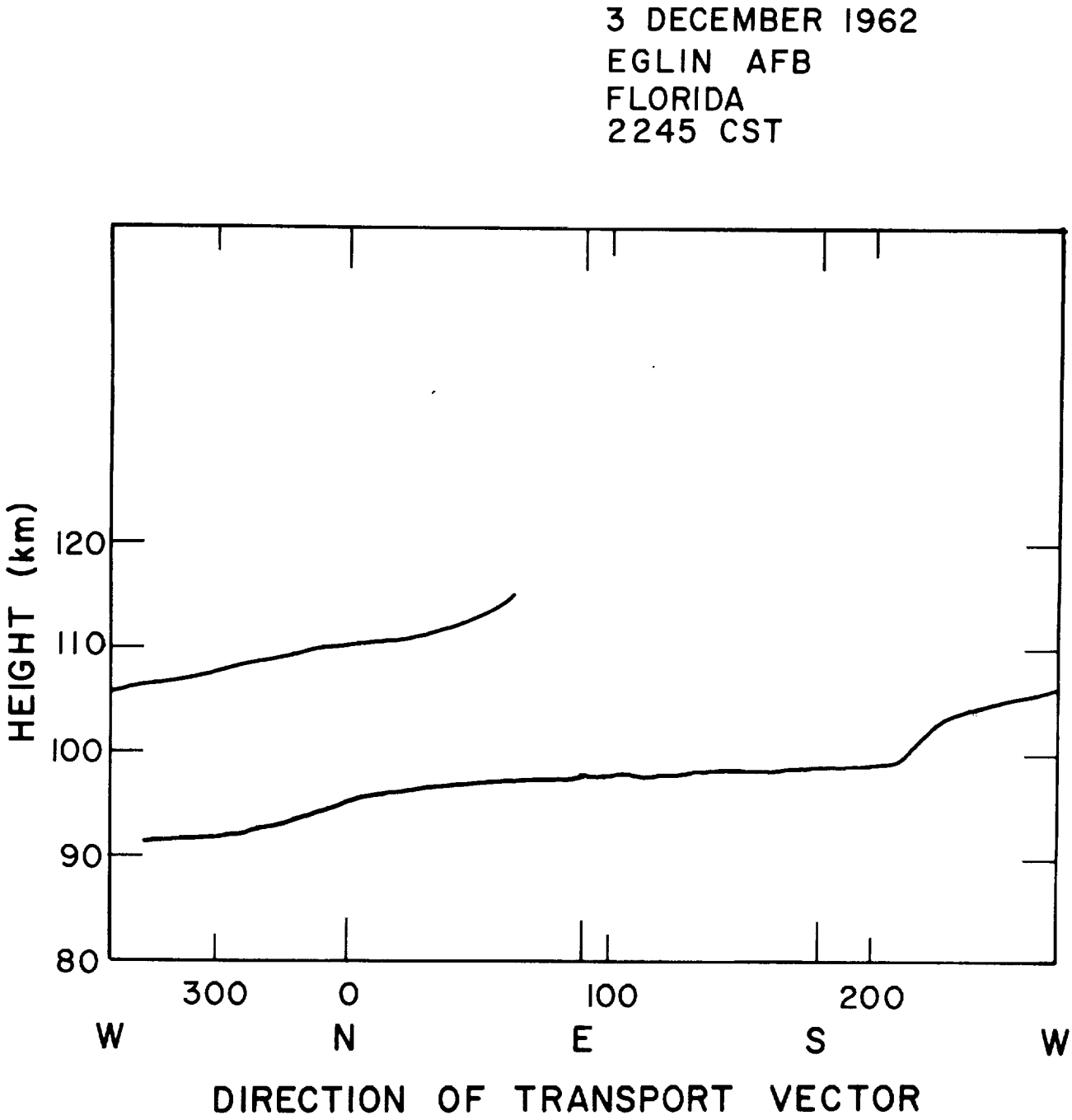

3 DECEMBER 1962
EGLIN AFB
FLORIDA
1801 CST
HEIGHT (km)
140
130
120
110
100
90
80
0
100
200
300
0
N
E
S
W
N
DIRECTION OF TRANSPORT VECTOR

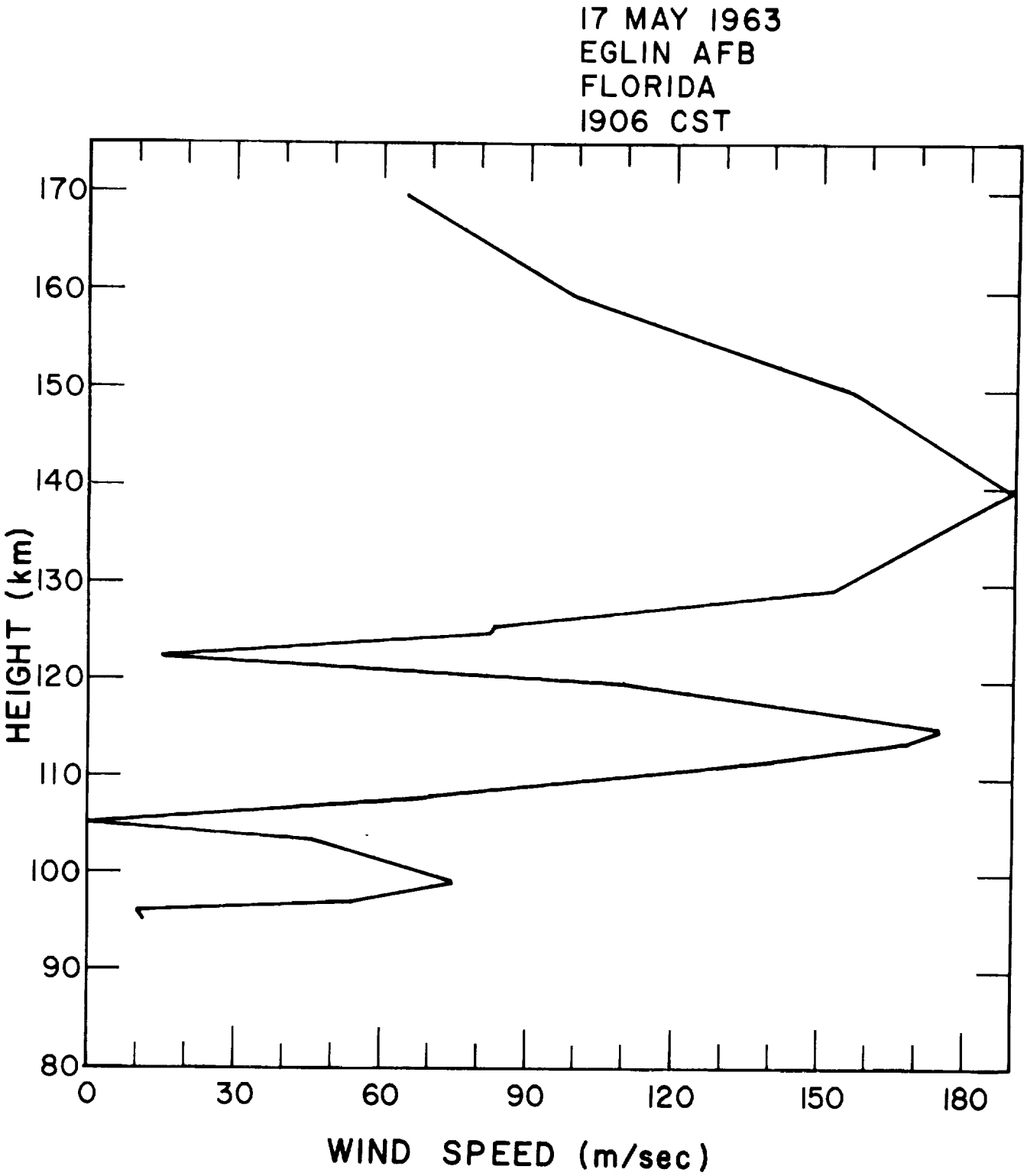

3 DECEMBER 1962
EGLIN AFB
FLORIDA
1801 CST
HEIGHT (km)
140
130
120
110
100
90
0
30
60
90
120
150
180
WIND SPEED (m/sec)

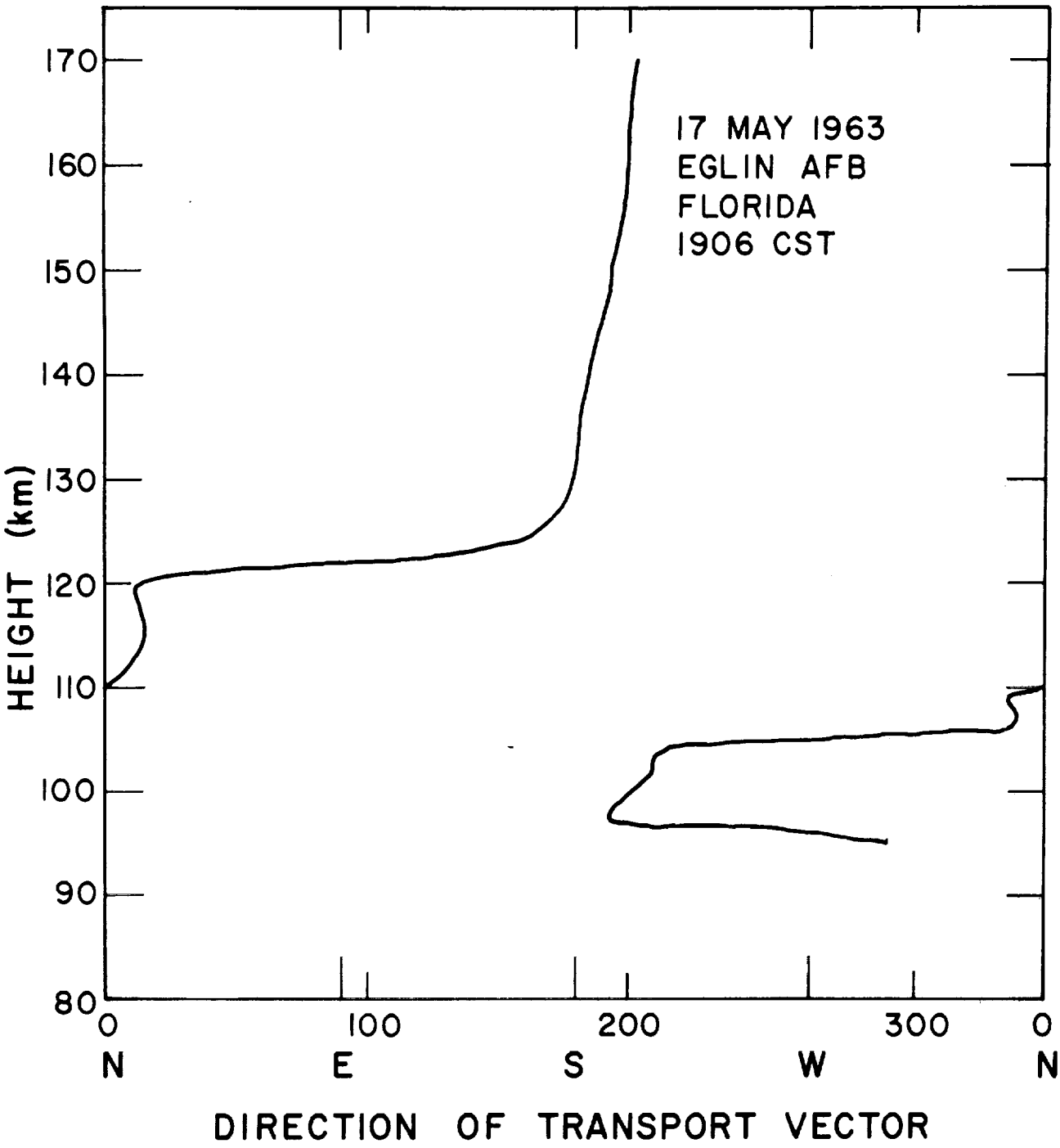

3 DECEMBER 1962
EGLIN AFB
FLORIDA
2145 CST
HEIGHT (km)
140
130
120
110
100
90
0
30
60
90
120
150
180
WIND SPEED (m/sec)

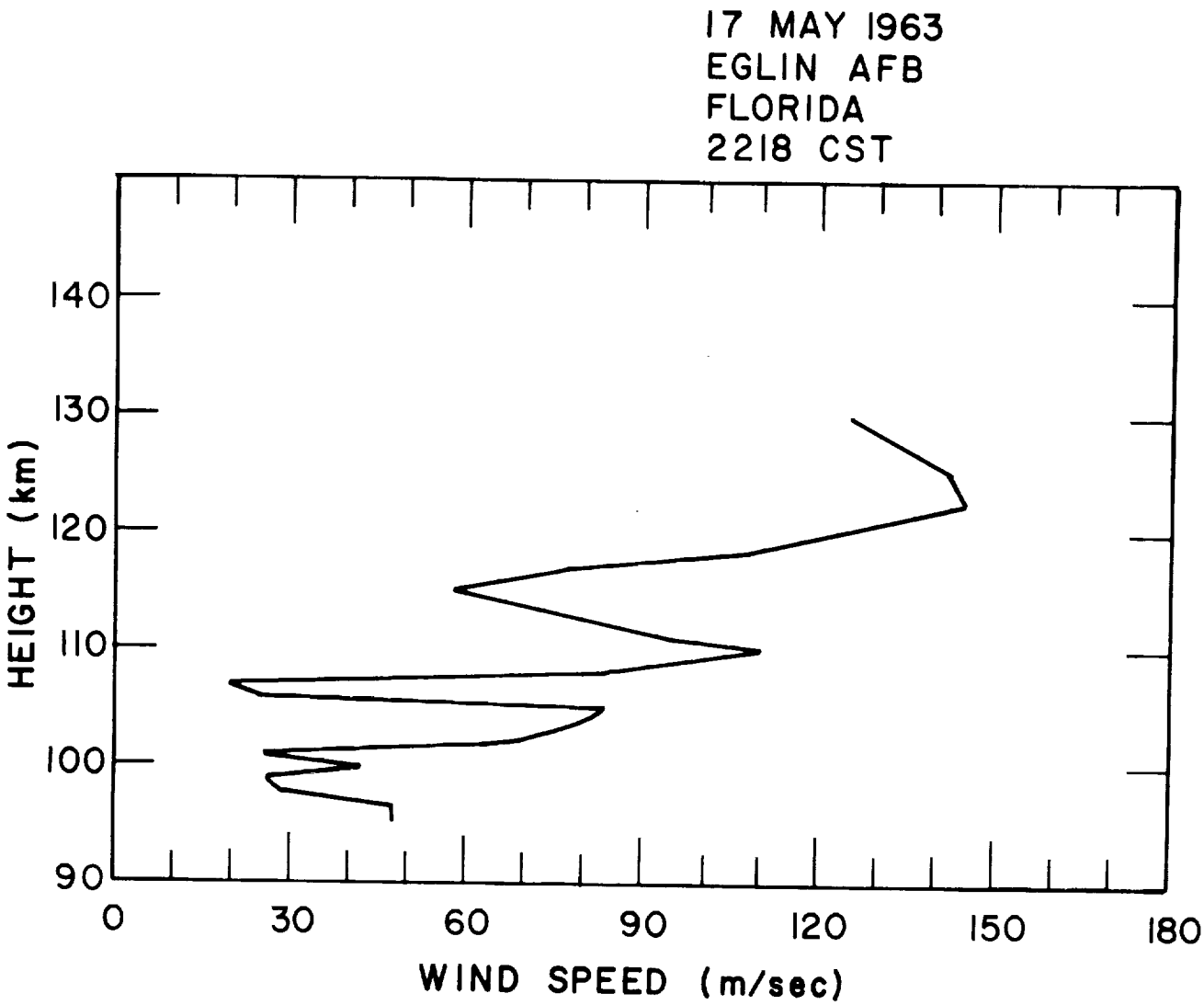

3 DECEMBER 1962
EGLIN AFB
FLORIDA
2145 CST
HEIGHT (km)
140
130
120
110
100
90
100
200
300
0
E
S
W
N
E
DIRECTION OF TRANSPORT VECTOR

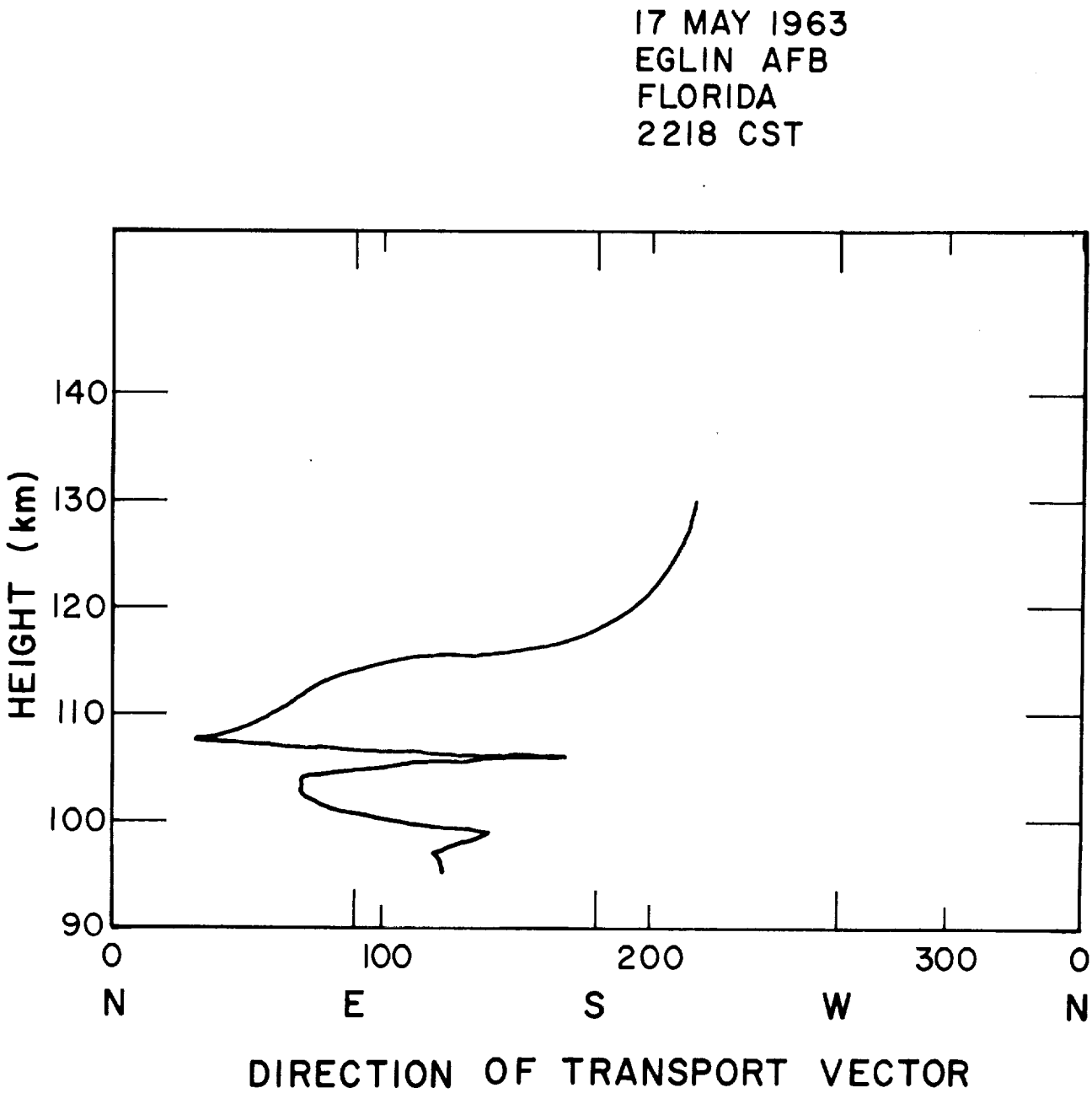

3 DECEMBER 1962
EGLIN AFB
FLORIDA
2245 CST
HEIGHT (km)
120
110
100
90
80
0
30
60
90
120
150
180
WIND SPEED (m/sec)

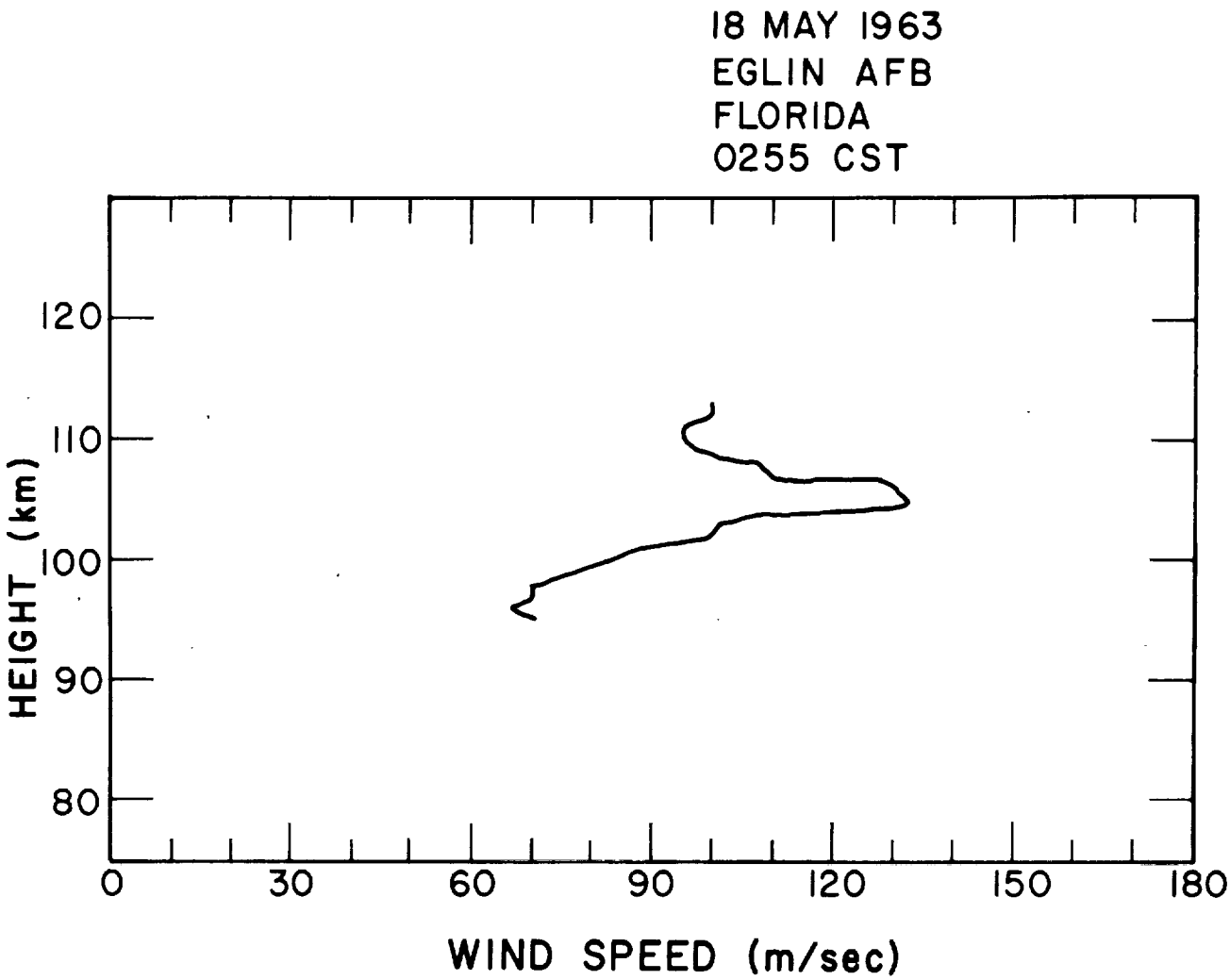

3 DECEMBER 1962
EGLIN AFB
FLORIDA
2245 CST
HEIGHT (km)
120
110
100
90
80
300
0
100
200
W
N
E
S
W
DIRECTION OF TRANSPORT VECTOR

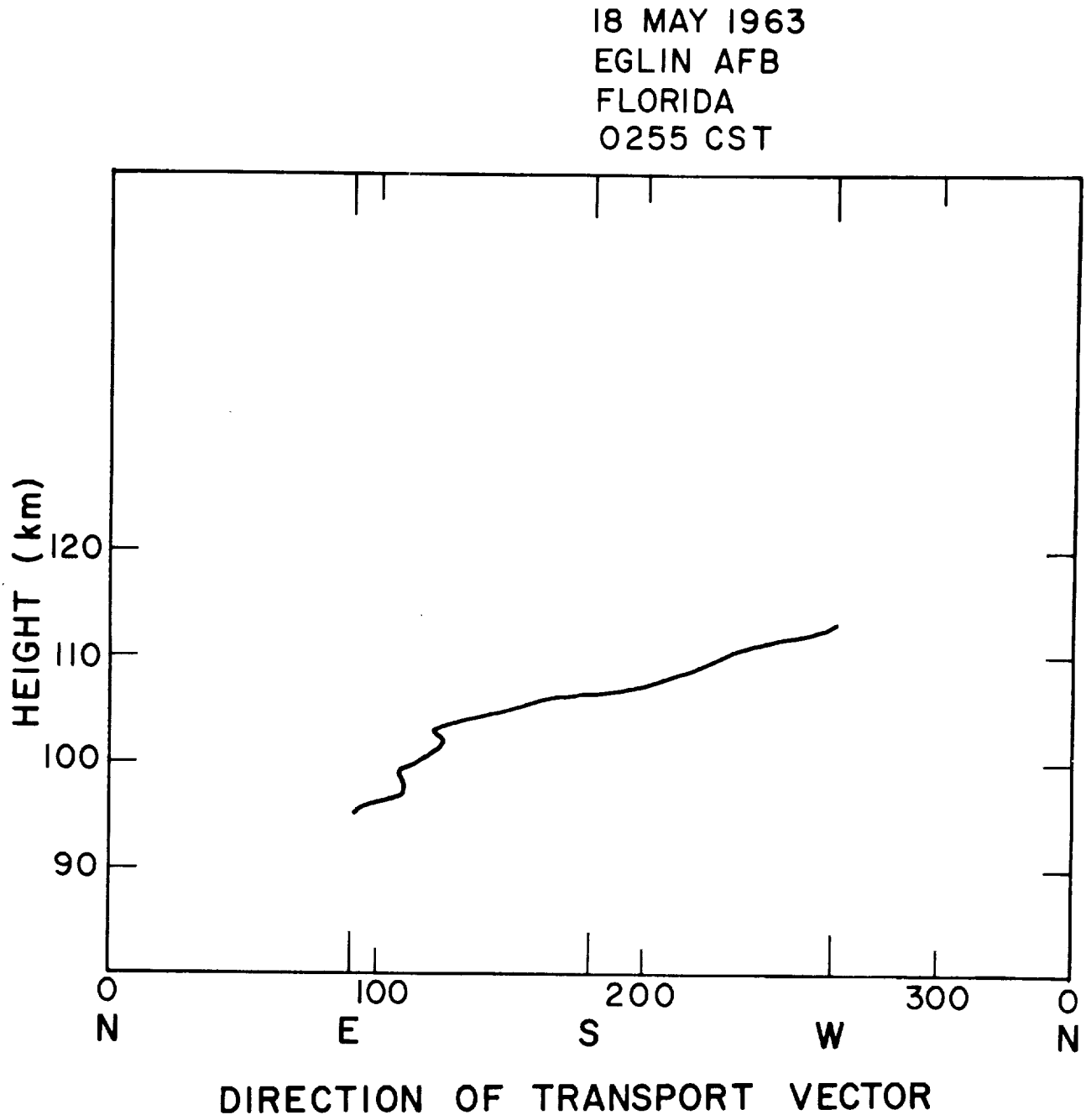

17 MAY 1963
EGLIN AFB
FLORIDA
1906 CST
HEIGHT (km)
170
160
150
140
130
120
110
100
90
80
0
30
60
90
120
150
180
WIND SPEED (m/sec)

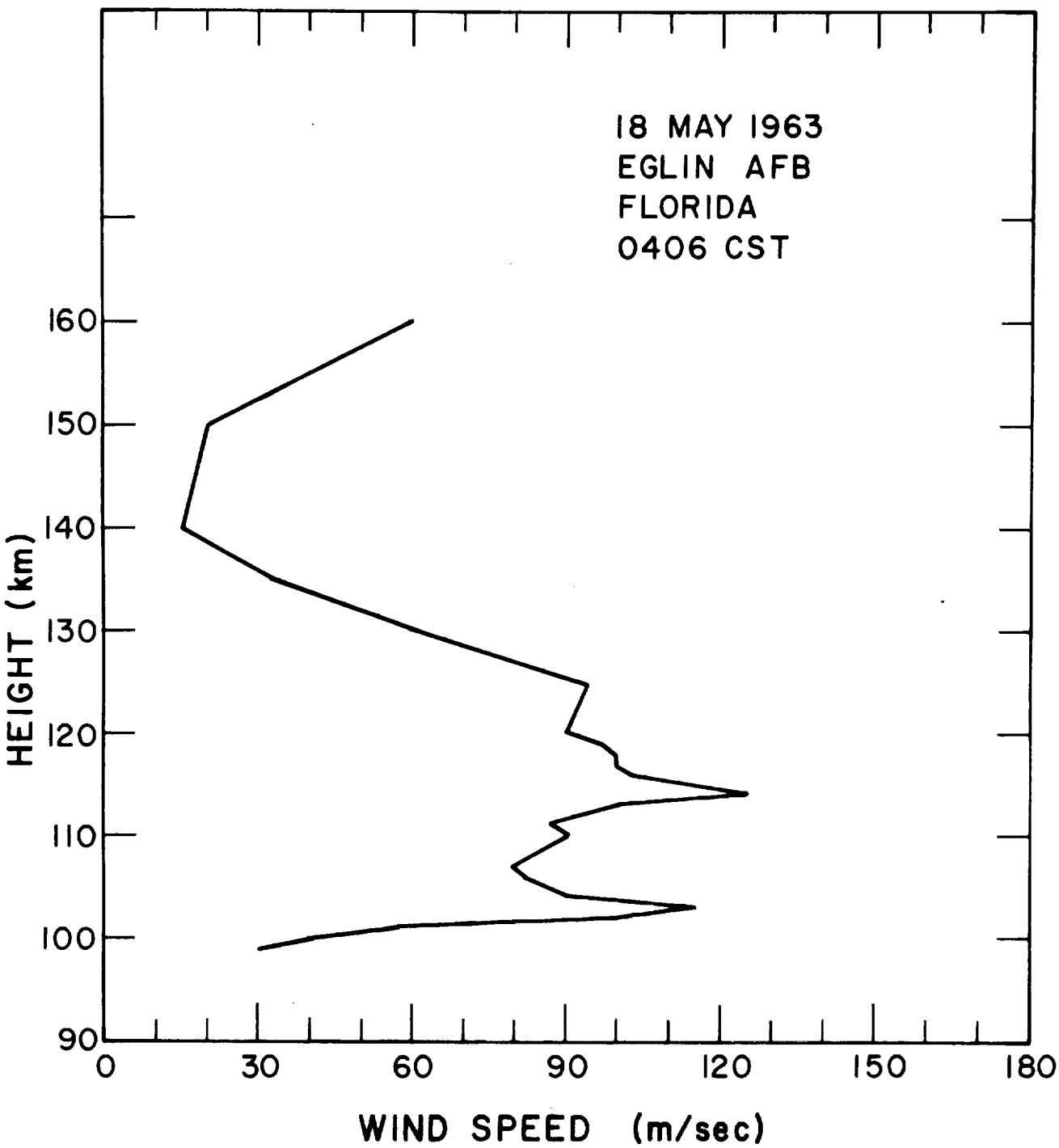

17 MAY 1963
EGLIN AFB
FLORIDA
1906 CST
HEIGHT (km)
170
160
150
140
130
120
110
100
90
80
0
100
200
300
0
N
E
S
W
N
DIRECTION OF TRANSPORT VECTOR

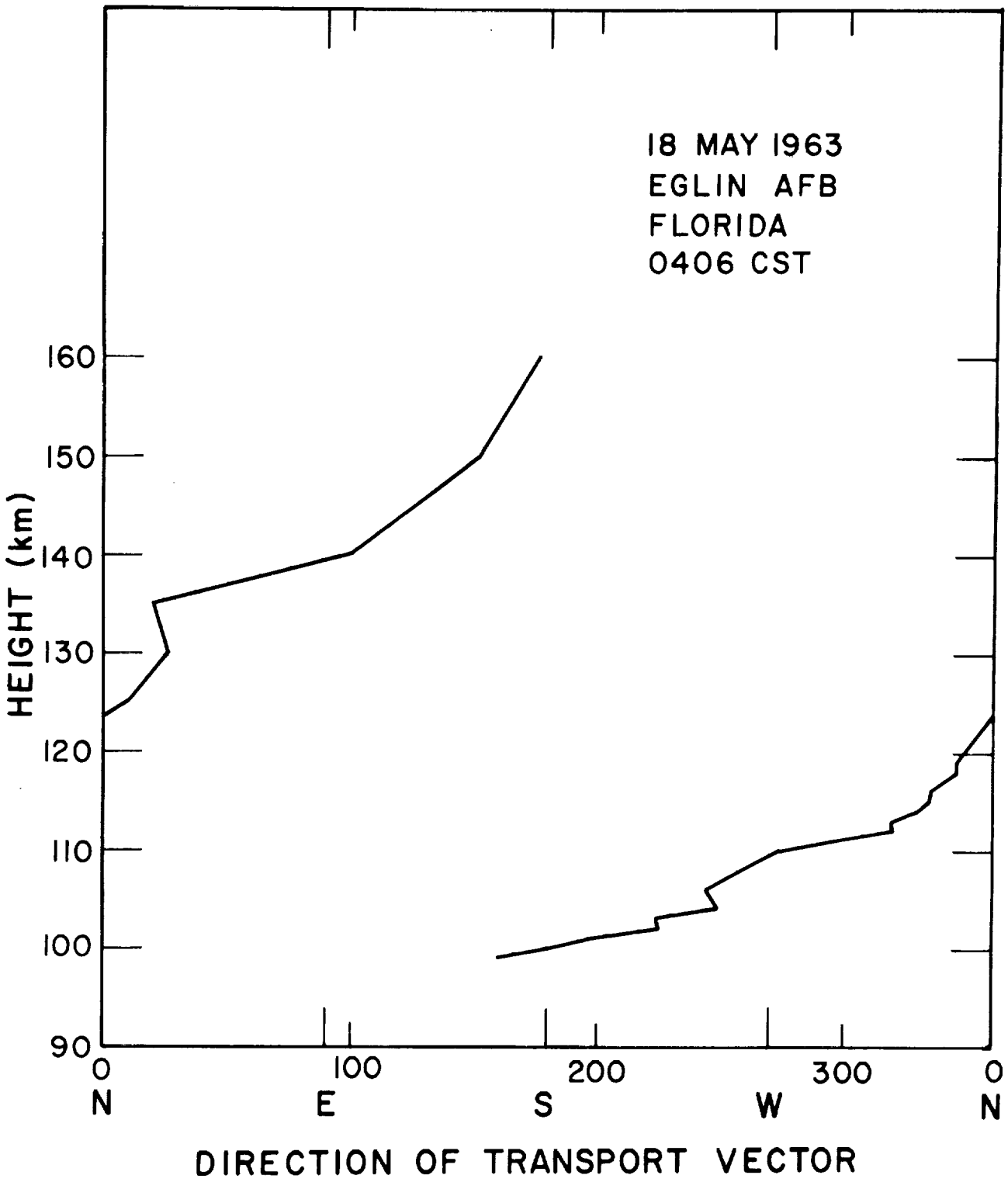

17 MAY 1963
EGLIN AFB
FLORIDA
2218 CST
HEIGHT (km)
140
130
120
110
100
90
0
30
60
90
120
150
180
WIND SPEED (m/sec)

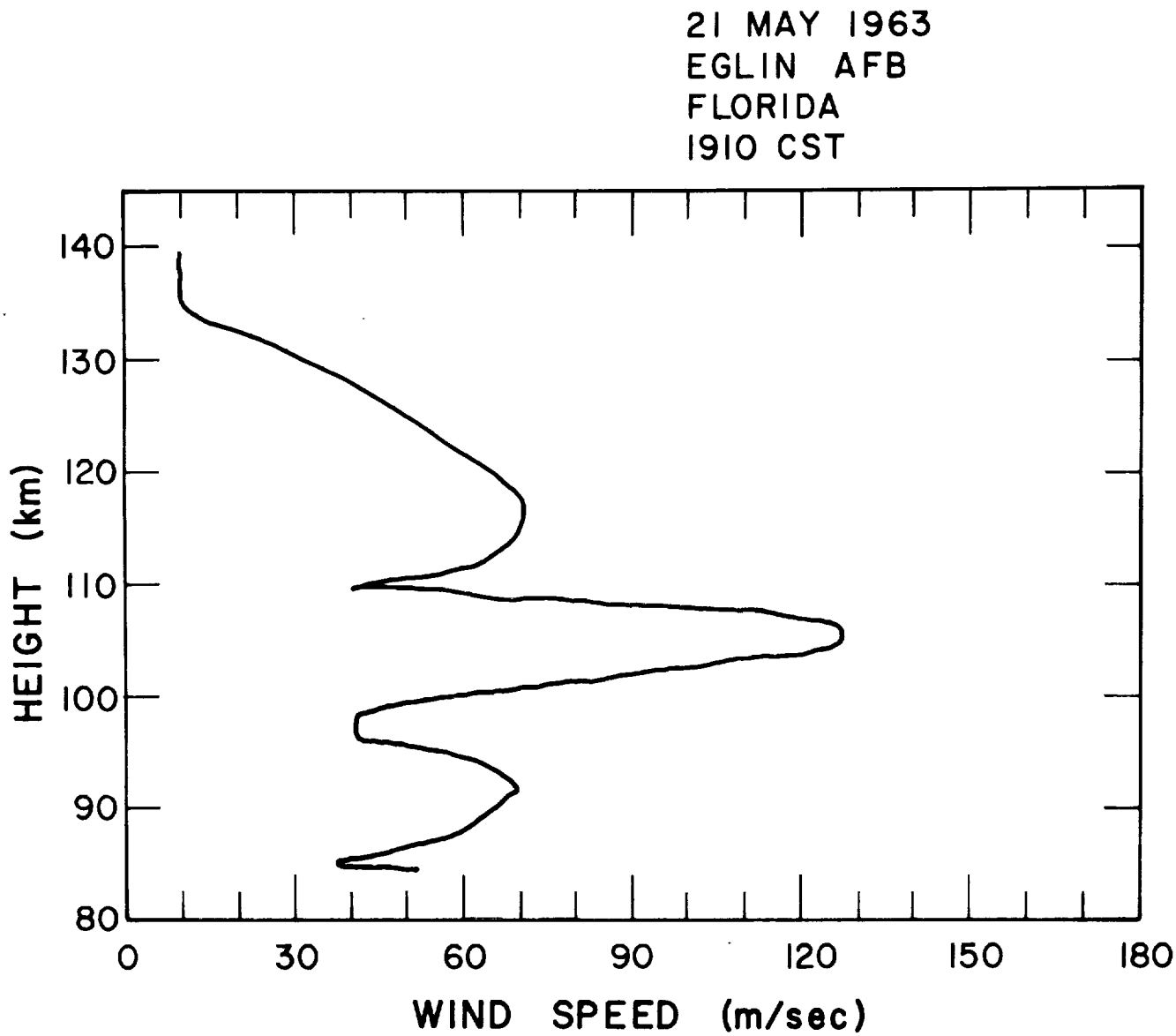

17 MAY 1963
EGLIN AFB
FLORIDA
2218 CST
HEIGHT (km)
140
130
120
110
100
90
0
100
200
300
0
N
E
S
W
N
DIRECTION OF TRANSPORT VECTOR

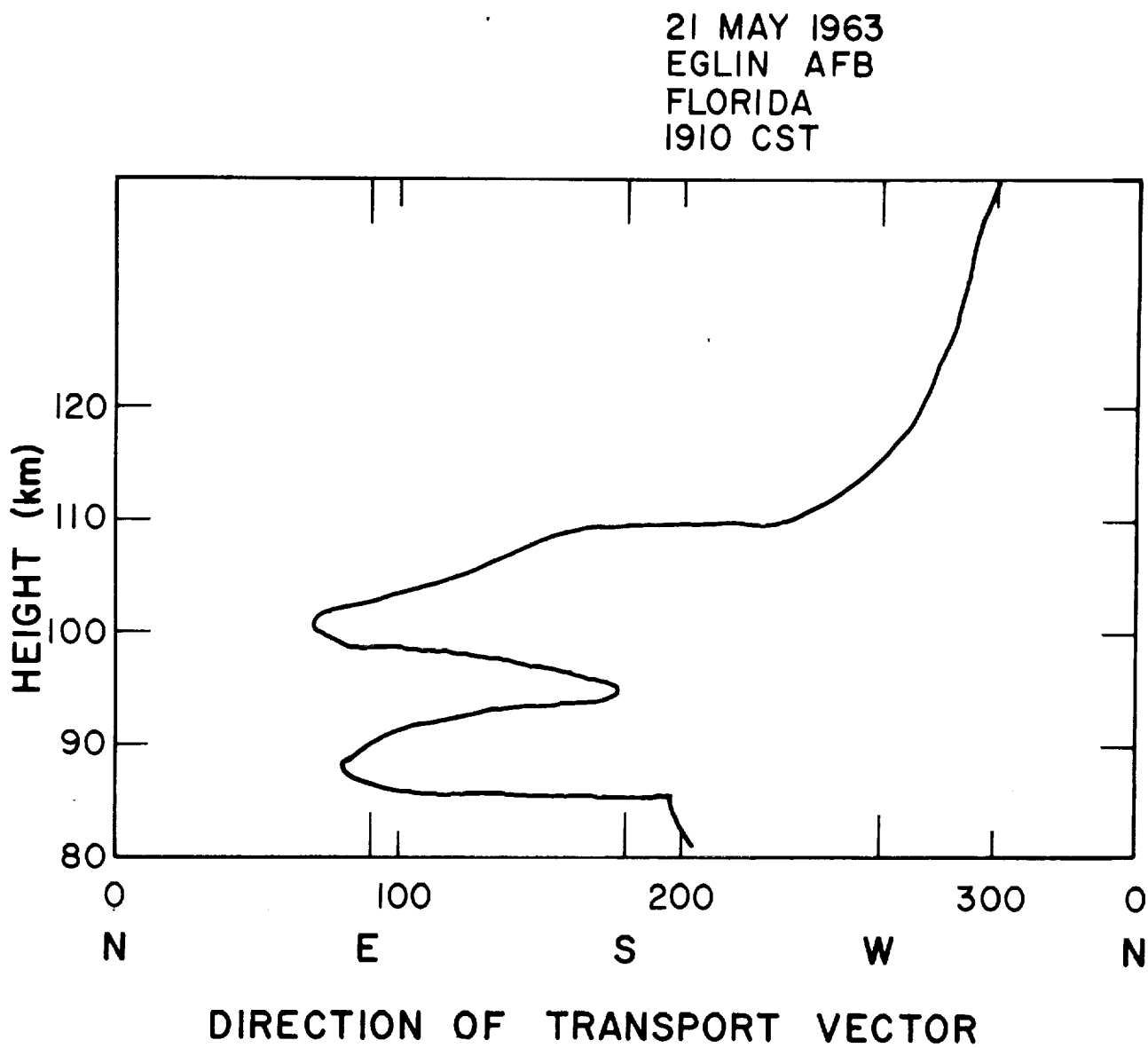

18 MAY 1963
EGLIN AFB
FLORIDA
0255 CST
HEIGHT (km)
120
110
100
90
80
0
30
60
90
120
150
180
WIND SPEED (m/sec)

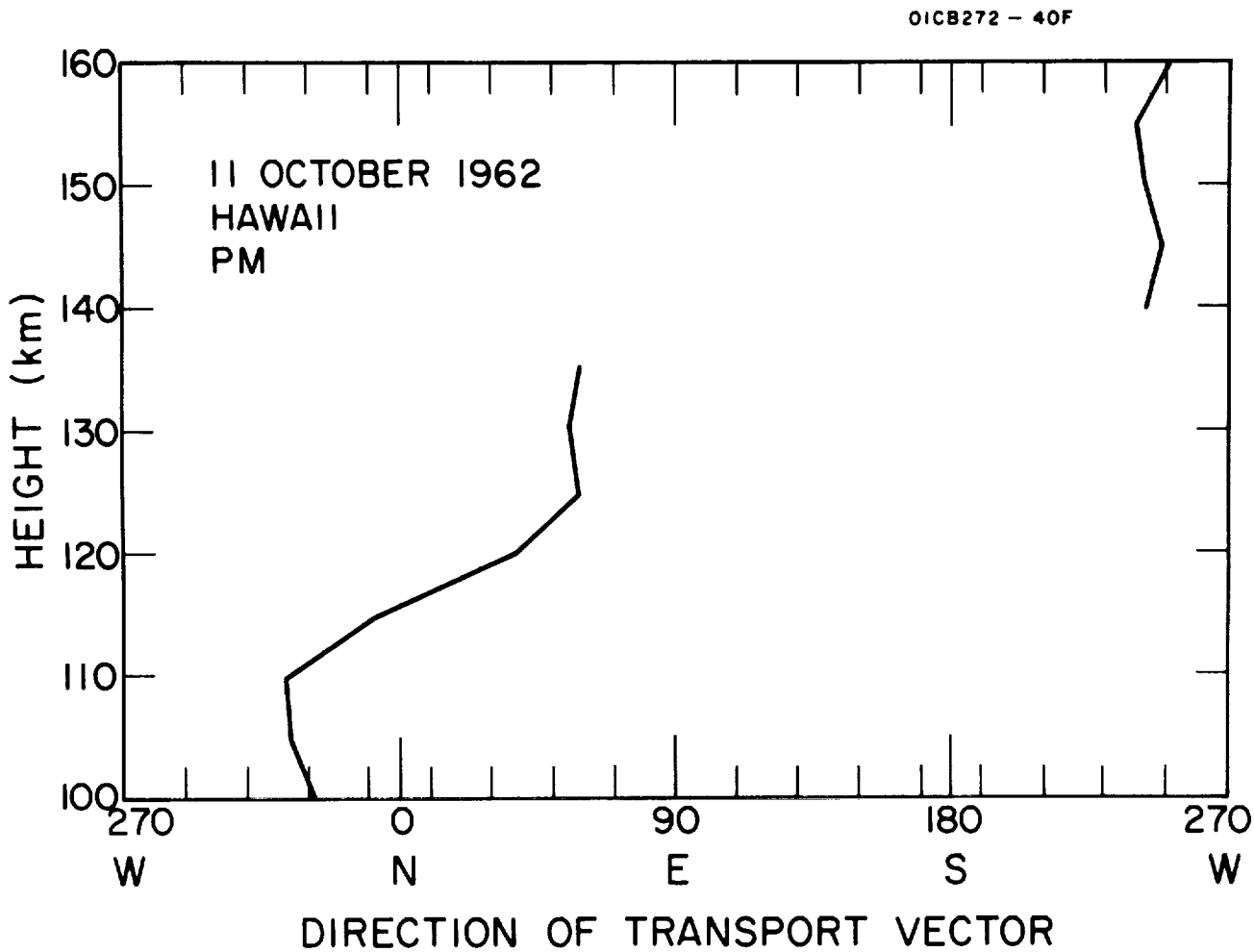

18 MAY 1963
EGLIN AFB
FLORIDA
0255 CST
HEIGHT (km)
120
110
100
90
0
N
100
E
200
S
300
W
0
N
DIRECTION OF TRANSPORT VECTOR

