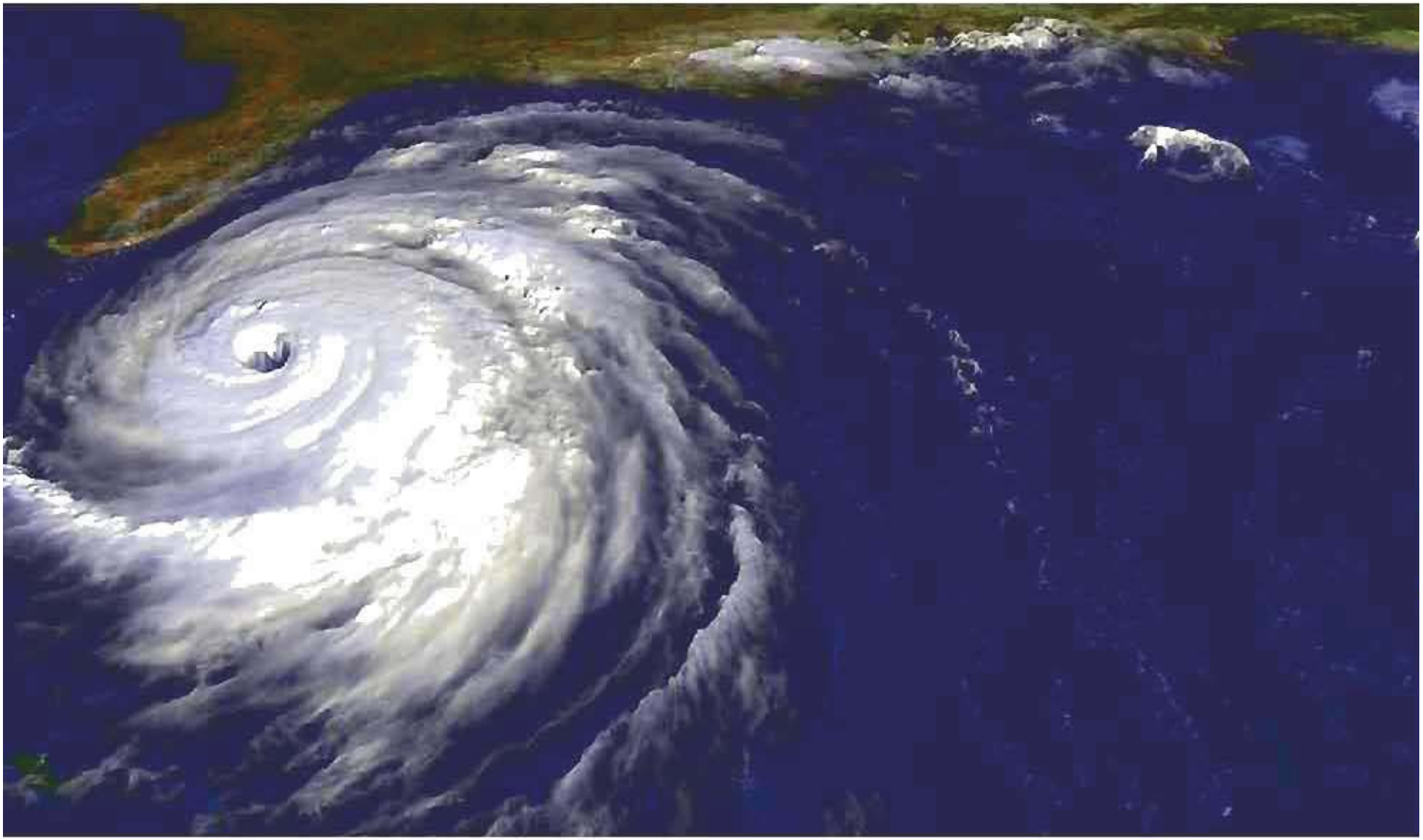
Tropical Cyclones

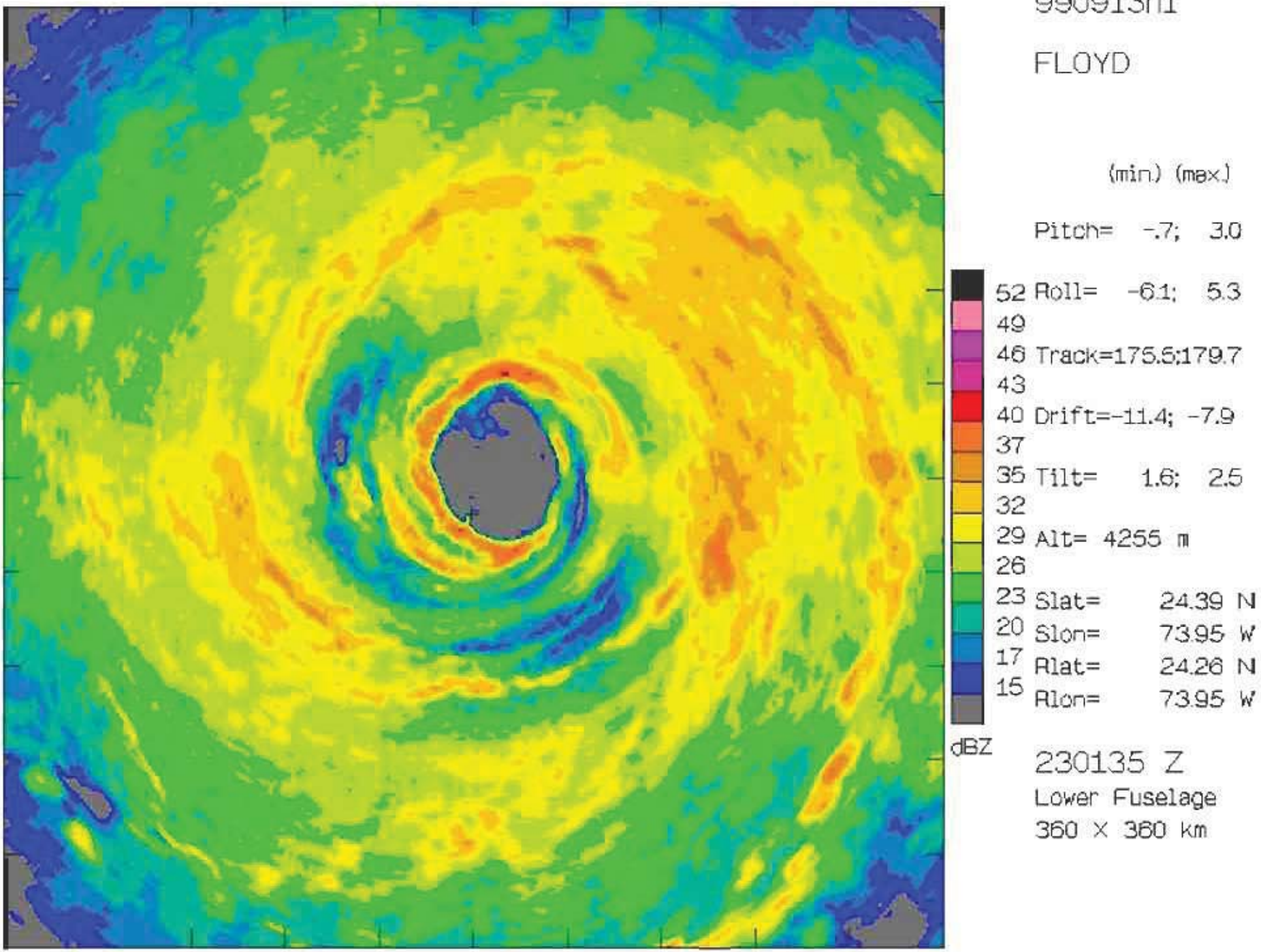
I: Observed characteristics

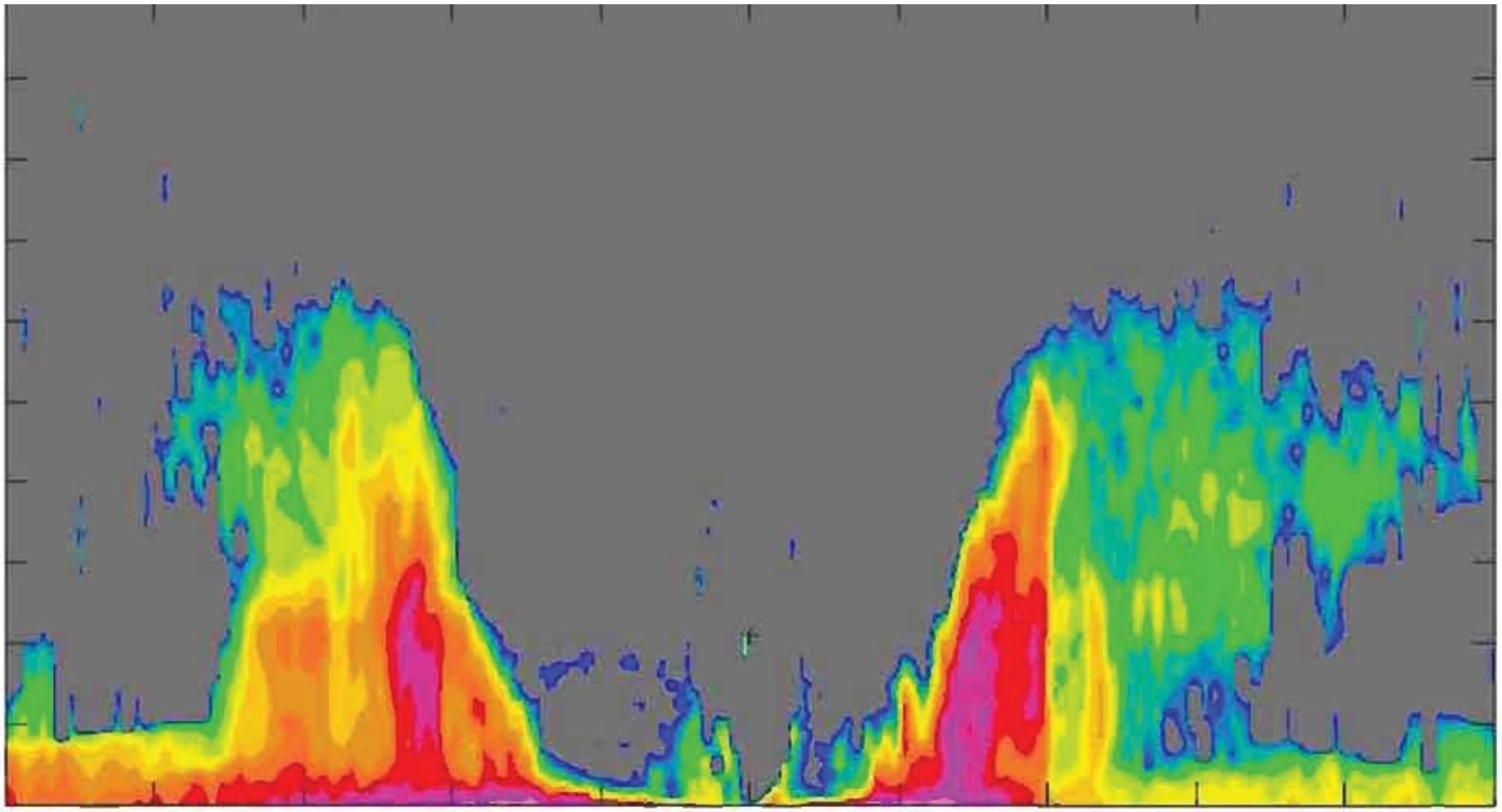
Images on pages 6, 18, 19, and 24 are copyrighted by Oxford, NY: Oxford University Press, 2005.
Book title is *Divine wind: the history and science of hurricanes*. ISBN: 0195149416. Used with permission.



