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Environment
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ATMOSPHERIC AND LIMNOLOGICAL OBSERVATIONS ON LAKE ONTARIO AUGUST 7-17, 1972.

Unpublished Manuscript

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ON LAKE ONTARIO

AUGUST 7-17, 1972.

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August 7-17, 1972

PROJECT MOVER, EPISODE 2

(STORM "BETTY")

Canada Centre for Inland Waters

Burlington, Ontario

PREFACE

Project MOVER (MOdel VERification) is a joint research project of the Physical and Descriptive Limnology Sections of the Canada Centre for Inland Waters. Its objectives are (1) to choose several episodes during the 1972 International Field Year on Lake Ontario when the wind forcing is markedly above background levels and when, as a consequence, the lake behavior can be related to a dominant cause, and (2) to analyze these episodes in a manner that will provide a means of developing comprehensive energy and momentum budgets for the lake and a basis for verification of mathematical models. A major incentive for this project was derived from a recommendation made at the 1971 Workshop on Numerical-Dynamical Modeling of the Great Lakes to establish a library of model test cases.

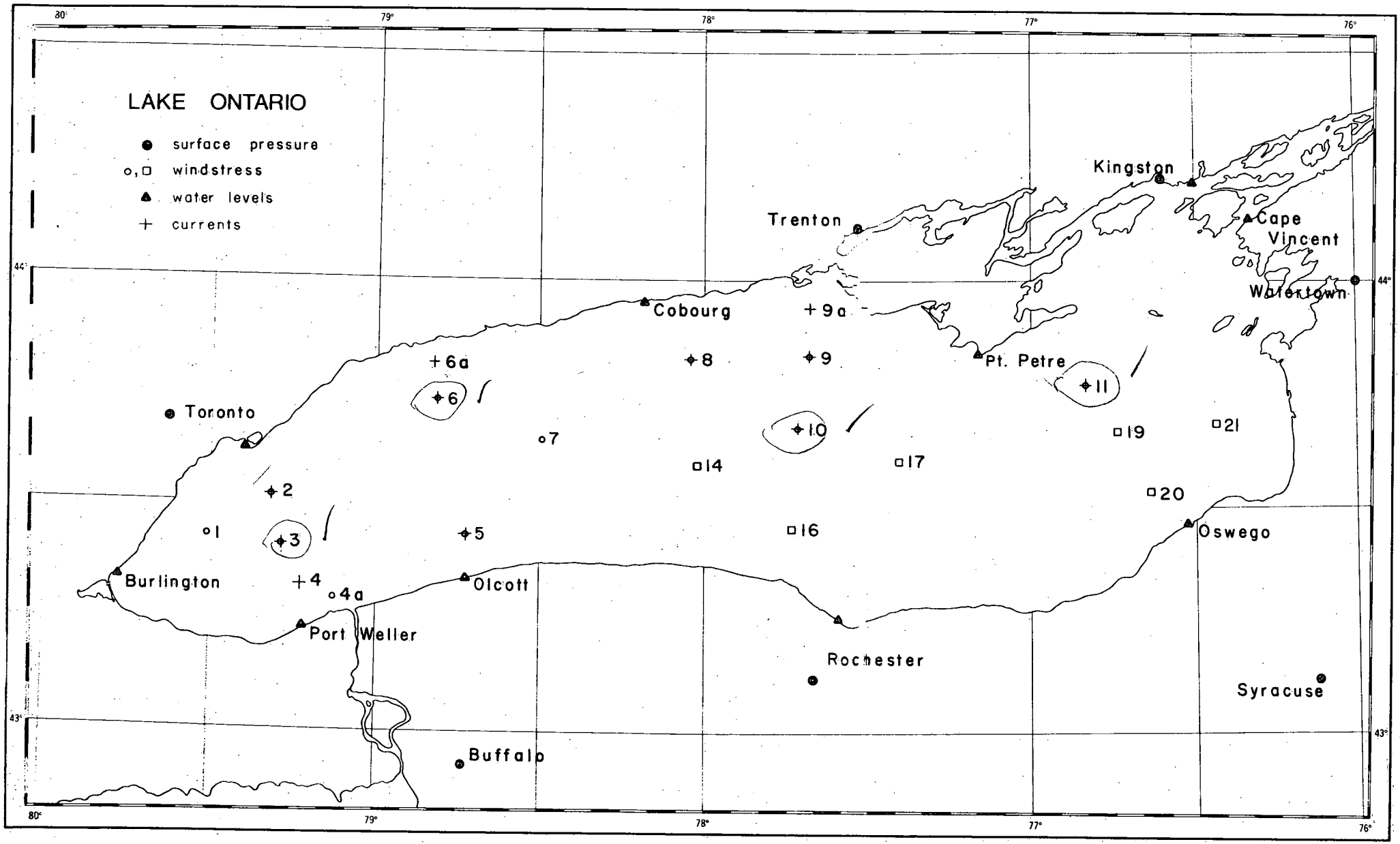
The first phase of project MOVER is to prepare a descriptive summary of each episode in the form of graphical displays which can be easily distributed and thus meet the above objective. The present report constitutes one such summary. The data presented in this report are based on field observations carried out in the framework of the International Field Year for the Great Lakes, a joint US-Canadian contribution to the International Hydrological Decade. The processing, analysis, and digitization of wind, current, and temperature data were carried out by F. C. Elder, E. B. Bennett, and F. M. Boyce. The report itself was prepared by D. E. Jordan.

I. INSTRUMENT LOCATION AND DATA HANDLING

II. SYNOPTIC MAPS OF BAROMETRIC PRESSURE, AND WATER TEMPERATURES

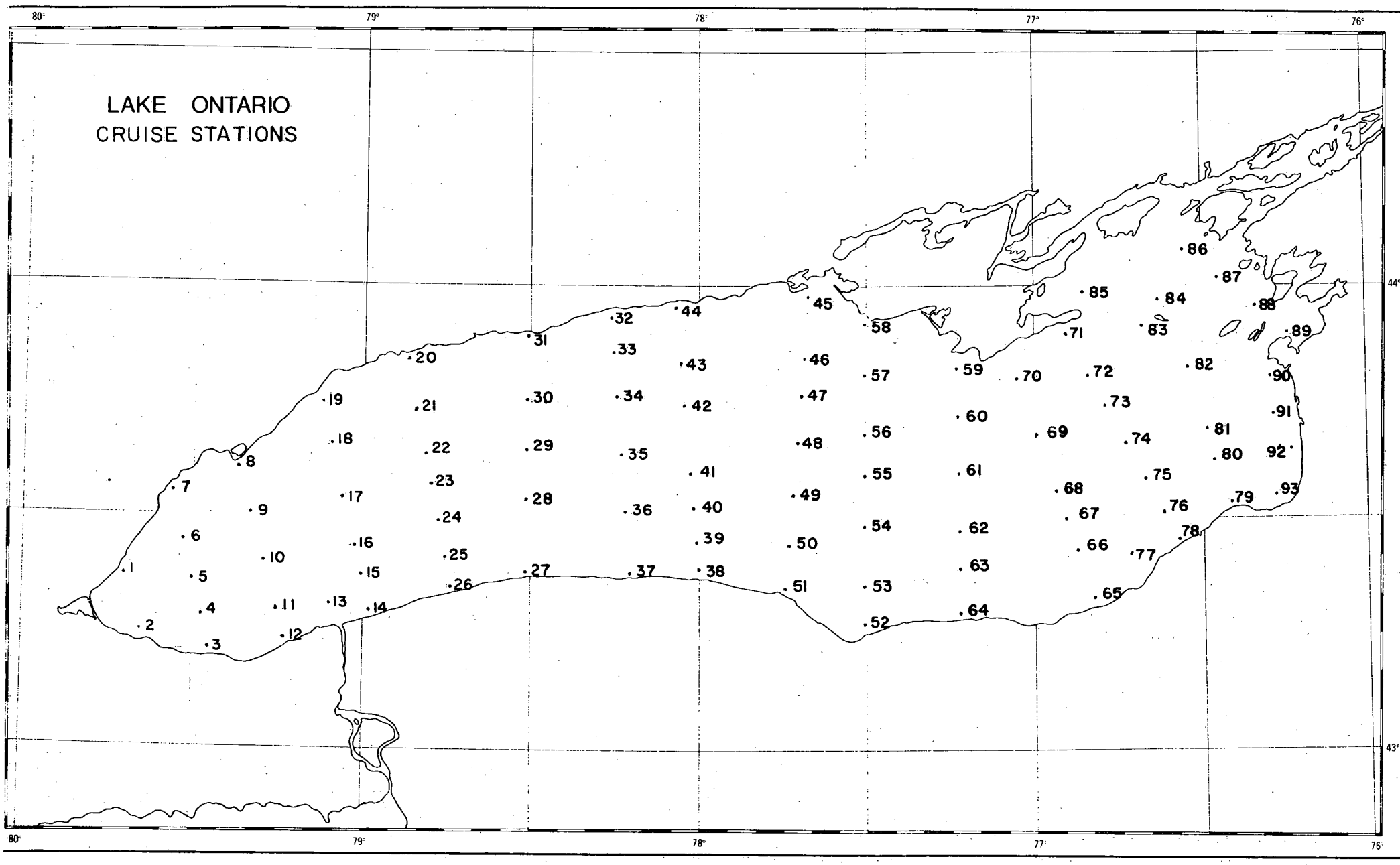
Layer temperatures obtained by vertical integration of observed temperatures at 1 metre intervals, horizontal interpolation by computer program presented under I.2.

III. TIME SERIES OF BAROMETRIC PRESSURE, WINDSTRESS, WATER LEVELS, WATER TEMPERATURES, AND CURRENTS


LAKE ONTARIO
surface pressure
windstress
water levels
currents
80°
79°
78°
77°
76°
44°
43°
Kingston
Trenton
Cape Vincent
Watertown
Cobourg
Pt. Petre
Toronto
Oswego
Burlington
Olcott
Port Weller
Rochester
Syracuse
Buffalo
1
2
3
4
4a
5
6
6a
7
8
9
9a
10
11
14
16
17
19
20
21

CURRENT METERS FOR THE "BETTY" STORM

Mooring No. IFYGL	Mooring No. Map	Depth (metres)	Position	Instrument depth and type			
2	2	109.4	43°31'08" N 79°19'32" W			30.0 G	52.5 G
3	3	114.0	43°24'35" N 79°17'36" W	9.8 P	15.2 G		
4	4	88.7	43°19'04" N 79°14'03" W		15.0 P	30.0 G	
6	6	86.0	43°44'10" N 78°49'05" W	10.1 P	15.0 P		50.3 G
8	8	71.9	43°49'34" N 78°02'37" W	9.8 G	14.8 G	29.8 G	
9	9	69.2	43°50'02" N 77°40'50" W		15.7 P	30.6 G	
10	10	136.2	43°40'23" N 77°42'57" W	10.1 P	15.1 G	30.1 G	50.3 G
11	11	78.6	43°46'13" N 76°49'44" W	10.1 P	15.1 P		
13	5	126.5	43°26'05" N 78°43'43" W		15.9 G		
32	6a	13.4	43°50'40" N 78°50'47" W	10.1 P			
34	6a	27.4	43°49'37" N 78°50'34" W	10.1 P			
55	9a	35.4	43°55'31" N 77°40'41" W	10.1 P			


LAKE ONTARIO
CRUISE STATIONS
80°
79°
78°
77°
76°
44°
43°
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
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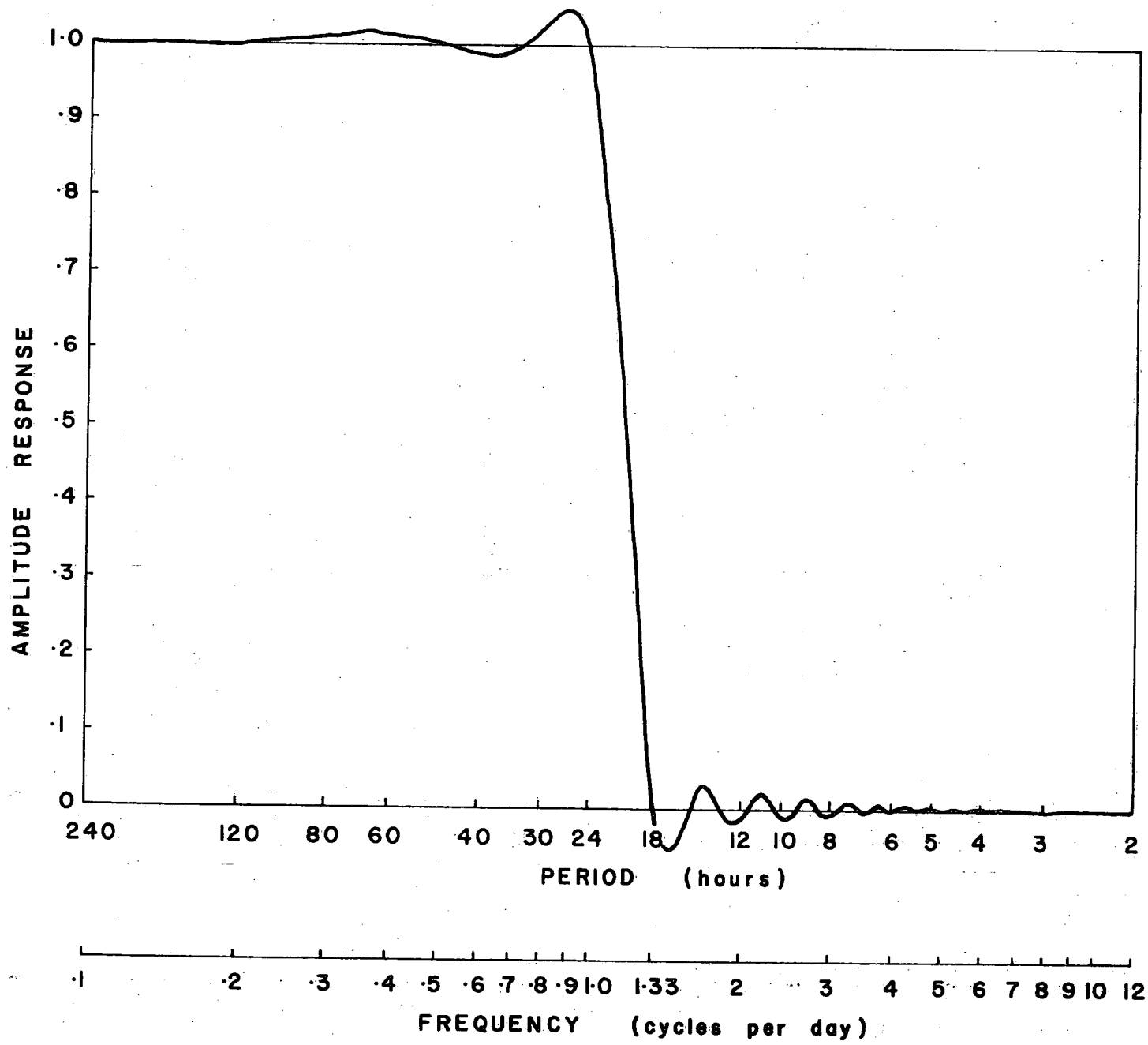
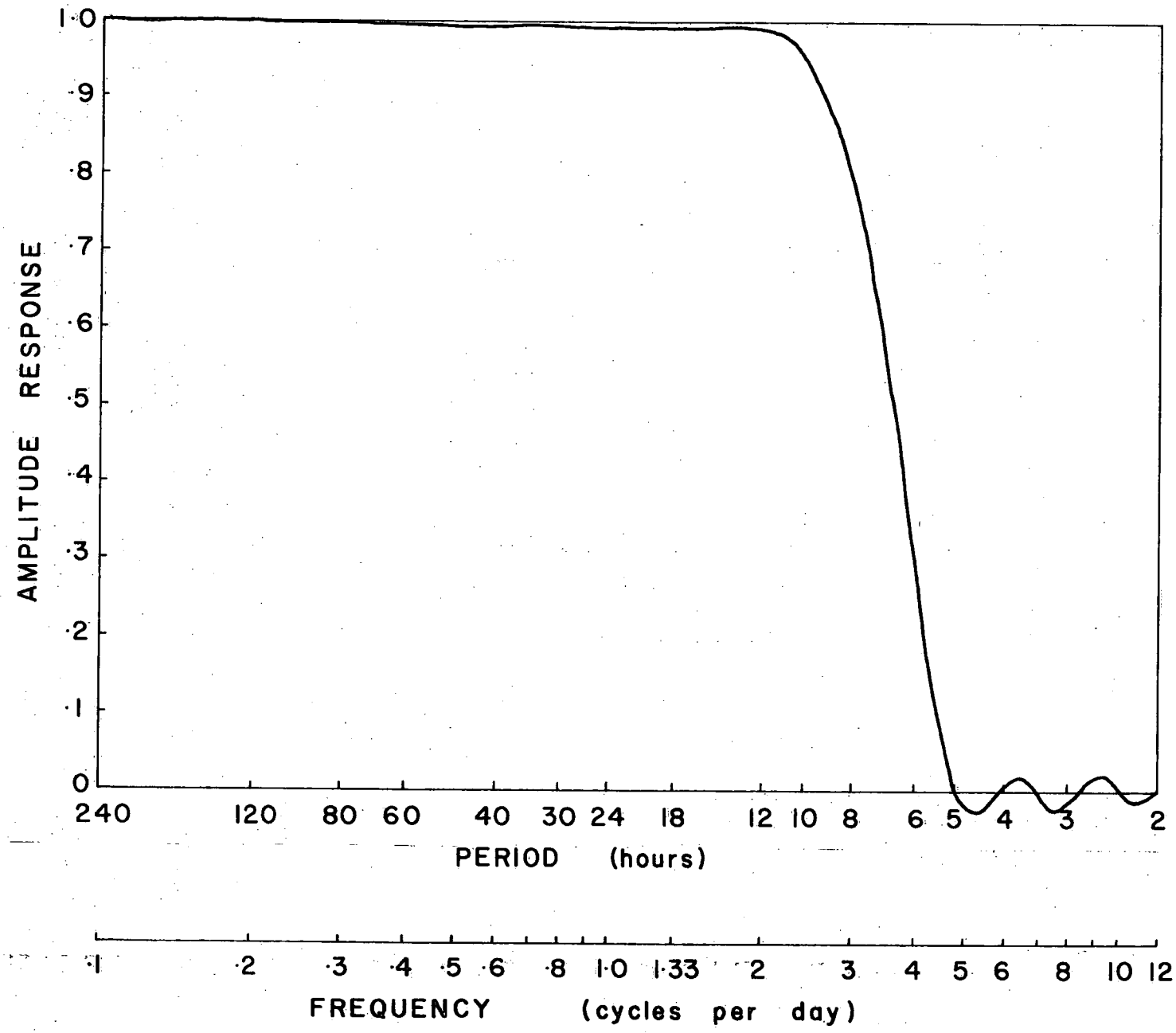
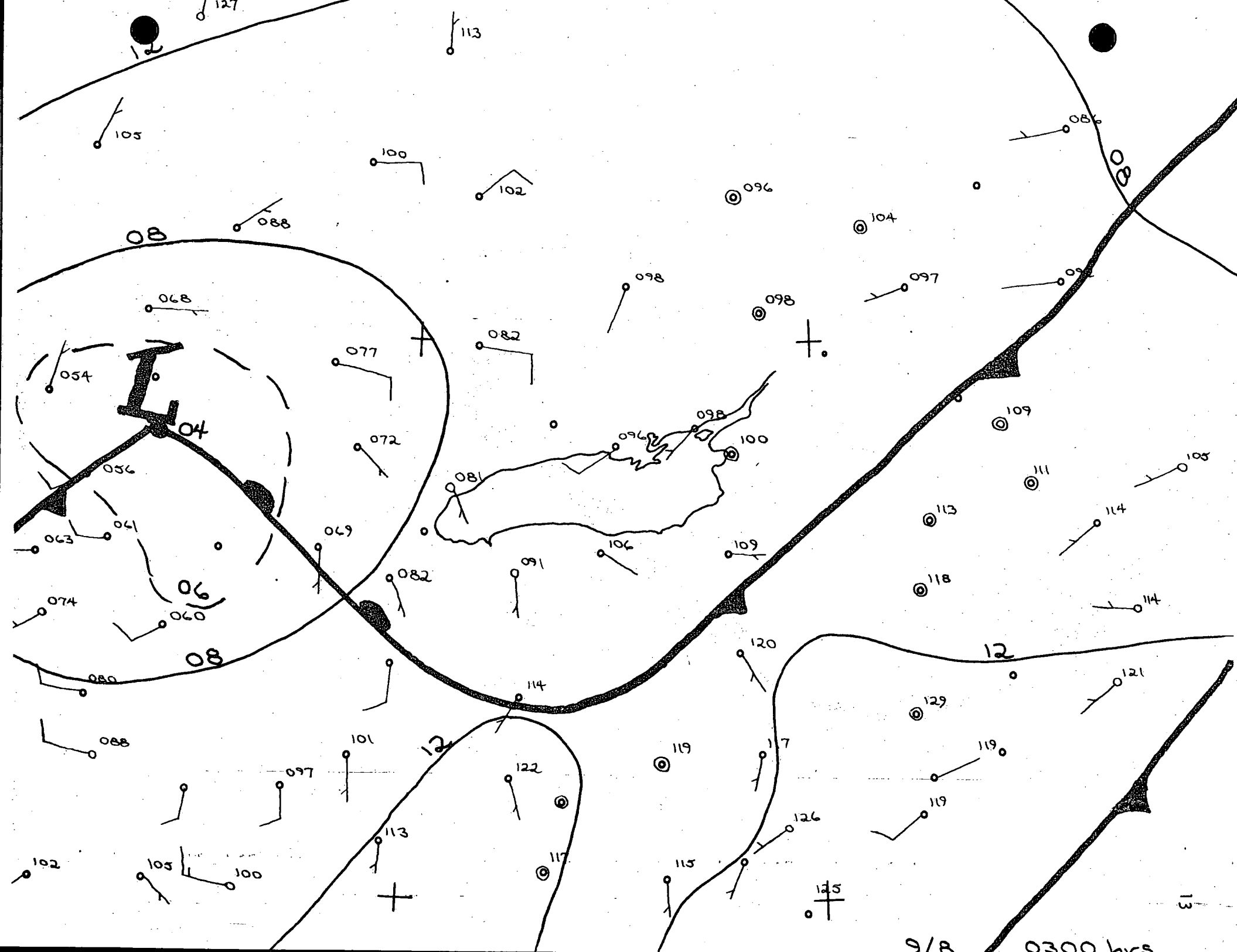

AMPLITUDE RESPONSE
1·0
·9
·8
·7
·6
·5
·4
·3
·2
·1
0
240
120
80
60
40
30
24
18
12
10
8
6
5
4
3
2
PERIOD (hours)
·1
·2
·3
·4
·5
·6
·7
·8
·9
1·0
1·33
2
3
4
5
6
7
8
9
10
12
FREQUENCY (cycles per day)

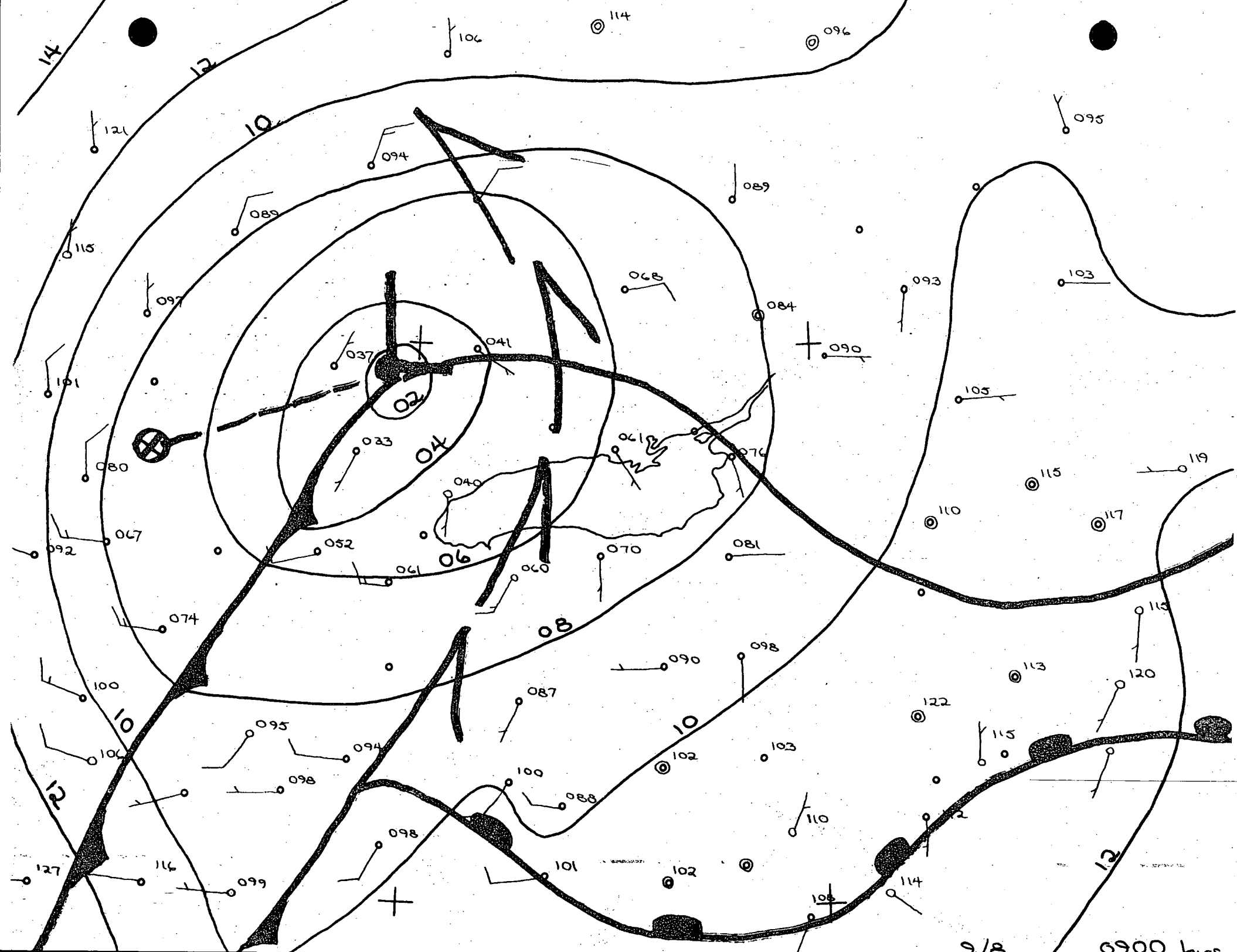

AMPLITUDE RESPONSE
1·0
·9
·8
·7
·6
·5
·4
·3
·2
·1
0
240 120 80 60 40 30 24 18 12 10 8 6 5 4 3 2
PERIOD (hours)
·1 ·2 ·3 ·4 ·5 ·6 ·8 1·0 1·33 2 3 4 5 6 8 10 12
FREQUENCY (cycles per day)

```
              SUBROUTINE FILTER(KSTORE,ZPNT,ZFLT)
        C ZPNT = INPUT ARRAY OF LENGTH KSTORE, ZFLT = LOW-PASS ARRAY
000006        DIMENSION ZPNT(360),ZFLT(360),W(200),R(200)
000006        DATA NCALL/0/
000006        IF(NCALL.GT.0) GO TO 50
        C SPECIFY CUT-OFF FREQUENCIES (FC,FT) AND NUMBER OF WEIGHTS (NT)
000010        FC=1./10.
000010        FT=1./5.
000012        NT=8
000013        TPI=2.*3.1415926536
000014        W0=FC+FT
000016        SUM=W0
000020        NSING=0.5/(FT-FC)+0.1
000025        DO 10 N=1,NT
000025        IF(N.EQ.NSING) GO TO 10
000030        XN=N
000030        WDUM=XN*2.*(FT-FC)
000034        WDUM=XN*TPI*(1.-WDUM*NSING)
000037        W(N)=(SIN(XN*TPI*FC)+SIN(XN*TPI*FT))/WDUM
000054        SUM=SUM+2.*W(N)
000057     10 CONTINUE
000064        W(NSING)=W(NSING-1)
000066        SUM=SUM+2.*W(NSING)
000070        W0=W0/SUM
000072        DO 20 N=1,NT
000073     20 W(N)=W(N)/SUM
000100        WRITE(6,15) W0,(W(N),N=1,NT)
000114     15 FORMAT(1X,20F6.3)
        C COMPUTE AMPLITUDE RESPONSE FOR FREQUENCIES 0 TO 6*FC
000114        FF=-FC/25.
000116        DO 30 J=1,126
000122        FF=FF+FC/25.
000125        R(J)=W0
000127        DO 30 N=1,NT
000130        XN=N
000131     30 R(J)=R(J)+2.*W(N)*COS(XN*TPI*FF)
000151        WRITE(6,35) (R(J),J=1,126)
000162     35 FORMAT(10X,20F6.3)
        C FILTER INPUT ARRAY BY LOW-PASS FILTER
000162     50 NCALL=NCALL+1
000164        NT1=NT+1
000165        KLAST=KSTORE-NT
000170        DO 70 KS=NT1,KLAST
000172        ZFLT(KS)=W0*ZPNT(KS)
000175        DO 70 N=1,NT
000177        KSMN=KS-N
000200        KSPN=KS+N
000201        ZTWO=ZPNT(KSMN)+ZPNT(KSPN)
000205     70 ZFLT(KS)=ZFLT(KS)+W(N)*ZTWO
000217        RETURN
000220        END
```

```
      SUBROUTINE SYNOPS(NSTAT,IMAX,JMAX,VAR,SYN)
C
C THIS ROUTINE PRODUCES A SYNOPTIC DISTRIBUTION ON A RECTANGULAR GRID
C FROM OBSERVATIONS IN A NUMBER OF ARBITRARILY DISTRIBUTED STATIONS.
C THE METHOD OF INTERPOLATION FROM STATIONS TO GRIDPOINTS IS ESTABLISHED
C THE FIRST TIME THE ROUTINE IS CALLED AND THE ASSOCIATED WEIGHTS ARE
C STORED FOR SUBSEQUENT USE.
C VAR(N) = VALUES OF VARIABLE IN OBSERVATION STATIONS
C SYN(J,I)= SYNOPTIC DISTRIBUTION OF VARIABLE ON RECTANGULAR GRID
C WHERE J INCREASES FROM SOUTH TO NORTH, I FROM WEST TO EAST.
C
      DIMENSION SYN(12,30),VAR(25)
      DIMENSION NST(4),WST(4),WS(4,12,30),NS(4,12,30)
      DIMENSION NAME(25),XSTAT(25),YSTAT(25),EFFECT(25)
      DIMENSION DEPTH(12,30)
      DIMENSION A(5),B(5)
      REAL LATO,LONGO,LAT,LONG,MIN,MINO,MAX
      DATA NCALL/0/
      IF(NCALL.GT.0) GO TO 100
      NSTAT=10
      JMAX=12
      IMAX=30
      GRID=10.16
      LATO=43.1666667
      LONGO=79.8166667
C
C DETERMINE THE LOCATION OF OBSERVATION STATIONS IN MAP COORDINATES (XSTAT,
C YSTAT) FROM GIVEN POSITIONS IN DEGREES LATITUDE AND LONGITUDE (LAT,LONG)
C AND FROM THE POSITION OF THE MAP ORIGIN (LATO,LONGO).
C
      READ(5,1) (A(I),I=1,5),(B(I),I=1,5)
    1 FORMAT(5E14.6)
      DO 5 N=1,NSTAT
      READ(5,2) NAME(N),DEGN,MINN,SECN,DEGW,MINW,SECW
    2 FORMAT(A7,6X,2(F3.0,2F2.0))
      LAT=DEGN+((MINN+SECN/60.0)/60.0)
      LONG=DEGW+((MINW+SECW/60.0)/60.0)
      G=LONGO-LONG
      P=LAT-LATO
      XSTAT(N)=G*A(1)+P*A(2)+P*G*A(3)+(G**2)*A(4)+(P**2)*A(5)
      YSTAT(N)=G*B(1)+P*B(2)+P*G*B(3)+(G**2)*B(4)+(P**2)*B(5)
    5 CONTINUE
      WRITE(6,3)
    3 FORMAT(1H1,51H    STATION NAME    STATION NO.      XSTAT      YSTAT)
      WRITE(6,4) (NAME(N),N,XSTAT(N),YSTAT(N),N=1,NSTAT)
    4 FORMAT(1H0,7X,A7,10X,I2,3X,F6.4,2X,F6.4)
C
C READ DEPTHS OF LAKE TO EXCLUDE MISPOINTS OUTSIDE THE LAKE AREA.
C
      WRITE(6,6)
    6 FORMAT(1H1,10X,25HDEPTHS  OF  LAKE  ONTARIO)
      DO 9 I=1,IMAX
      READ(5,7) (DEPTH(J,I),J=1,JMAX)
    7 FORMAT(15X,F2.0,3X,9(F3.0,5X),F2.0,2X,F2.0)
      WRITE(6,8) (DEPTH(J,I),J=1,JMAX)
    8 FORMAT(1H0,12F5.0/)
    9 CONTINUE
```

```
C
C DETERMINE WHICH STATIONS ARE THE CLOSEST TO EACH GRIDPOINT AND COMPUTE
C THE NORMALIZED EFFECTS (WEIGHTS) OF THESE STATIONS ON THAT GRIDPOINT.
C THE TOTAL NUMBER OF STATIONS WHICH ARE ALLOWED TO AFFECT ONE GRIDPOINT
C IS LIMITED TO KSTAT.  THE INDICES OF THE STATIONS AFFECTING POINT(J,I)
C ARE STORED IN ARRAY NS(K,J,I) AND THEIR WEIGHTS IN ARRAY WS(K,J,I).
C THE METHOD OF INTERPOLATION IS AT THE OPTION OF THE USER AND IT WILL BE
C ESTABLISHED BY SPECIFYING KSTAT AND THE FORMULA FOR COMPUTING EFFECT(N)
C
      KSTAT=3
      WRITE(6,10)
   10 FORMAT(1H1,11X,1HI,9X,1HJ,5X,5HWST 1,3X,5HWST 1,5X,5HWST 2,3X,
     15HWST 2,5X,5HWST 3,3X,5HWST 3,5X,5HWST 4,3X,5HWST 4)
      DO 90 I=1,IMAX
      DO 90 J=1,JMAX
      IF (DEPTH(J,I).LE.0.) GO TO 90
      XPOINT=(I-1)*GRID
      YPOINT=(J-1)*GRID
      DO 20 N=1,NSTAT
      XDIST=XSTAT(N)-XPOINT
      YDIST=YSTAT(N)-YPOINT
      SQDIST=XDIST**2 + YDIST**2
   20 EFFECT(N)=1./SQDIST
      DO 40 K=1,KSTAT
      WST(K)=0.
      DO 30 N=1,NSTAT
      IF (EFFECT(N).LE.WST(K)) GO TO 30
      NST(K)=N
      WST(K)=EFFECT(N)
   30 CONTINUE
      N=NST(K)
   40 EFFECT(N)=0.
      SUMW=0.
      DO 50 K=1,KSTAT
   50 SUMW=SUMW+WST(K)
      DO 60 K=1,KSTAT
   60 WST(K)=WST(K)/SUMW
      WRITE(6,70) I,J,(NST(K),WST(K),K=1,4)
   70 FORMAT(1H ,9X,I3,2X,I3,4(5X,I3,2X,F5.5))
      DO 80 K=1,KSTAT
      WS(K,J,I)=WST(K)
   80 NS(K,J,I)=NST(K)
   90 CONTINUE
C
C MULTIPLY THE VALUES OF THE VARIABLE IN THE STATIONS BY THEIR WEIGHTS.
C
  100 NCALL=NCALL+1
      DO 110 I=1,IMAX
      DO 110 J=1,JMAX
      SYN(J,I)=0.
      IF(DEPTH(J,I).LE.0.) GO TO 110
      DO 105 K=1,KSTAT
      N=NS(K,J,I)
  105 SYN(J,I)=SYN(J,I)+WS(K,J,I)*VAR(N)
  110 CONTINUE
      RETURN
      END
```


9/8 0300 hrs


14
12
10
02
04
06
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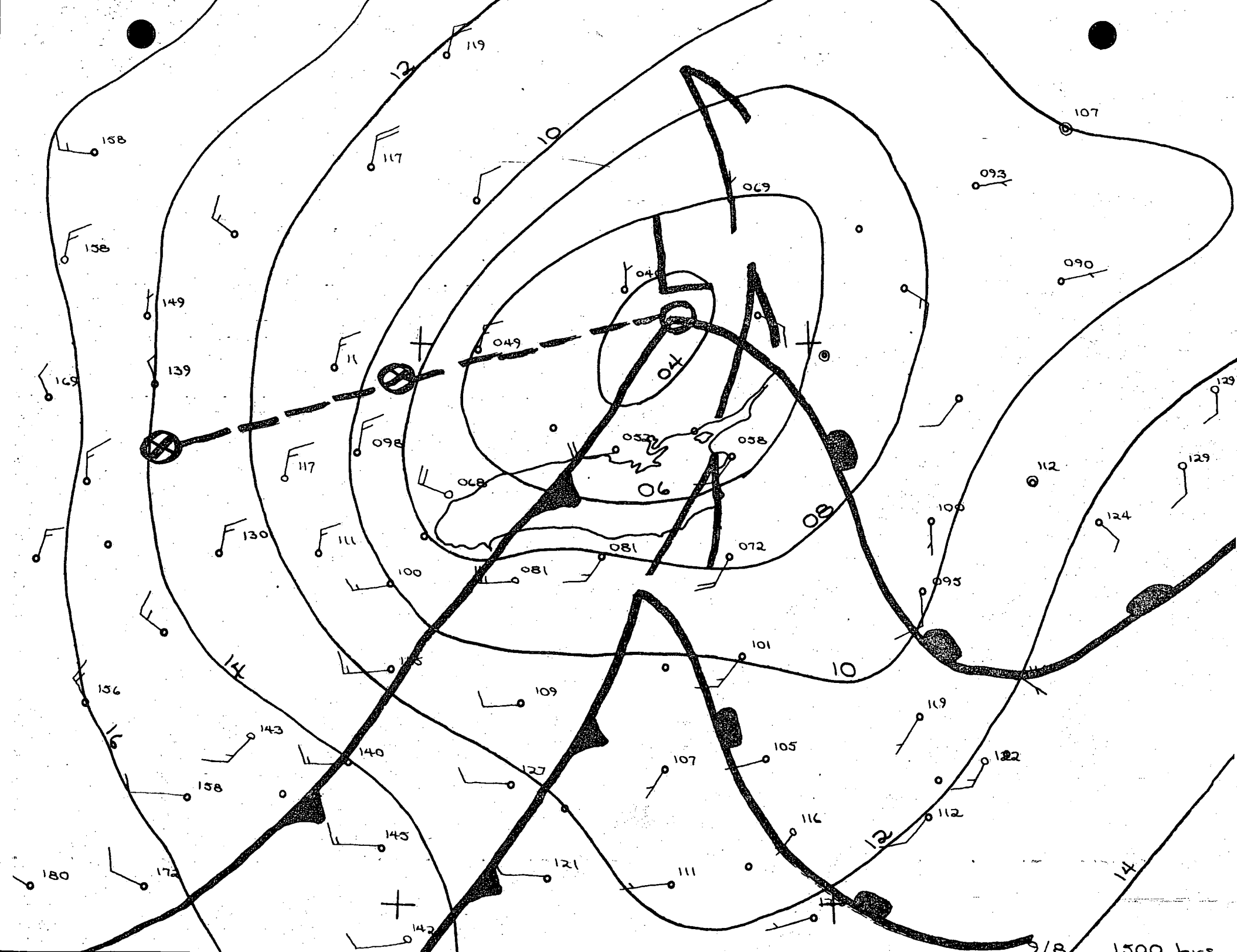
10
12
12
9/8
0900 hrs


12
10
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16
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119
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158
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139
169
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098
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100
156
143
140
158
145
180
172
142
069
049
068
052
058
081
081
072
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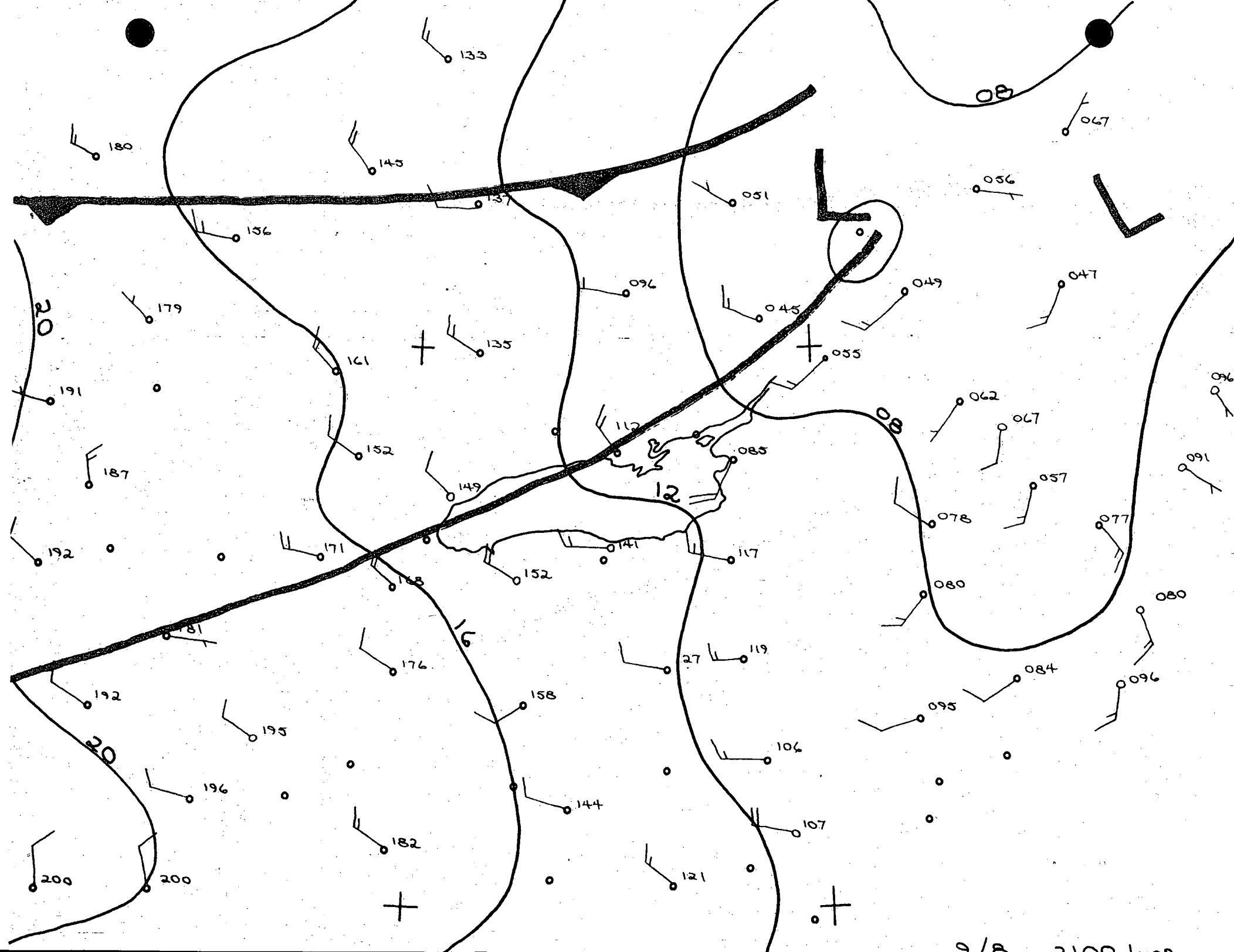
122
112
119