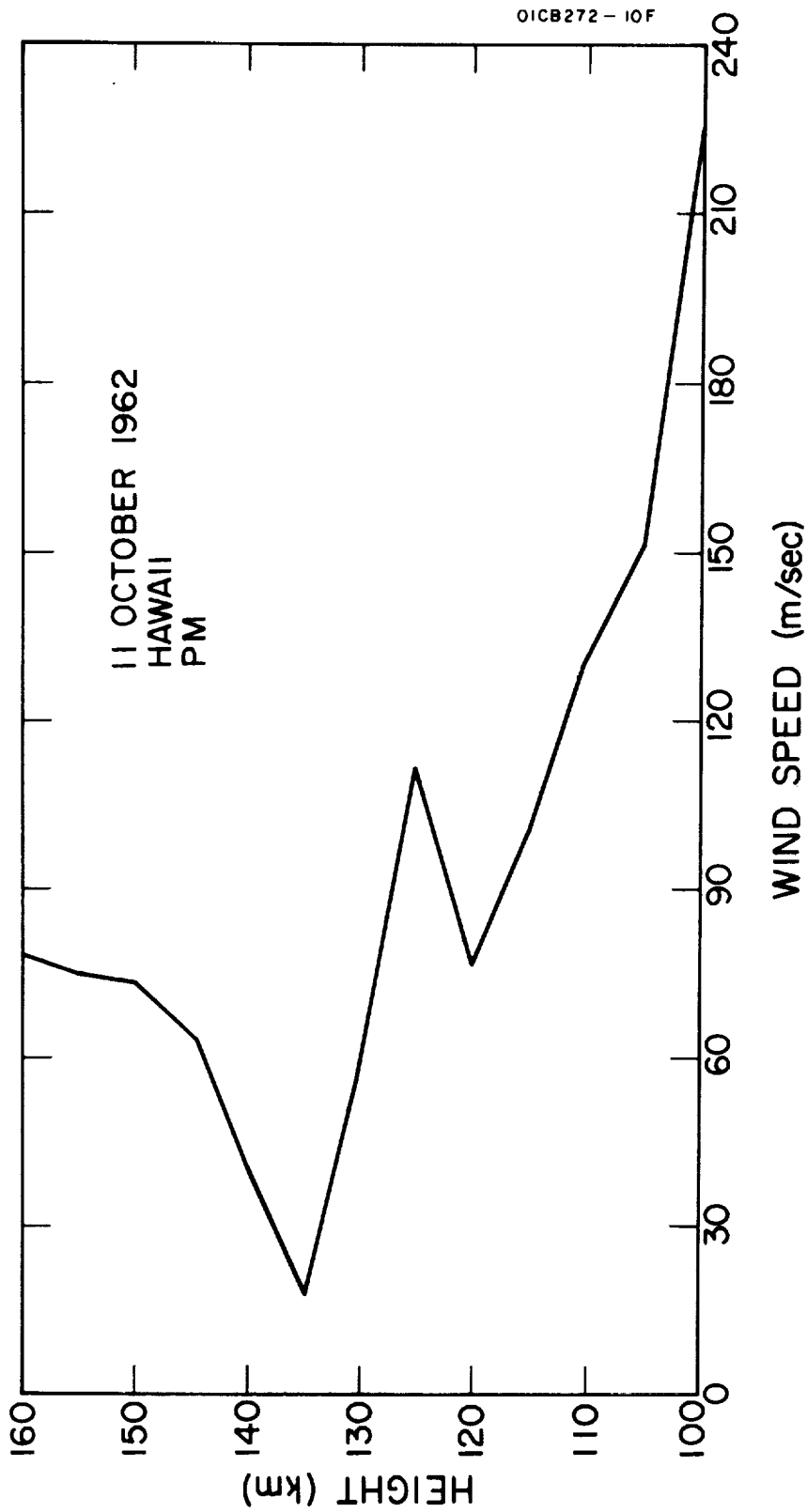

18 MAY 1963
EGLIN AFB
FLORIDA
0406 CST
HEIGHT (km)
160
150
140
130
120
110
100
90
0
30
60
90
120
150
180
WIND SPEED (m/sec)

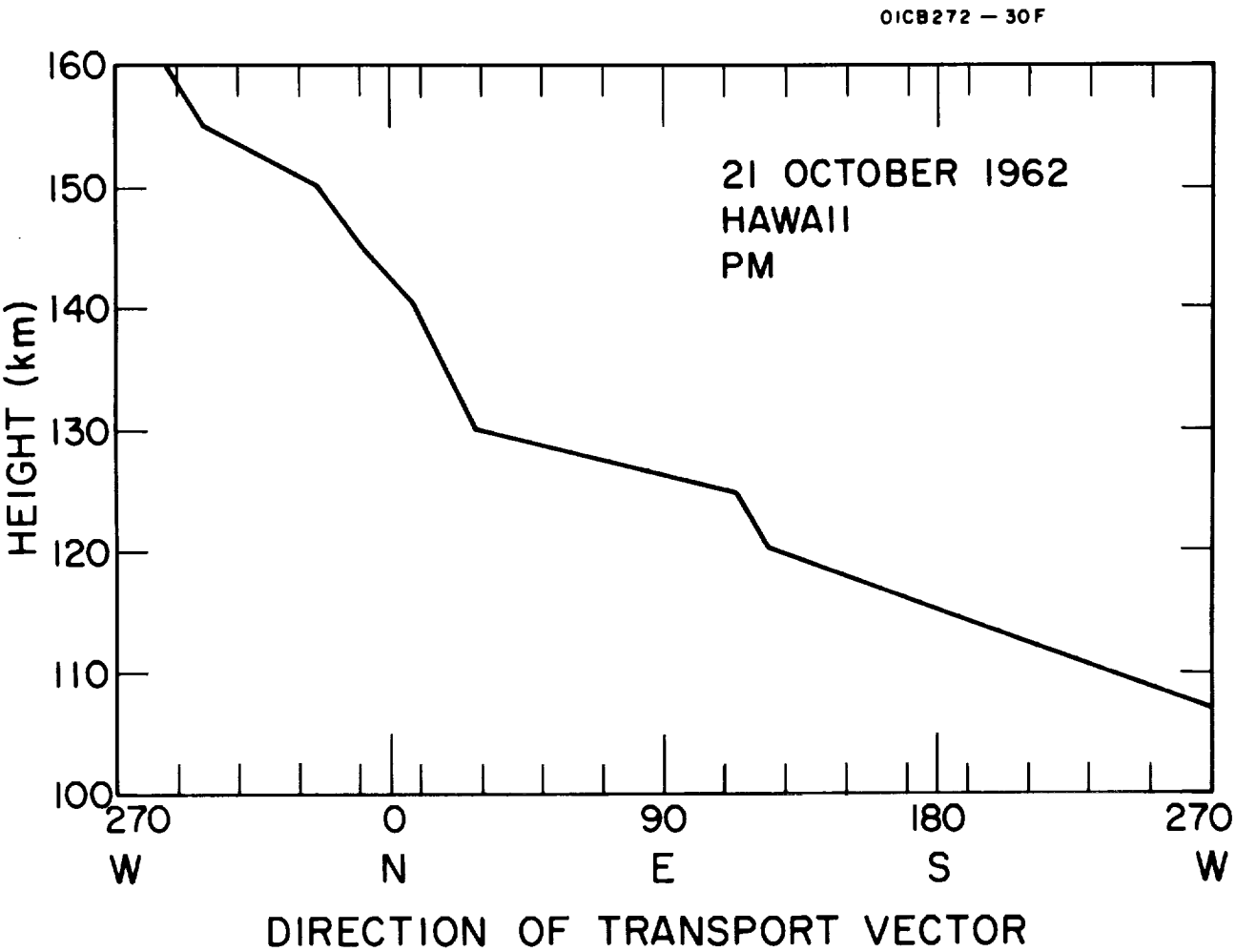

18 MAY 1963
EGLIN AFB
FLORIDA
0406 CST
HEIGHT (km)
160
150
140
130
120
110
100
90
0
100
200
300
0
N
E
S
W
N
DIRECTION OF TRANSPORT VECTOR

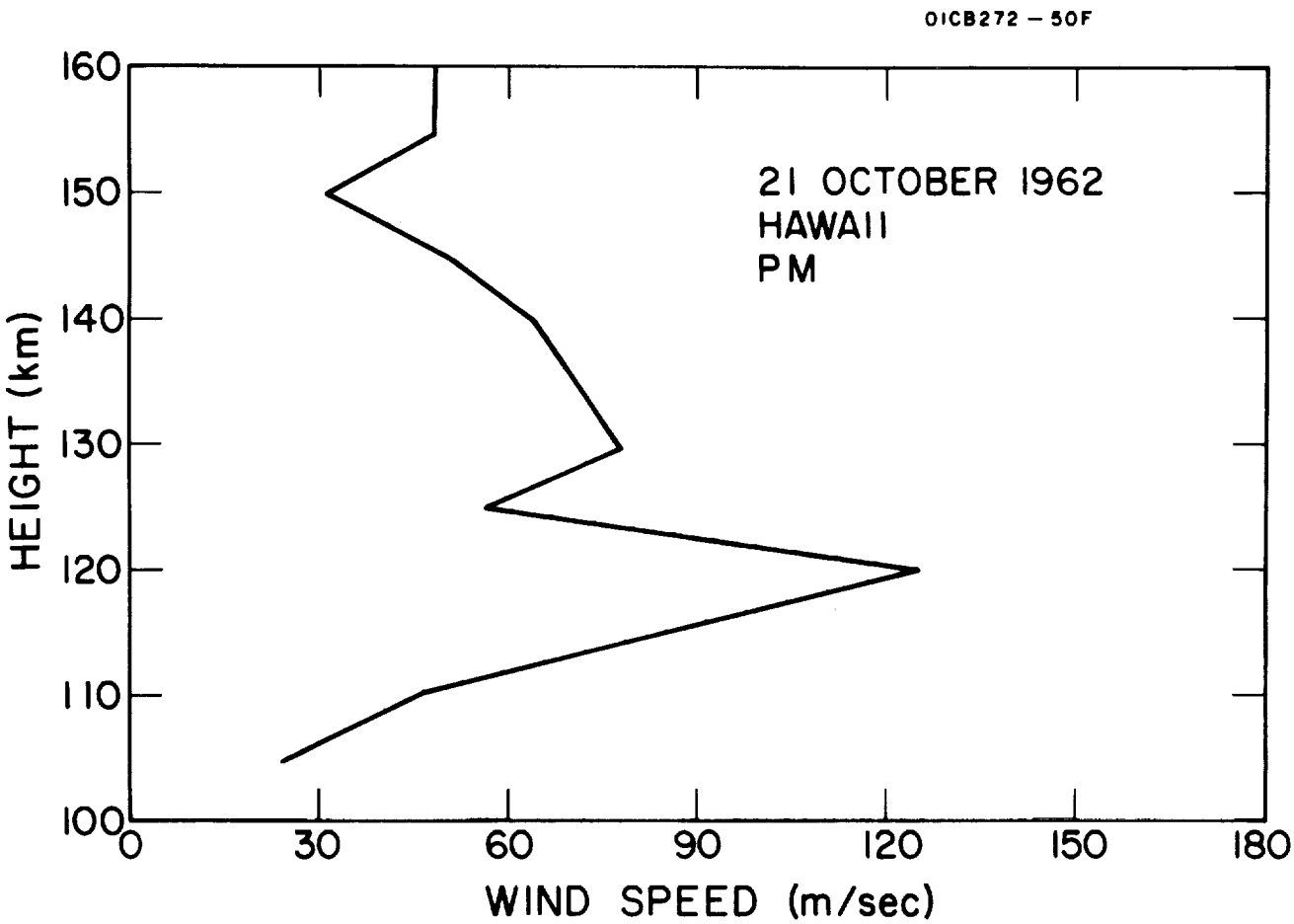

21 MAY 1963
EGLIN AFB
FLORIDA
1910 CST
HEIGHT (km)
140
130
120
110
100
90
80
0
30
60
90
120
150
180
WIND SPEED (m/sec)

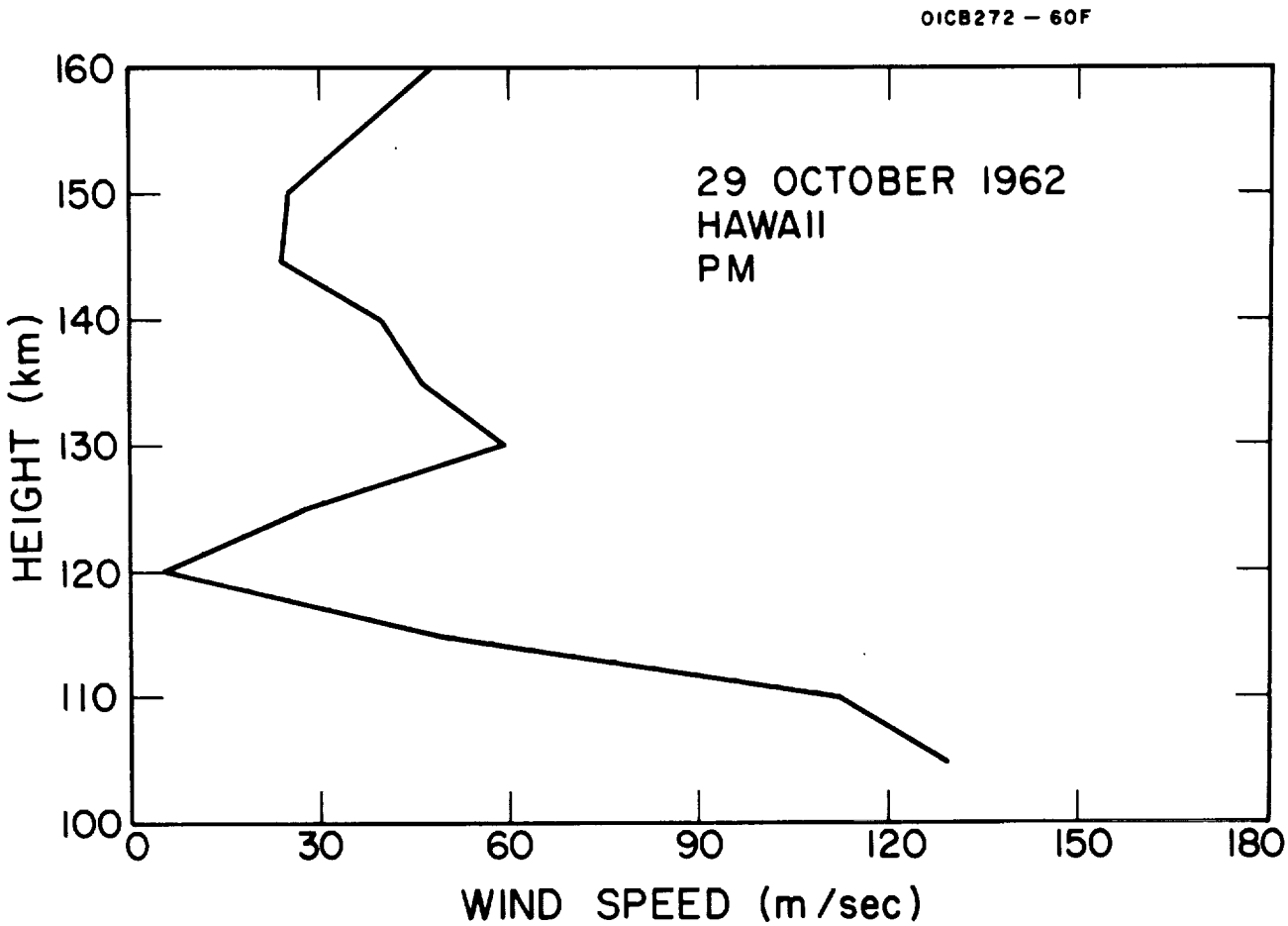

21 MAY 1963
EGLIN AFB
FLORIDA
1910 CST
HEIGHT (km)
120
110
100
90
80
0
100
200
300
0
N
E
S
W
N
DIRECTION OF TRANSPORT VECTOR

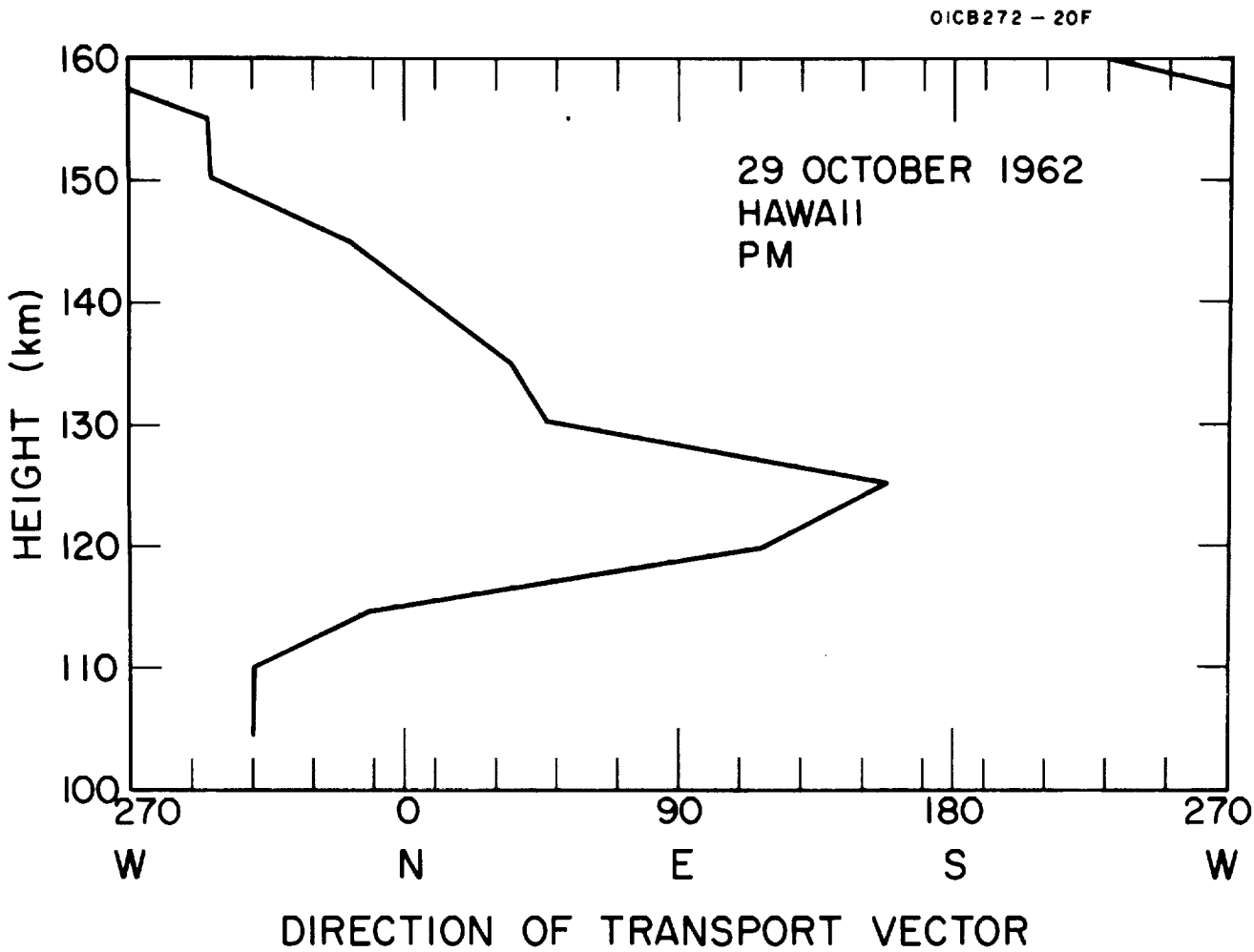

01CB272 – 40F
11 OCTOBER 1962
HAWAII
PM
HEIGHT (km)
160
150
140
130
120
110
100
270
W
0
N
90
E
180
S
270
W
DIRECTION OF TRANSPORT VECTOR


01CB272 – 10F
11 OCTOBER 1962
HAWAII
PM
WIND SPEED (m/sec)
0
30
60
90
120
150
180
210
240
HEIGHT (km)
100
110
120
130
140
150
160

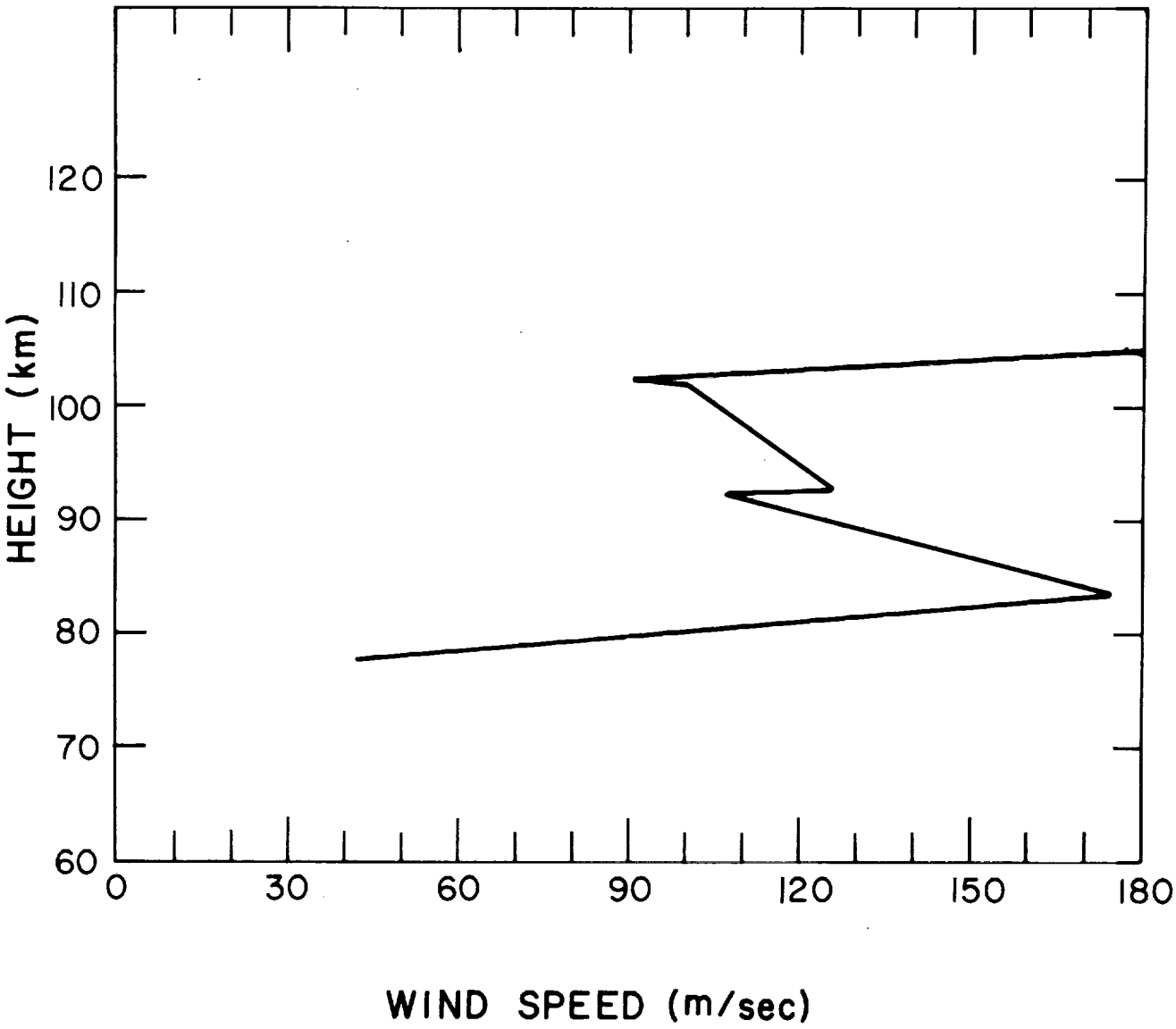

01CB272 — 30F
21 OCTOBER 1962
HAWAII
PM
HEIGHT (km)
160
150
140
130
120
110
100
270
W
0
N
90
E
180
S
270
W
DIRECTION OF TRANSPORT VECTOR

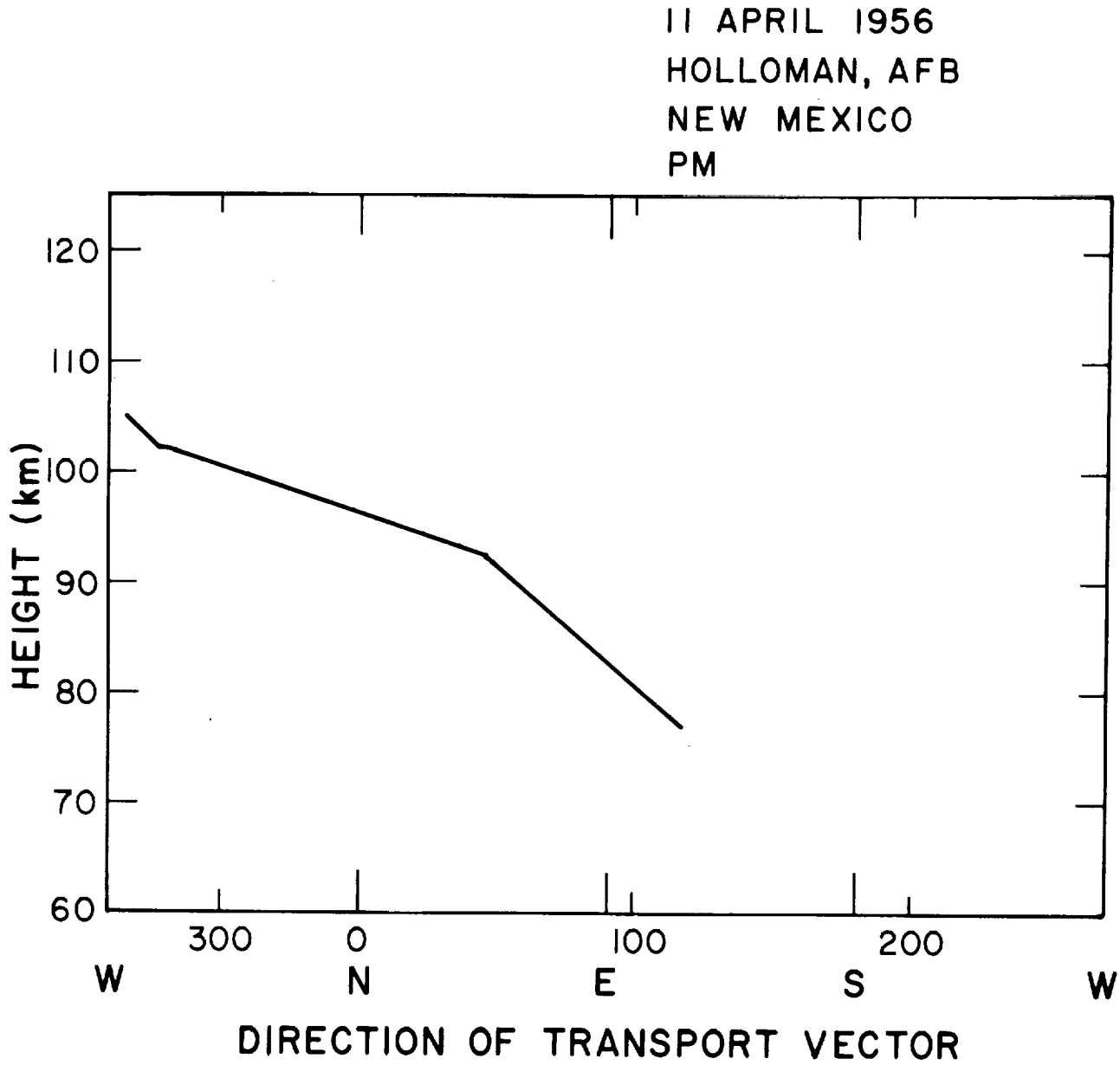

01CB272 – 50F
21 OCTOBER 1962
HAWAII
PM
HEIGHT (km)
160
150
140
130
120
110
100
0
30
60
90
120
150
180
WIND SPEED (m/sec)

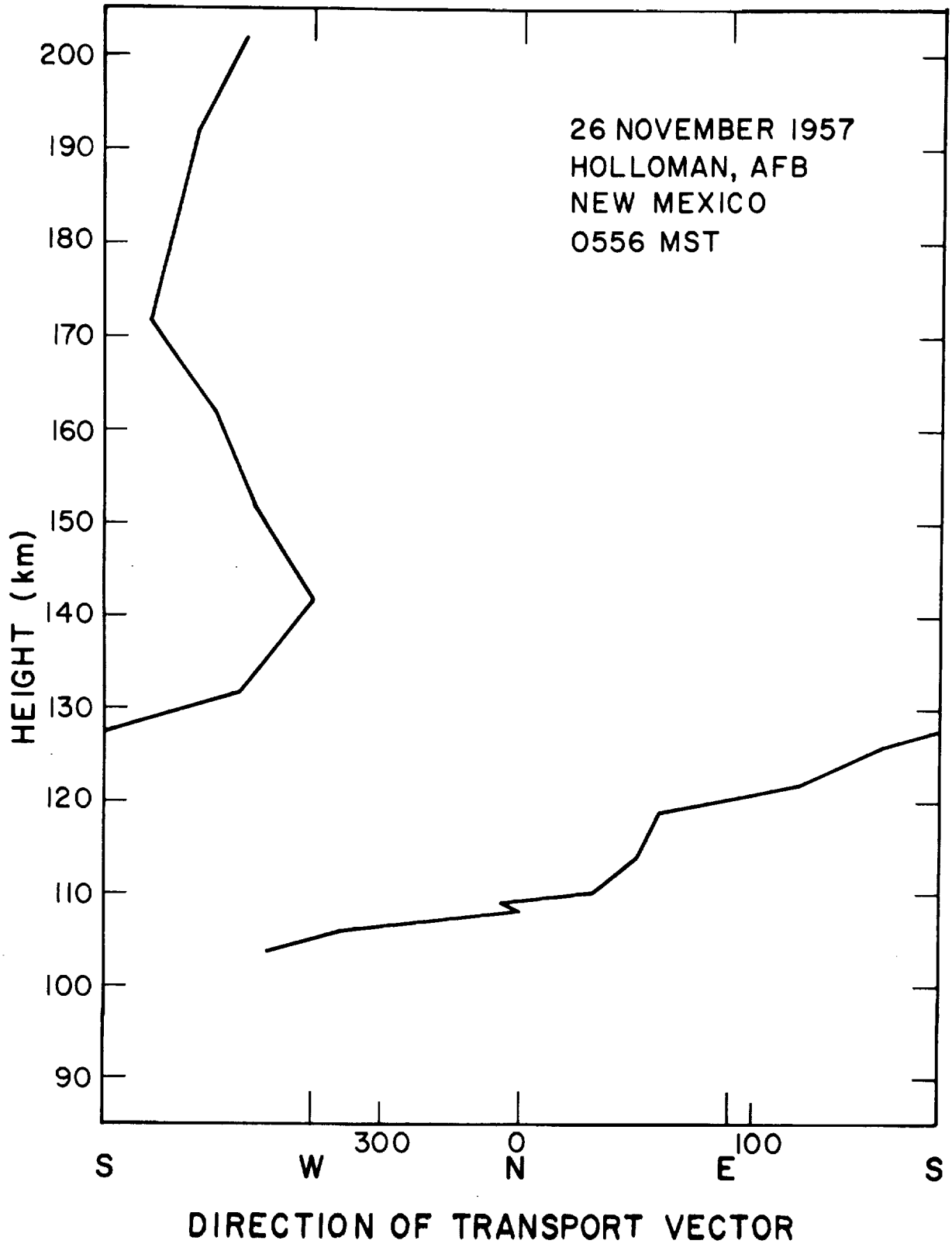

01CB272 — 60F
29 OCTOBER 1962
HAWAII
PM
HEIGHT (km)
160
150
140
130
120
110
100
0
30
60
90
120
150
180
WIND SPEED (m/sec)

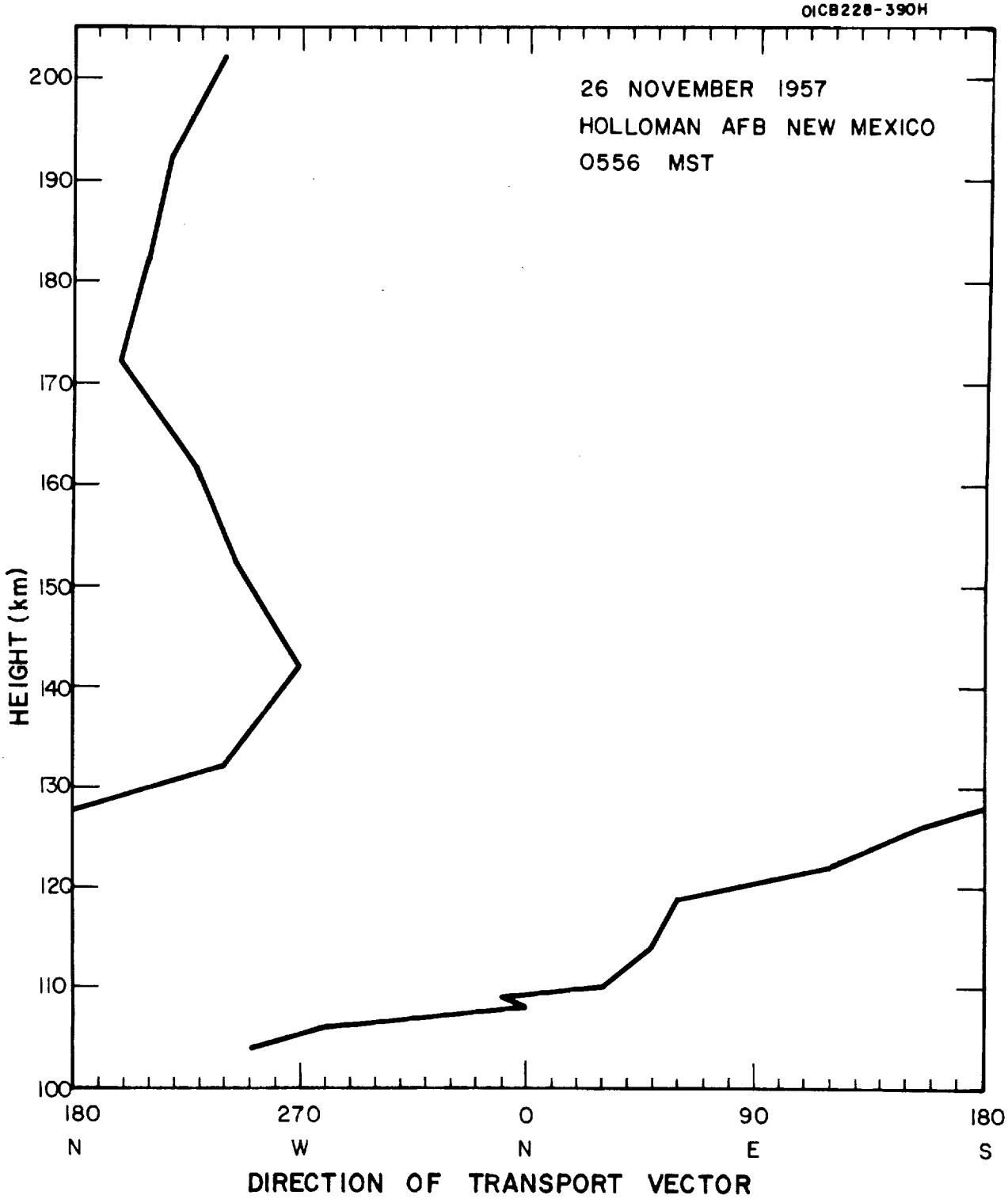

01CB272 – 20F
29 OCTOBER 1962
HAWAII
PM
HEIGHT (km)
160
150
140
130
120
110
100
270
0
90
180
270
W
N
E
S
W
DIRECTION OF TRANSPORT VECTOR

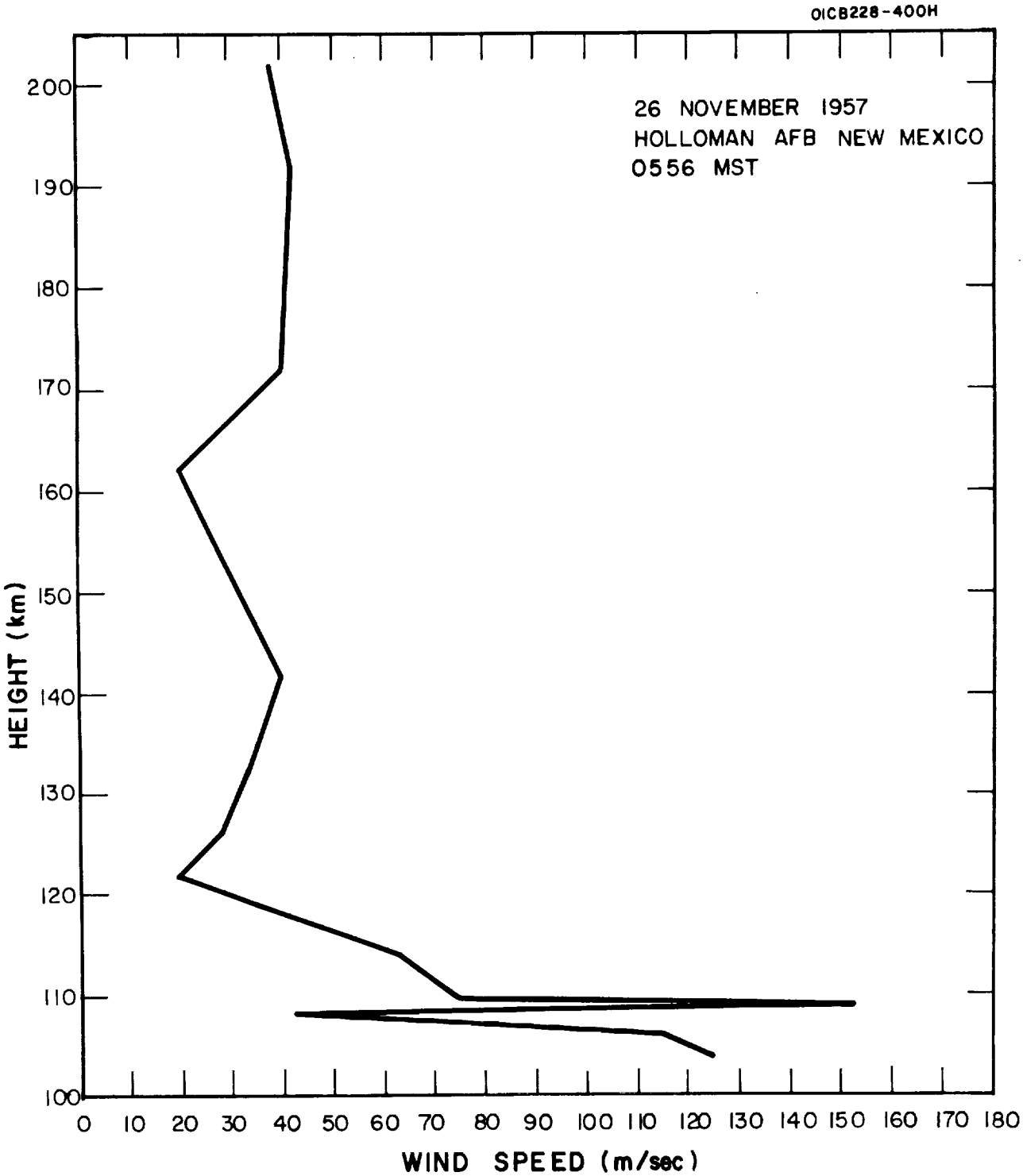
11 APRIL 1956
HOLLOMAN, AFB
NEW MEXICO
PM

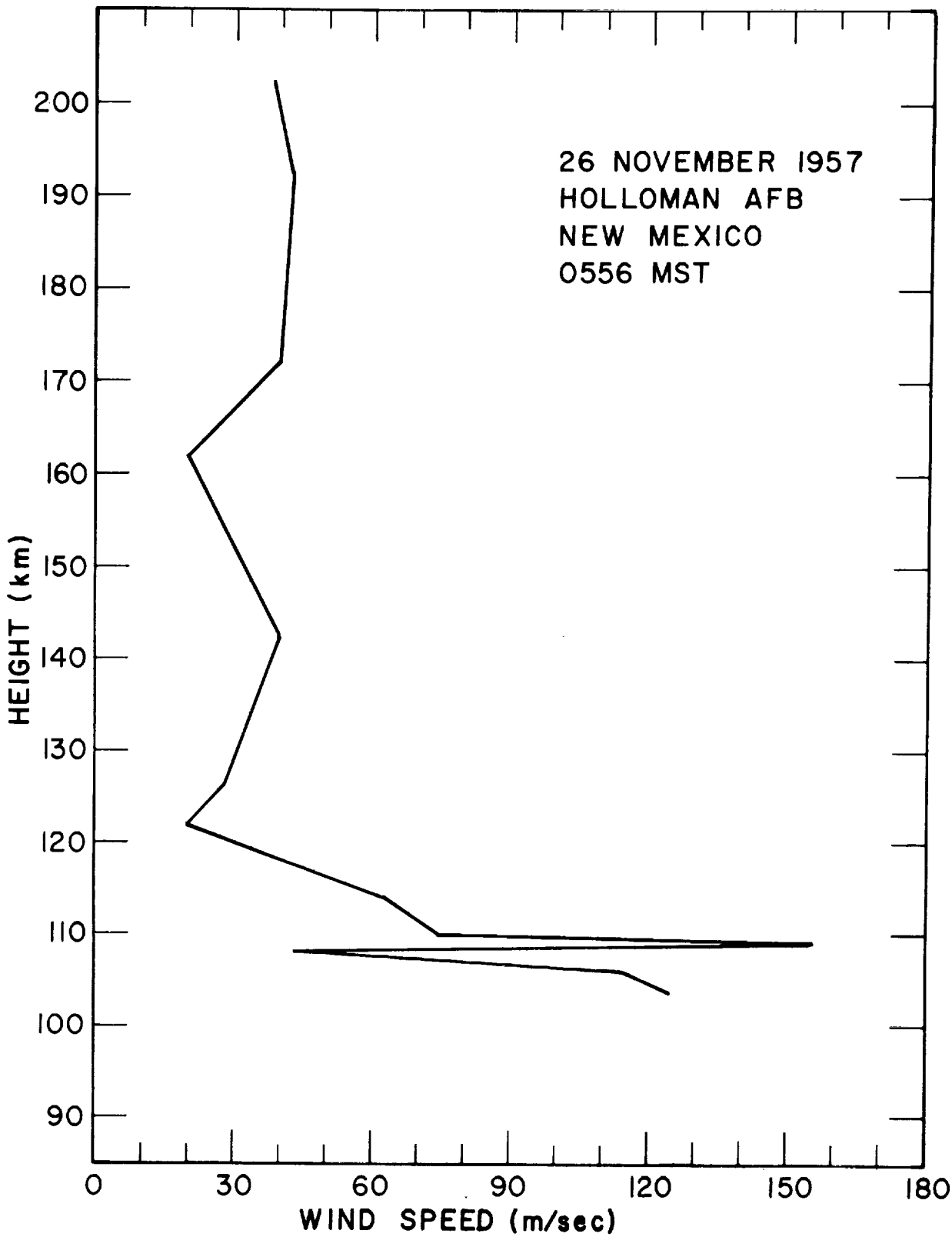


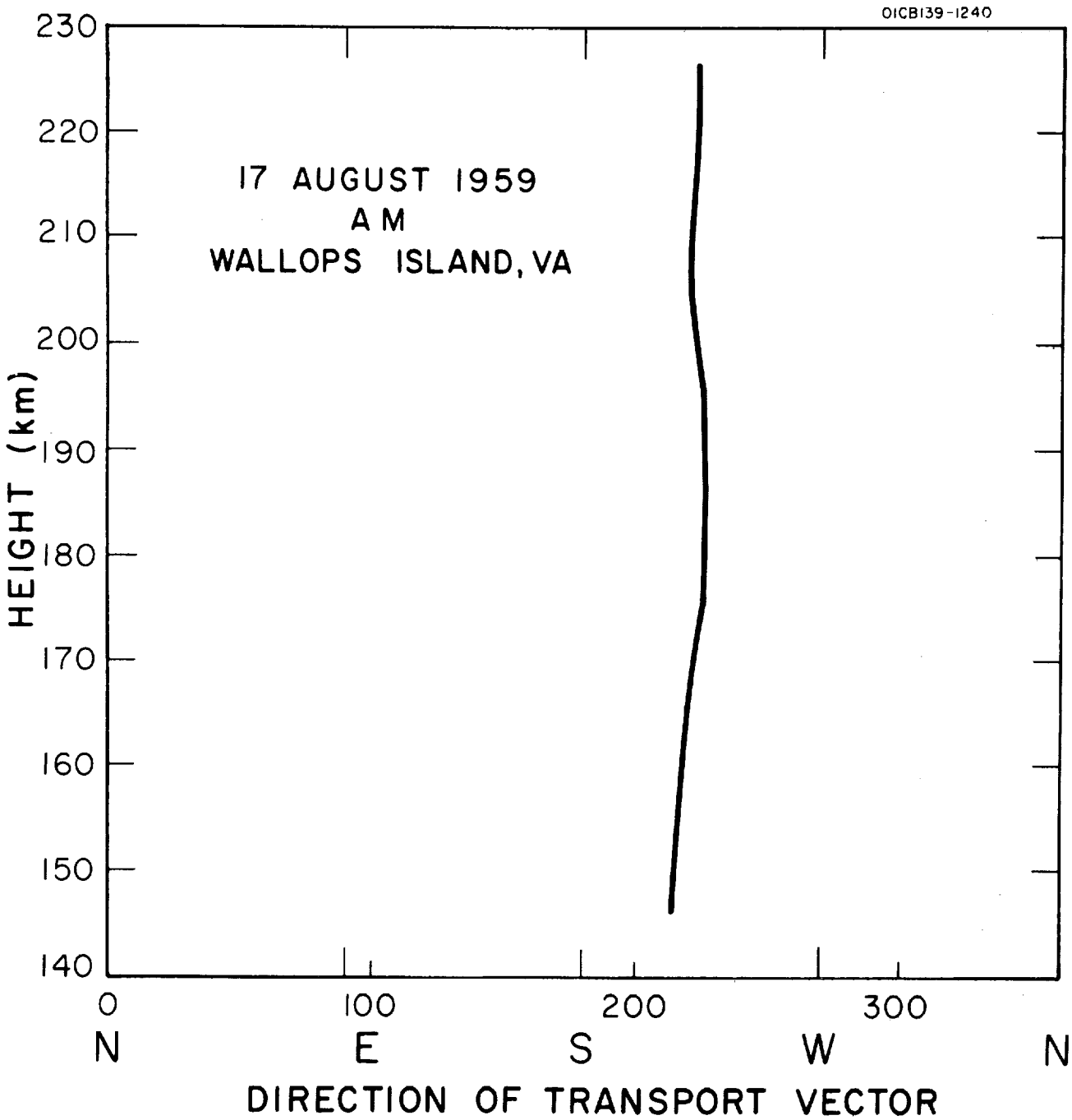

11 APRIL 1956
HOLLOMAN, AFB
NEW MEXICO
PM
HEIGHT (km)
120
110
100
90
80
70
60
300
0
100
200
W
N
E
S
W
DIRECTION OF TRANSPORT VECTOR

