19980826I1-LPS

Mission Summary
980826I Aircraft 43RF
Bonnie Single Aircraft Landfall Mission

Scientific Crew (43RF)

Lead Scientist	P. Black
Radar	M. Black
Workstation	P. Dodge
GPS sonde scientist	M. Black
SCR/SRA scientist	E. Walsh
SCR/SRA engineer	W. Wright
Observer/cloud physics	T. Schuur

Mission Briefing:

This mission consisted of a single aircraft flight into Bonnie as it was making landfall over Wilmington, N.C. It was concurrent with an AFRES reconnaissance flight at 10 kft. Flight legs were designed to make Doppler radar measurements in FAST mode while flying radials on the Wilmington and Moorhead City WSR-88D Doppler radars as well as the dual Doppler on Wheels (DOW) sites established by J. Wurman, U. Oklahoma, just prior to the flight 20 and 40 nm NE of Wilmington along the coast. The flight was also designed to map the boundary wind structure along the coast using GPS dropsondes from 7 kft. for onshore and offshore flow. A total of 41 sondes were deployed, 37 successfully. The flight was further designed to map the surface wave field at landfall using the new SRA as well as map the storm surge elevations along the shoreline as the eye moved onshore. All of these objectives were accomplished

The flight consisted of an initial flight leg along the coast at 5 kft from Charleston to the eye, which was just offshore at the time, and which consisted of offshore flow. The leg then continued through an inner developing eyewall, through an outer eyewall, numerous stratiform bands, through an outer convective band consisting of several rotating supercells and ending at Cape Hatteras. GPS drops were made over Frying Pan Shoals (in the eye) and Diamond Shoals Lighthouse C-man stations. The flight leg was repeated at 7 kft altitude back to Charleston. The aircraft then flew offshore to the 120 nm radius and commenced a series of 3 radial legs into the storm from the SE to the center, Center to E and NE to center along the coast with a final leg to the storm center along a radial from Moorhead City to the center just before landfall of the center. A final leg from the center to the coast and along the coast to Charleston completed the flight.

Mission Synopsis

Highest flight level winds were 118 kt in the outer eyewall. Min pressure was a constant 962 mb. Peak wave heights of from 40-50 ft were measured. During the flight (around 20Z) an inner eyewall developed from a convective feature along the south side the eyewall grew in place during the flight. The inner eye developed in place as opposed to an eyewall replacement cycle caused by an outer band moving inward. An intense outer convective band was observed to the north of the center with numerous imbedded cores. A hook echo was observed inland from the coast as part of this intense convective band. This was observed earlier by the other P-3 light, but was over water at that time. Numerous small intense convective cells were actively growing in the NE quadrant. AFRES flew a nearly identical pattern to 43RF above us at 10 kft.

Passes along the beach were made from the outer convective band northeastward to Cape Hatteras and then north to duck Pier for purpose of mapping the dune heights with the SRA and for mapping inland surge heights. Three radials on the Wilmington radar were made as well as one on

the Moorehead City radar for joint TA Doppler and WSR-88D Doppler analysis. Radials were also flown on the DOW radars NE of Wilmington.