133
180
145
137
156
051
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067
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047
045
179
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161
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191
062
067
096
08
112
085
152
187
149
12
057
091
078
077
192
171
141
117
168
152
080
080
181
16
176
27
119
084
096
192
158
095
195
106
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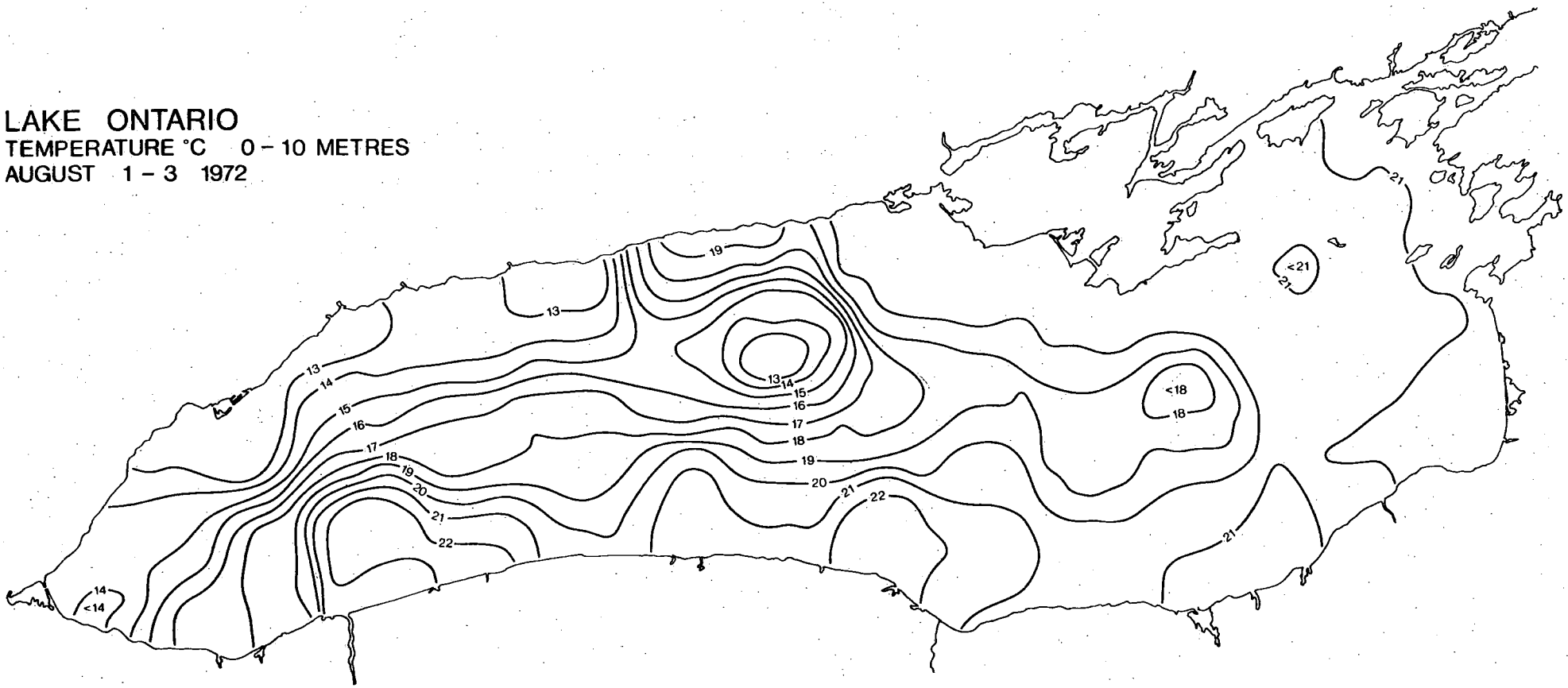
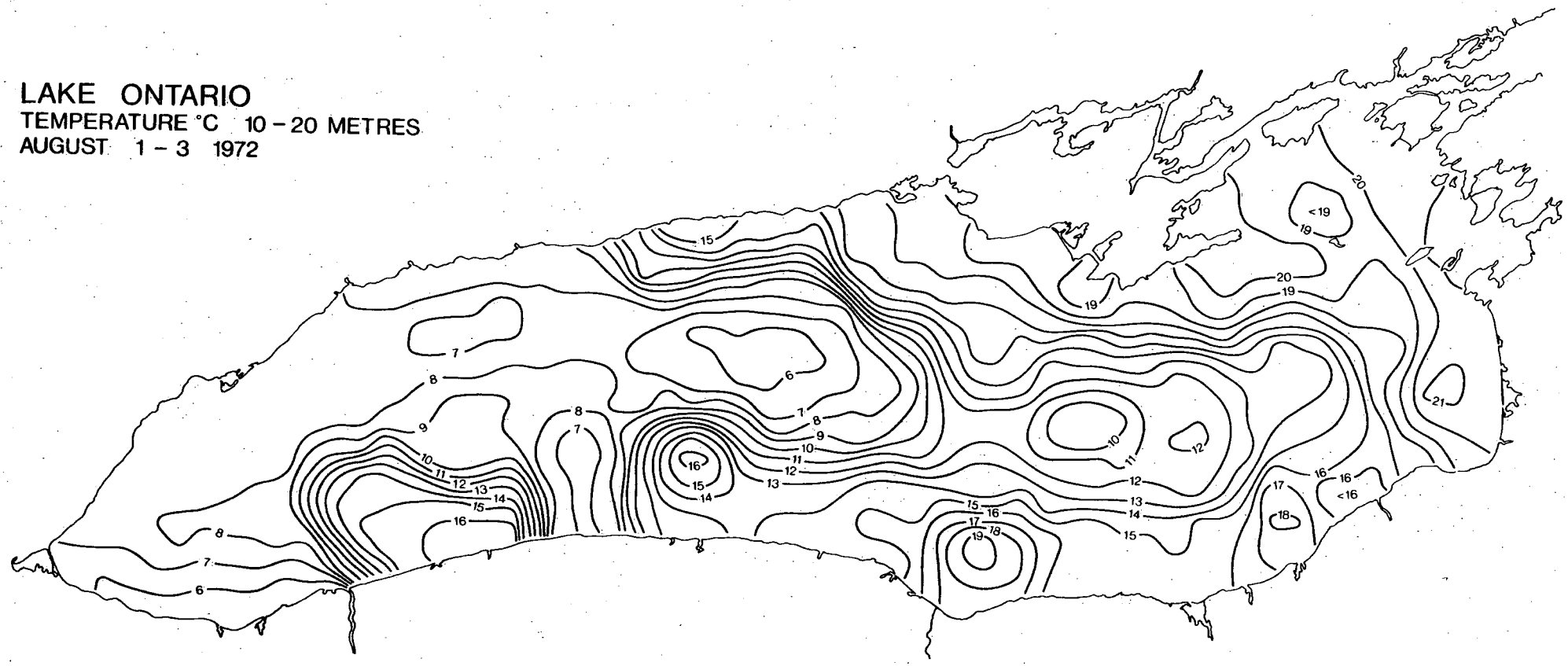
196
144
107
182
121
200
200

LAKE ONTARIO
TEMPERATURE °C 0 – 10 METRES
AUGUST 1 – 3 1972

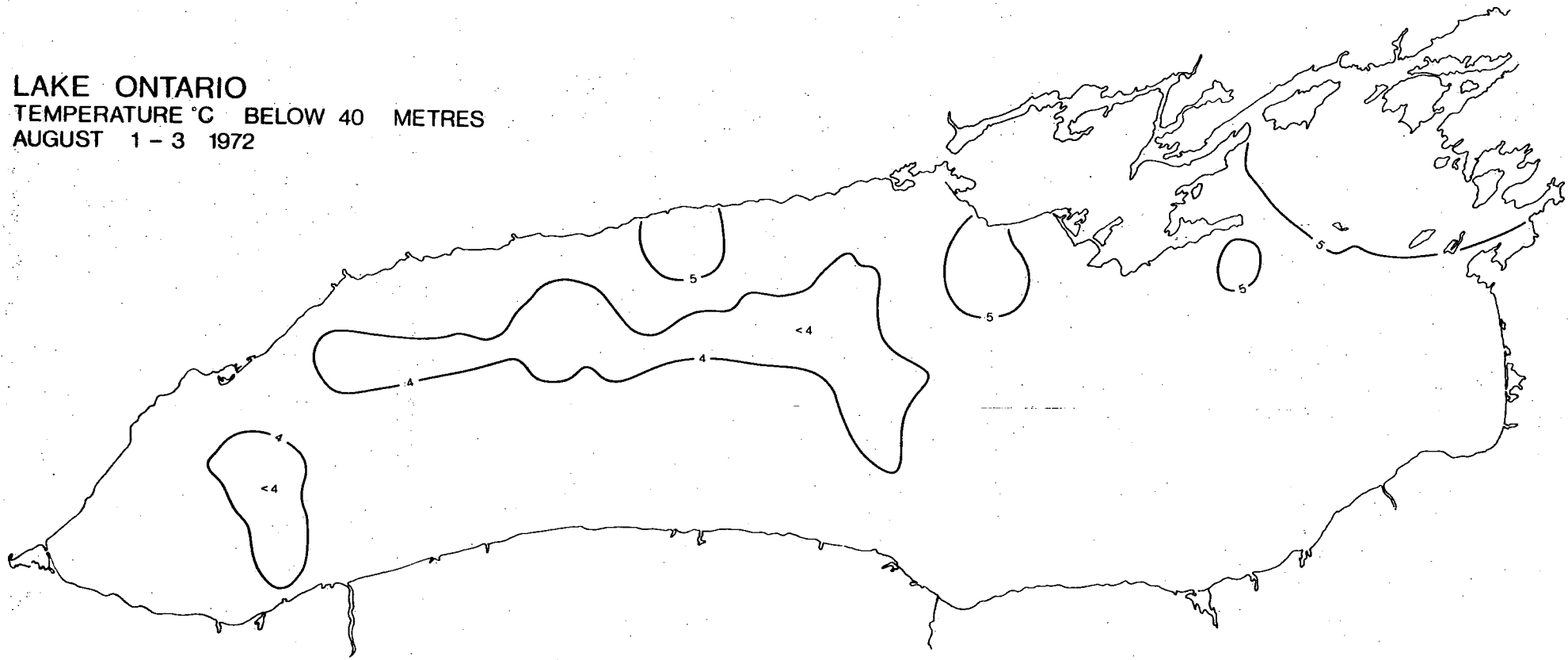


LAKE ONTARIO
TEMPERATURE °C 10 – 20 METRES
AUGUST 1 – 3 1972

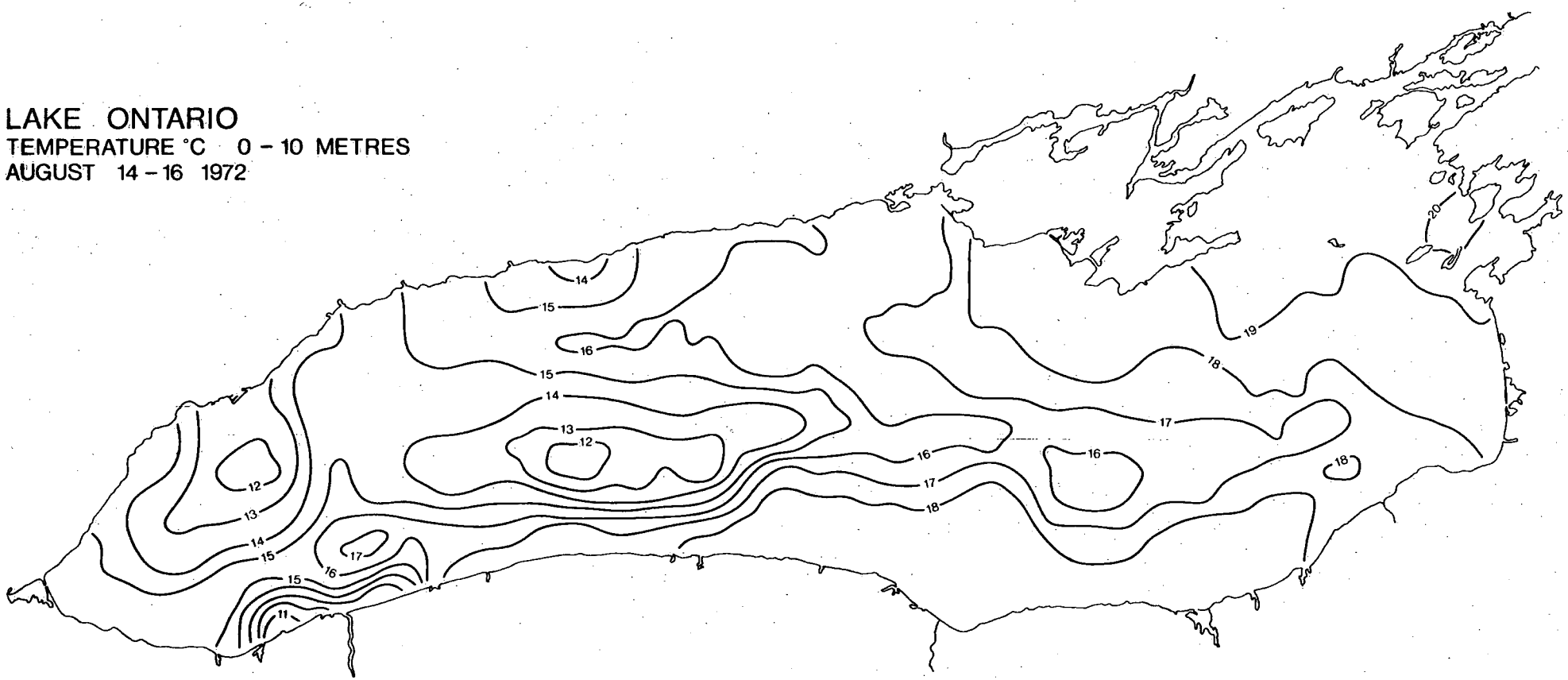


LAKE ONTARIO
TEMPERATURE °C 20 - 40 METRES
AUGUST 1 - 3 1972

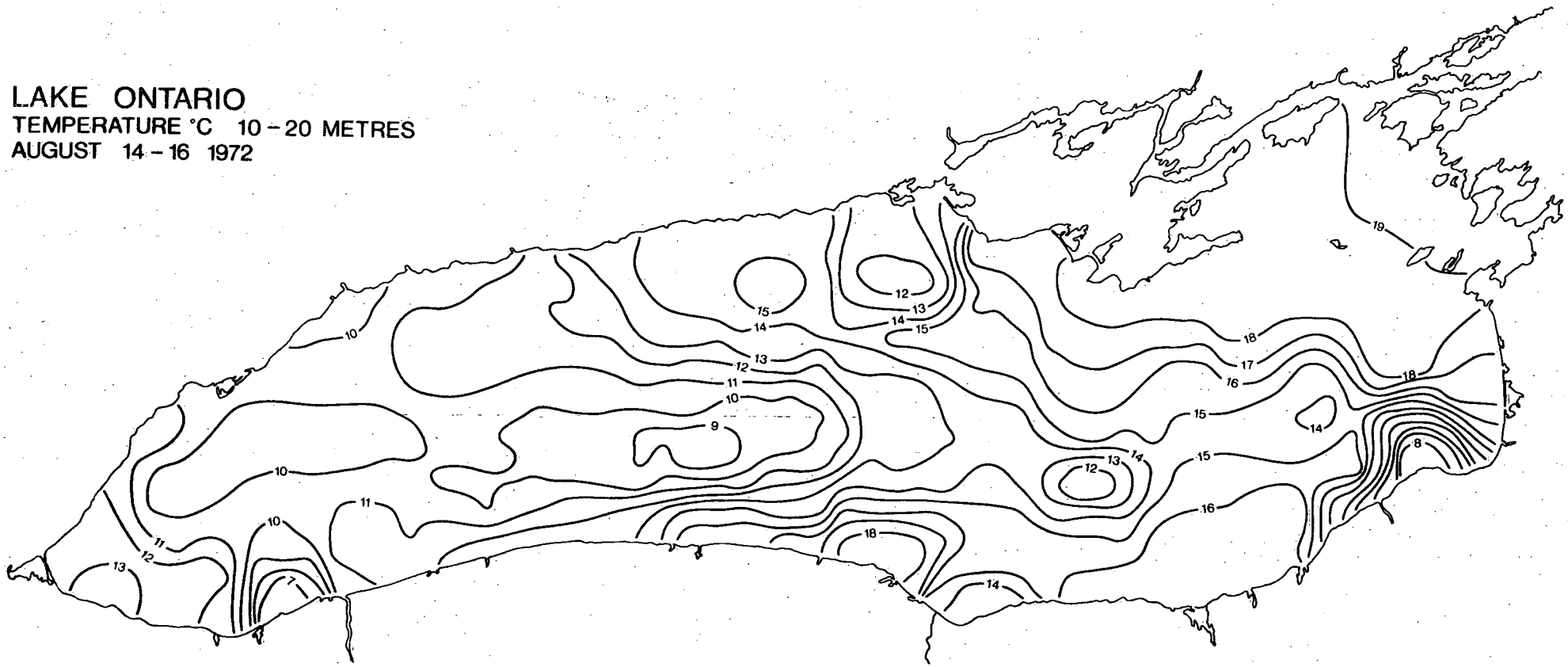
LAKE ONTARIO
TEMPERATURE °C BELOW 40 METRES
AUGUST 1 – 3 1972



LAKE ONTARIO
TEMPERATURE °C 0 – 10 METRES
AUGUST 14 – 16 1972

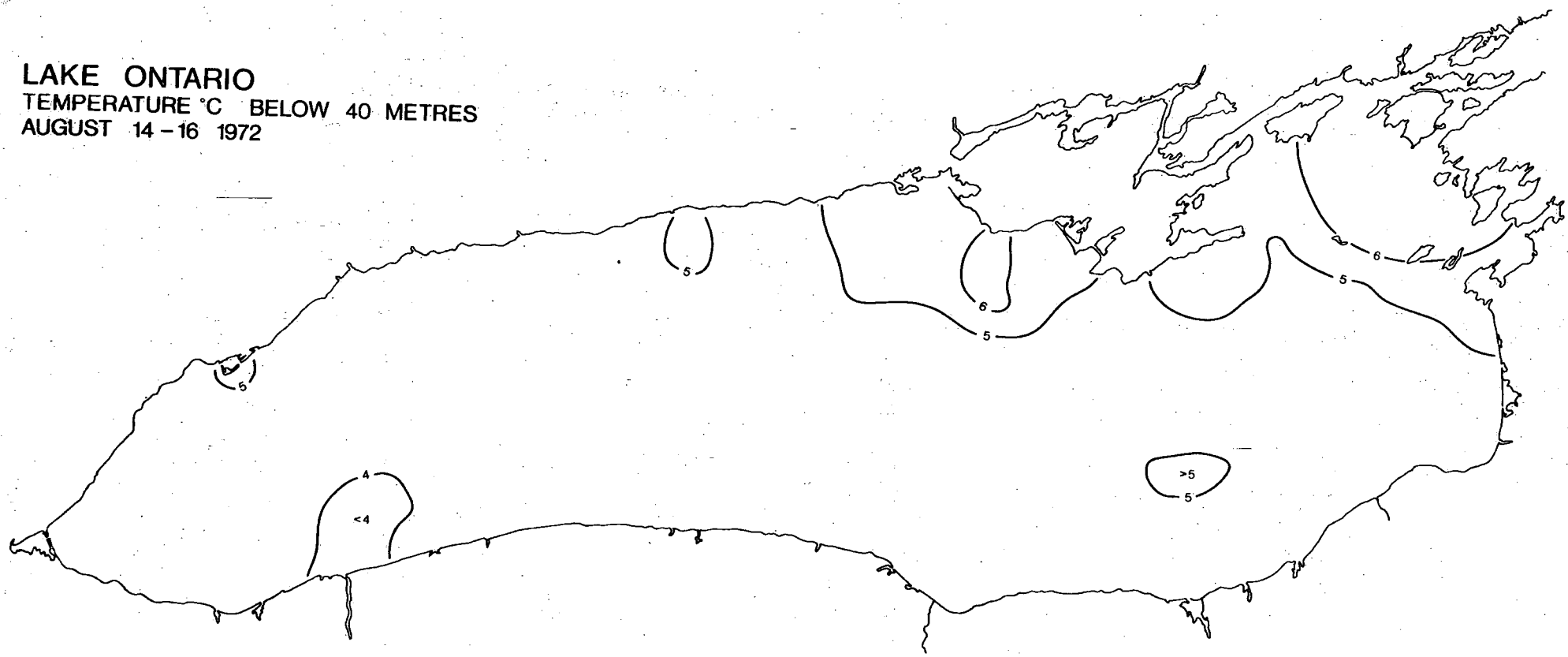


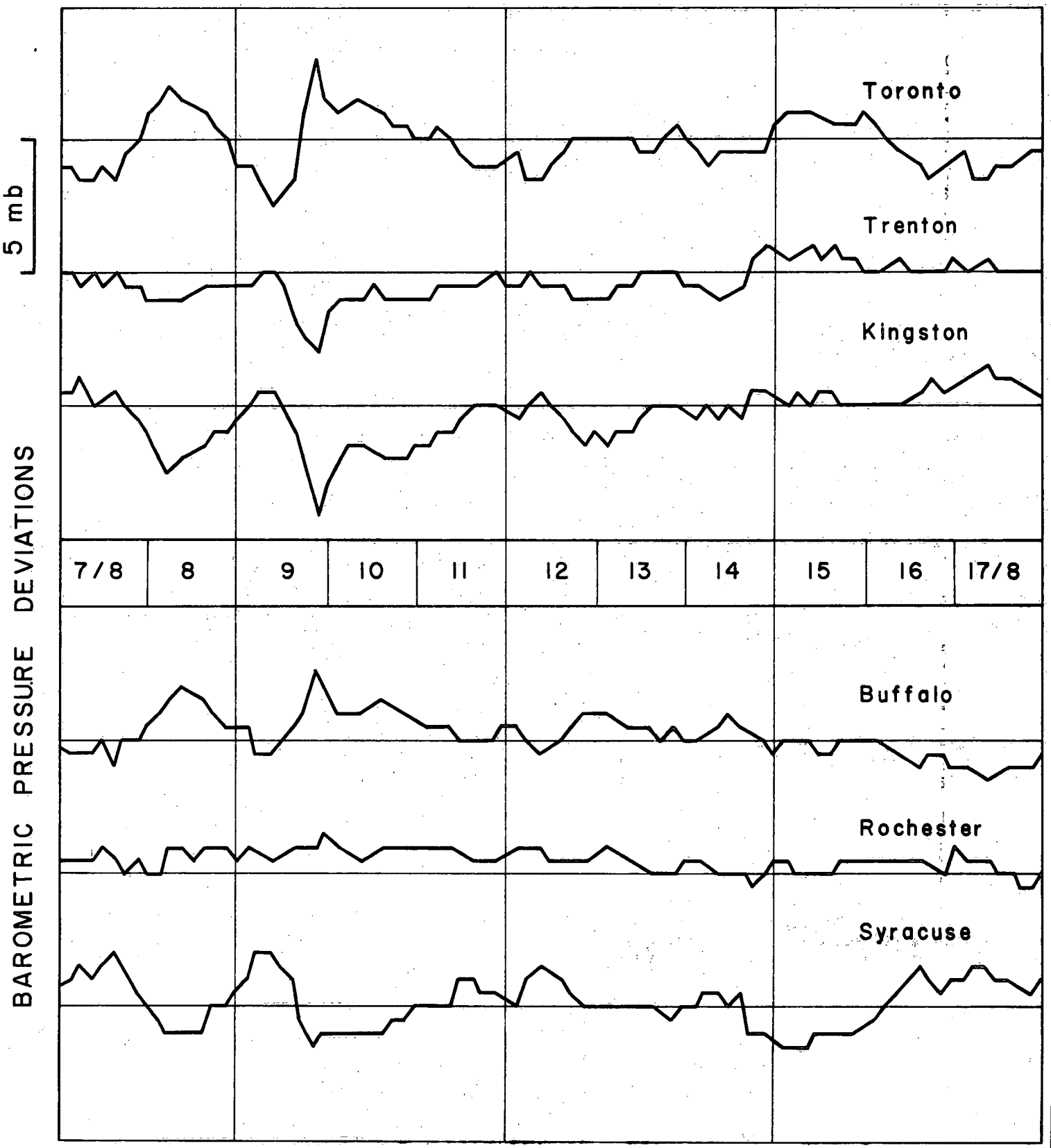
LAKE ONTARIO
TEMPERATURE °C 10 – 20 METRES
AUGUST 14 – 16 1972

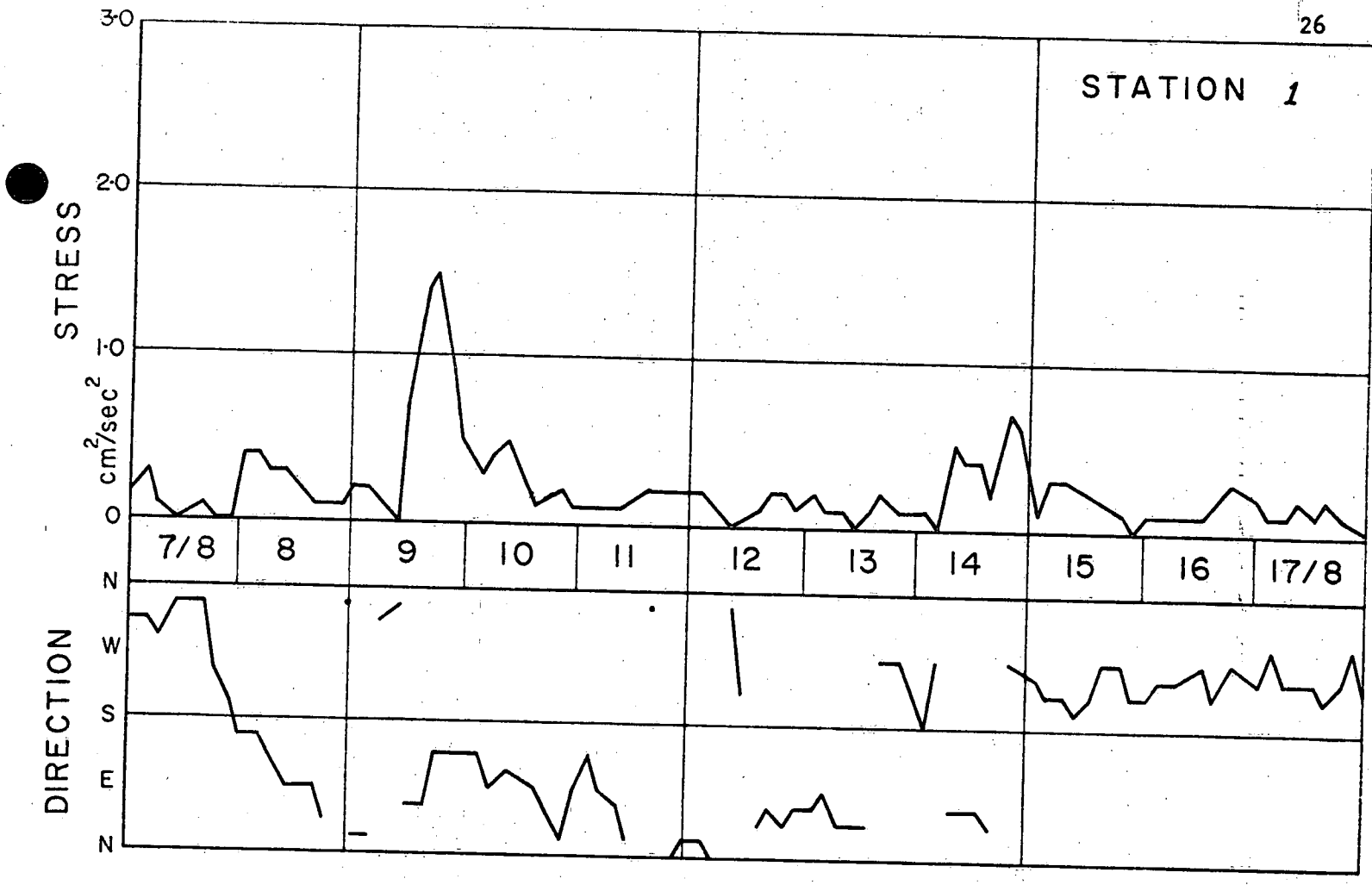


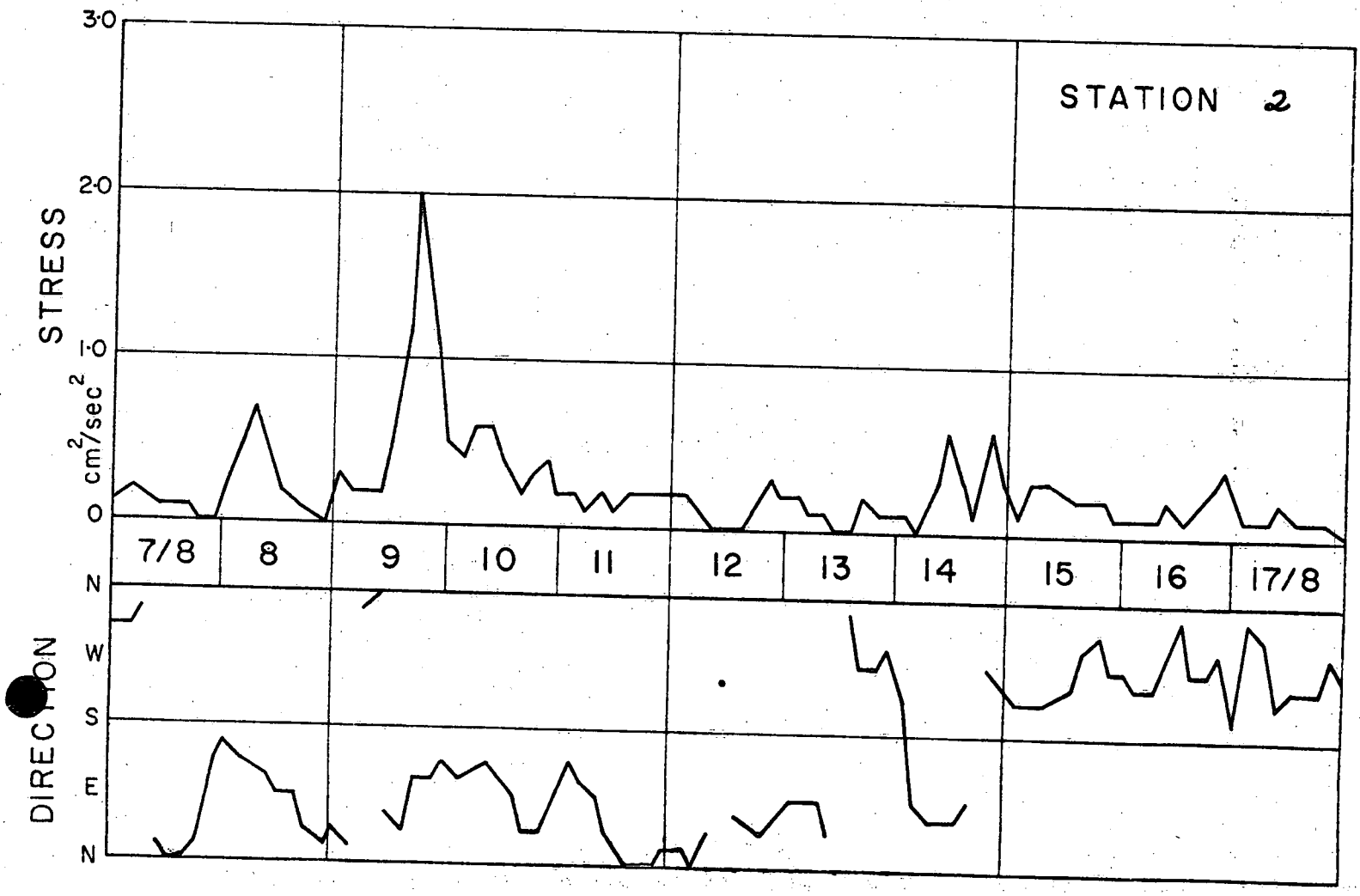
LAKE ONTARIO
TEMPERATURE °C 20 – 40 METRES
AUGUST 14 – 16 1972

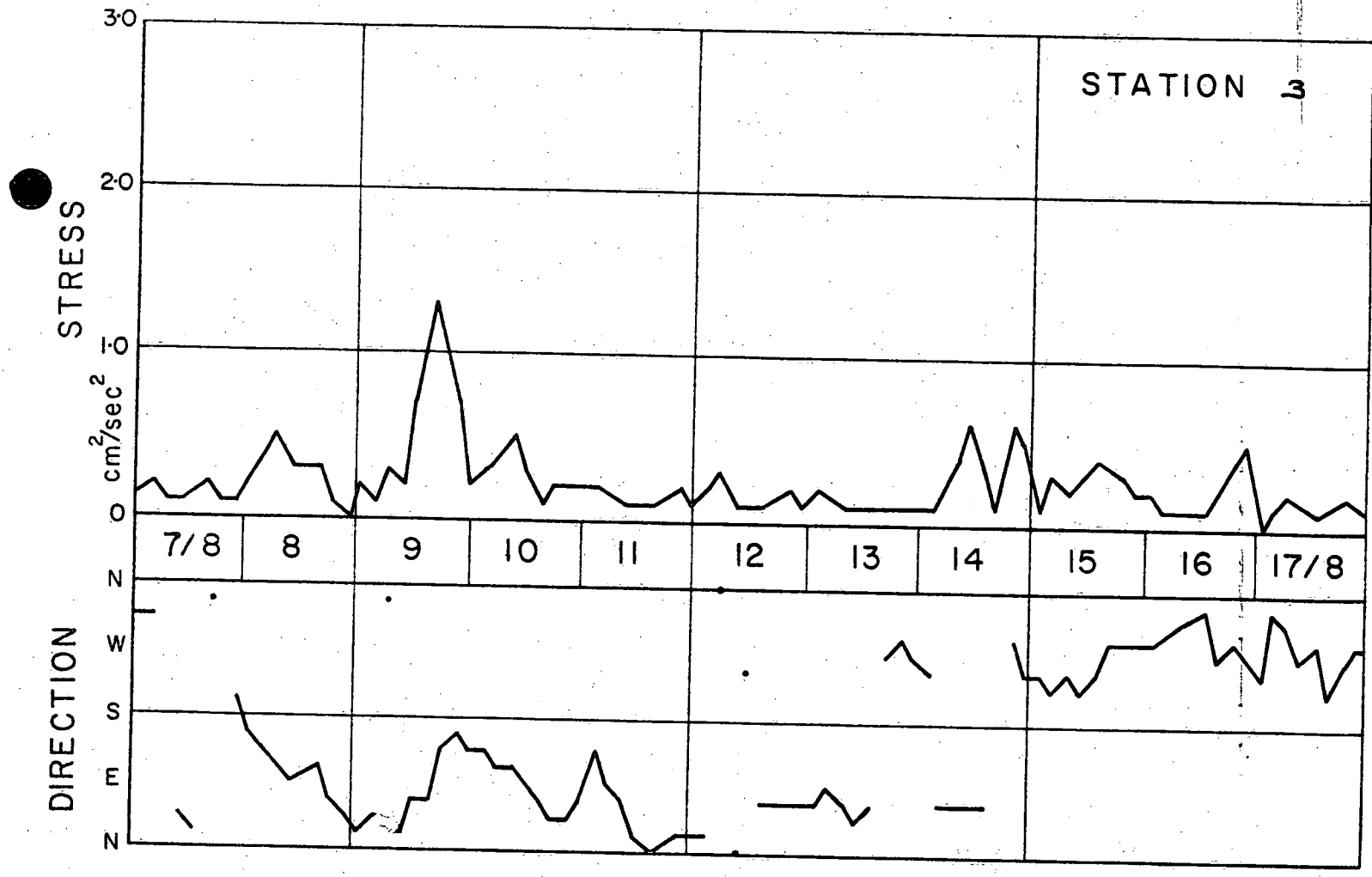
LAKE ONTARIO
TEMPERATURE °C BELOW 40 METRES
AUGUST 14 – 16 1972

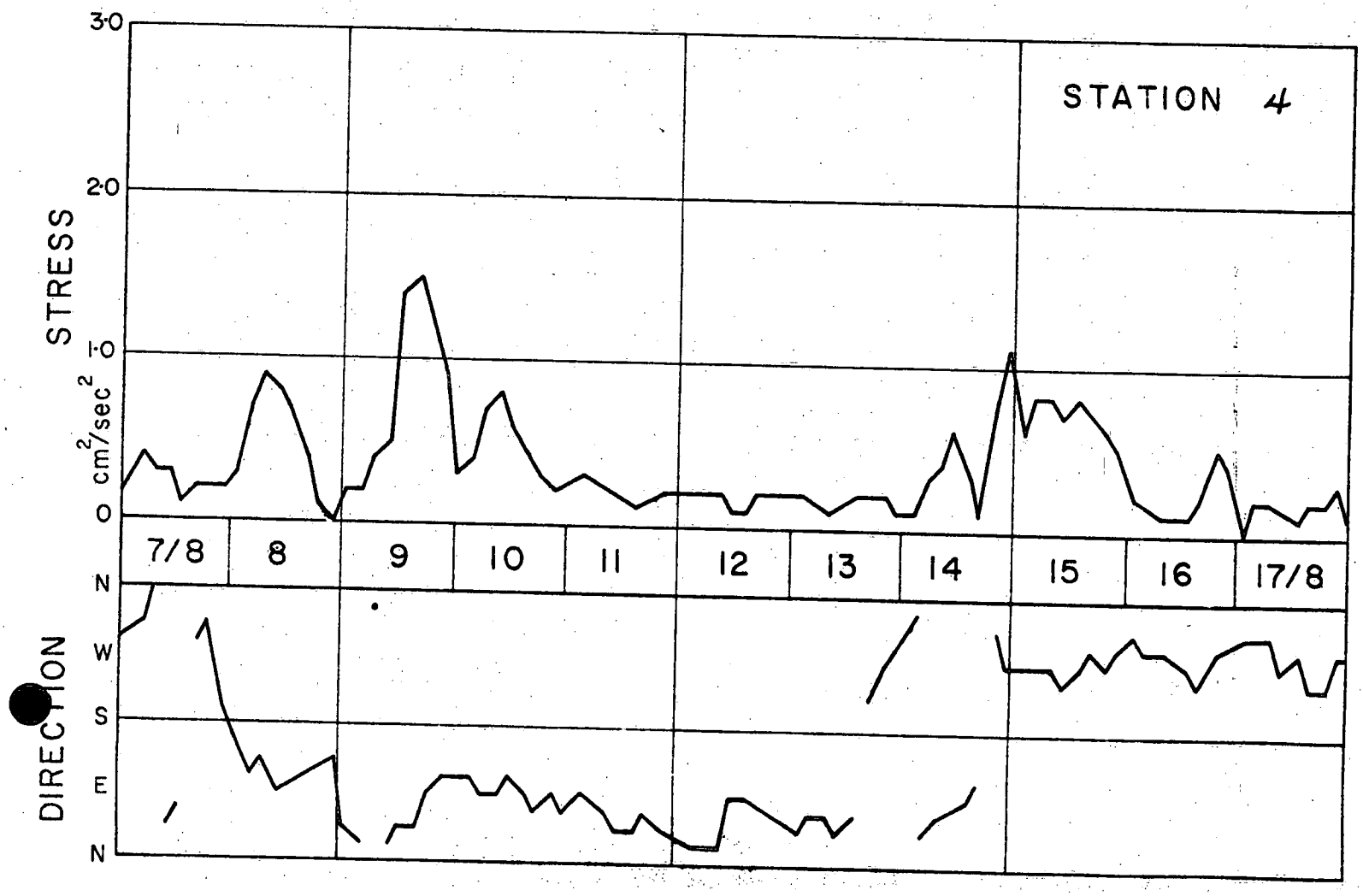


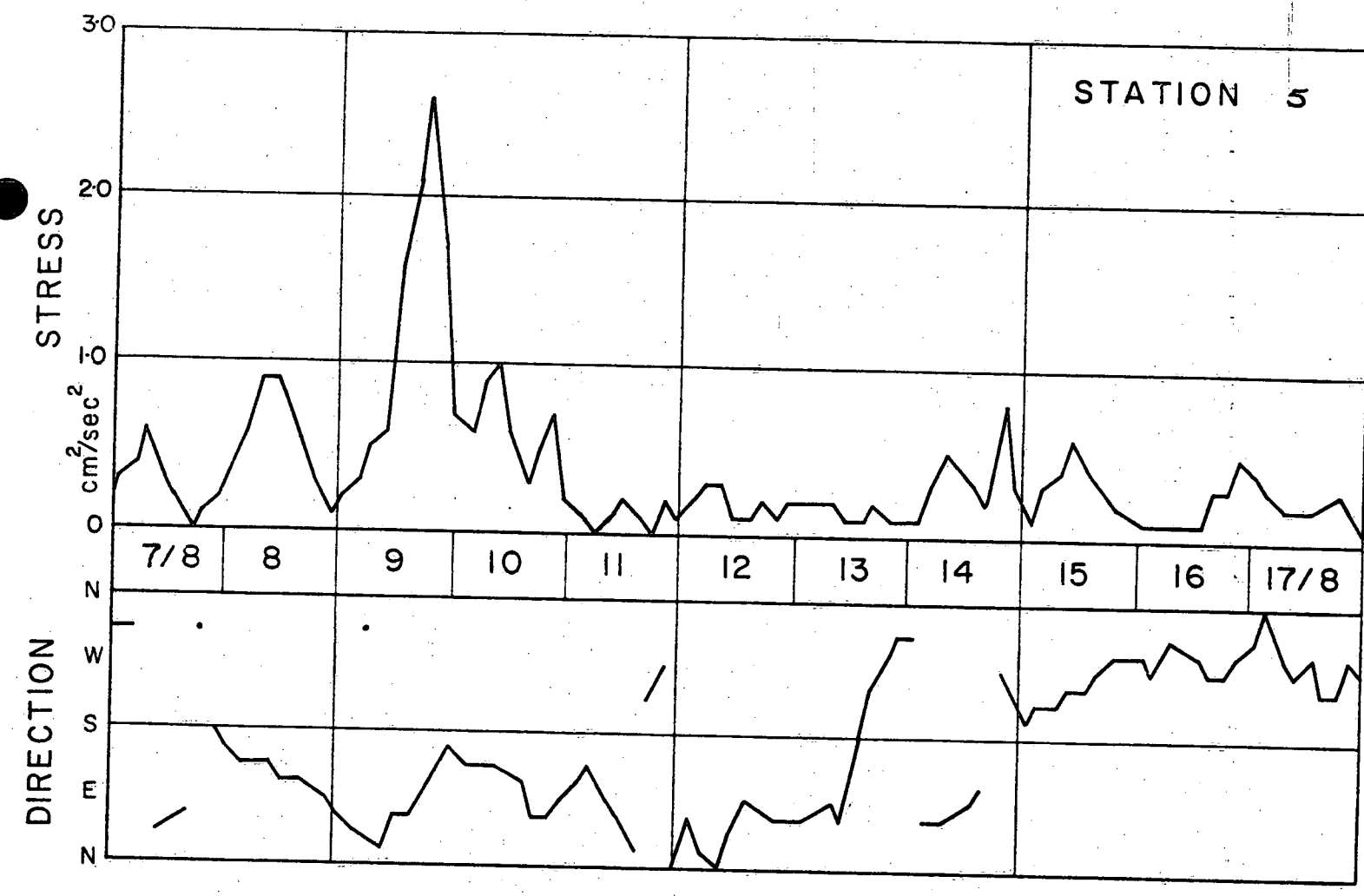

5 mb
BAROMETRIC PRESSURE DEVIATIONS
Toronto
Trenton
Kingston
7/8
8
9
10
11
12
13
14
15
16
17/8
Buffalo
Rochester
Syracuse