940719 193334 STS65 92 014

UNITED STATES DEPT OF COMMERCE
UNITED STATES DEPT OF COMMERCE


990913h1
FLOYD
(min) (max)
Pitch= -.7; 3.0
Roll= -6.1; 5.3
Track=175.5;179.7
Drift=-11.4; -7.9
Tilt= 1.6; 2.5
Alt= 4255 m
Slat= 24.39 N
Slon= 73.95 W
Rlat= 24.26 N
Rlon= 73.95 W
52
49
46
43
40
37
35
32
29
26
23
20
17
15
dBZ
230135 Z
Lower Fuselage
360 X 360 km



E 225723 Z 990913H1 FLOYD W

dBZ

5 8 12 15 19 22 26 30 33 37 40 44 47 51

	(min.)	(max.)
Pitch=	.9;	1.2
Roll=	-.2;	6.4
Track=	187.5;	189.2

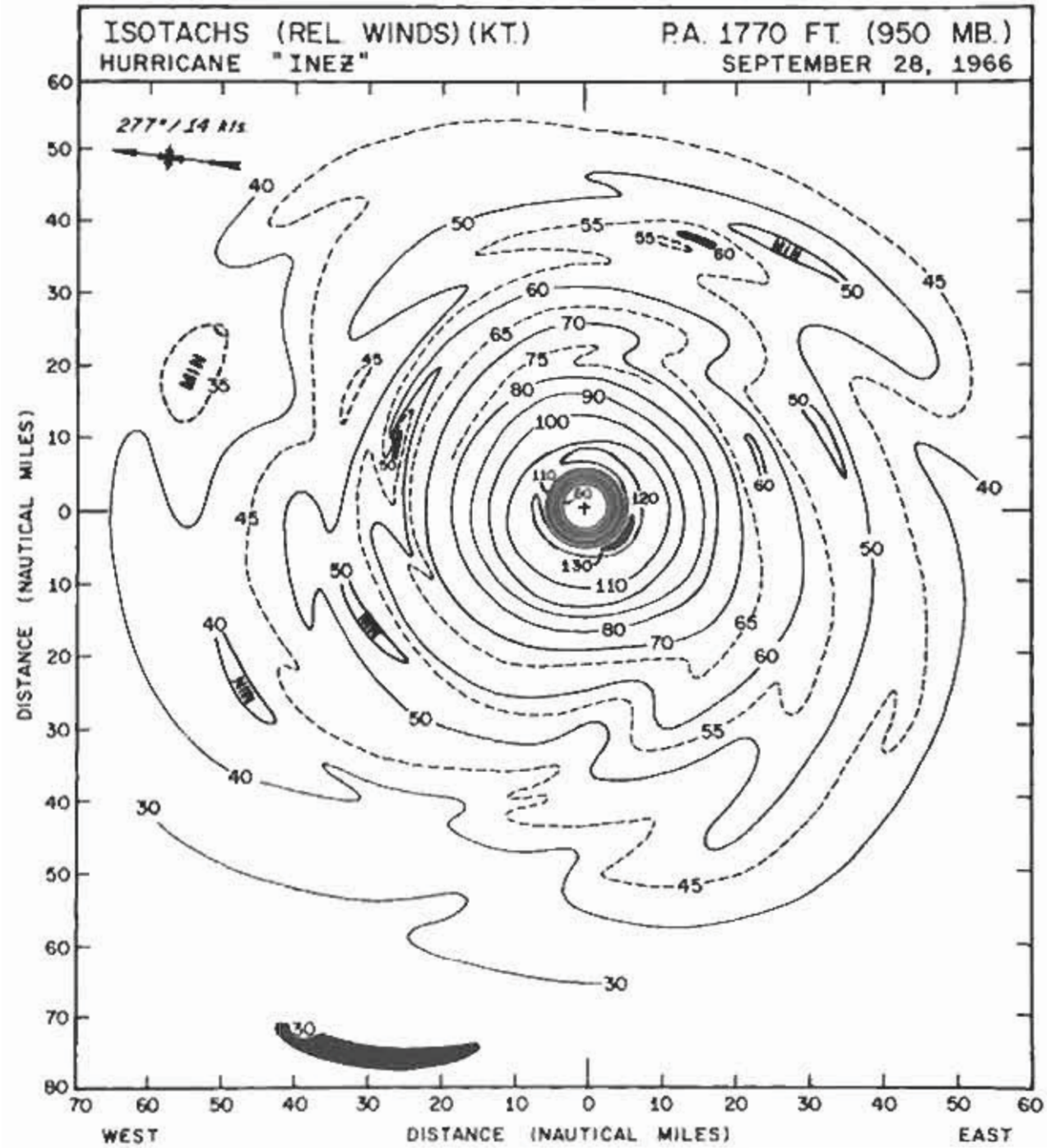
	(min.)	(max.)
Drift=	5.6;	6.7
Tilt=	-26.0;	-1.3
120 X	20 km	

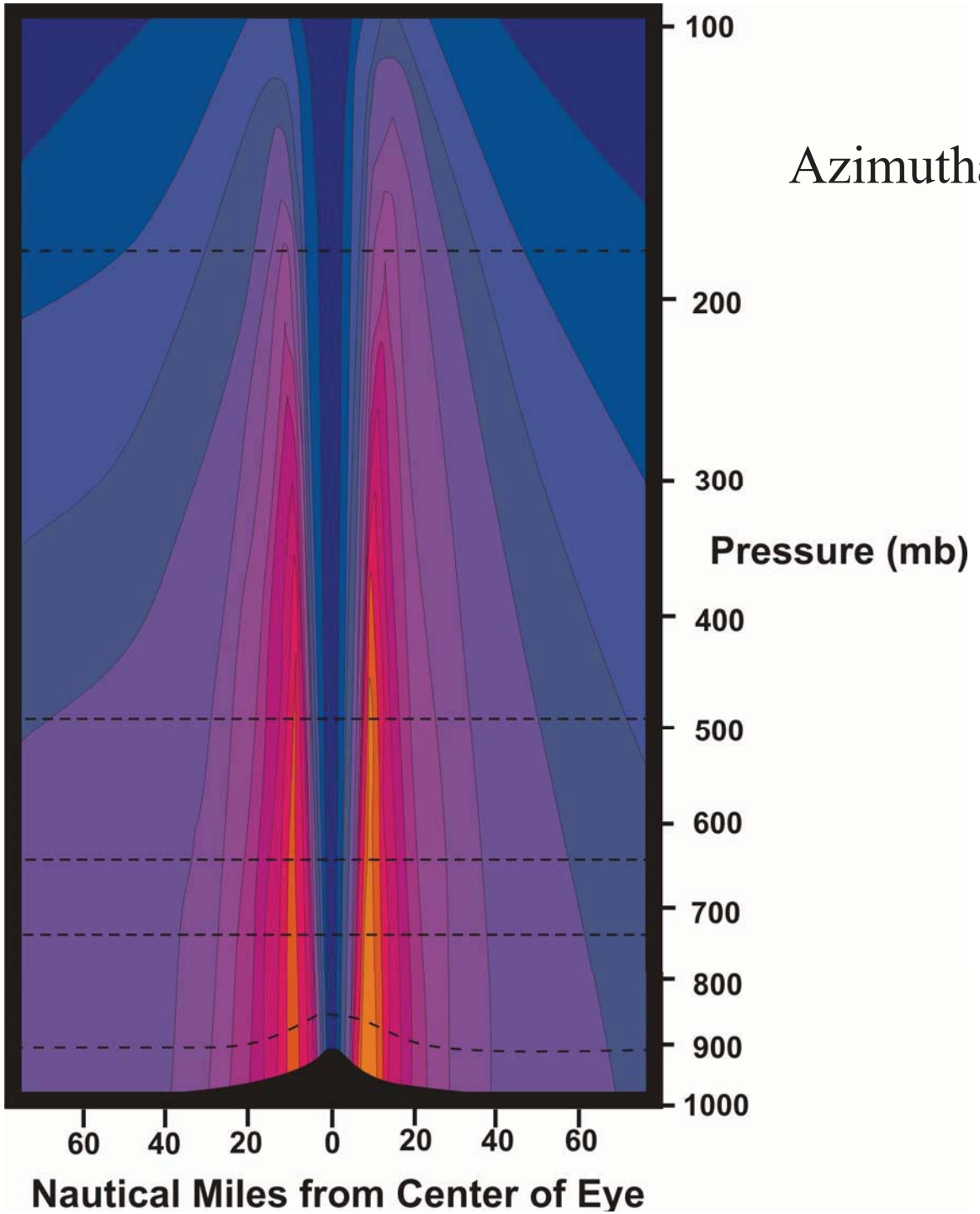
Tail Radar

Alt= 4243 m

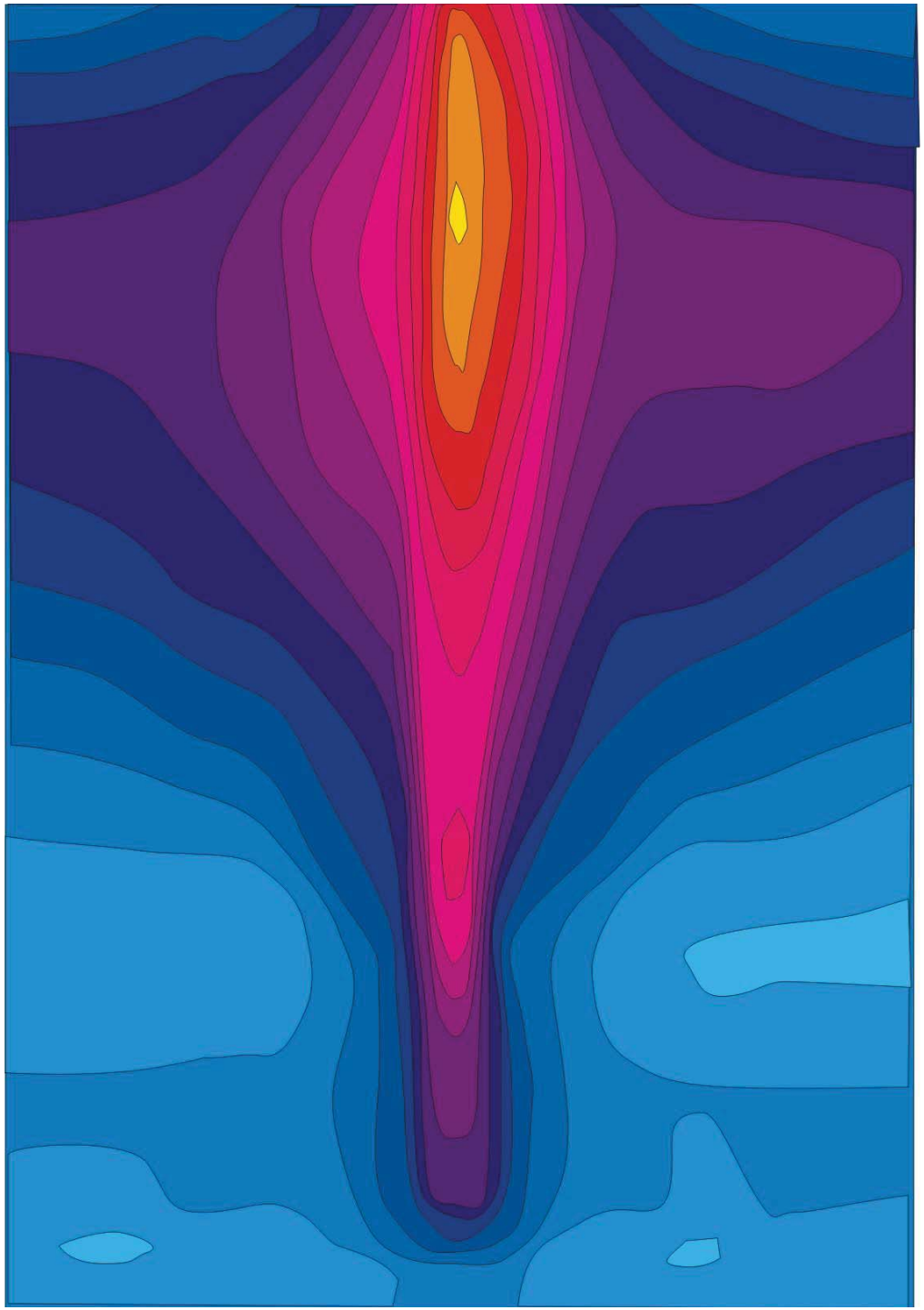
Rlat= 24.56 N

Rlon= 73.86 W


ISOTACHS (REL. WINDS) (KT.)
HURRICANE "INEZ"
P.A. 1770 FT. (950 MB.)
SEPTEMBER 28, 1966
277°/14 kts
DISTANCE (NAUTICAL MILES)
WEST
DISTANCE (NAUTICAL MILES)
EAST
MIN