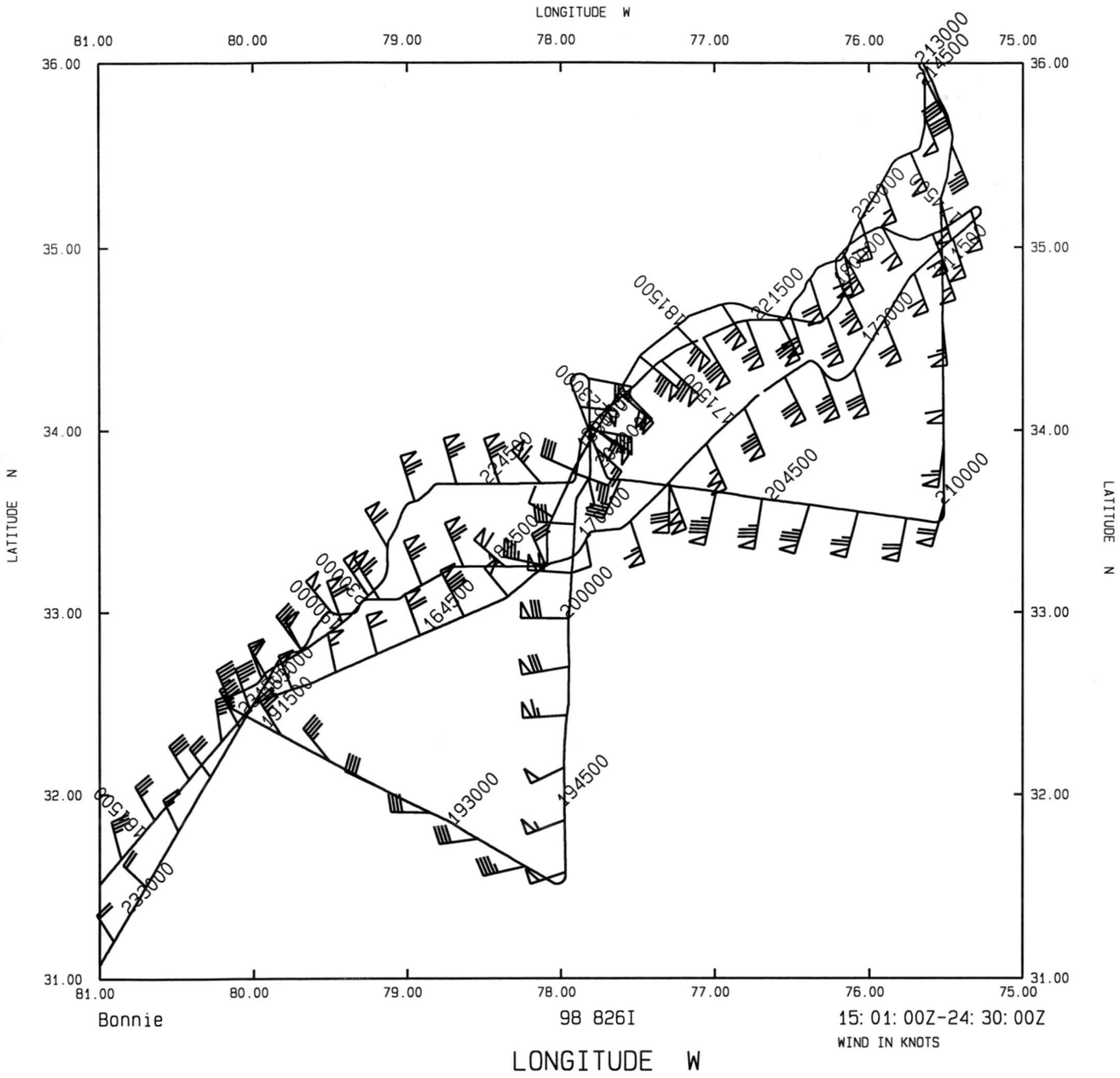
Evaluation:

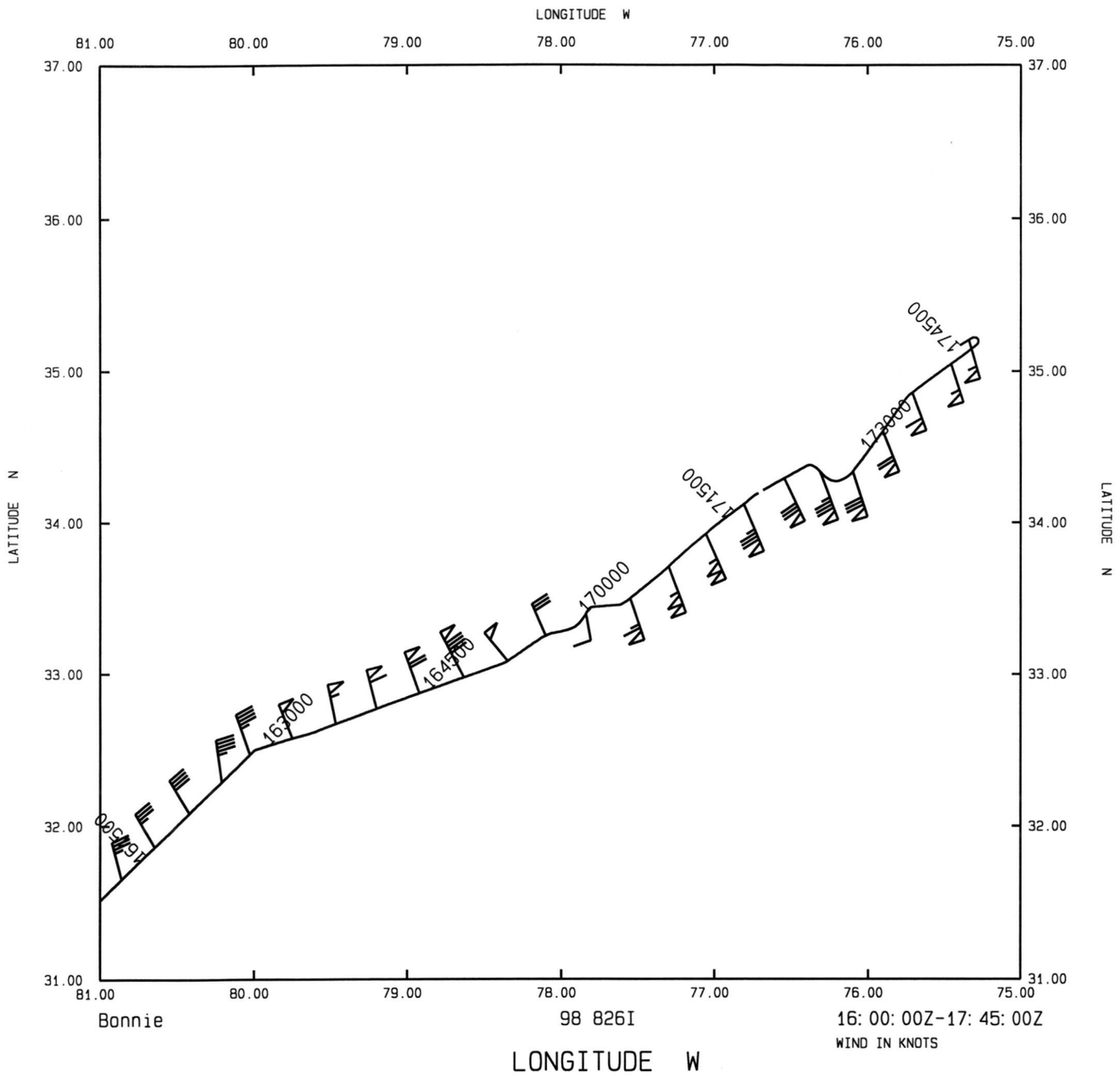
This flight provided a unique insight into the changing boundary layer wind and thermal structure along the coast shoreward of the Gulf Stream during a landfalling storm. Unique radar observations were obtained concurrent with ground-based WSR-88D radar data. Concurrent observations with DOW