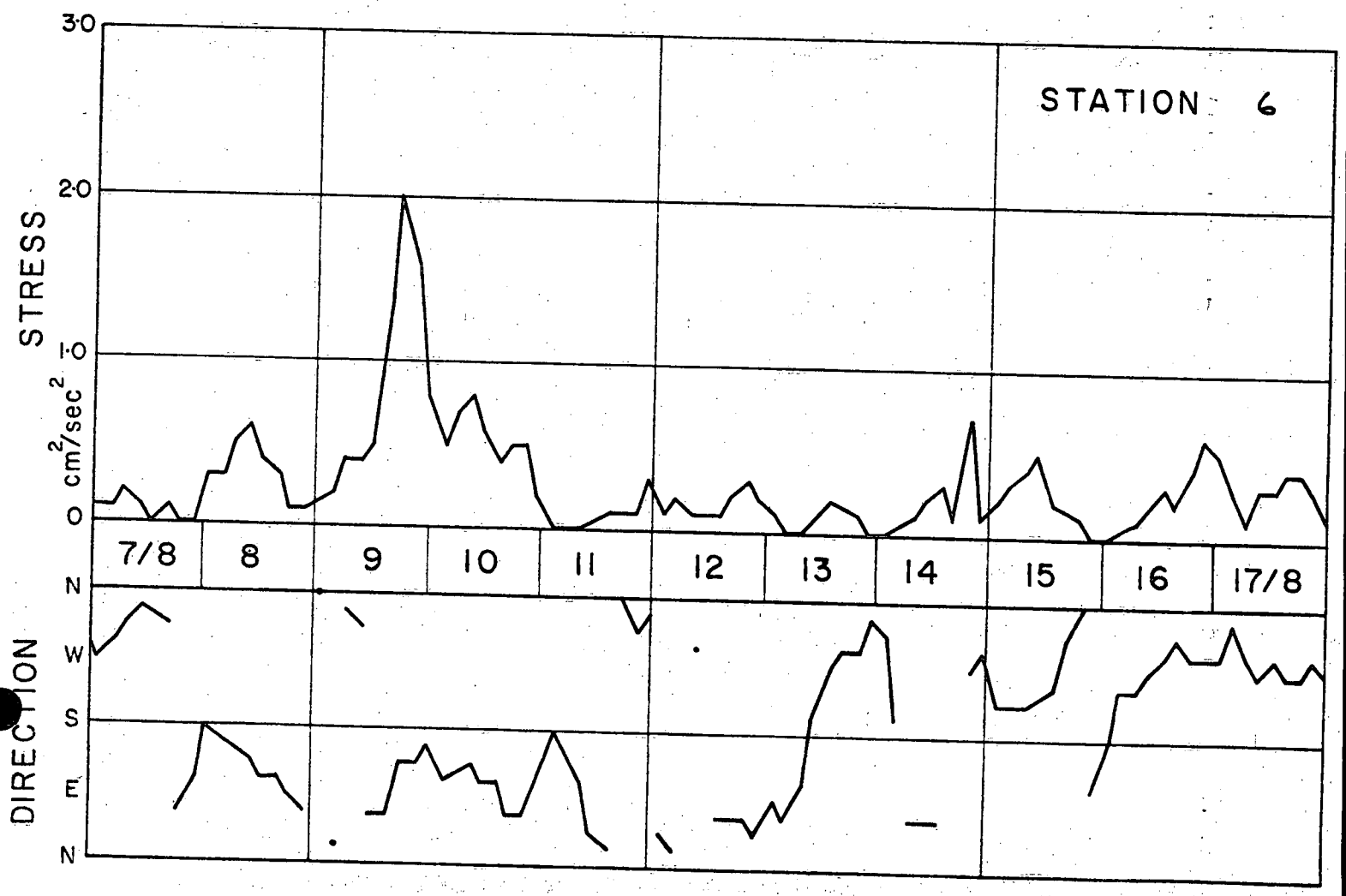

STATION 1
STRESS
cm²/sec²
3·0
2·0
1·0
0
7/8
8
9
10
11
12
13
14
15
16
17/8
DIRECTION
N
W
S
E
N

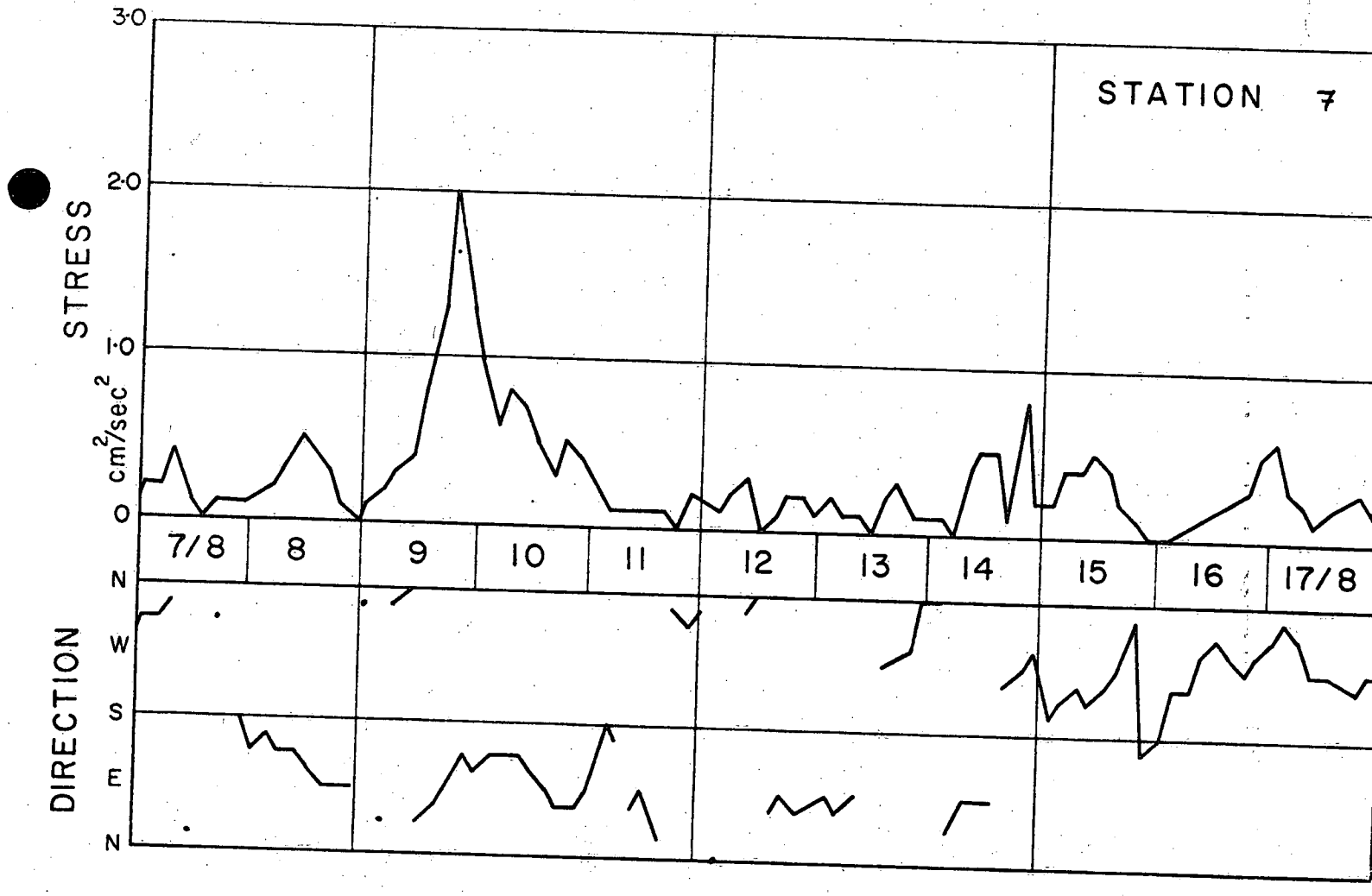

STATION 2
STRESS
cm²/sec²
3·0
2·0
1·0
0
7/8
8
9
10
11
12
13
14
15
16
17/8
DIRECTION
N
W
S
E
N

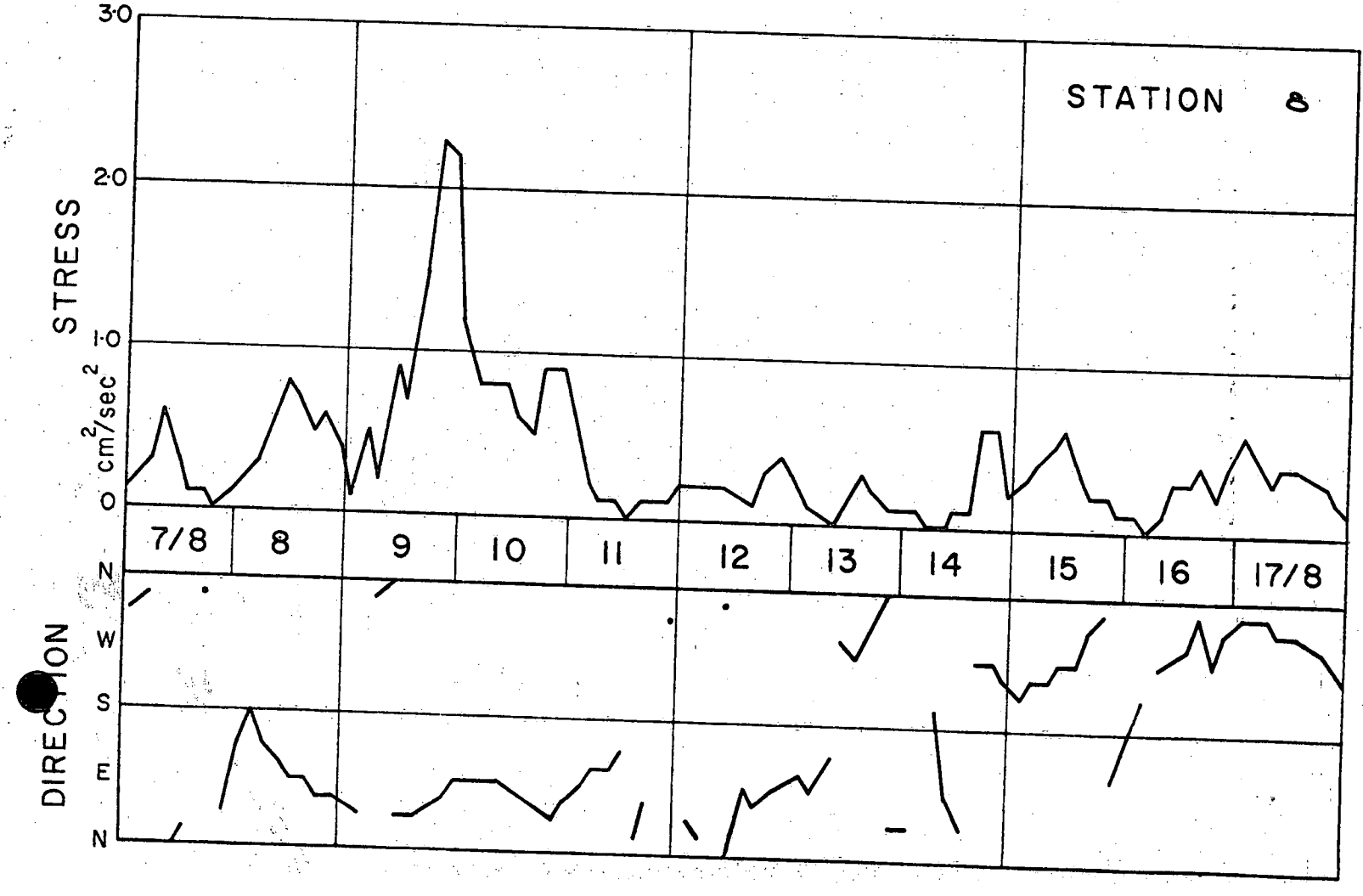

STATION 3
STRESS
cm²/sec²
3·0
2·0
1·0
0
7/8
8
9
10
11
12
13
14
15
16
17/8
DIRECTION
N
W
S
E
N

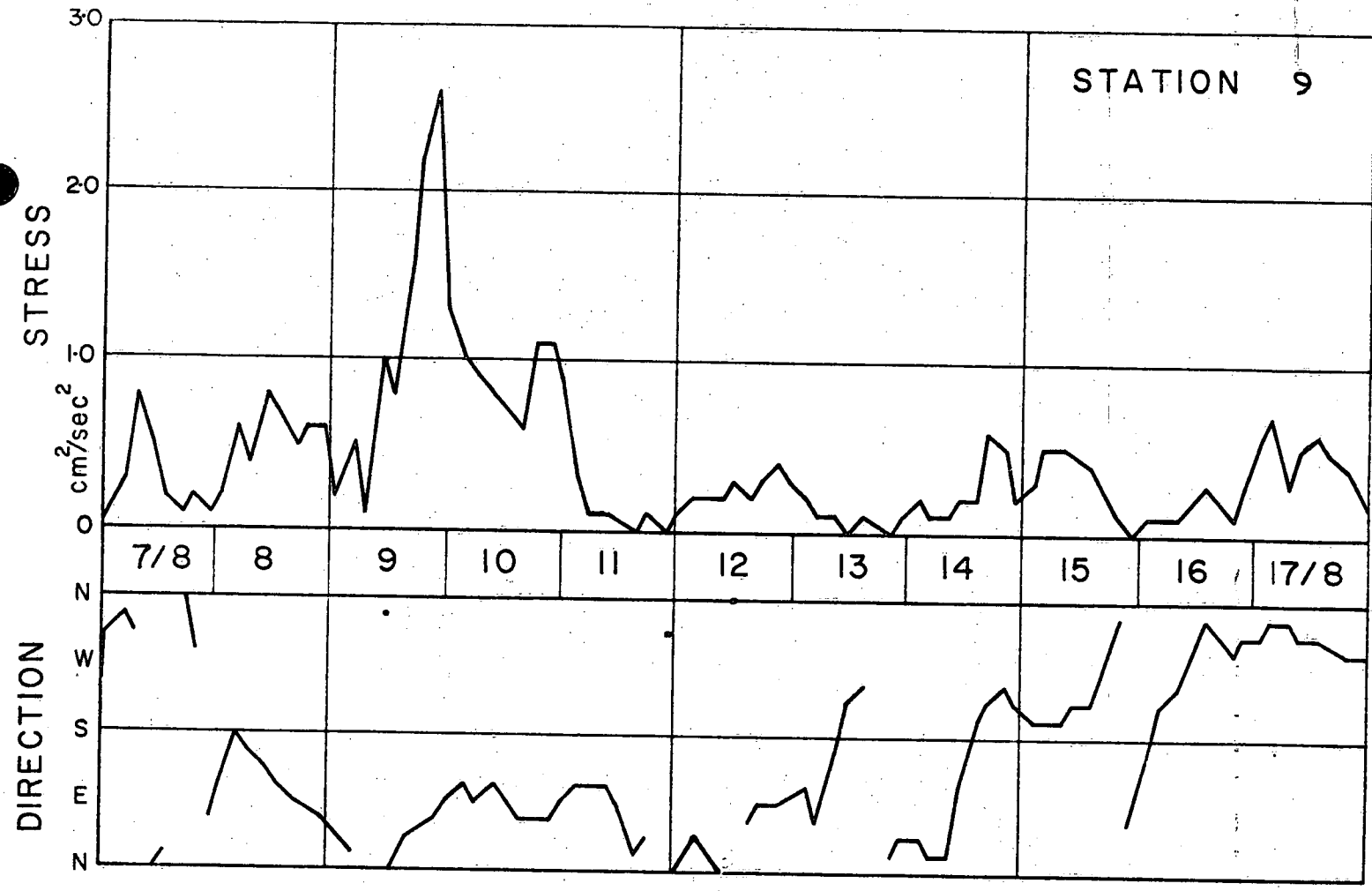

STATION 4
STRESS
cm²/sec²
3·0
2·0
1·0
0
7/8
8
9
10
11
12
13
14
15
16
17/8
DIRECTION
N
W
S
E
N

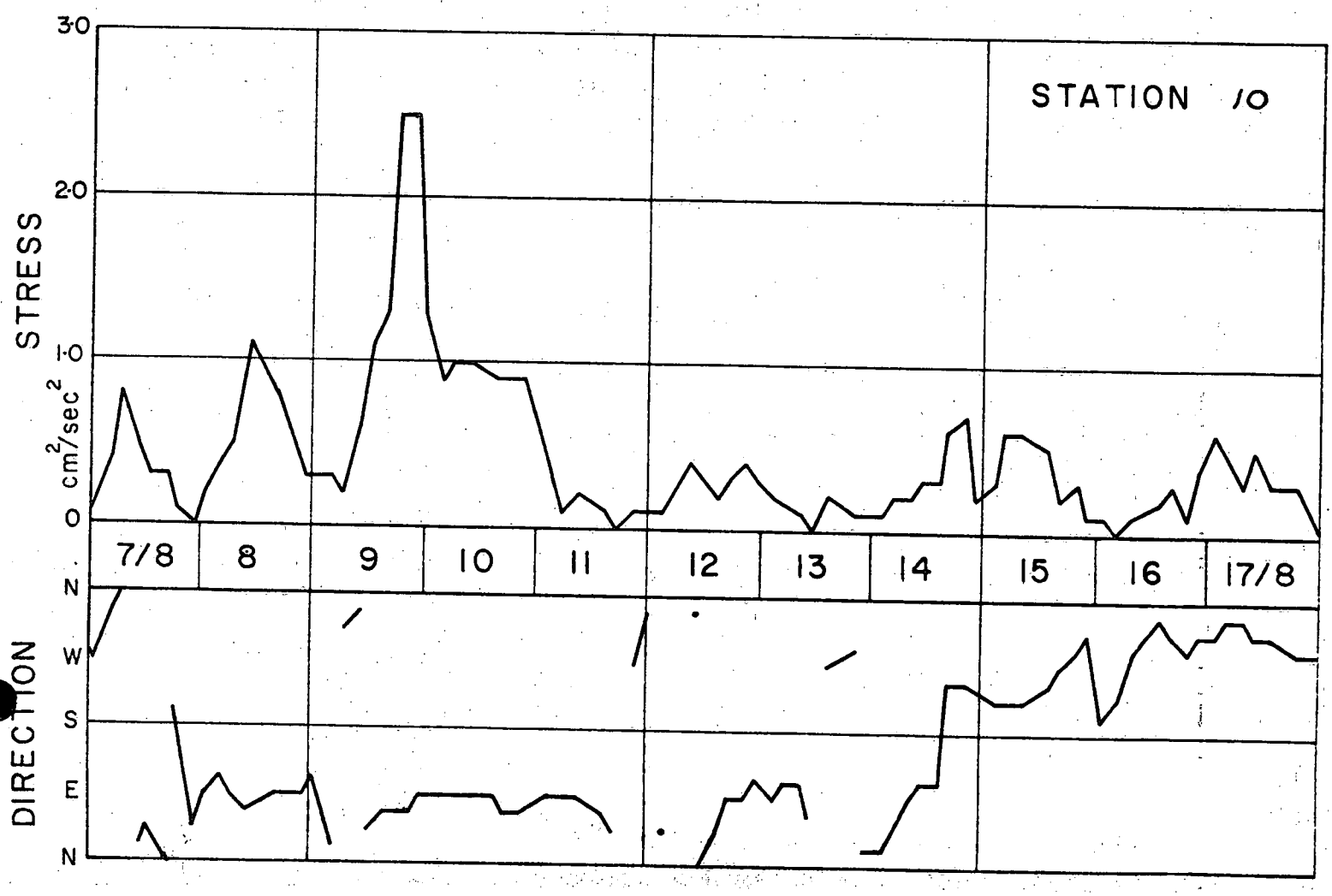

STATION 5
STRESS
cm²/sec²
3·0
2·0
1·0
0
7/8
8
9
10
11
12
13
14
15
16
17/8
DIRECTION
N
W
S
E
N

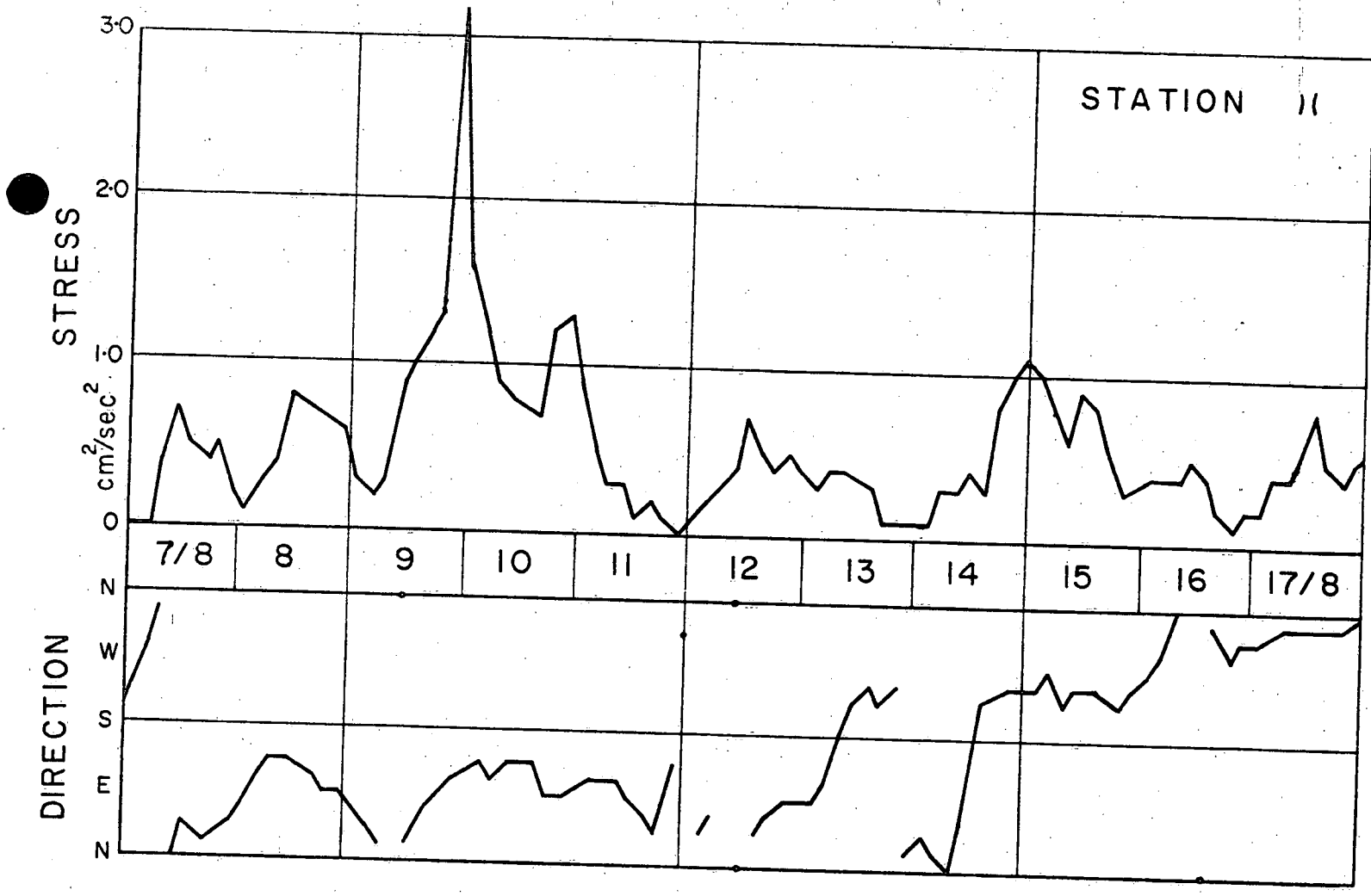

STATION 6
STRESS
cm²/sec²
3·0
2·0
1·0
0
7/8
8
9
10
11
12
13
14
15
16
17/8
DIRECTION
N
W
S
E
N

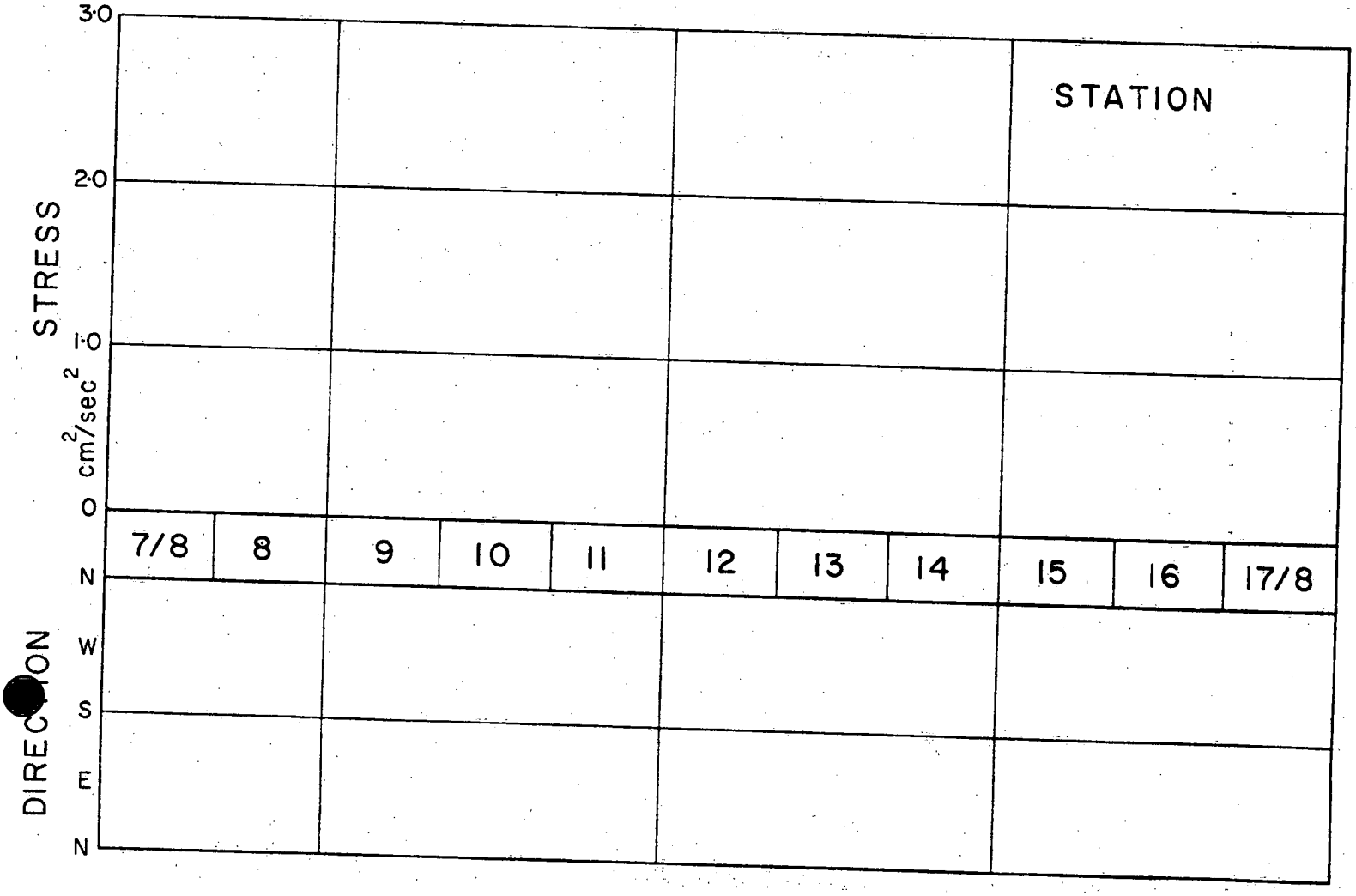

STATION 7
STRESS
cm²/sec²
3·0
2·0
1·0
0
7/8
8
9
10
11
12
13
14
15
16
17/8
DIRECTION
N
W
S
E
N

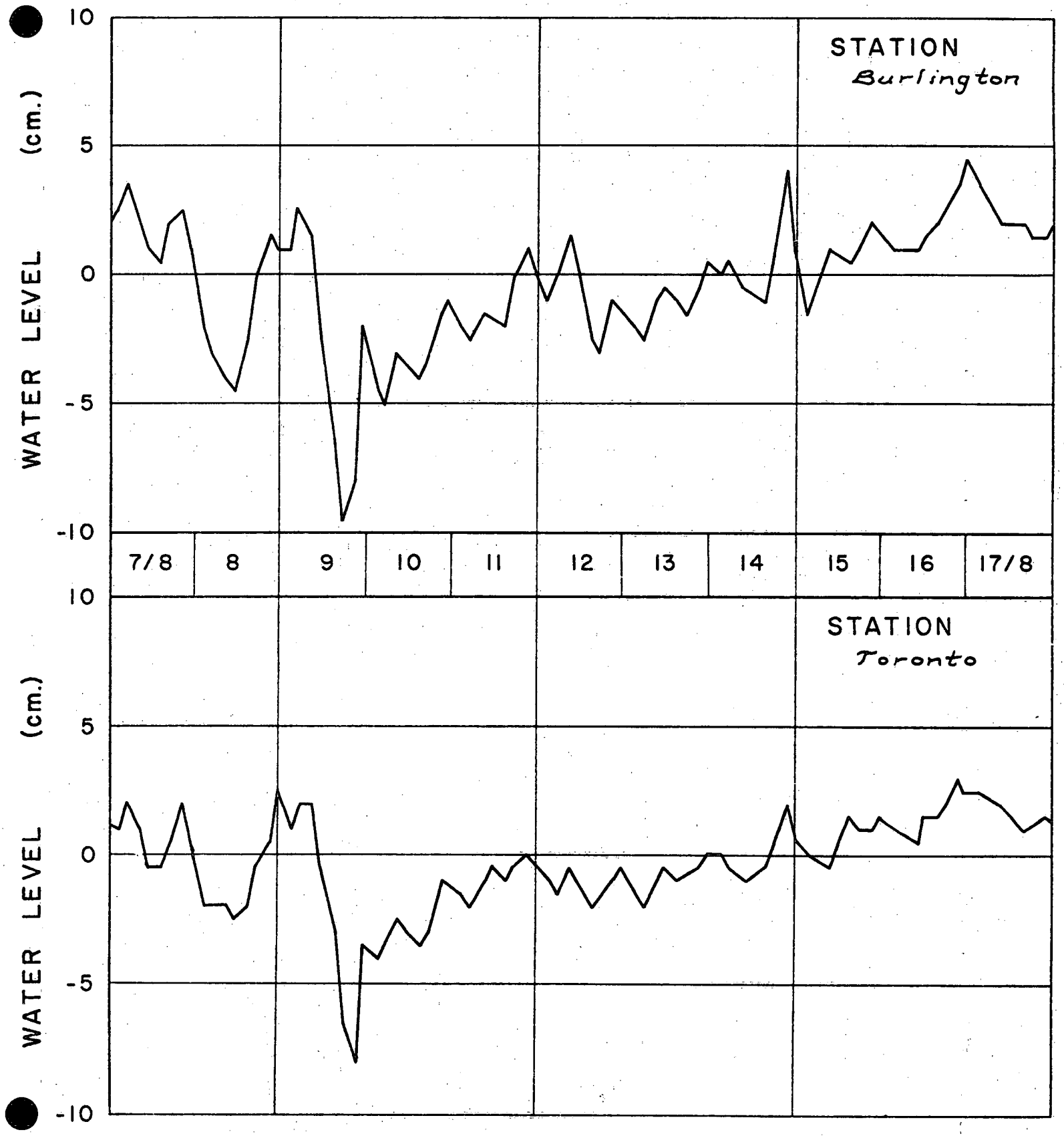

STATION 8
STRESS
cm²/sec²
3·0
2·0
1·0
0
7/8
8
9
10
11
12
13
14
15
16
17/8
DIRECTION
N
W
S
E
N

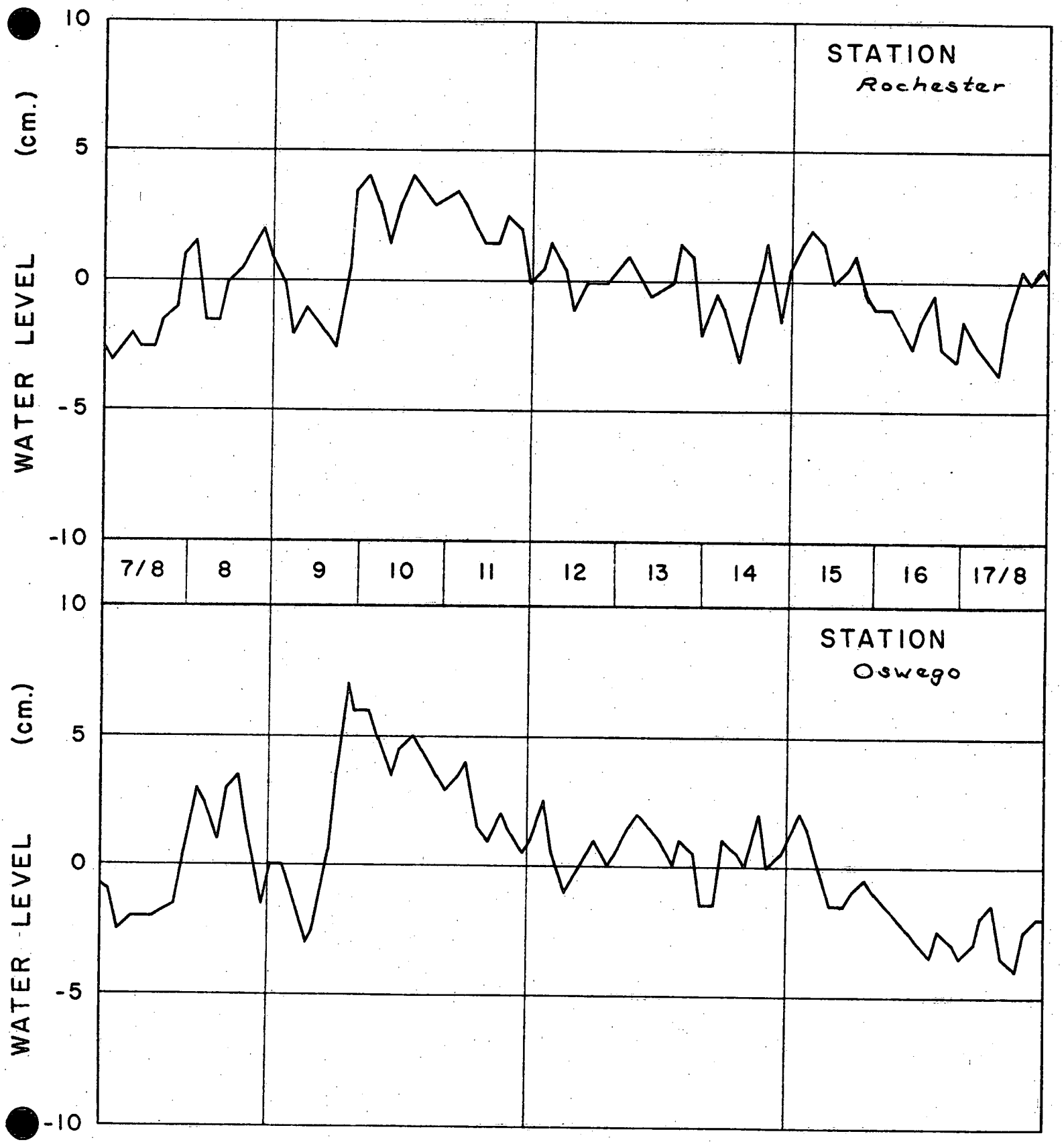

STATION 9
STRESS
cm²/sec²
3·0
2·0
1·0
0
7/8
8
9
10
11
12
13
14
15
16
17/8
DIRECTION
N
W
S
E
N

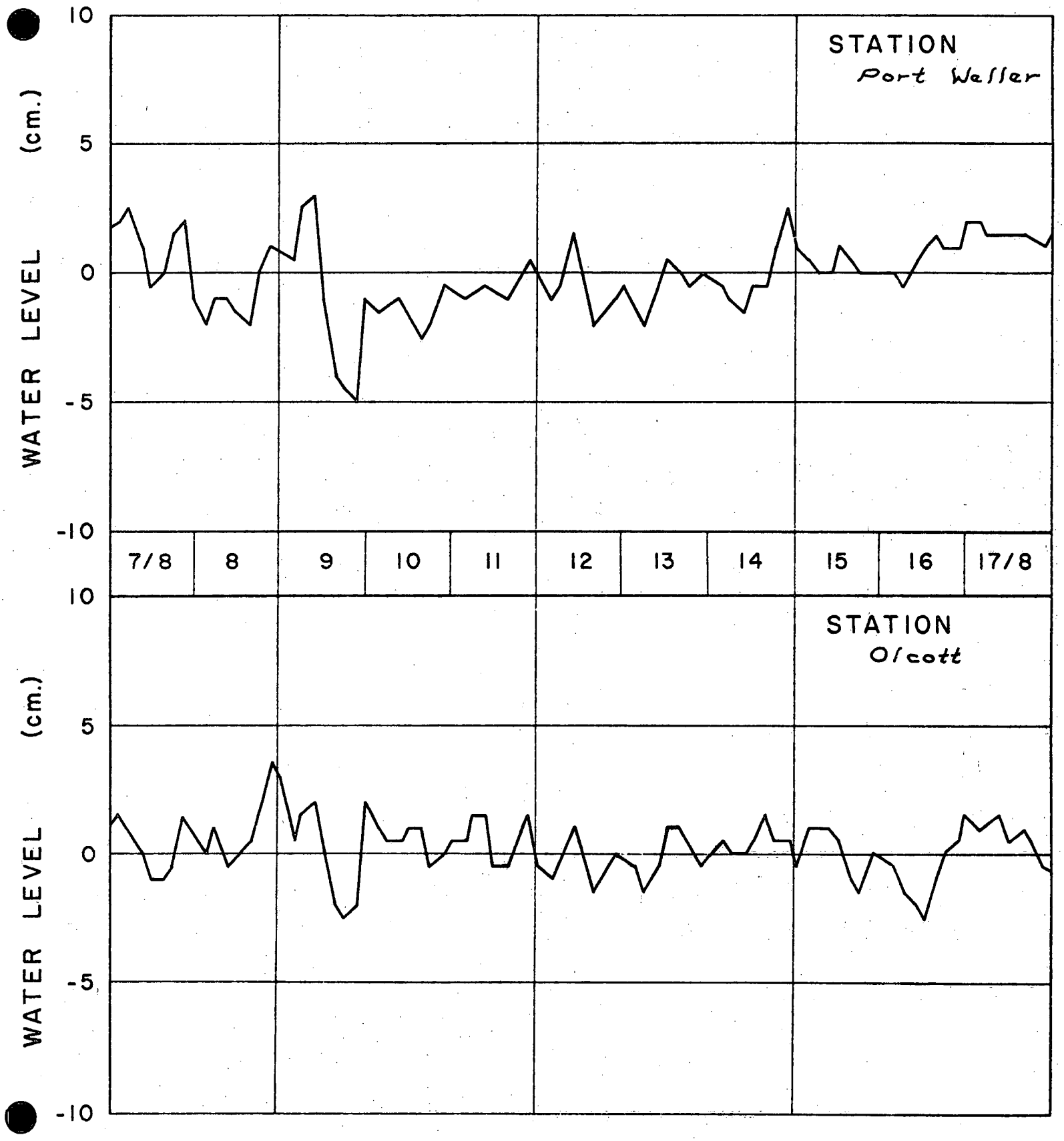

STATION 10
STRESS
cm²/sec²
3·0
2·0
1·0
0
7/8
8
9
10
11
12
13
14
15
16
17/8
DIRECTION
N
W
S
E
N

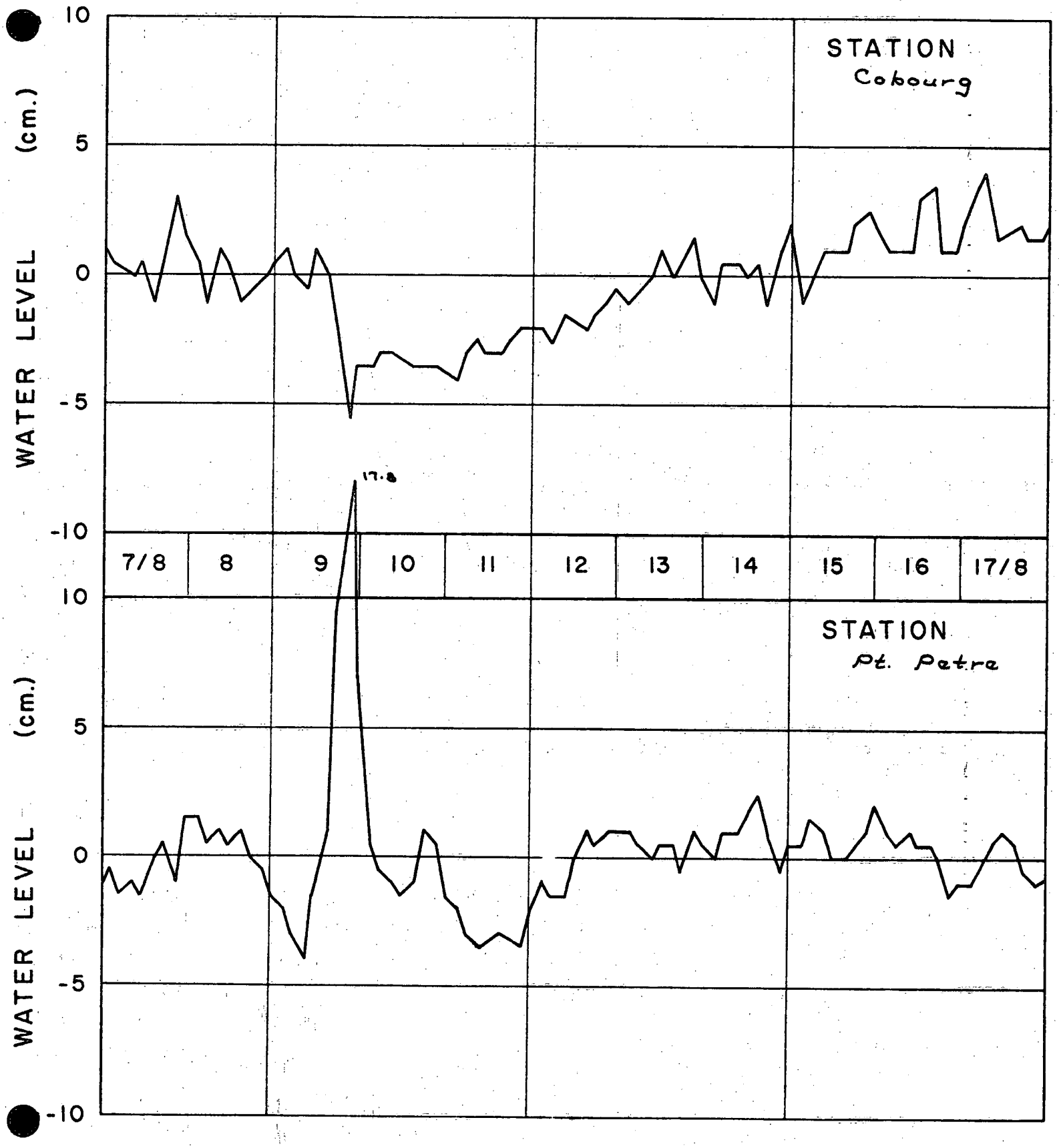

STATION 11
STRESS
cm²/sec²
3·0
2·0
1·0
0
7/8
8
9
10
11
12
13
14
15
16
17/8
DIRECTION
N
W
S
E
N


STATION
STRESS
cm²/sec²
3·0
2·0
1·0
0
7/8
8
9
10
11
12
13
14
15
16
17/8
DIRECTION
N
W
S
E
N

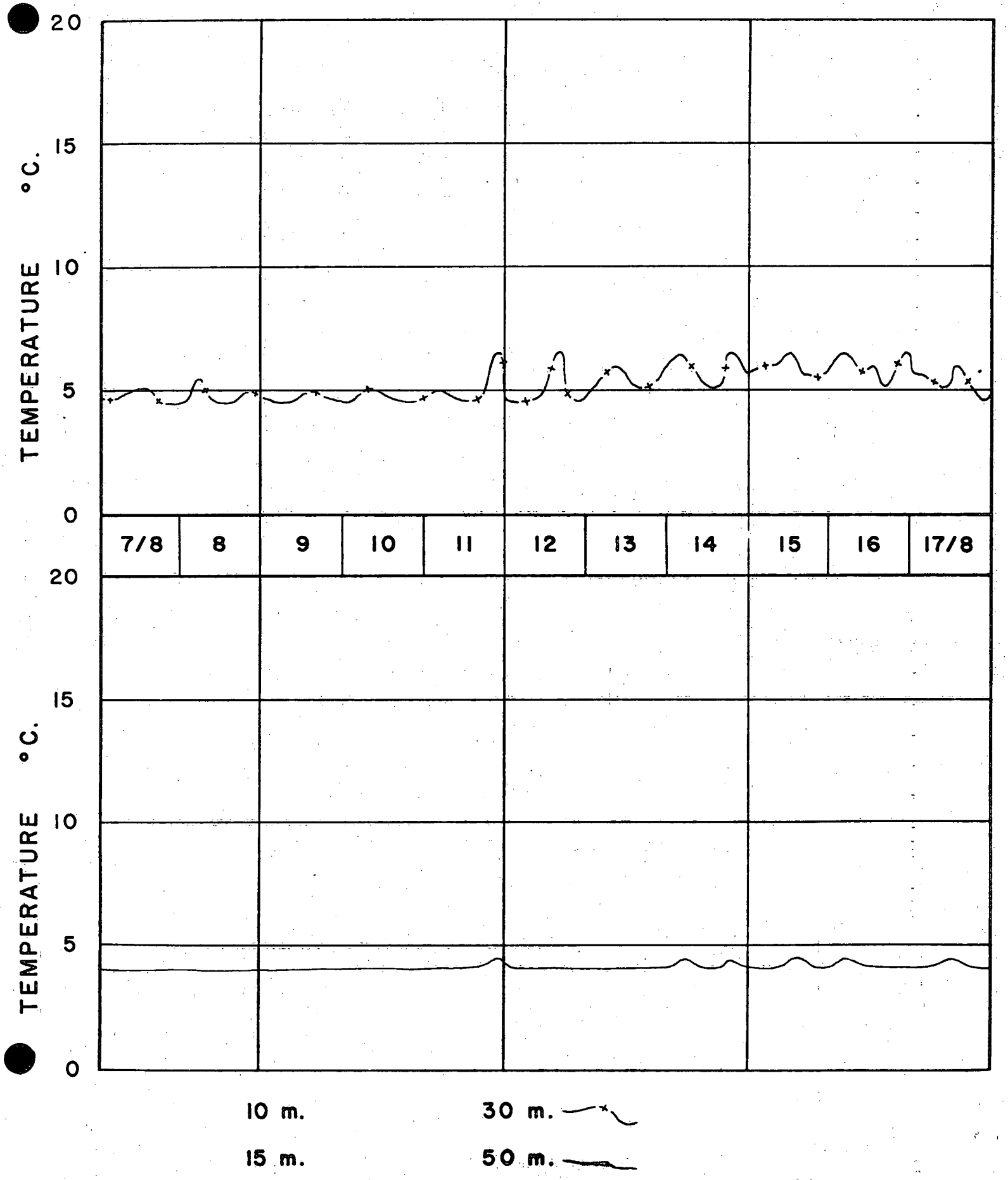

STATION
Burlington
WATER LEVEL (cm.)
10
5
0
-5
-10
7/8
8
9
10
11
12
13
14
15
16
17/8
STATION
Toronto
WATER LEVEL (cm.)
10
5
0
-5
-10