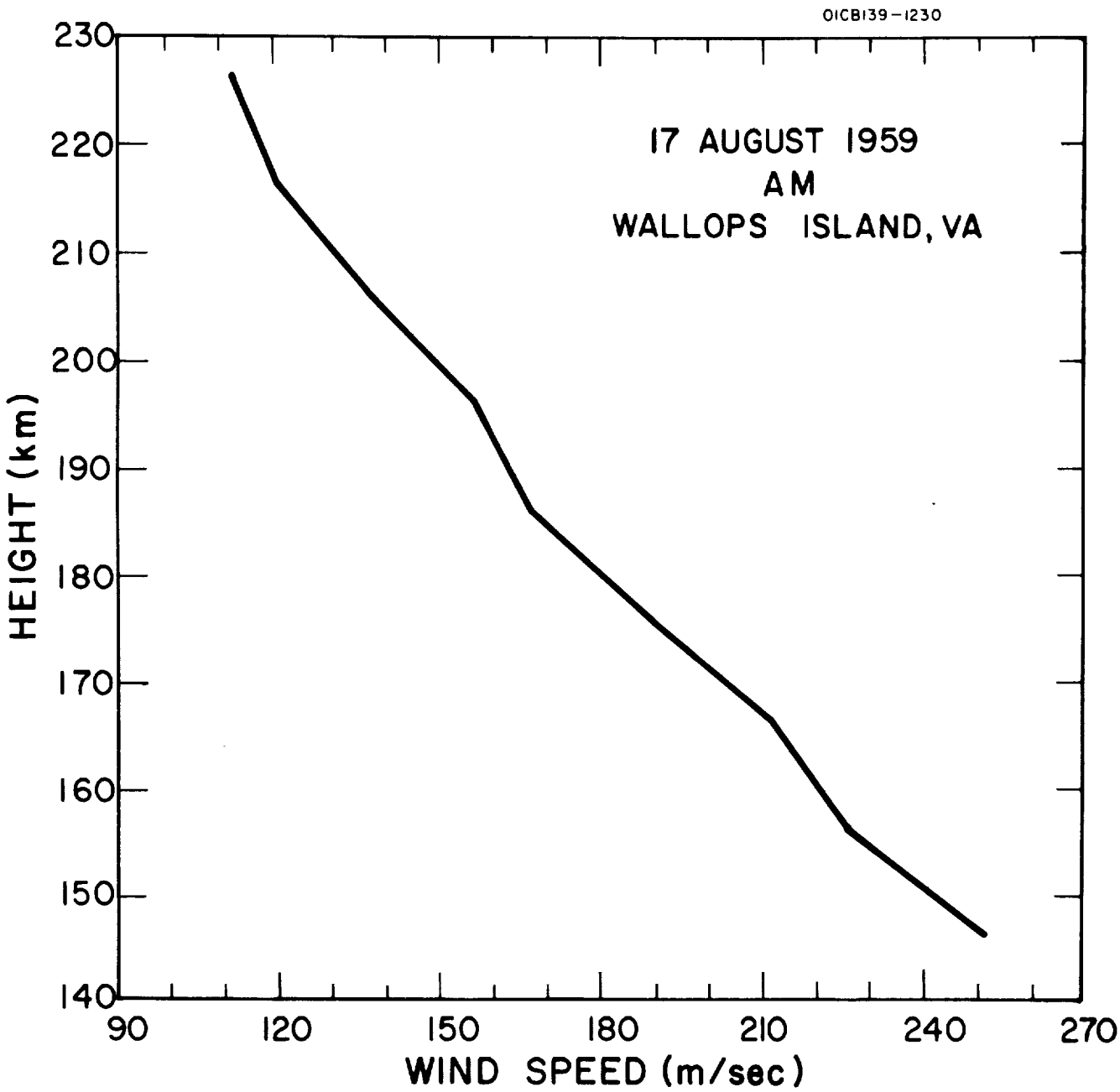

26 NOVEMBER 1957
HOLLOMAN, AFB
NEW MEXICO
0556 MST
HEIGHT (km)
200
190
180
170
160
150
140
130
120
110
100
90
S
W
300
0
N
E
100
S
DIRECTION OF TRANSPORT VECTOR

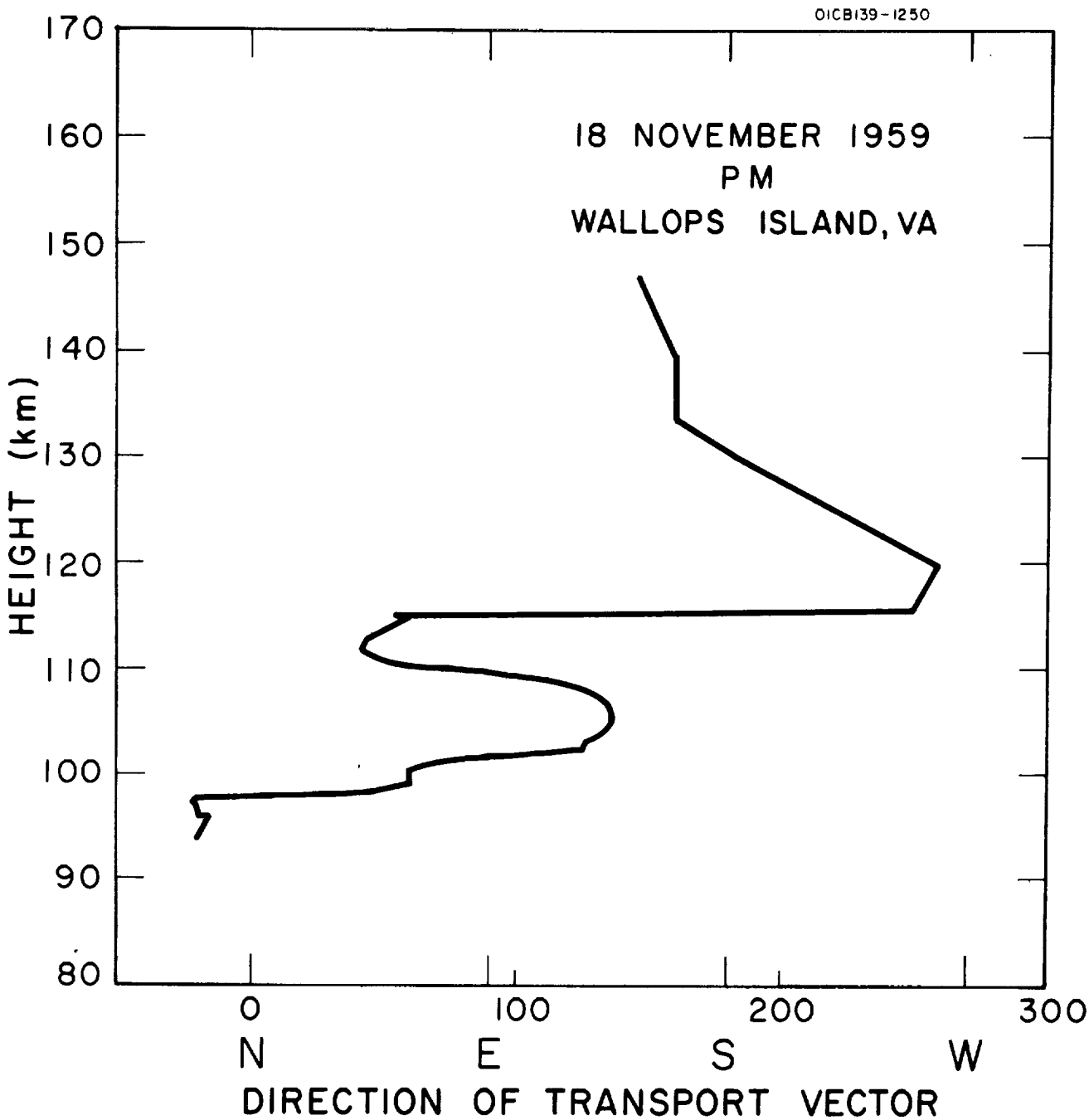

01CB228-390H
26 NOVEMBER 1957
HOLLOMAN AFB NEW MEXICO
0556 MST
HEIGHT (km)
200
190
180
170
160
150
140
130
120
110
100
180
N
270
W
0
N
90
E
180
S
DIRECTION OF TRANSPORT VECTOR

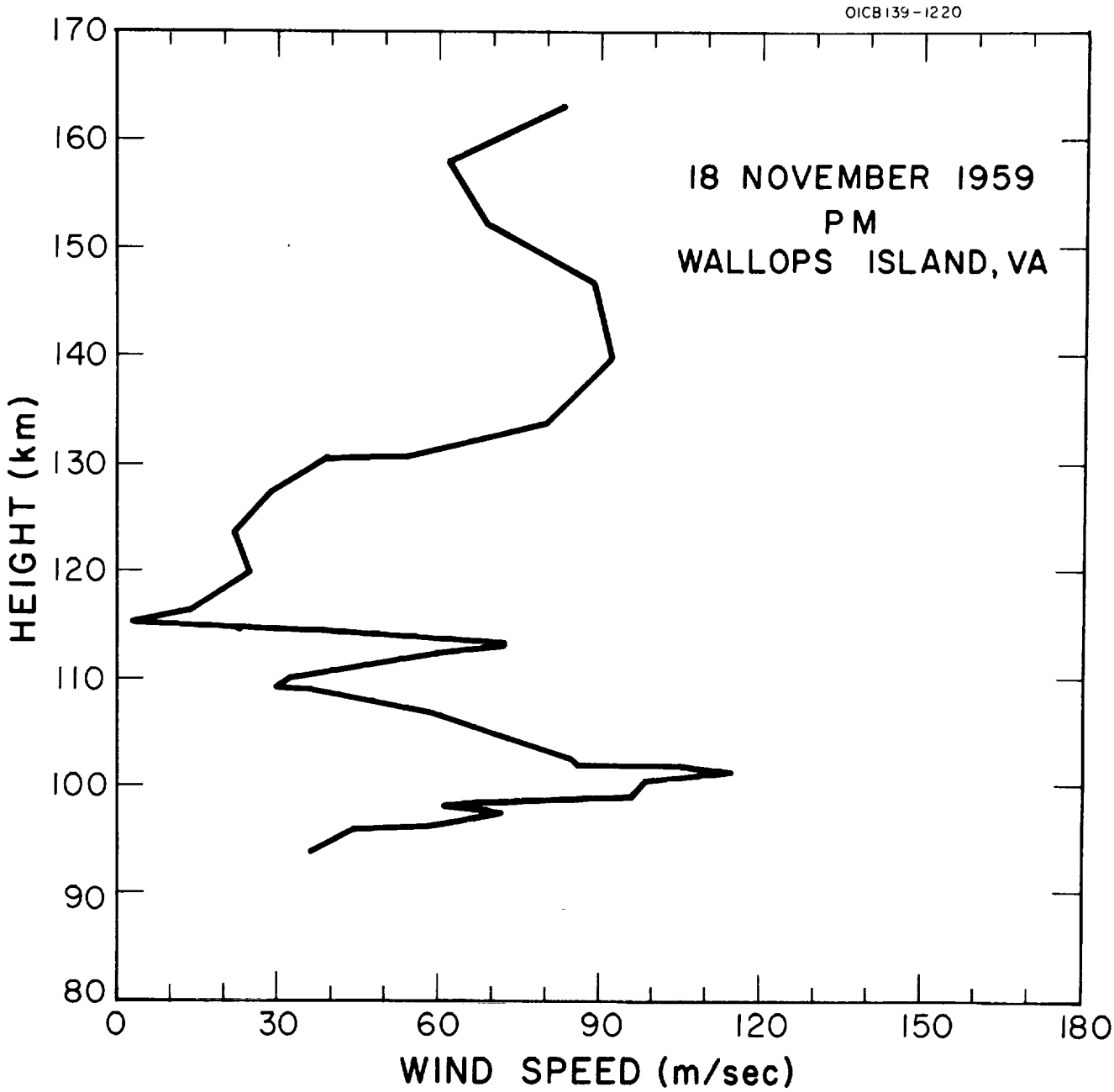

01CB228-400H
26 NOVEMBER 1957
HOLLOMAN AFB NEW MEXICO
0556 MST
HEIGHT (km)
200
190
180
170
160
150
140
130
120
110
100
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180
WIND SPEED (m/sec)

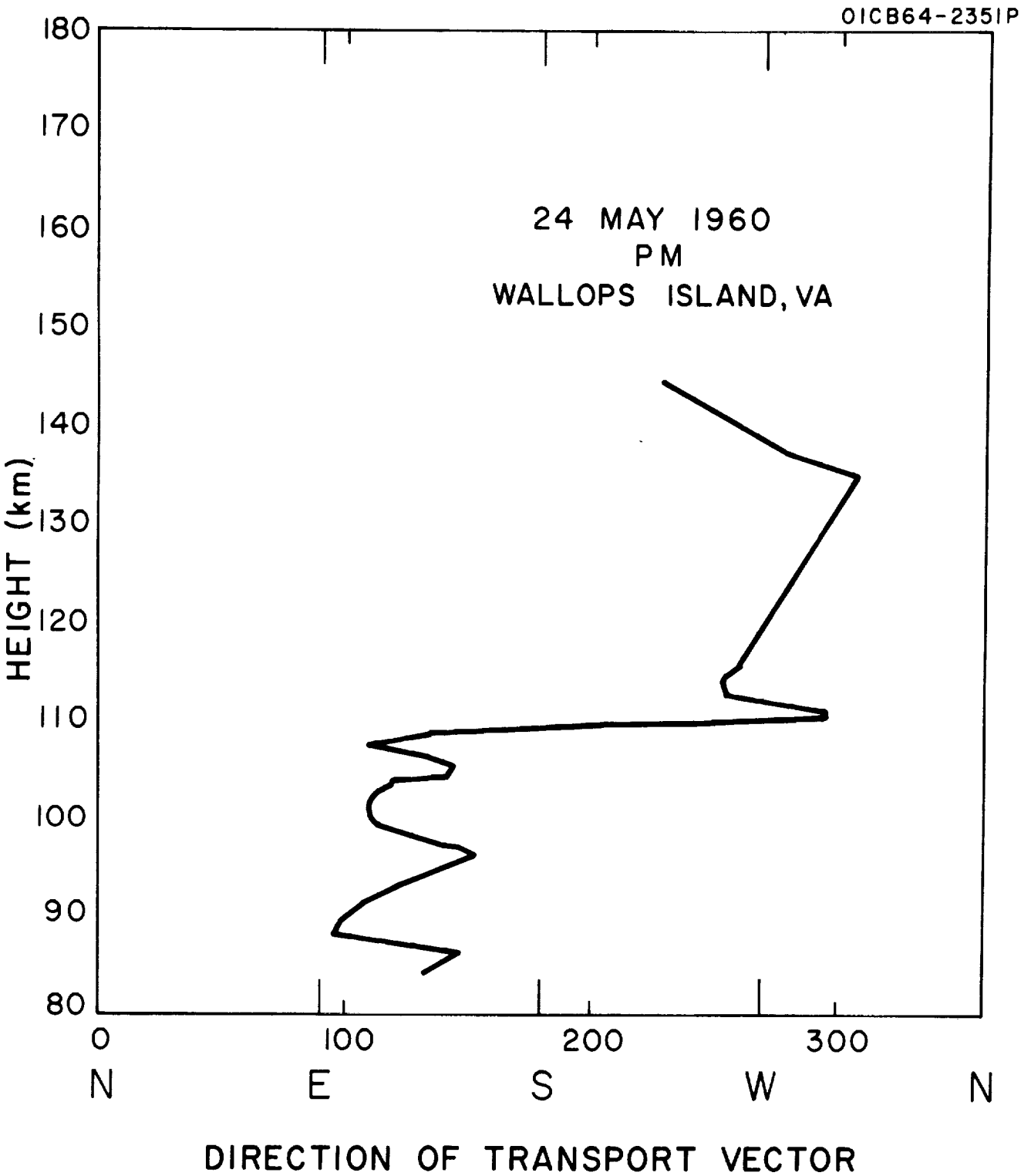

26 NOVEMBER 1957
HOLLOMAN AFB
NEW MEXICO
0556 MST
HEIGHT (km)
200
190
180
170
160
150
140
130
120
110
100
90
0
30
60
90
120
150
180
WIND SPEED (m/sec)

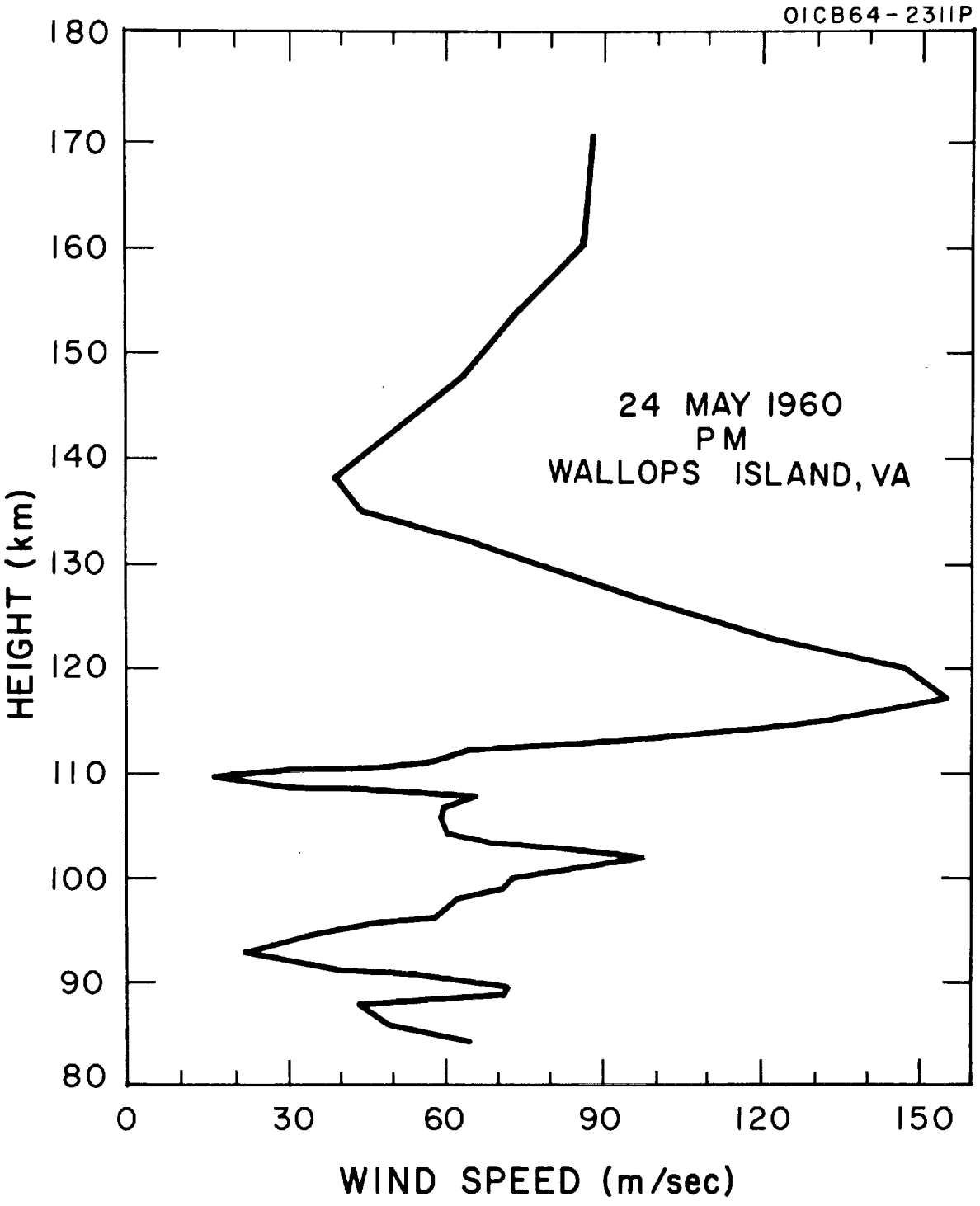

01CB139-1240
17 AUGUST 1959
A M
WALLOPS ISLAND, VA
HEIGHT (km)
230
220
210
200
190
180
170
160
150
140
0
100
200
300
N
E
S
W
N
DIRECTION OF TRANSPORT VECTOR

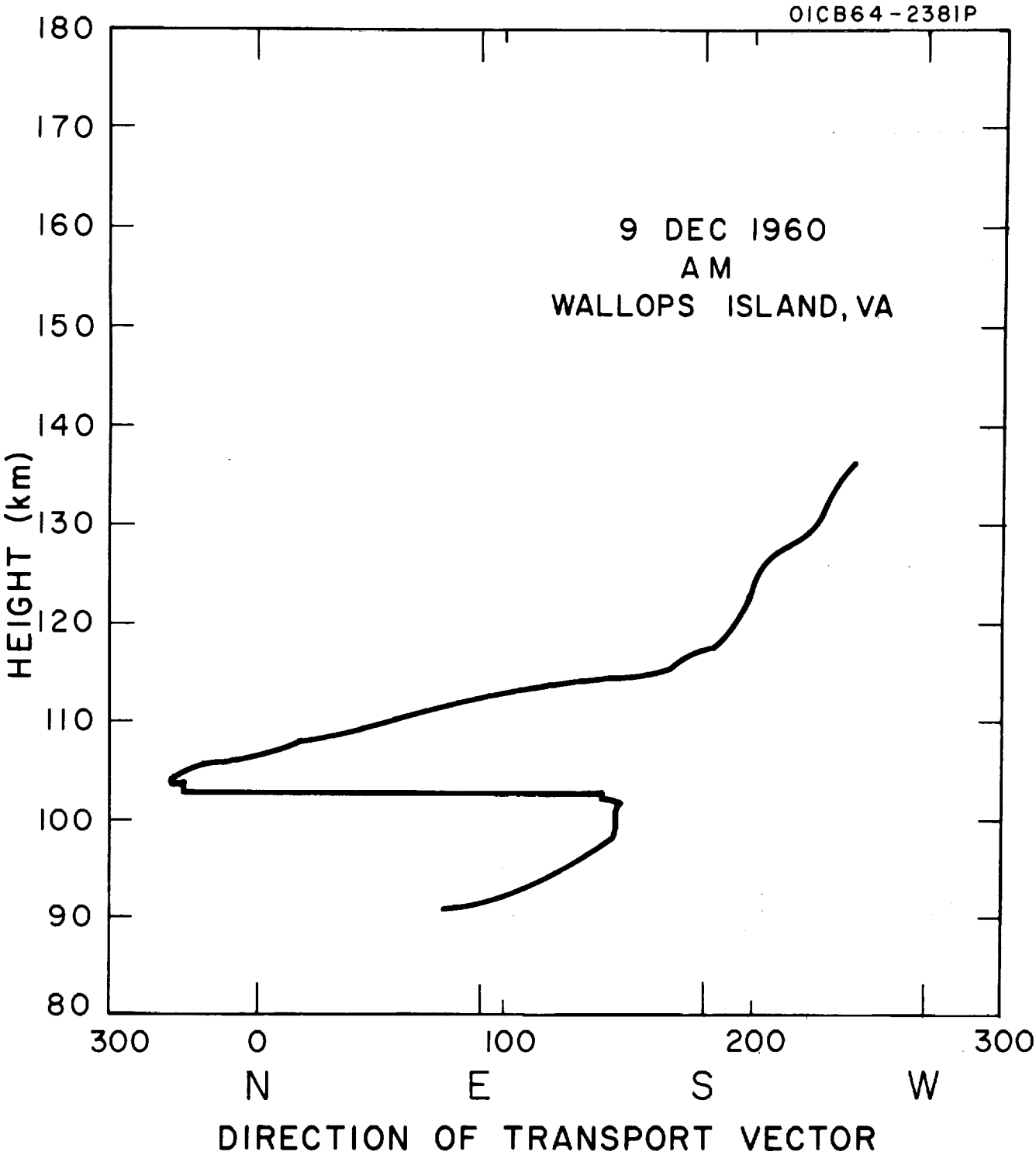

01CB139-1230
17 AUGUST 1959
AM
WALLOPS ISLAND, VA
HEIGHT (km)
230
220
210
200
190
180
170
160
150
140
90
120
150
180
210
240
270
WIND SPEED (m/sec)

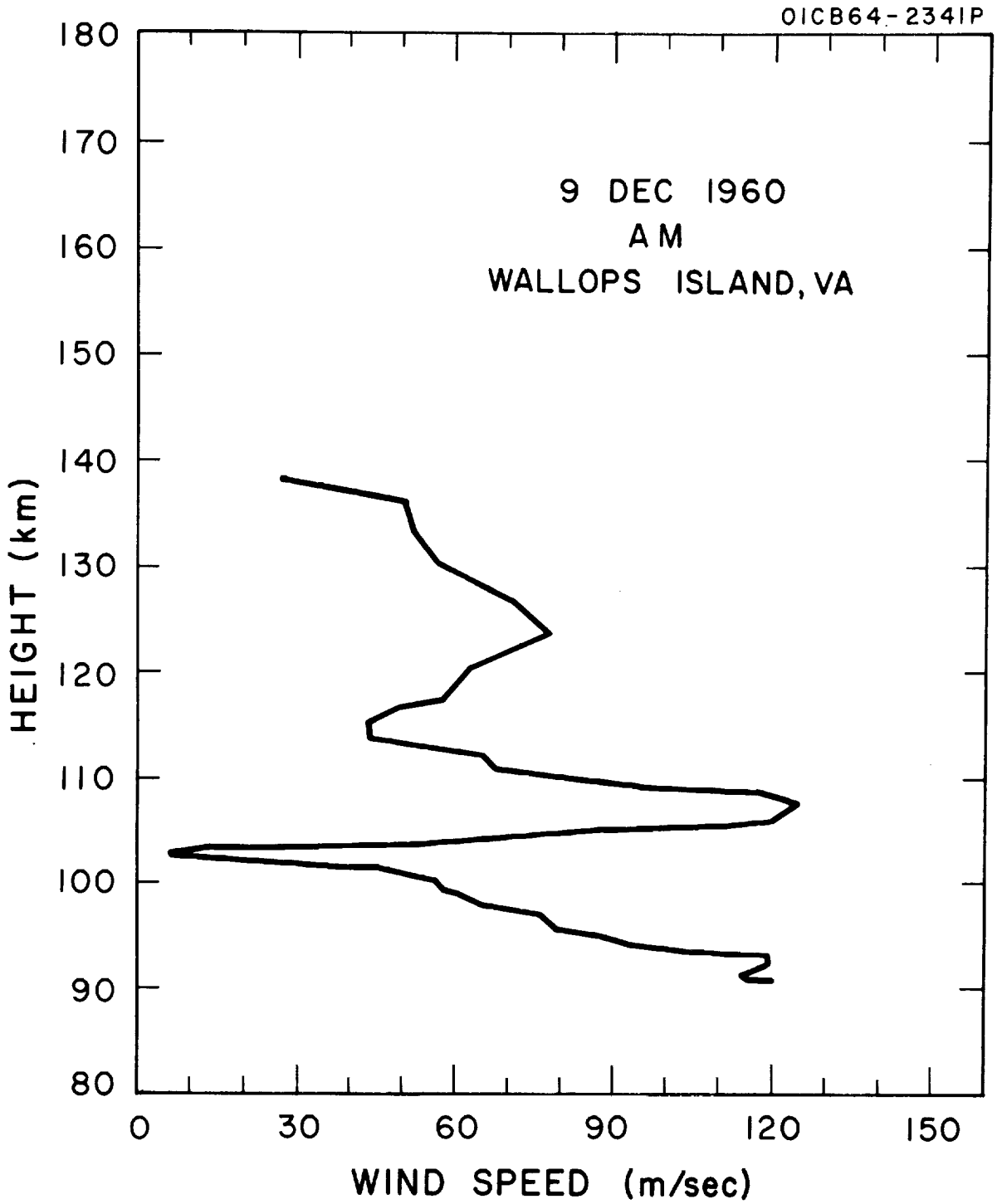

01CB139-1250
18 NOVEMBER 1959
PM
WALLOPS ISLAND, VA
HEIGHT (km)
170
160
150
140
130
120
110
100
90
80
0
100
200
300
N
E
S
W
DIRECTION OF TRANSPORT VECTOR

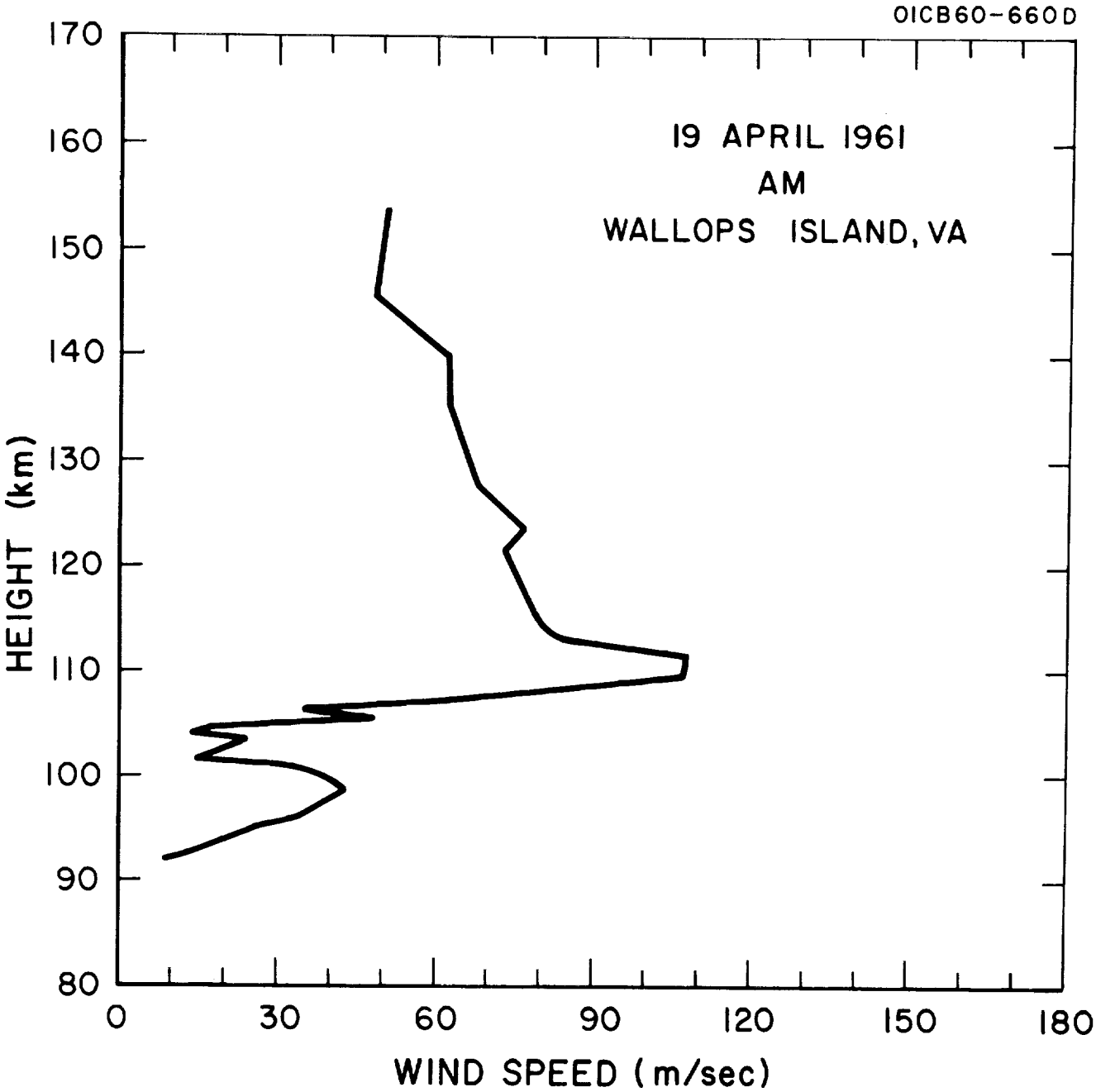

OICB139-1220
18 NOVEMBER 1959
PM
WALLOPS ISLAND, VA
HEIGHT (km)
170
160
150
140
130
120
110
100
90
80
0
30
60
90
120
150
180
WIND SPEED (m/sec)

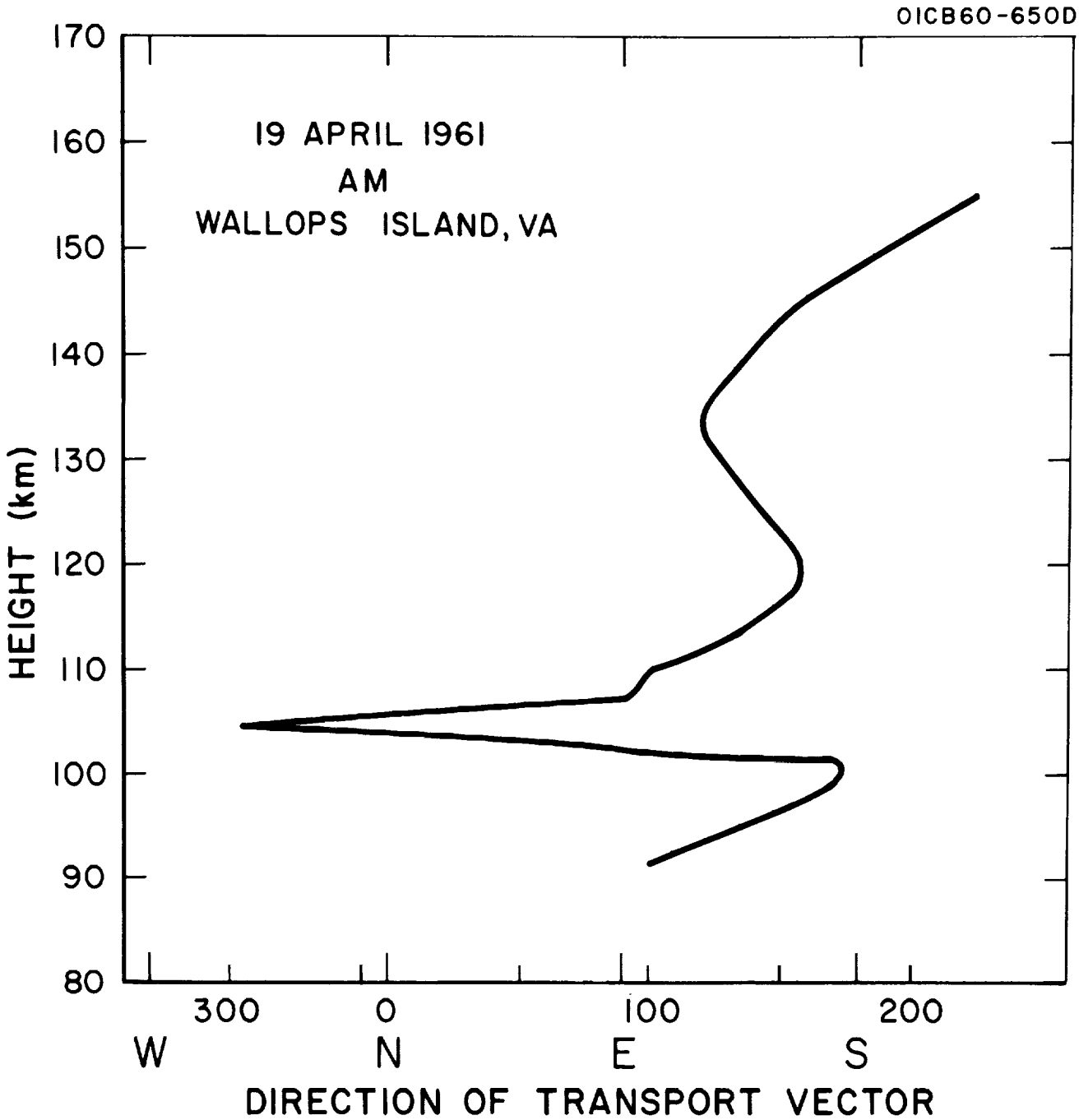

01CB64-2351P
24 MAY 1960
PM
WALLOPS ISLAND, VA
HEIGHT (km)
180
170
160
150
140
130
120
110
100
90
80
0
100
200
300
N
E
S
W
N
DIRECTION OF TRANSPORT VECTOR

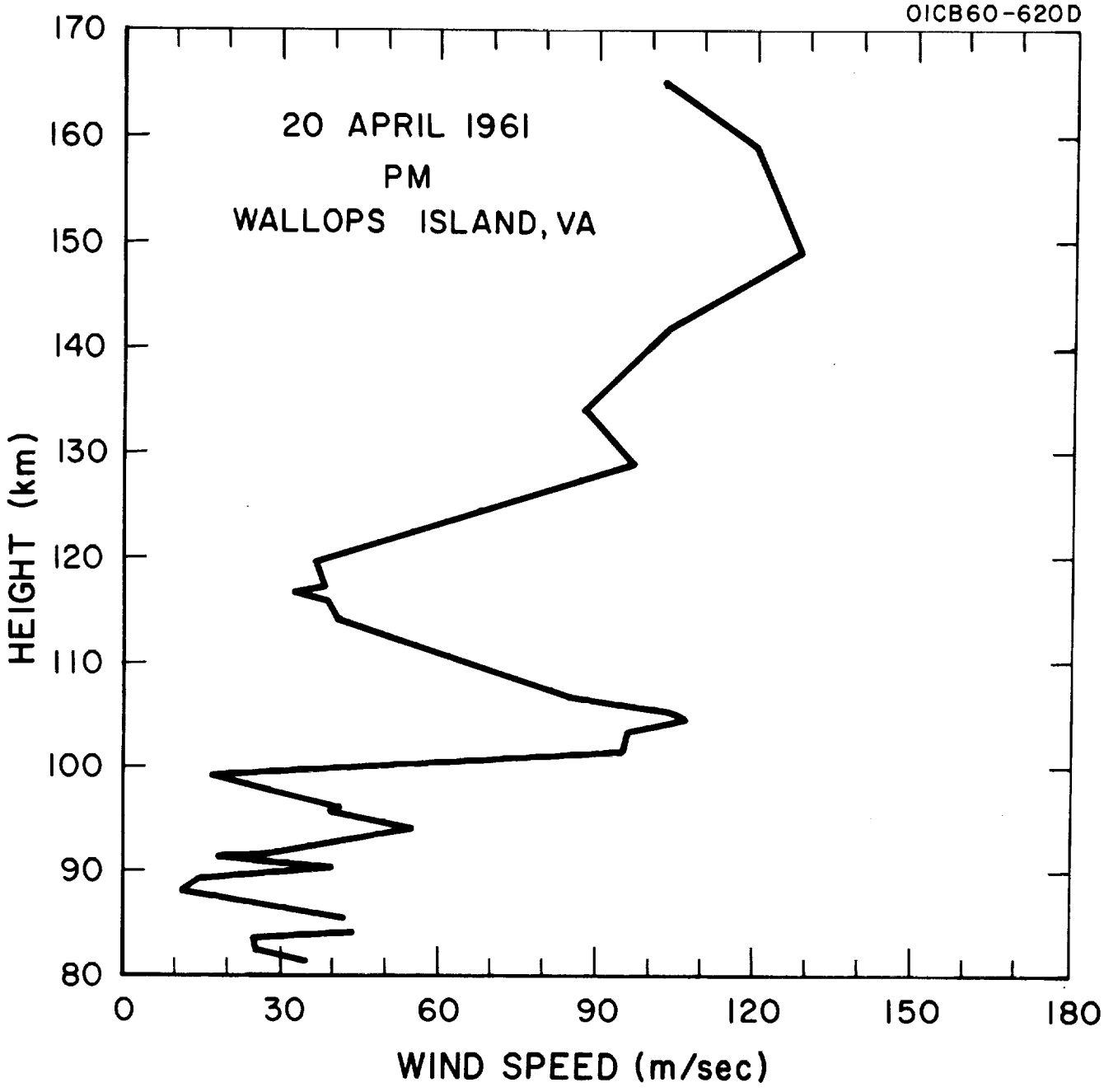

01CB64-2311P
24 MAY 1960
PM
WALLOPS ISLAND, VA
HEIGHT (km)
180
170
160
150
140
130
120
110
100
90
80
0
30
60
90
120
150
WIND SPEED (m/sec)

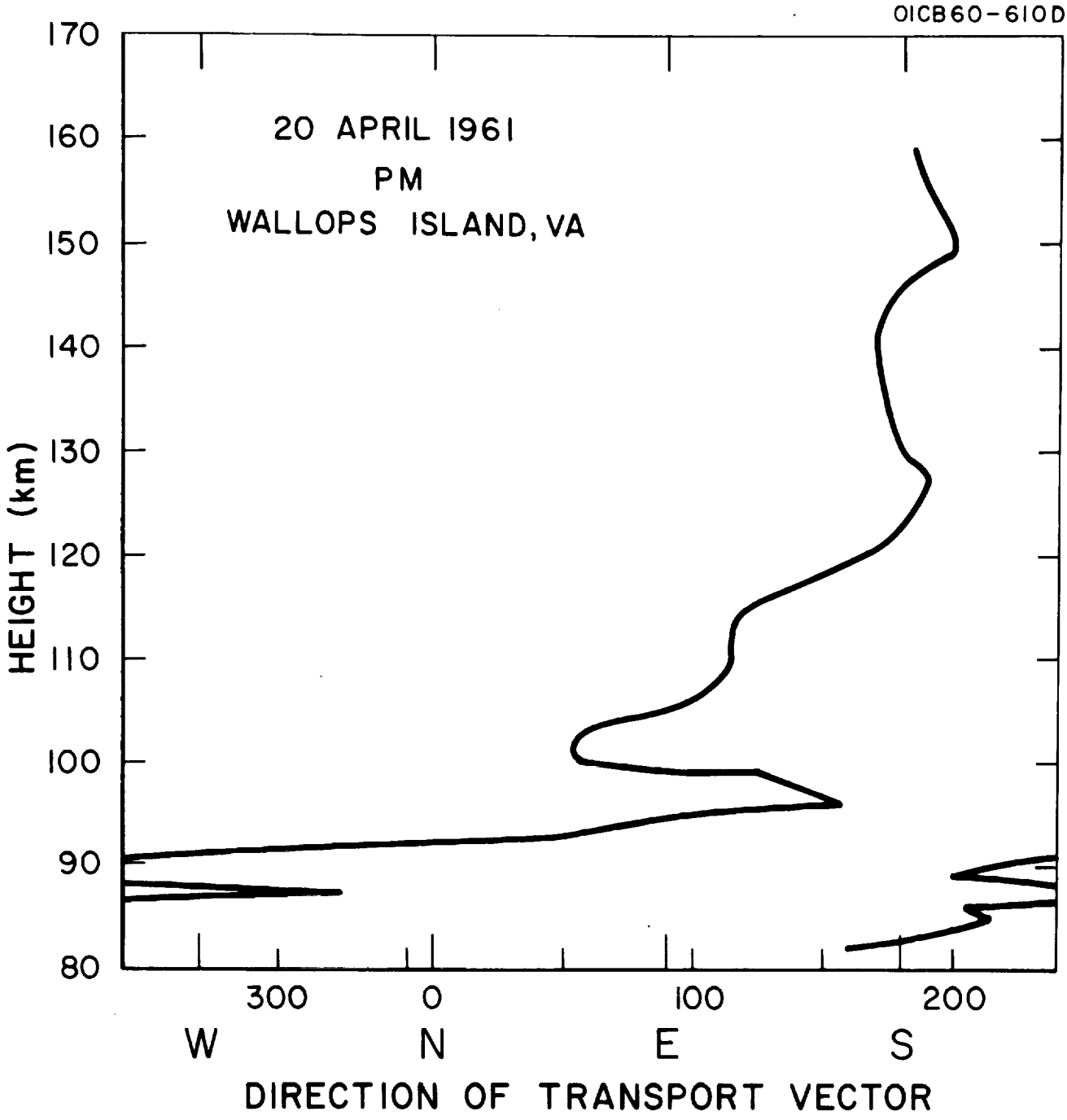

01CB64-2381P
9 DEC 1960
AM
WALLOPS ISLAND, VA
HEIGHT (km)
180
170
160
150
140
130
120
110
100
90
80
300
0
100
200
300
N
E
S
W
DIRECTION OF TRANSPORT VECTOR