dual Doppler data also form a unique part of this data set. Most significant were the SRA measurements of the changing ocean surface wave conditions as large deep ocean waves propagated onto the shelf and shoreline, as well as direct storm surge measurements for the first time.

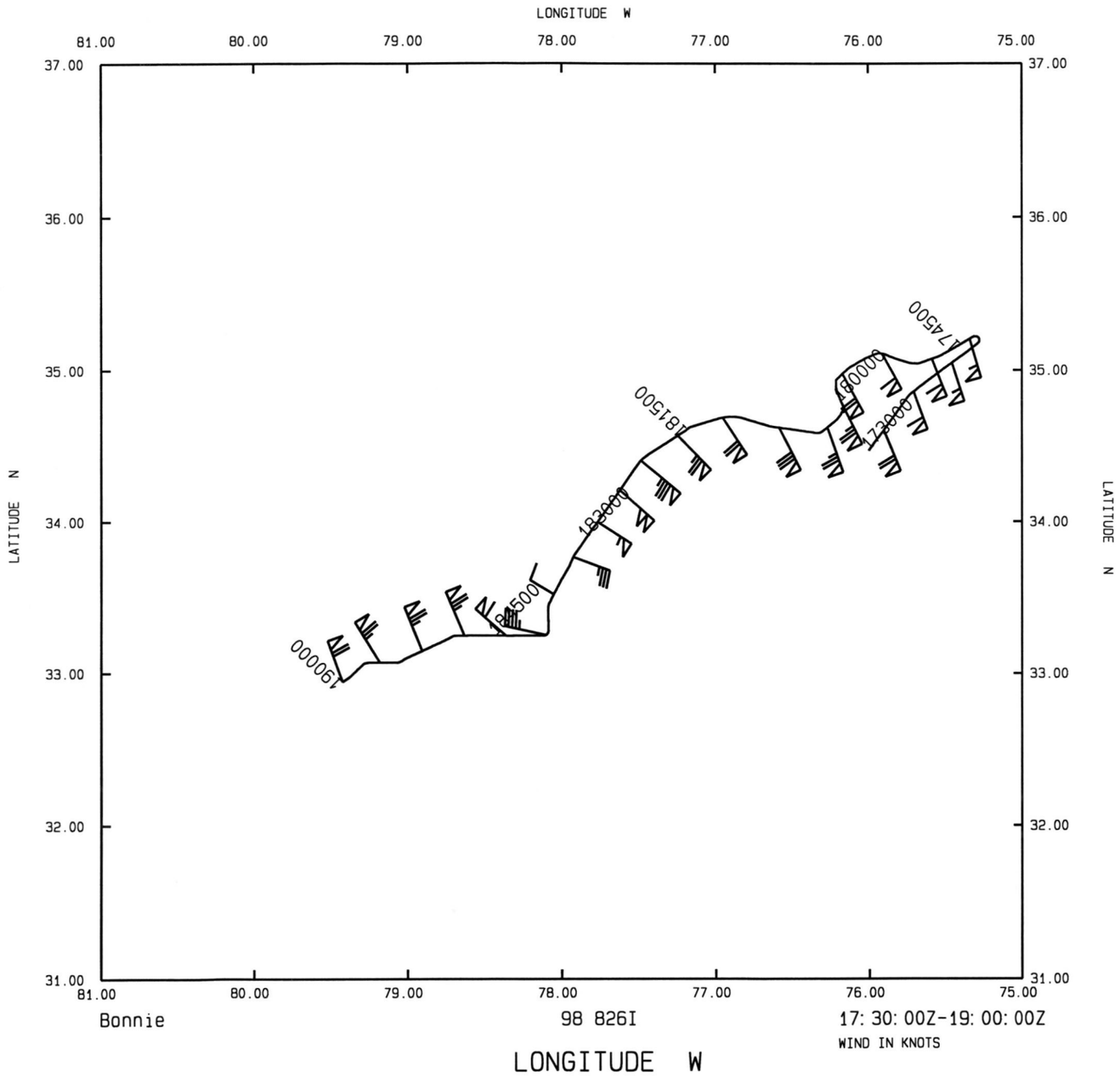
Problems:

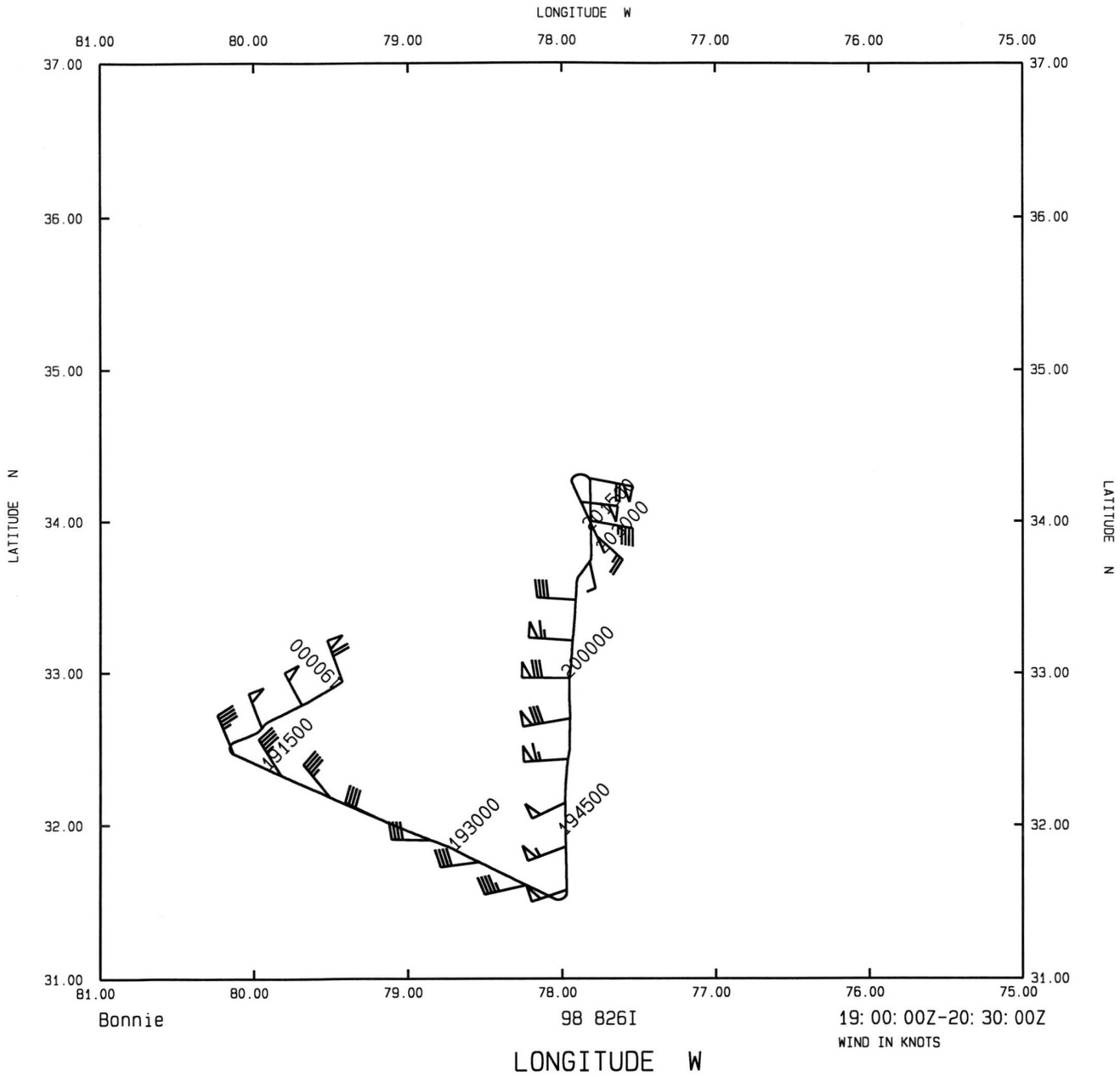
No significant problems occurred.