STATION
Rochester
WATER LEVEL (cm.)
10
5
0
-5
-10
7/8
8
9
10
11
12
13
14
15
16
17/8
STATION
Oswego
WATER LEVEL (cm.)
10
5
0
-5
-10

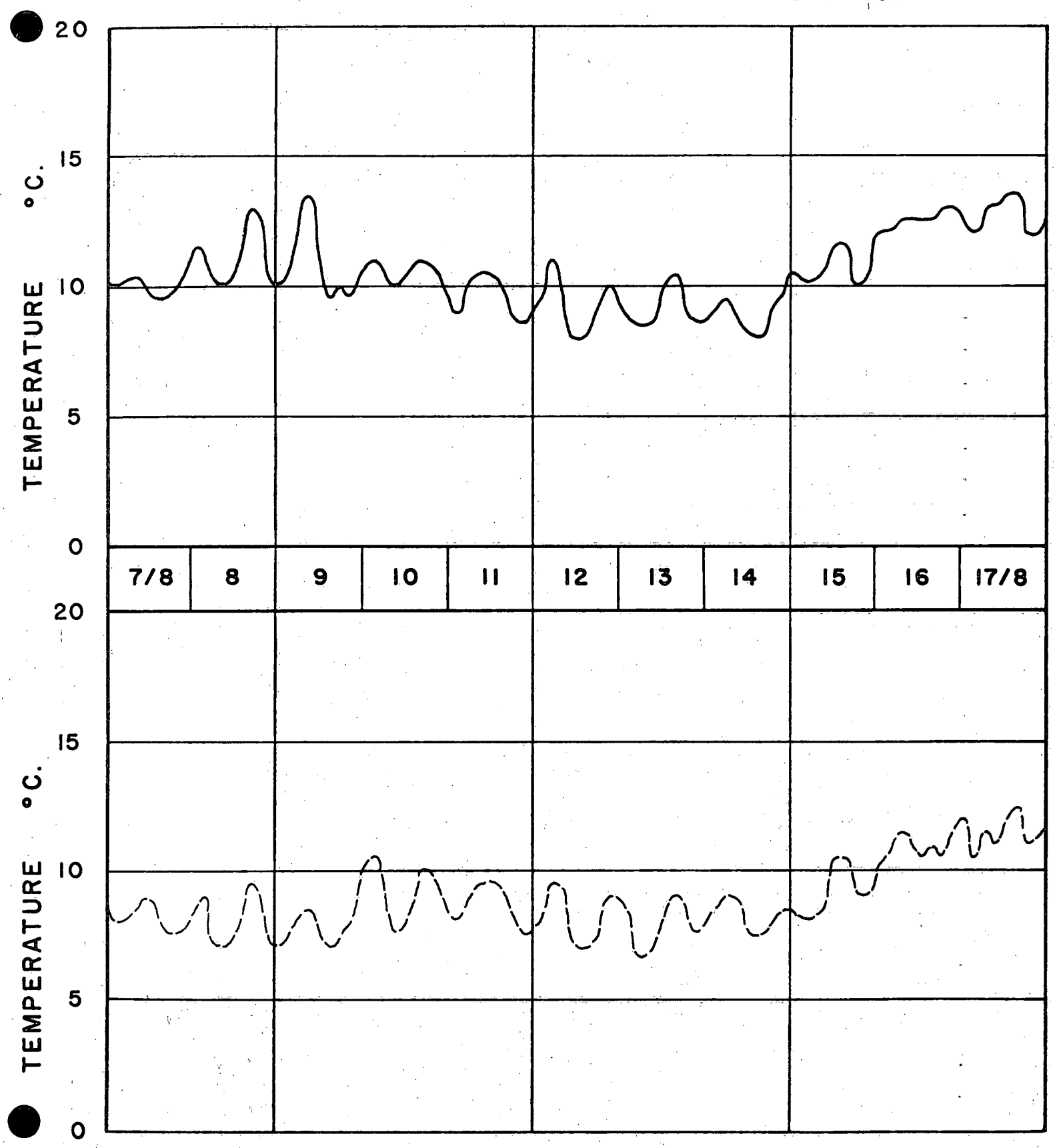

STATION
Port Weller
WATER LEVEL (cm.)
10
5
0
-5
-10
7/8
8
9
10
11
12
13
14
15
16
17/8
STATION
Olcott
WATER LEVEL (cm.)
10
5
0
-5
-10


STATION
Cobourg
WATER LEVEL (cm.)
10
5
0
-5
-10
17.8
7/8
8
9
10
11
12
13
14
15
16
17/8
STATION
Pt. Petre
WATER LEVEL (cm.)
10
5
0
-5
-10

STATION 2


TEMPERATURE °C.
20
15
10
5
0
7/8
8
9
10
11
12
13
14
15
16
17/8
TEMPERATURE °C.
20
15
10
5
0
10 m.
15 m.
30 m.
50 m.

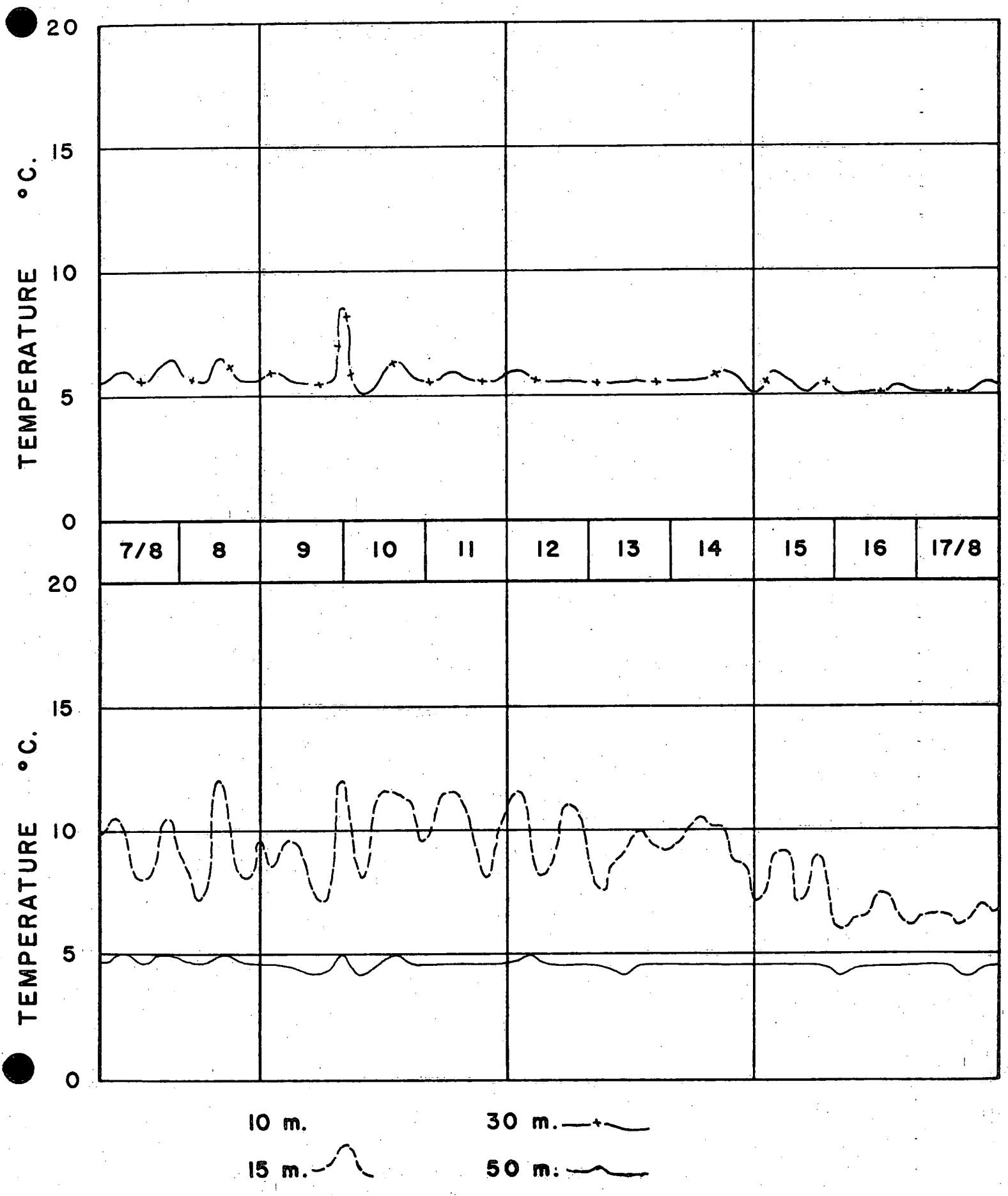
STATION 3



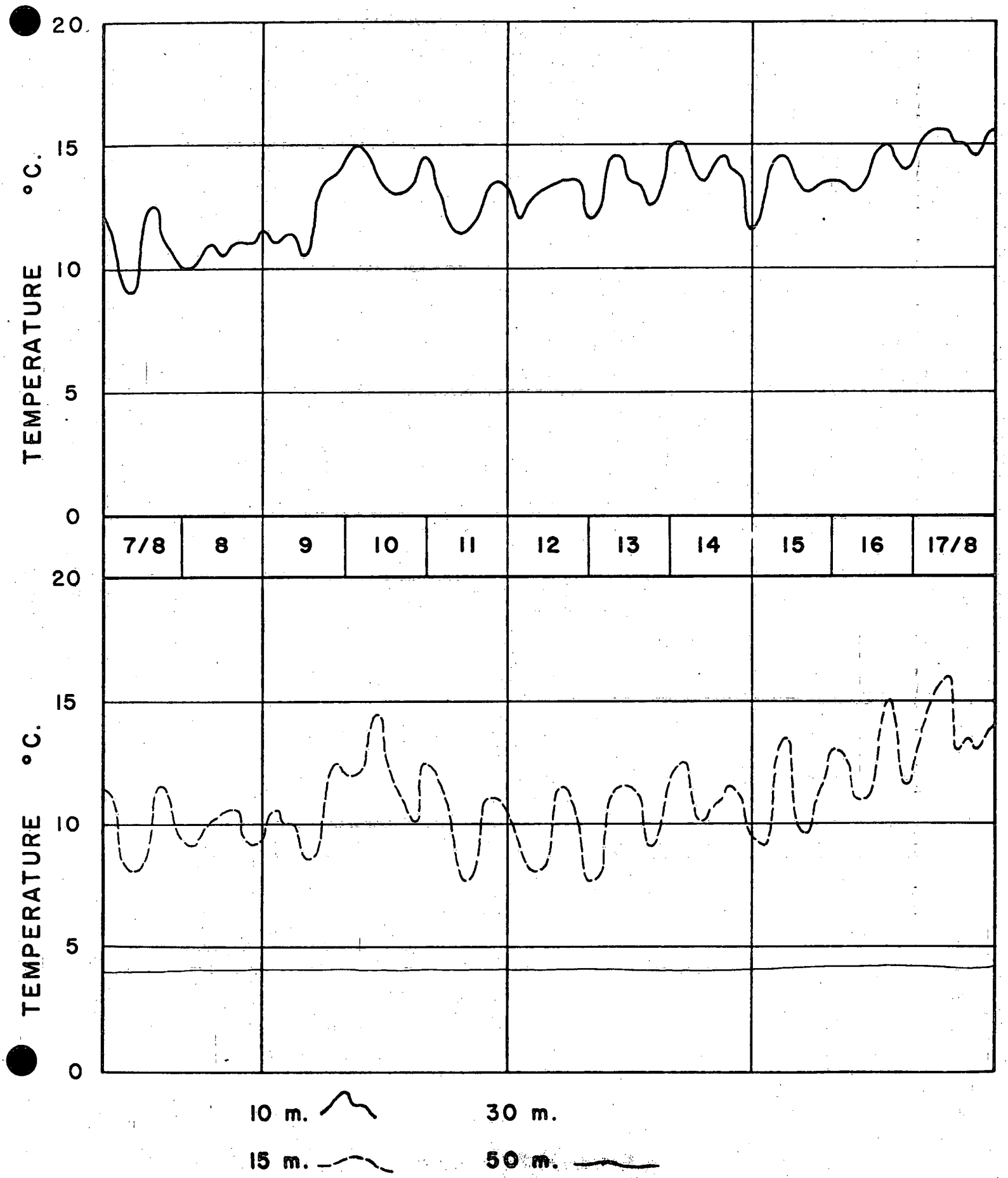
10 m. 30 m.

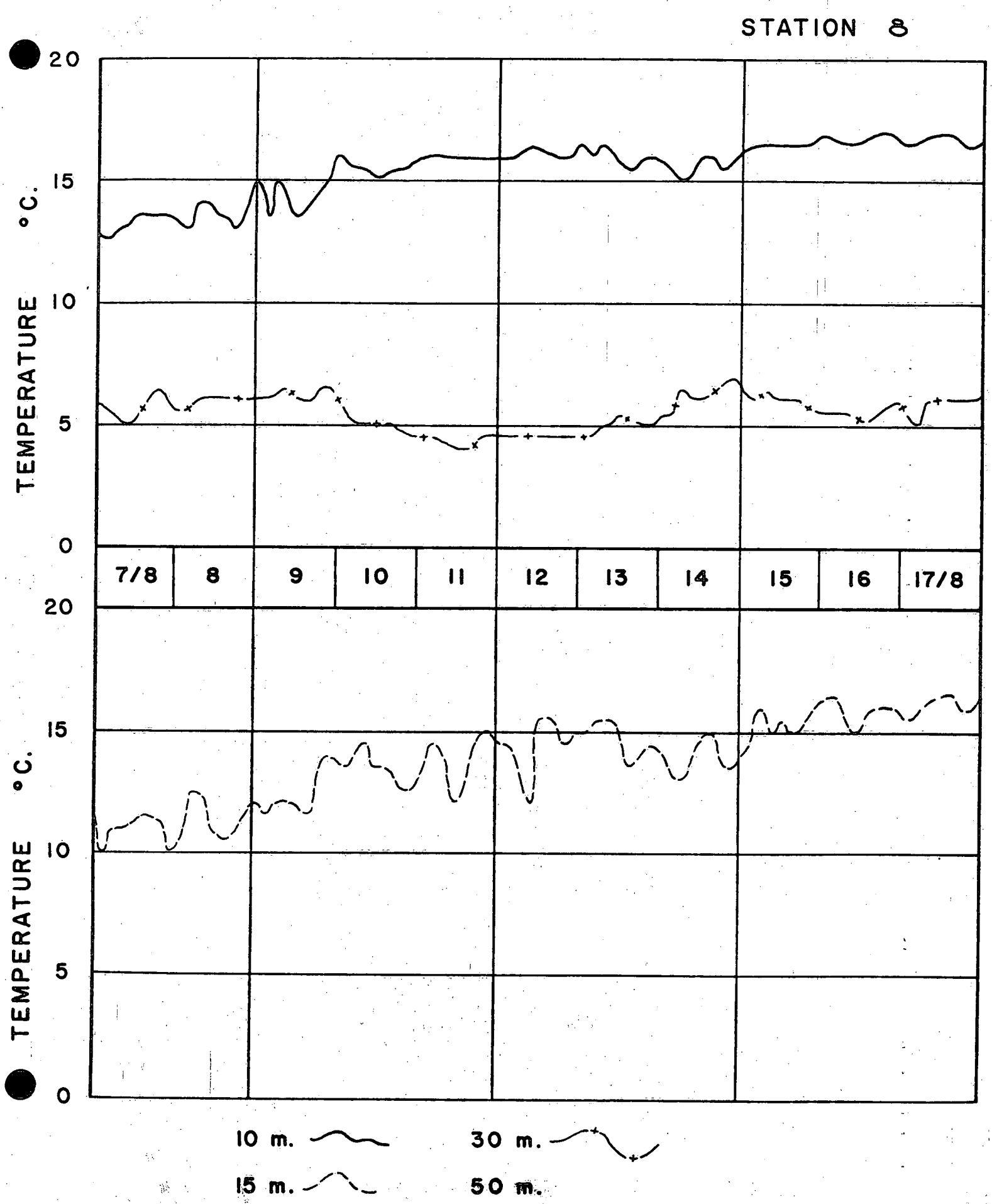
15 m. 50 m.

STATION 4

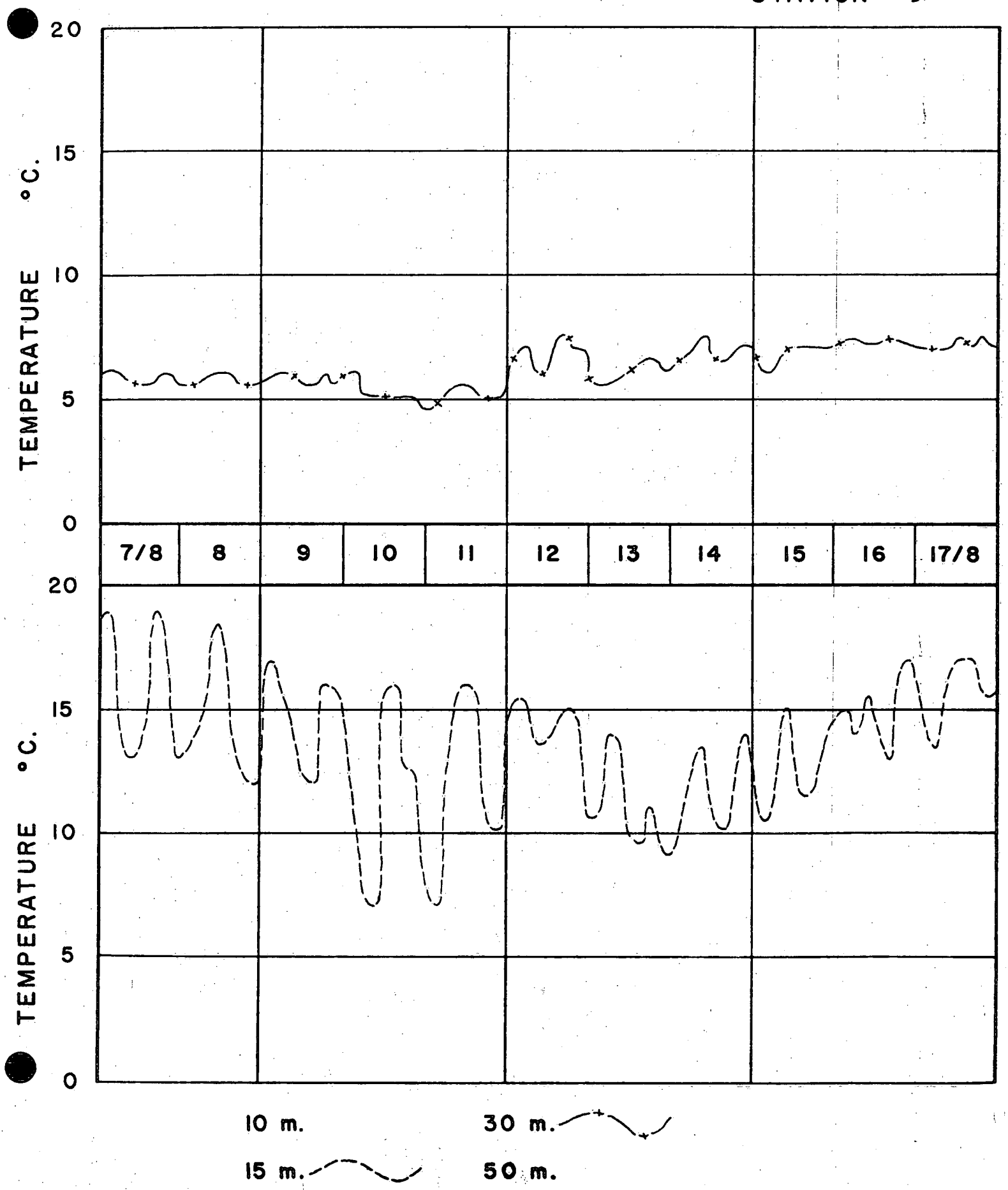

20
15
10
5
0
TEMPERATURE °C.
7/8
8
9
10
11
12
13
14
15
16
17/8
20
15
10
5
0
TEMPERATURE °C.
10 m.
15 m.
30 m.
50 m.

STATION 6

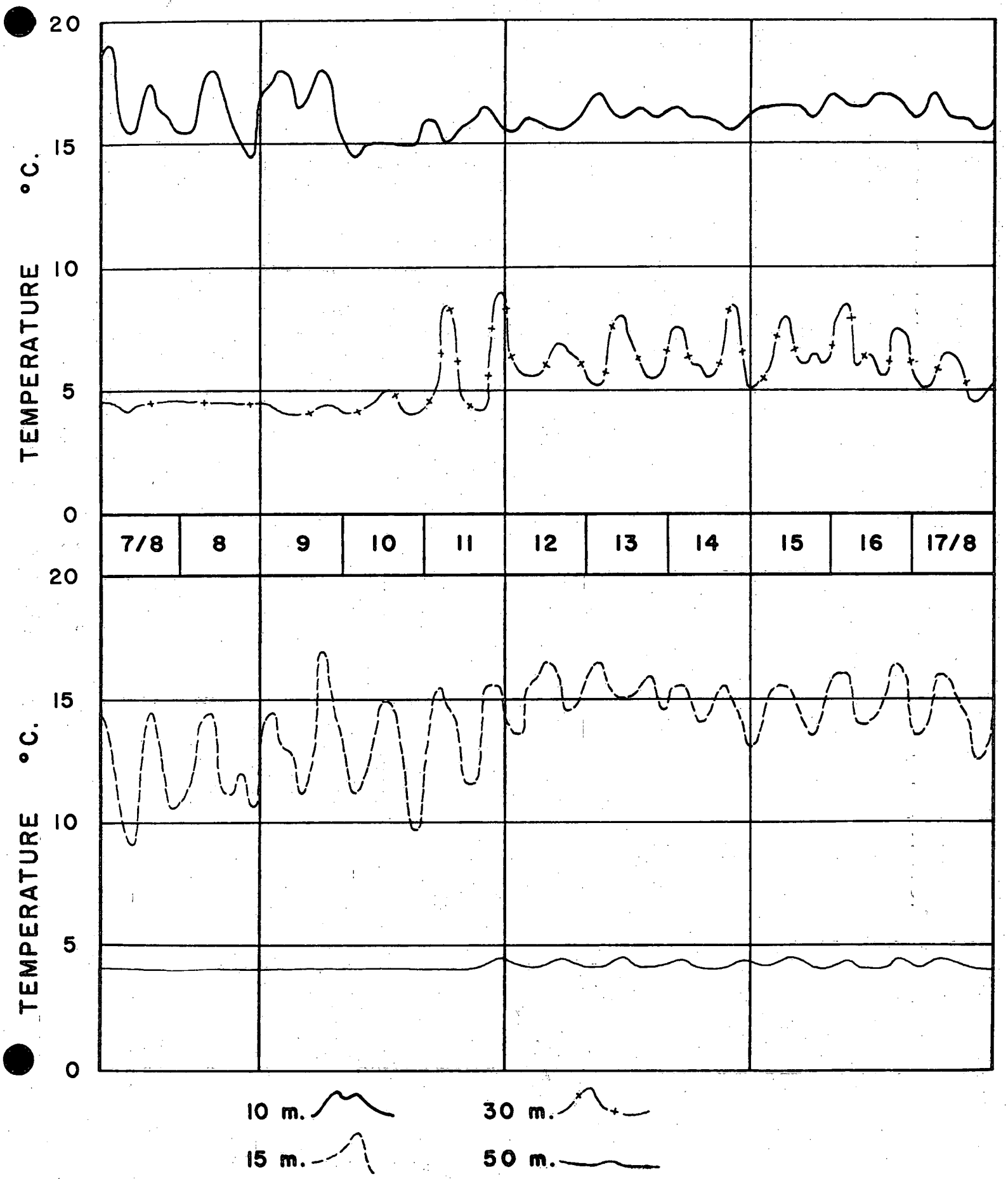

20
15
10
5
0
TEMPERATURE °C.
7/8
8
9
10
11
12
13
14
15
16
17/8
20
15
10
5
0
TEMPERATURE °C.
10 m.
30 m.
15 m.
50 m.

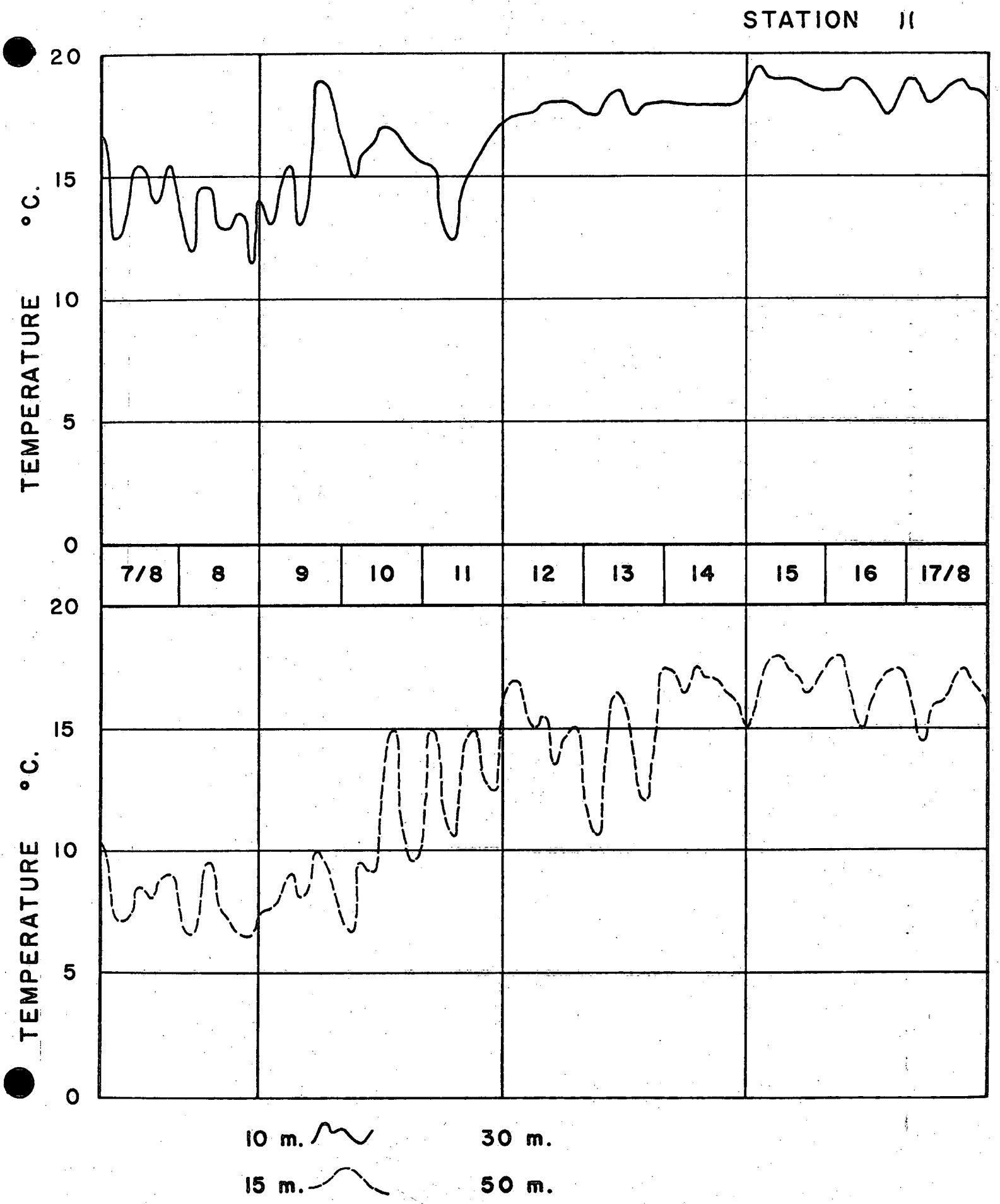

STATION 8
TEMPERATURE °C.
20
15
10
5
0
7/8
8
9
10
11
12
13
14
15
16
17/8
10 m.
15 m.
30 m.
50 m.

STATION 9

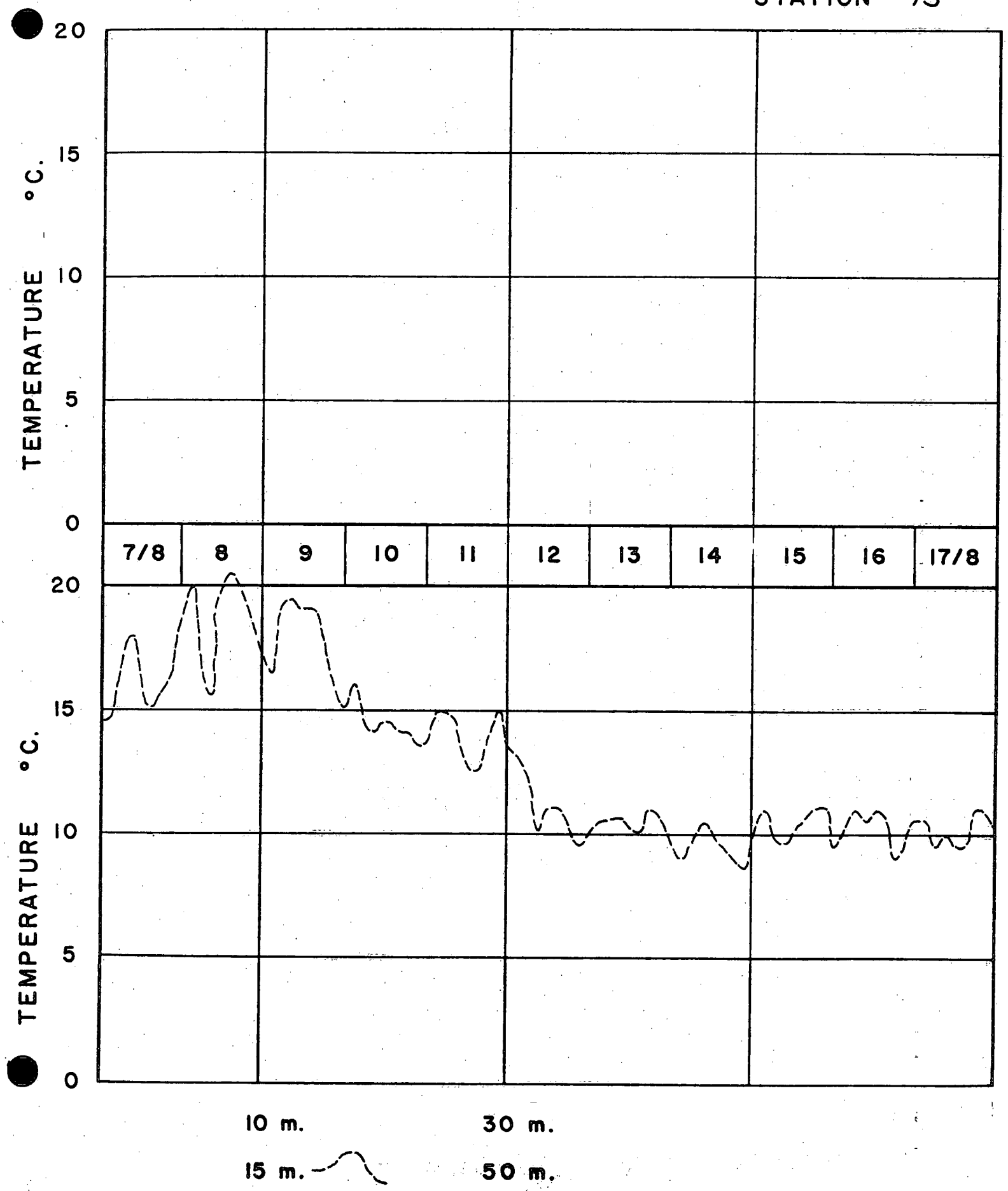

TEMPERATURE °C.
20
15
10
5
0
7/8
8
9
10
11
12
13
14
15
16
17/8
TEMPERATURE °C.
20
15
10
5
0
10 m.
30 m.
15 m.
50 m.

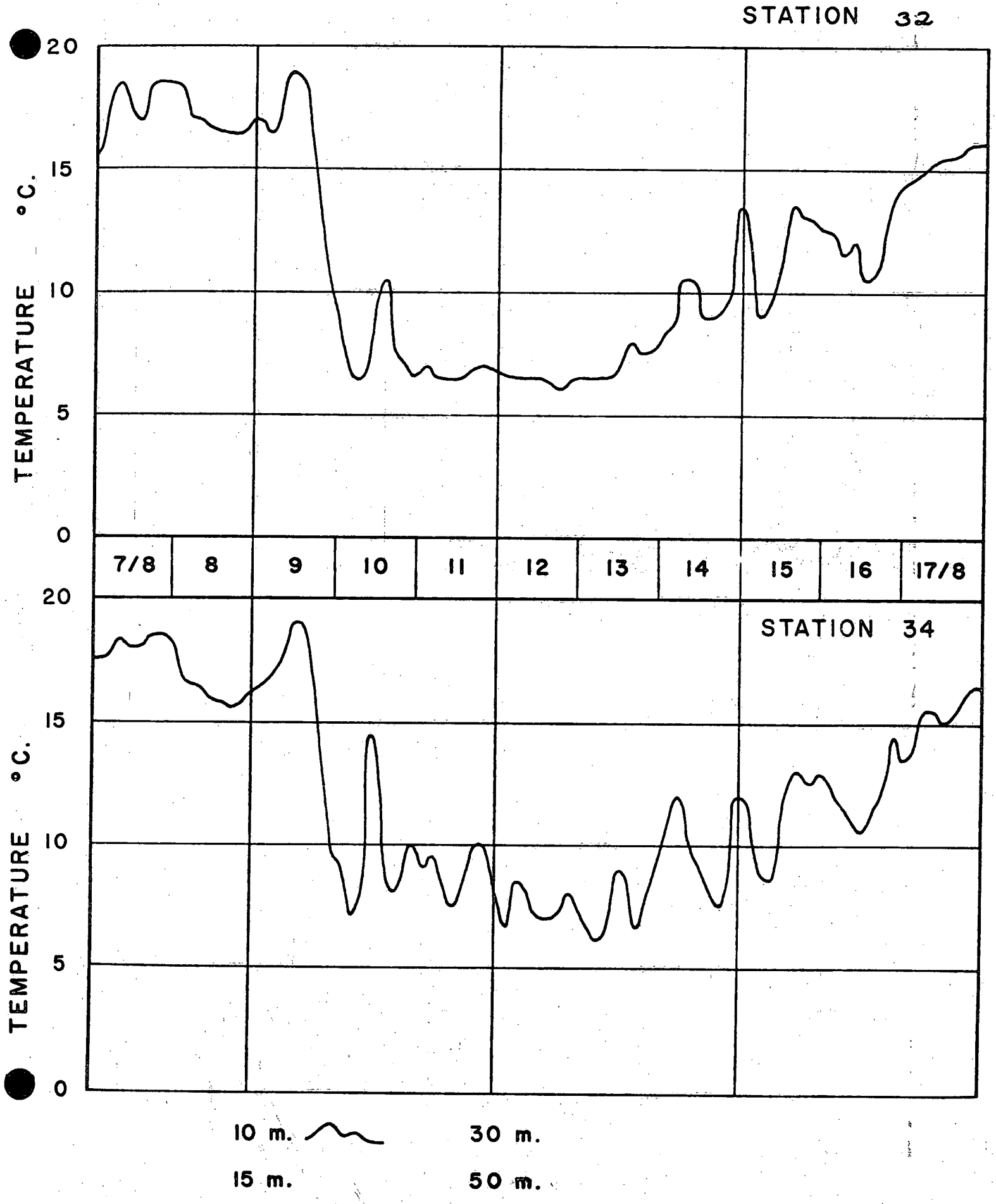
STATION 10

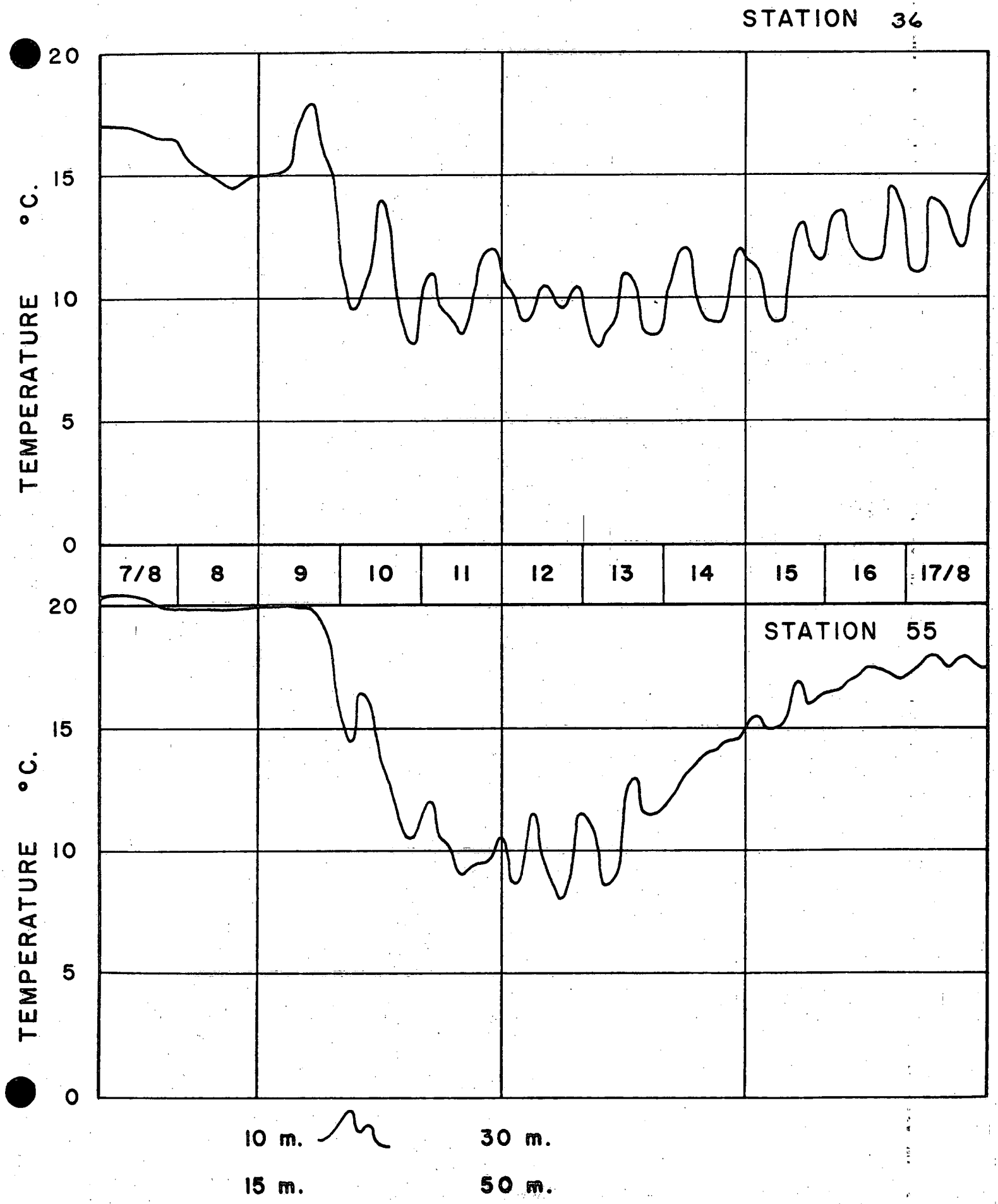

20
15
10
5
0
TEMPERATURE °C.
7/8
8
9
10
11
12
13
14
15
16
17/8
20
15
10
5
0
TEMPERATURE °C.
10 m.
15 m.
30 m.
50 m.