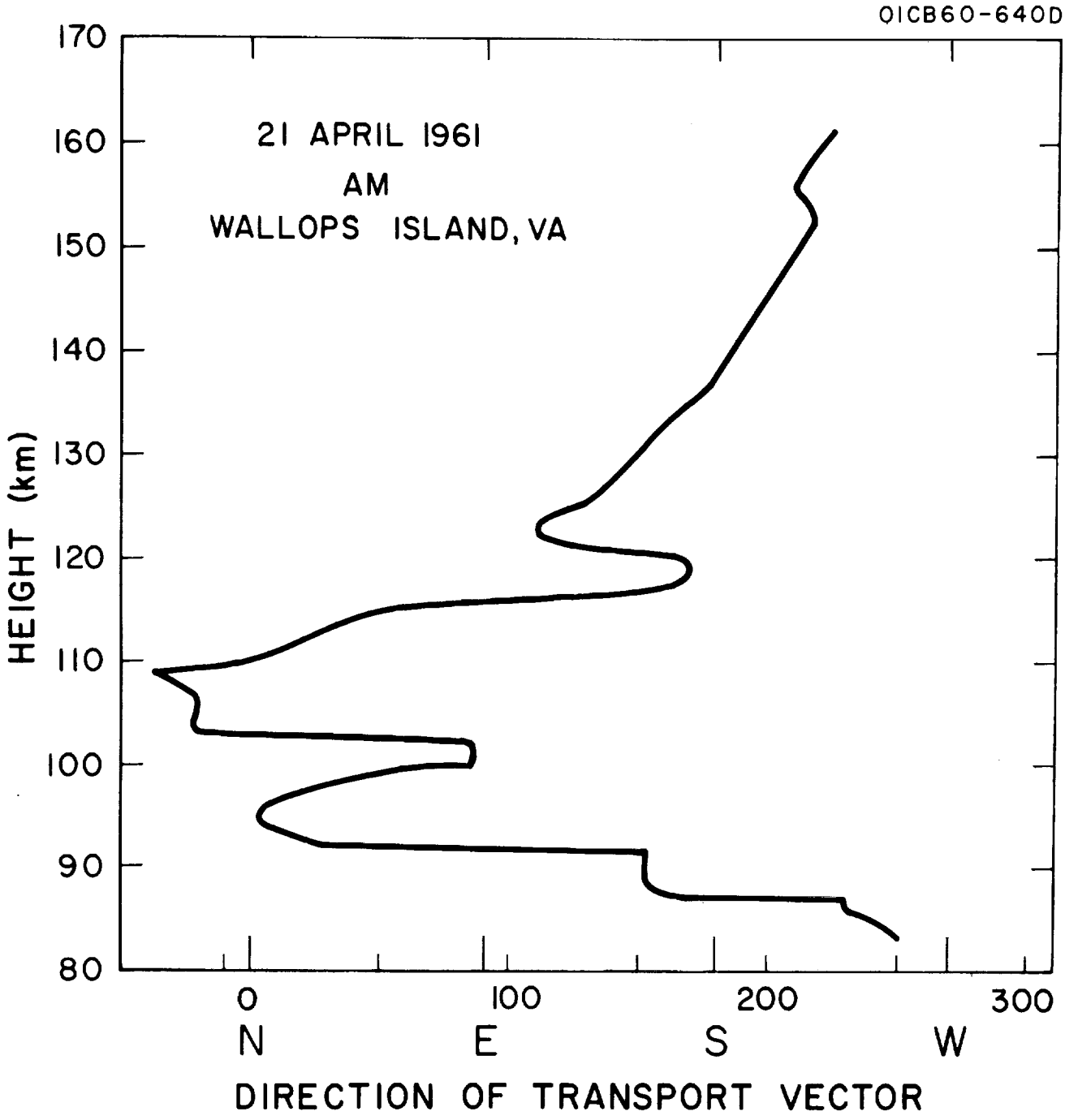

01CB64-2341P
9 DEC 1960
AM
WALLOPS ISLAND, VA
HEIGHT (km)
180
170
160
150
140
130
120
110
100
90
80
0
30
60
90
120
150
WIND SPEED (m/sec)

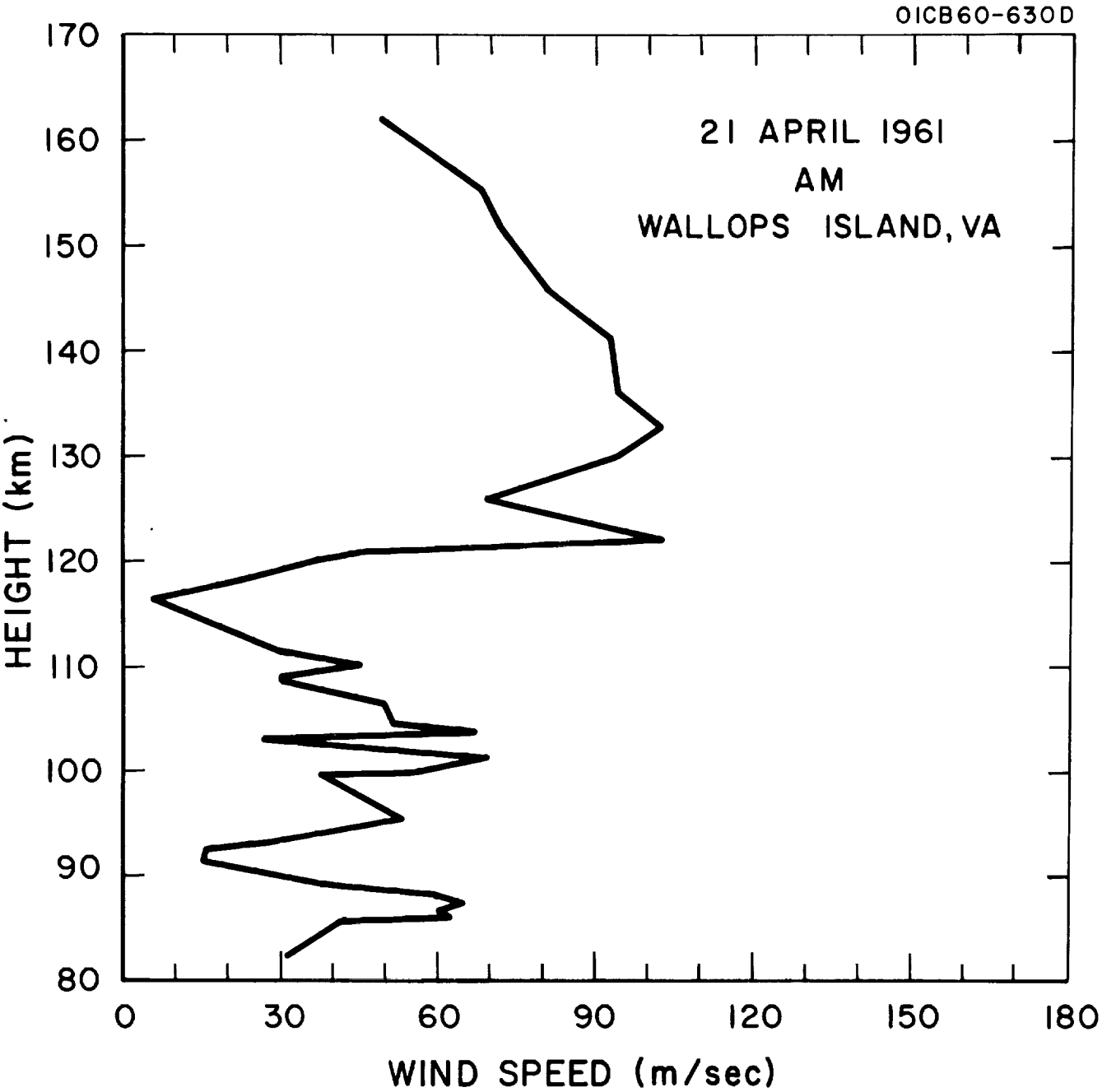

01CB60-660D
19 APRIL 1961
AM
WALLOPS ISLAND, VA
HEIGHT (km)
170
160
150
140
130
120
110
100
90
80
0
30
60
90
120
150
180
WIND SPEED (m/sec)

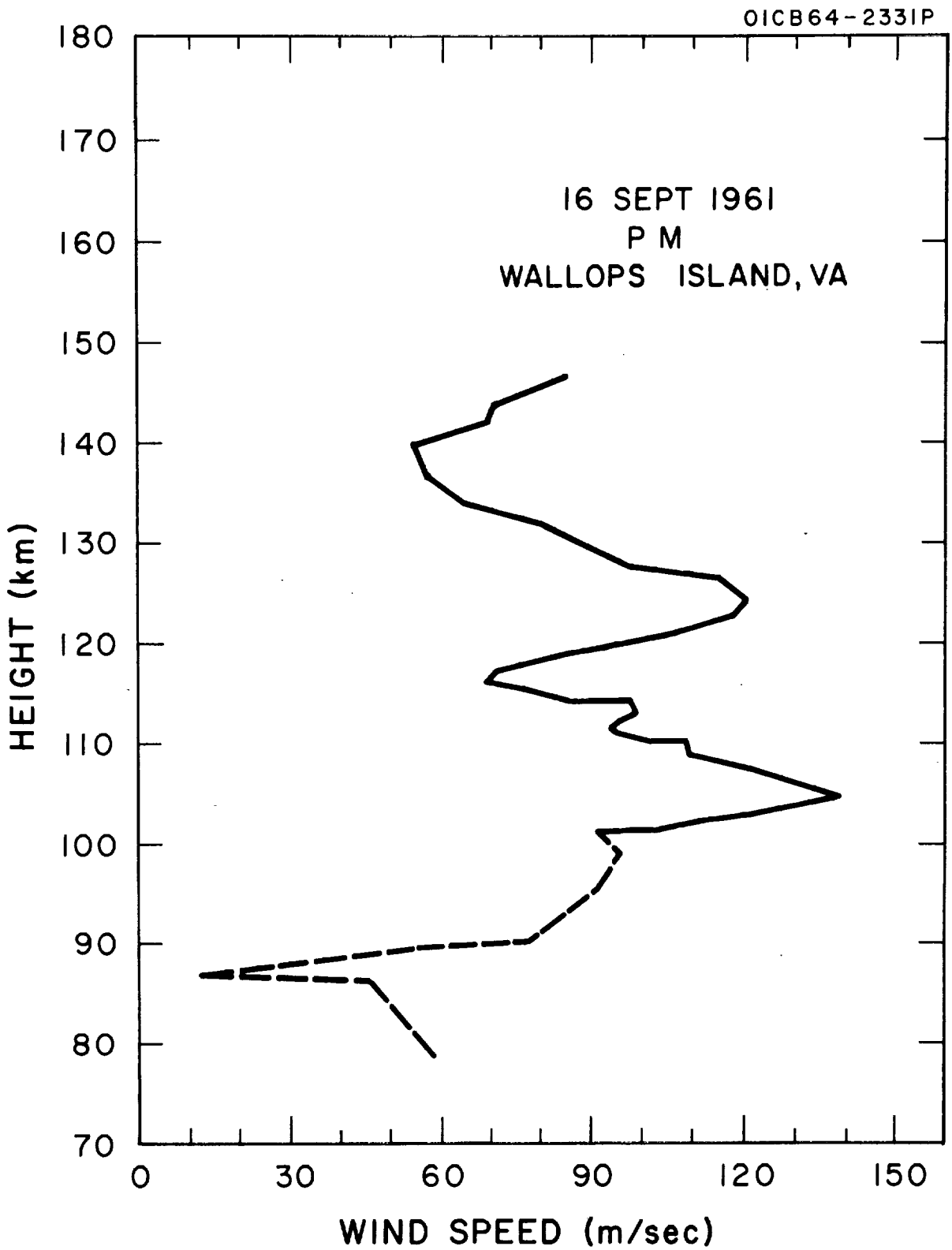

01CB60-650D
19 APRIL 1961
AM
WALLOPS ISLAND, VA
HEIGHT (km)
170
160
150
140
130
120
110
100
90
80
300
0
100
200
W
N
E
S
DIRECTION OF TRANSPORT VECTOR

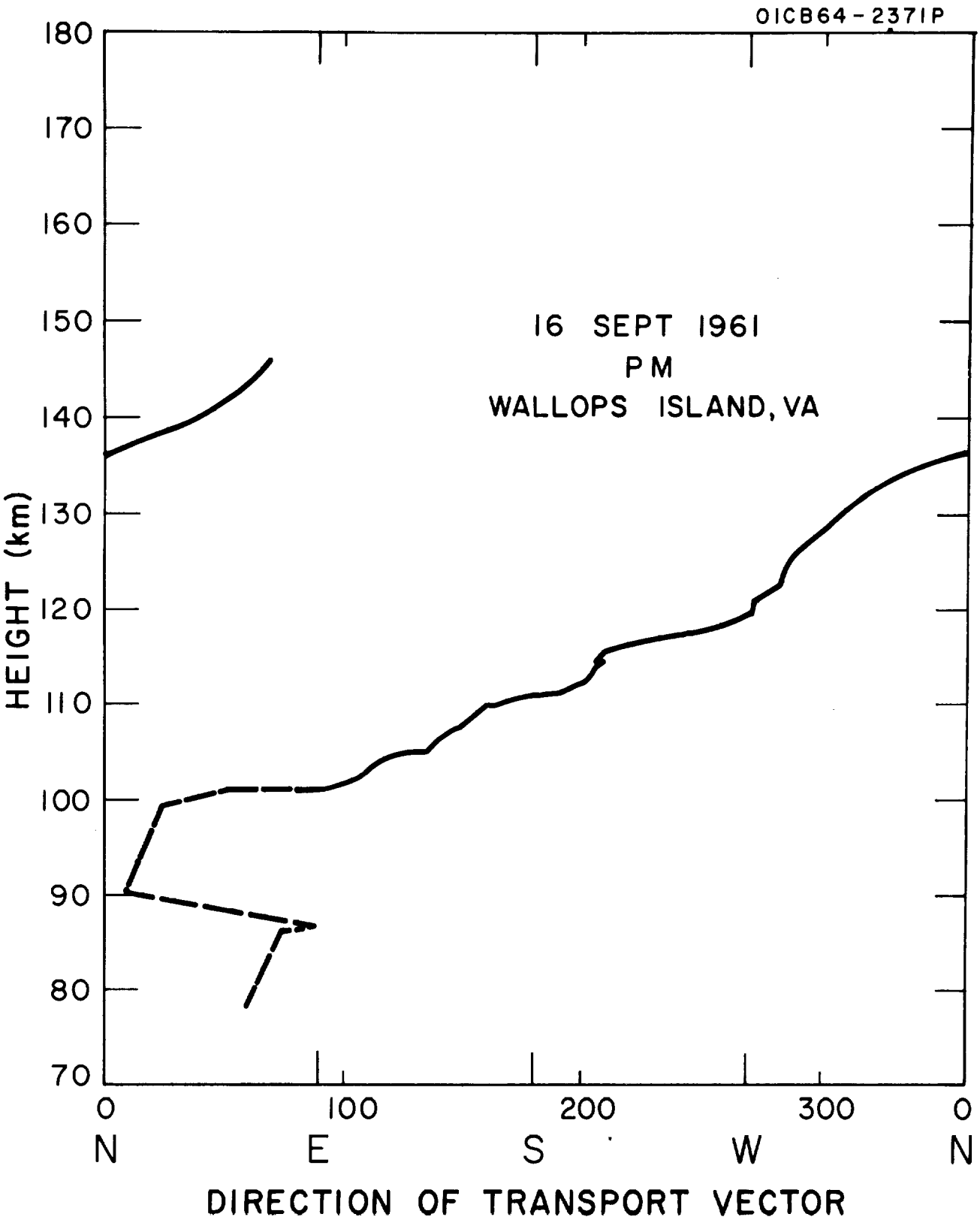

01CB60-620D
20 APRIL 1961
PM
WALLOPS ISLAND, VA
HEIGHT (km)
170
160
150
140
130
120
110
100
90
80
0
30
60
90
120
150
180
WIND SPEED (m/sec)

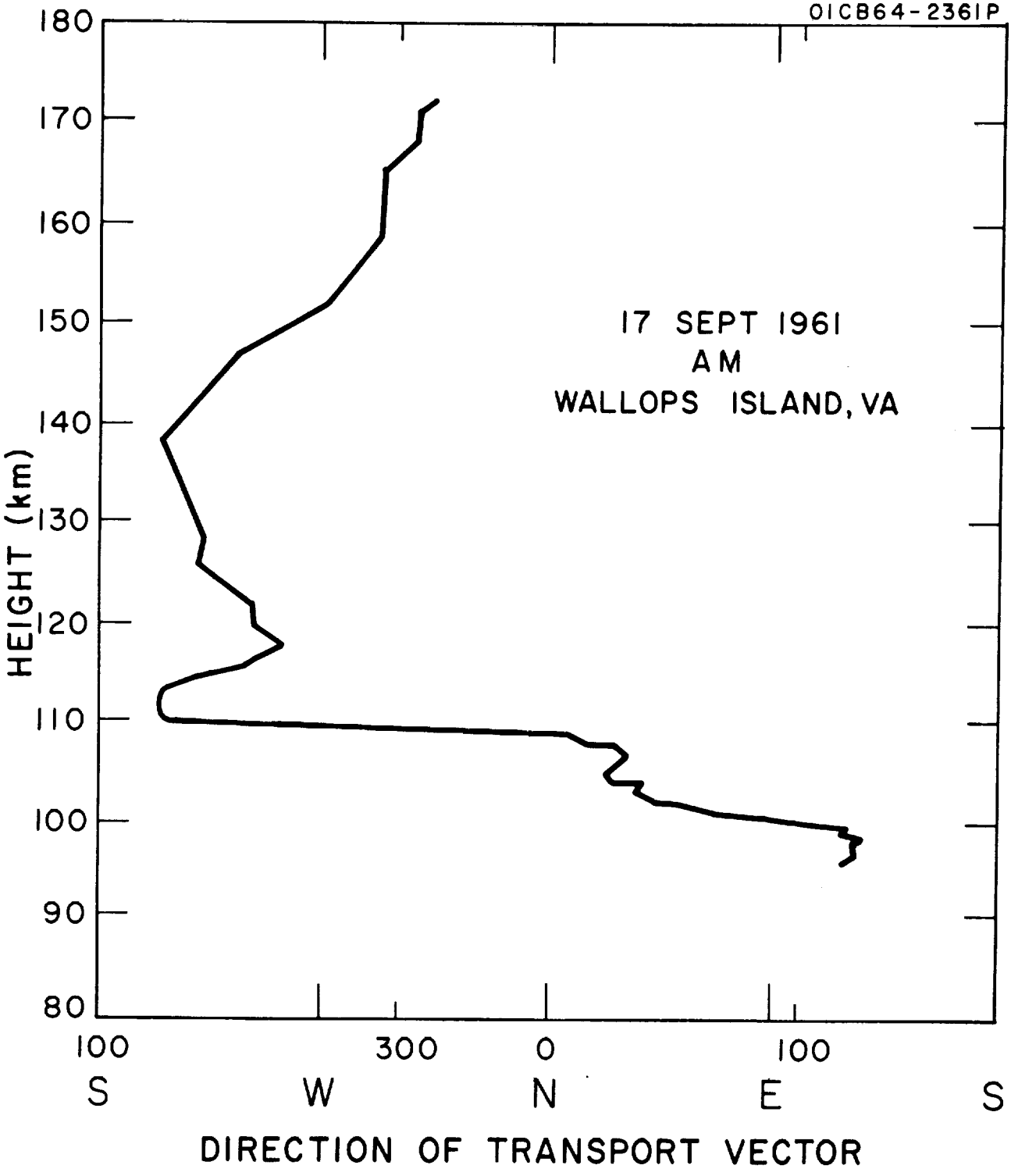

01CB60-610D
20 APRIL 1961
PM
WALLOPS ISLAND, VA
HEIGHT (km)
170
160
150
140
130
120
110
100
90
80
300
0
100
200
W
N
E
S
DIRECTION OF TRANSPORT VECTOR

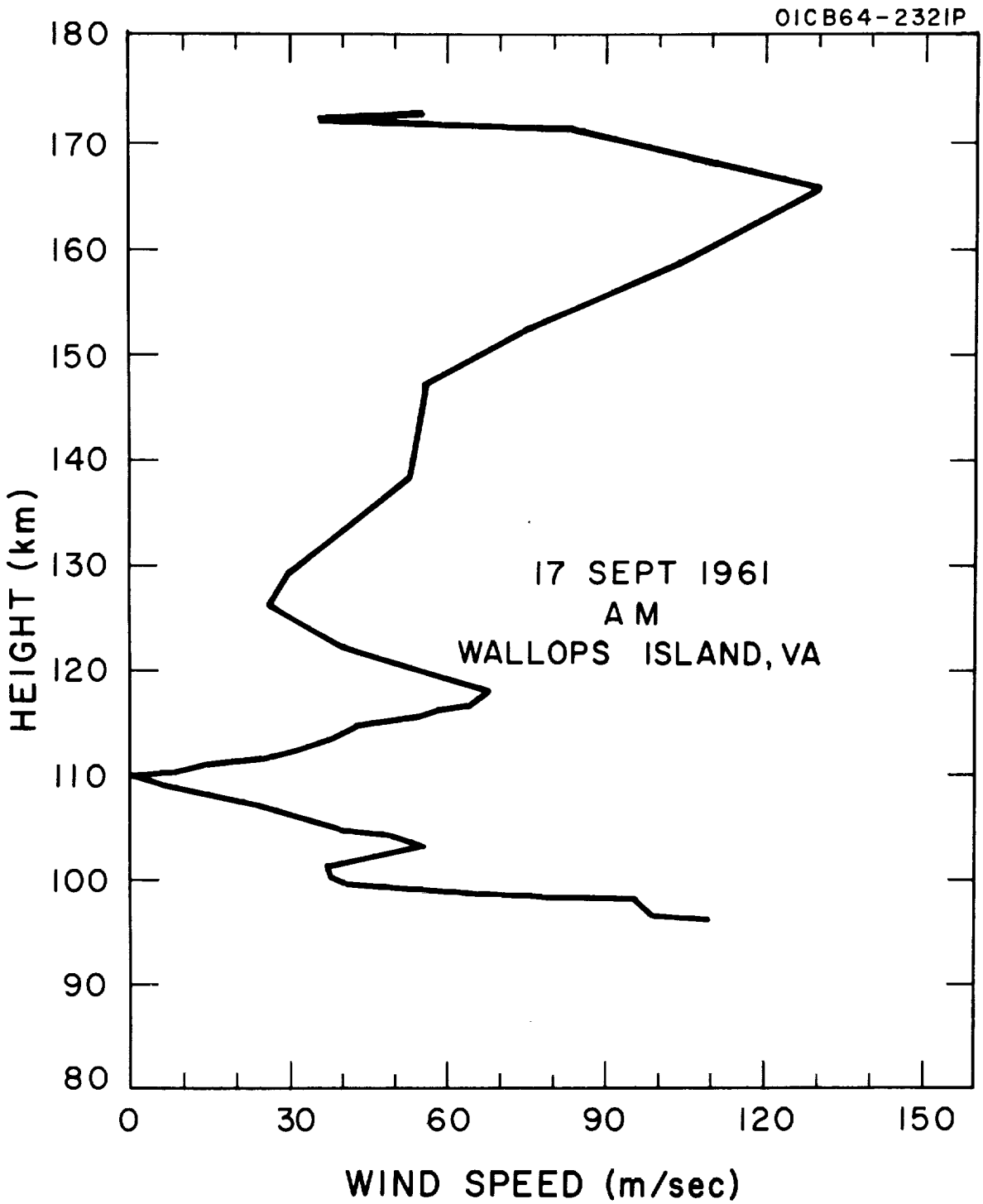

01CB60-640D
21 APRIL 1961
AM
WALLOPS ISLAND, VA
HEIGHT (km)
170
160
150
140
130
120
110
100
90
80
0
100
200
300
N
E
S
W
DIRECTION OF TRANSPORT VECTOR

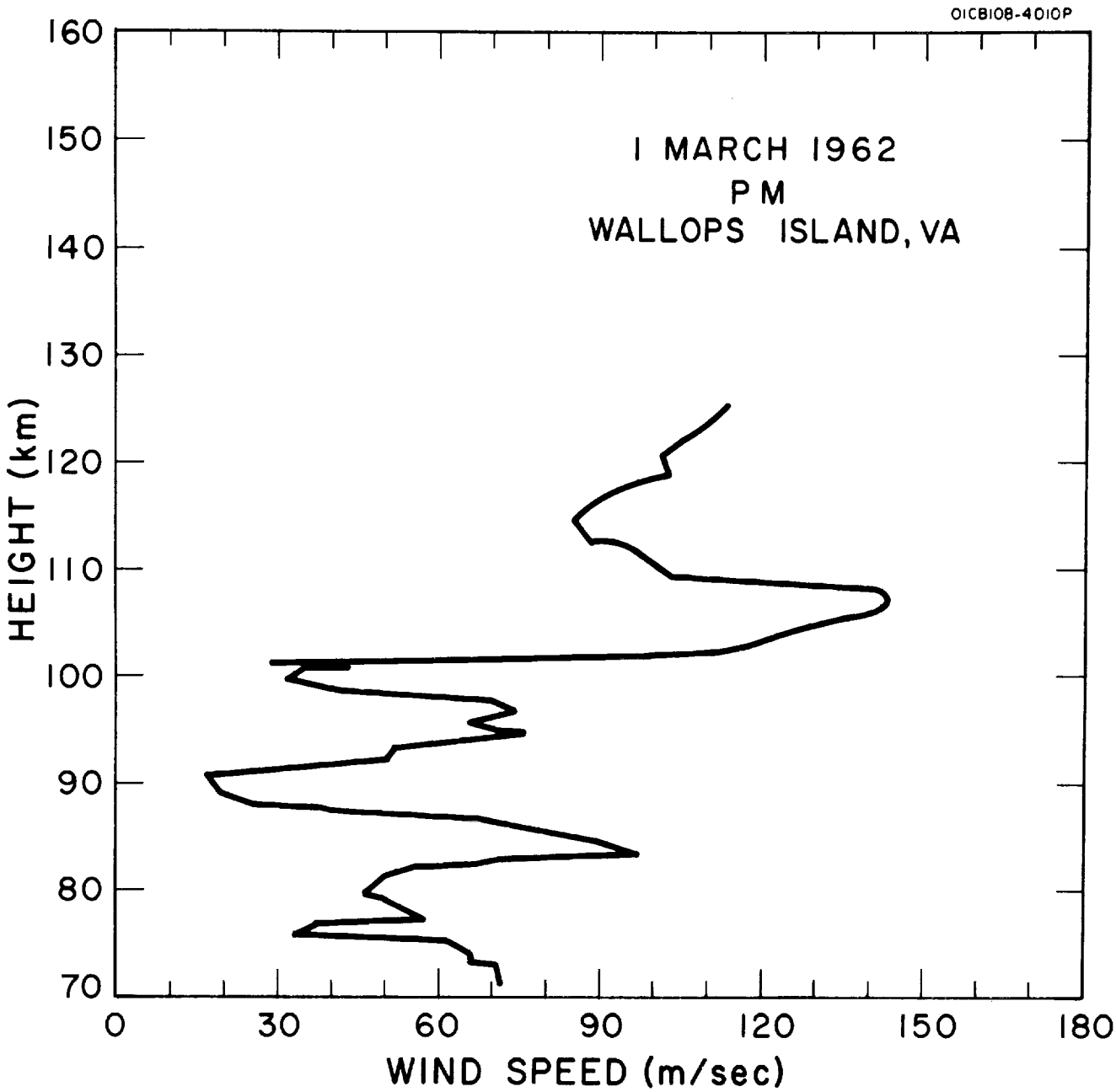

01CB60-630D
21 APRIL 1961
AM
WALLOPS ISLAND, VA
HEIGHT (km)
170
160
150
140
130
120
110
100
90
80
0
30
60
90
120
150
180
WIND SPEED (m/sec)

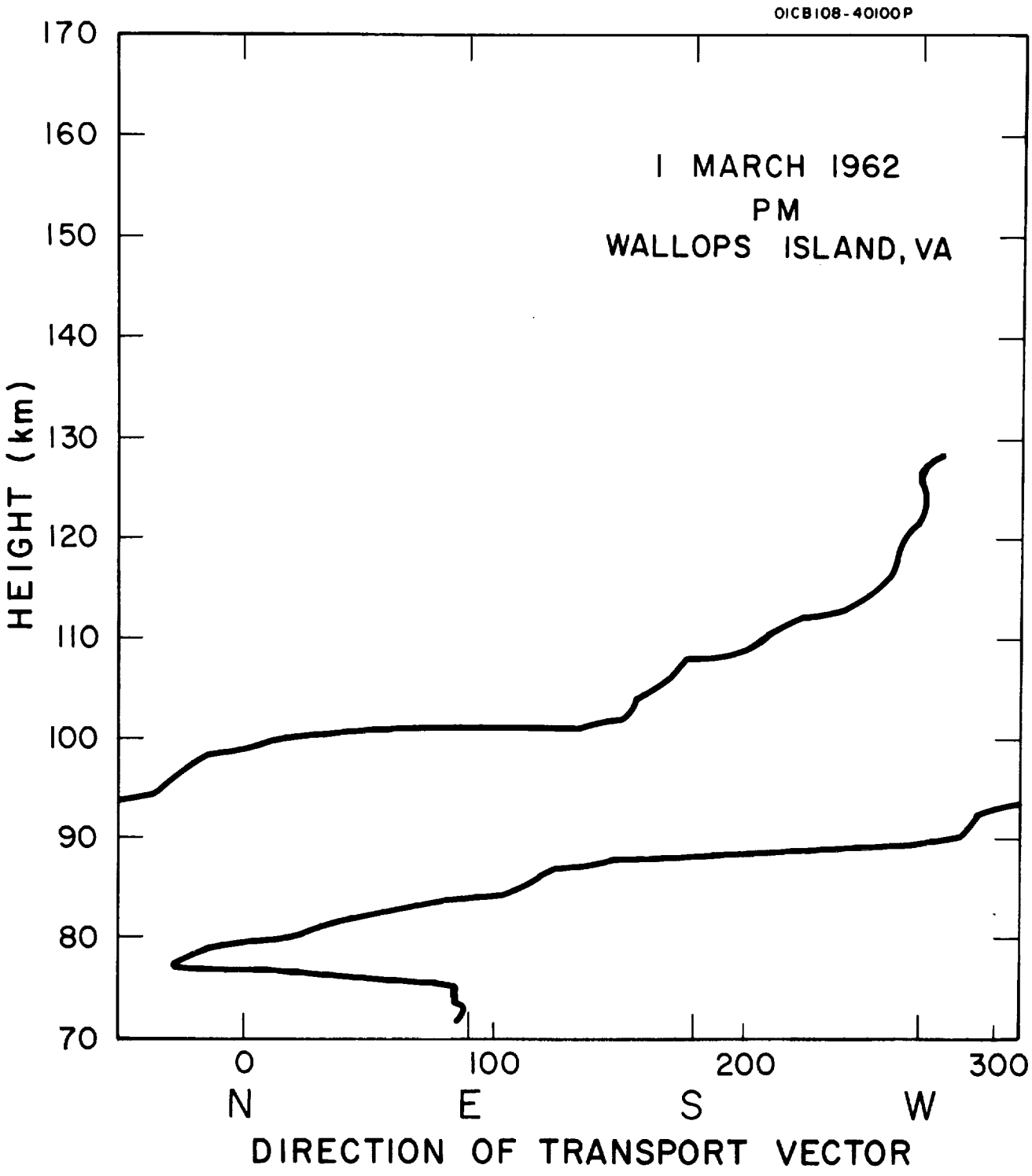

01CB64-2331P
16 SEPT 1961
P M
WALLOPS ISLAND, VA
HEIGHT (km)
180
170
160
150
140
130
120
110
100
90
80
70
0
30
60
90
120
150
WIND SPEED (m/sec)

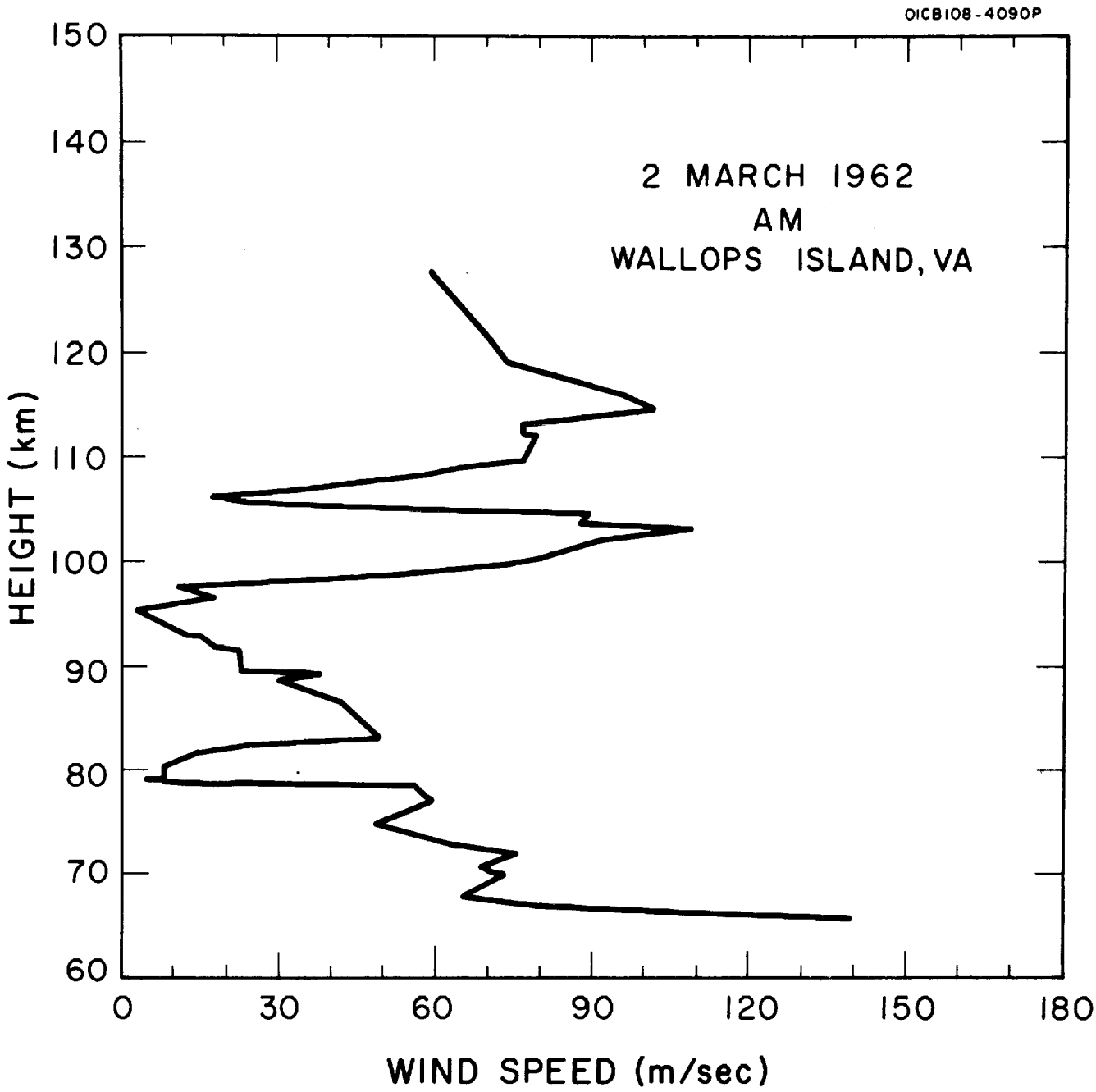

01CB64-2371P
16 SEPT 1961
PM
WALLOPS ISLAND, VA
HEIGHT (km)
180
170
160
150
140
130
120
110
100
90
80
70
0
100
200
300
0
N
E
S
W
N
DIRECTION OF TRANSPORT VECTOR

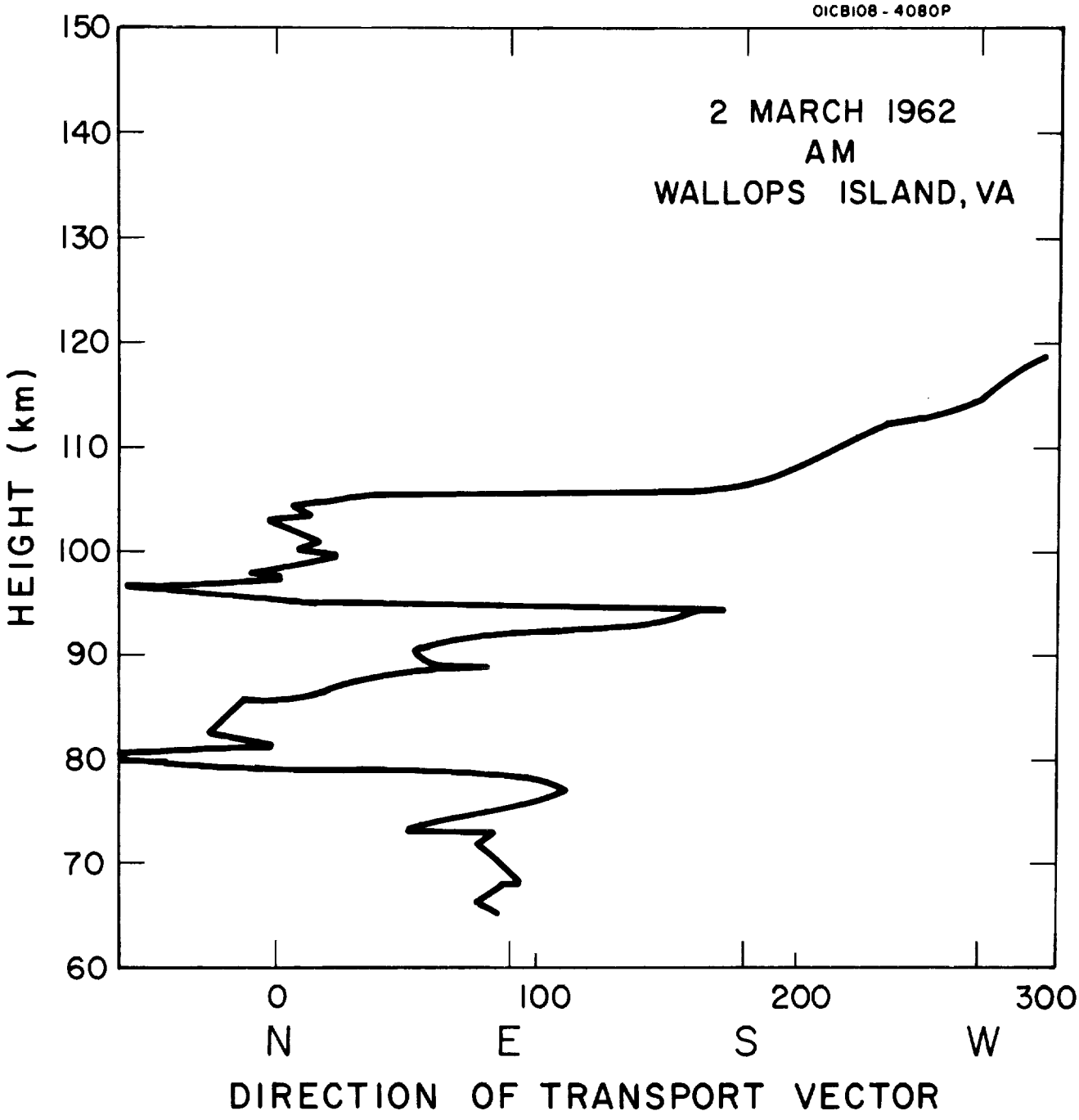

01CB64-2361P
17 SEPT 1961
AM
WALLOPS ISLAND, VA
HEIGHT (km)
180
170
160
150
140
130
120
110
100
90
80
100
300
0
100
S
W
N
E
S
DIRECTION OF TRANSPORT VECTOR

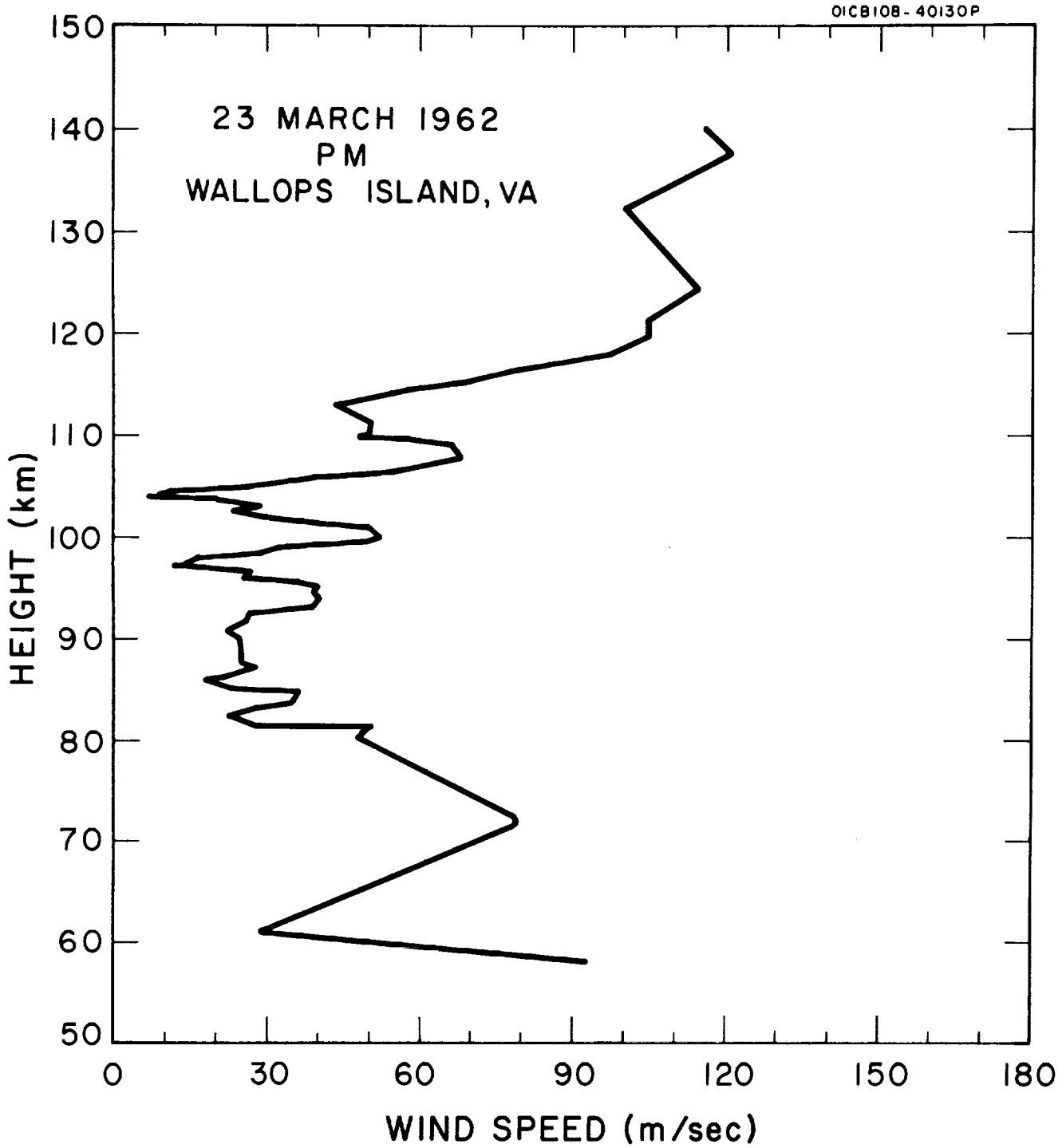

01CB64-2321P
180
170
160
150
140
130
120
110
100
90
80
HEIGHT (km)
0
30
60
90
120
150
WIND SPEED (m/sec)
17 SEPT 1961
A M
WALLOPS ISLAND, VA

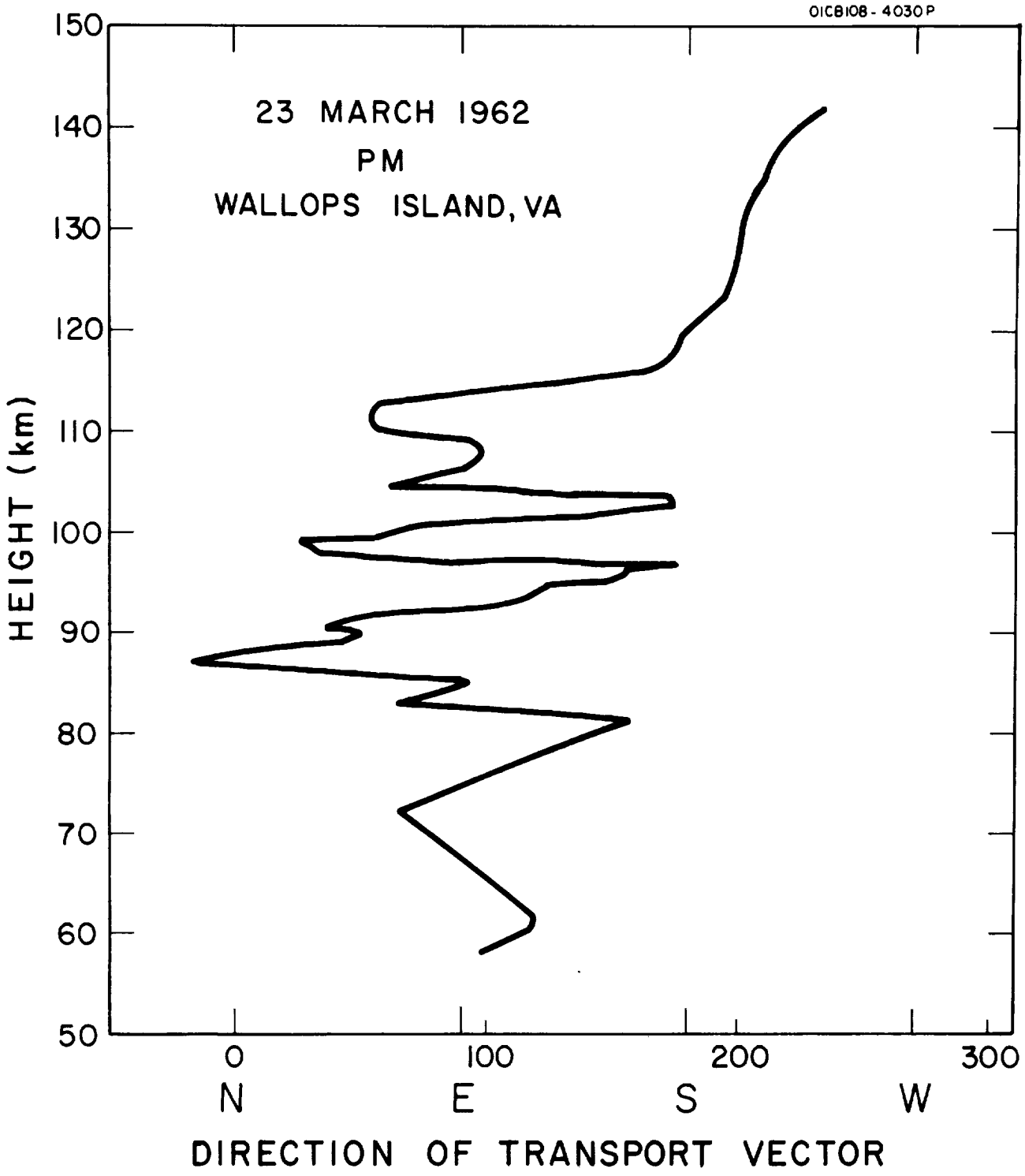

01CB108-4010P
1 MARCH 1962
PM
WALLOPS ISLAND, VA
HEIGHT (km)
160
150
140
130
120
110
100
90
80
70
0
30
60
90
120
150
180
WIND SPEED (m/sec)