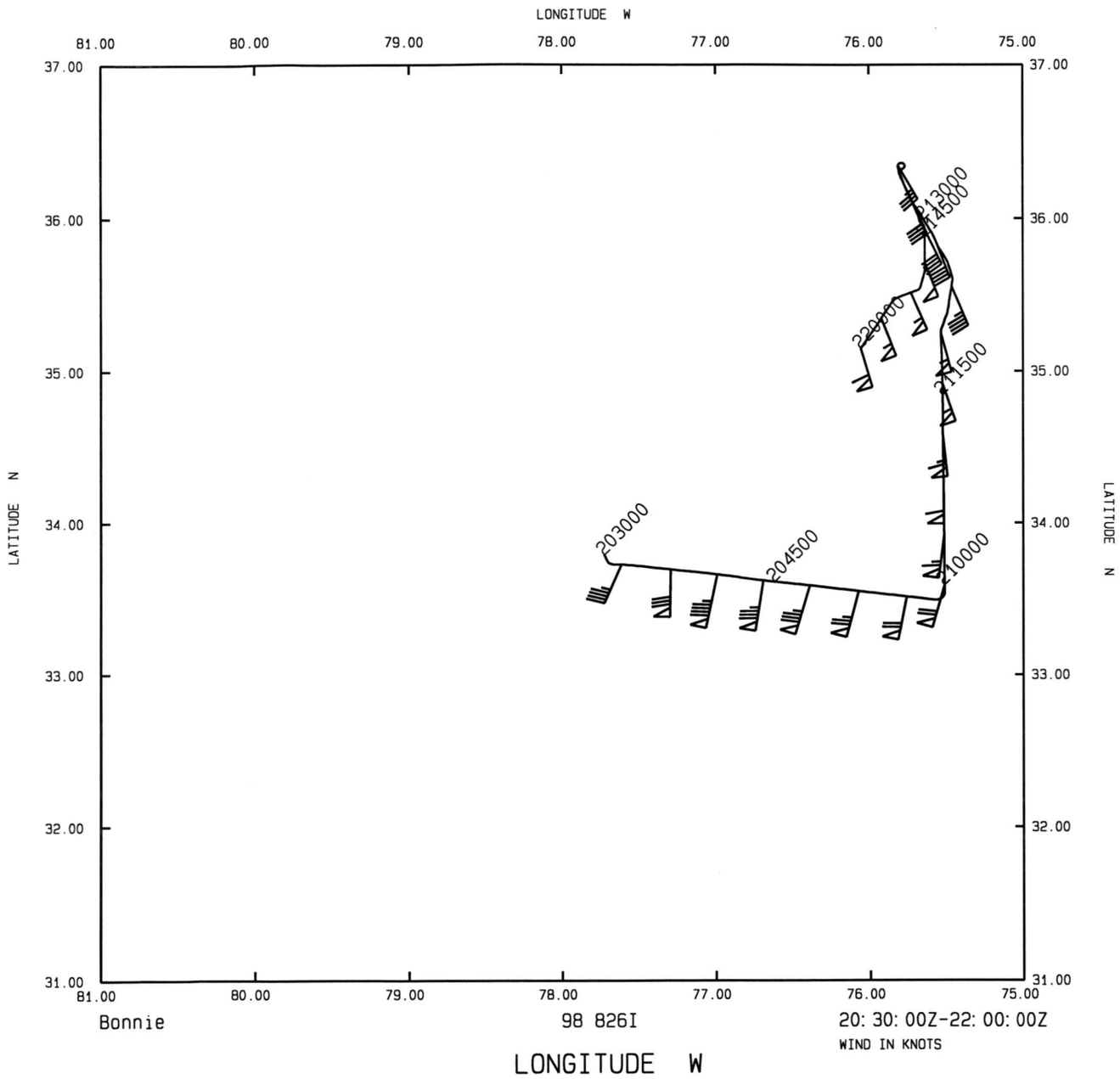
Peter G. Black

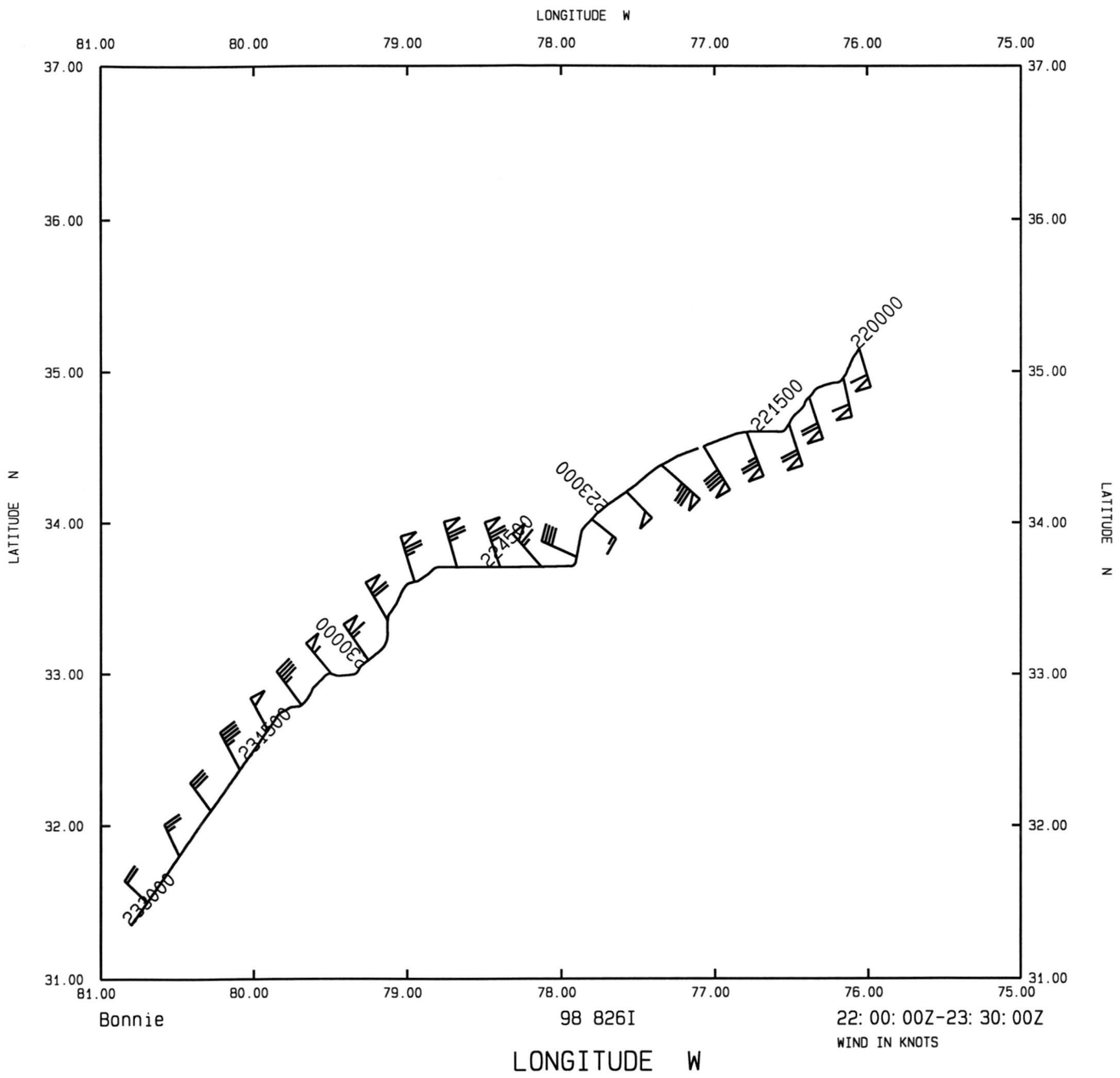

LONGITUDE W
81.00
80.00
79.00
78.00
77.00
76.00
75.00
36.00
35.00
34.00
33.00
32.00
31.00
LATITUDE N
Bonnie
98 826I
15: 01: 00Z-24: 30: 00Z
WIND IN KNOTS
LONGITUDE W