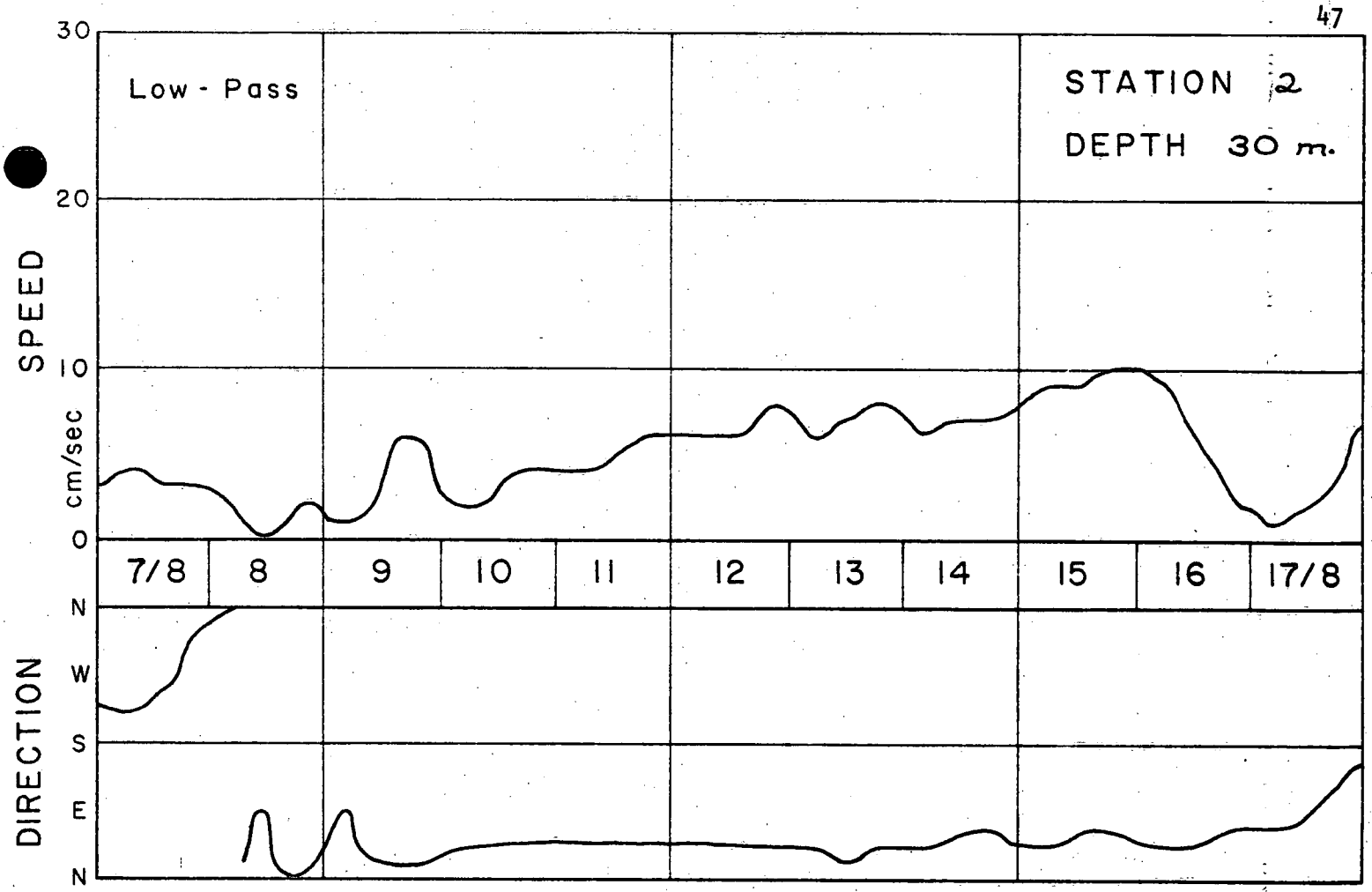

STATION 11
TEMPERATURE °C.
20
15
10
5
0
7/8
8
9
10
11
12
13
14
15
16
17/8
10 m.
30 m.
15 m.
50 m.

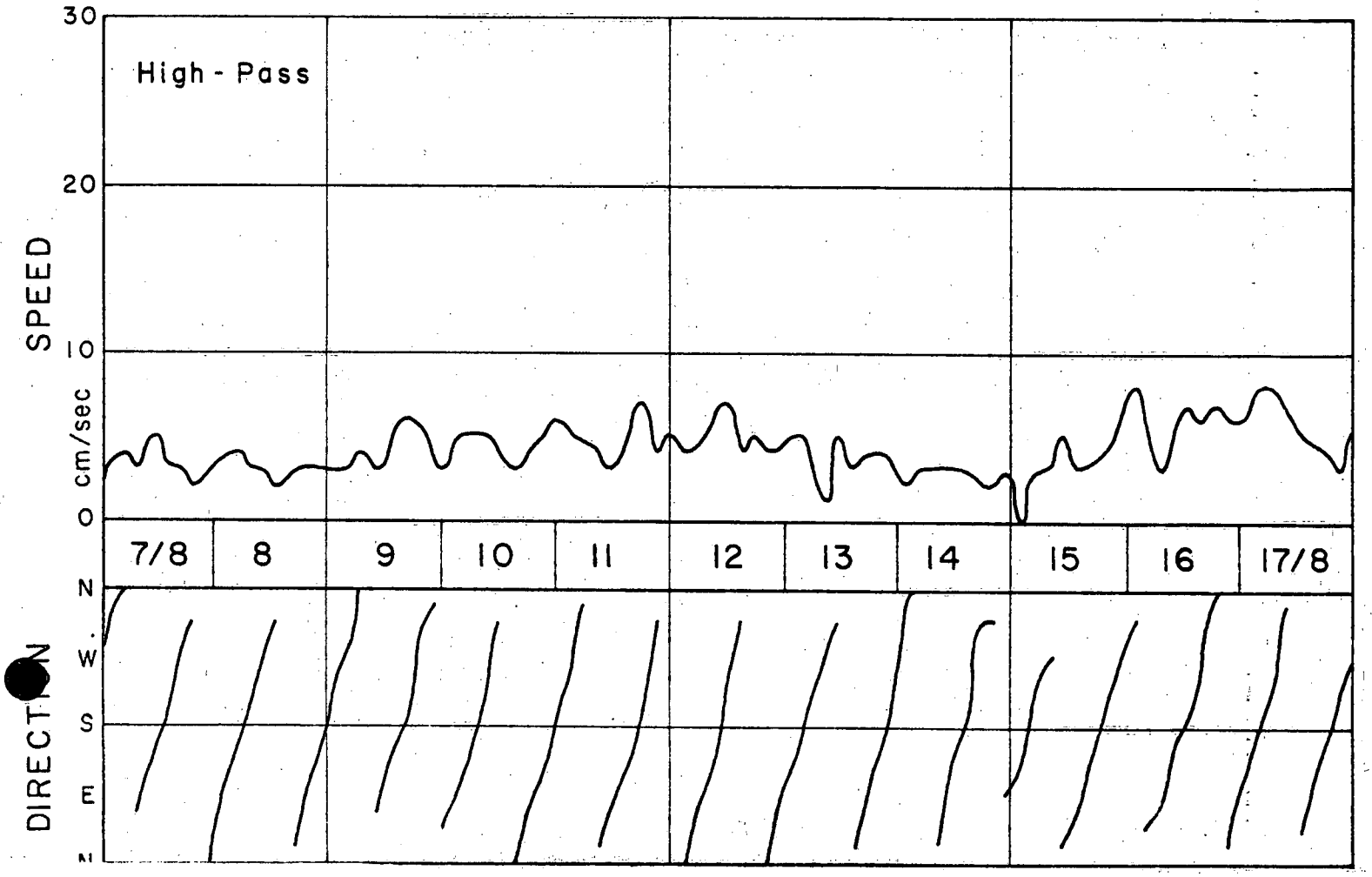
STATION 13

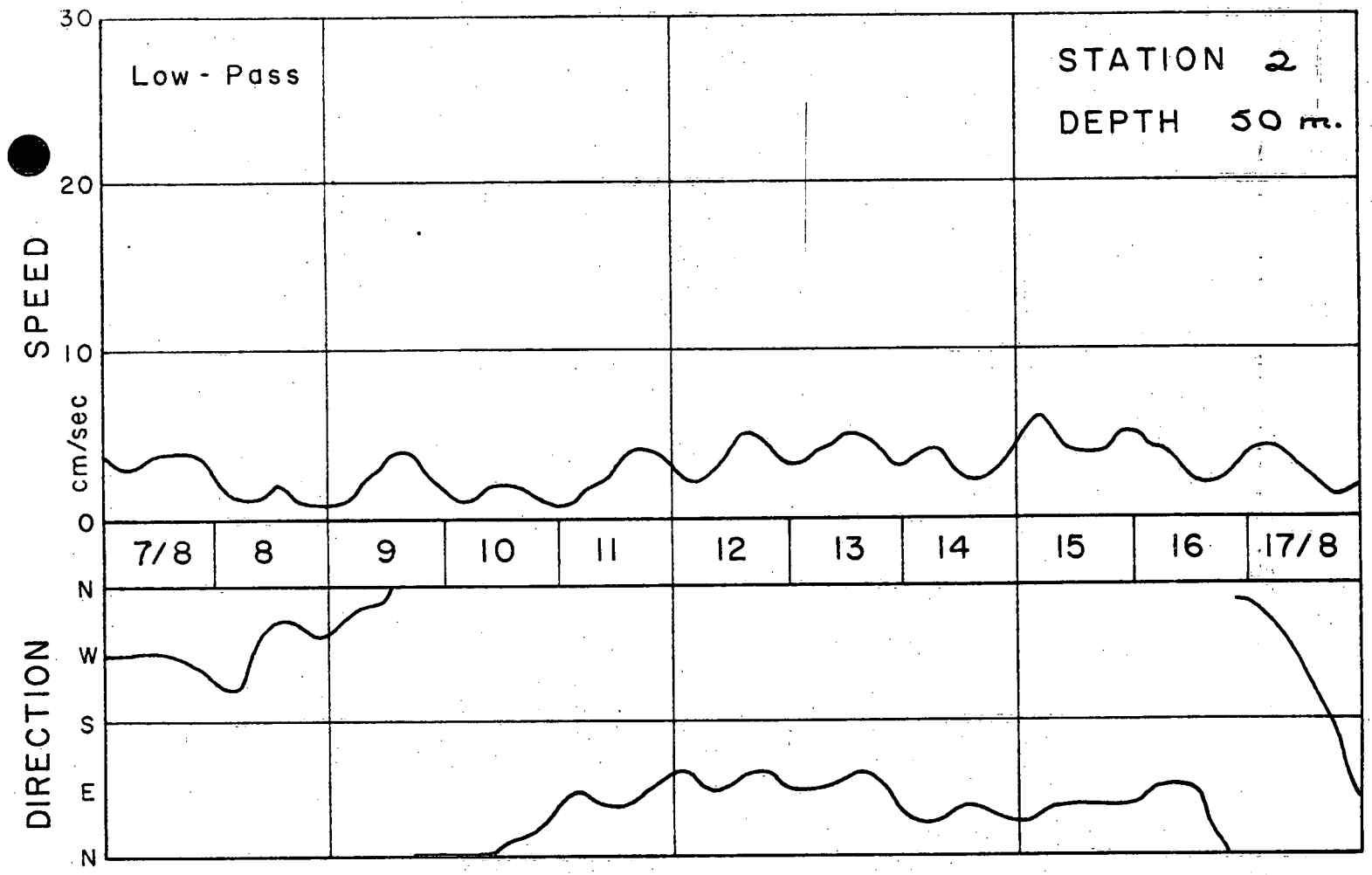

20
15
10
5
0
TEMPERATURE °C.
7/8
8
9
10
11
12
13
14
15
16
17/8
20
15
10
5
0
TEMPERATURE °C.
10 m.
30 m.
15 m.
50 m.

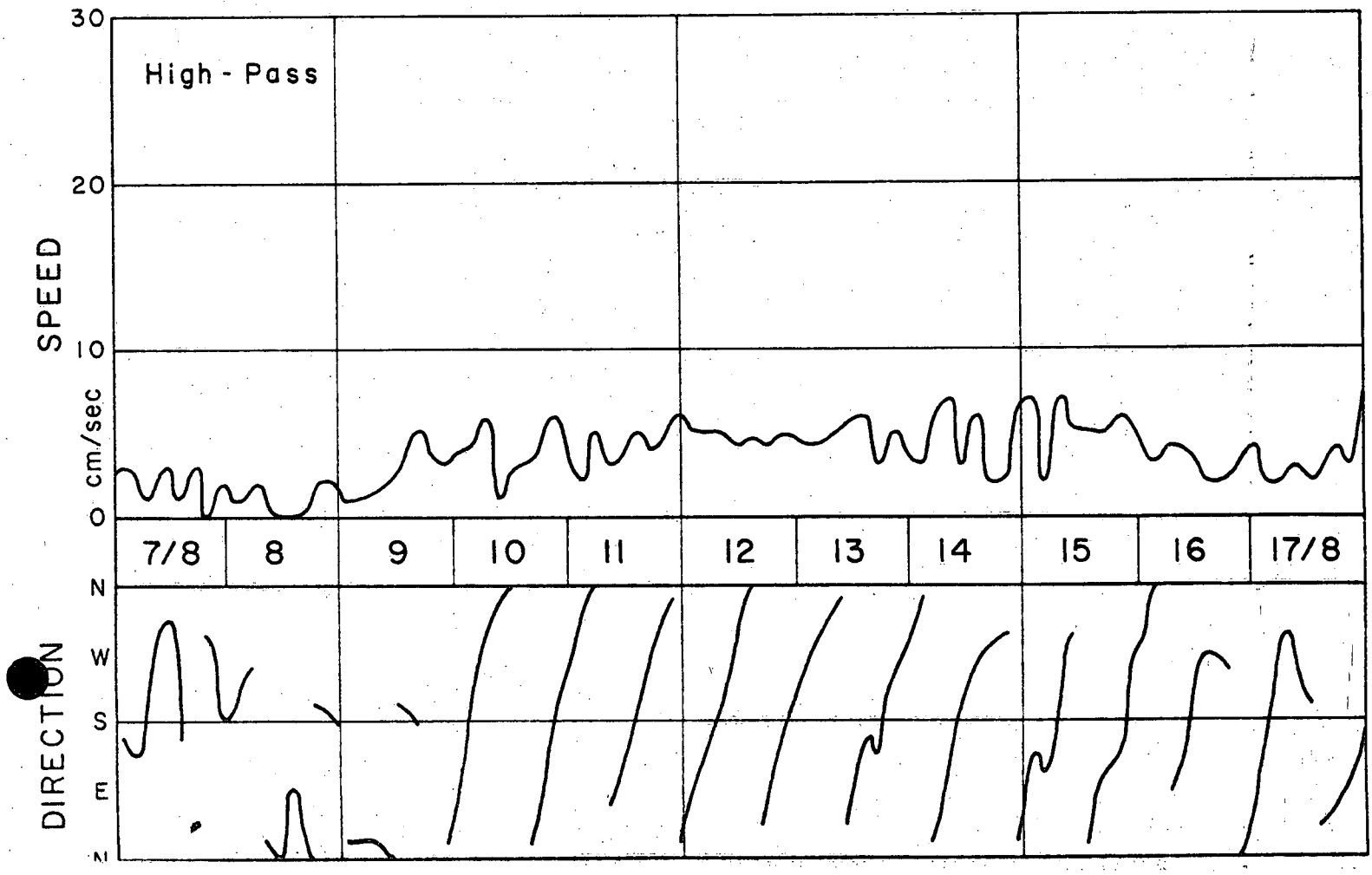

STATION 32
TEMPERATURE °C.
20
15
10
5
0
7/8
8
9
10
11
12
13
14
15
16
17/8
STATION 34
TEMPERATURE °C.
20
15
10
5
0
10 m.
15 m.
30 m.
50 m.

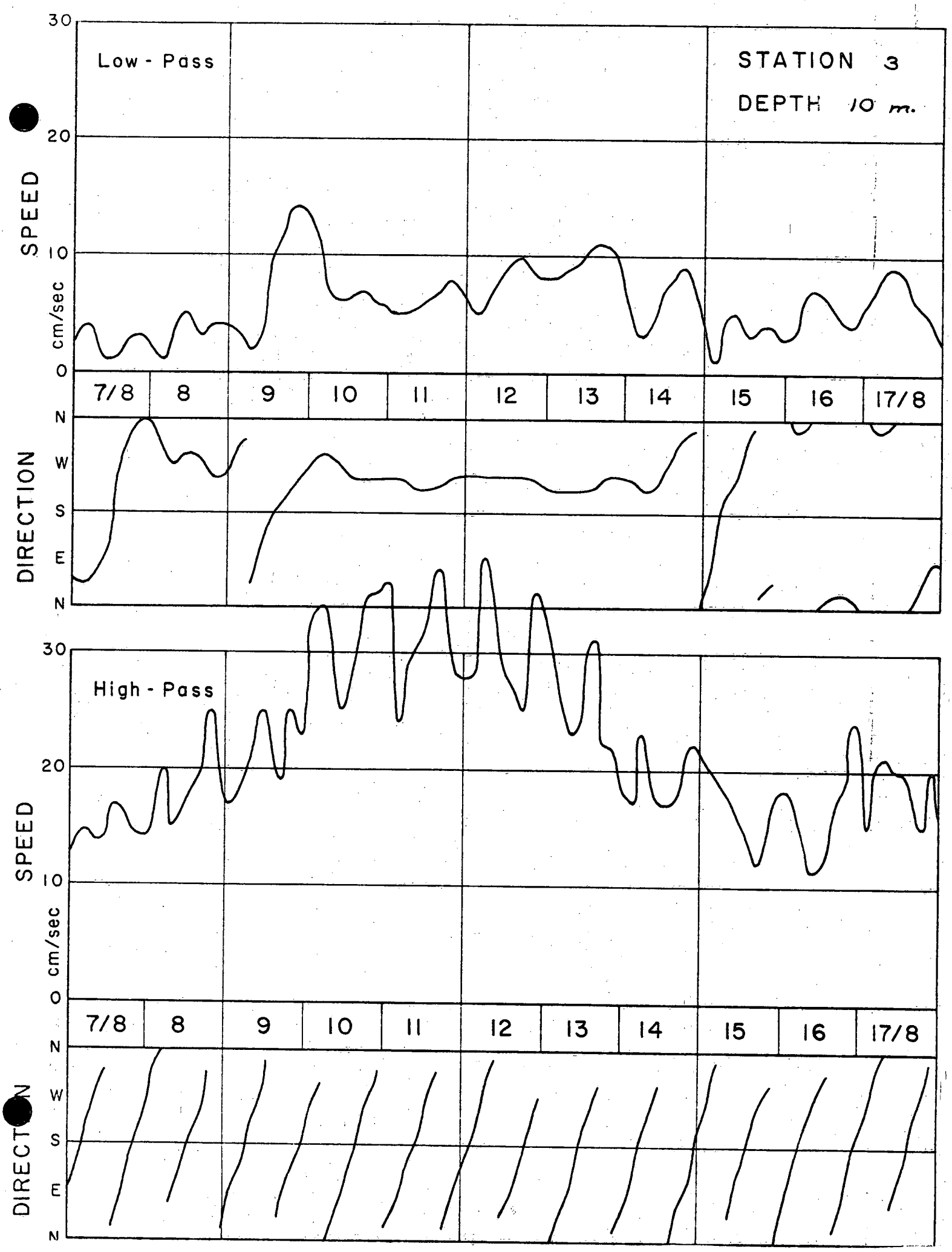

STATION 36
TEMPERATURE °C.
20
15
10
5
0
7/8
8
9
10
11
12
13
14
15
16
17/8
STATION 55
TEMPERATURE °C.
20
15
10
5
0
10 m.
15 m.
30 m.
50 m.

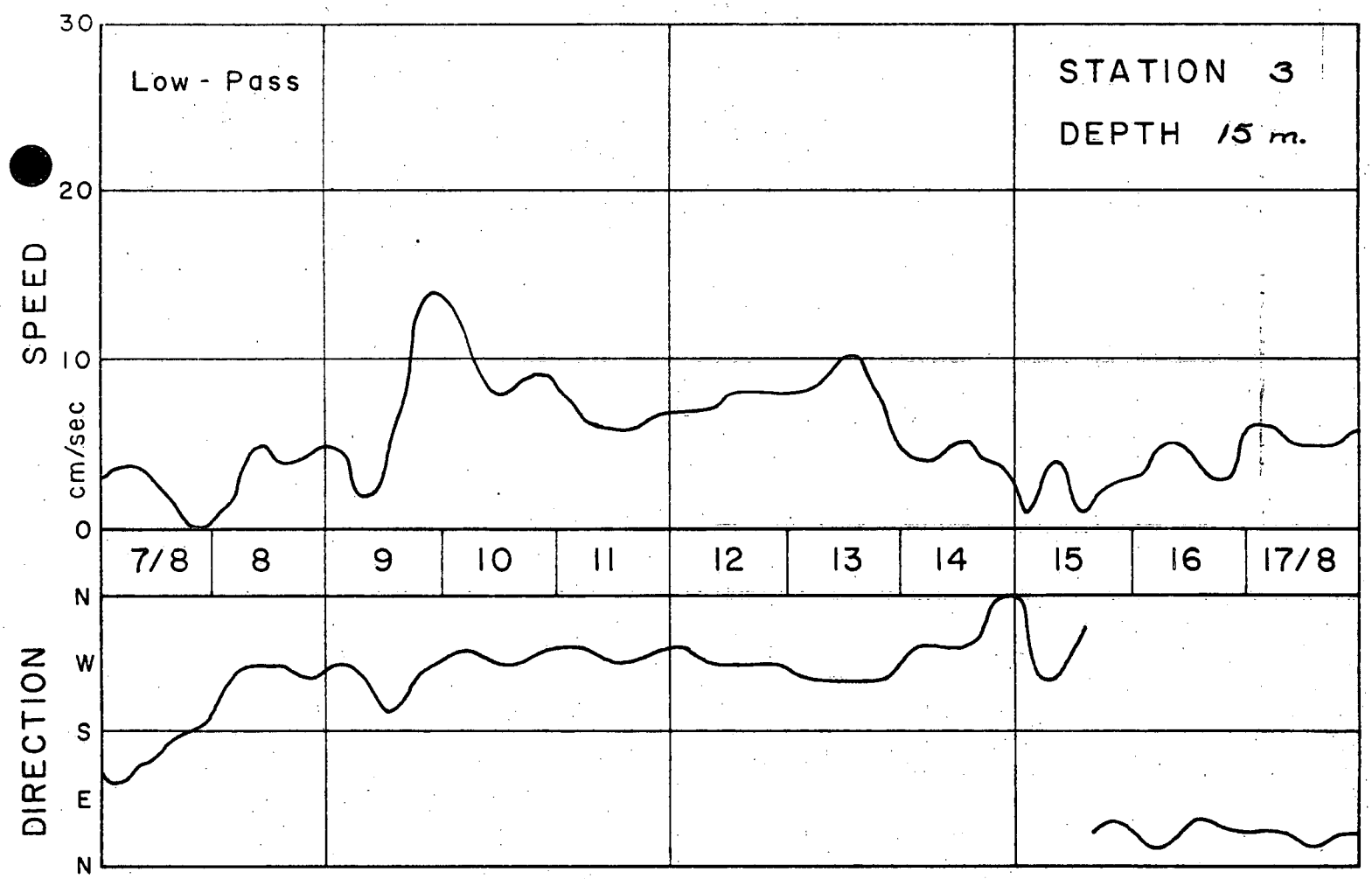

Low - Pass
STATION 2
DEPTH 30 m.
SPEED
cm/sec
30
20
10
0
7/8
8
9
10
11
12
13
14
15
16
17/8
DIRECTION
N
W
S
E
N

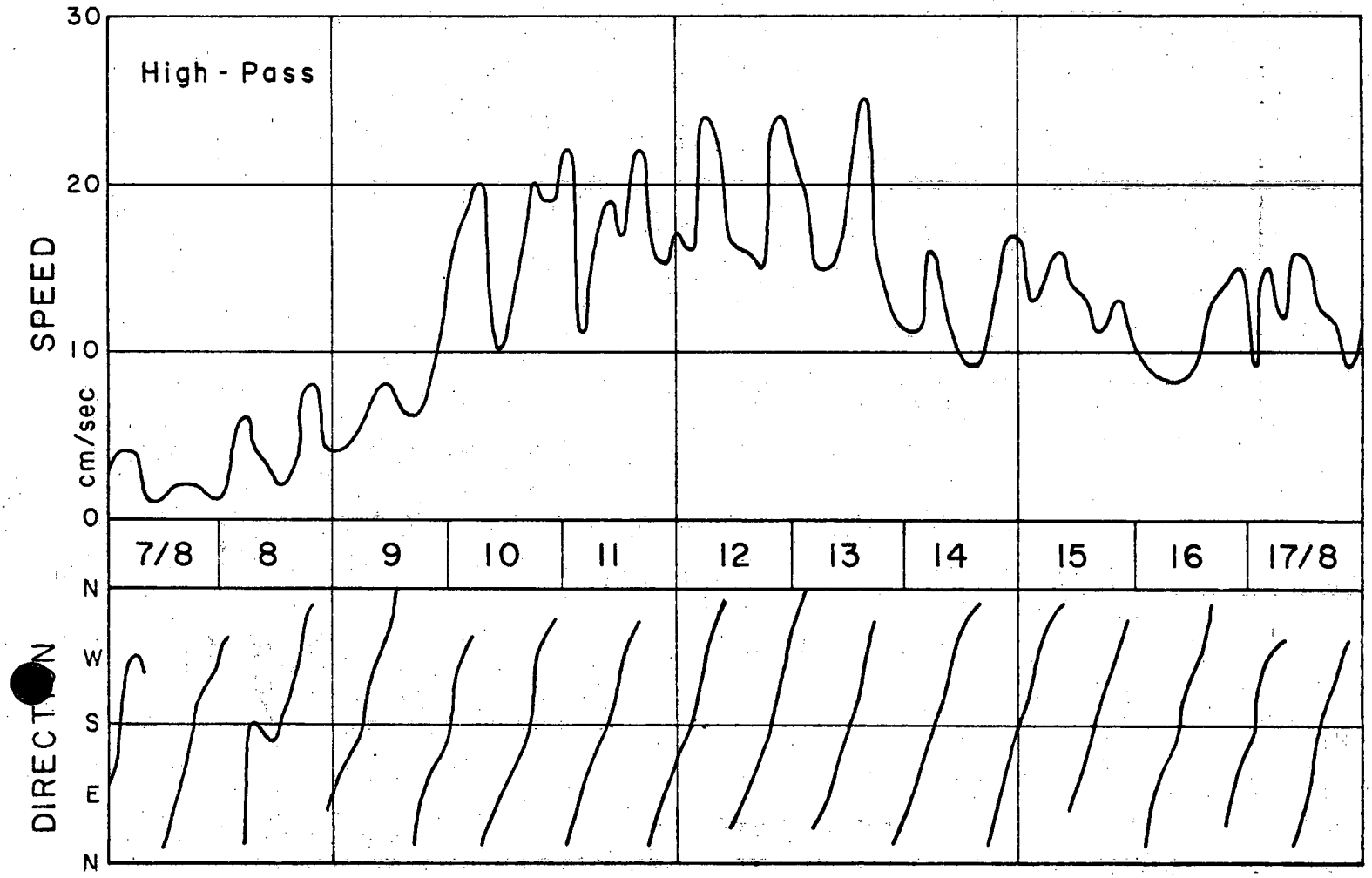

High - Pass
SPEED
cm/sec
30
20
10
0
7/8
8
9
10
11
12
13
14
15
16
17/8
DIRECTION
N
W
S
E
N

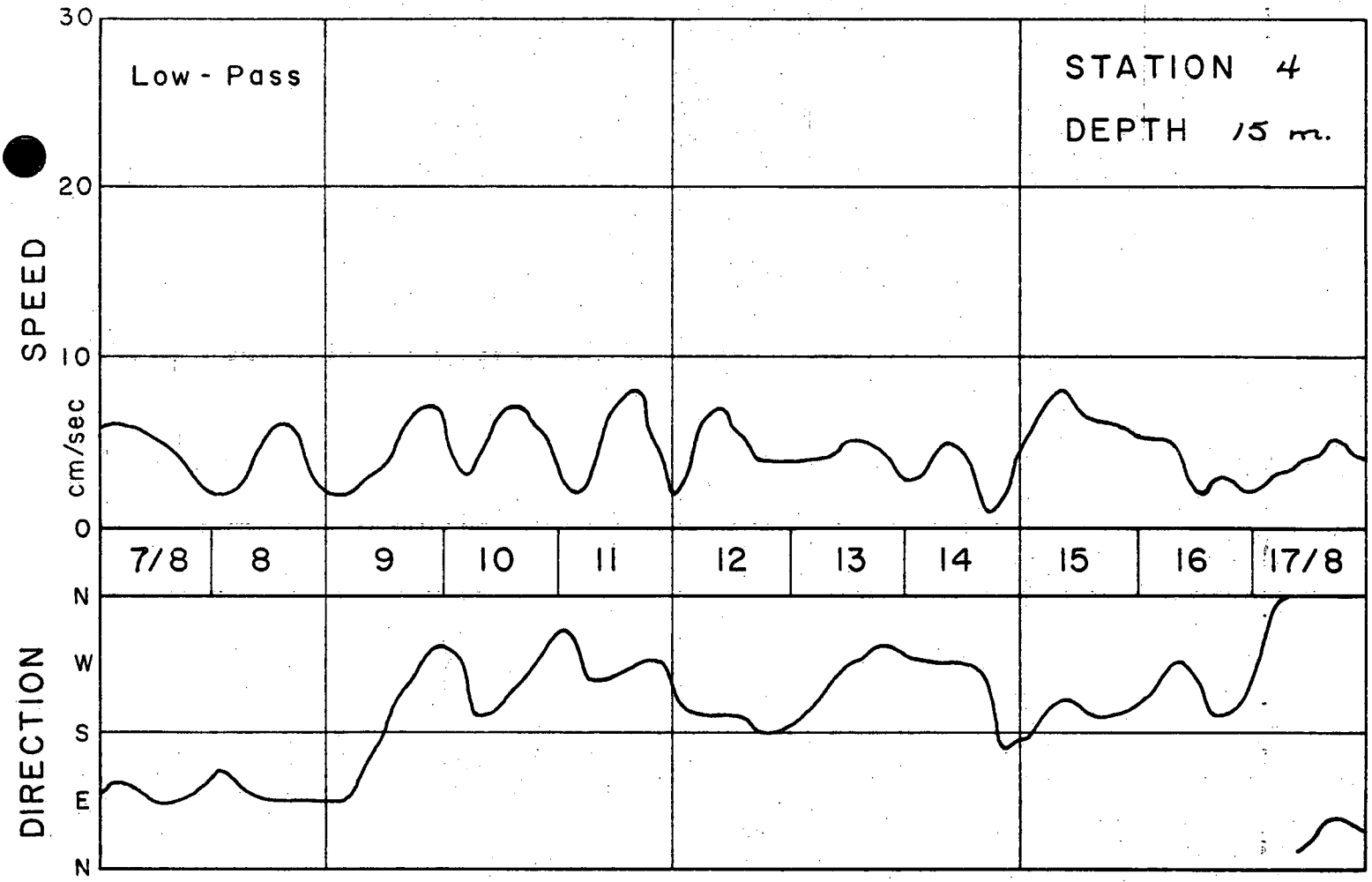

Low - Pass
STATION 2
DEPTH 50 m.
SPEED
cm/sec
30
20
10
0
7/8
8
9
10
11
12
13
14
15
16
17/8
DIRECTION
N
W
S
E
N

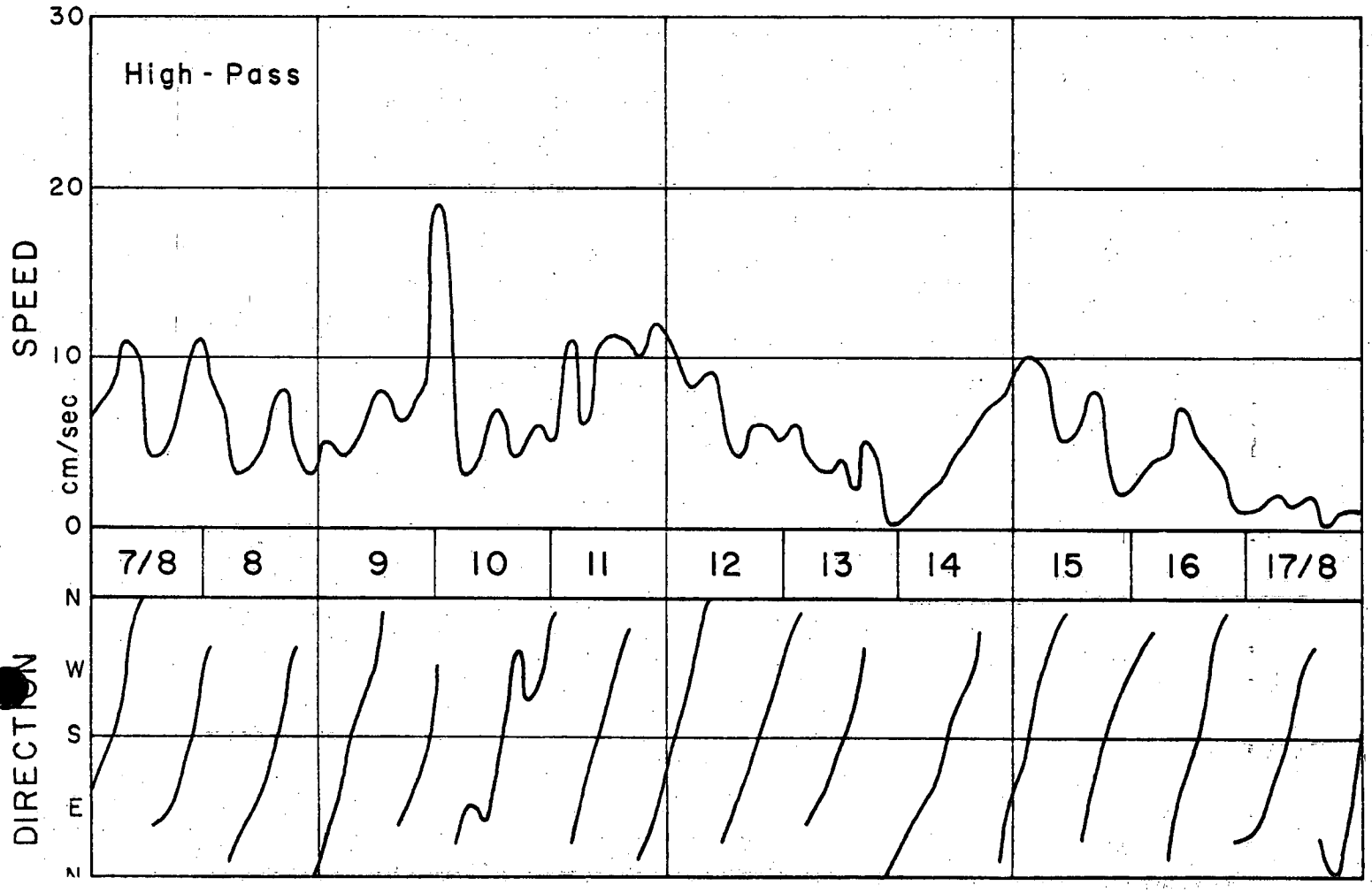

High - Pass
SPEED
cm/sec
30
20
10
0
7/8
8
9
10
11
12
13
14
15
16
17/8
DIRECTION
N
W
S
E
N

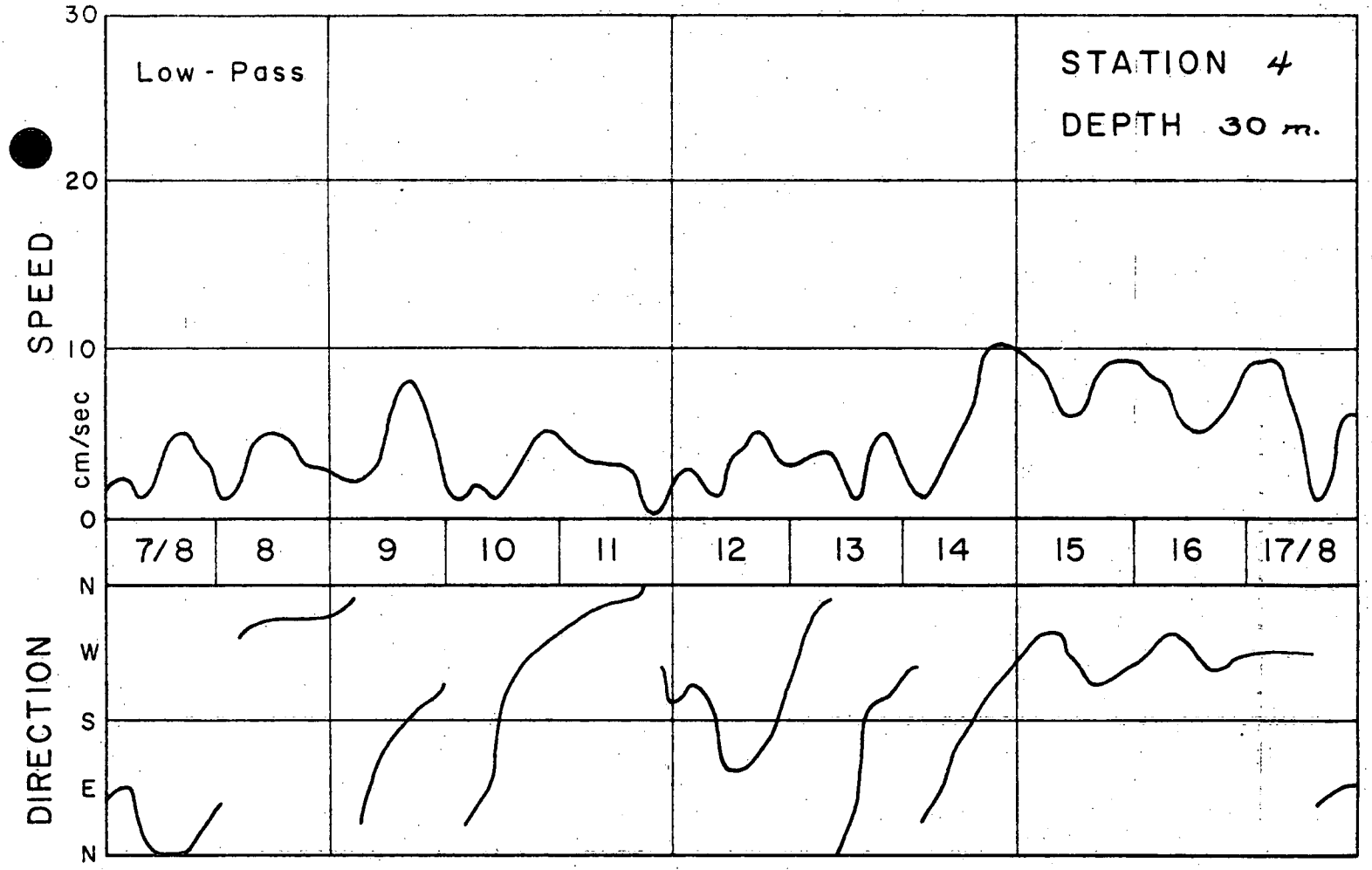

Low - Pass
STATION 3
DEPTH 10 m.
SPEED
cm/sec
30
20
10
0
7/8
8
9
10
11
12
13
14
15
16
17/8
DIRECTION
N
W
S
E
N
High - Pass
SPEED
cm/sec
30
20
10
0
7/8
8
9
10
11
12
13
14
15
16
17/8
DIRECTION
N
W
S
E
N

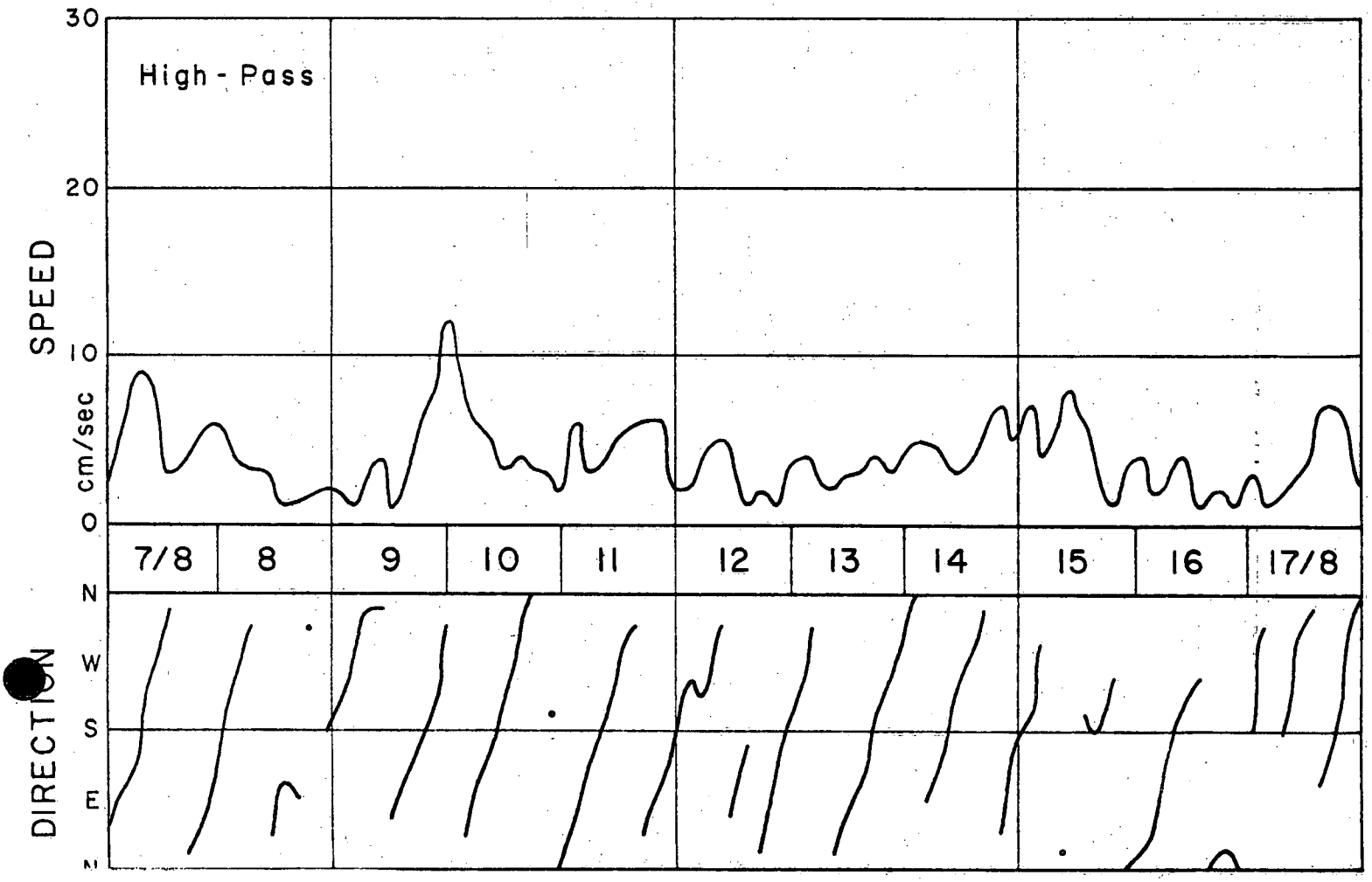

Low - Pass
STATION 3
DEPTH 15 m.
SPEED
cm/sec
30
20
10
0
7/8
8
9
10
11
12
13
14
15
16
17/8
DIRECTION
N
W
S
E
N