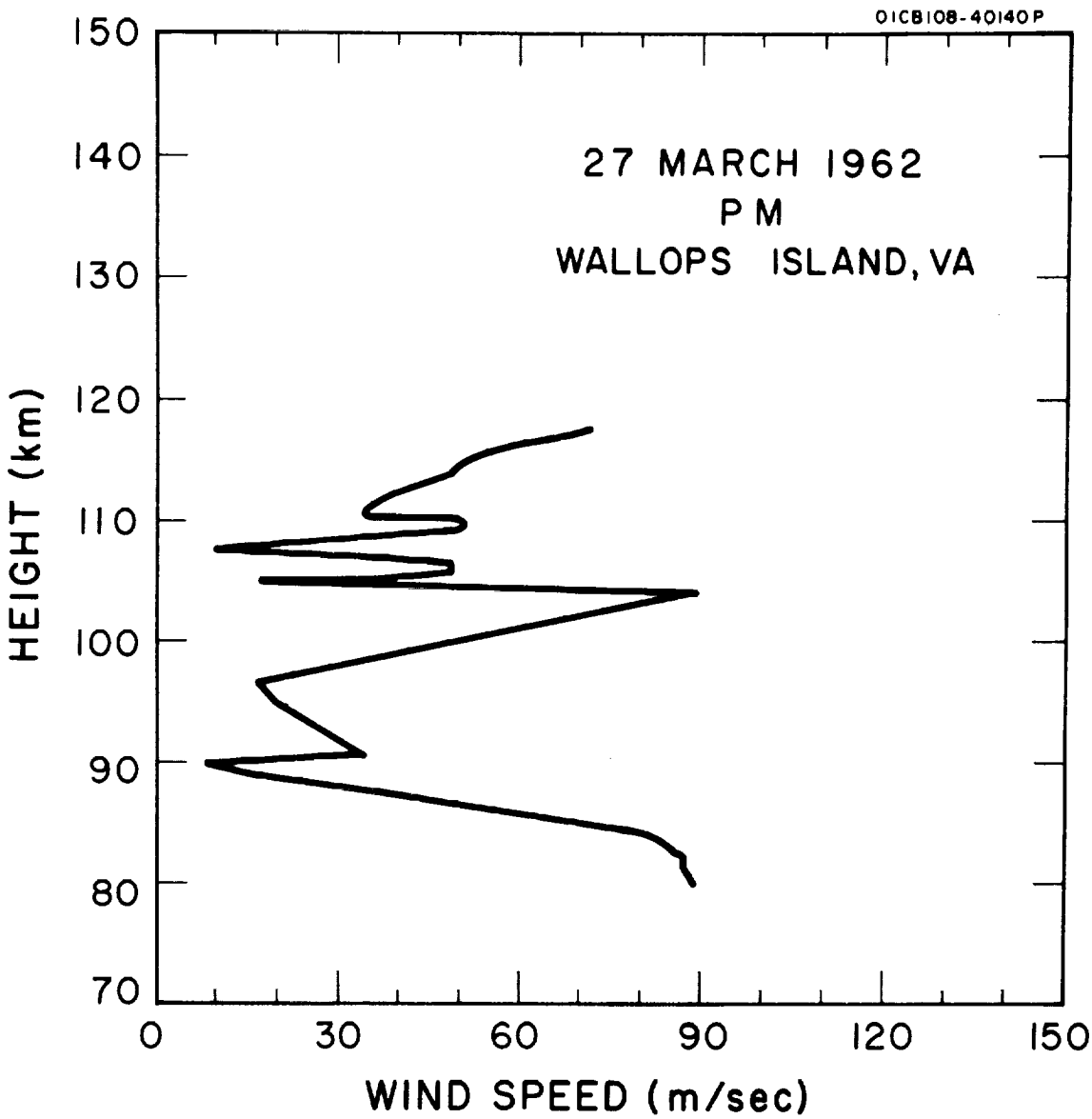

01CB108-40100P
1 MARCH 1962
PM
WALLOPS ISLAND, VA
HEIGHT (km)
170
160
150
140
130
120
110
100
90
80
70
0
100
200
300
N
E
S
W
DIRECTION OF TRANSPORT VECTOR

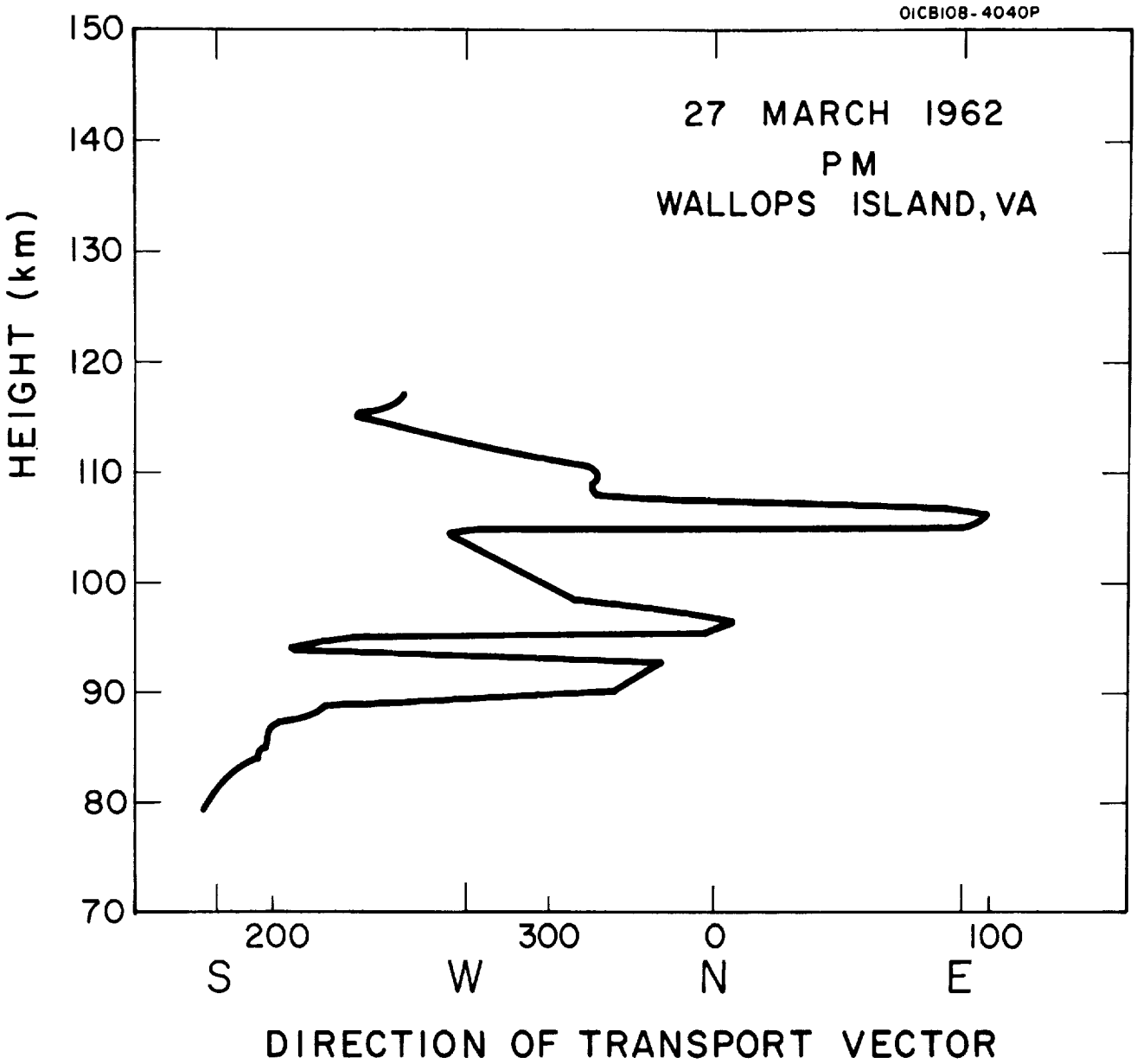

01CB108-4090P
2 MARCH 1962
AM
WALLOPS ISLAND, VA
HEIGHT (km)
150
140
130
120
110
100
90
80
70
60
0
30
60
90
120
150
180
WIND SPEED (m/sec)

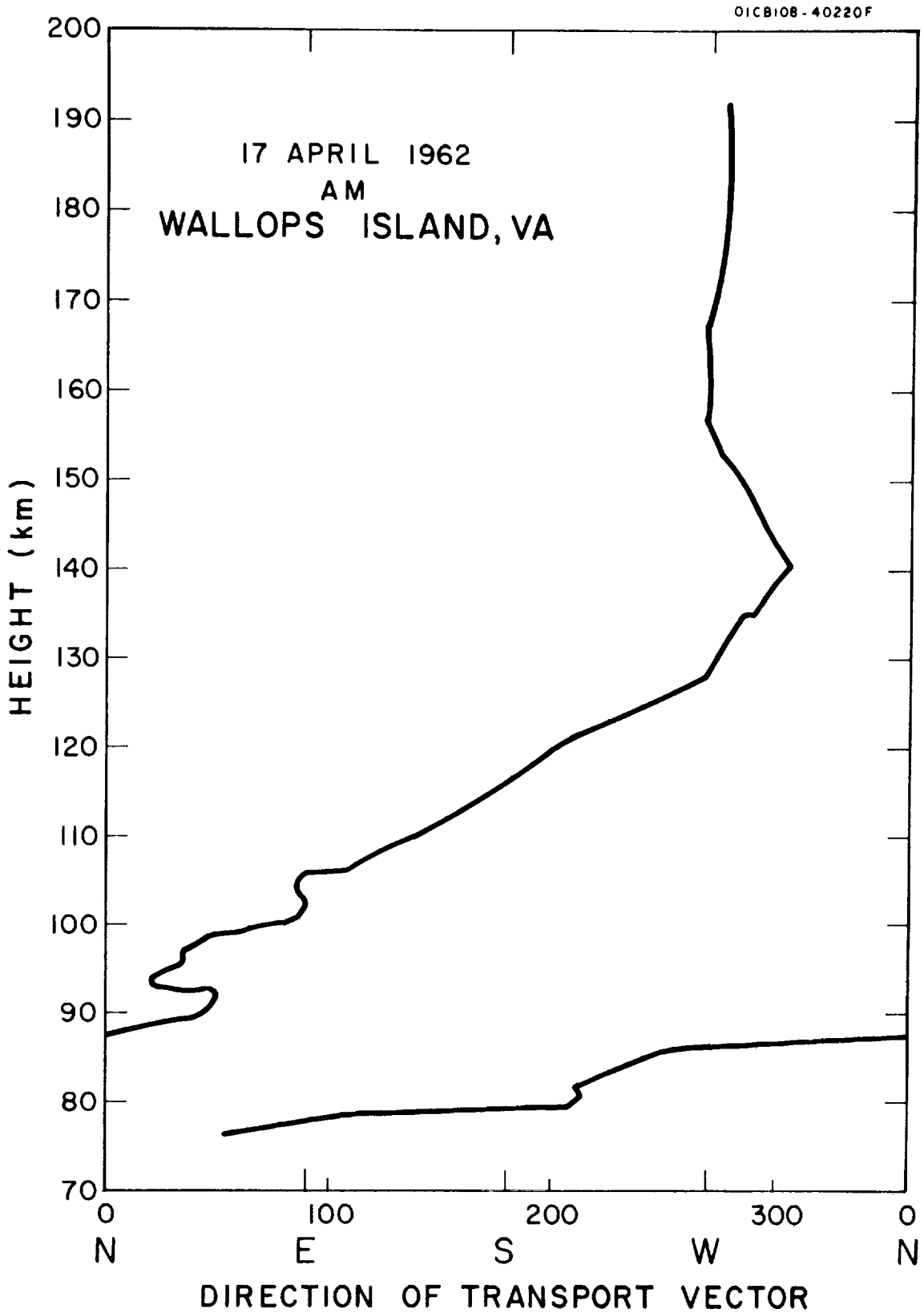

01CB108 - 4080P
2 MARCH 1962
AM
WALLOPS ISLAND, VA
HEIGHT (km)
150
140
130
120
110
100
90
80
70
60
0
100
200
300
N
E
S
W
DIRECTION OF TRANSPORT VECTOR

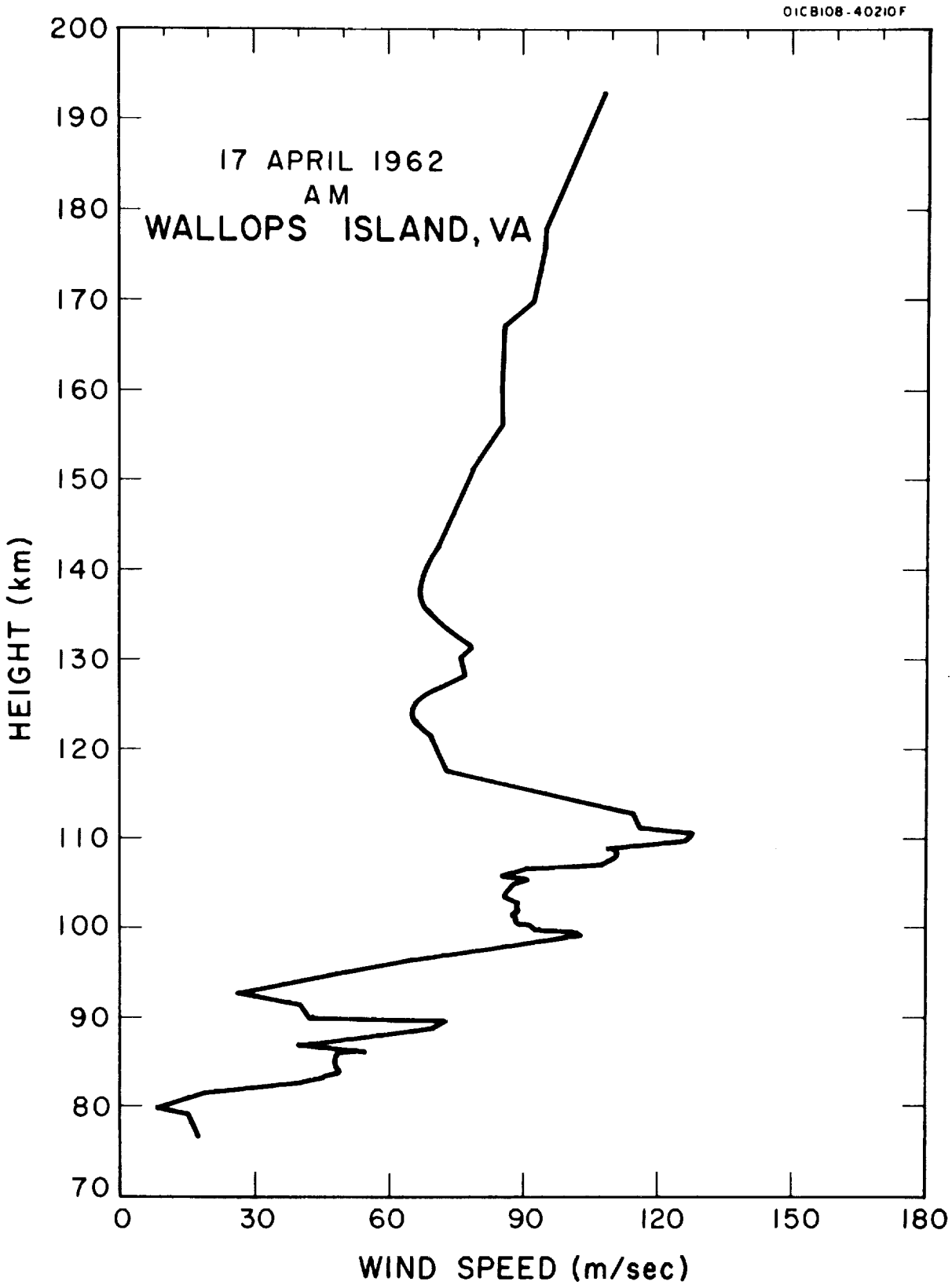

01CB108-40130P
23 MARCH 1962
PM
WALLOPS ISLAND, VA
HEIGHT (km)
150
140
130
120
110
100
90
80
70
60
50
0
30
60
90
120
150
180
WIND SPEED (m/sec)

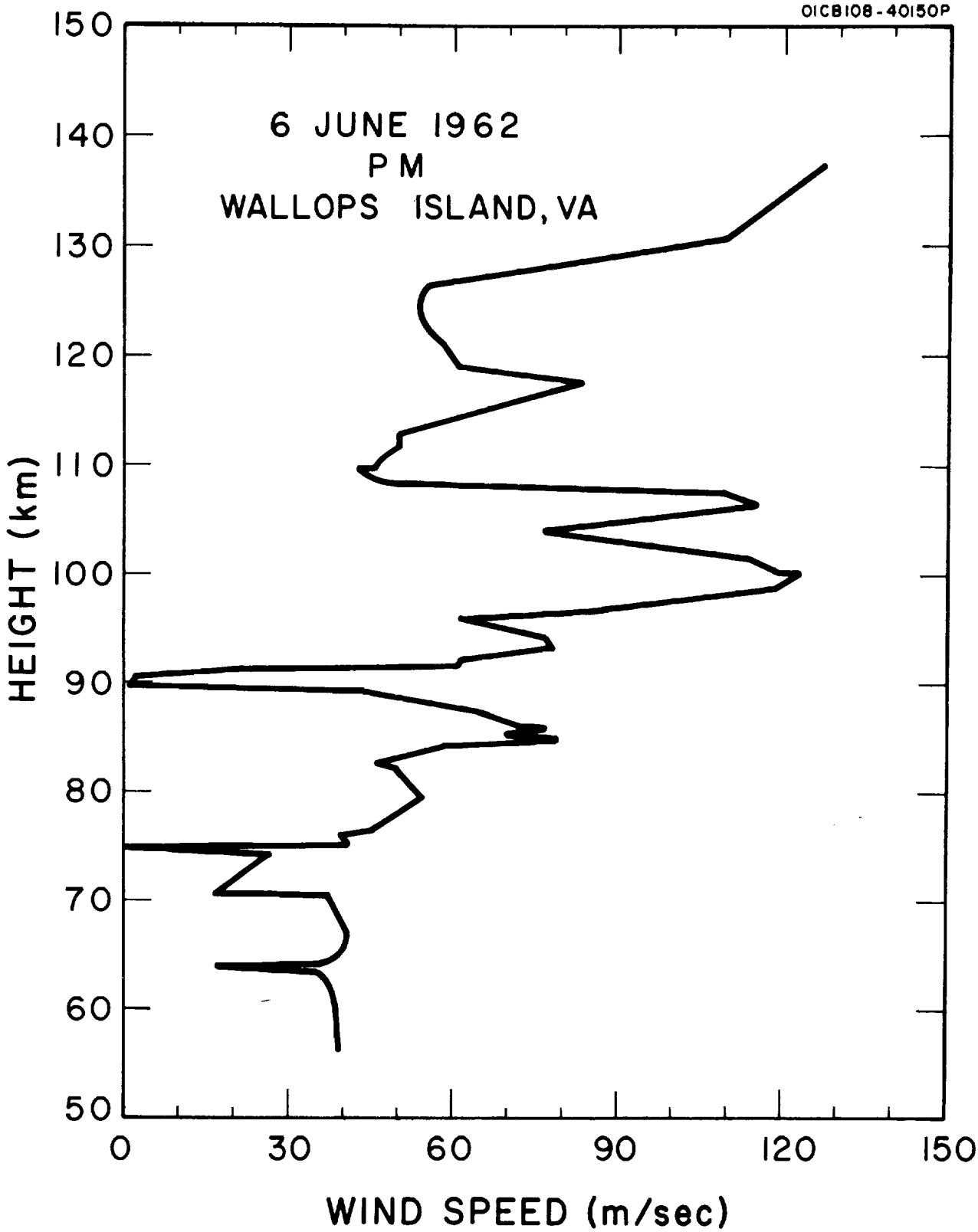

01CB108-4030P
23 MARCH 1962
PM
WALLOPS ISLAND, VA
HEIGHT (km)
150
140
130
120
110
100
90
80
70
60
50
0
100
200
300
N
E
S
W
DIRECTION OF TRANSPORT VECTOR

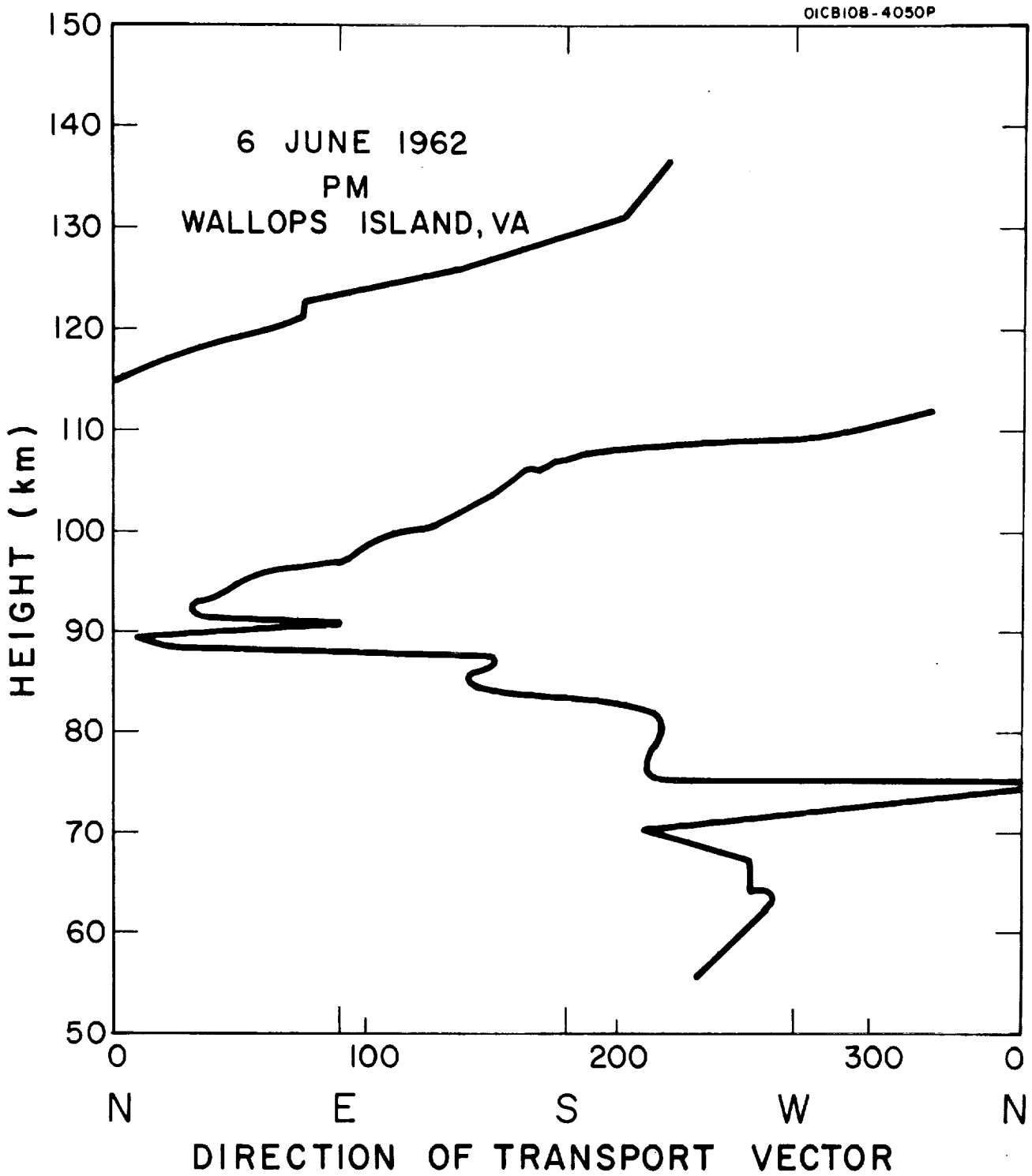

01CB108-40140P
27 MARCH 1962
PM
WALLOPS ISLAND, VA
HEIGHT (km)
150
140
130
120
110
100
90
80
70
0
30
60
90
120
150
WIND SPEED (m/sec)

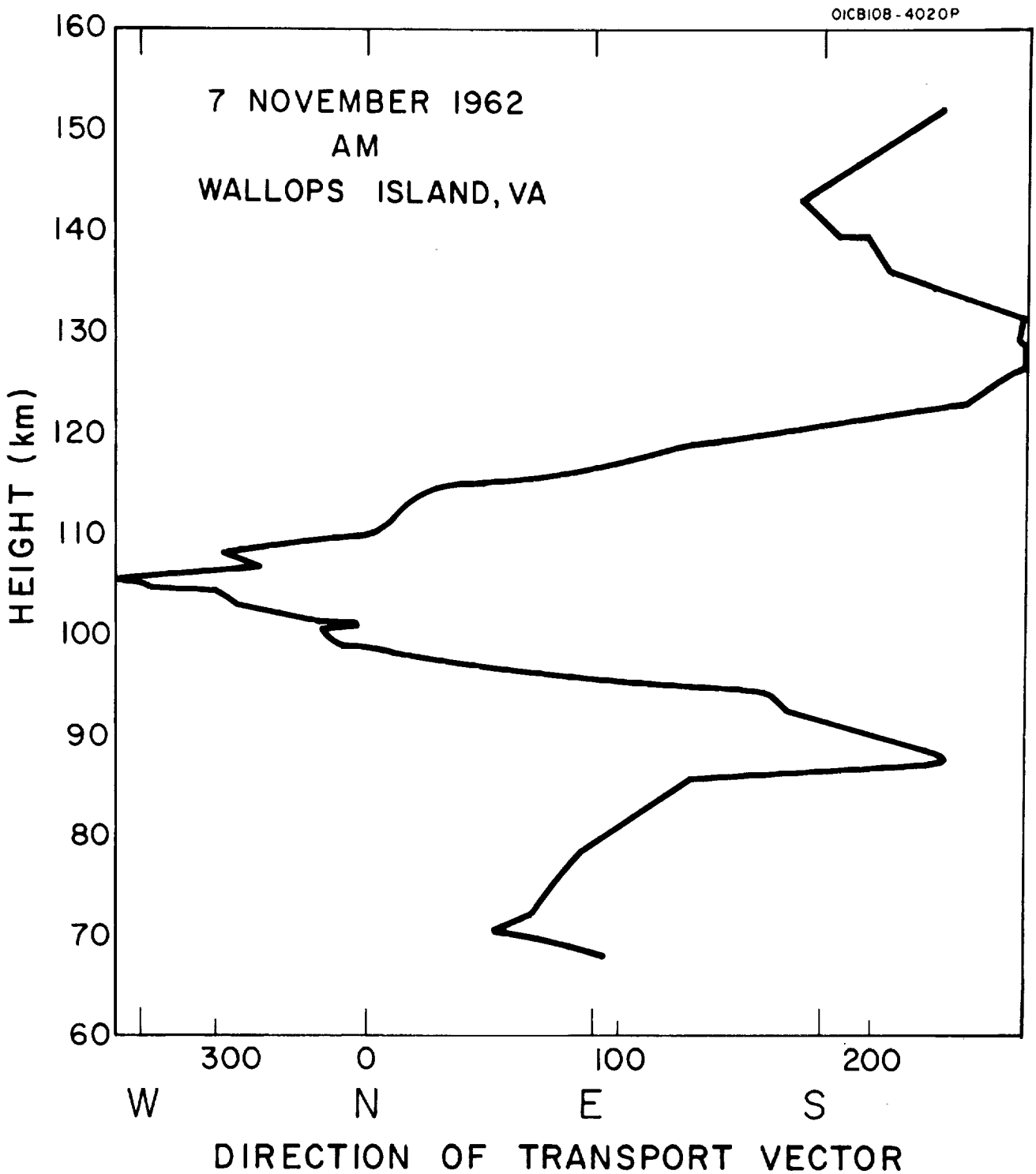

01CB108-4040P
27 MARCH 1962
PM
WALLOPS ISLAND, VA
HEIGHT (km)
150
140
130
120
110
100
90
80
70
200
300
0
100
S
W
N
E
DIRECTION OF TRANSPORT VECTOR

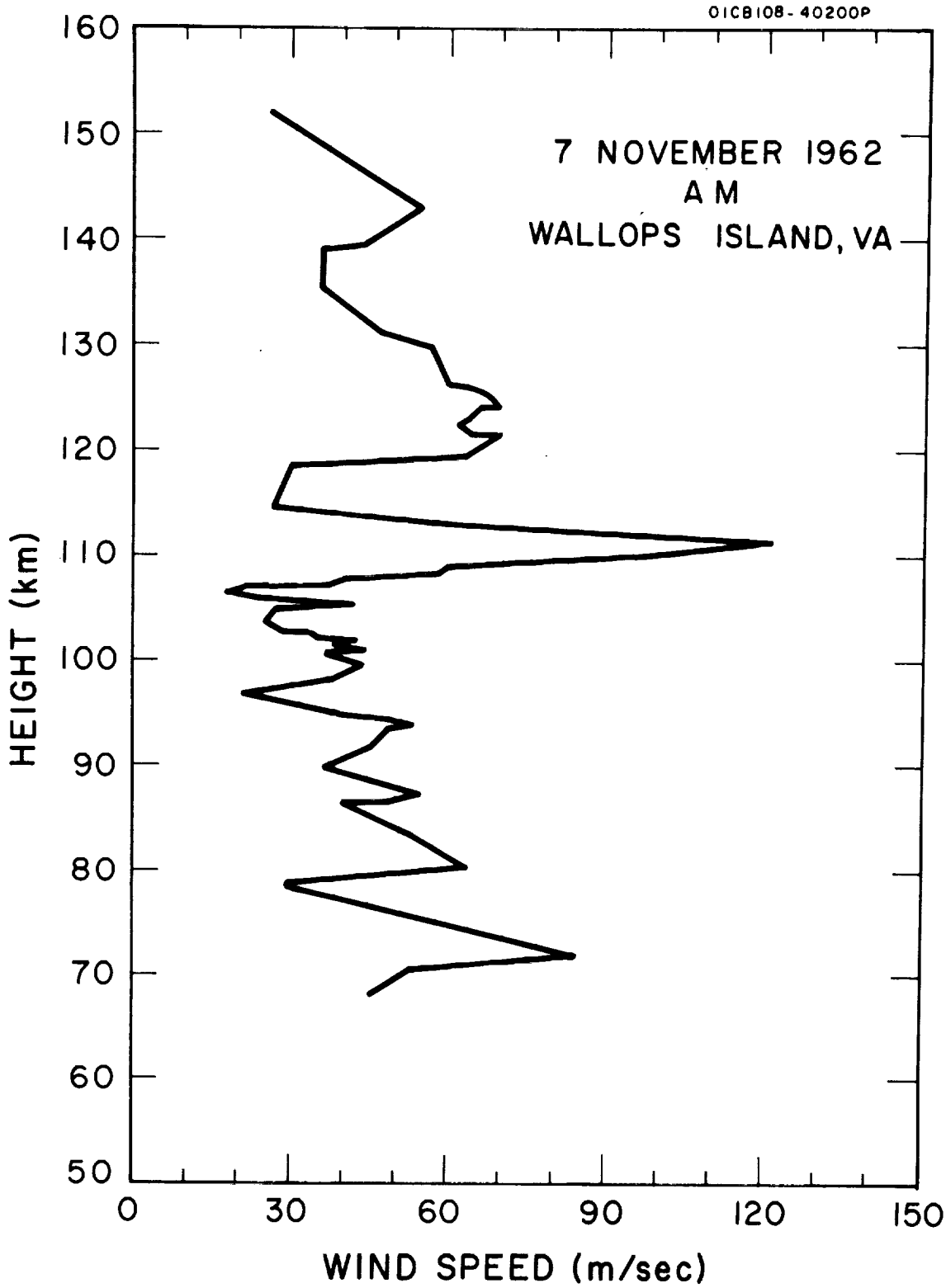

01CB108-40220F
17 APRIL 1962
AM
WALLOPS ISLAND, VA
HEIGHT (km)
200
190
180
170
160
150
140
130
120
110
100
90
80
70
0
100
200
300
0
N
E
S
W
N
DIRECTION OF TRANSPORT VECTOR

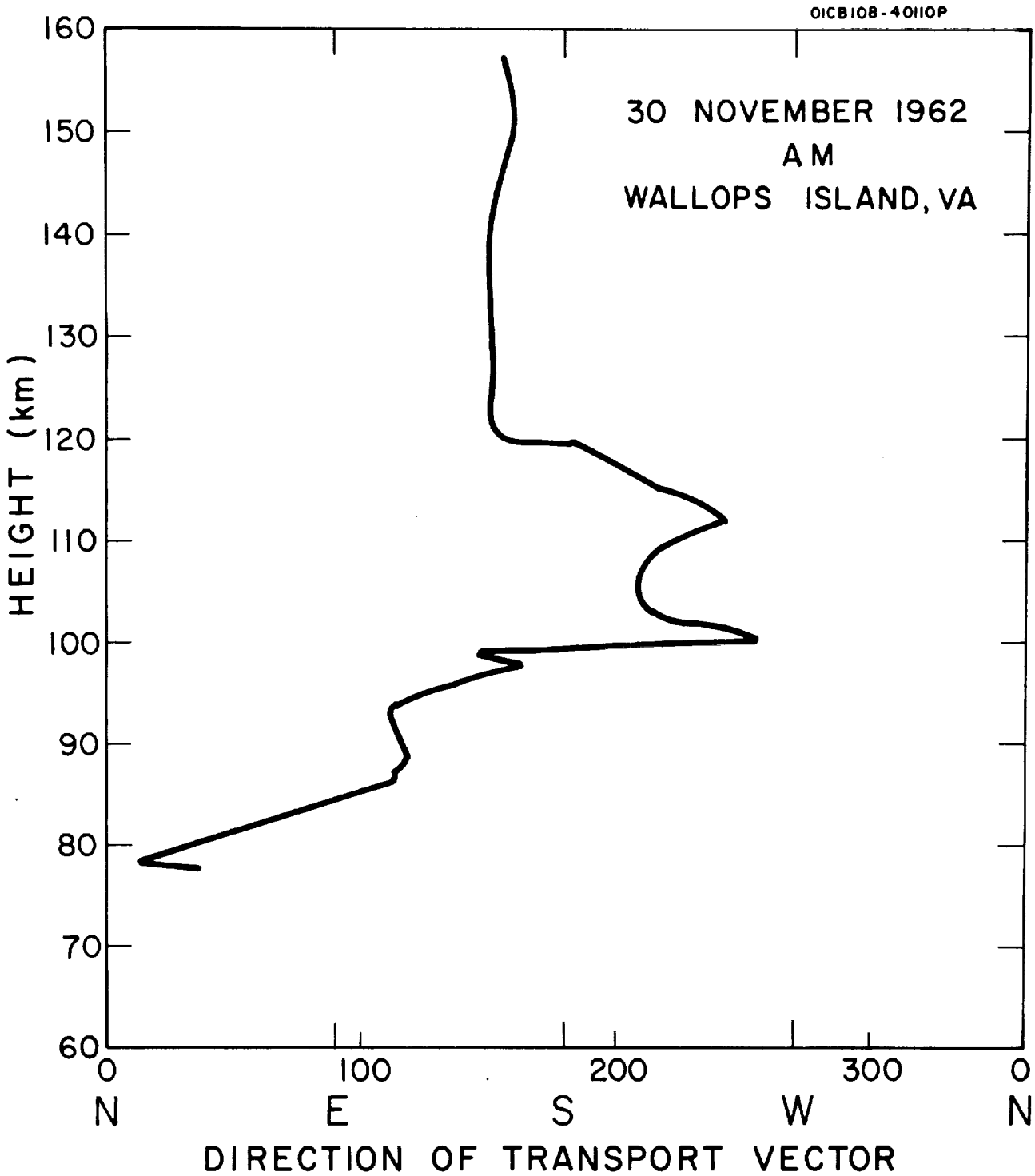

01CB108-40210F
17 APRIL 1962
AM
WALLOPS ISLAND, VA
HEIGHT (km)
200
190
180
170
160
150
140
130
120
110
100
90
80
70
0
30
60
90
120
150
180
WIND SPEED (m/sec)

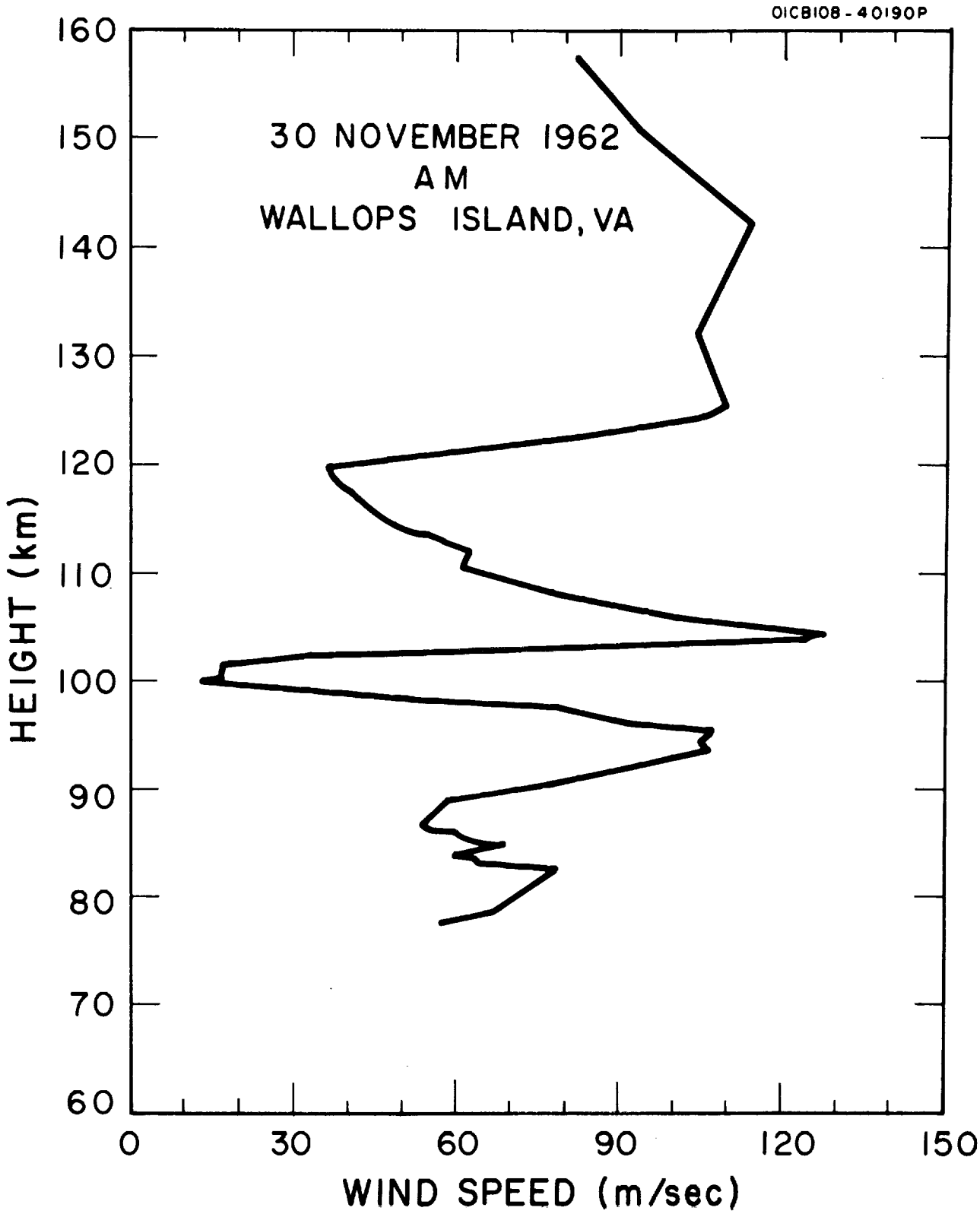

01CB108-40150P
6 JUNE 1962
P M
WALLOPS ISLAND, VA
HEIGHT (km)
150
140
130
120
110
100
90
80
70
60
50
0
30
60
90
120
150
WIND SPEED (m/sec)

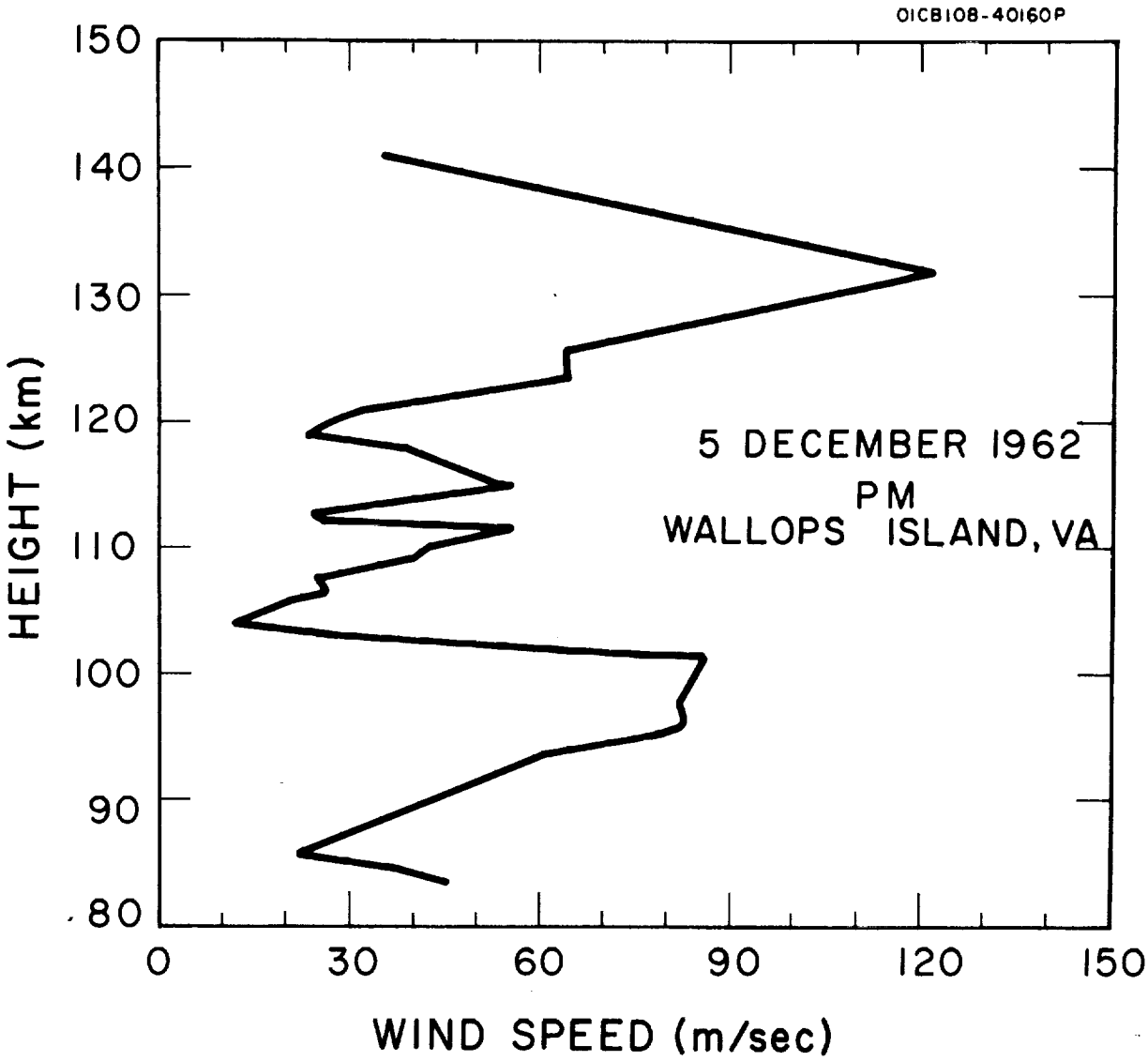

01CB108-4050P
6 JUNE 1962
PM
WALLOPS ISLAND, VA
HEIGHT (km)
150
140
130
120
110
100
90
80
70
60
50
0
100
200
300
0
N
E
S
W
N
DIRECTION OF TRANSPORT VECTOR