Azimuthal wind

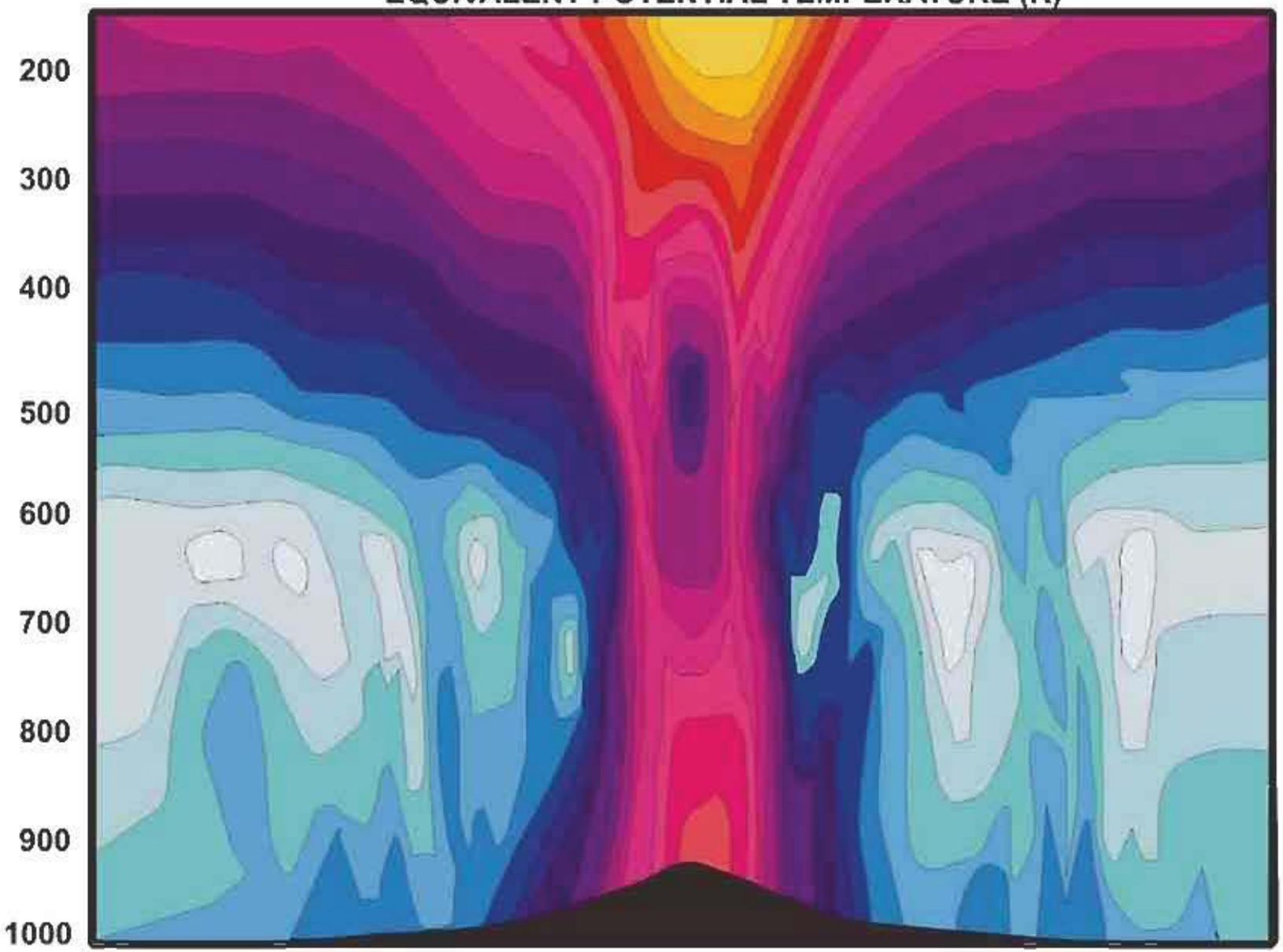


Temperature perturbation at constant altitude

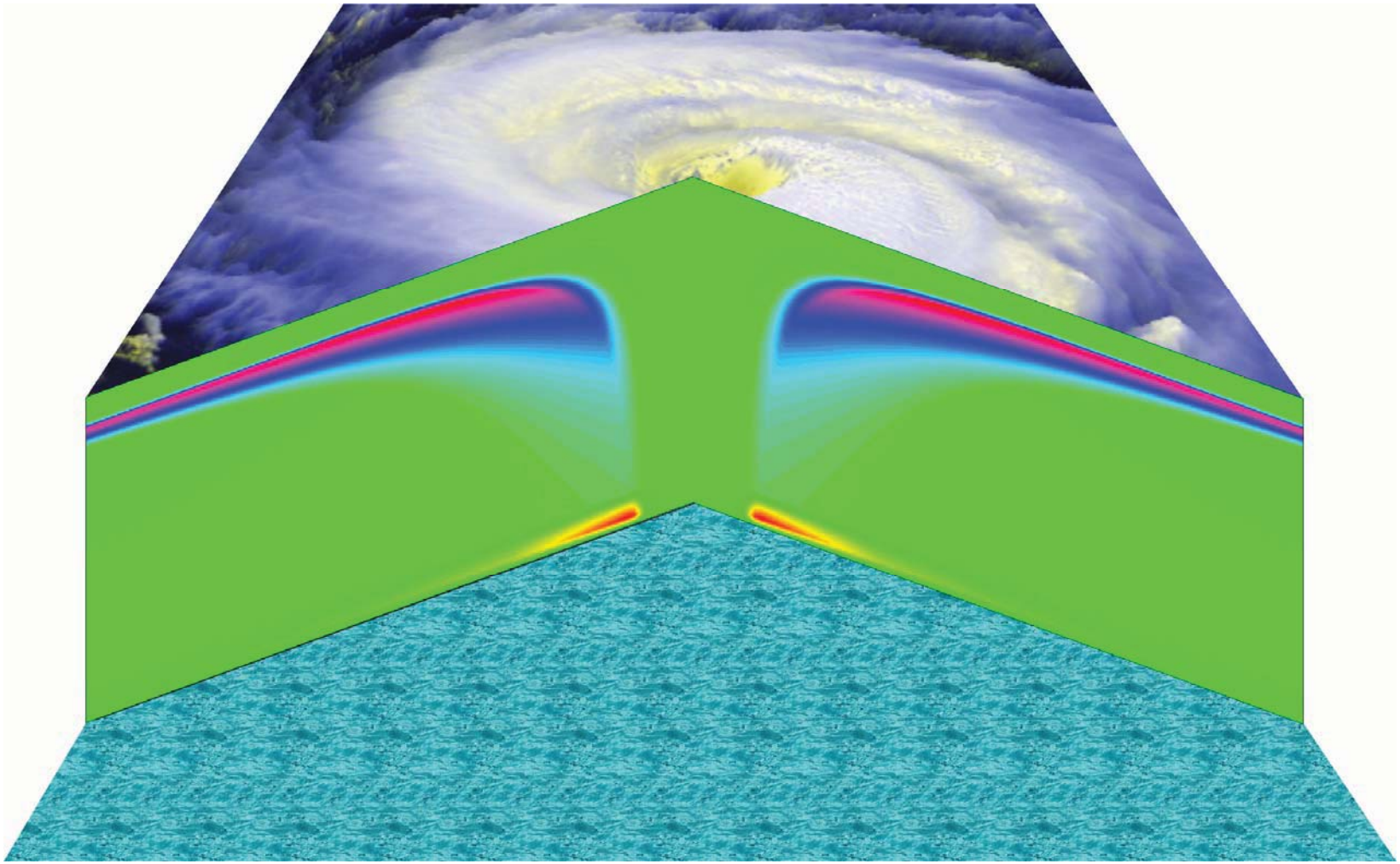
HURRICANE INEZ

SEPTEMBER 28, 1966

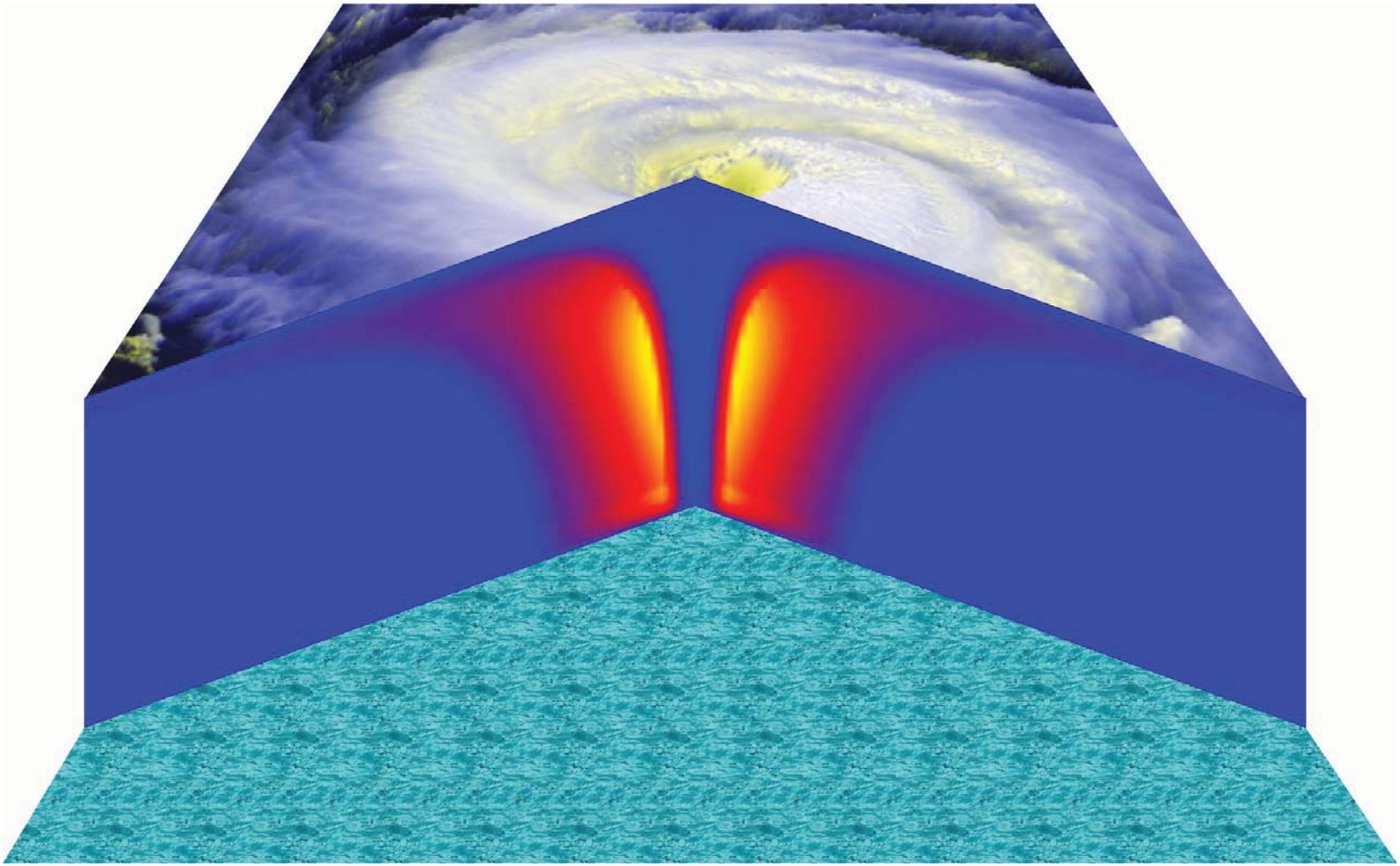
EQUIVALENT POTENTIAL TEMPERATURE (K)