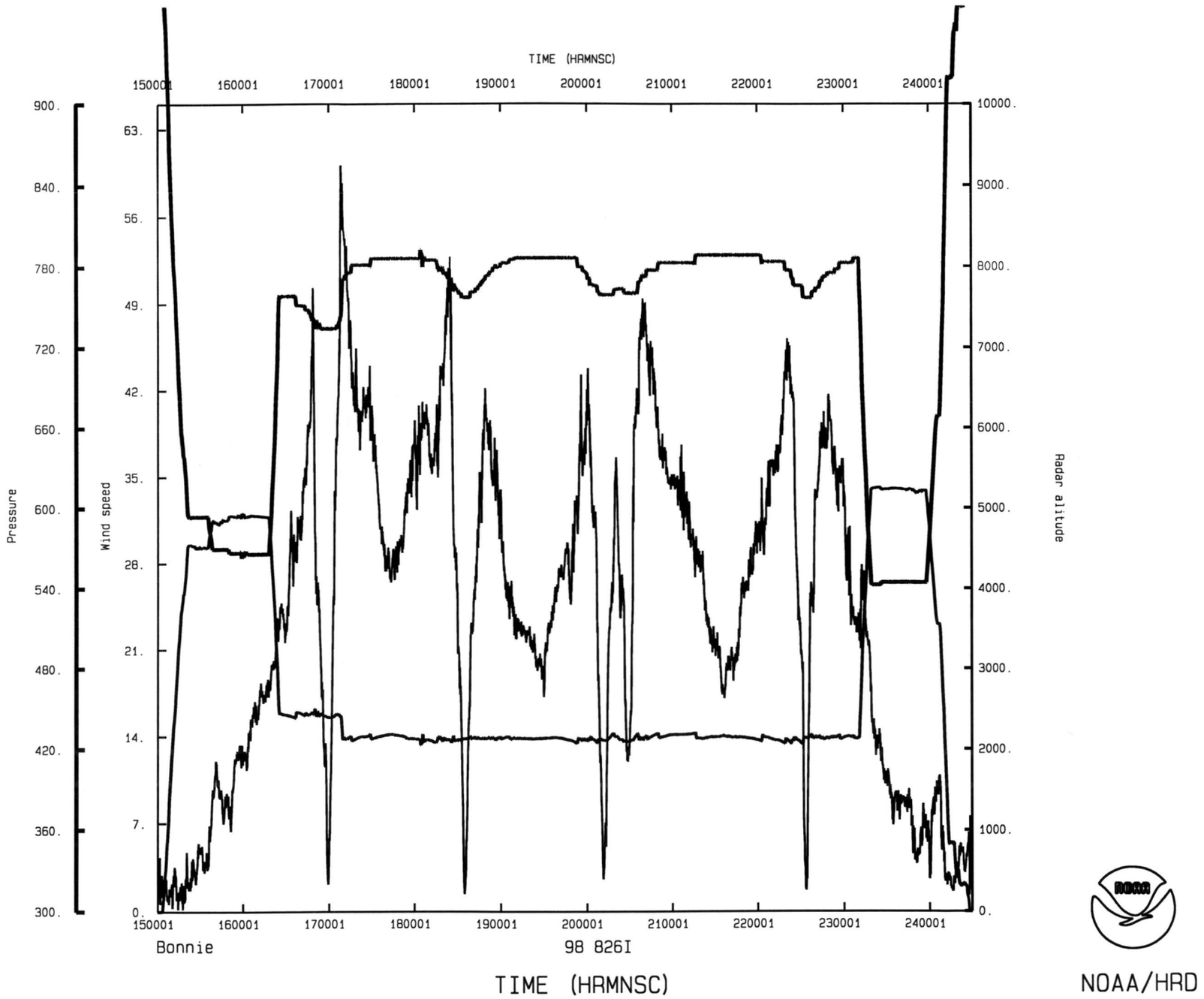

LONGITUDE W
81.00
80.00
79.00
78.00
77.00
76.00
75.00
37.00
36.00
35.00
34.00
33.00
32.00
31.00
LATITUDE N
160500
163000
164500
170000
171500
173000
174500
Bonnie
98 826I
16: 00: 00Z-17: 45: 00Z
WIND IN KNOTS
LONGITUDE W