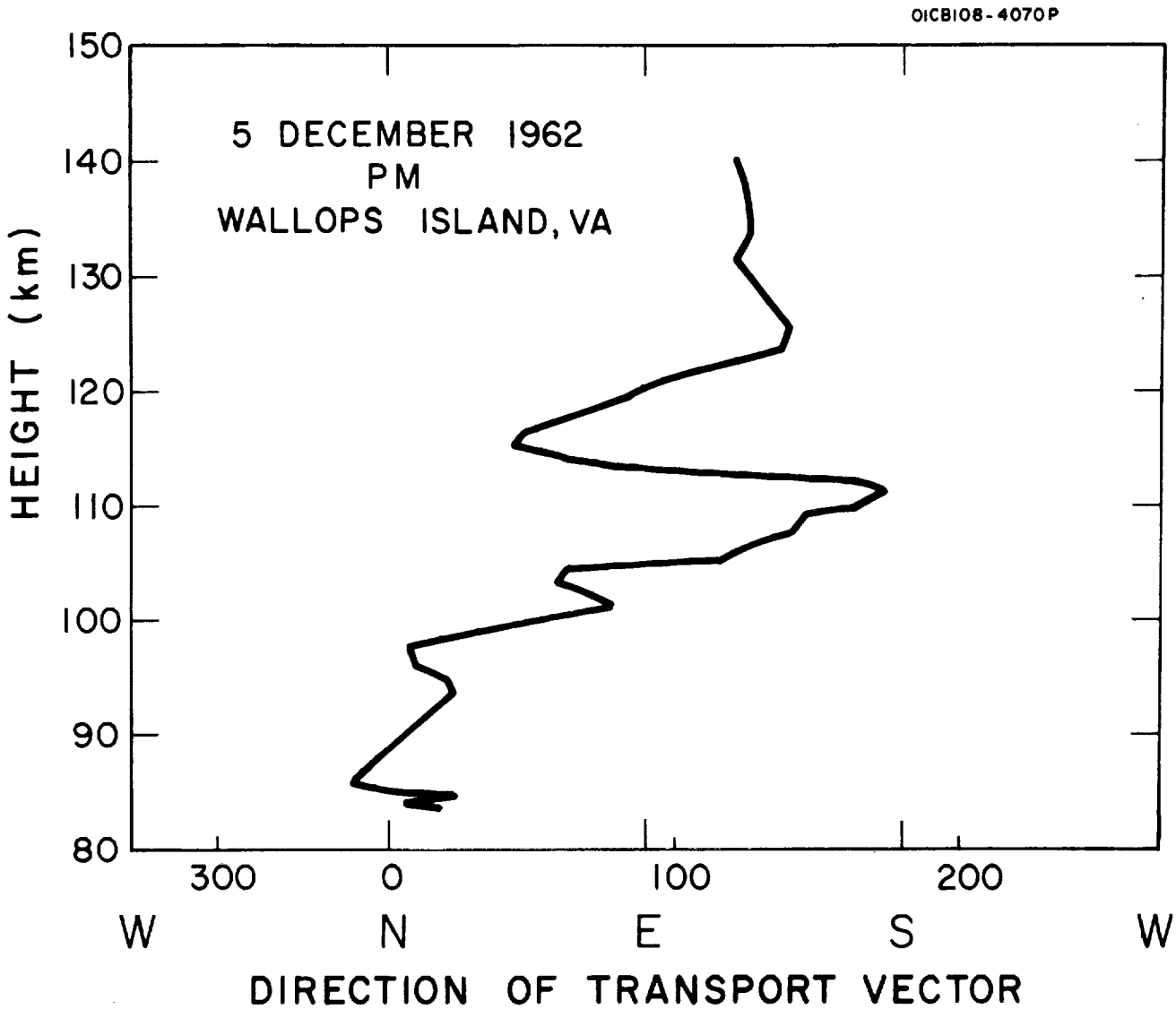

01CB108-4020P
7 NOVEMBER 1962
AM
WALLOPS ISLAND, VA
HEIGHT (km)
160
150
140
130
120
110
100
90
80
70
60
300
0
100
200
W
N
E
S
DIRECTION OF TRANSPORT VECTOR

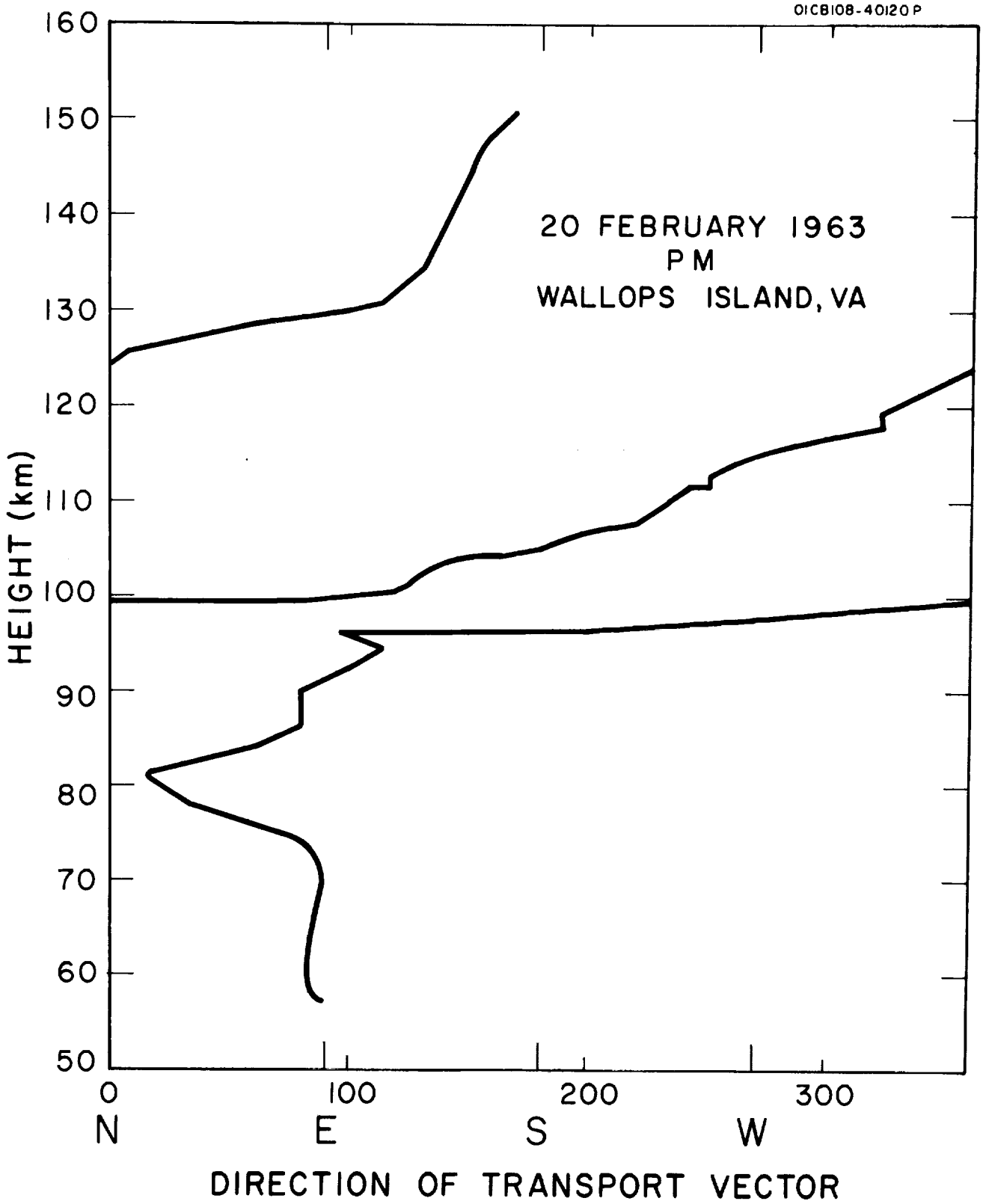

01CB108-40200P
7 NOVEMBER 1962
A M
WALLOPS ISLAND, VA
HEIGHT (km)
160
150
140
130
120
110
100
90
80
70
60
50
0
30
60
90
120
150
WIND SPEED (m/sec)

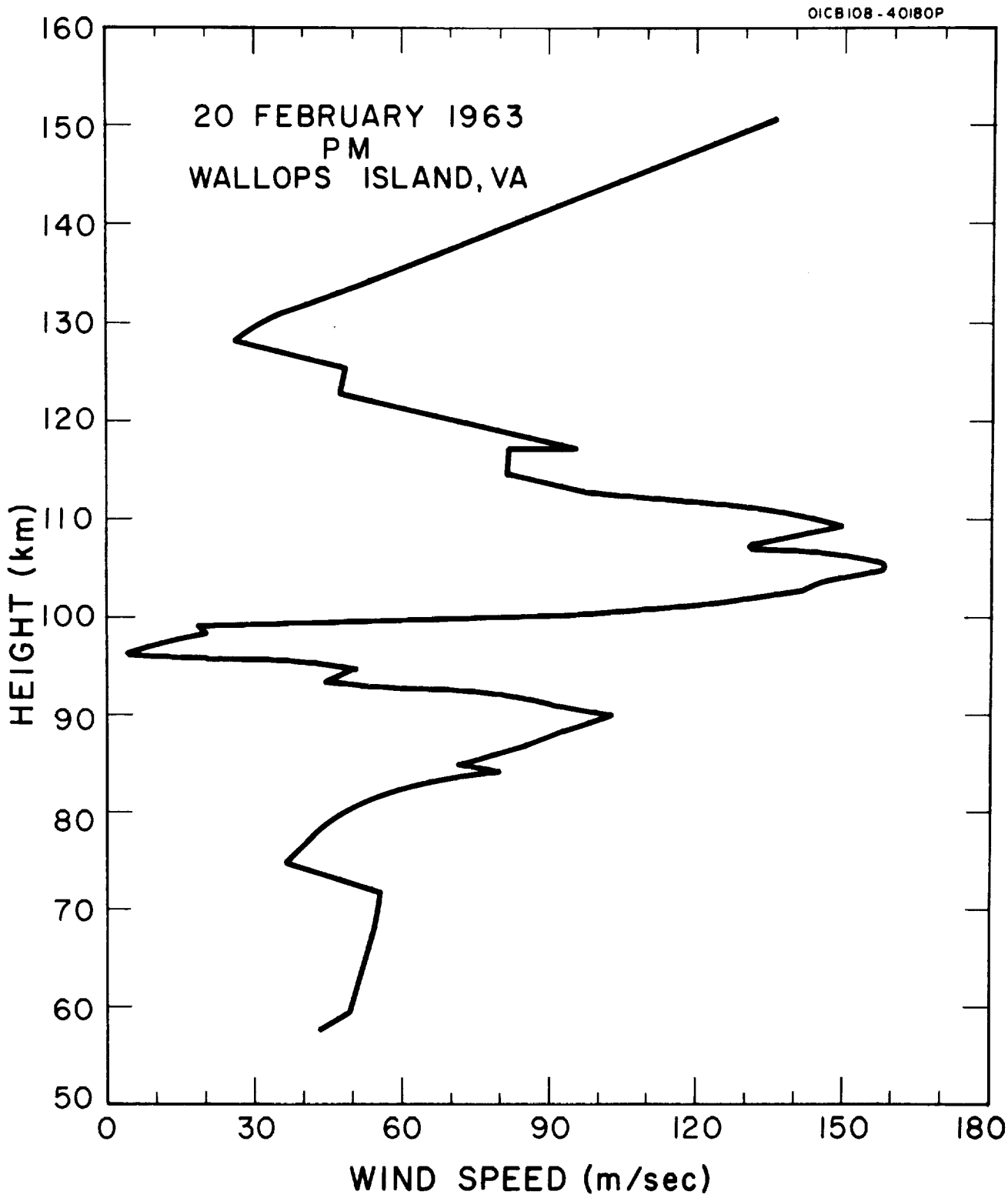

01CB108-40110P
30 NOVEMBER 1962
AM
WALLOPS ISLAND, VA
HEIGHT (km)
160
150
140
130
120
110
100
90
80
70
60
0
100
200
300
0
N
E
S
W
N
DIRECTION OF TRANSPORT VECTOR

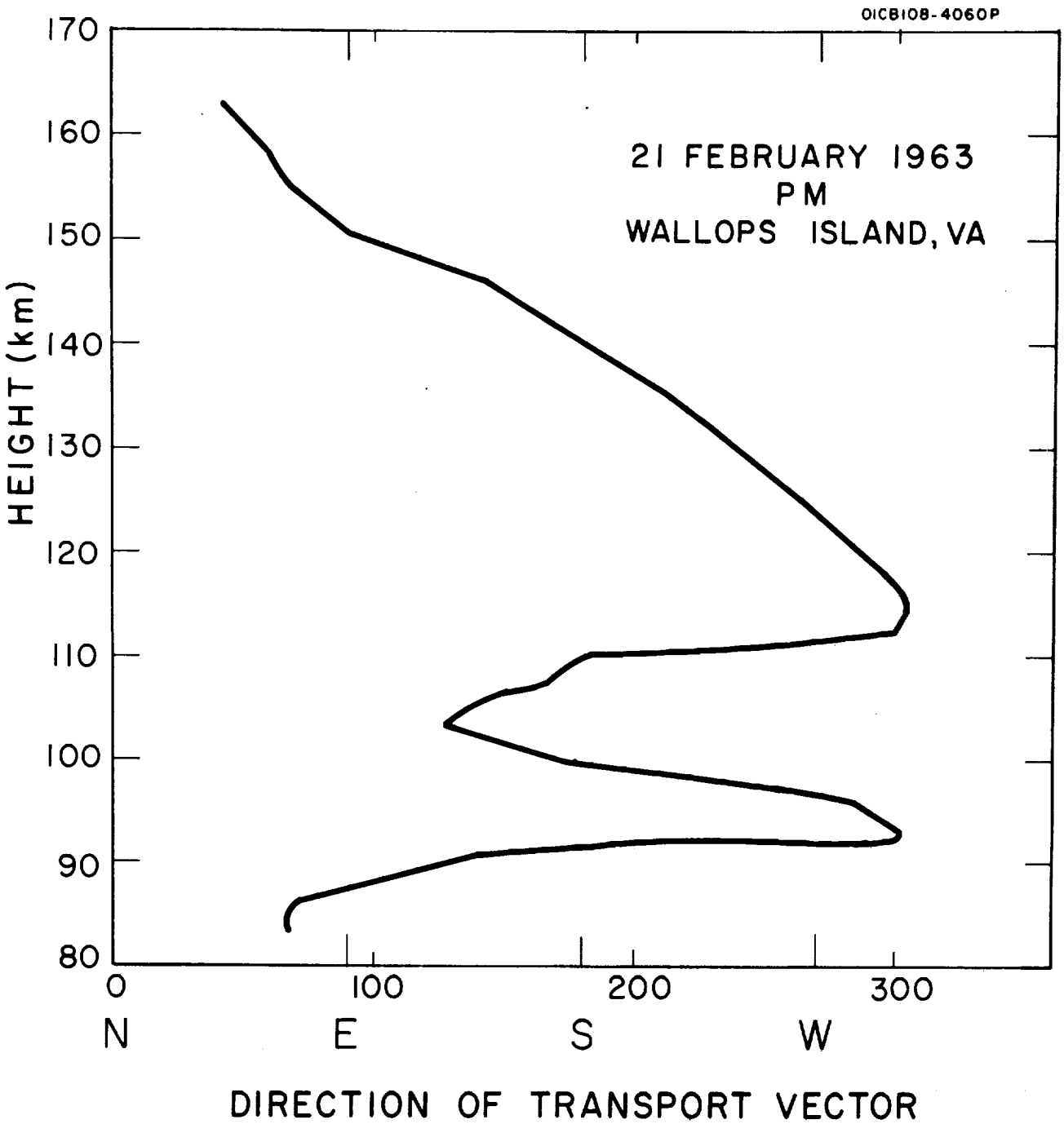

01CB108-40190P
30 NOVEMBER 1962
AM
WALLOPS ISLAND, VA
HEIGHT (km)
160
150
140
130
120
110
100
90
80
70
60
0
30
60
90
120
150
WIND SPEED (m/sec)

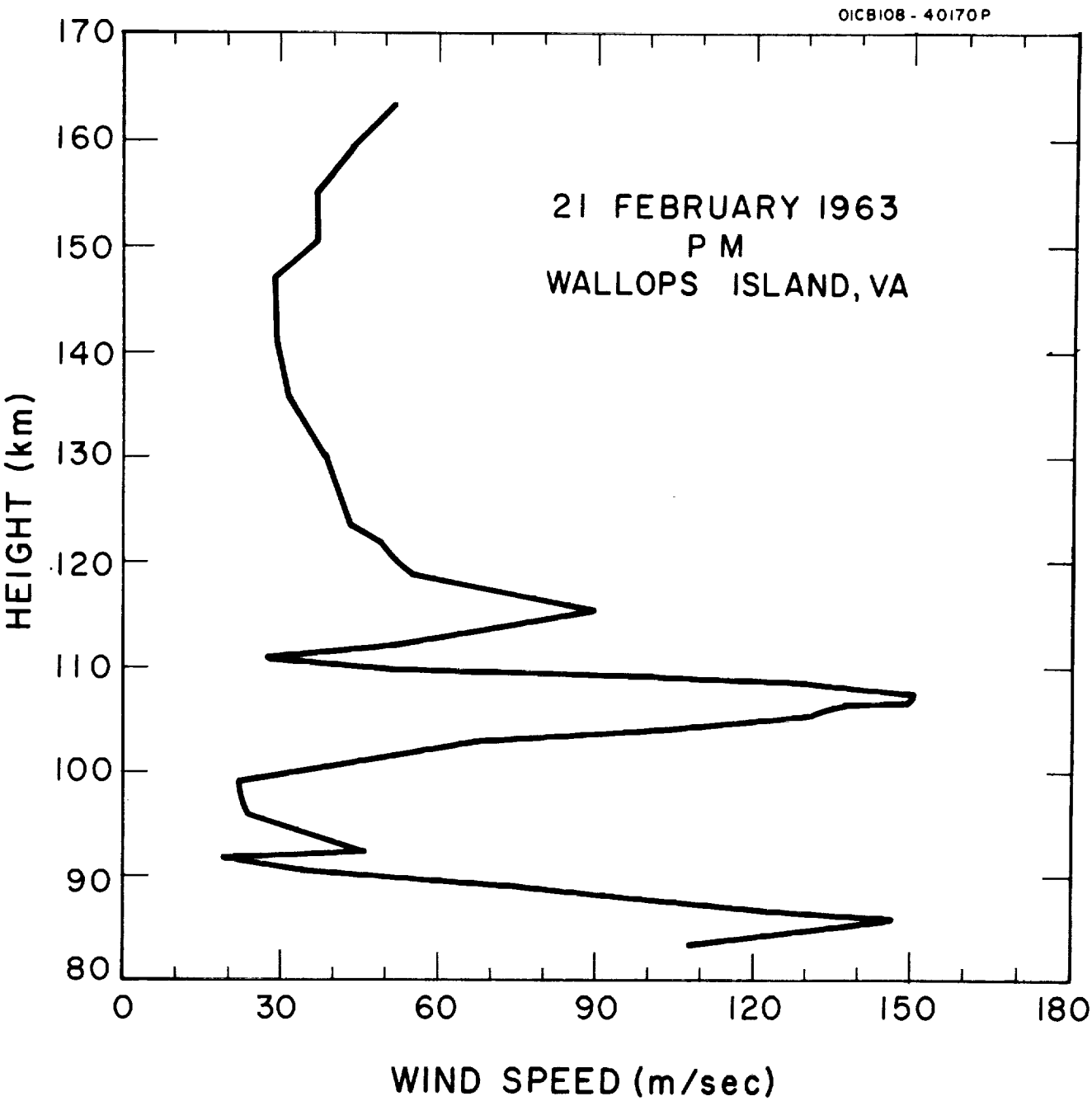

01CB108-40160P
150
140
130
120
110
100
90
80
HEIGHT (km)
0
30
60
90
120
150
WIND SPEED (m/sec)
5 DECEMBER 1962
PM
WALLOPS ISLAND, VA

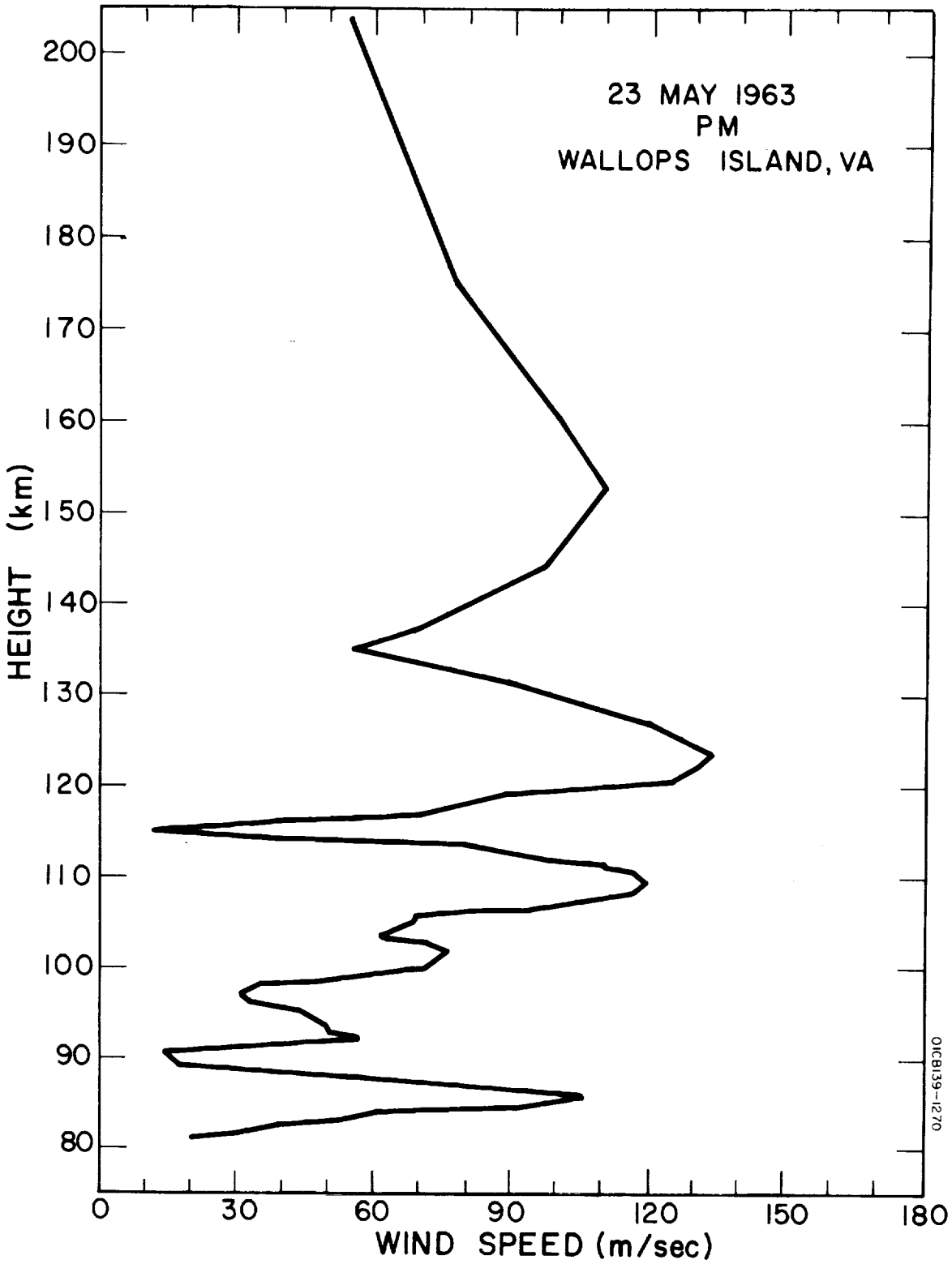

01CB108-4070P
5 DECEMBER 1962
PM
WALLOPS ISLAND, VA
HEIGHT (km)
150
140
130
120
110
100
90
80
300
0
100
200
W
N
E
S
W
DIRECTION OF TRANSPORT VECTOR

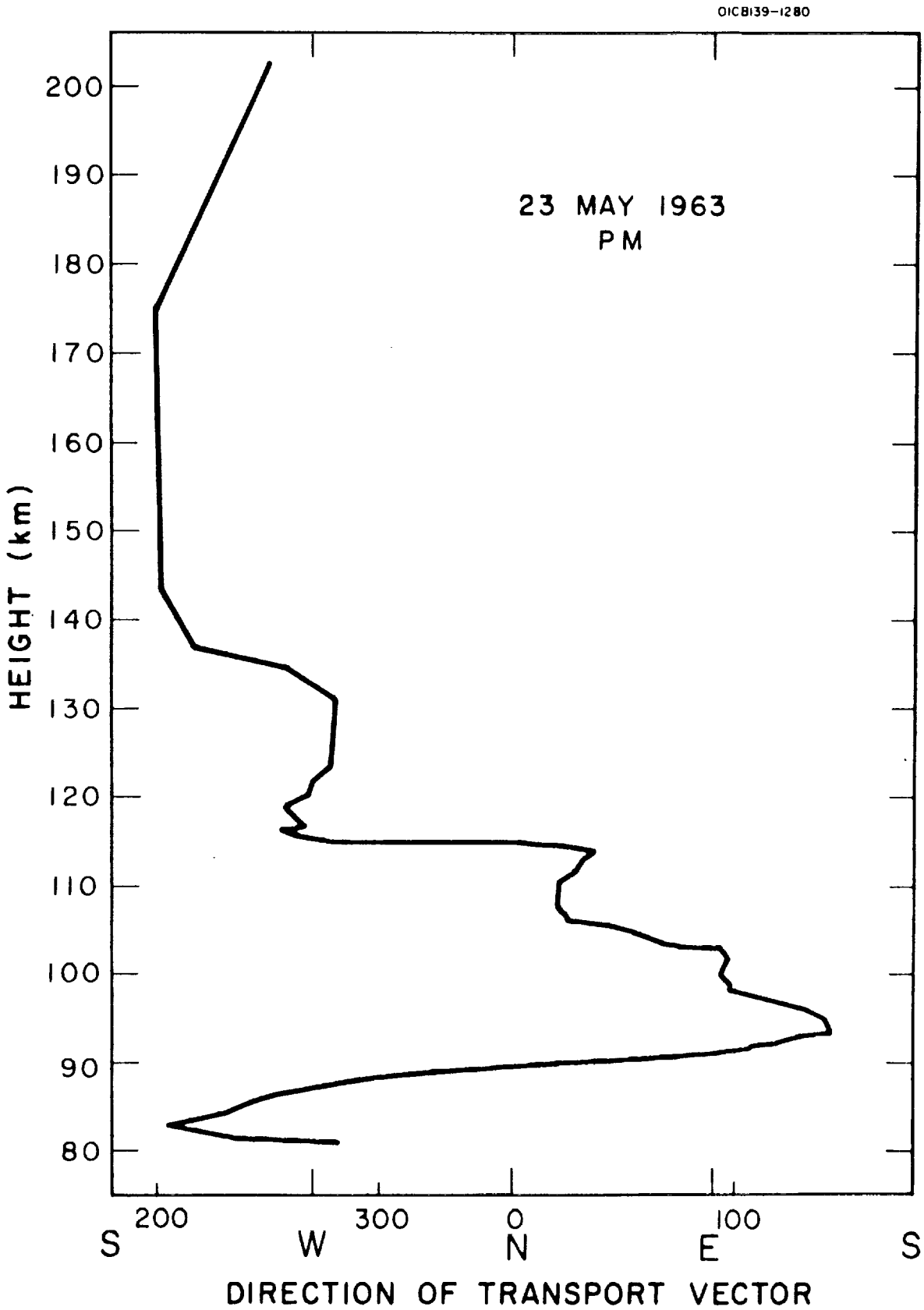

01CB108-40120 P
20 FEBRUARY 1963
PM
WALLOPS ISLAND, VA
HEIGHT (km)
160
150
140
130
120
110
100
90
80
70
60
50
0
100
200
300
N
E
S
W
DIRECTION OF TRANSPORT VECTOR

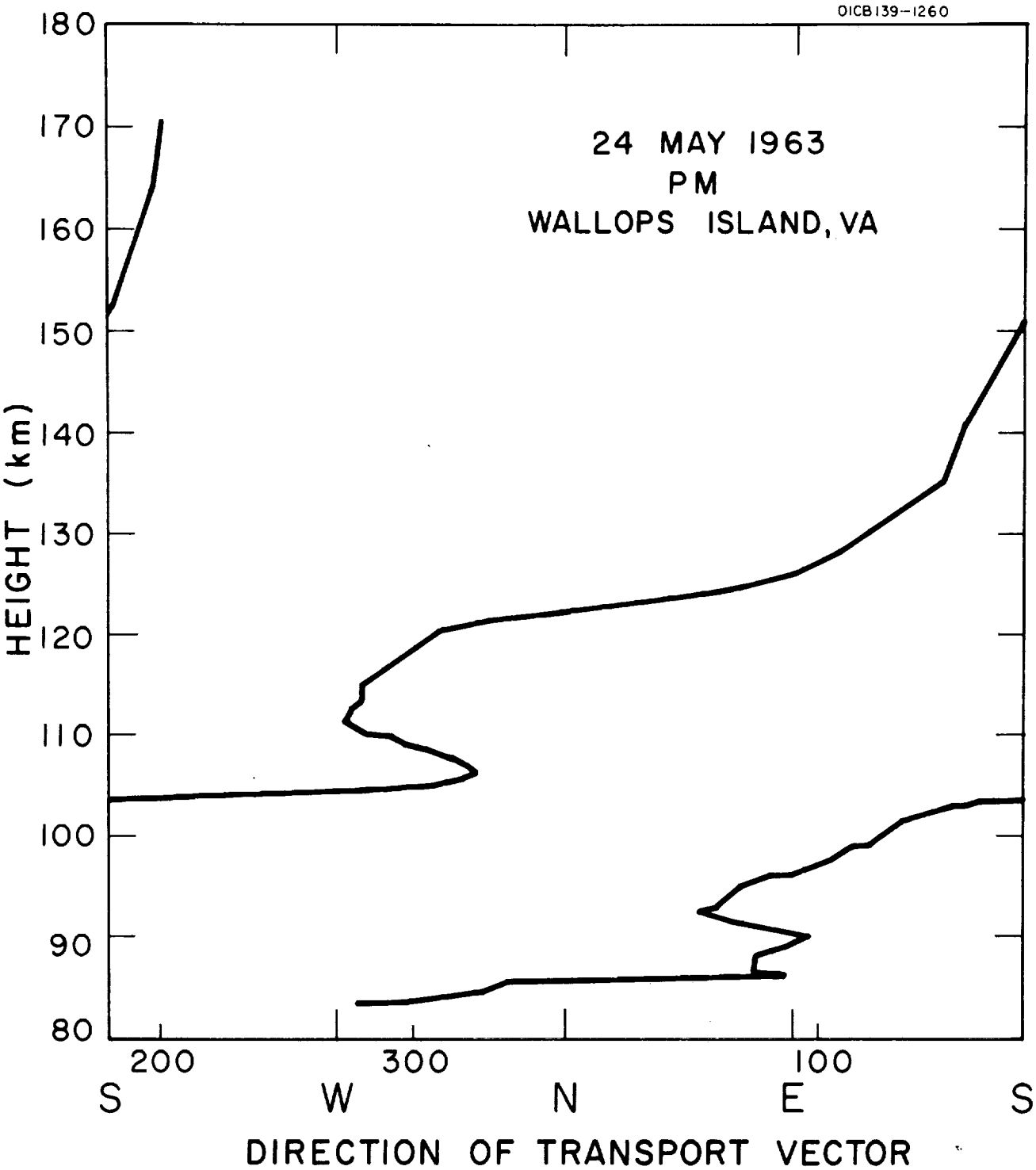

01CB108-40180P
20 FEBRUARY 1963
PM
WALLOPS ISLAND, VA
HEIGHT (km)
160
150
140
130
120
110
100
90
80
70
60
50
0
30
60
90
120
150
180
WIND SPEED (m/sec)

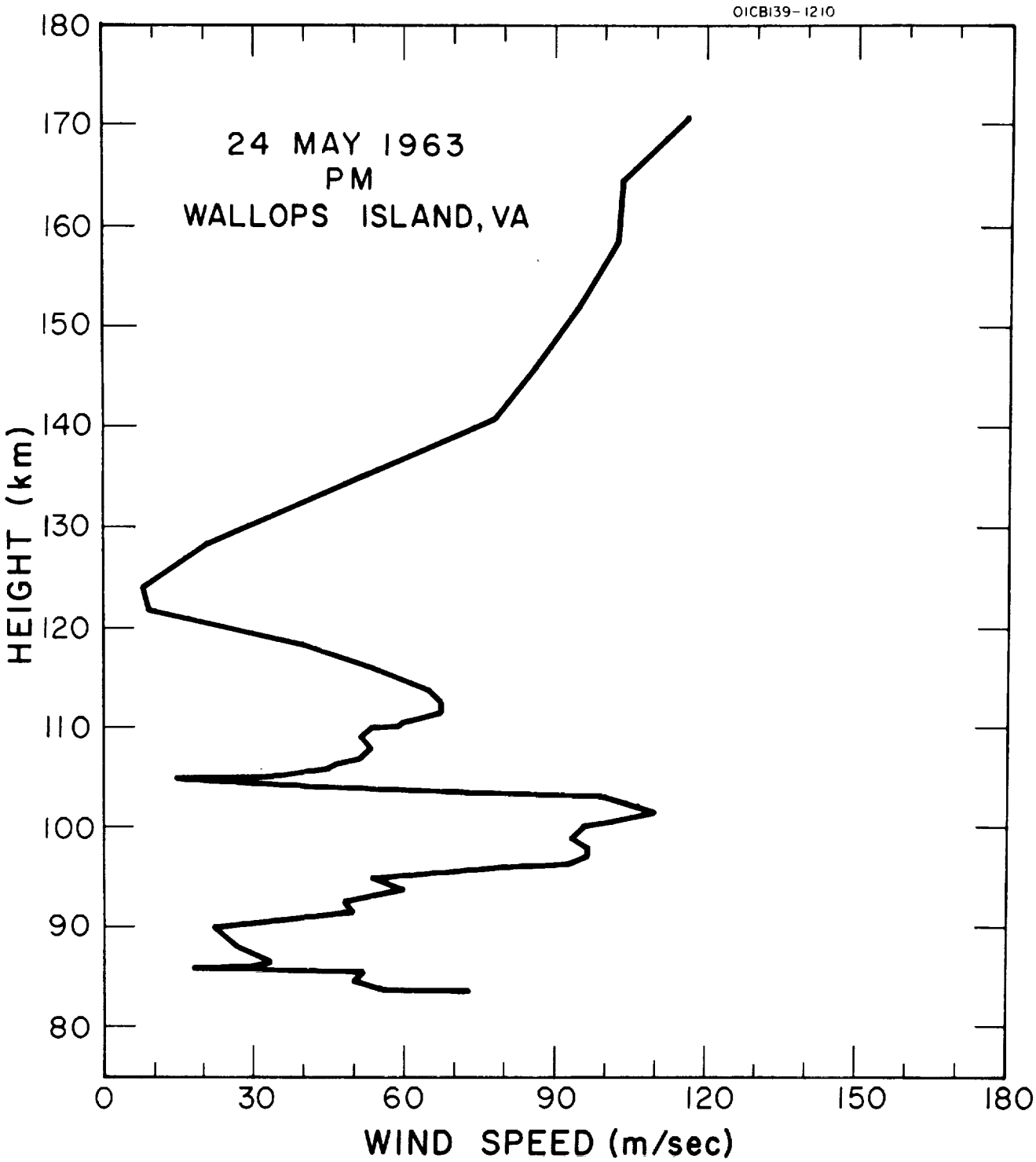

01CB108-4060P
21 FEBRUARY 1963
PM
WALLOPS ISLAND, VA
HEIGHT (km)
170
160
150
140
130
120
110
100
90
80
0
100
200
300
N
E
S
W
DIRECTION OF TRANSPORT VECTOR

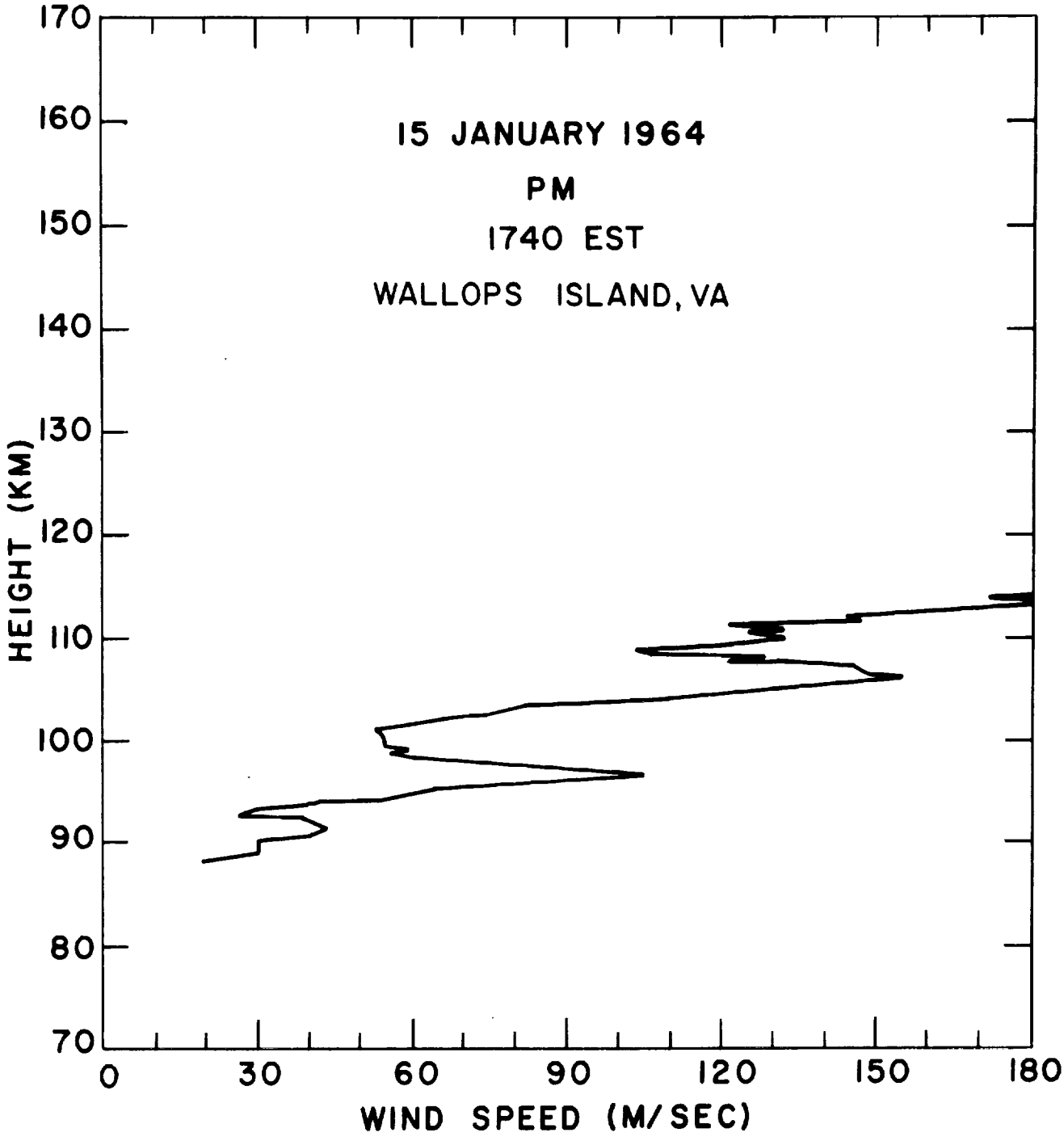

01CB108 - 40170P
21 FEBRUARY 1963
P M
WALLOPS ISLAND, VA
HEIGHT (km)
170
160
150
140
130
120
110
100
90
80
0
30
60
90
120
150
180
WIND SPEED (m/sec)

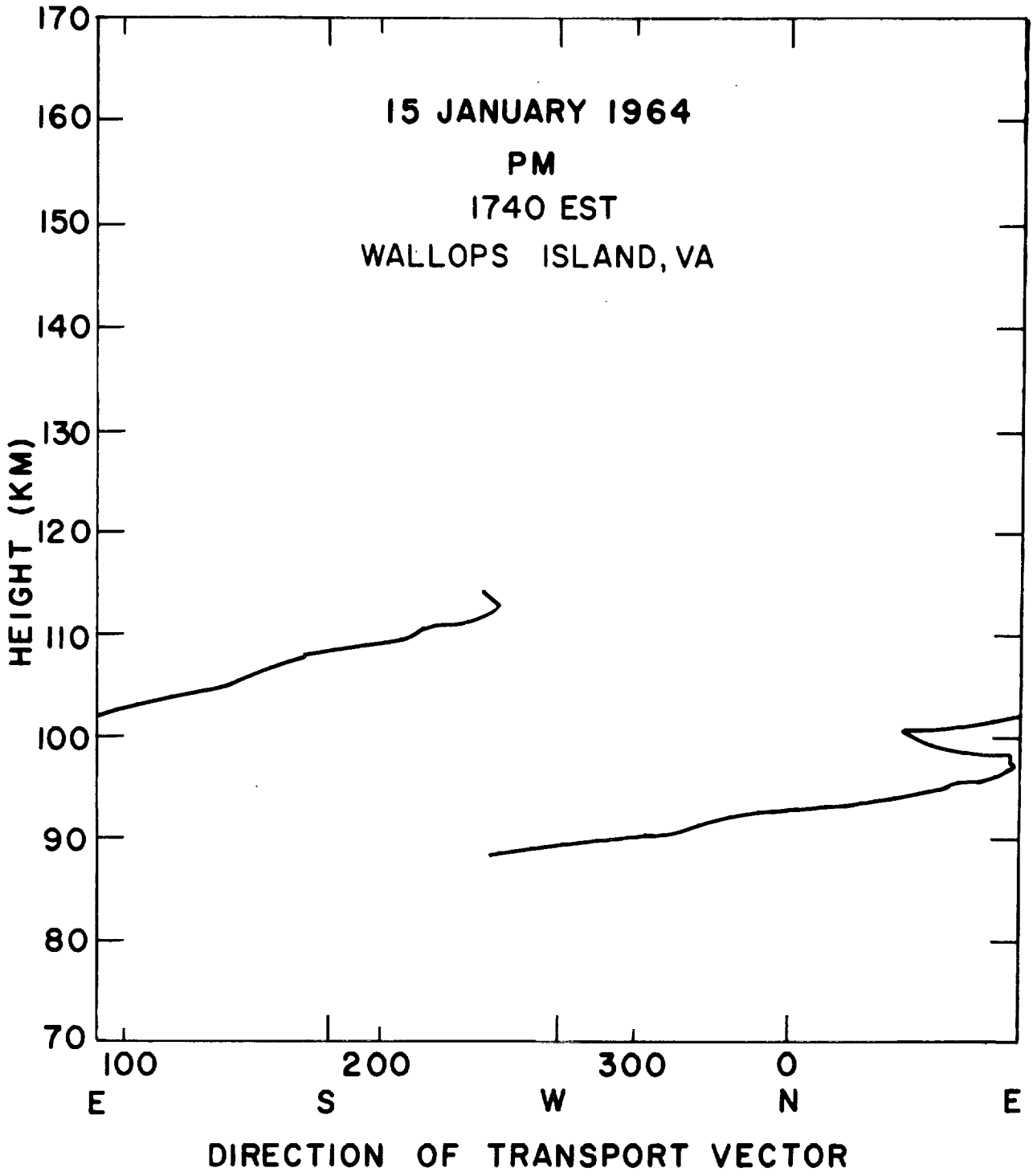

23 MAY 1963
PM
WALLOPS ISLAND, VA
HEIGHT (km)
200
190
180
170
160
150
140
130
120
110
100
90
80
0
30
60
90
120
150
180
WIND SPEED (m/sec)
OICB139-1270

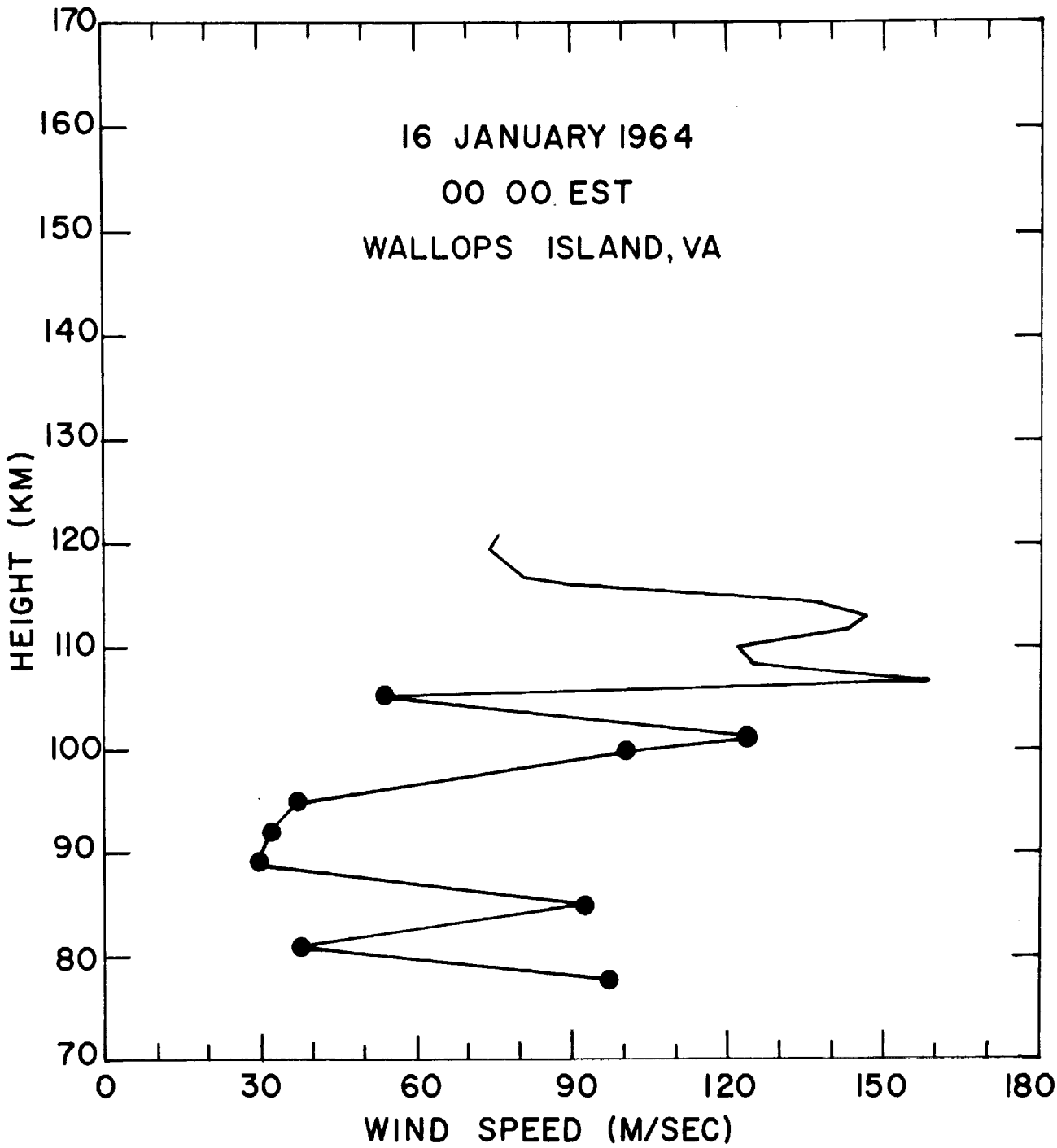

01C8139-1280
23 MAY 1963
PM
HEIGHT (km)
200
190
180
170
160
150
140
130
120
110
100
90
80
S
200
W
300
N
0
E
100
S
DIRECTION OF TRANSPORT VECTOR