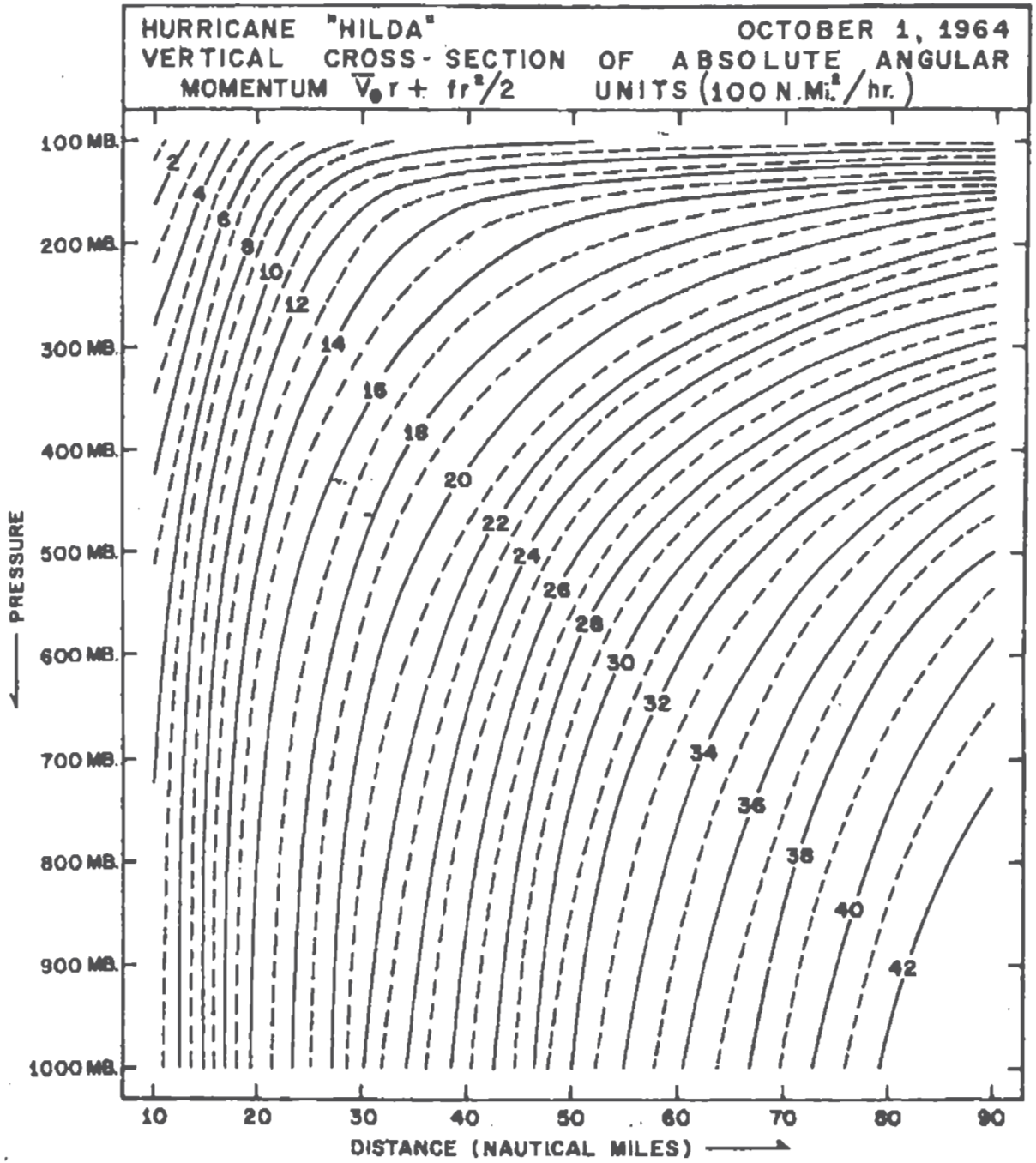


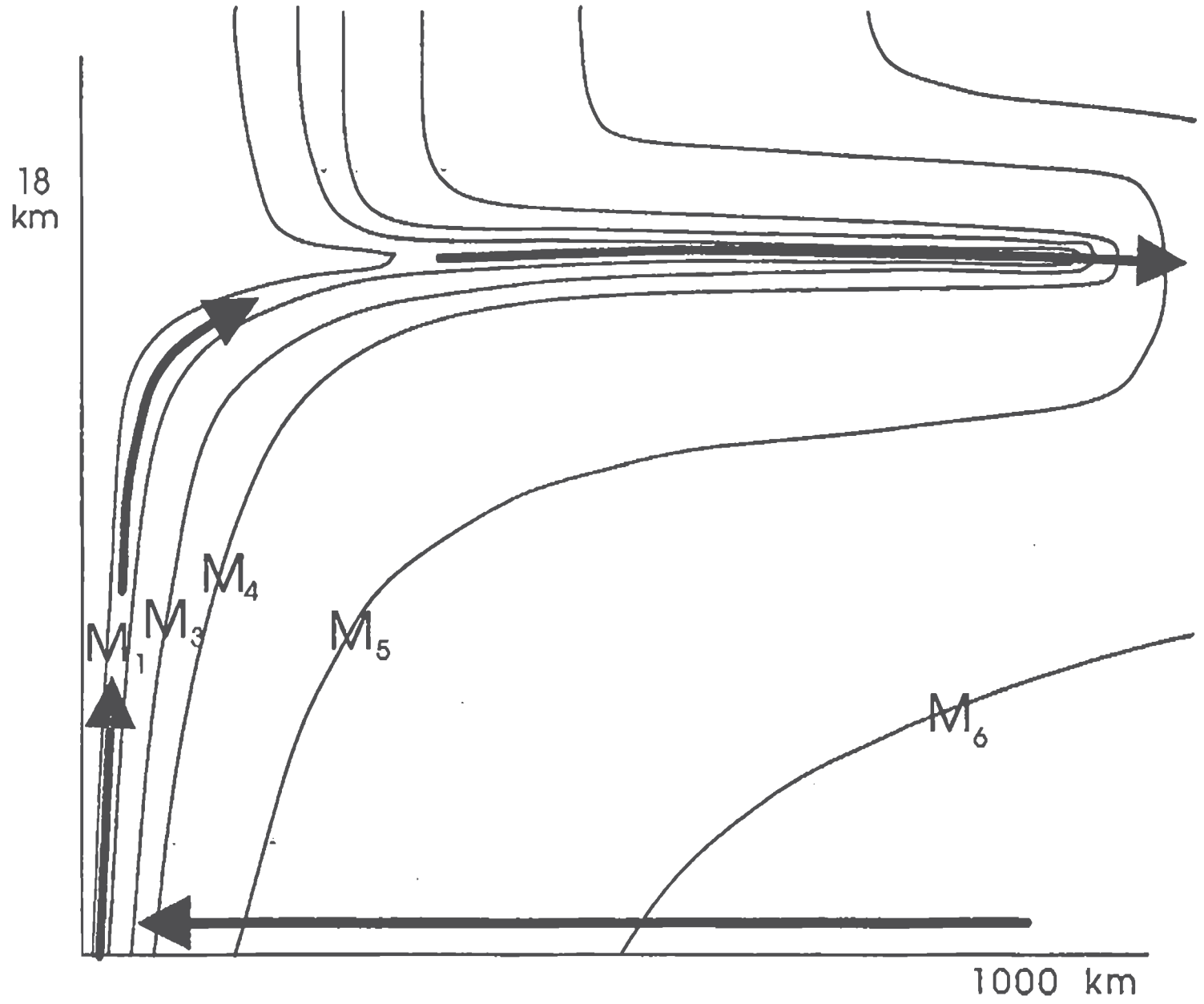
Radial wind

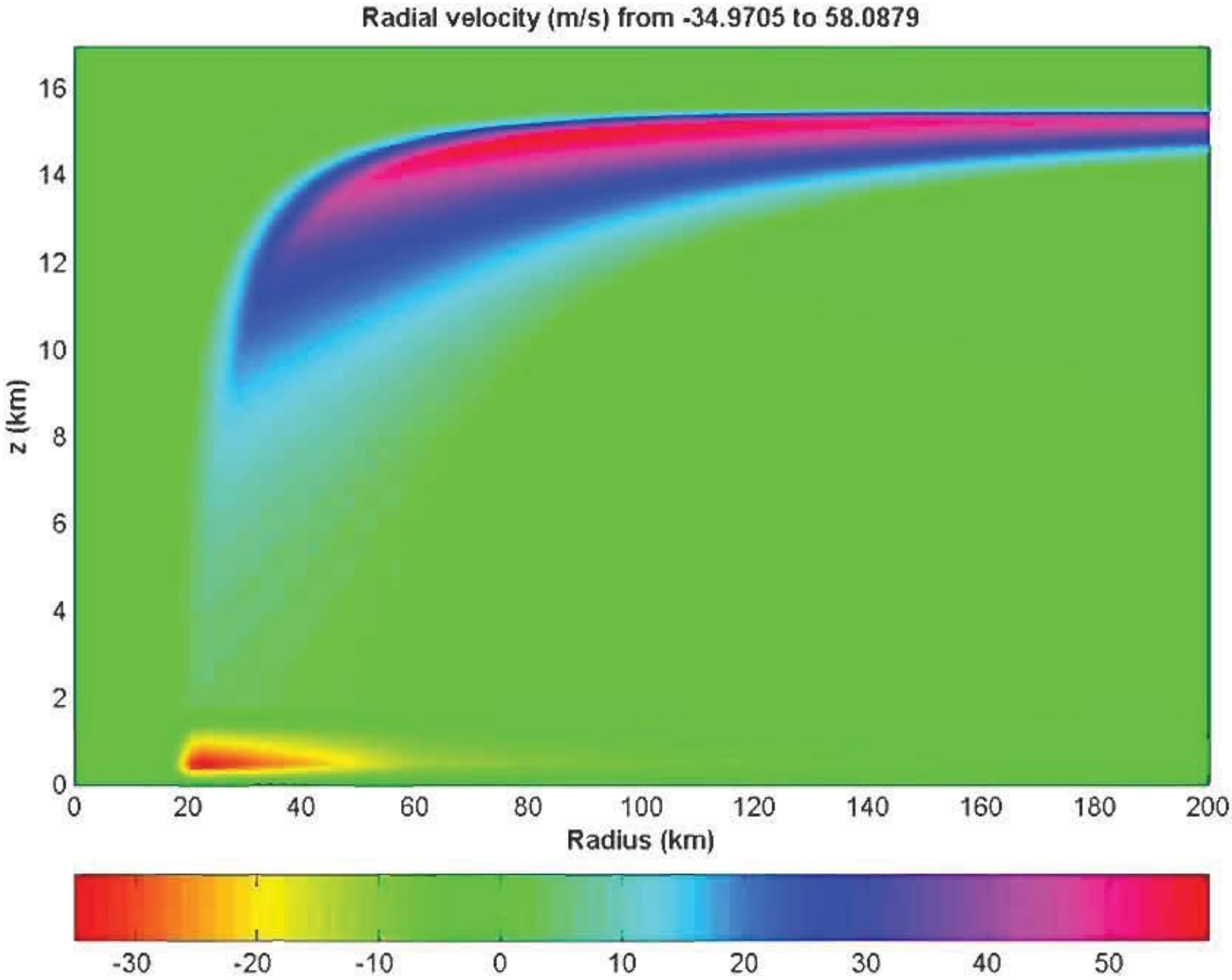


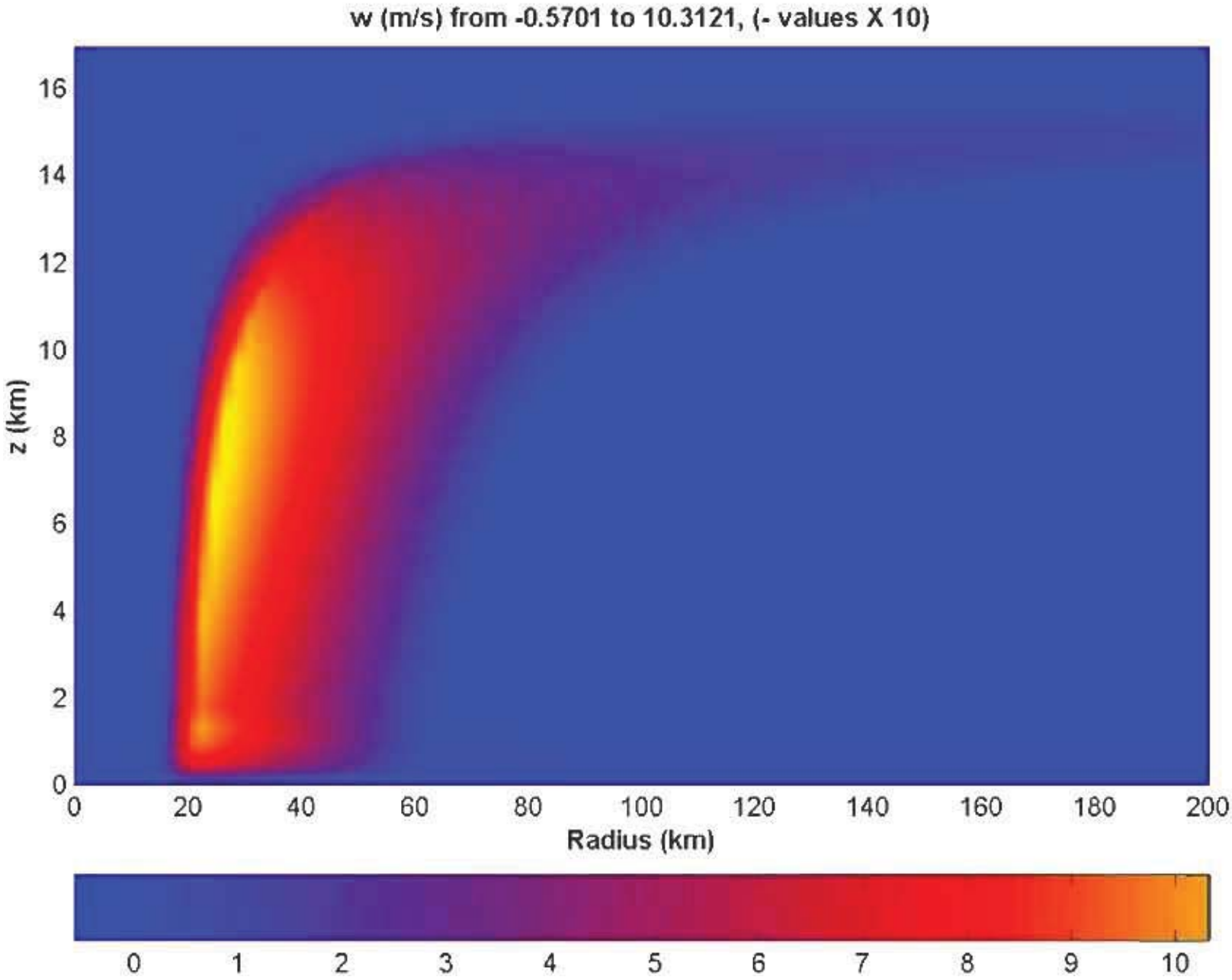
Vertical velocity



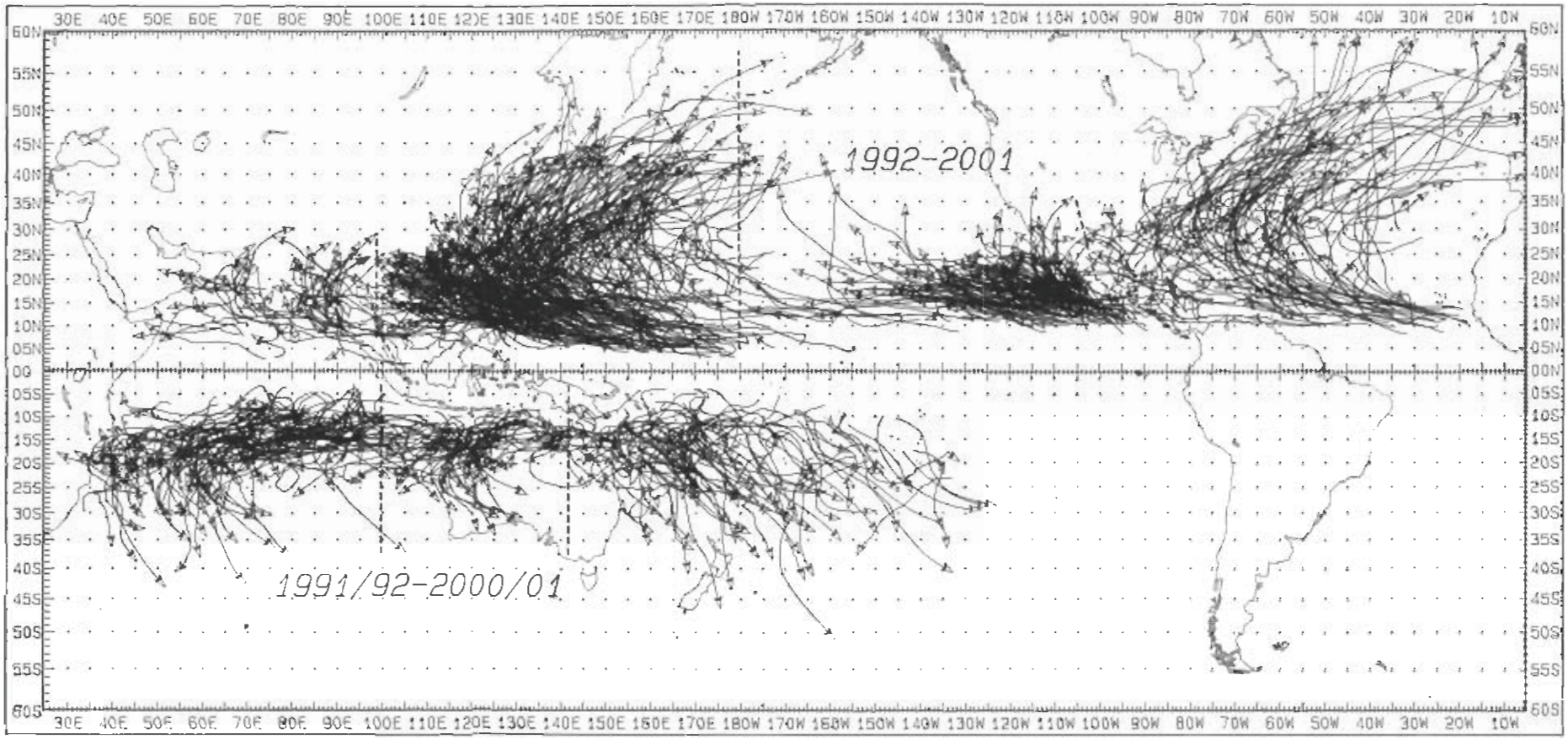

HURRICANE "HILDA"
OCTOBER 1, 1964
VERTICAL CROSS-SECTION OF ABSOLUTE ANGULAR MOMENTUM $\overline{V}_\theta r + fr^2/2$ UNITS (100 N.Mi.²/hr.)
100 MB.
200 MB.
300 MB.
400 MB.
500 MB.
600 MB.
700 MB.
800 MB.
900 MB.
1000 MB.
PRESSURE
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
36
38
40
42
10
20
30
40
50
60
70
80
90
DISTANCE (NAUTICAL MILES)