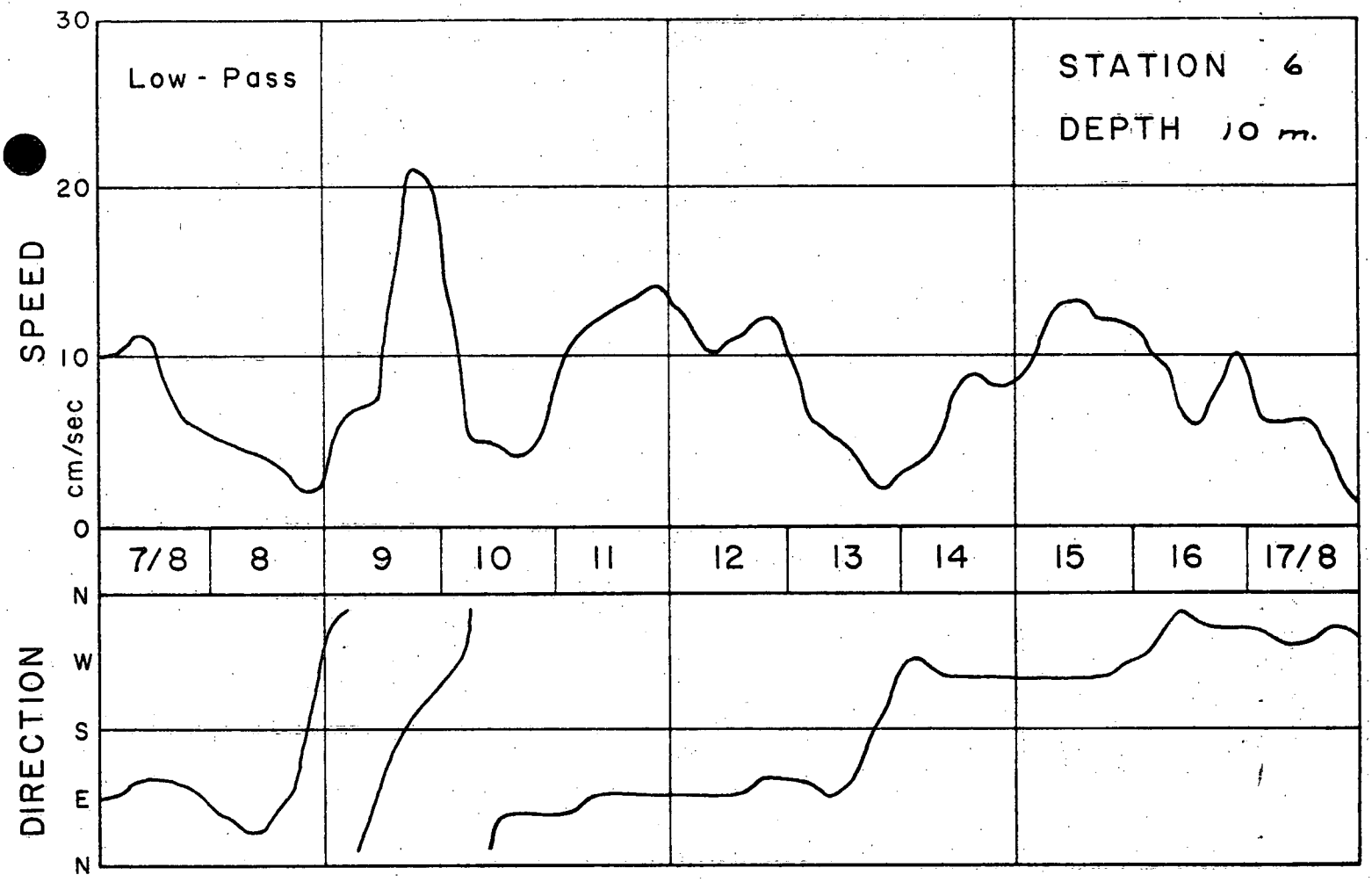

High - Pass
SPEED
cm/sec
30
20
10
0
7/8
8
9
10
11
12
13
14
15
16
17/8
DIRECTION
N
W
S
E
N

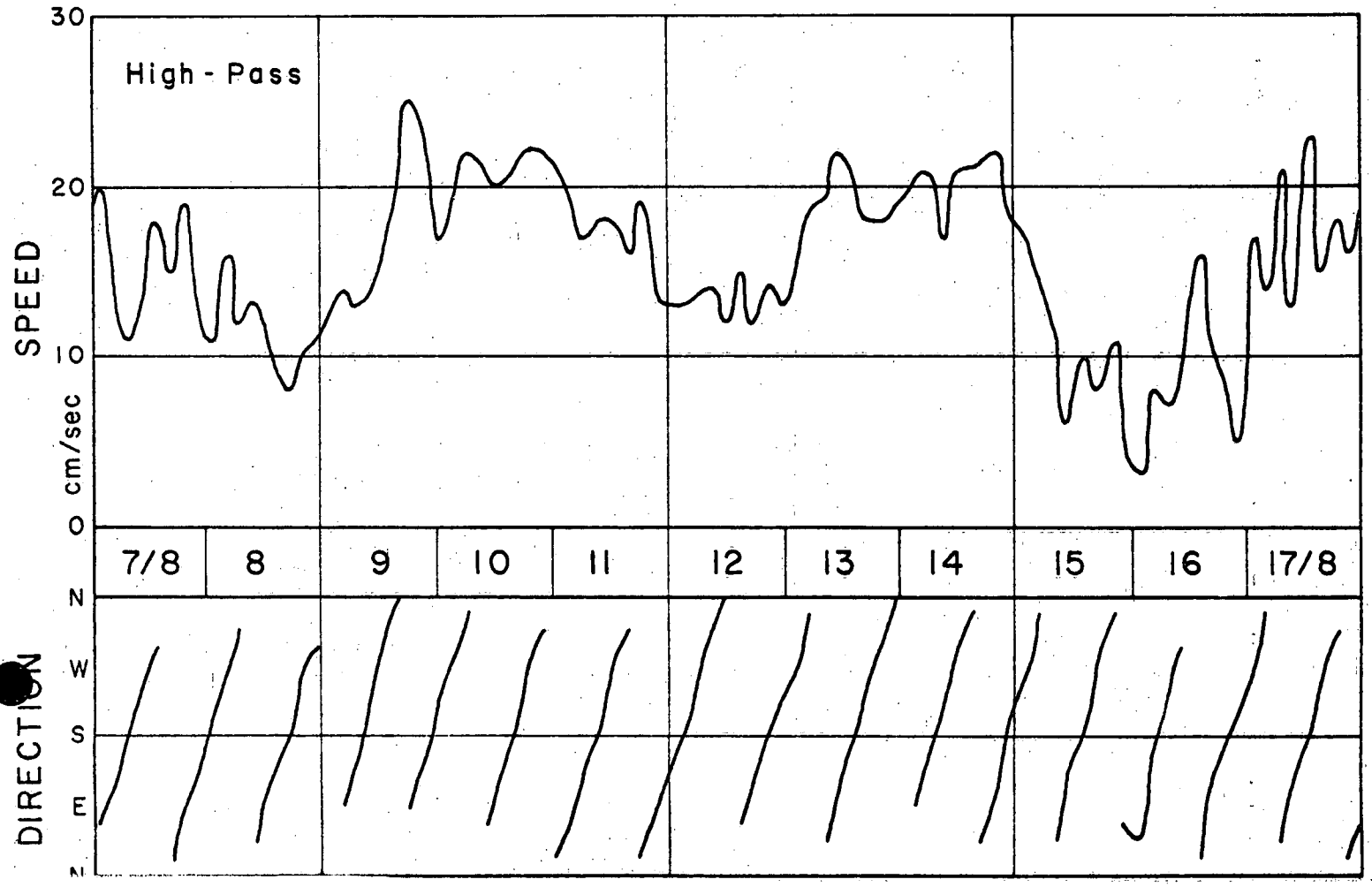

Low - Pass
STATION 4
DEPTH 15 m.
SPEED
cm/sec
30
20
10
0
7/8
8
9
10
11
12
13
14
15
16
17/8
DIRECTION
N
W
S
E
N

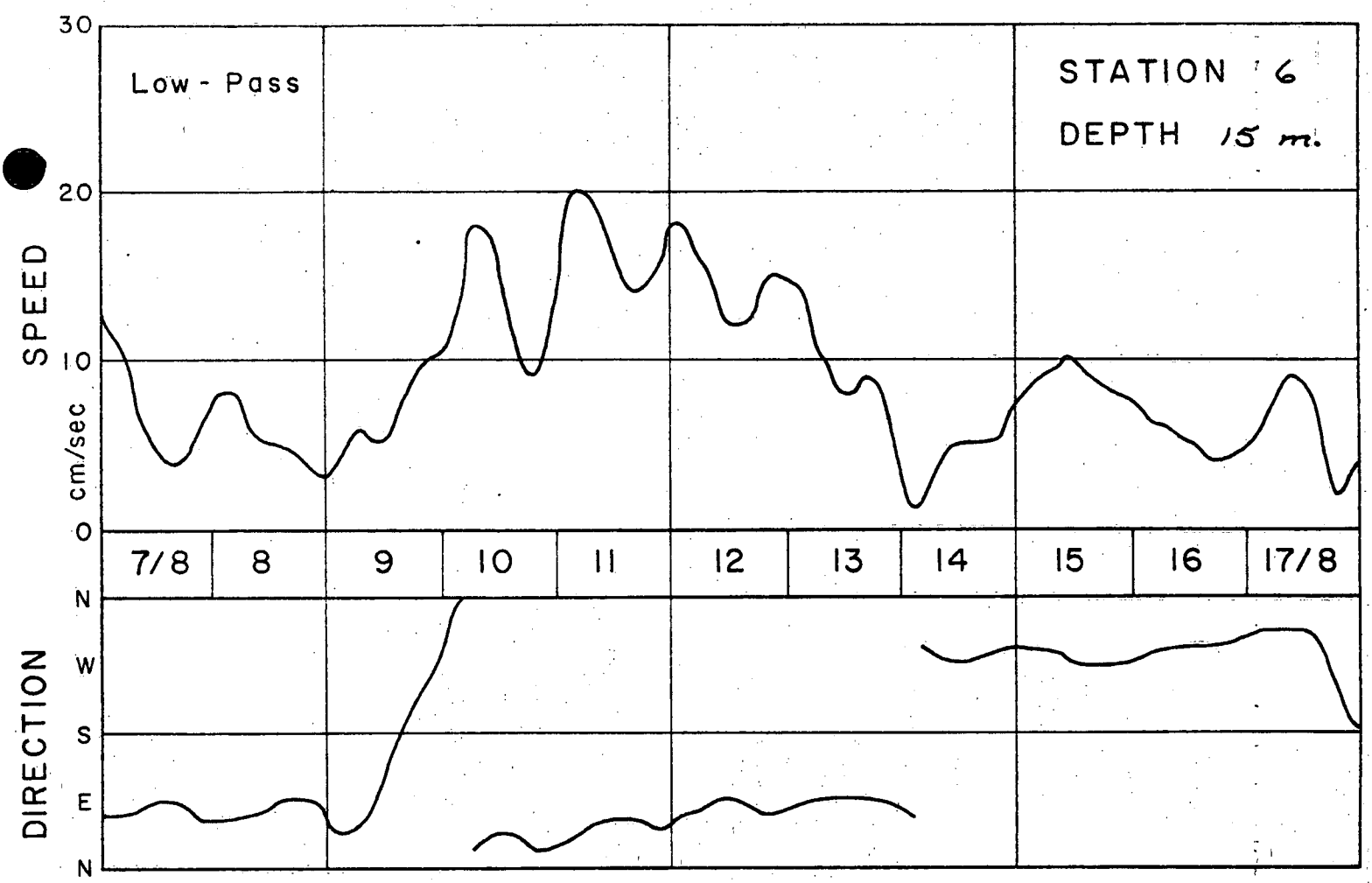

High - Pass
SPEED
cm/sec
30
20
10
0
7/8
8
9
10
11
12
13
14
15
16
17/8
DIRECTION
N
W
S
E
N


Low - Pass
STATION 4
DEPTH 30 m.
SPEED
cm/sec
30
20
10
0
7/8
8
9
10
11
12
13
14
15
16
17/8
DIRECTION
N
W
S
E
N


High - Pass
SPEED
cm/sec
30
20
10
0
7/8
8
9
10
11
12
13
14
15
16
17/8
DIRECTION
N
W
S
E
N


Low - Pass
STATION 6
DEPTH 10 m.
SPEED
cm/sec
30
20
10
0
7/8
8
9
10
11
12
13
14
15
16
17/8
DIRECTION
N
W
S
E
N


High - Pass
SPEED
cm/sec
30
20
10
0
7/8
8
9
10
11
12
13
14
15
16
17/8
DIRECTION
N
W
S
E
N