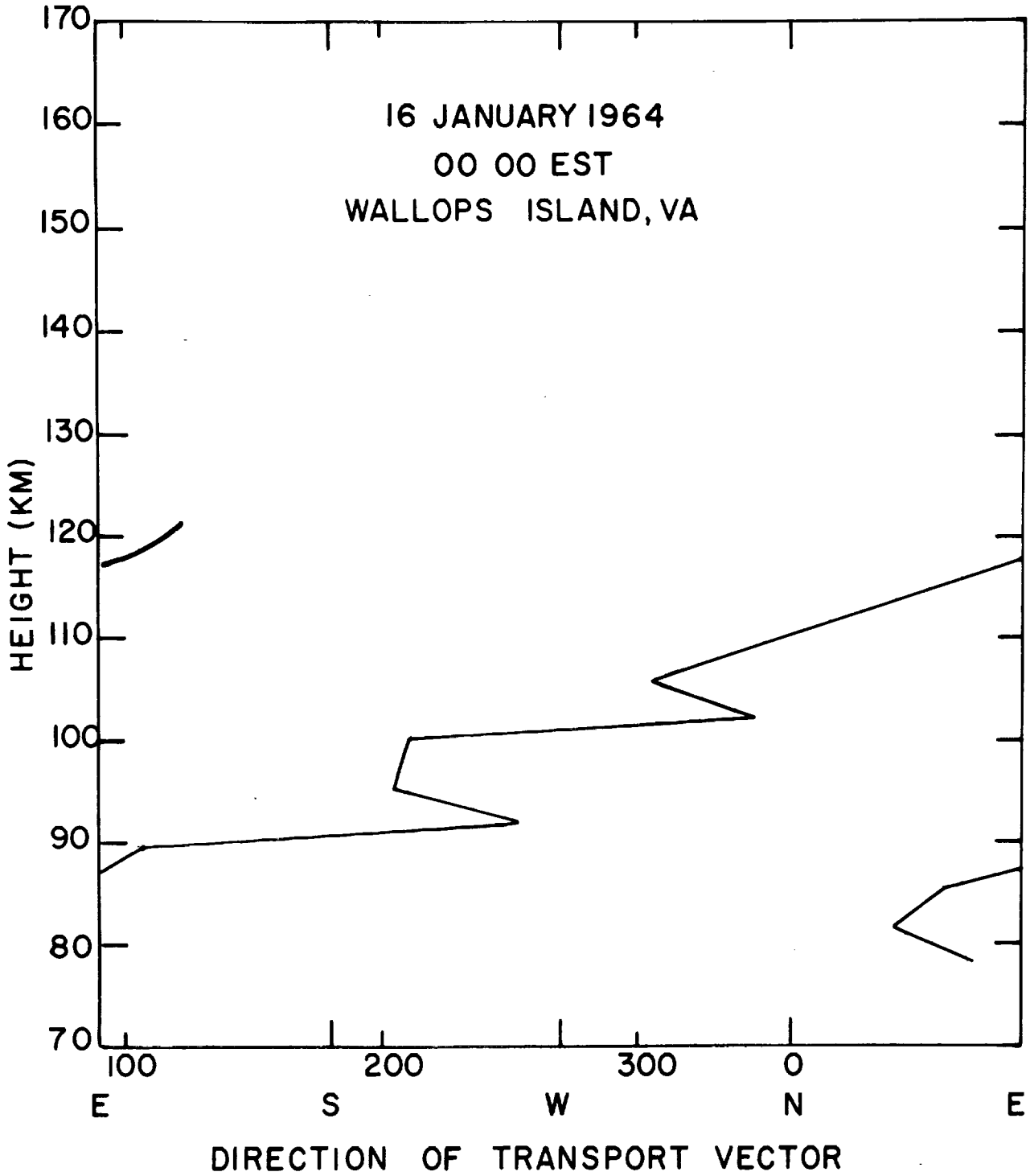

01CB139-1260
24 MAY 1963
PM
WALLOPS ISLAND, VA
HEIGHT (km)
180
170
160
150
140
130
120
110
100
90
80
200
300
100
S
W
N
E
S
DIRECTION OF TRANSPORT VECTOR

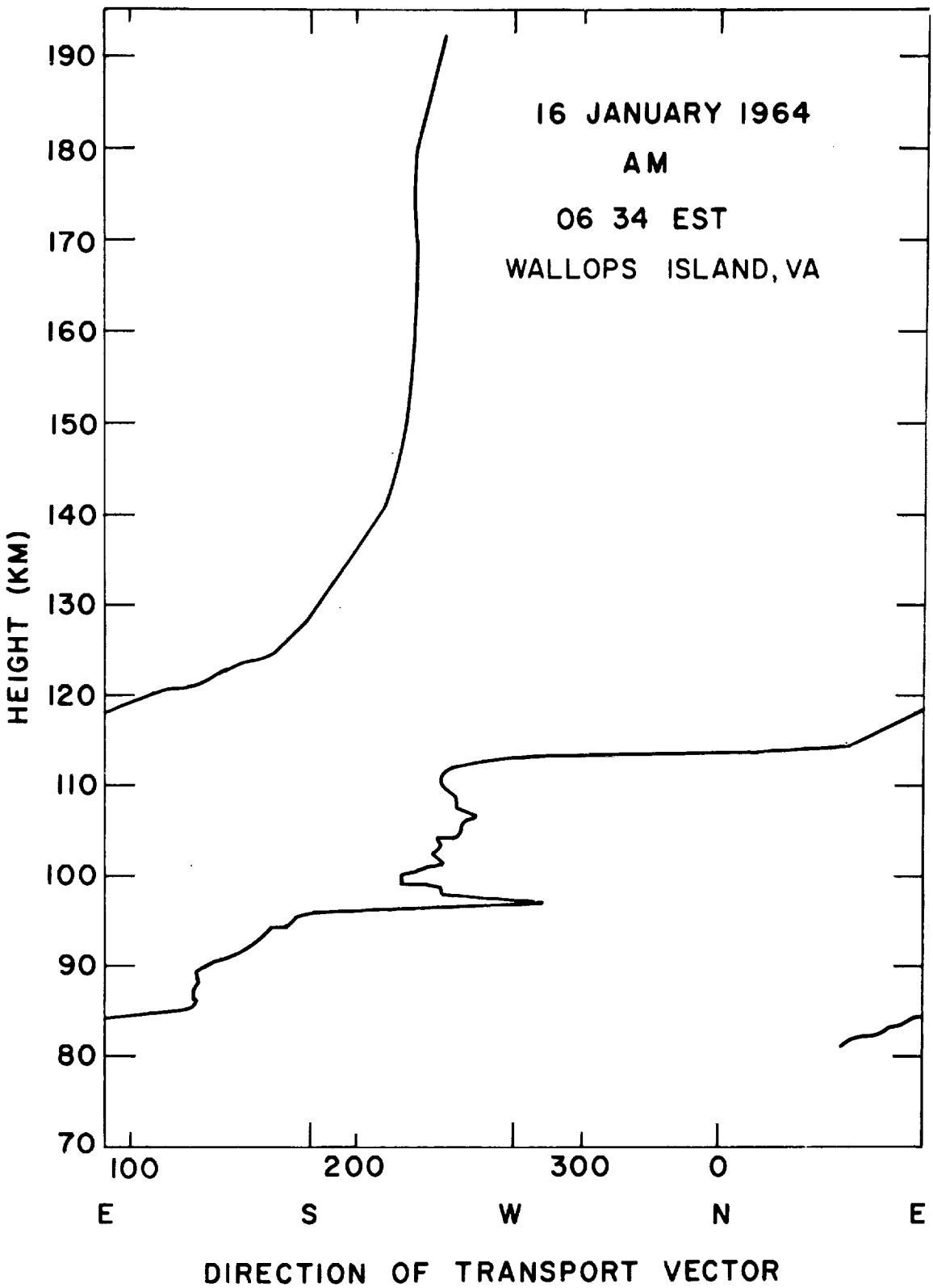

01CB139-1210
24 MAY 1963
PM
WALLOPS ISLAND, VA
HEIGHT (km)
180
170
160
150
140
130
120
110
100
90
80
0
30
60
90
120
150
180
WIND SPEED (m/sec)

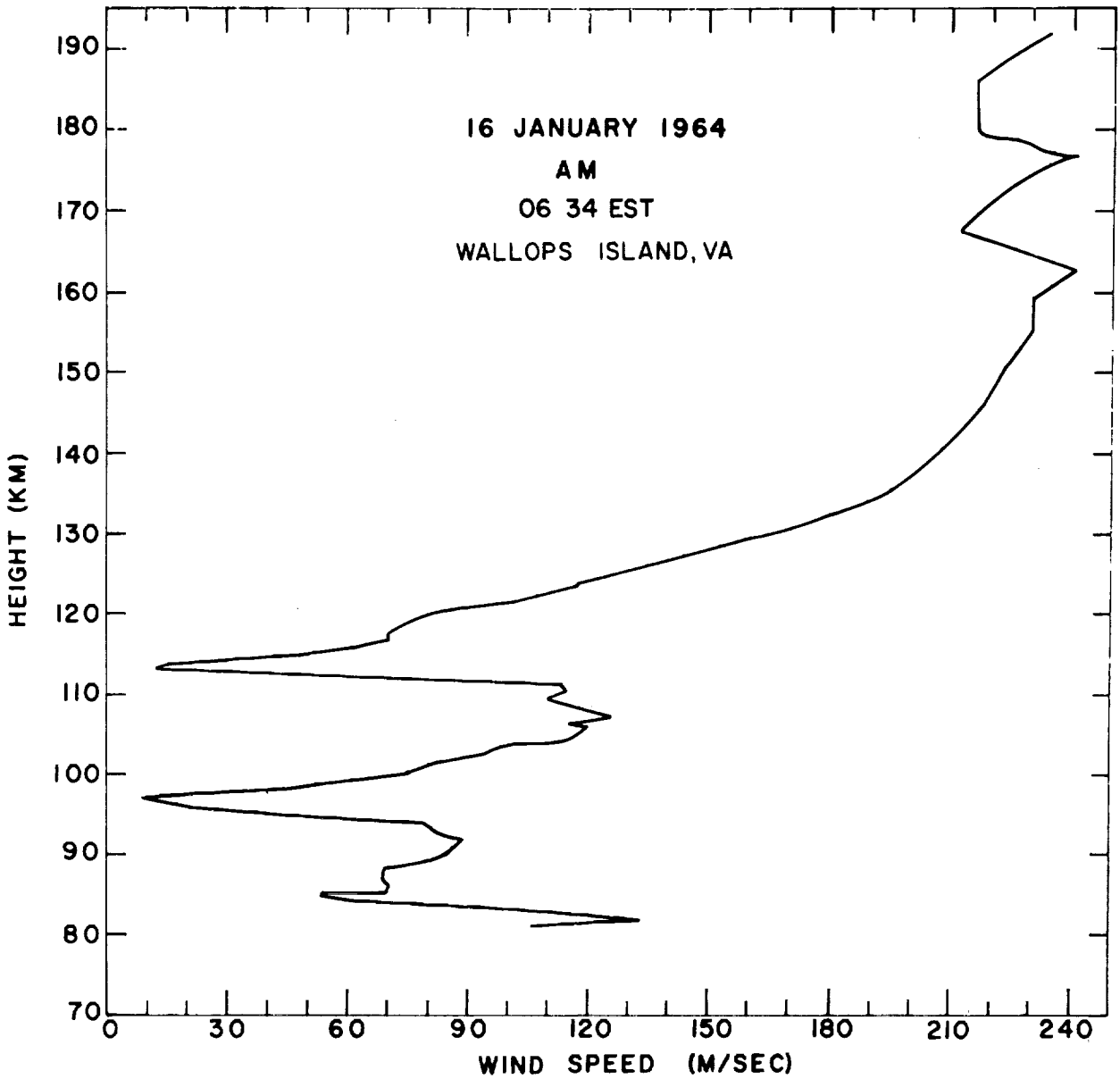

15 JANUARY 1964
PM
1740 EST
WALLOPS ISLAND, VA
HEIGHT (KM)
170
160
150
140
130
120
110
100
90
80
70
0
30
60
90
120
150
180
WIND SPEED (M/SEC)

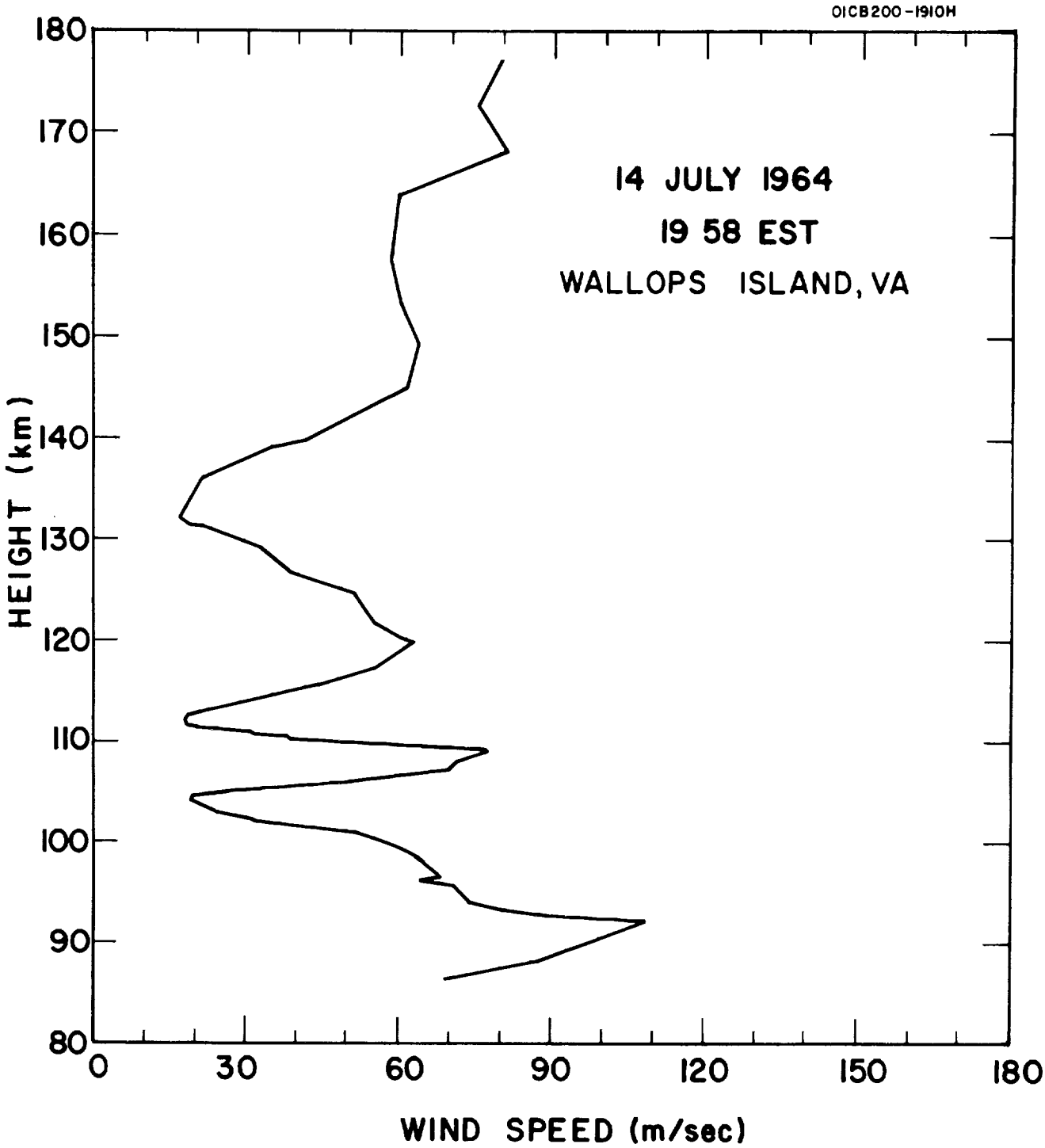

15 JANUARY 1964
PM
1740 EST
WALLOPS ISLAND, VA
HEIGHT (KM)
170
160
150
140
130
120
110
100
90
80
70
100
200
300
0
E
S
W
N
E
DIRECTION OF TRANSPORT VECTOR

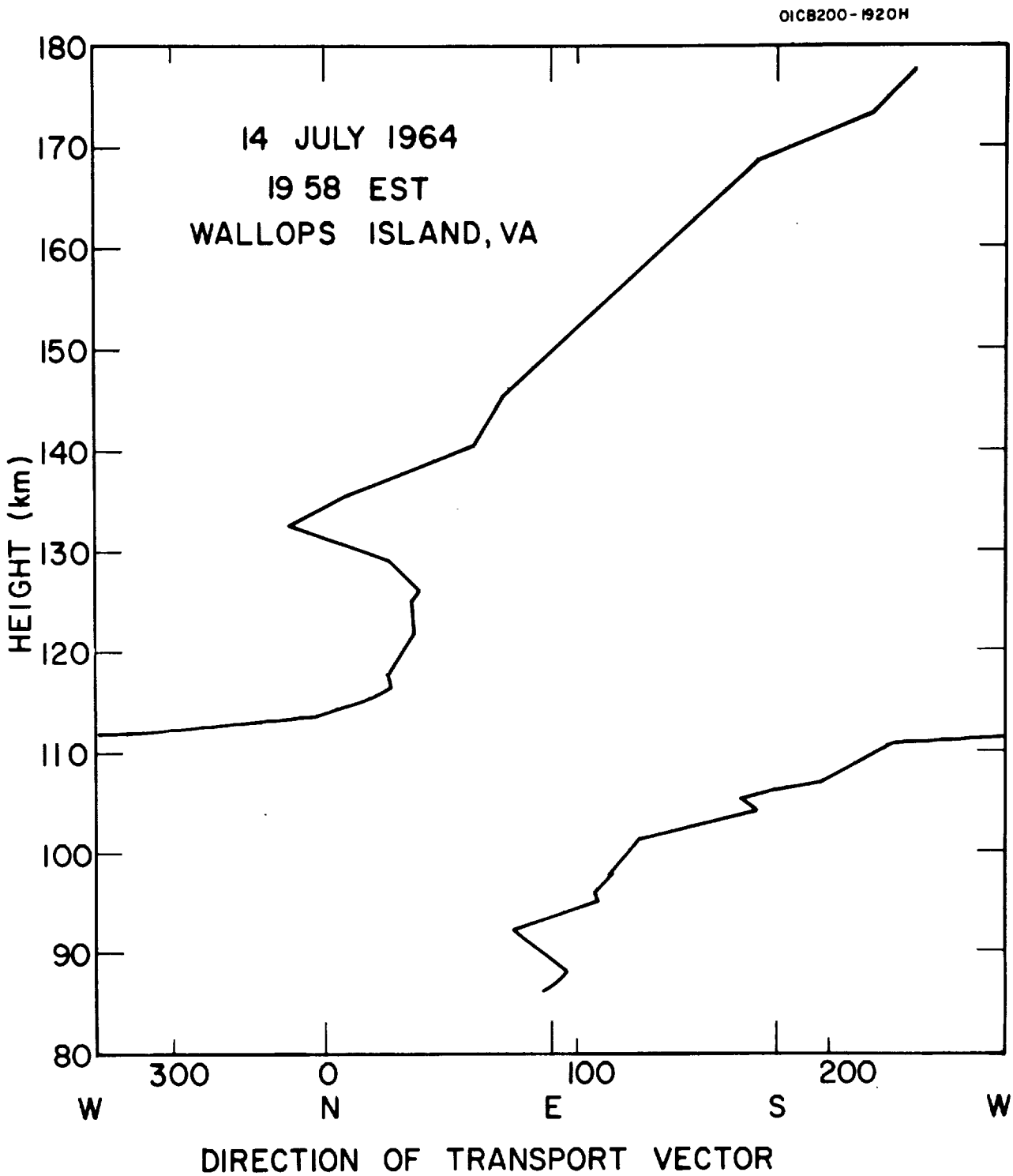

16 JANUARY 1964
00 00 EST
WALLOPS ISLAND, VA
HEIGHT (KM)
170
160
150
140
130
120
110
100
90
80
70
0
30
60
90
120
150
180
WIND SPEED (M/SEC)

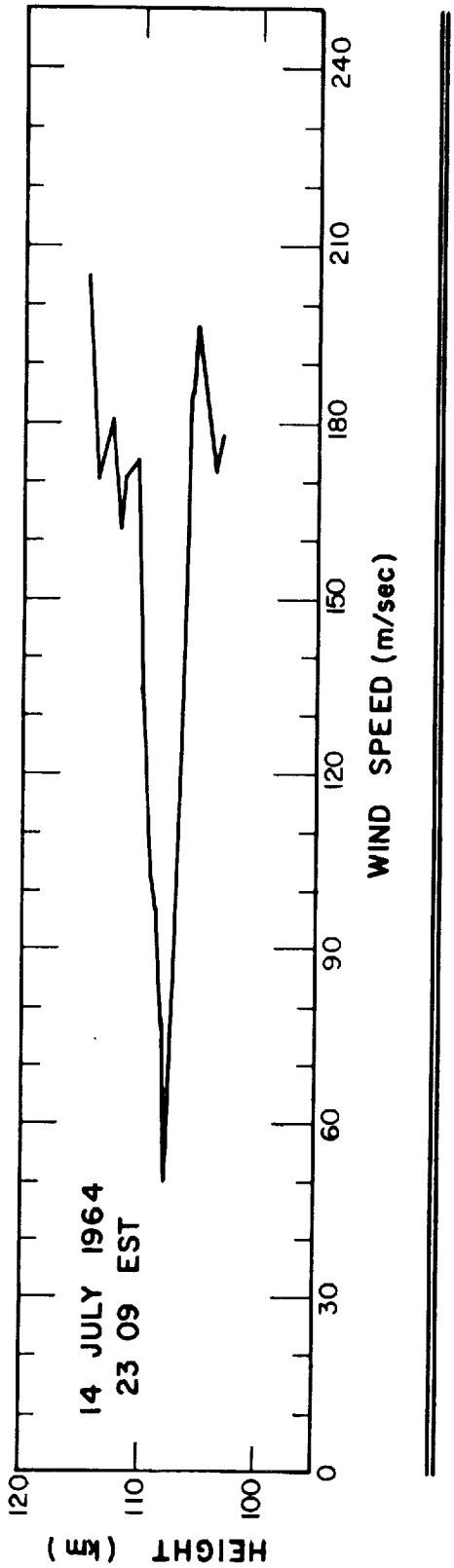

16 JANUARY 1964
00 00 EST
WALLOPS ISLAND, VA
HEIGHT (KM)
170
160
150
140
130
120
110
100
90
80
70
100
200
300
0
E
S
W
N
E
DIRECTION OF TRANSPORT VECTOR

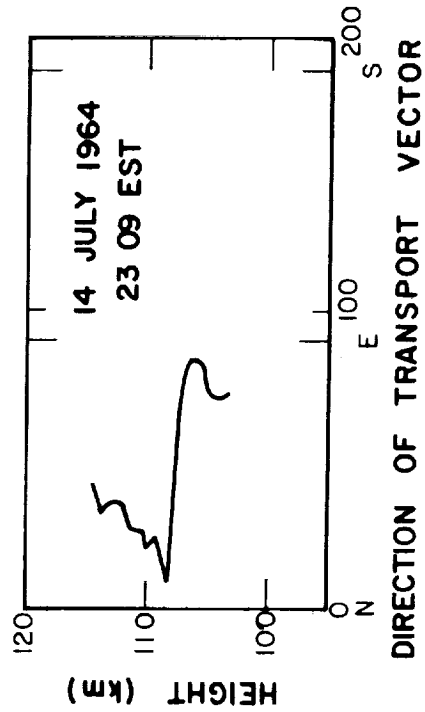

16 JANUARY 1964
AM
06 34 EST
WALLOPS ISLAND, VA
HEIGHT (KM)
190
180
170
160
150
140
130
120
110
100
90
80
70
100
200
300
0
E
S
W
N
E
DIRECTION OF TRANSPORT VECTOR


16 JANUARY 1964
AM
06 34 EST
WALLOPS ISLAND, VA
HEIGHT (KM)
190
180
170
160
150
140
130
120
110
100
90
80
70
0
30
60
90
120
150
180
210
240
WIND SPEED (M/SEC)

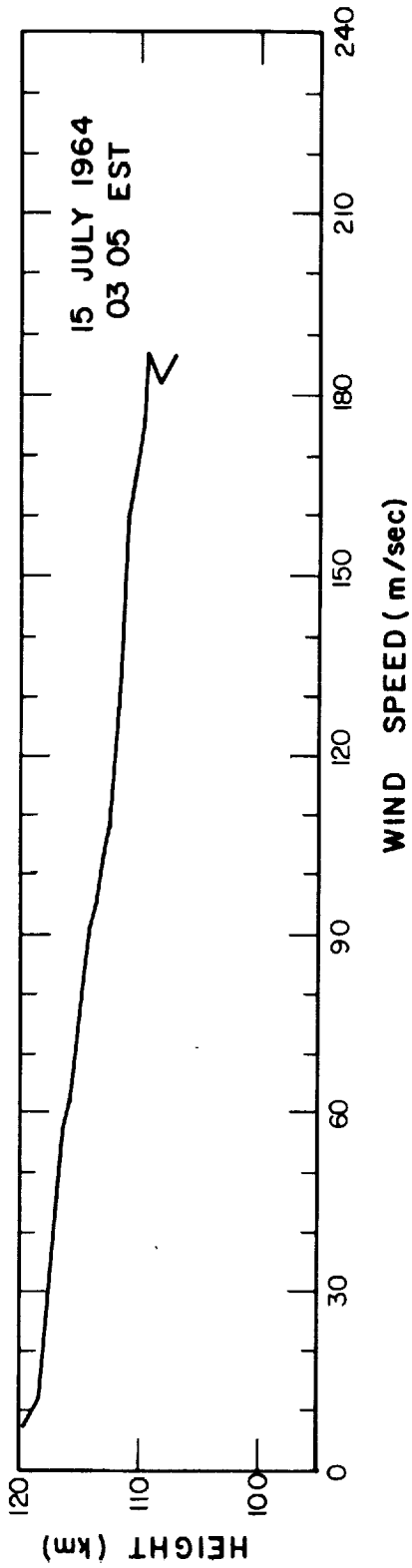

01CB200-1910H
14 JULY 1964
19 58 EST
WALLOPS ISLAND, VA
HEIGHT (km)
180
170
160
150
140
130
120
110
100
90
80
0
30
60
90
120
150
180
WIND SPEED (m/sec)

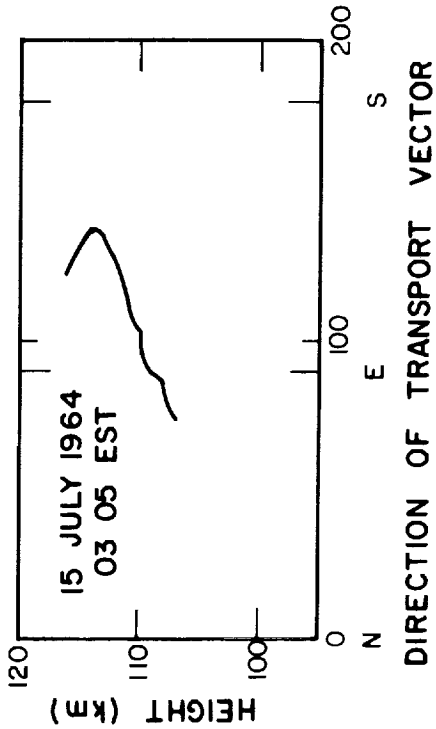

01CB200-1920H
14 JULY 1964
19 58 EST
WALLOPS ISLAND, VA
HEIGHT (km)
180
170
160
150
140
130
120
110
100
90
80
300
0
100
200
W
N
E
S
W
DIRECTION OF TRANSPORT VECTOR



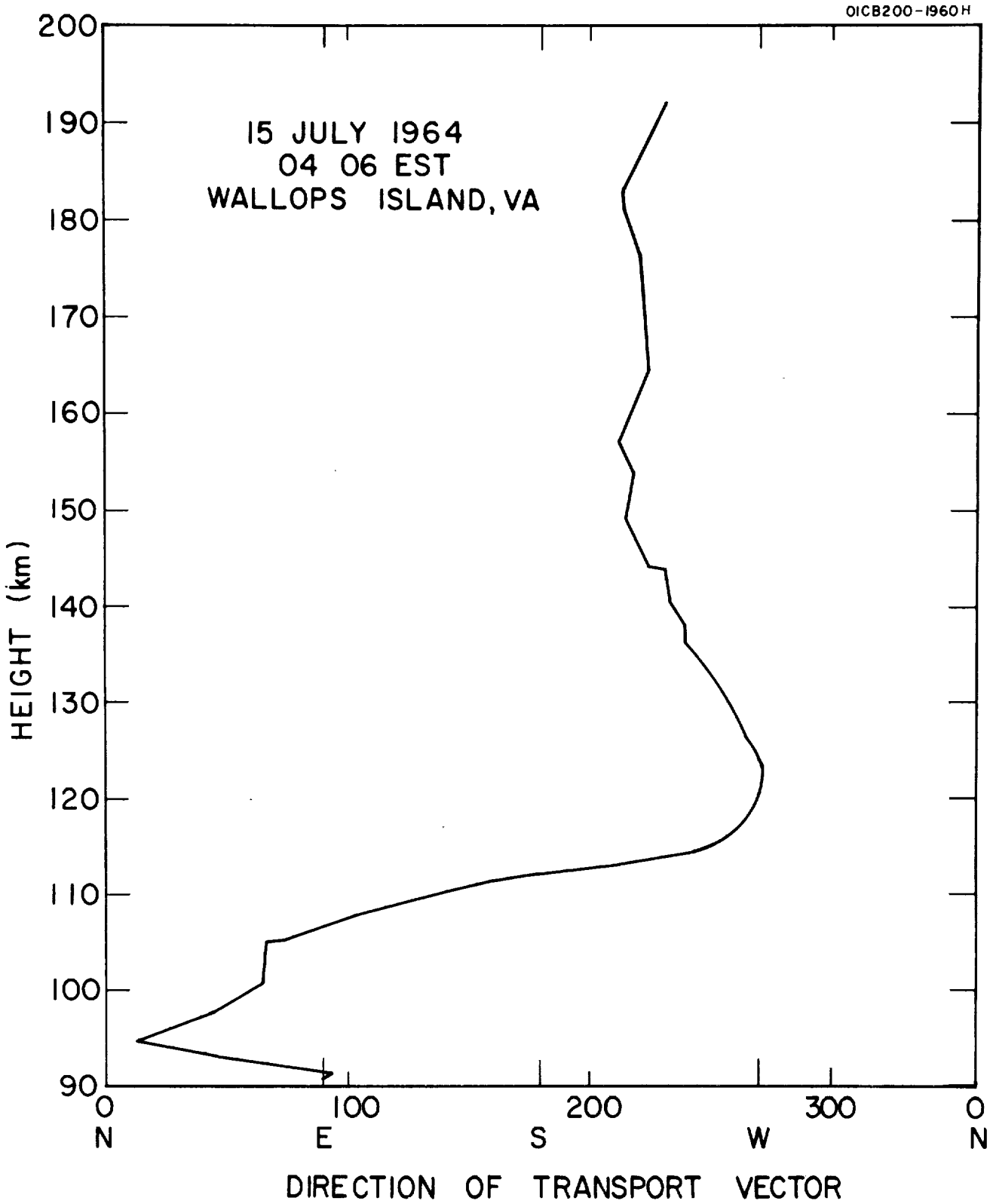


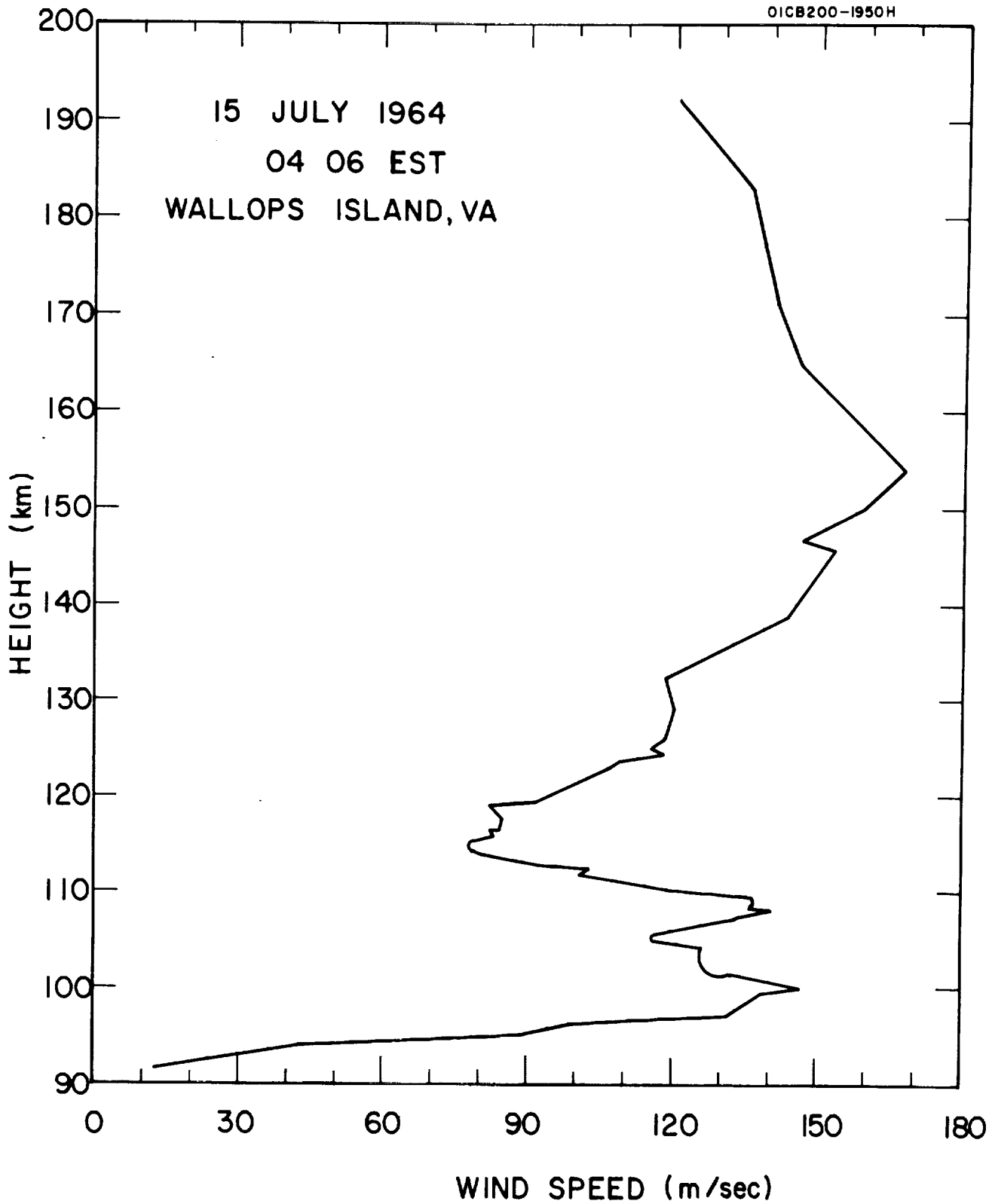
01CB200-1930H

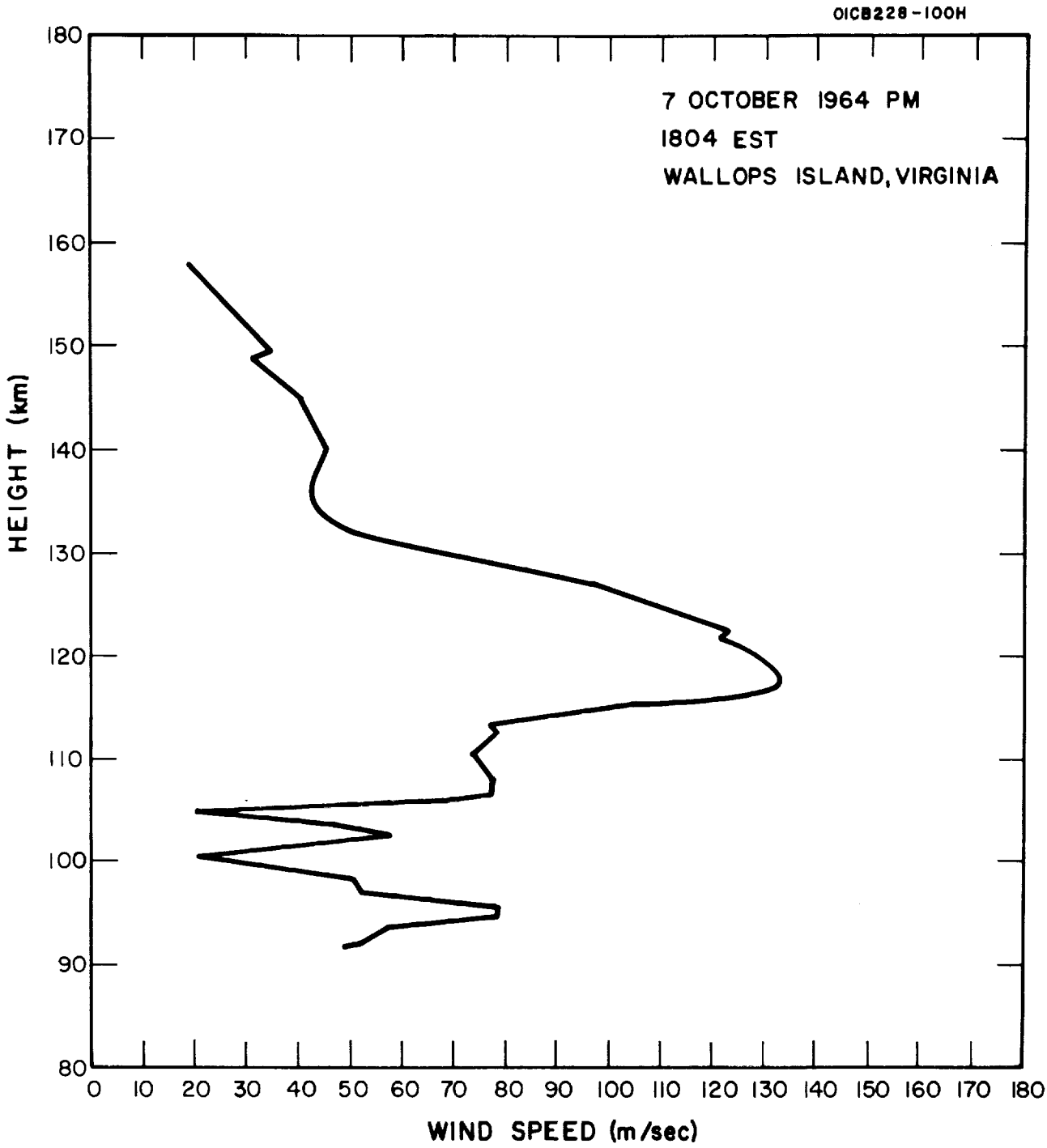


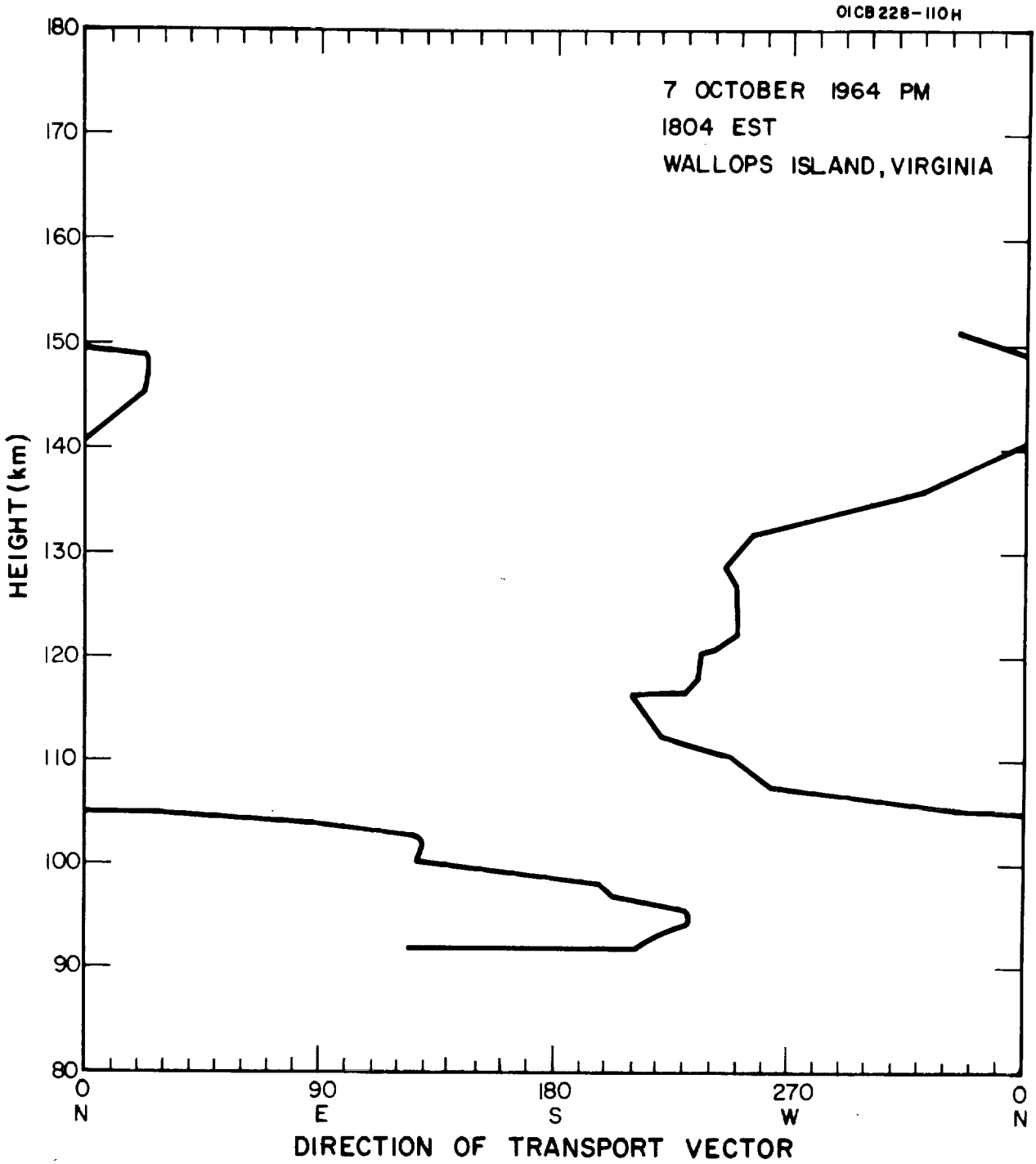


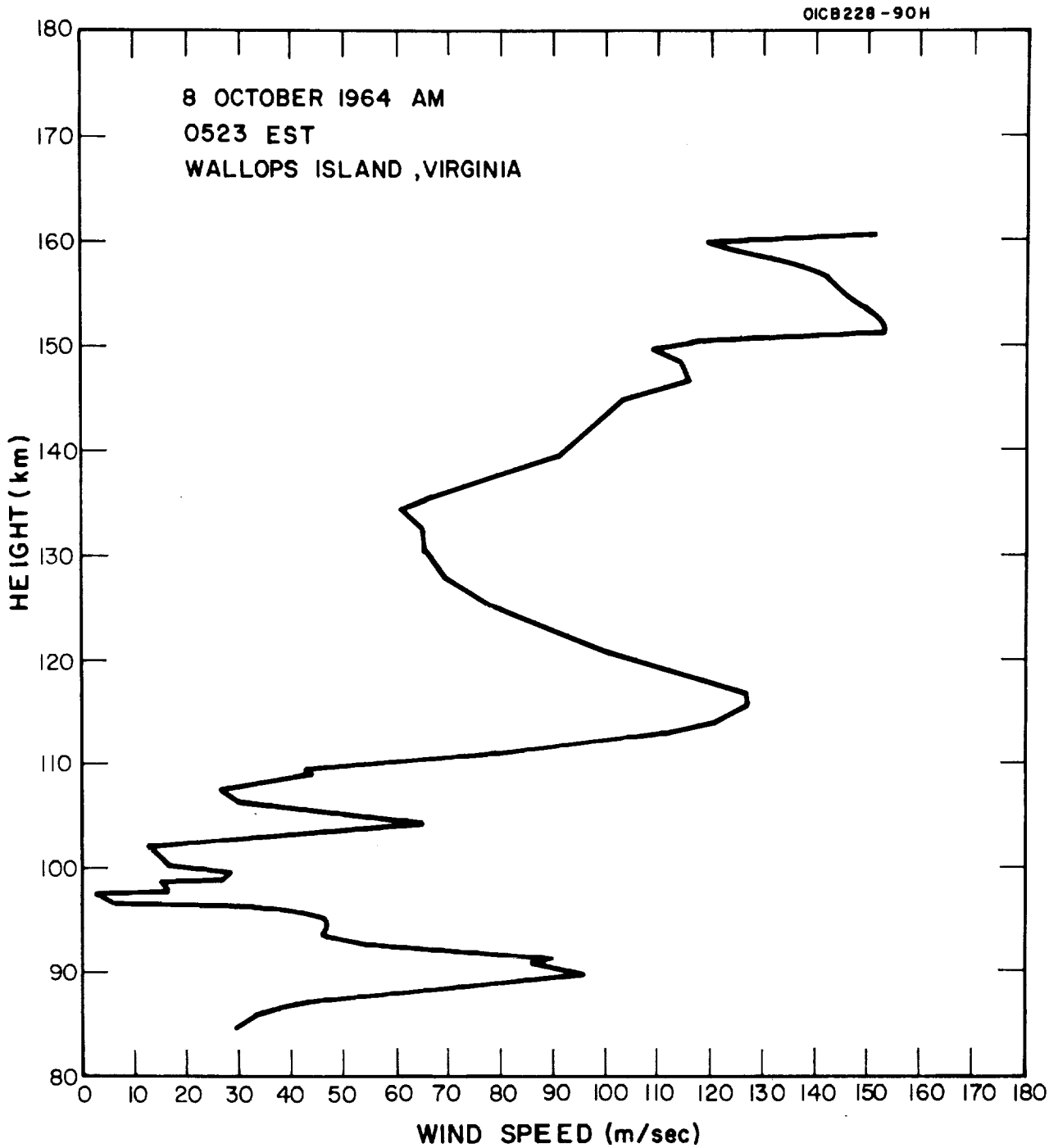
01CB200-1940H

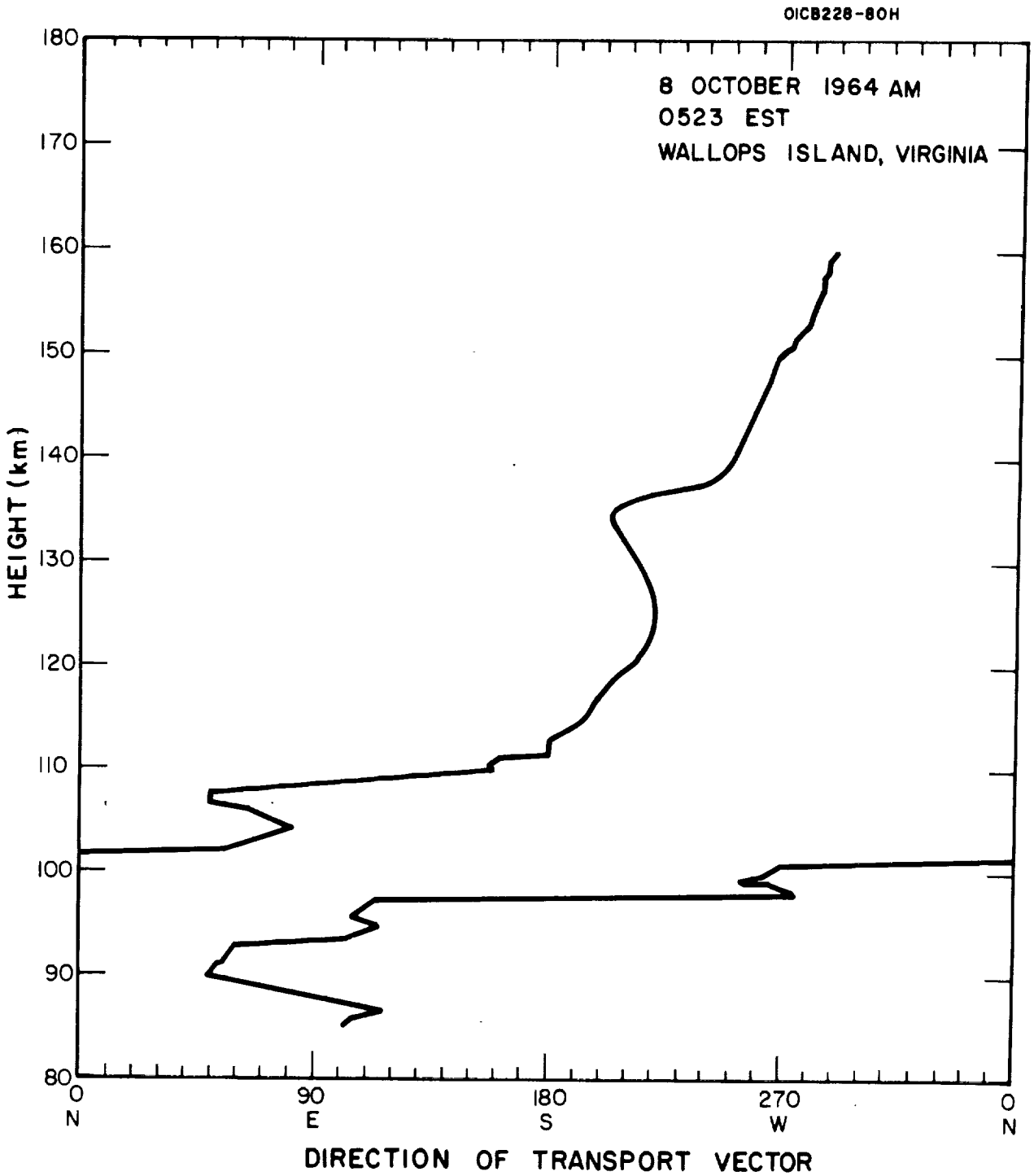

01CB200-1960H
15 JULY 1964
04 06 EST
WALLOPS ISLAND, VA
HEIGHT (km)
200
190
180
170
160
150
140
130
120
110
100
90
0
N
100
E
200
S
300
W
0
N
DIRECTION OF TRANSPORT VECTOR