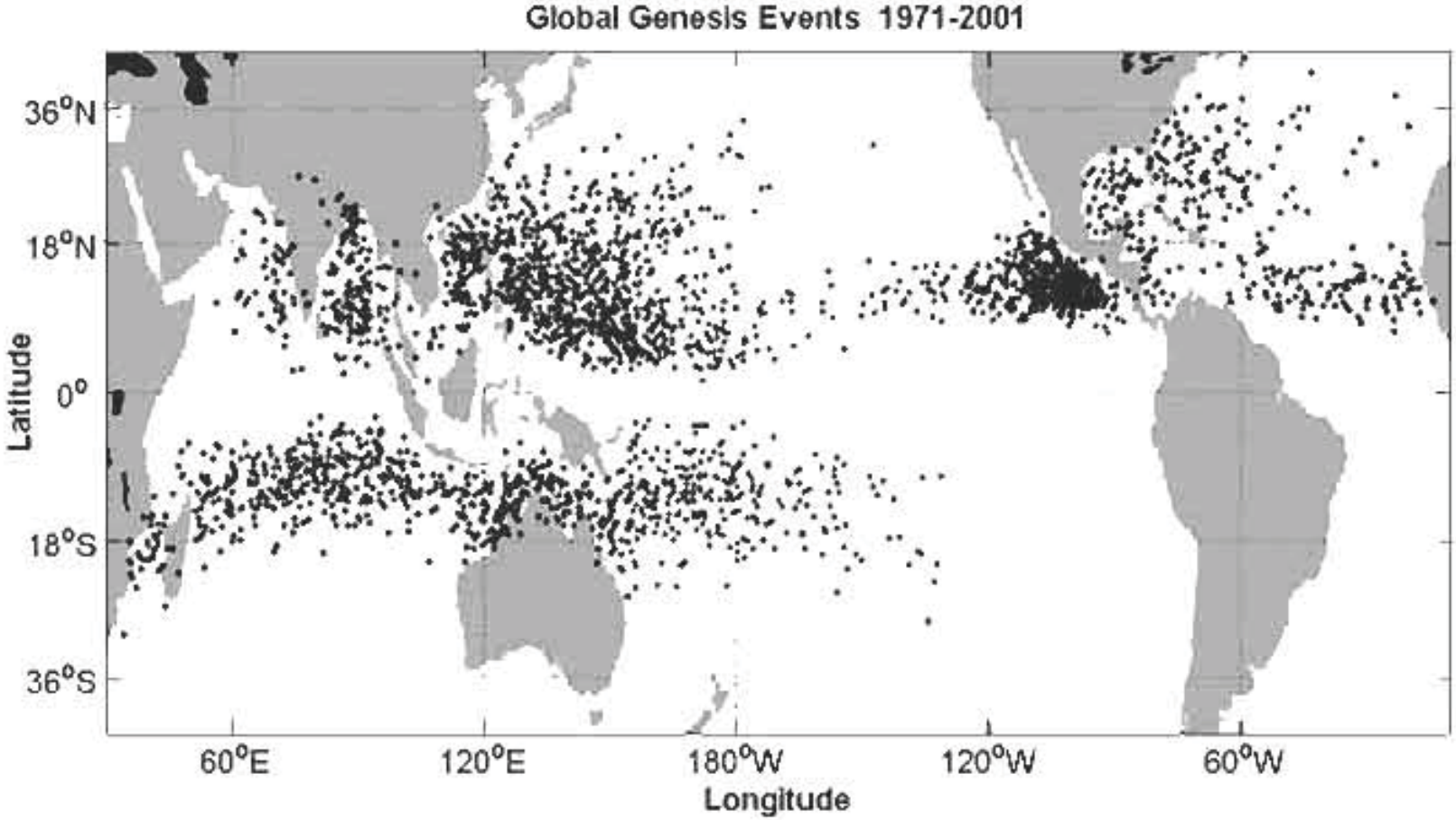

18
km
M1
M3
M4
M5
M6
1000 km

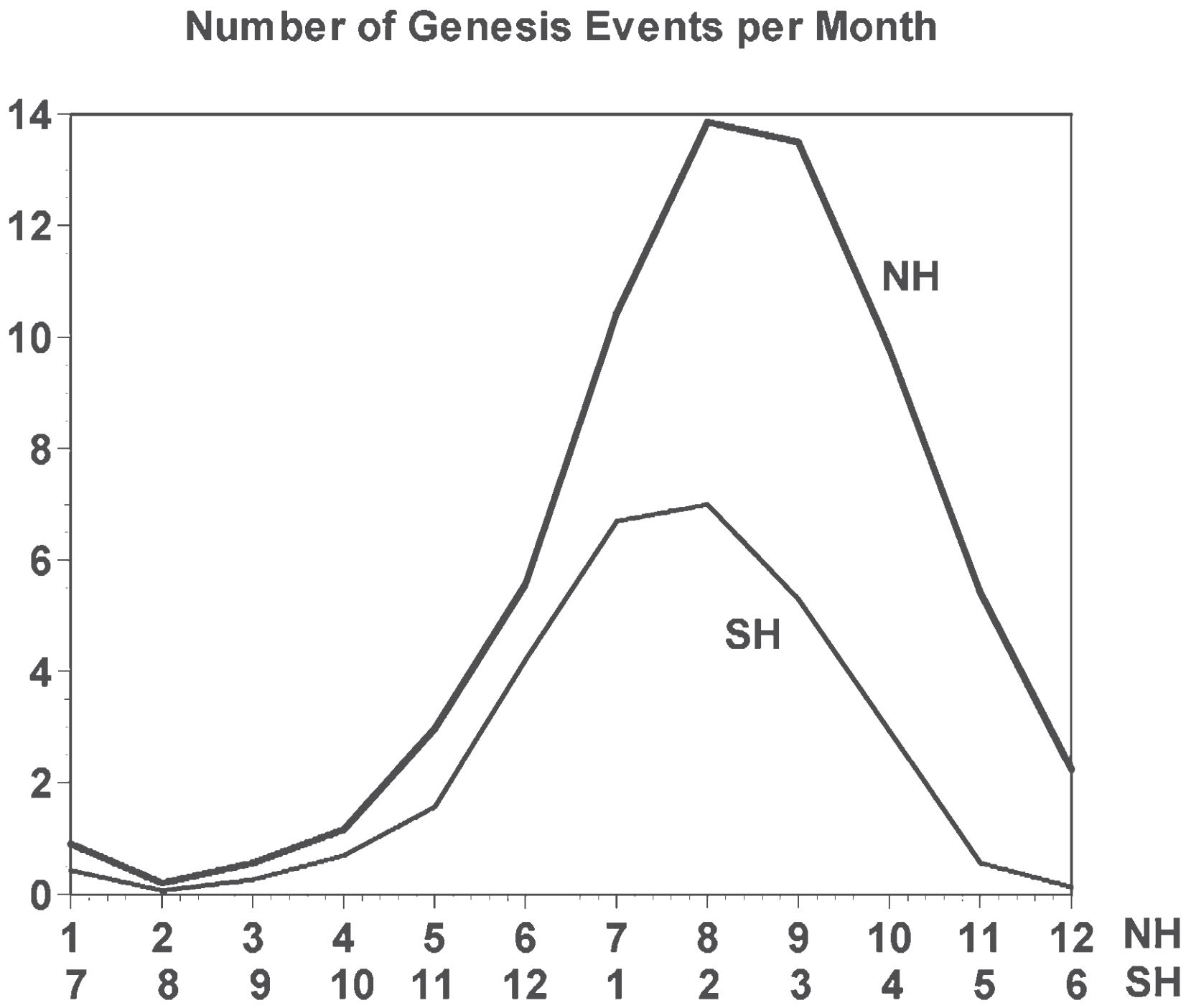

Radial velocity (m/s) from -34.9705 to 58.0879
z (km)
0
2
4
6
8
10
12
14
16
0
20
40
60
80
100
120
140
160
180
200
Radius (km)
-30
-20
-10
0
10
20
30
40
50

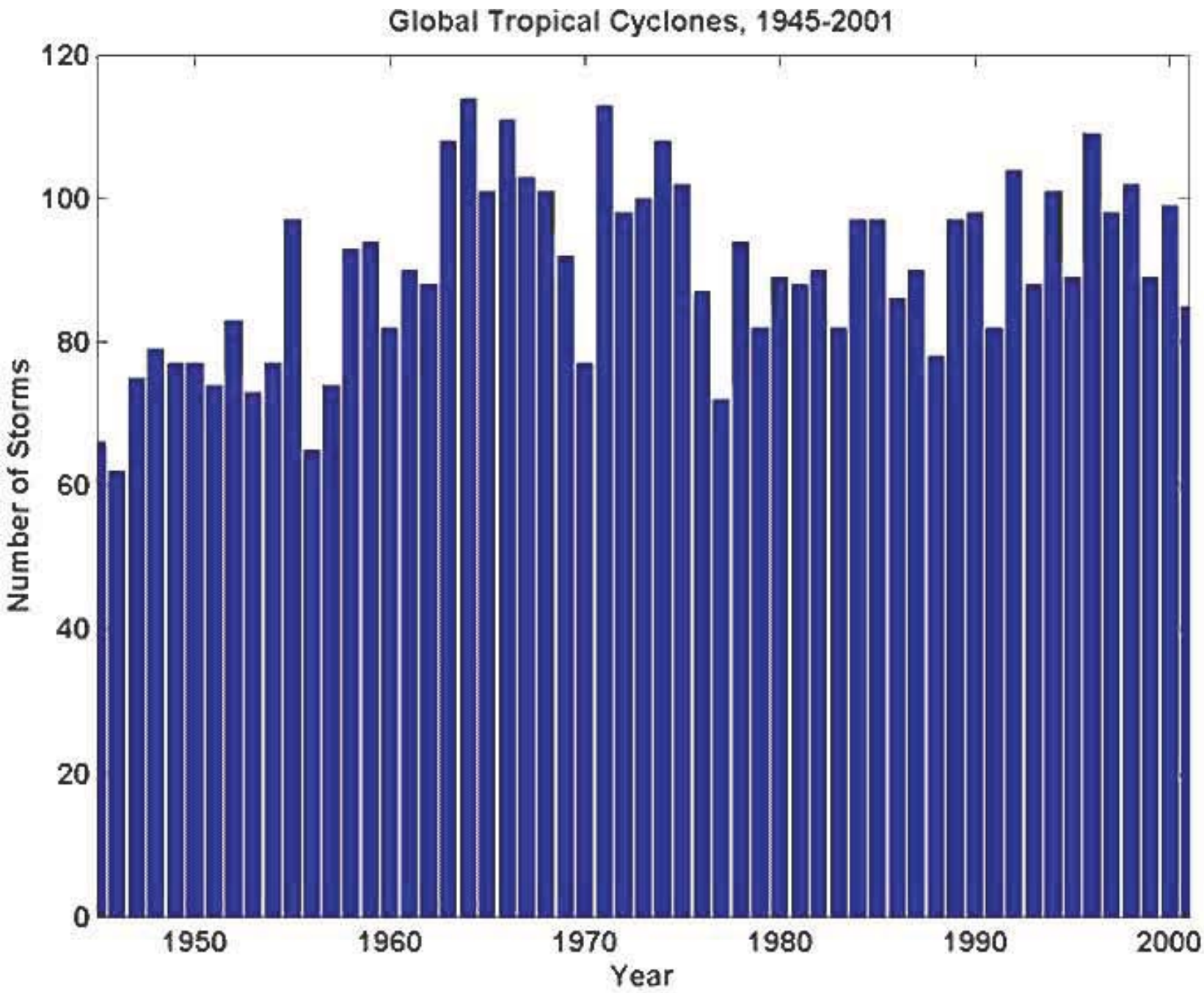

w (m/s) from -0.5701 to 10.3121, (- values X 10)
z (km)
0
2
4
6
8
10
12
14
16
0
20
40
60
80
100
120
140
160
180
200
Radius (km)
0
1
2
3
4
5
6
7
8
9
10