Low - Pass
STATION 6
DEPTH 15 m.
SPEED
cm/sec
30
20
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17/8
DIRECTION
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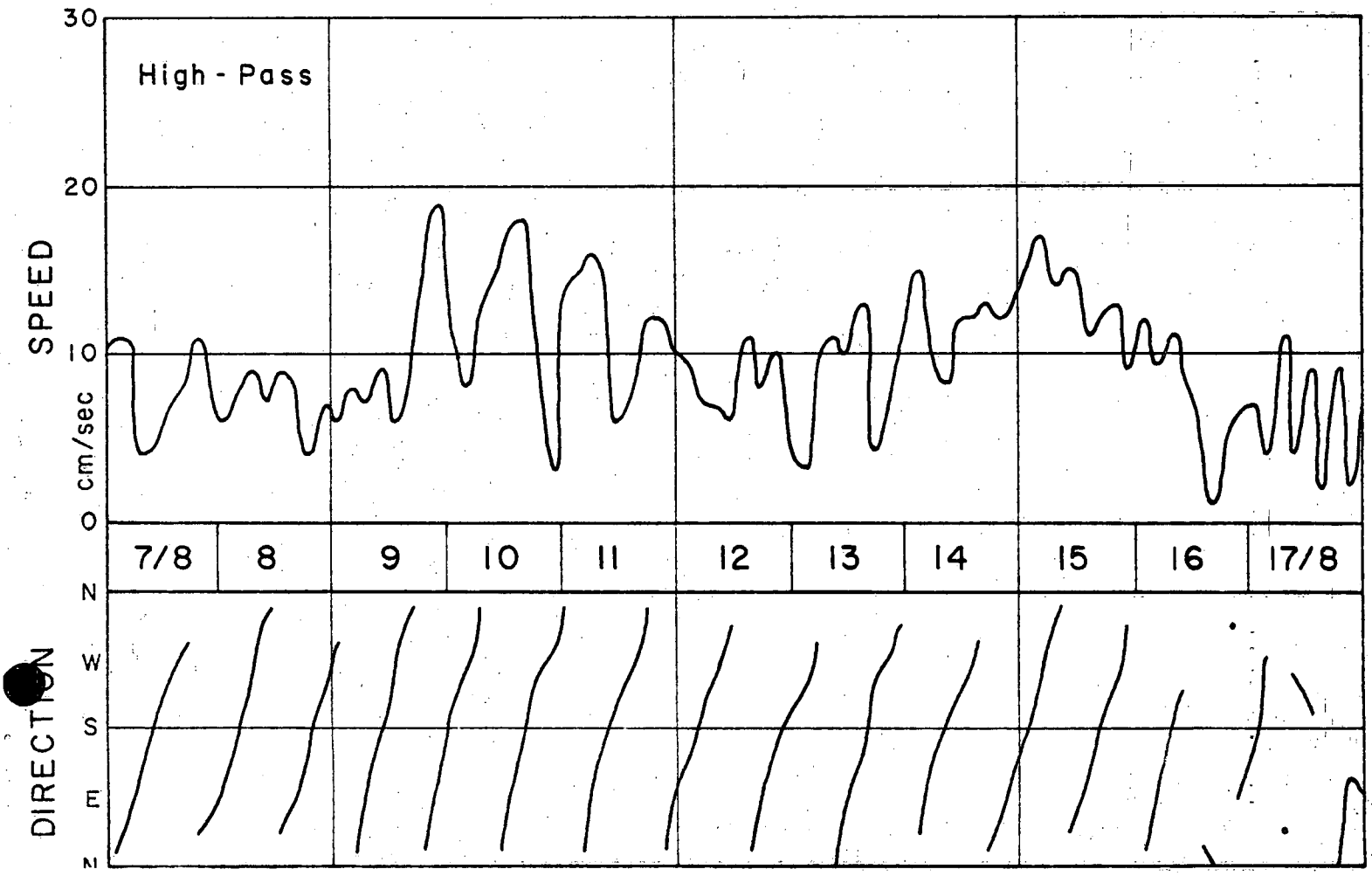
High - Pass
SPEED
cm/sec
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DIRECTION
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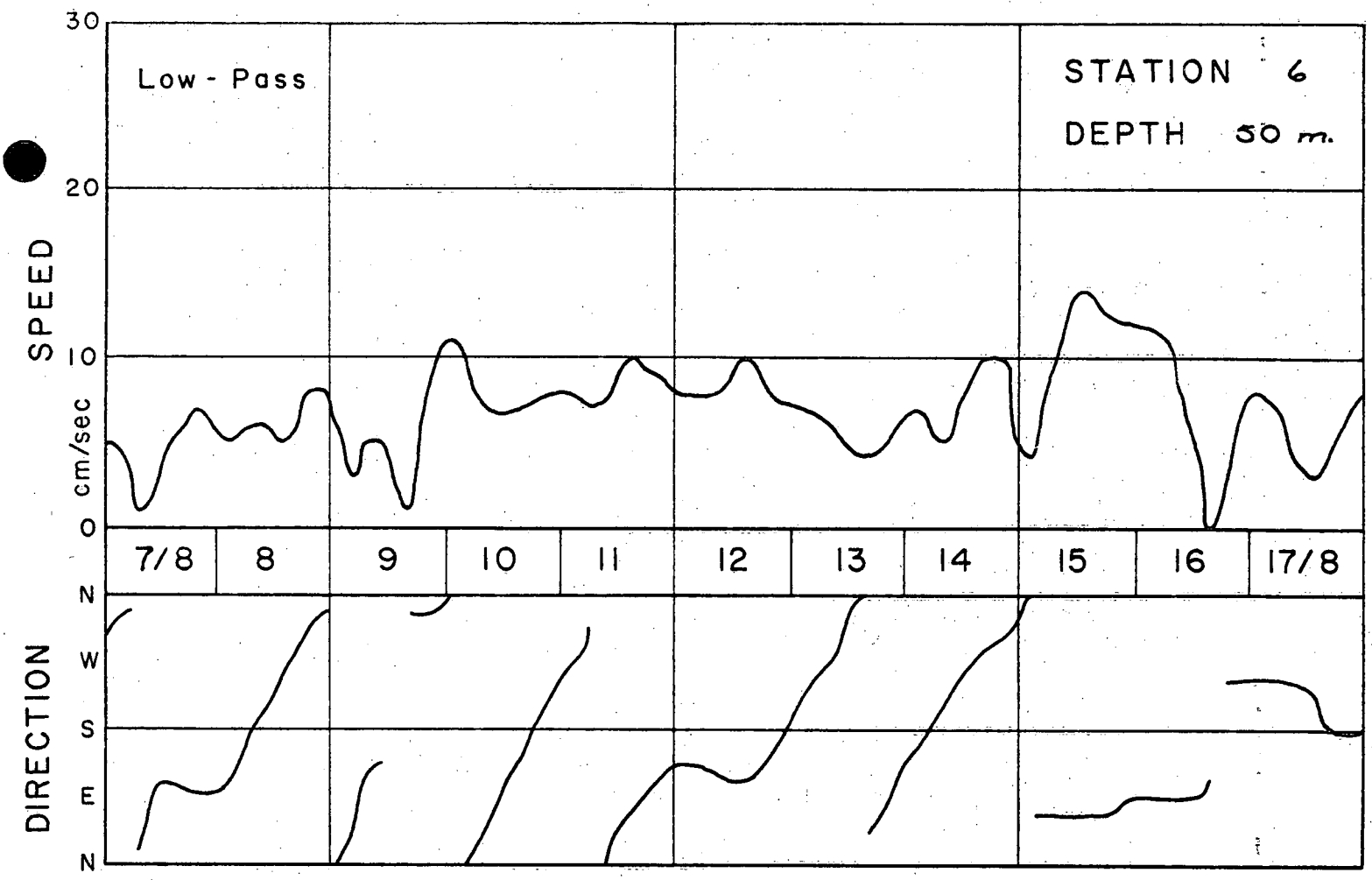
Low - Pass
STATION 6
DEPTH 50 m.
SPEED
cm/sec
30
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DIRECTION
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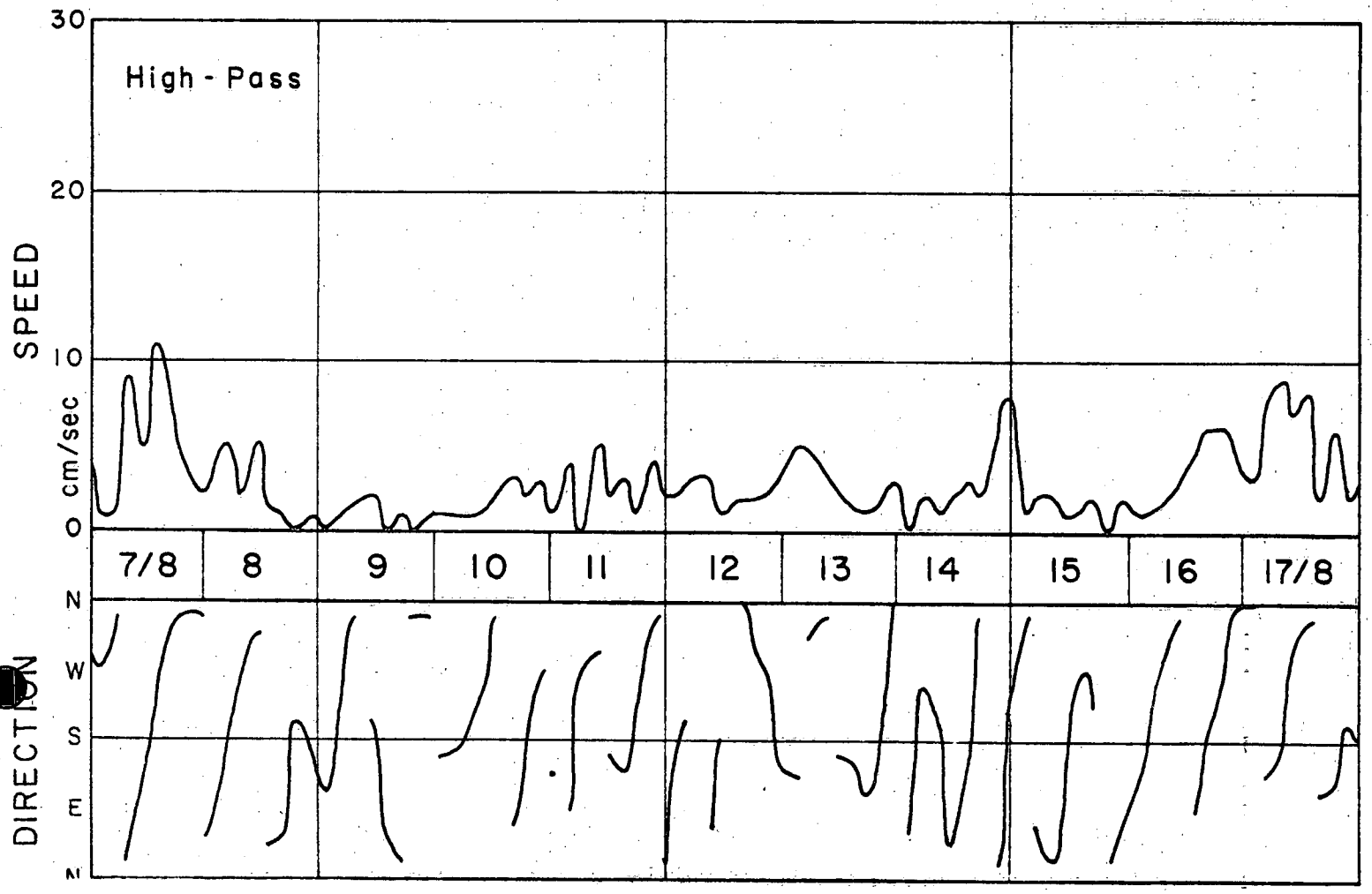
High - Pass
SPEED
cm/sec
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DIRECTION
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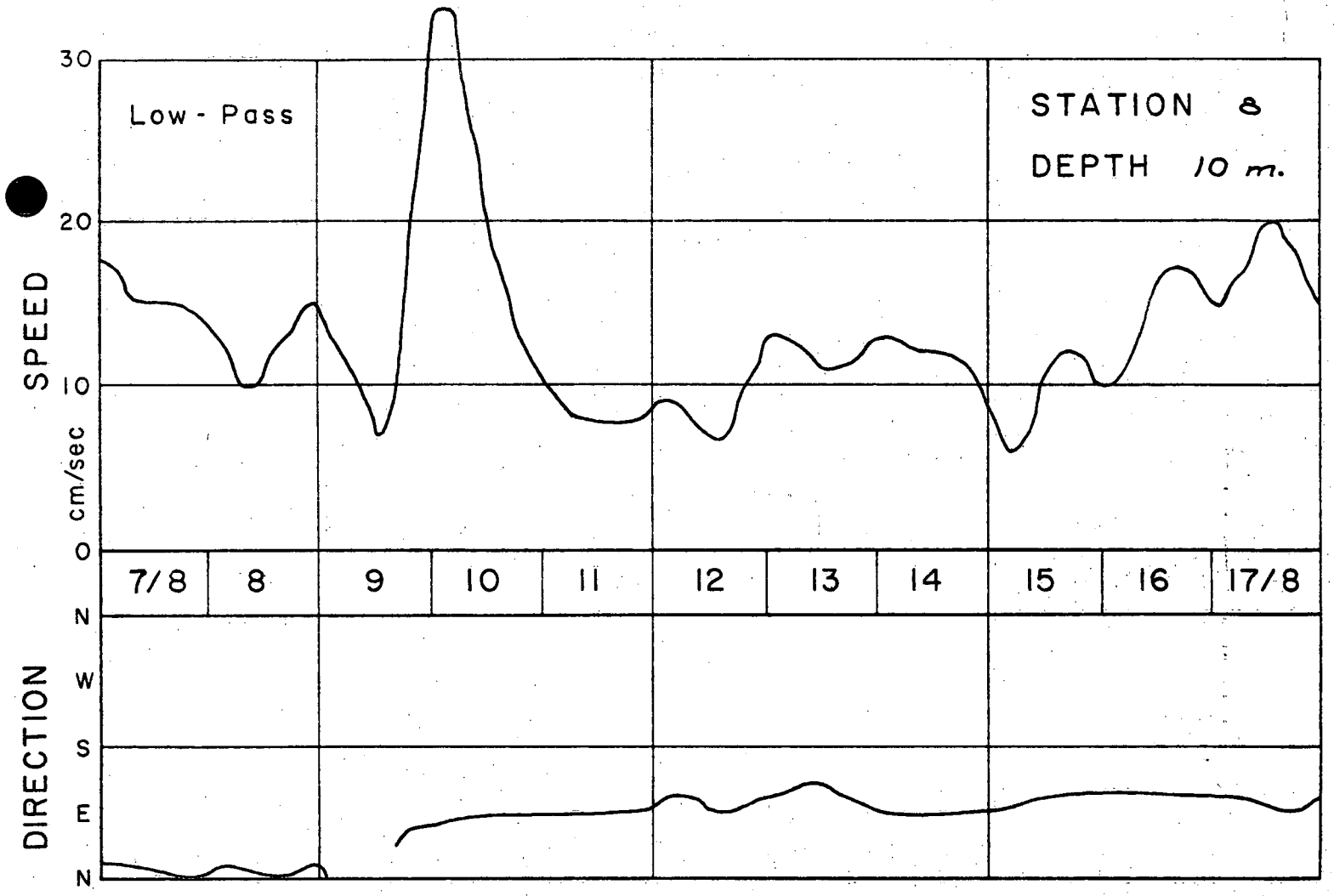
Low - Pass
STATION 8
DEPTH 10 m.
SPEED
cm/sec
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20
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17/8
DIRECTION
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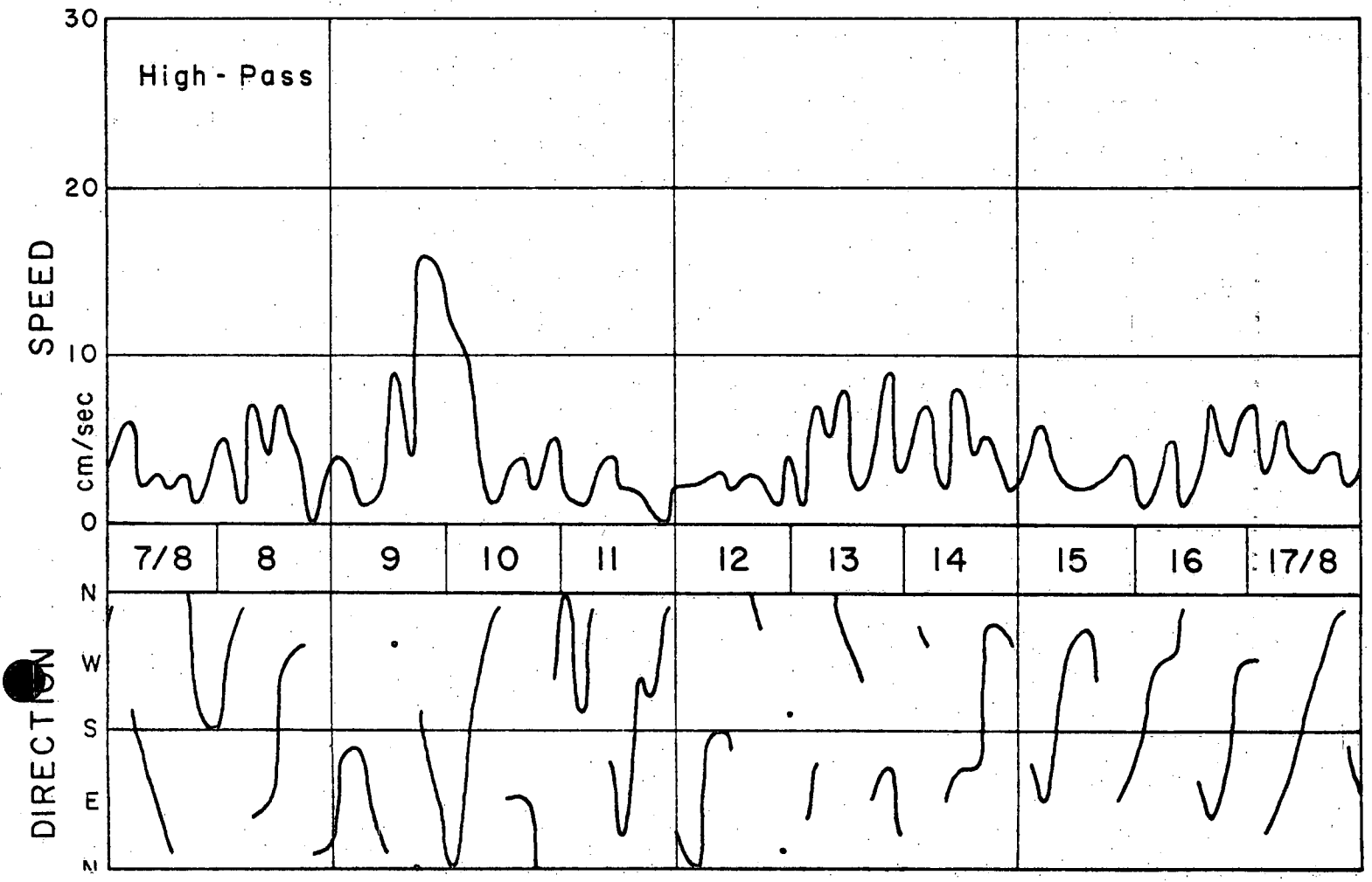
High - Pass
SPEED
cm/sec
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DIRECTION
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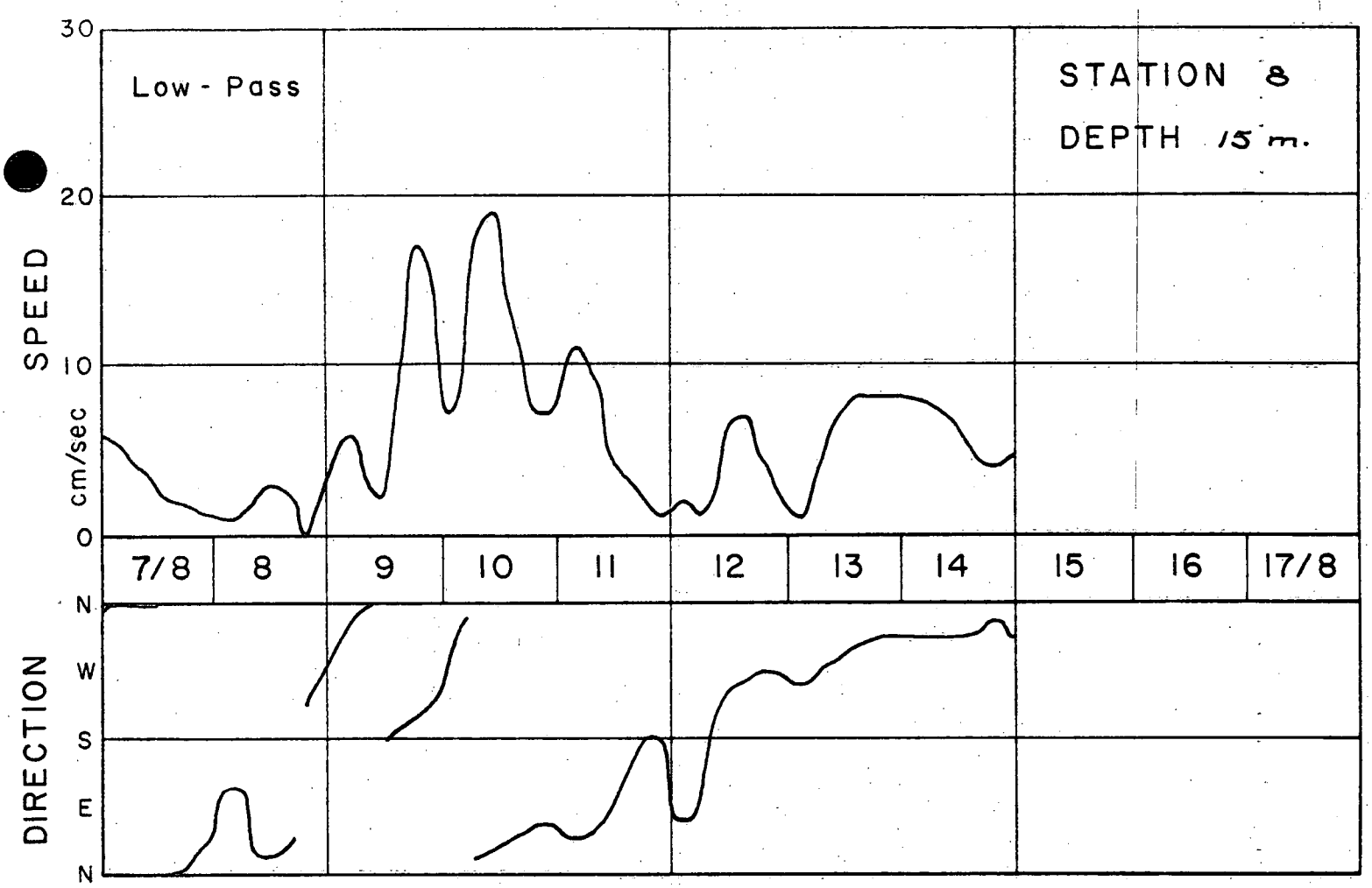
Low - Pass
STATION 8
DEPTH 15 m.
SPEED
cm/sec
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DIRECTION
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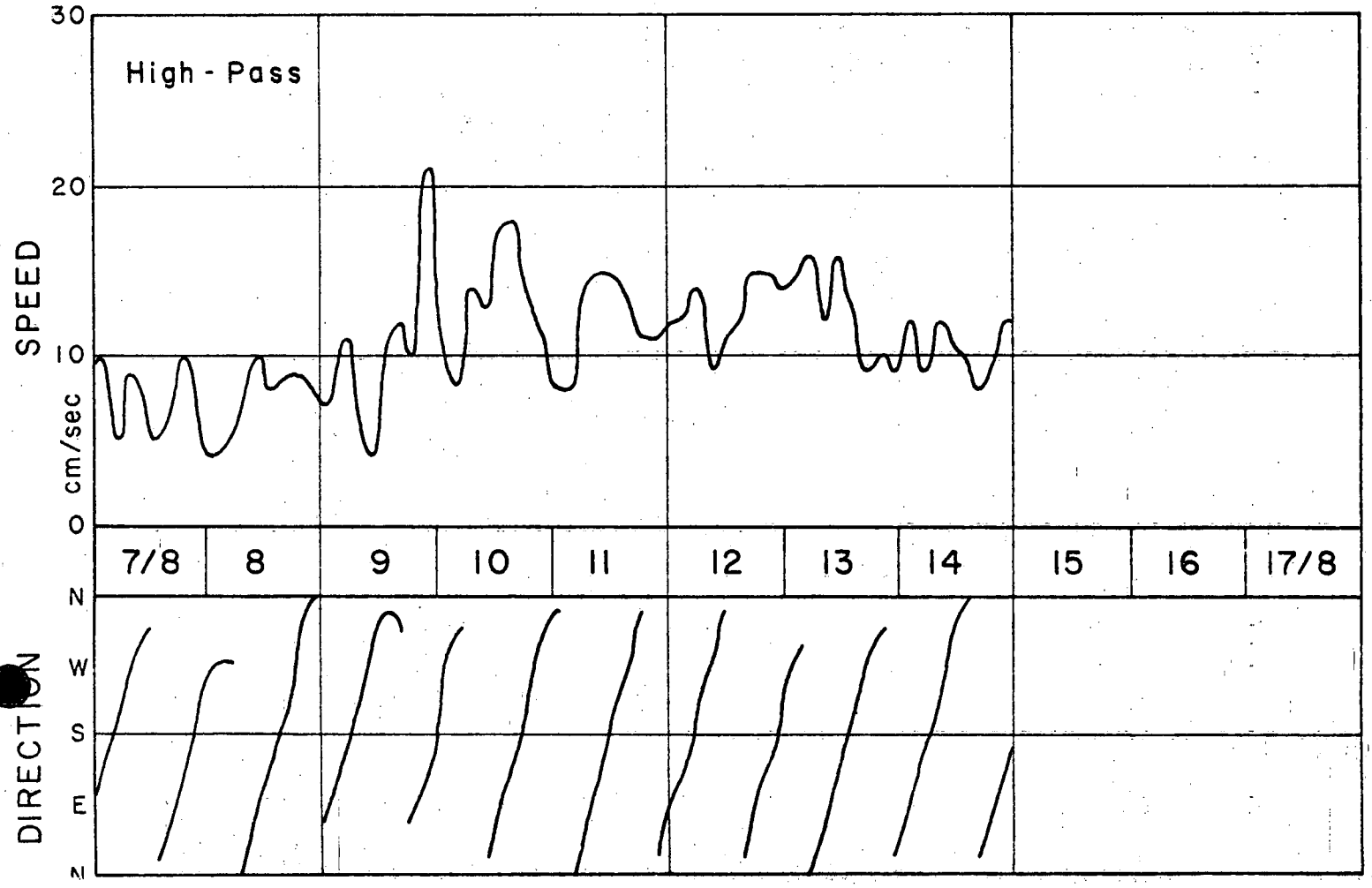
High - Pass
SPEED
cm/sec
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DIRECTION
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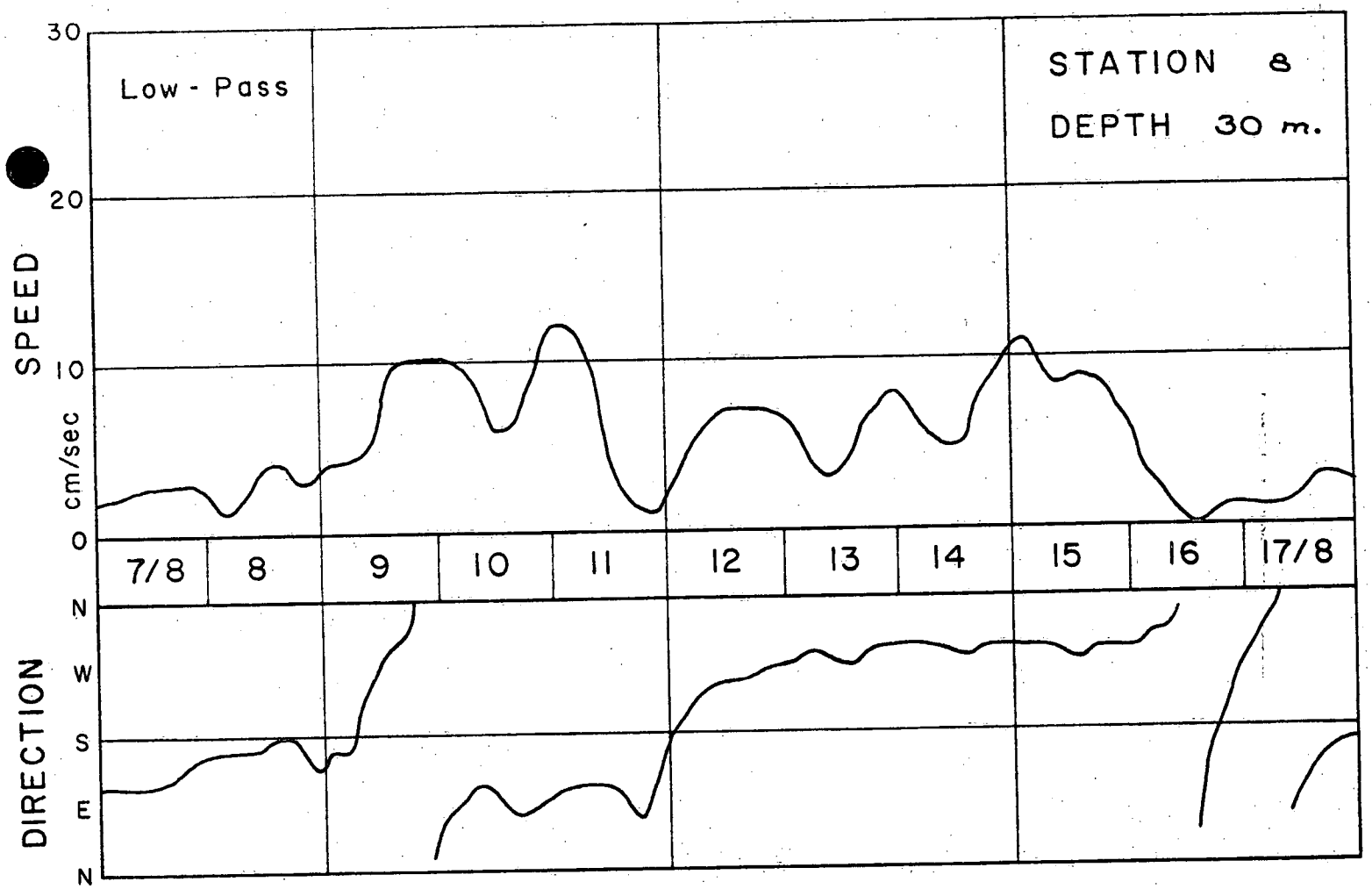
Low - Pass
STATION 8
DEPTH 30 m.
SPEED
cm/sec
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DIRECTION
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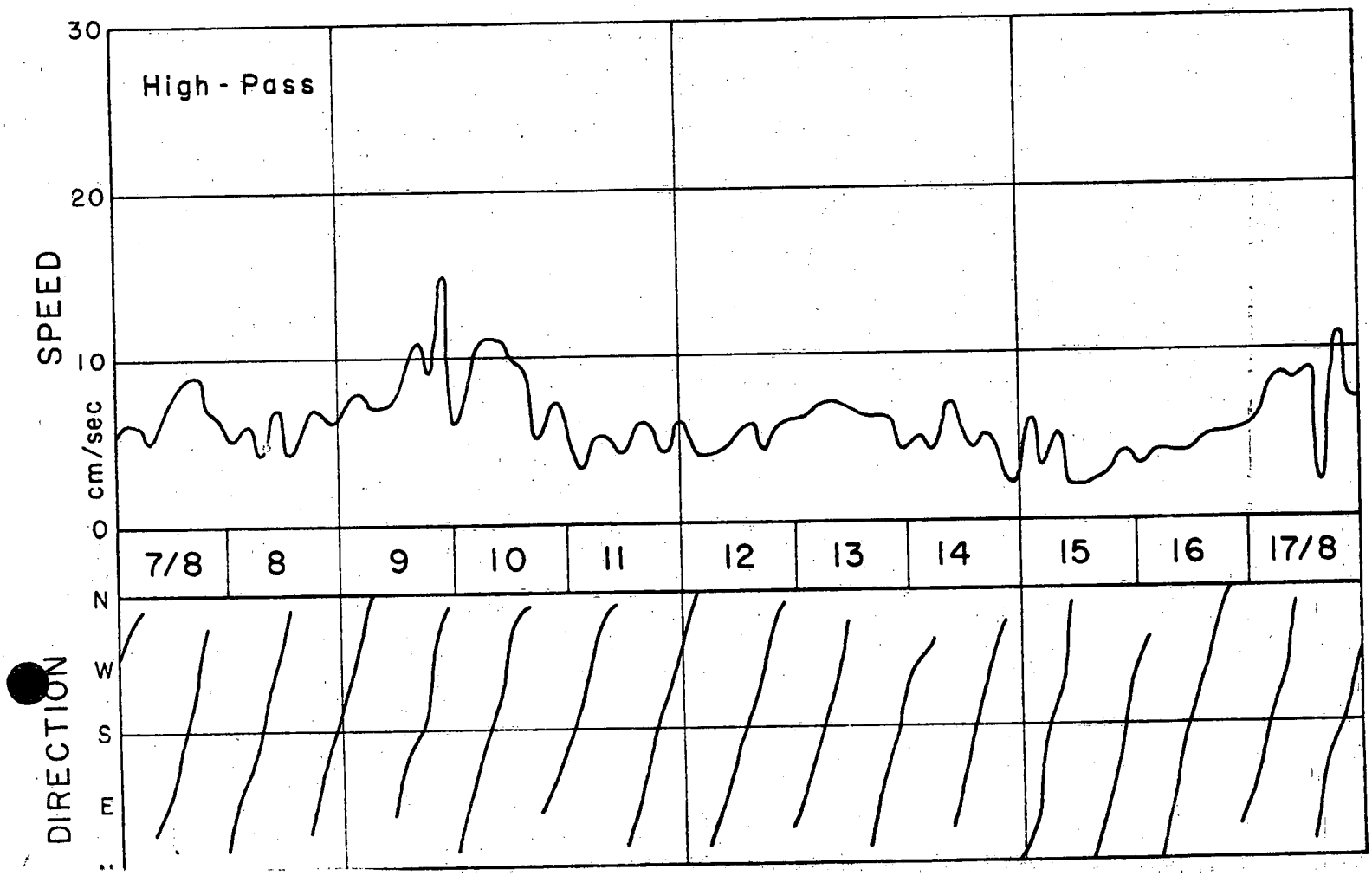
High - Pass
SPEED
cm/sec
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DIRECTION
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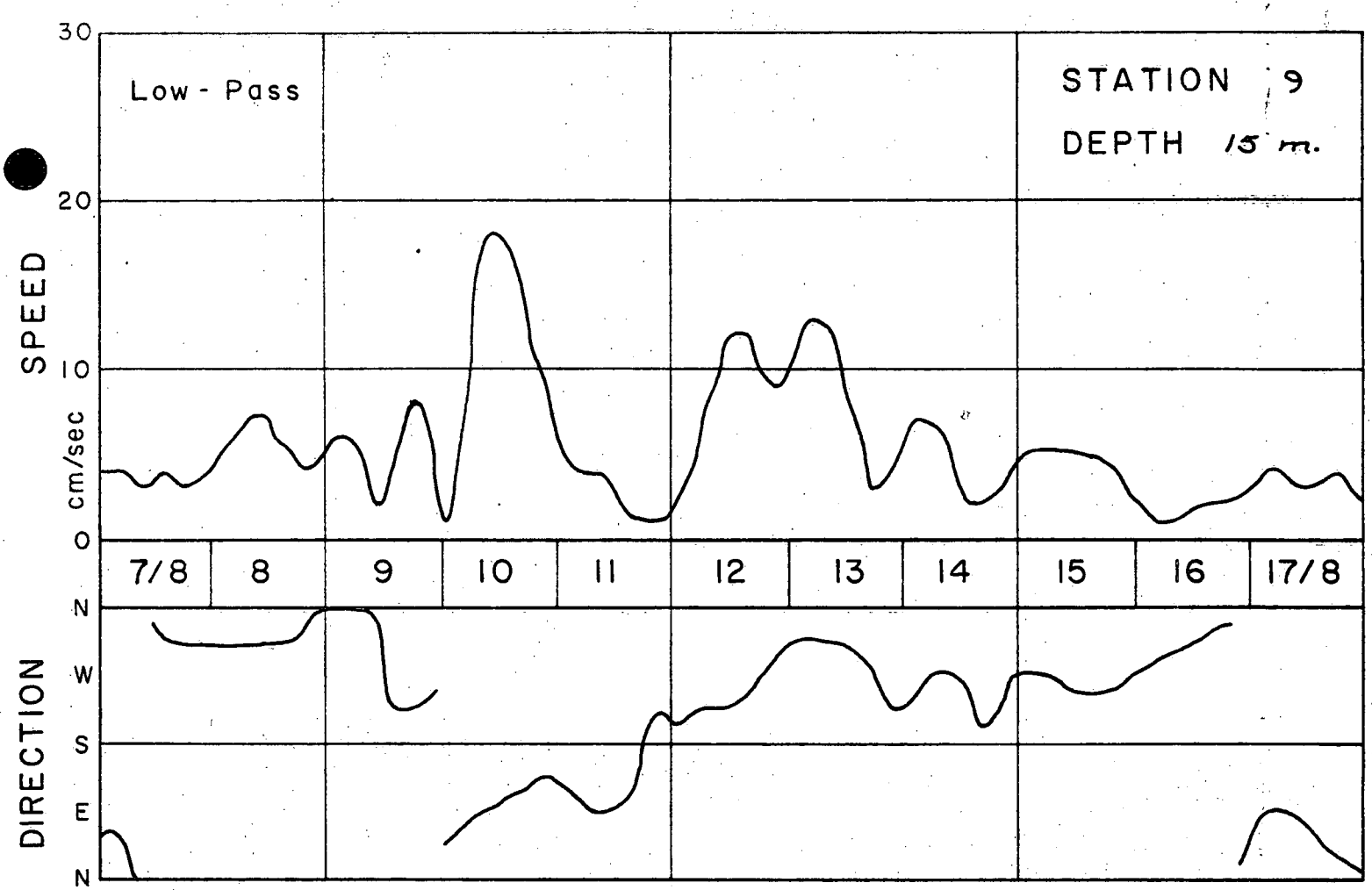
Low - Pass
STATION 9
DEPTH 15 m.
SPEED
cm/sec
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DIRECTION
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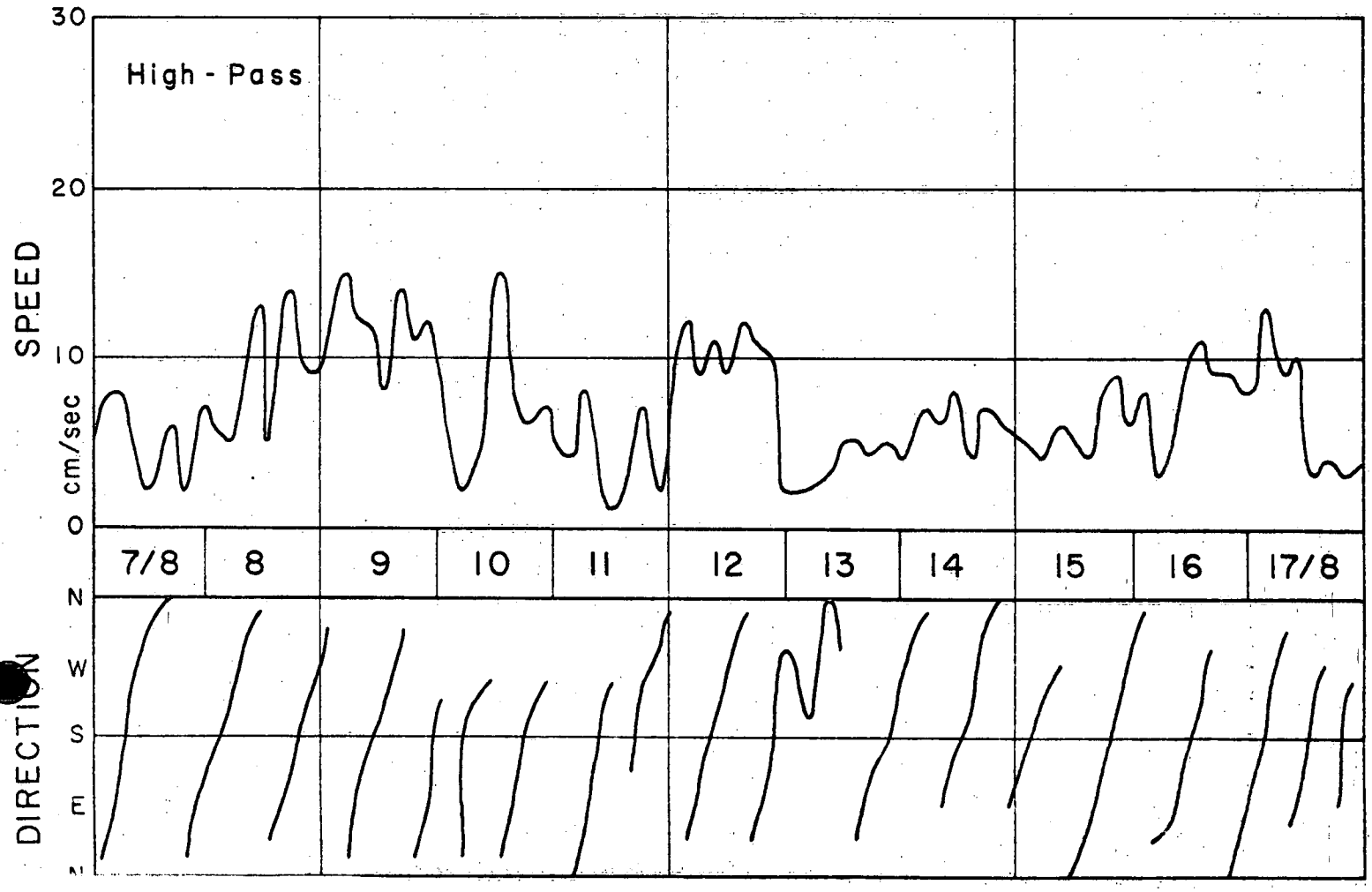
High - Pass
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cm/sec
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DIRECTION
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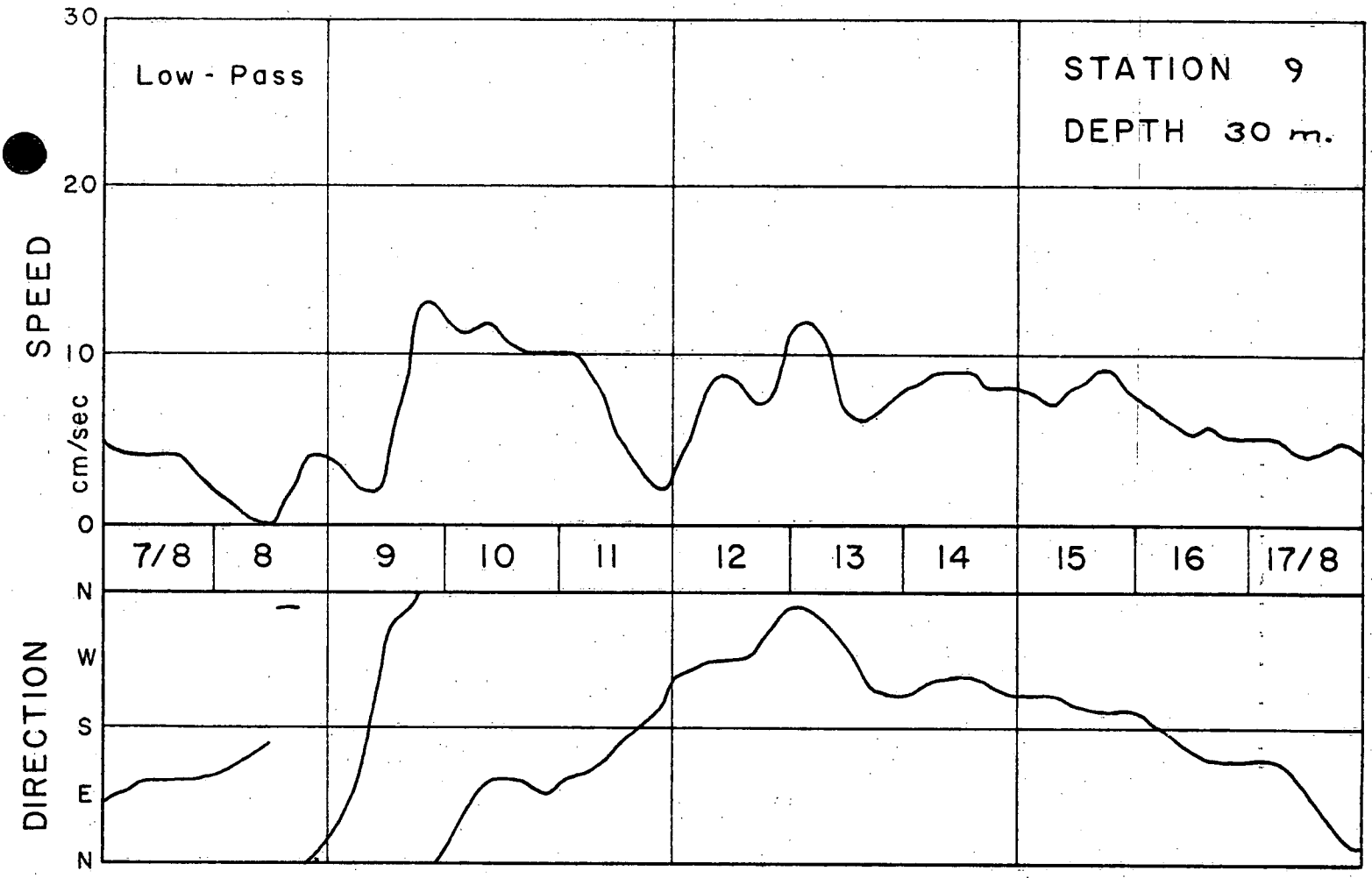
Low - Pass
STATION 9
DEPTH 30 m.
SPEED
cm/sec
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DIRECTION
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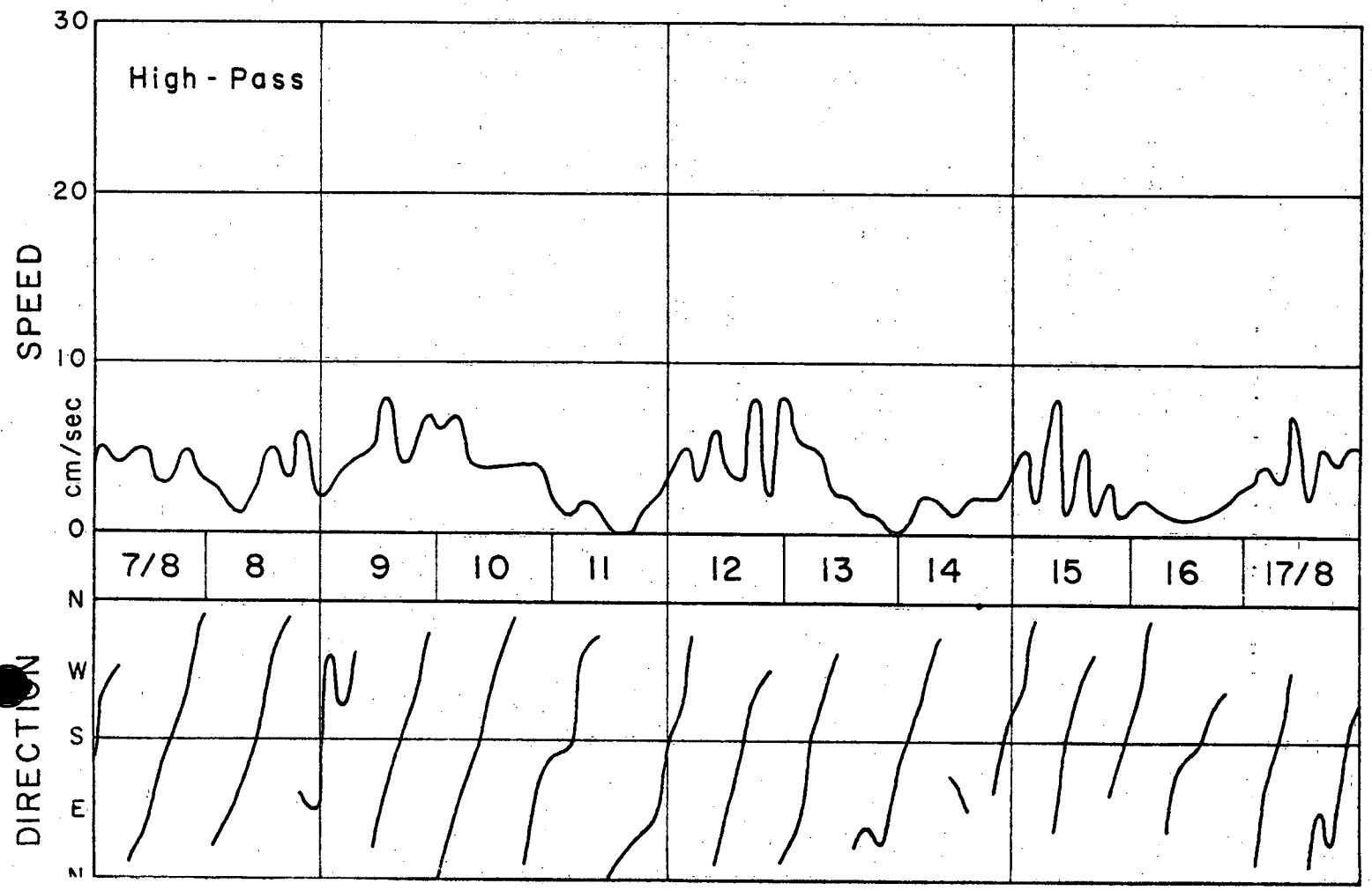
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DIRECTION
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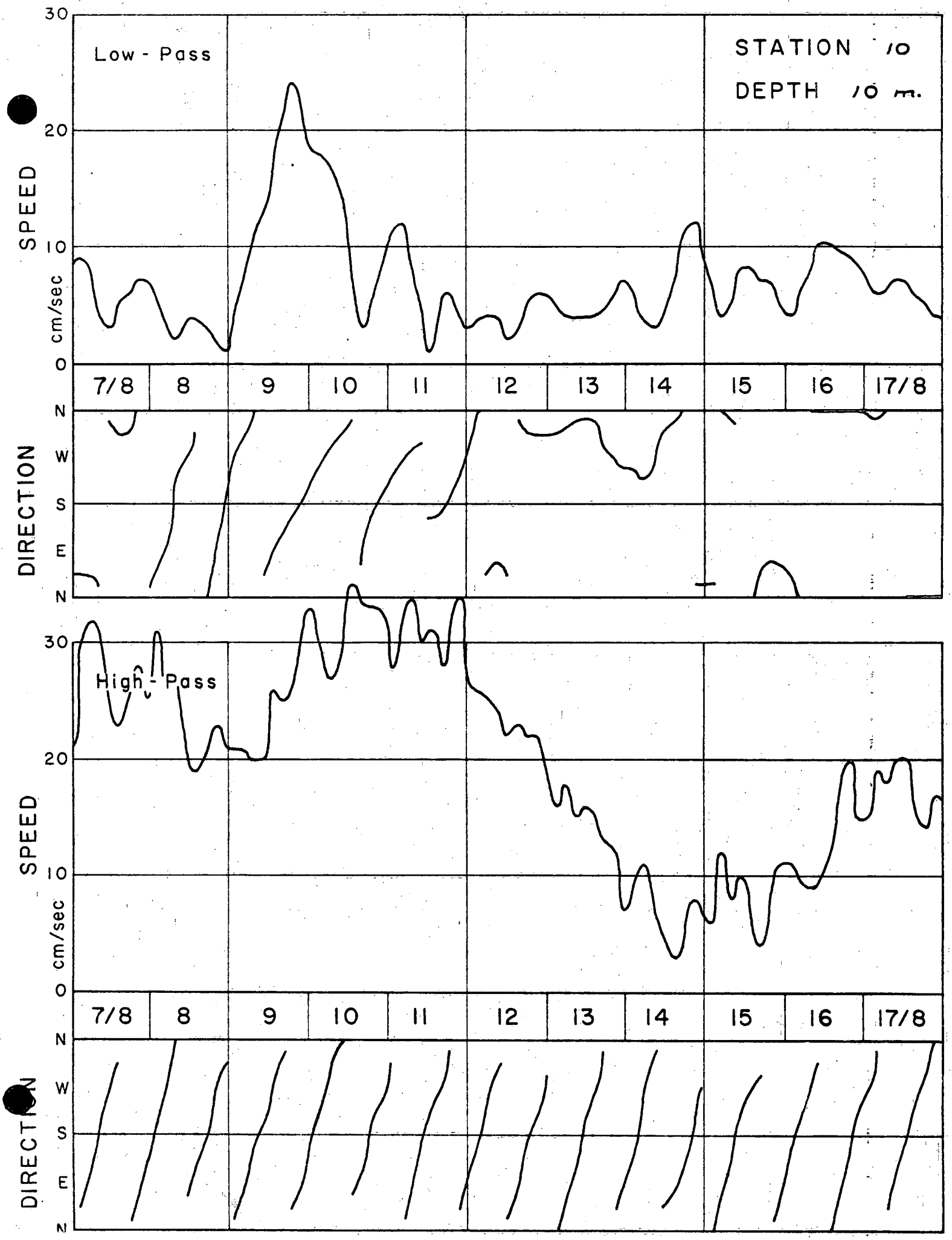
Low - Pass
STATION 10
DEPTH 10 m.
SPEED
cm/sec
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DIRECTION
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High - Pass
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DIRECTION
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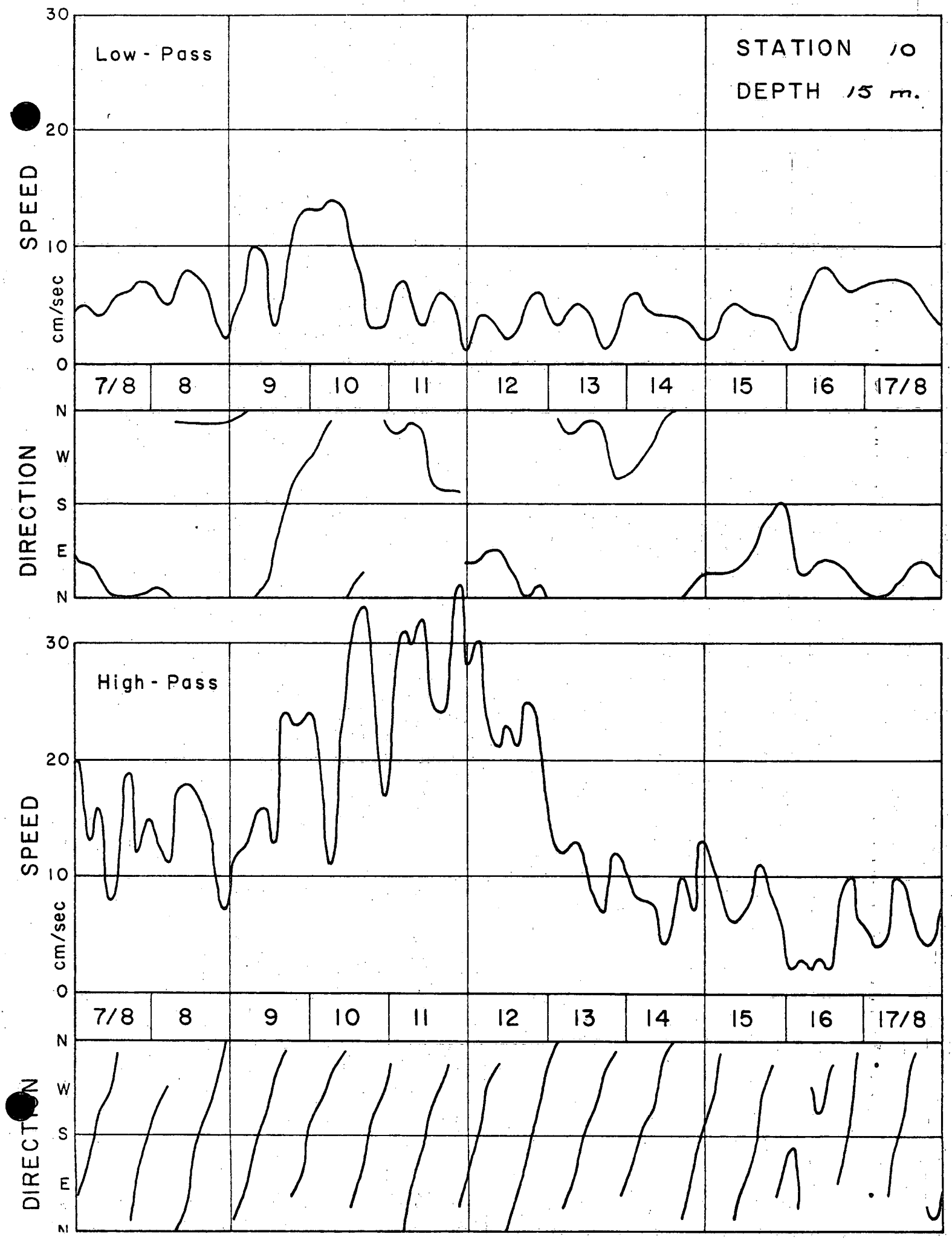
Low - Pass
STATION 10
DEPTH 15 m.
SPEED
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DIRECTION
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High - Pass