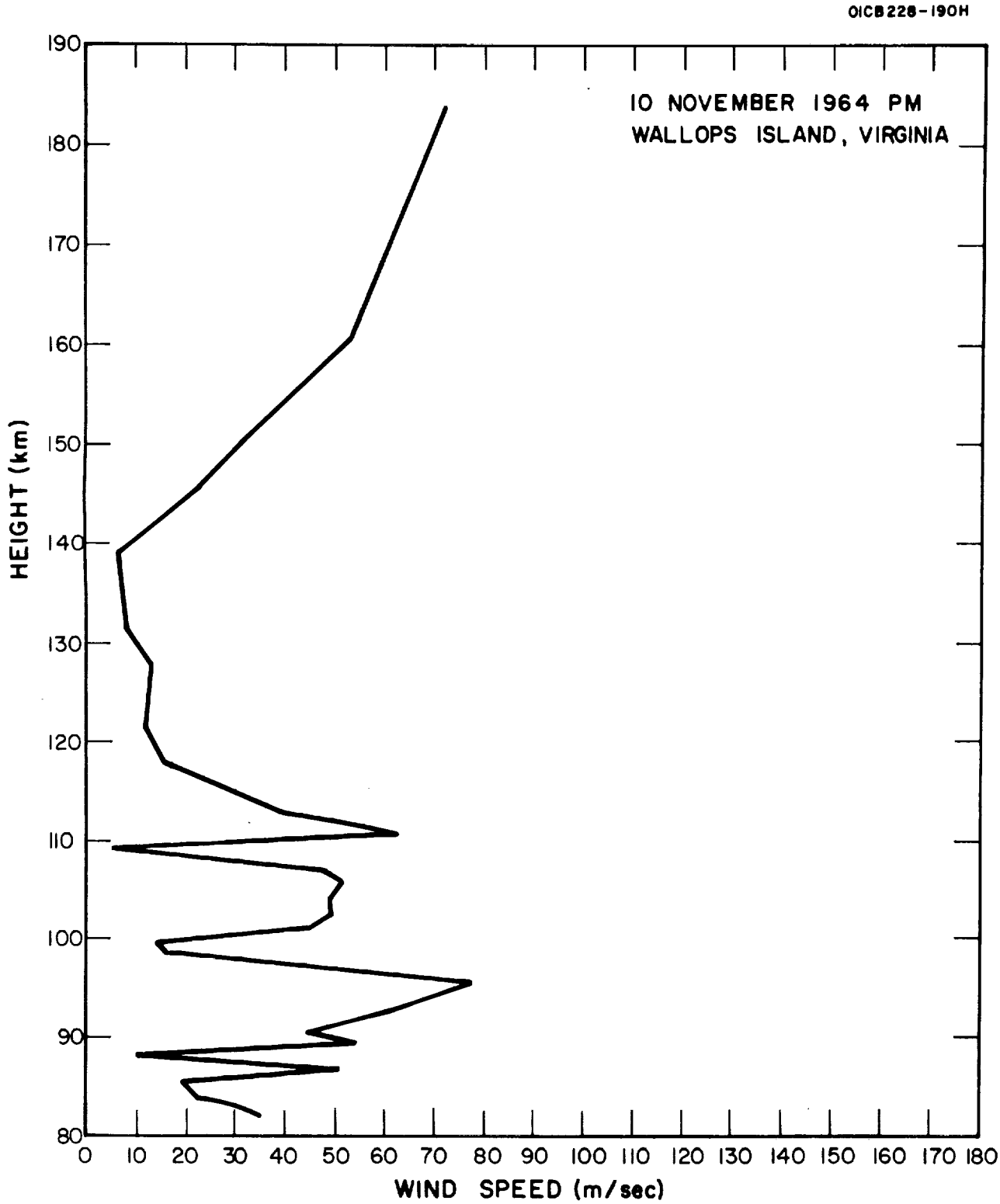

01CB200-1950H
15 JULY 1964
04 06 EST
WALLOPS ISLAND, VA
HEIGHT (km)
200
190
180
170
160
150
140
130
120
110
100
90
0
30
60
90
120
150
180
WIND SPEED (m/sec)

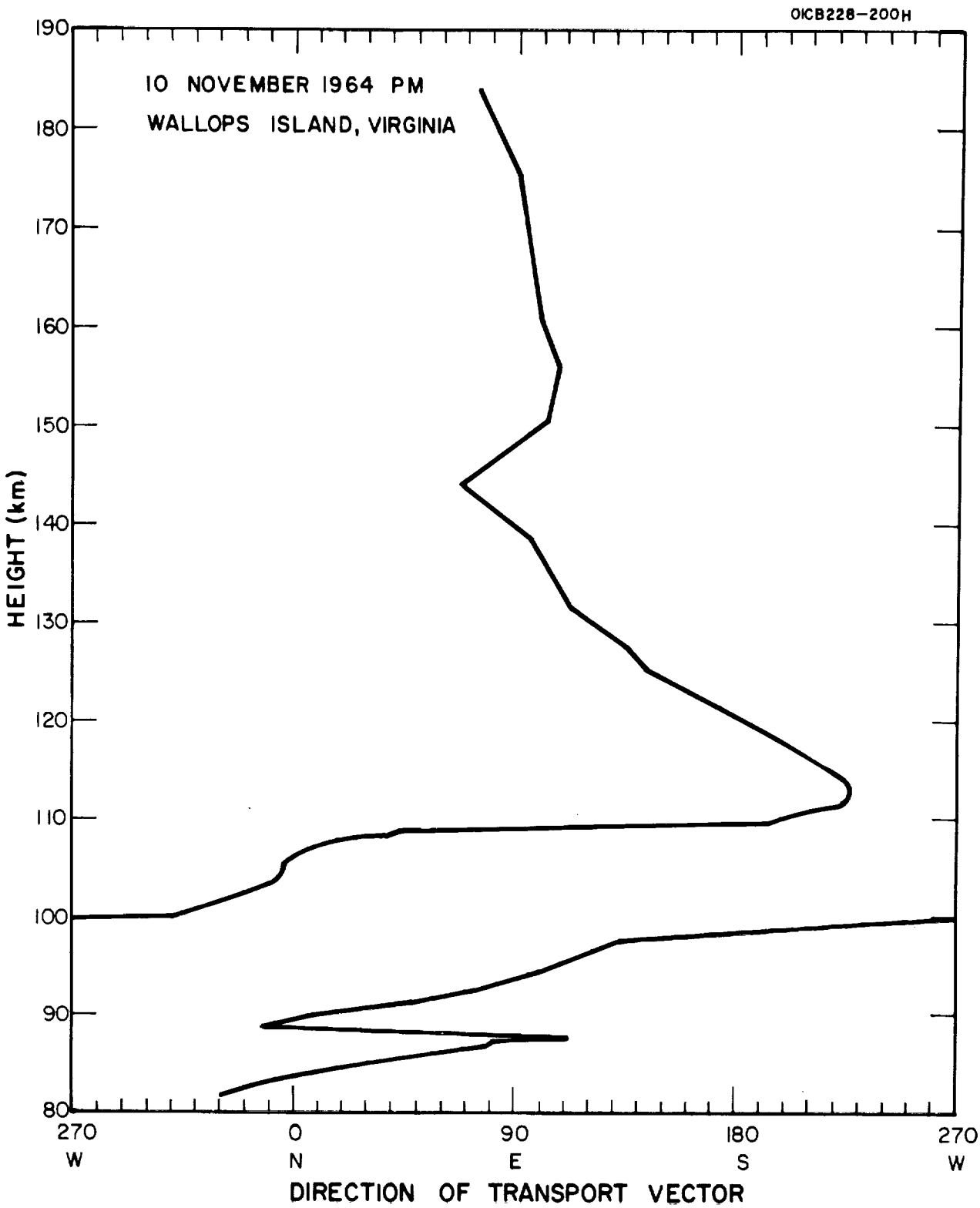

01CB228-100H
7 OCTOBER 1964 PM
1804 EST
WALLOPS ISLAND, VIRGINIA
HEIGHT (km)
180
170
160
150
140
130
120
110
100
90
80
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180
WIND SPEED (m/sec)

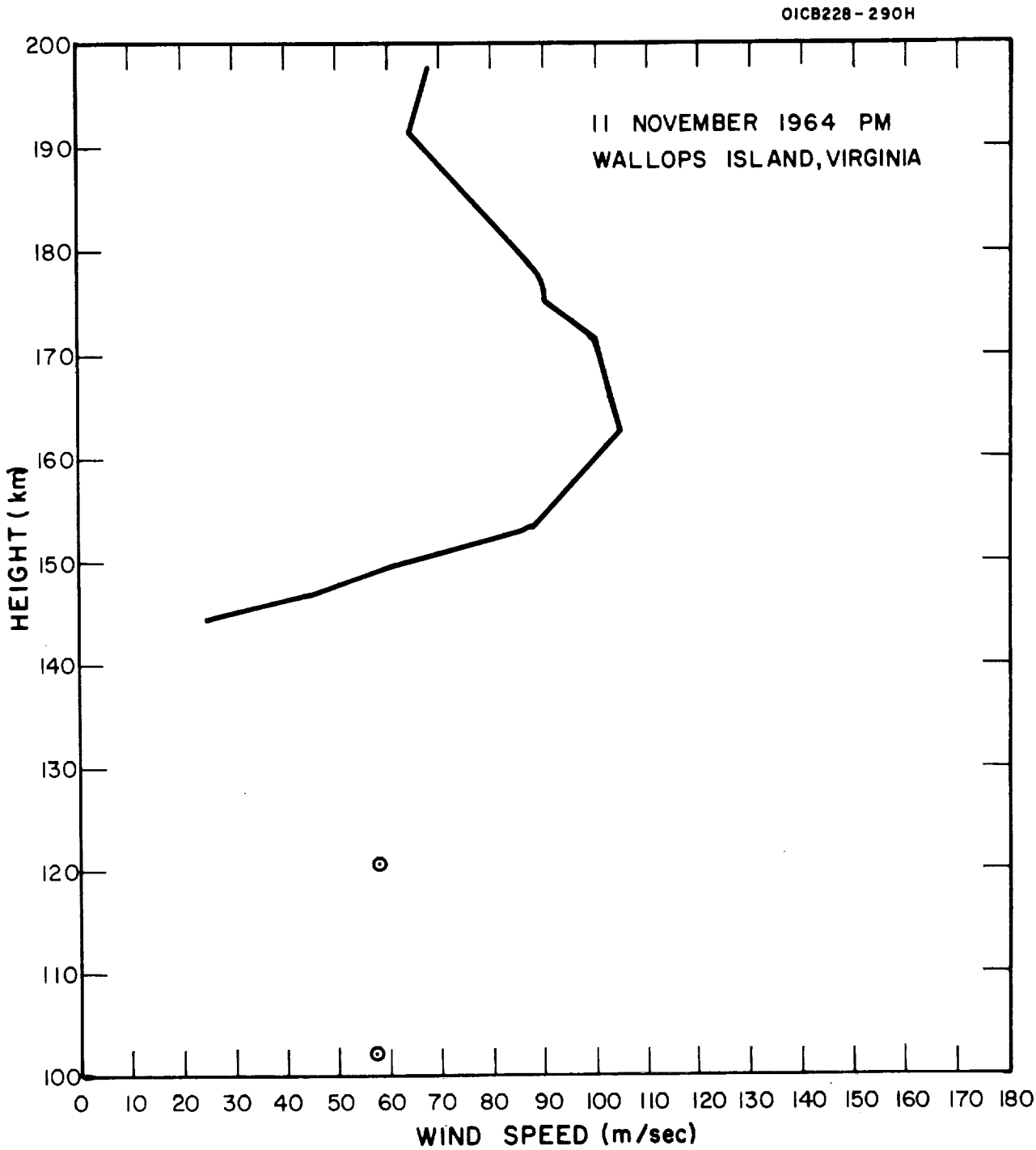

01CB228-110H
7 OCTOBER 1964 PM
1804 EST
WALLOPS ISLAND, VIRGINIA
HEIGHT (km)
180
170
160
150
140
130
120
110
100
90
80
0
N
90
E
180
S
270
W
0
N
DIRECTION OF TRANSPORT VECTOR

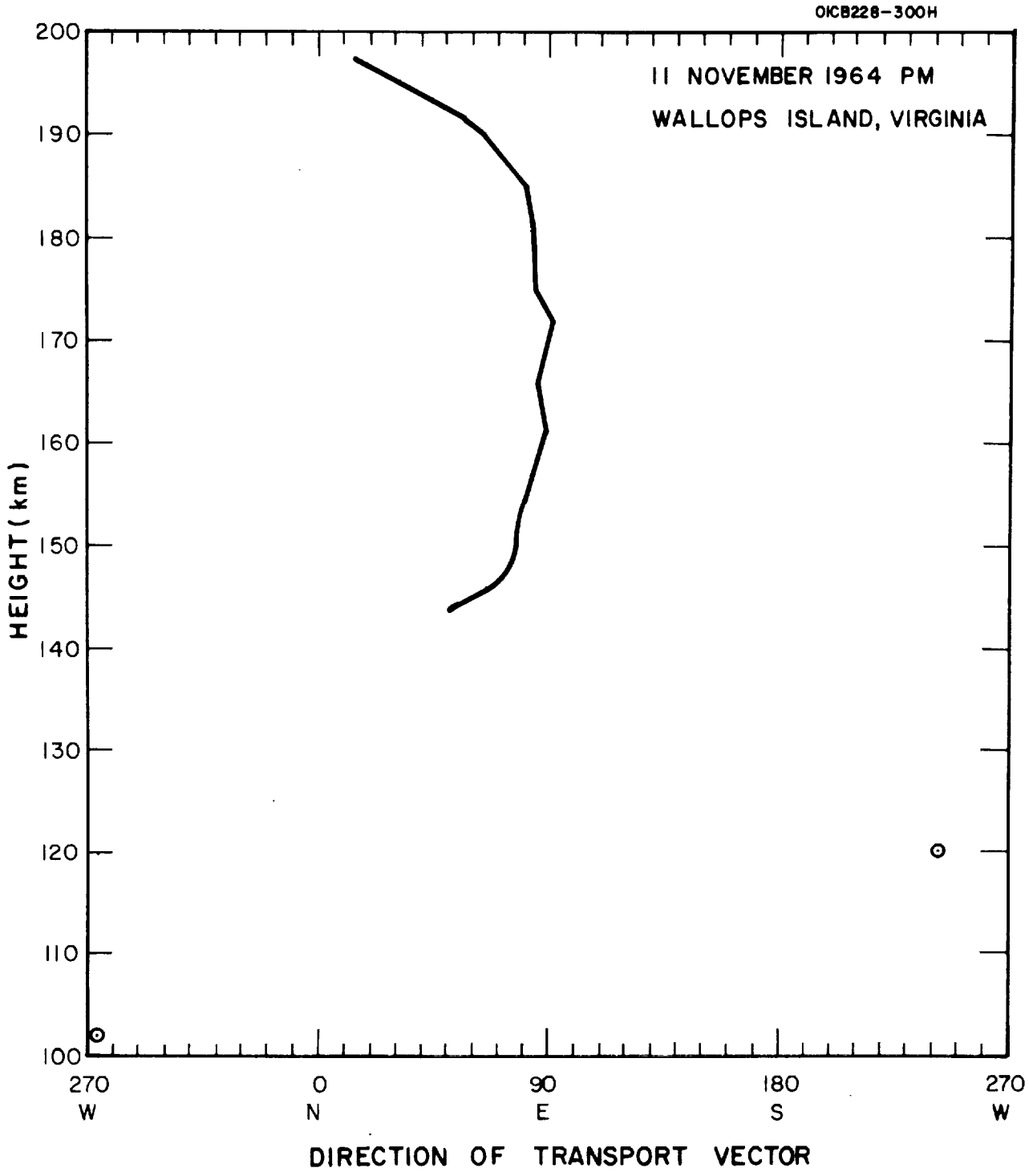

01CB228-90H
8 OCTOBER 1964 AM
0523 EST
WALLOPS ISLAND ,VIRGINIA
HEIGHT (km)
180
170
160
150
140
130
120
110
100
90
80
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180
WIND SPEED (m/sec)

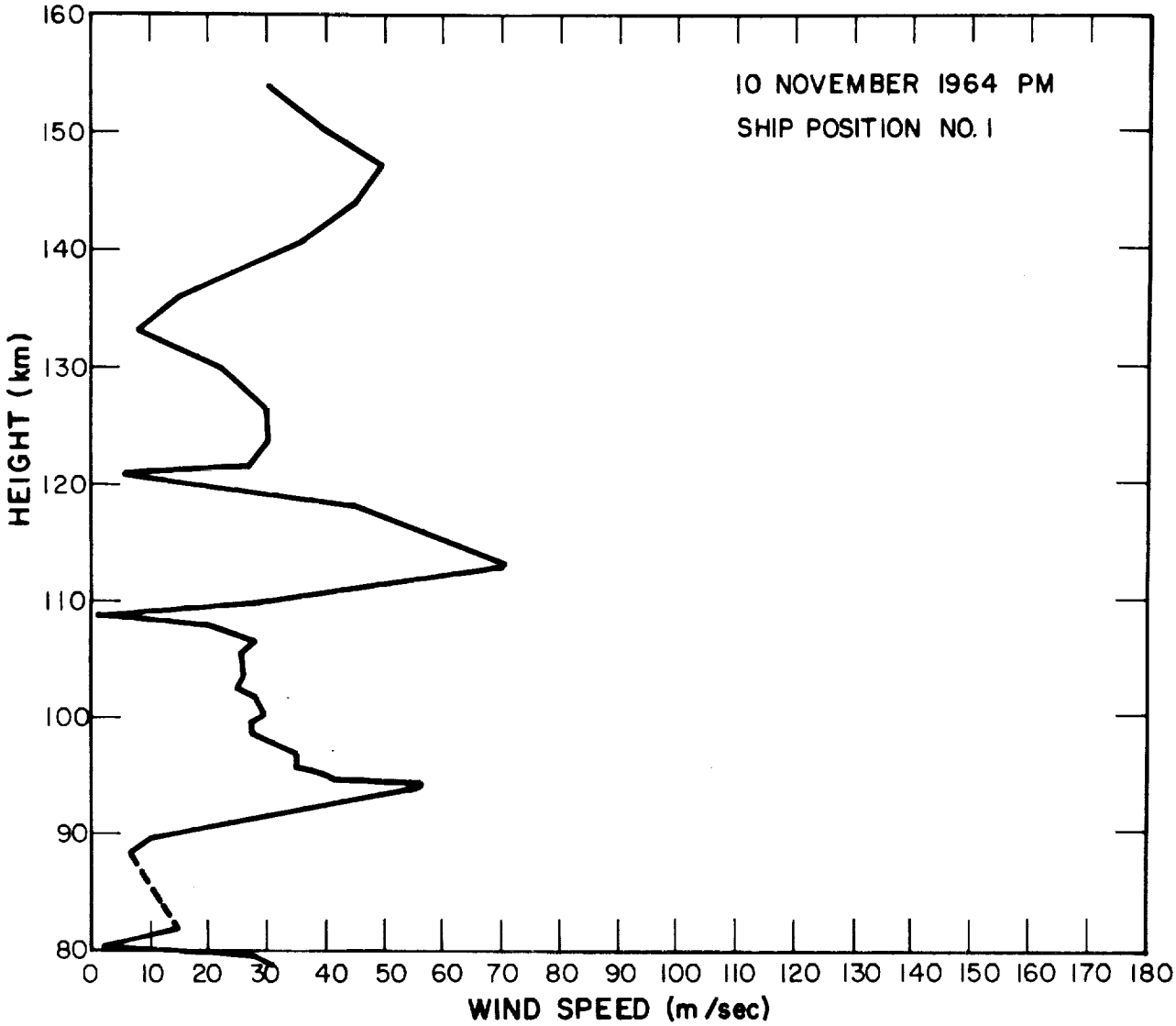

01CB228-80H
8 OCTOBER 1964 AM
0523 EST
WALLOPS ISLAND, VIRGINIA
HEIGHT (km)
180
170
160
150
140
130
120
110
100
90
80
0
N
90
E
180
S
270
W
0
N
DIRECTION OF TRANSPORT VECTOR

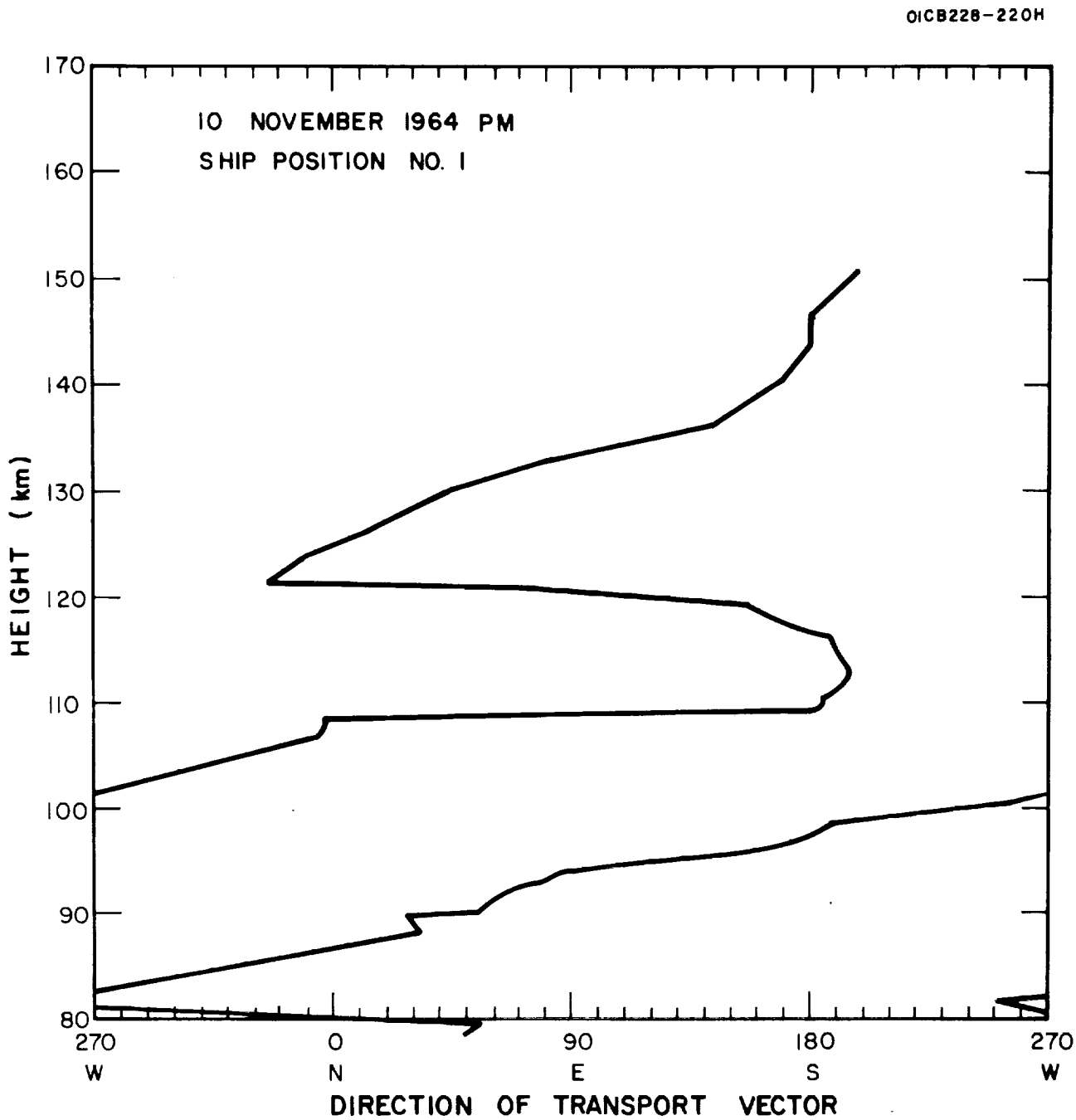

01CB228-190H
10 NOVEMBER 1964 PM
WALLOPS ISLAND, VIRGINIA
HEIGHT (km)
190
180
170
160
150
140
130
120
110
100
90
80
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
WIND SPEED (m/sec)

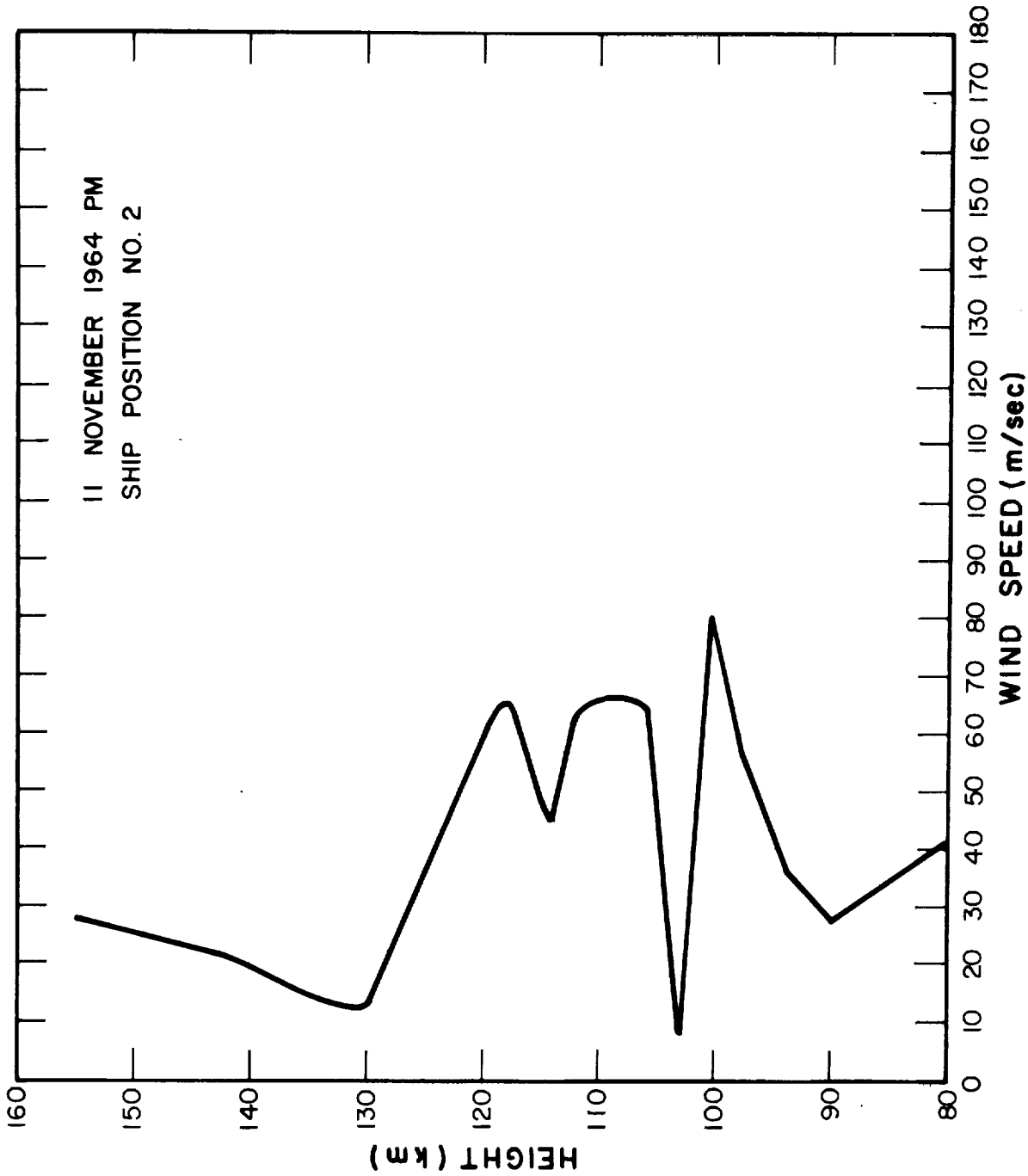

OICB228-200H
10 NOVEMBER 1964 PM
WALLOPS ISLAND, VIRGINIA
HEIGHT (km)
190
180
170
160
150
140
130
120
110
100
90
80
270
W
0
N
90
E
180
S
270
W
DIRECTION OF TRANSPORT VECTOR

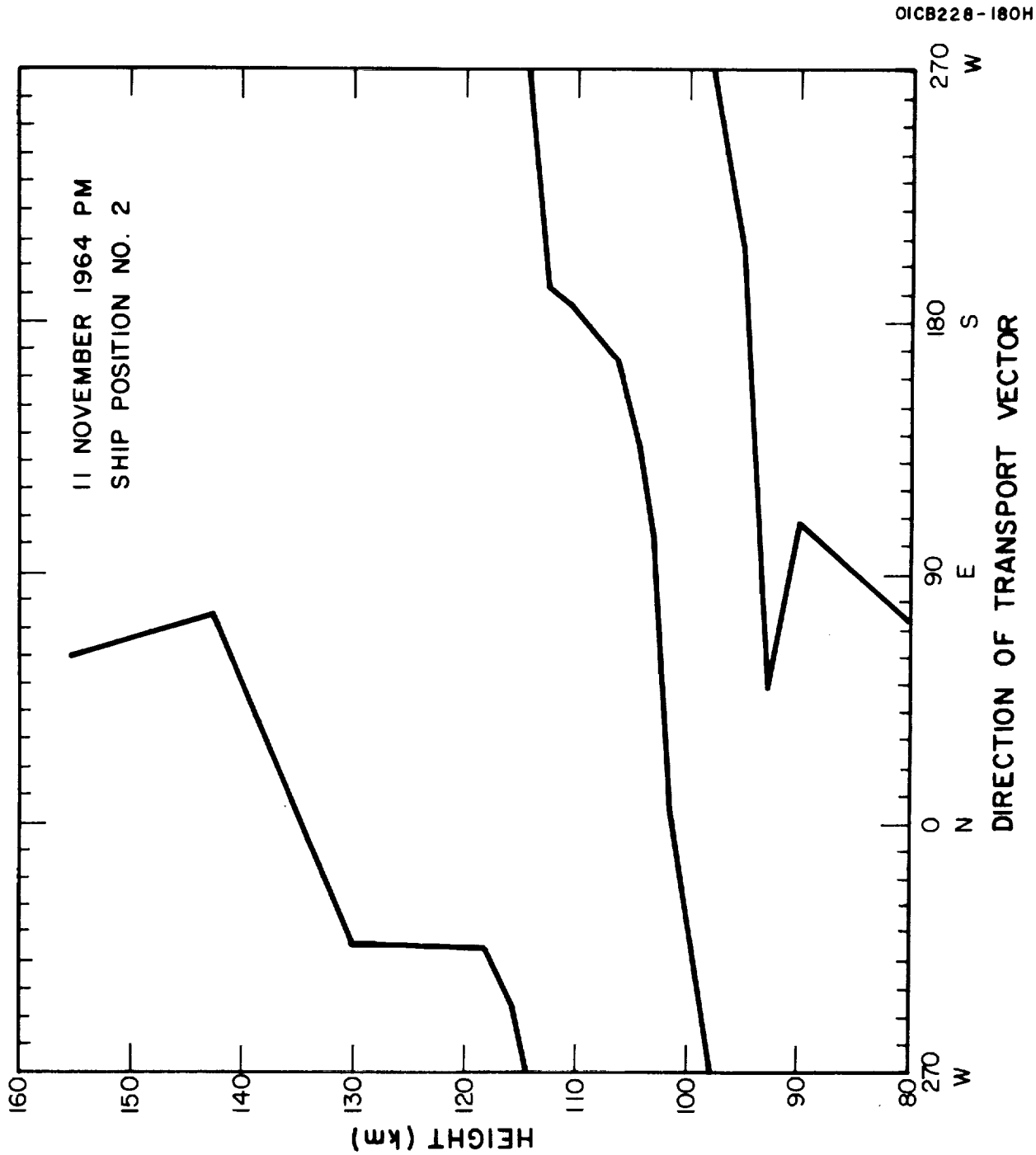

01CB228-290H
11 NOVEMBER 1964 PM
WALLOPS ISLAND, VIRGINIA
HEIGHT (km)
200
190
180
170
160
150
140
130
120
110
100
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180
WIND SPEED (m/sec)

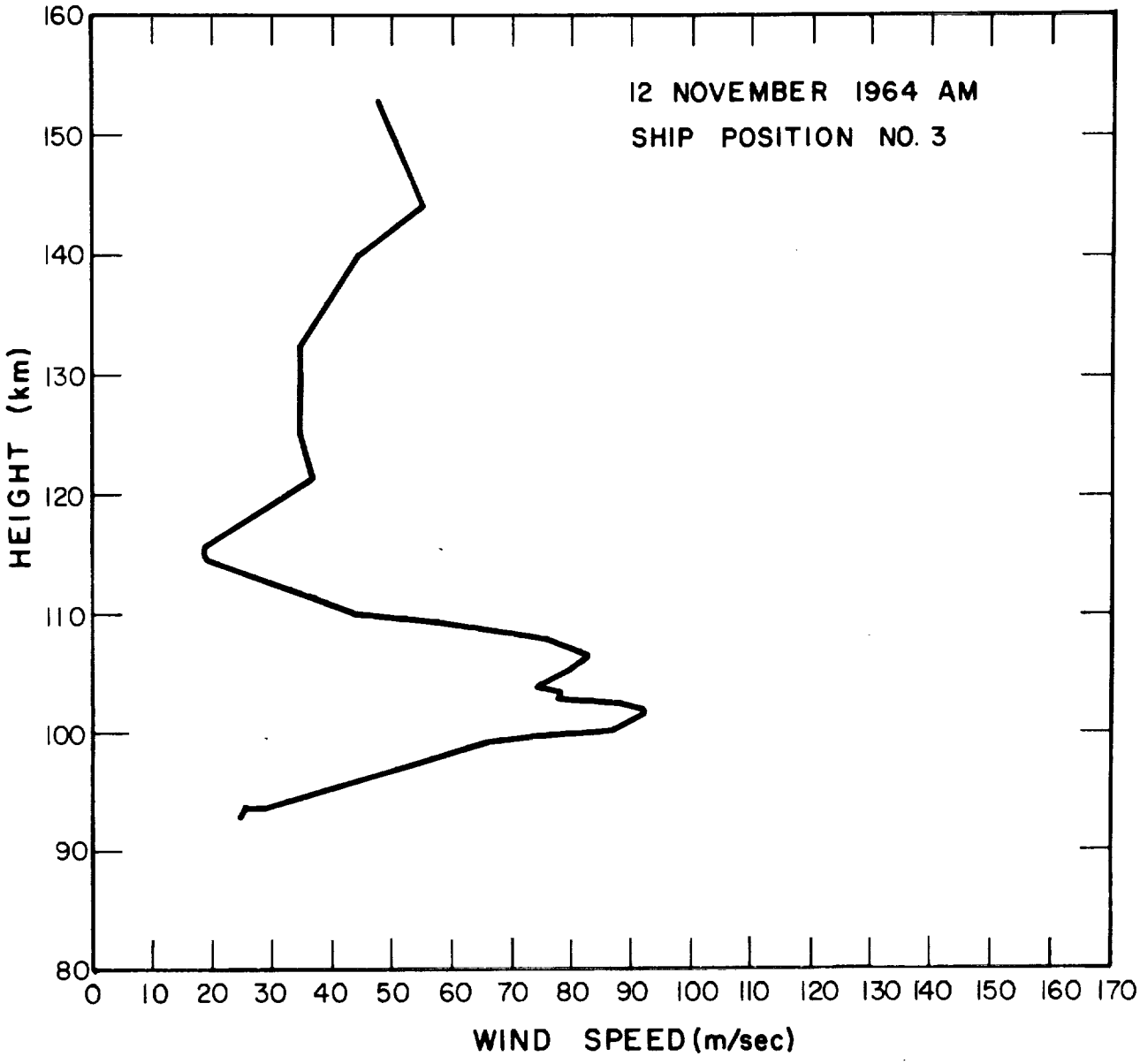

OICB228-300H
11 NOVEMBER 1964 PM
WALLOPS ISLAND, VIRGINIA
HEIGHT (km)
200
190
180
170
160
150
140
130
120
110
100
270
W
0
N
90
E
180
S
270
W
DIRECTION OF TRANSPORT VECTOR

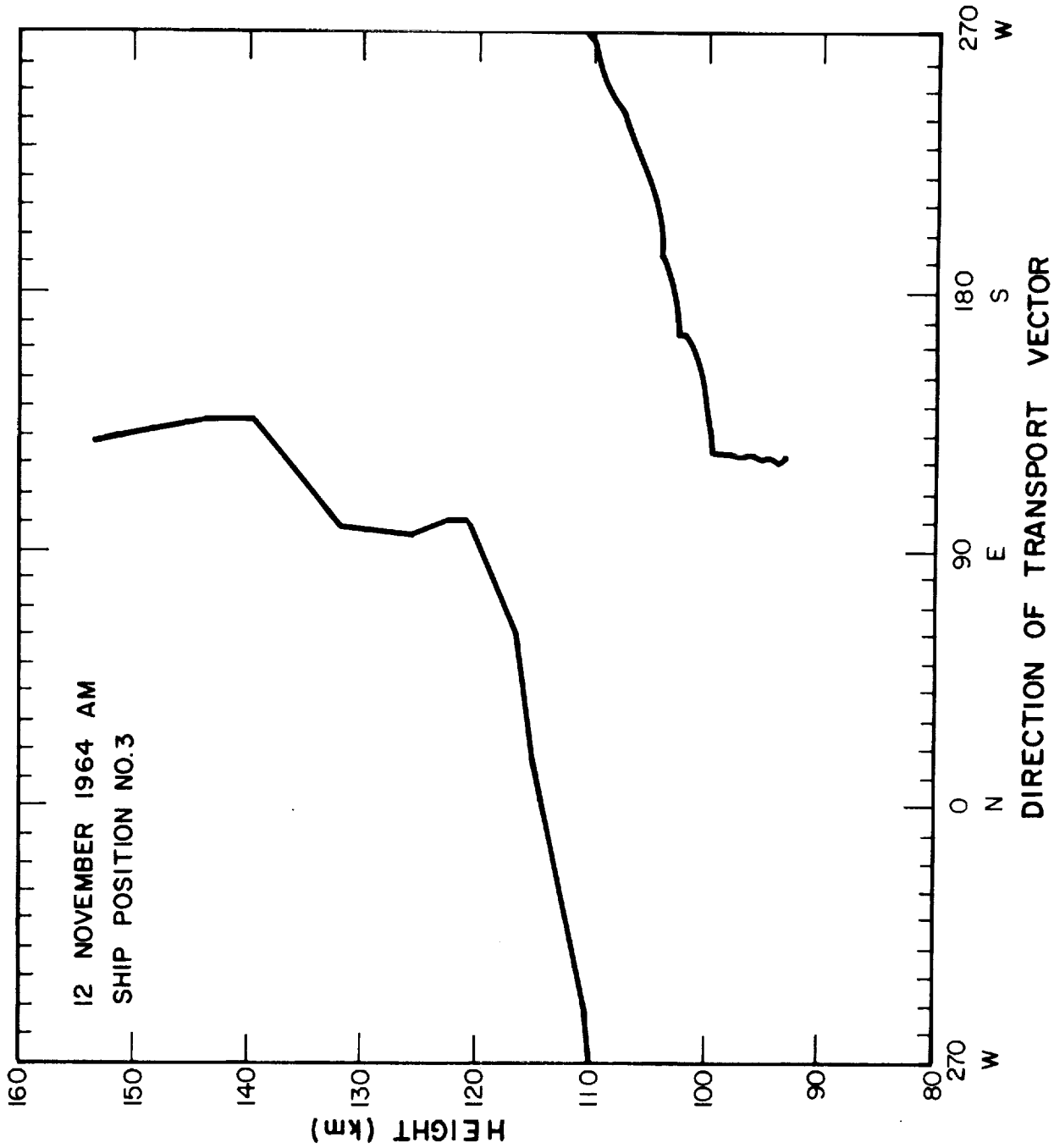

10 NOVEMBER 1964 PM
SHIP POSITION NO. 1
HEIGHT (km)
160
150
140
130
120
110
100
90
80
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180
WIND SPEED (m/sec)


01CB228-220H
10 NOVEMBER 1964 PM
SHIP POSITION NO. 1
HEIGHT (km)
170
160
150
140
130
120
110
100
90
80
270
W
0
N
90
E
180
S
270
W
DIRECTION OF TRANSPORT VECTOR


11 NOVEMBER 1964 PM
SHIP POSITION NO. 2
HEIGHT (km)
160
150
140
130
120
110
100
90
80
WIND SPEED (m/sec)
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180


01CB228-180H
11 NOVEMBER 1964 PM
SHIP POSITION NO. 2
HEIGHT (km)
160
150
140
130
120
110
100
90
80
270
W
0
N
90
E
180
S
270
W
DIRECTION OF TRANSPORT VECTOR


12 NOVEMBER 1964 AM
SHIP POSITION NO. 3
HEIGHT (km)
160
150
140
130
120
110
100
90
80
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
WIND SPEED (m/sec)


12 NOVEMBER 1964 AM
SHIP POSITION NO.3
HEIGHT (km)
160
150
140
130
120
110
100
90
80
270
W
0
N
90
E
180
S
270
W
DIRECTION OF TRANSPORT VECTOR