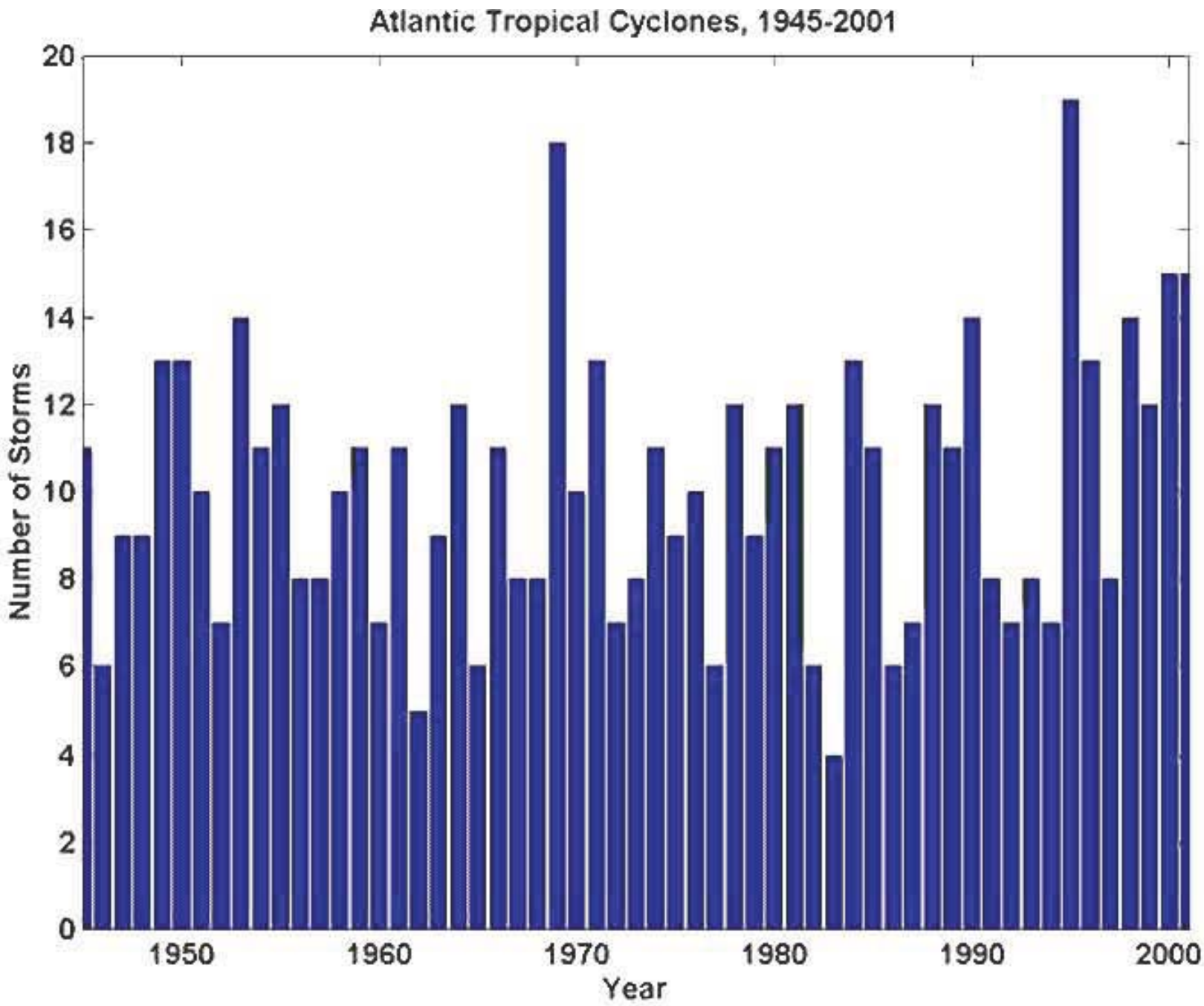
GLOBAL TROPICAL CYCLONES: 10 YEARS OF TRACKS



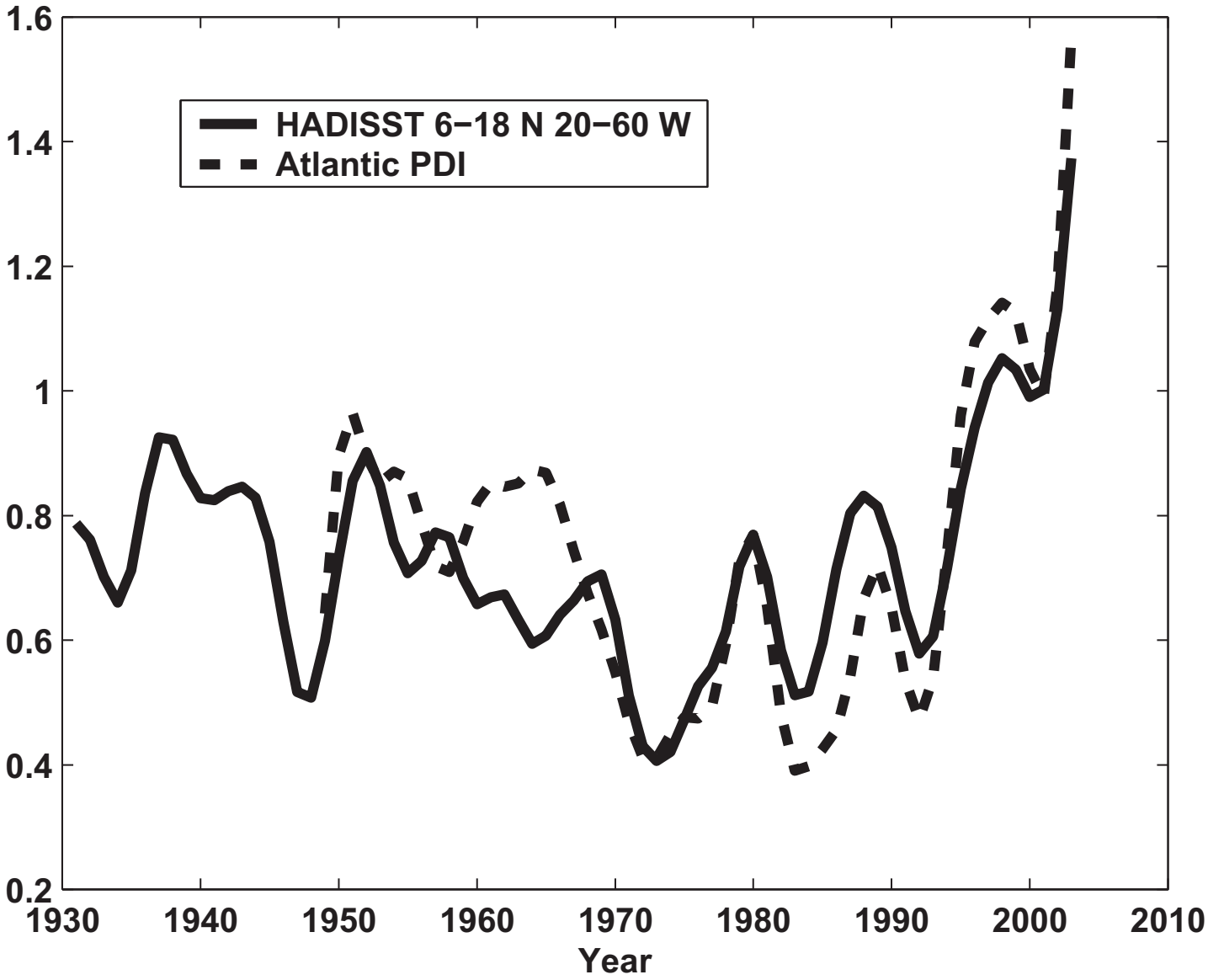

Global Genesis Events 1971-2001
36°N
18°N
0°
18°S
36°S
Latitude
60°E
120°E
180°W
120°W
60°W
Longitude


Number of Genesis Events per Month
14
12
10
8
6
4
2
0
NH
SH
1 2 3 4 5 6 7 8 9 10 11 12 NH
7 8 9 10 11 12 1 2 3 4 5 6 SH

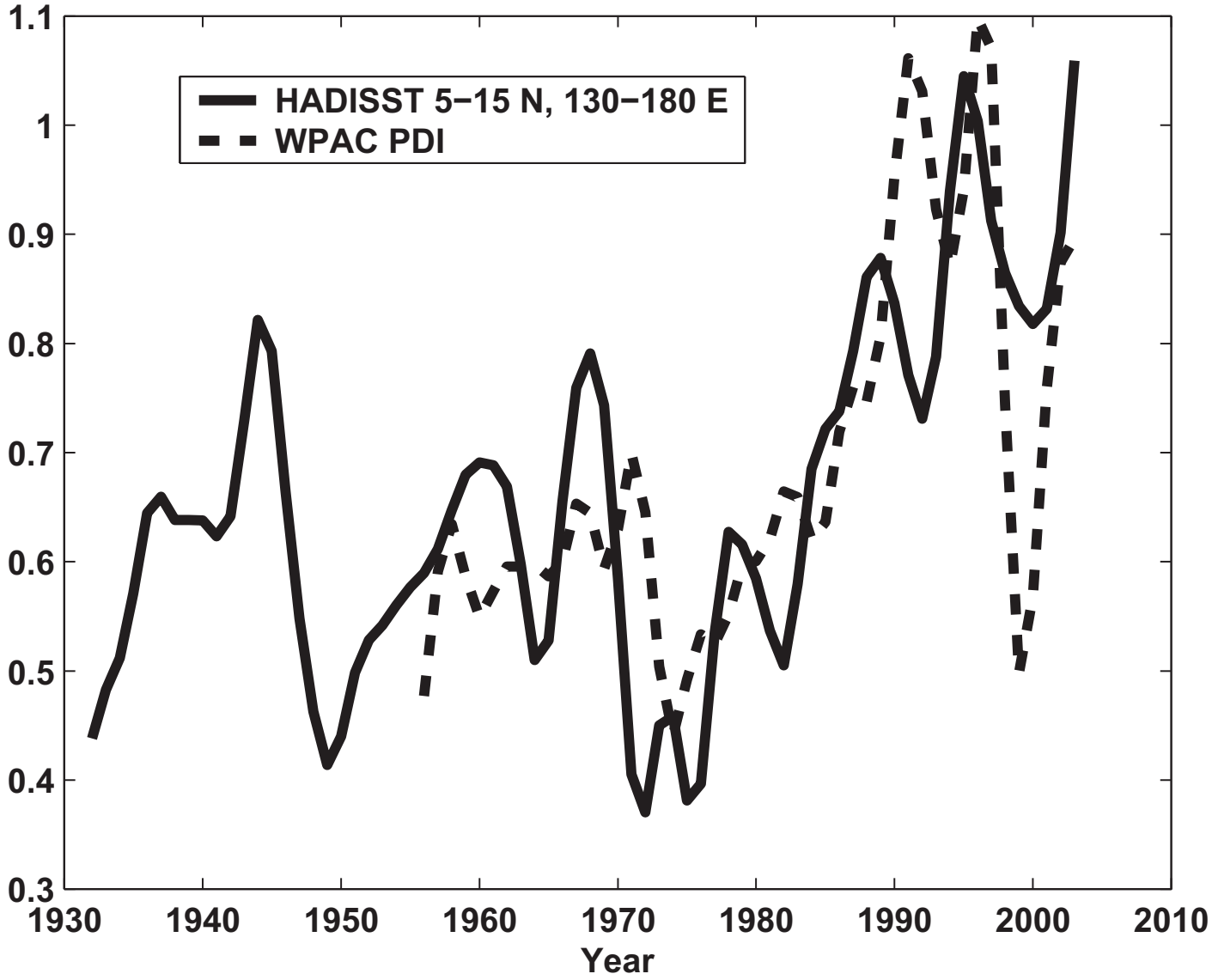

Global Tropical Cyclones, 1945-2001
Number of Storms
Year
0
20
40
60
80
100
120
1950
1960
1970
1980
1990
2000


Atlantic Tropical Cyclones, 1945-2001
Number of Storms
Year
0
2
4
6
8
10
12
14
16
18
20
1950
1960
1970
1980
1990
2000