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DIRECTION
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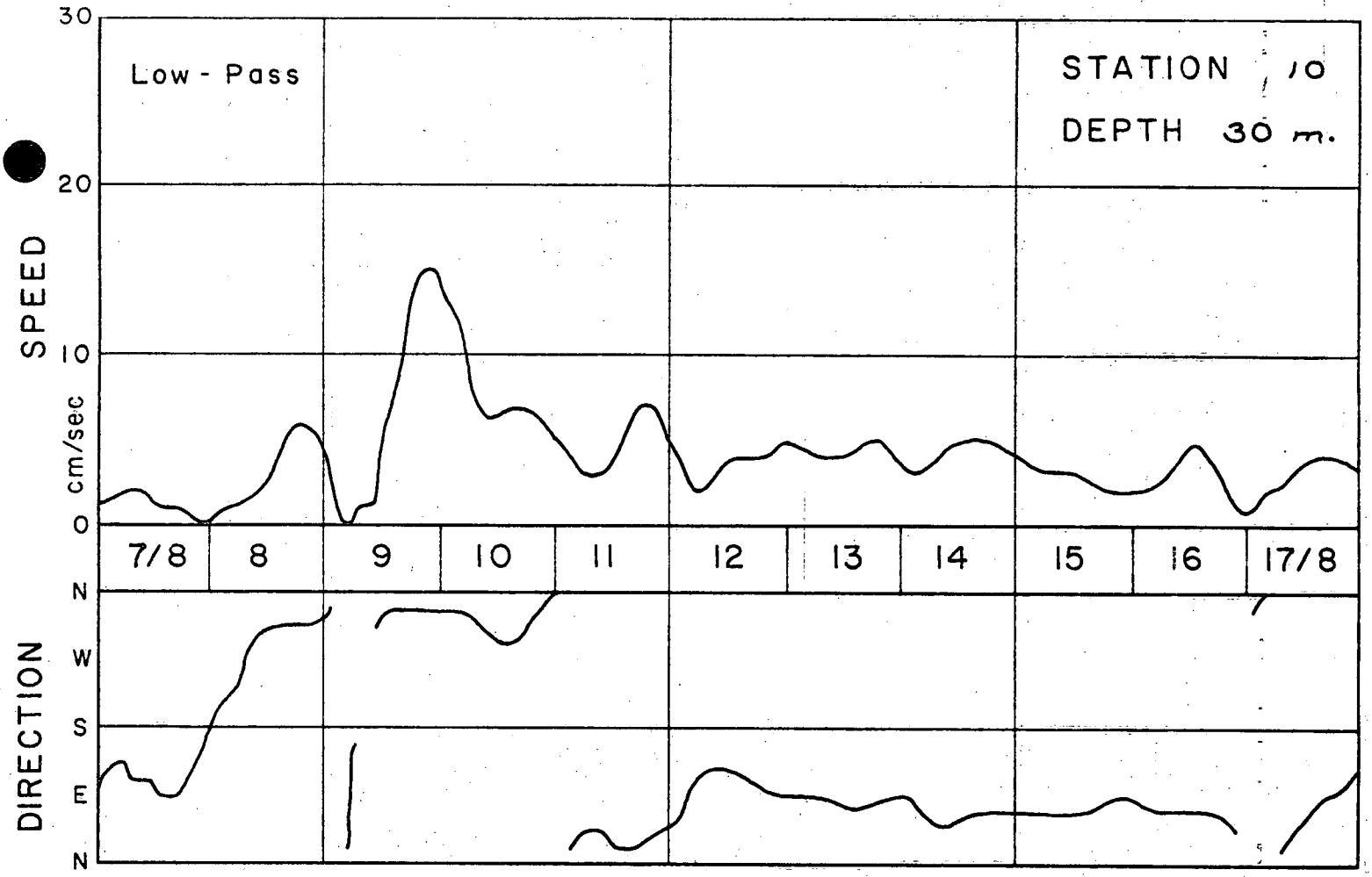
Low - Pass
STATION 10
DEPTH 30 m.
SPEED
cm/sec
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DIRECTION
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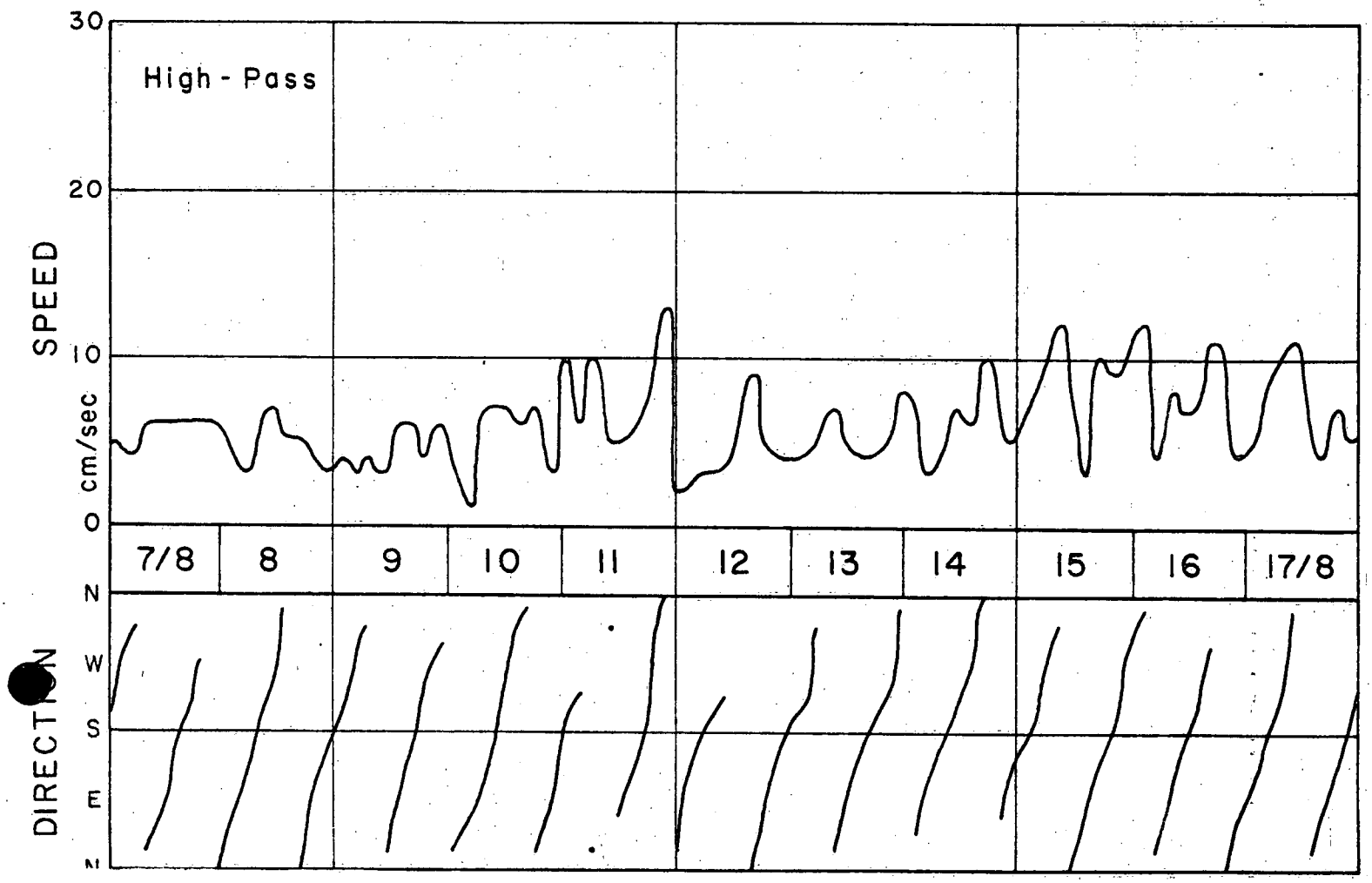
High - Pass
SPEED
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DIRECTION
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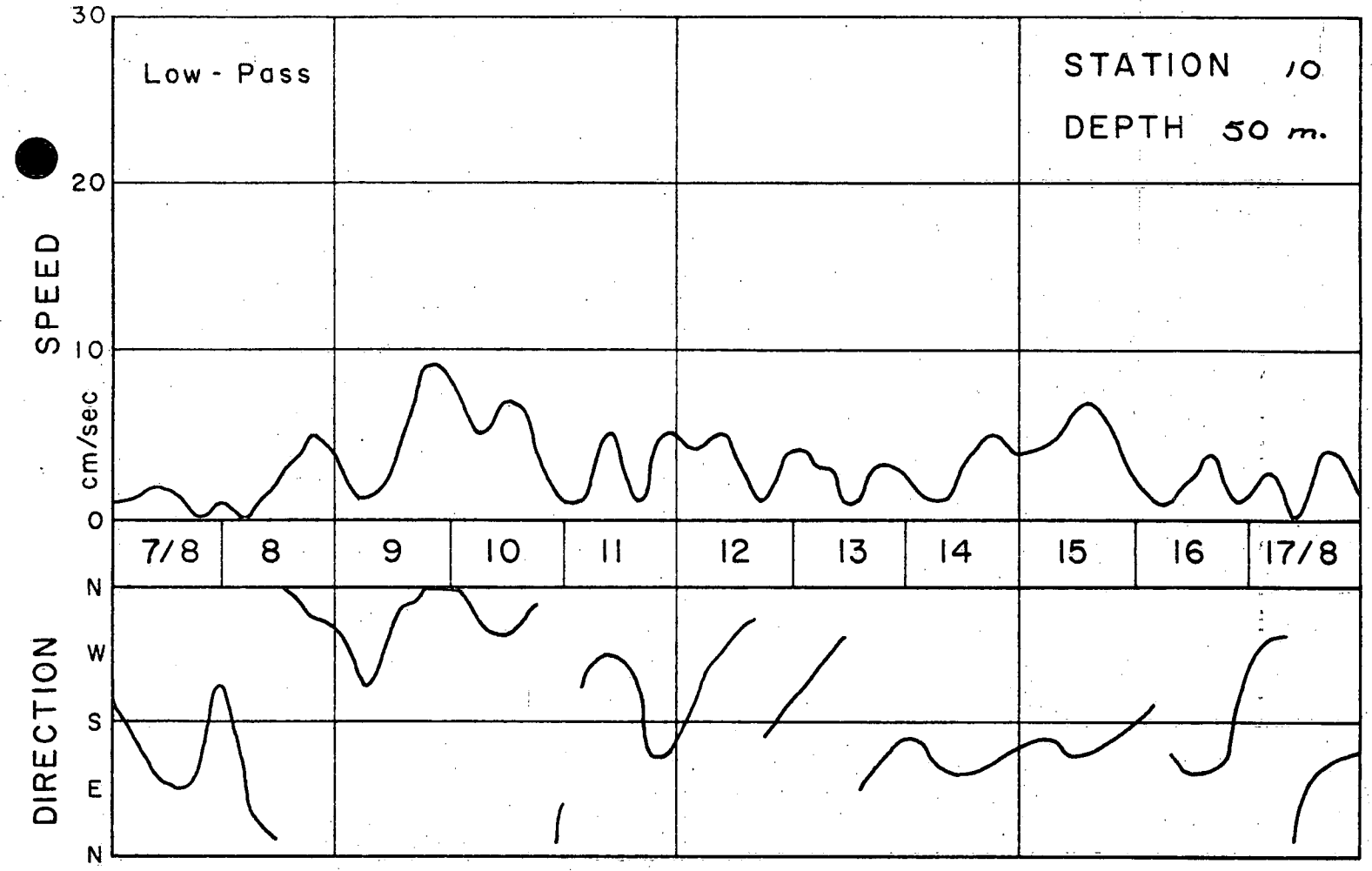
Low - Pass
STATION 10
DEPTH 50 m.
SPEED
cm/sec
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DIRECTION
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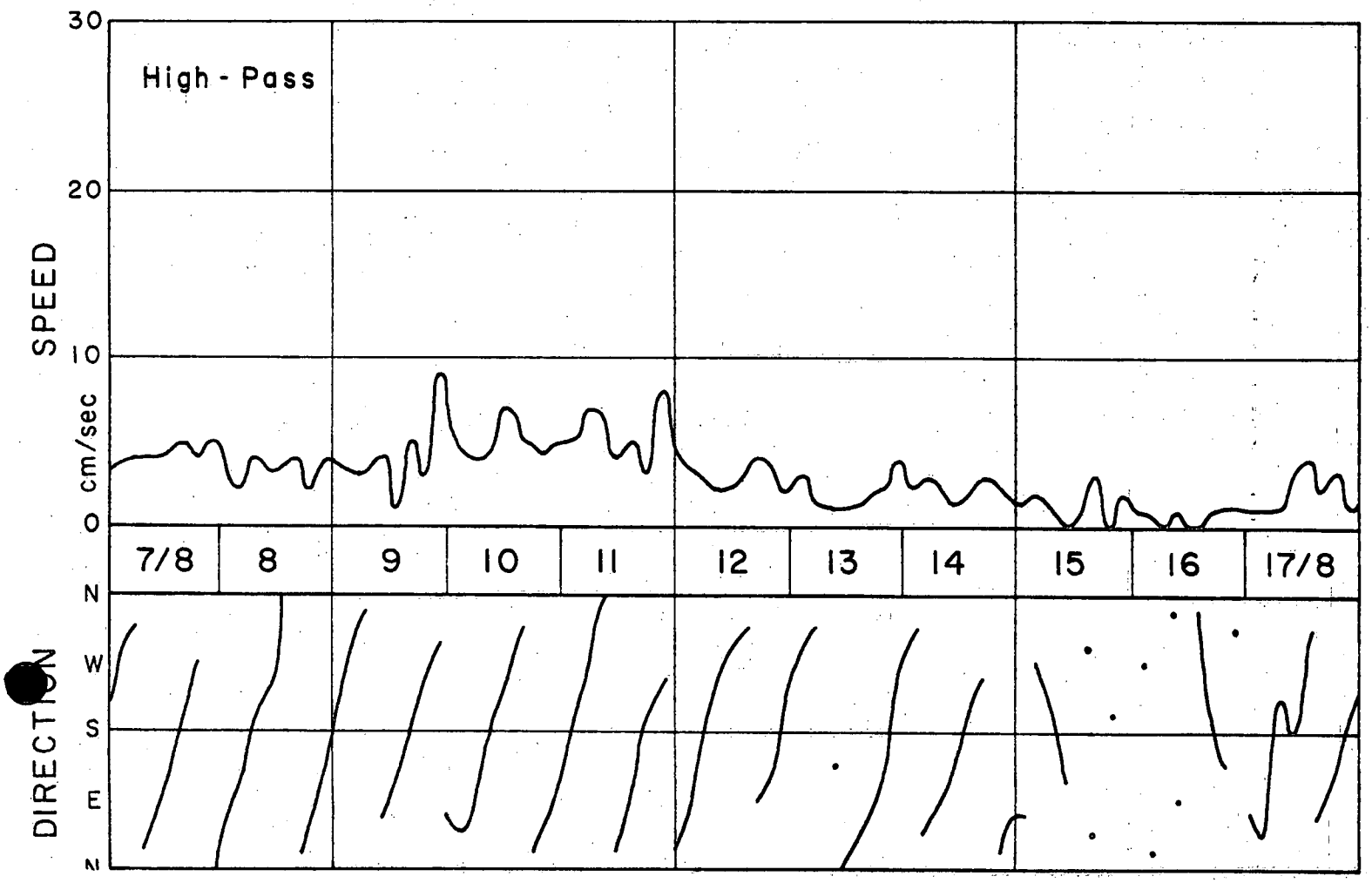
High - Pass
SPEED
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DIRECTION
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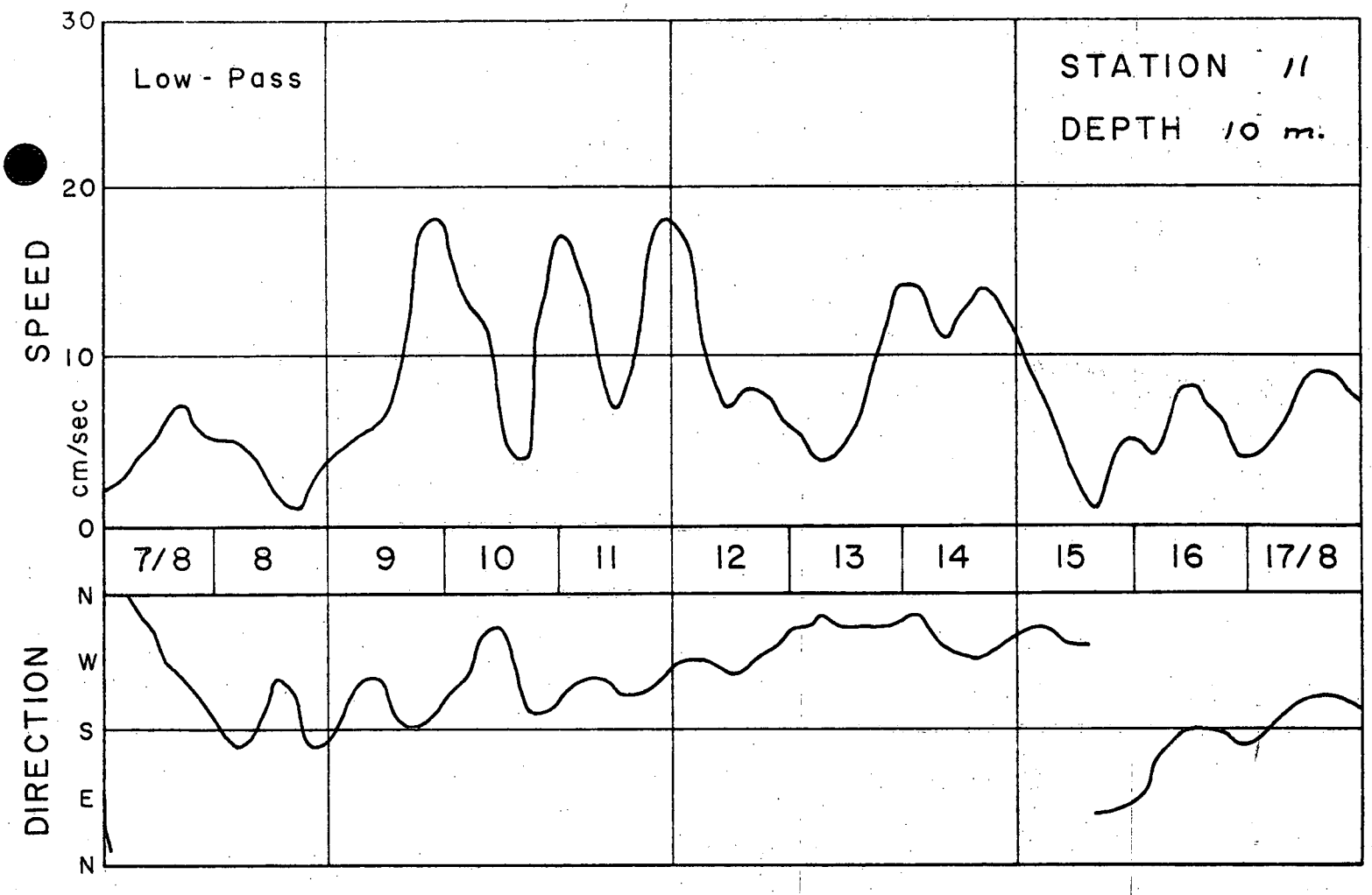
Low - Pass
STATION 11
DEPTH 10 m.
SPEED
cm/sec
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DIRECTION
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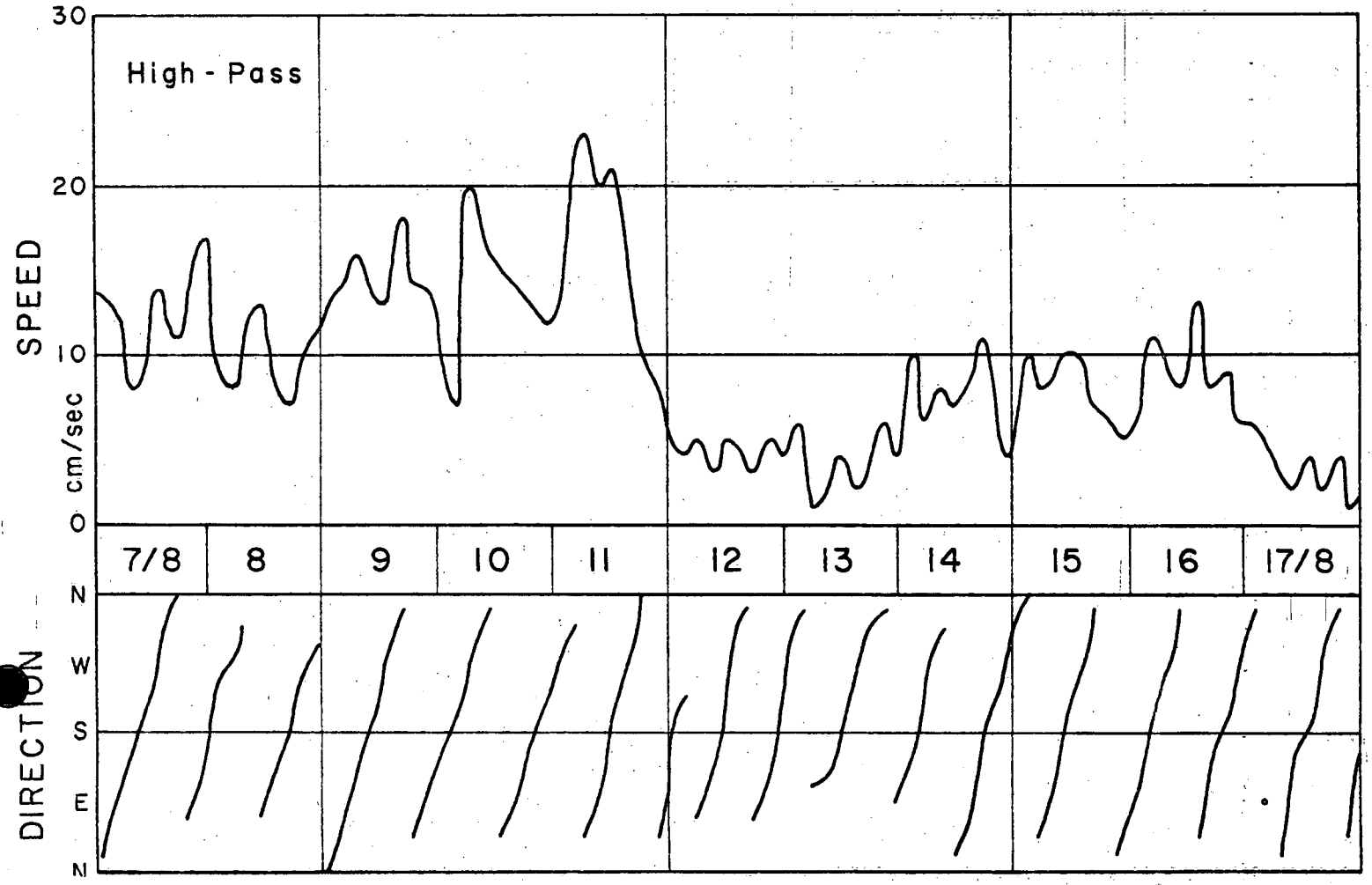
High - Pass
SPEED
cm/sec
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DIRECTION
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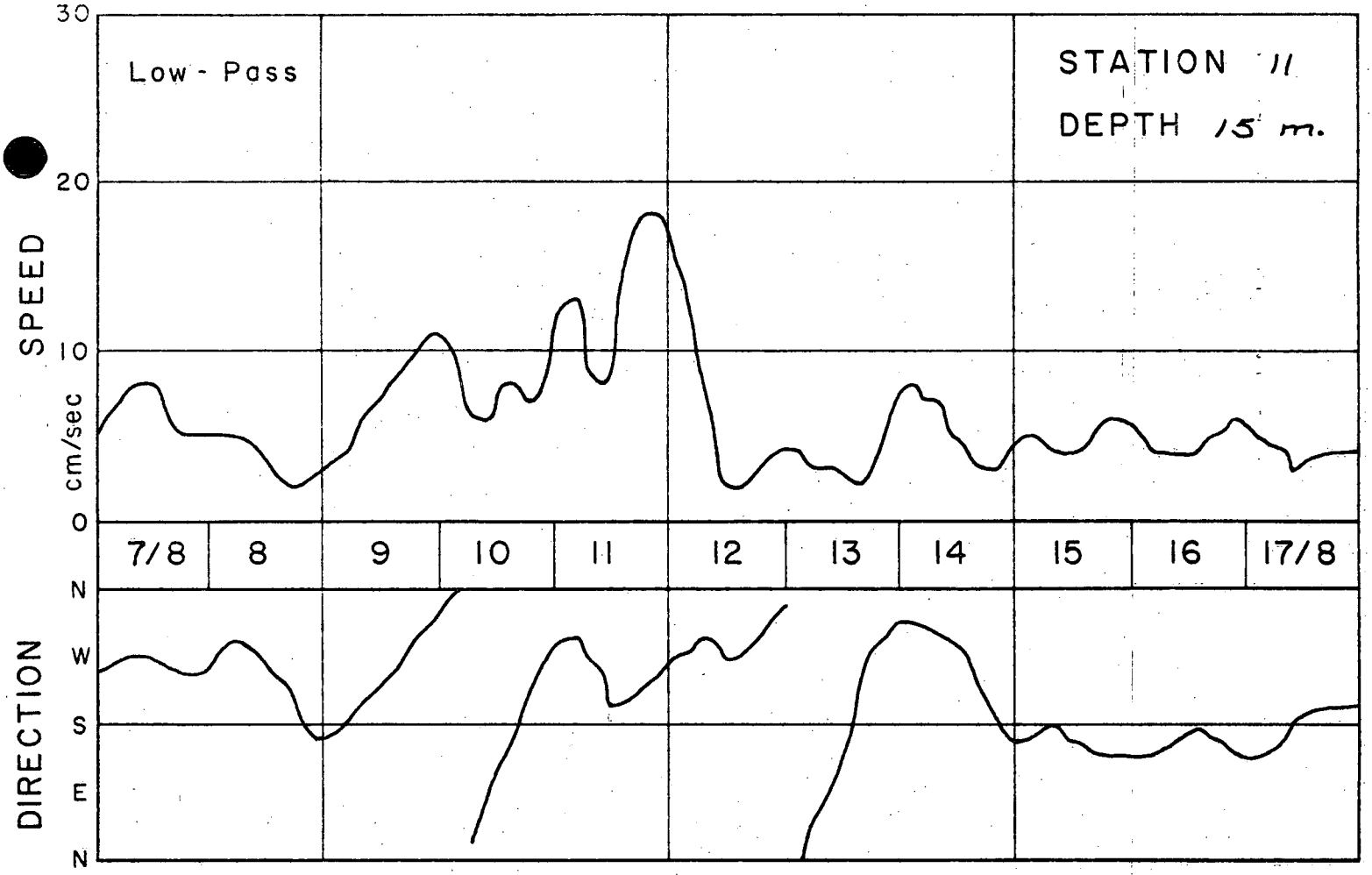
Low - Pass
STATION 11
DEPTH 15 m.
SPEED
cm/sec
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DIRECTION
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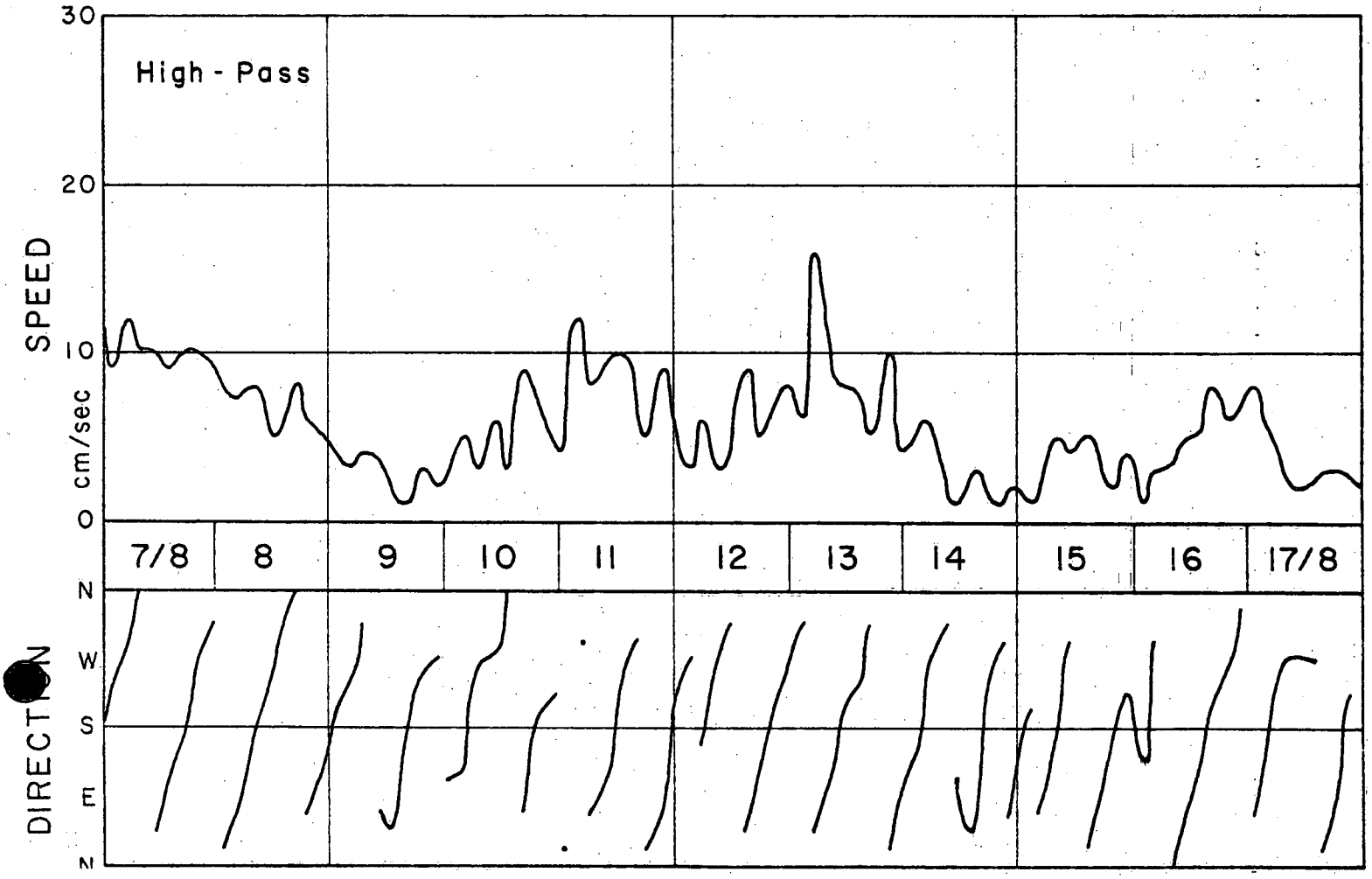
High - Pass
SPEED
cm/sec
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17/8
DIRECTION
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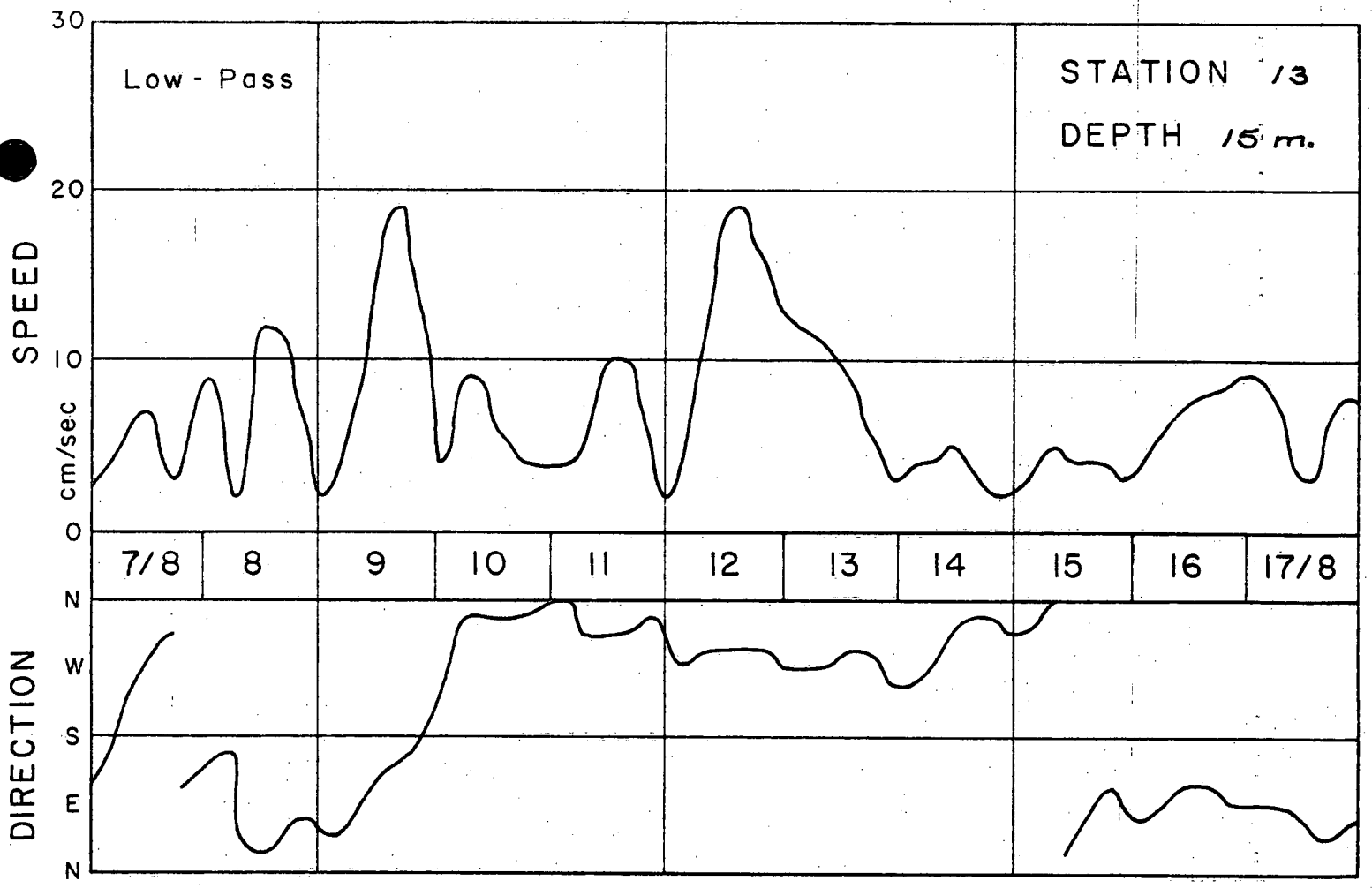
Low - Pass
STATION 13
DEPTH 15 m.
SPEED
cm/sec
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DIRECTION
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E
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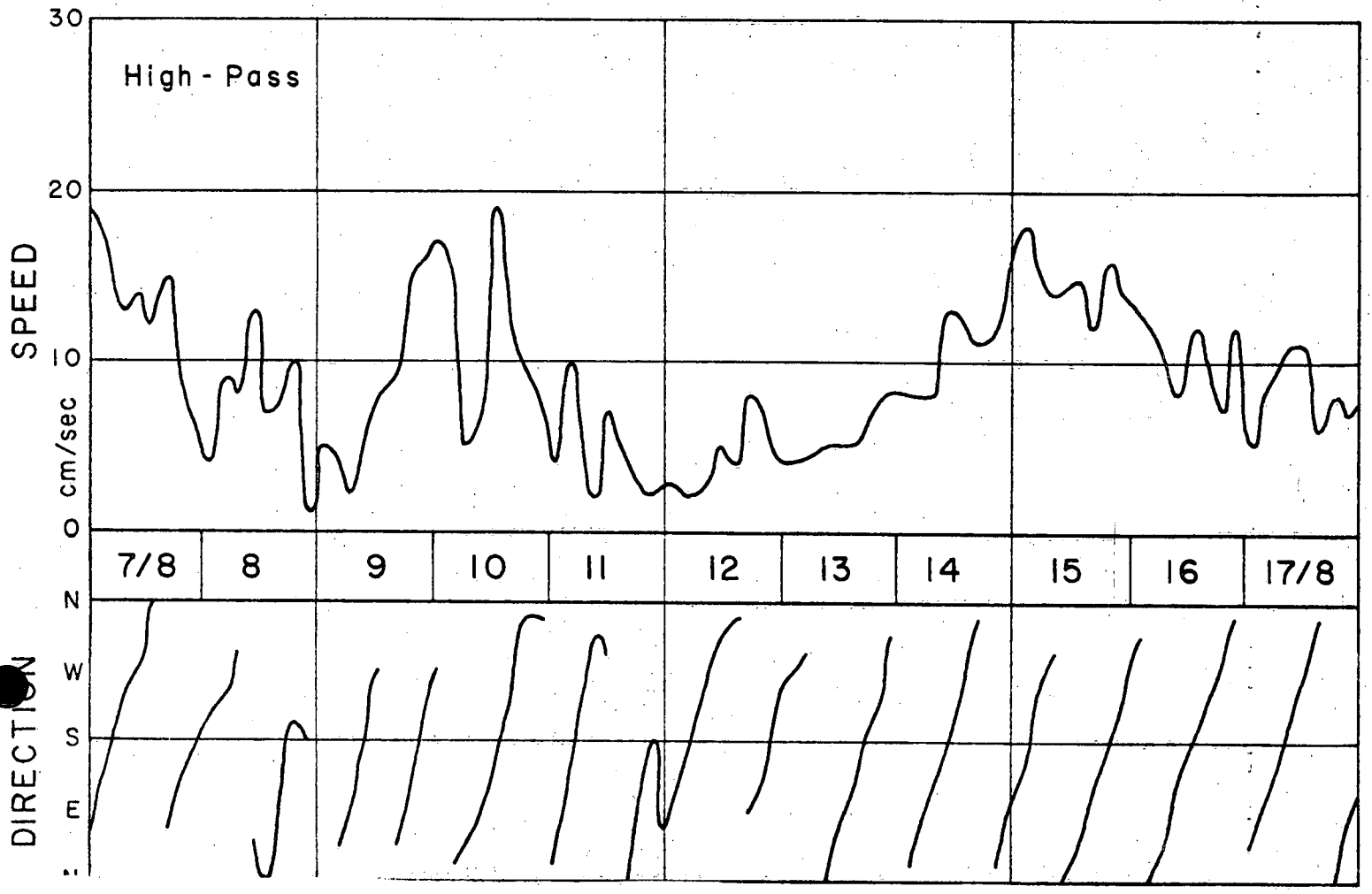
High - Pass
SPEED
cm/sec
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DIRECTION
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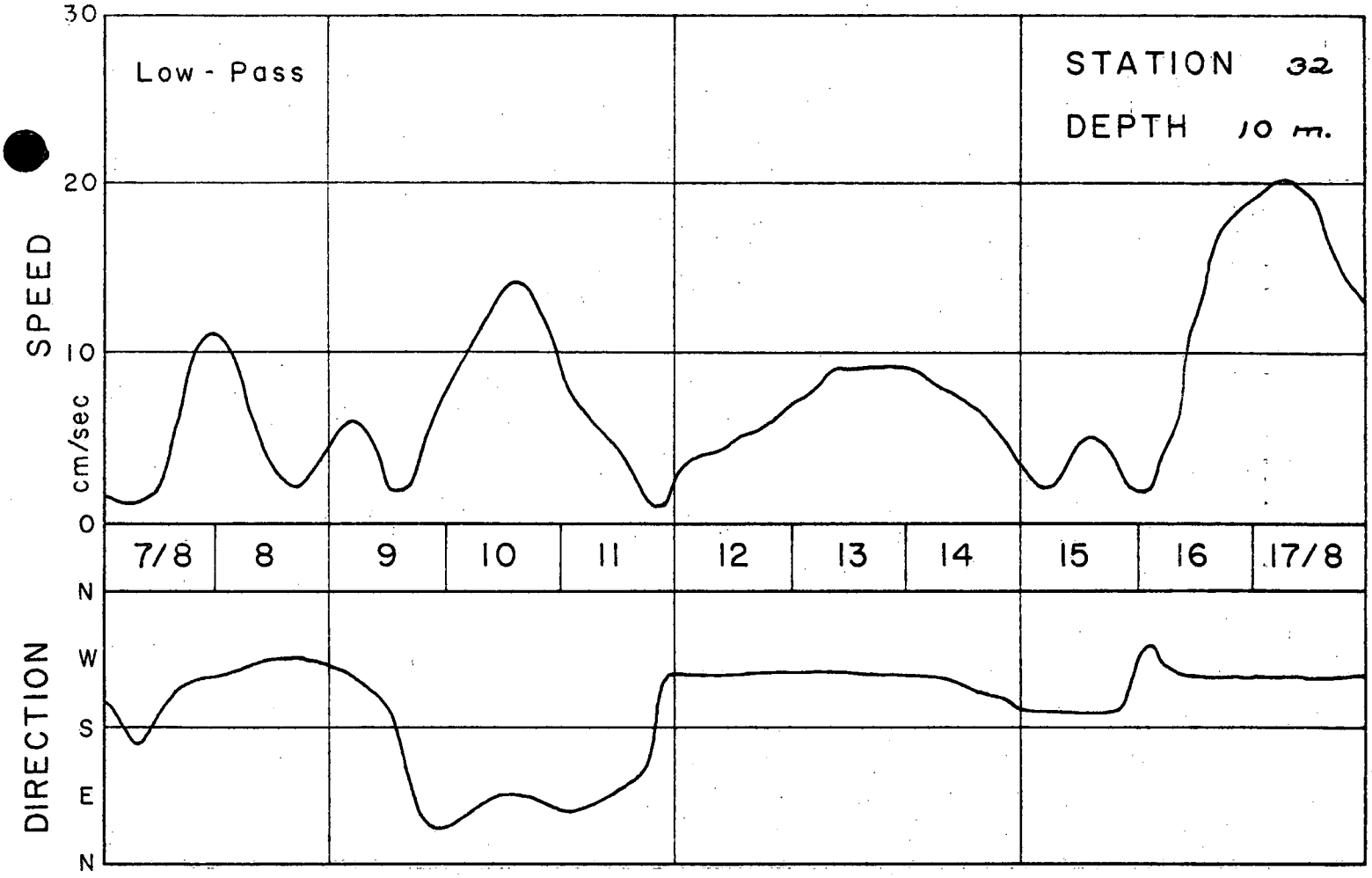
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cm/sec
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DIRECTION
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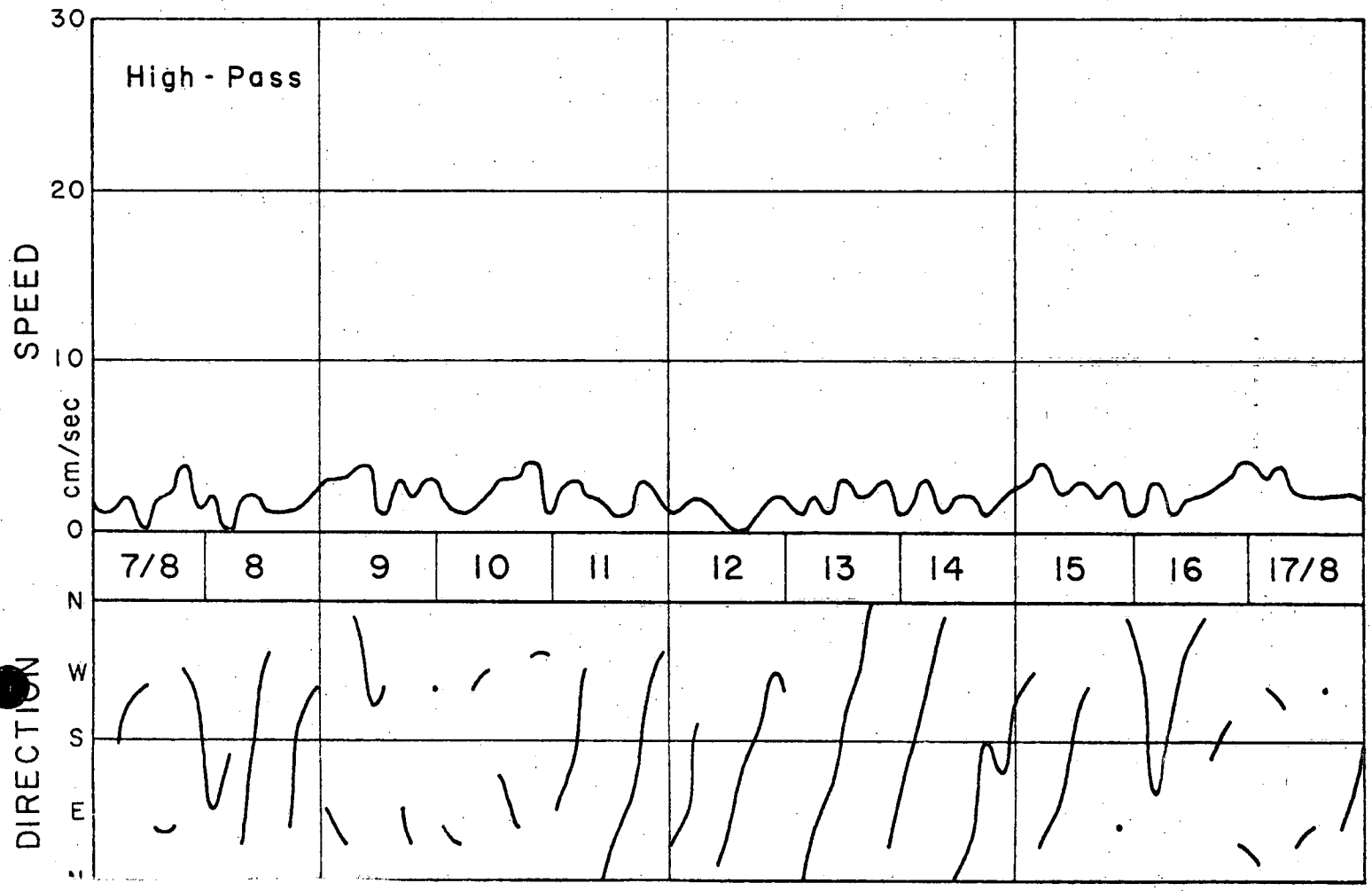
High - Pass
SPEED
cm/sec
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DIRECTION
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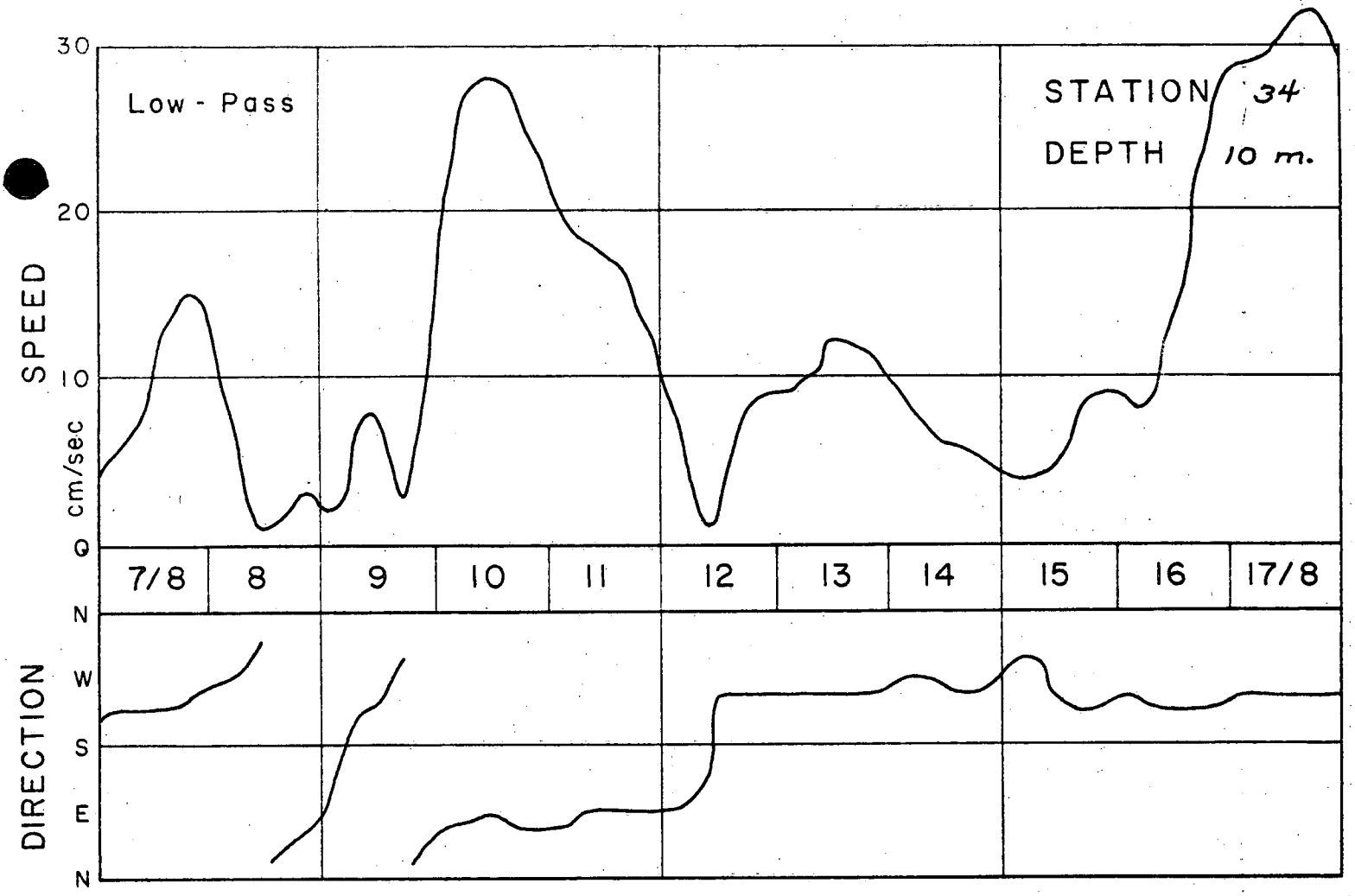
Low - Pass
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SPEED
cm/sec
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DIRECTION
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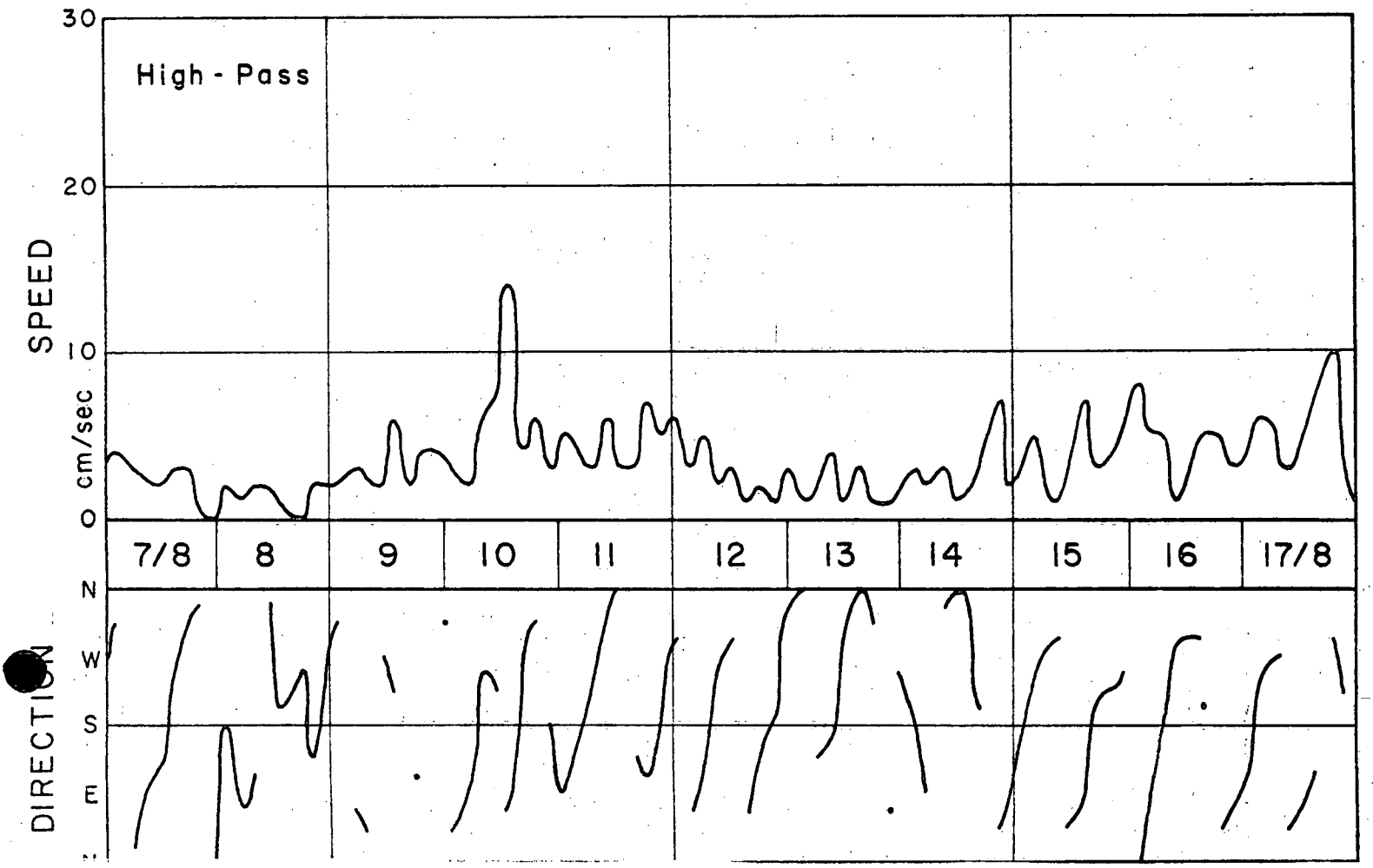
High - Pass
SPEED
cm/sec
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DIRECTION
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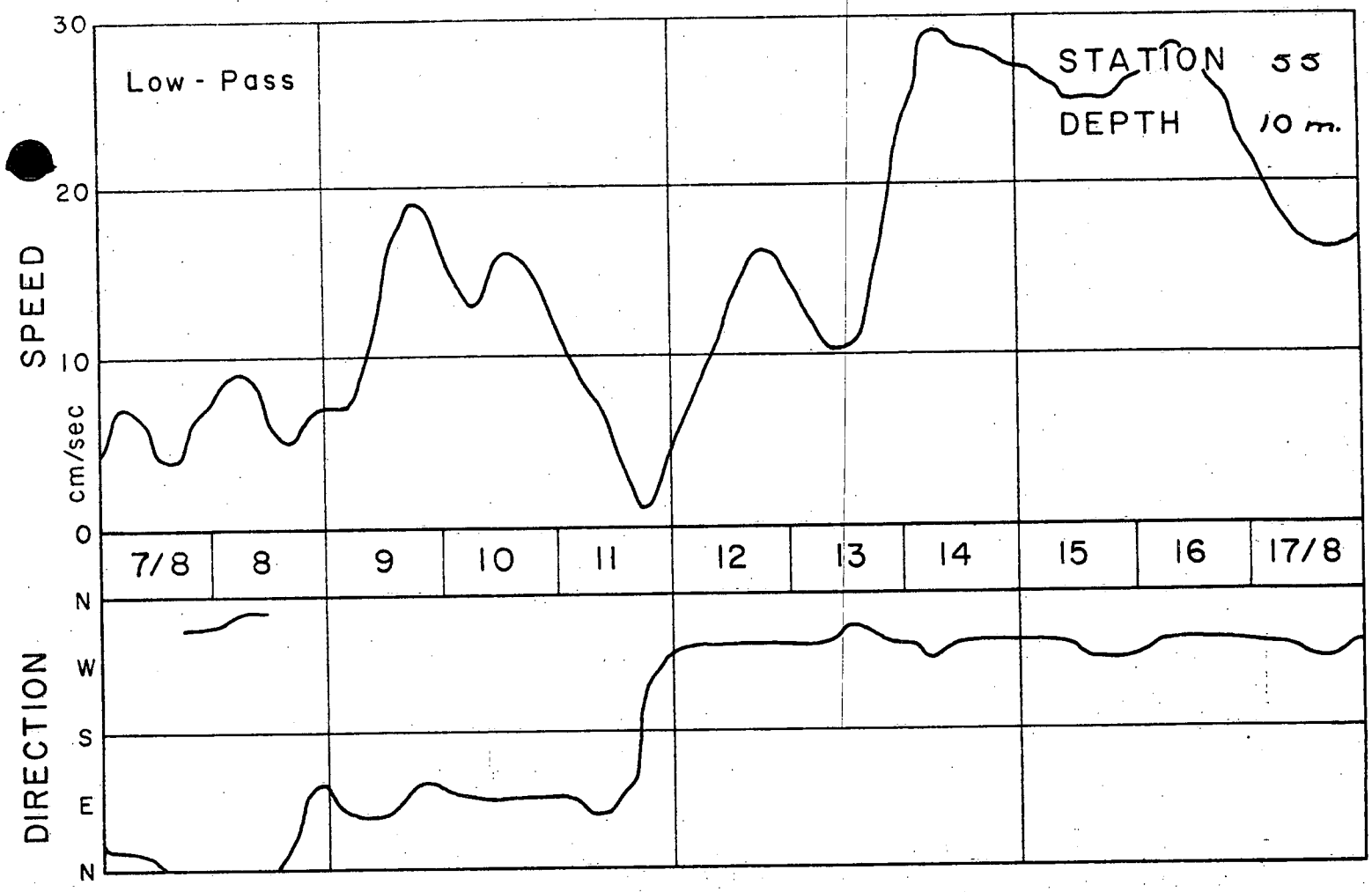
Low - Pass
STATION 55
DEPTH 10 m.
SPEED
cm/sec
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DIRECTION
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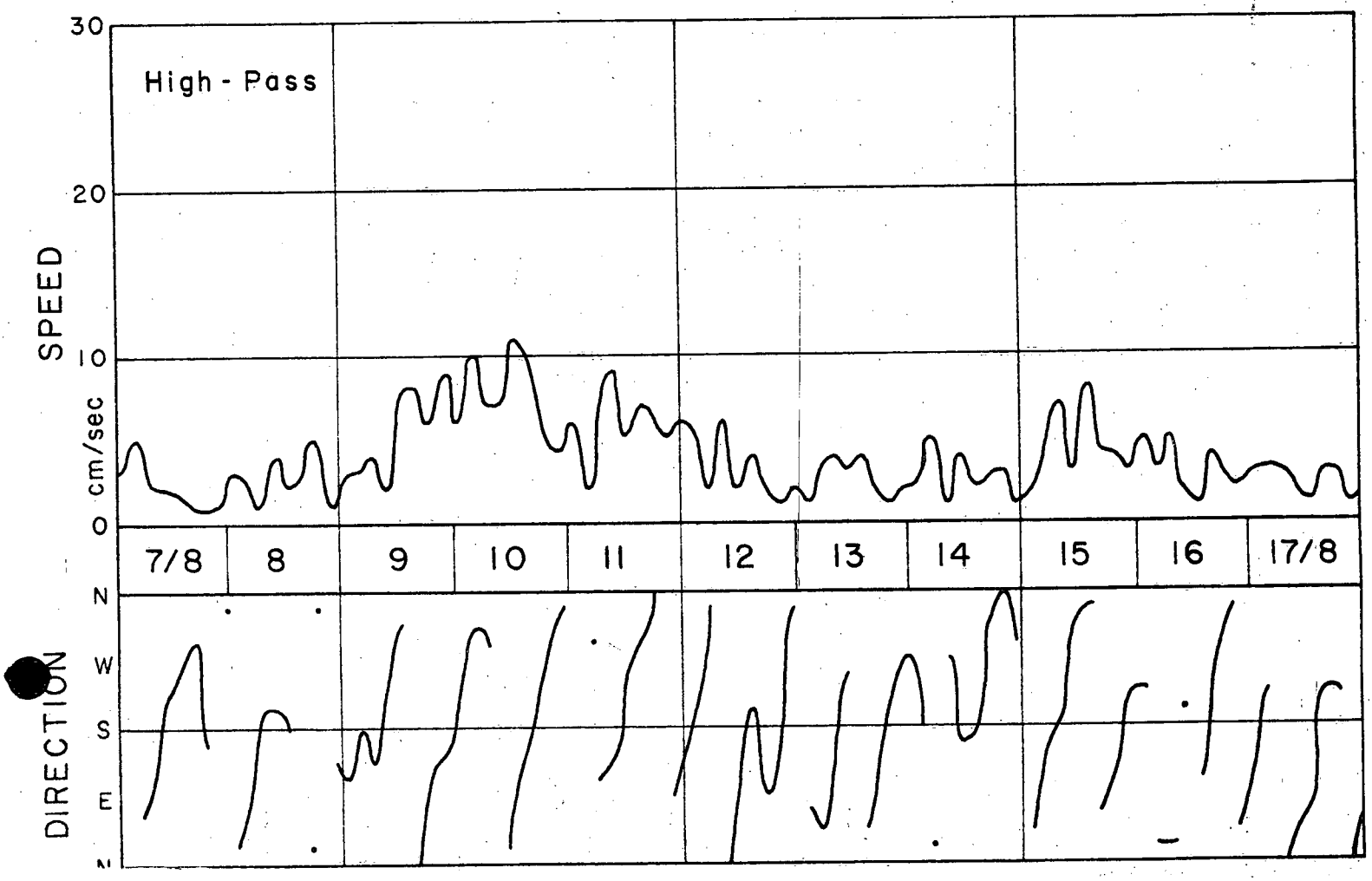
High - Pass
SPEED
cm/sec
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DIRECTION
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