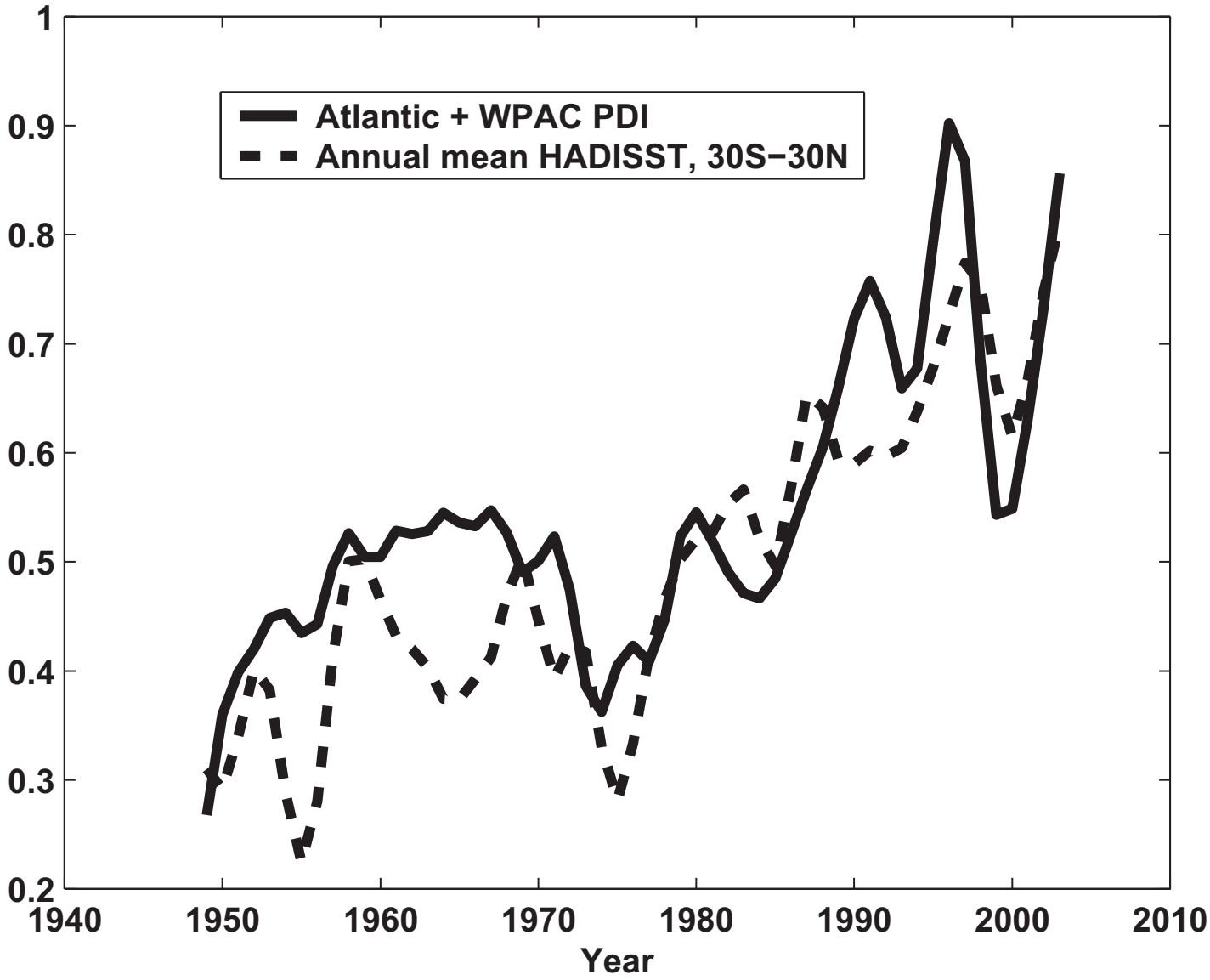
Tropical Atlantic ST versus Total Power Dissipation Index



Tropical North Pacific ST versus Total Power Dissipation Index



Tropical SST versus ATL and NWP Total Power Dissipation Index



U.S. Insured Losses to Hurricanes: 1950-1995

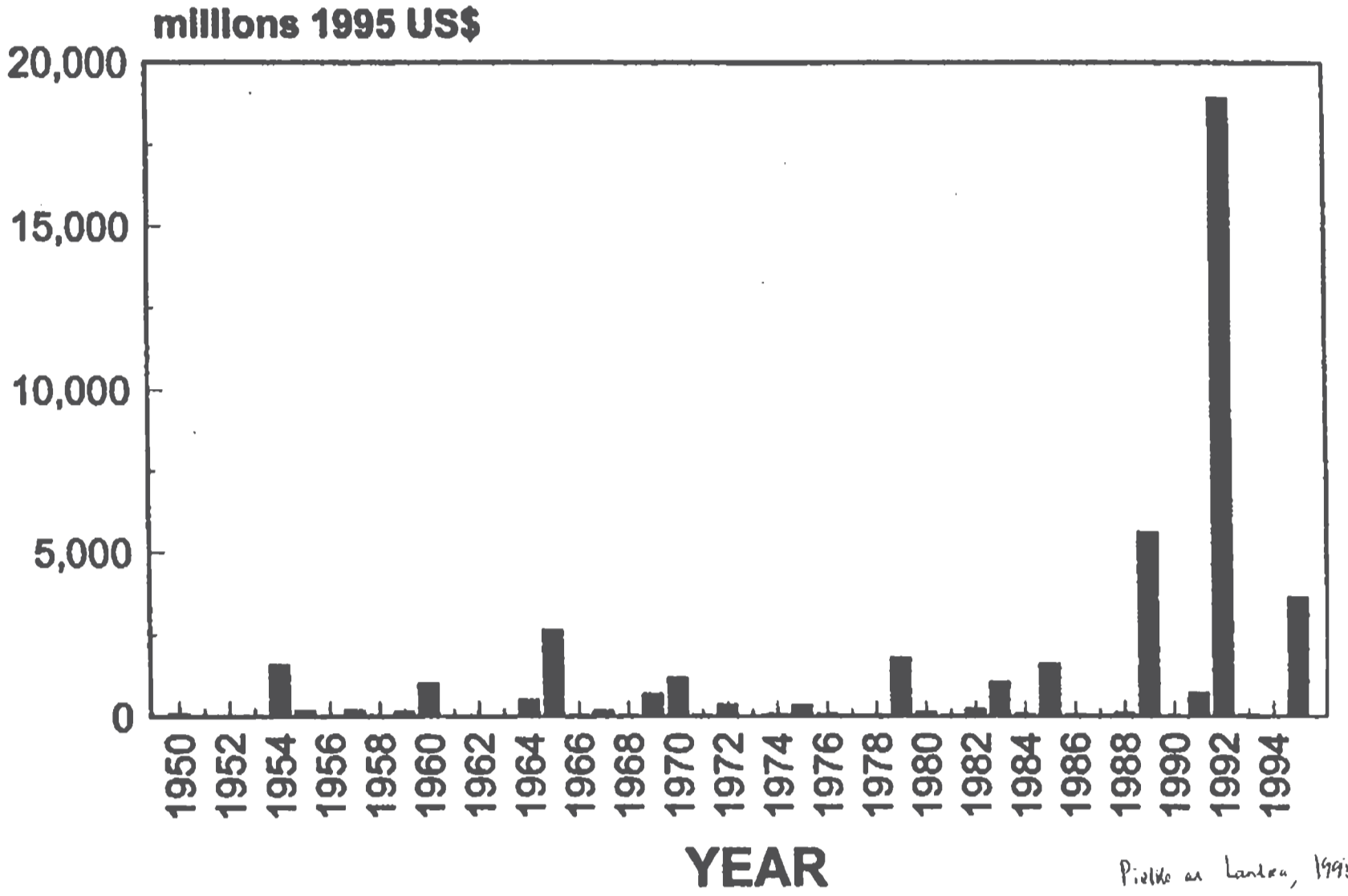


FIG. 2. Time series of hurricane-related insured losses in the United States (in millions of 1995 U.S. dollars) from 1950 to 1995 (data provided courtesy of Property Claims Services, Inc.).

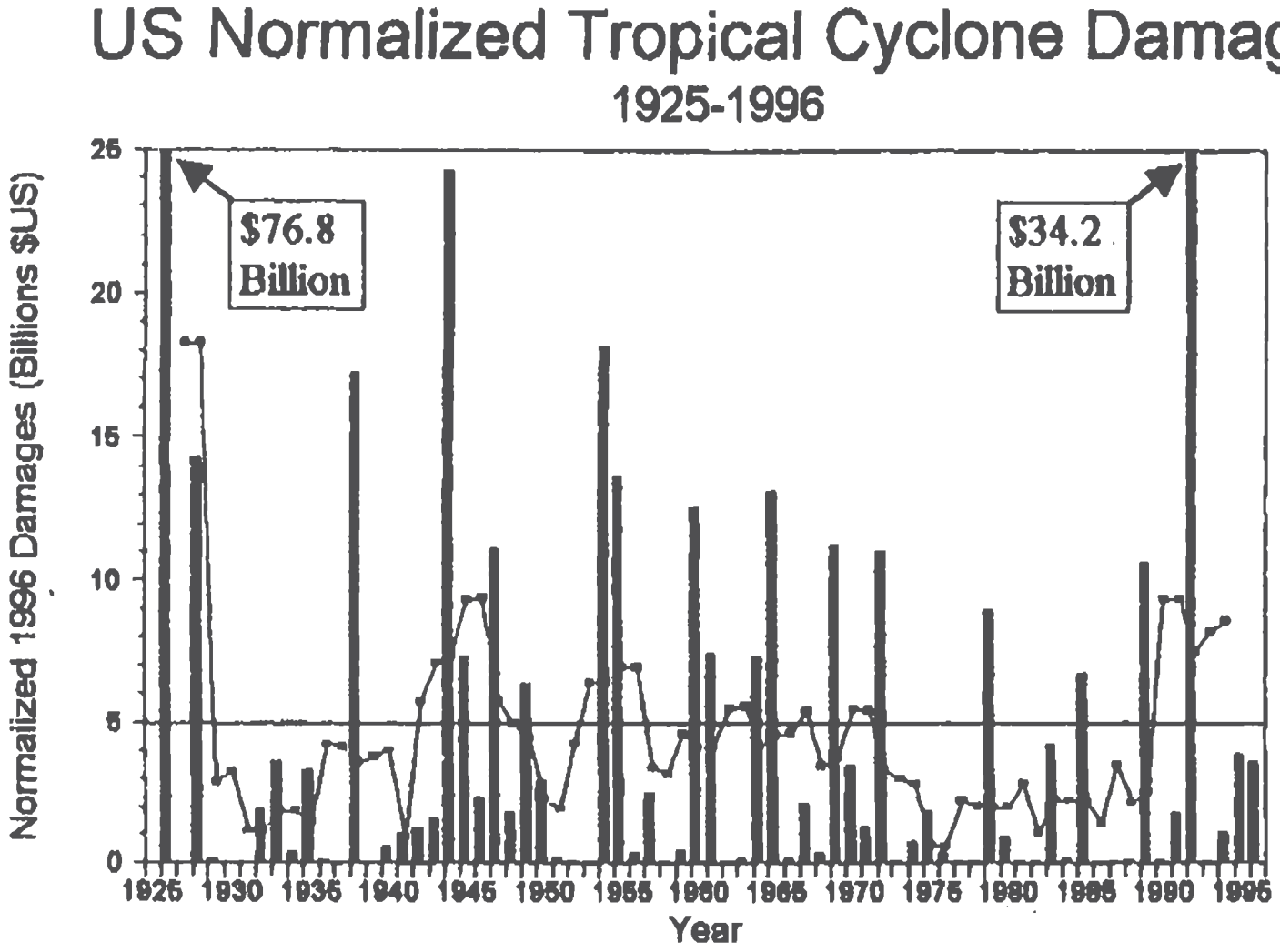


Figure 13. Time series of annual normalized tropical cyclone damage for the U.S. East and Gulf Coasts. The long–term (1950–90) average of $3.5 billion per year (solid line) as well as a five year running mean (light curve) are superimposed on the time series. Damage is normalized to 1996 dollars by inflation, coastal county population changes, and an index of personal property amounts.

MIT OpenCourseWare
http://ocw.mit.edu

12.811 Tropical Meteorology

Spring 2011

For information about citing these materials or our Terms of Use, visit: http://ocw.mit.edu/terms.