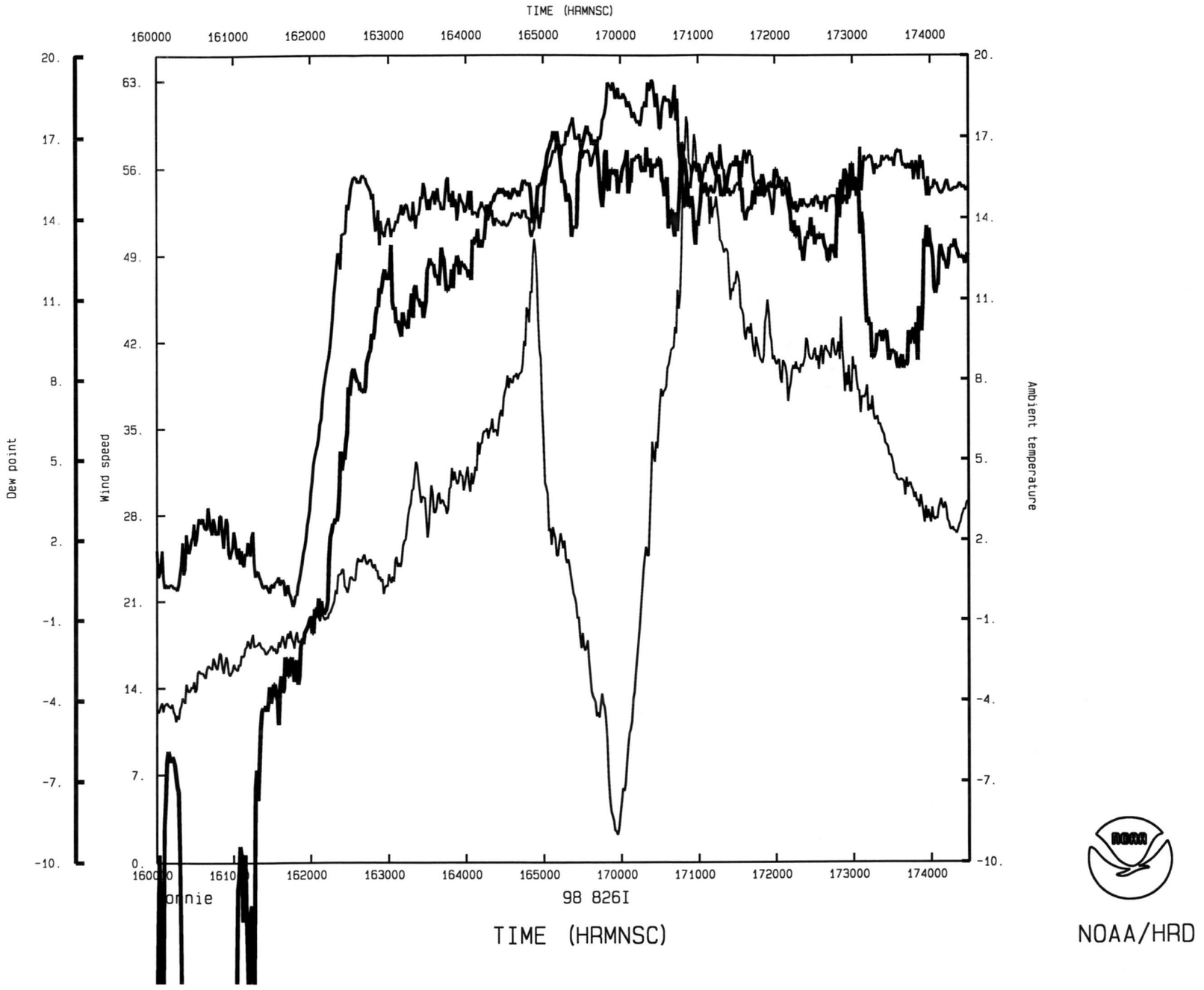

LONGITUDE W
81.00
80.00
79.00
78.00
77.00
76.00
75.00
37.00
36.00
35.00
34.00
33.00
32.00
31.00
LATITUDE N
190000
182500
175000
167500
160000
152500
145000
Bonnie
98 826I
17: 30: 00Z-19: 00: 00Z
WIND IN KNOTS
LONGITUDE W


LONGITUDE W
81.00
80.00
79.00
78.00
77.00
76.00
75.00
37.00
36.00
35.00
34.00
33.00
32.00
31.00
LATITUDE N
LATITUDE N
190000
191500
193000
194500
200000
201500
203000
Bonnie
98 826I
19: 00: 00Z-20: 30: 00Z
WIND IN KNOTS
LONGITUDE W

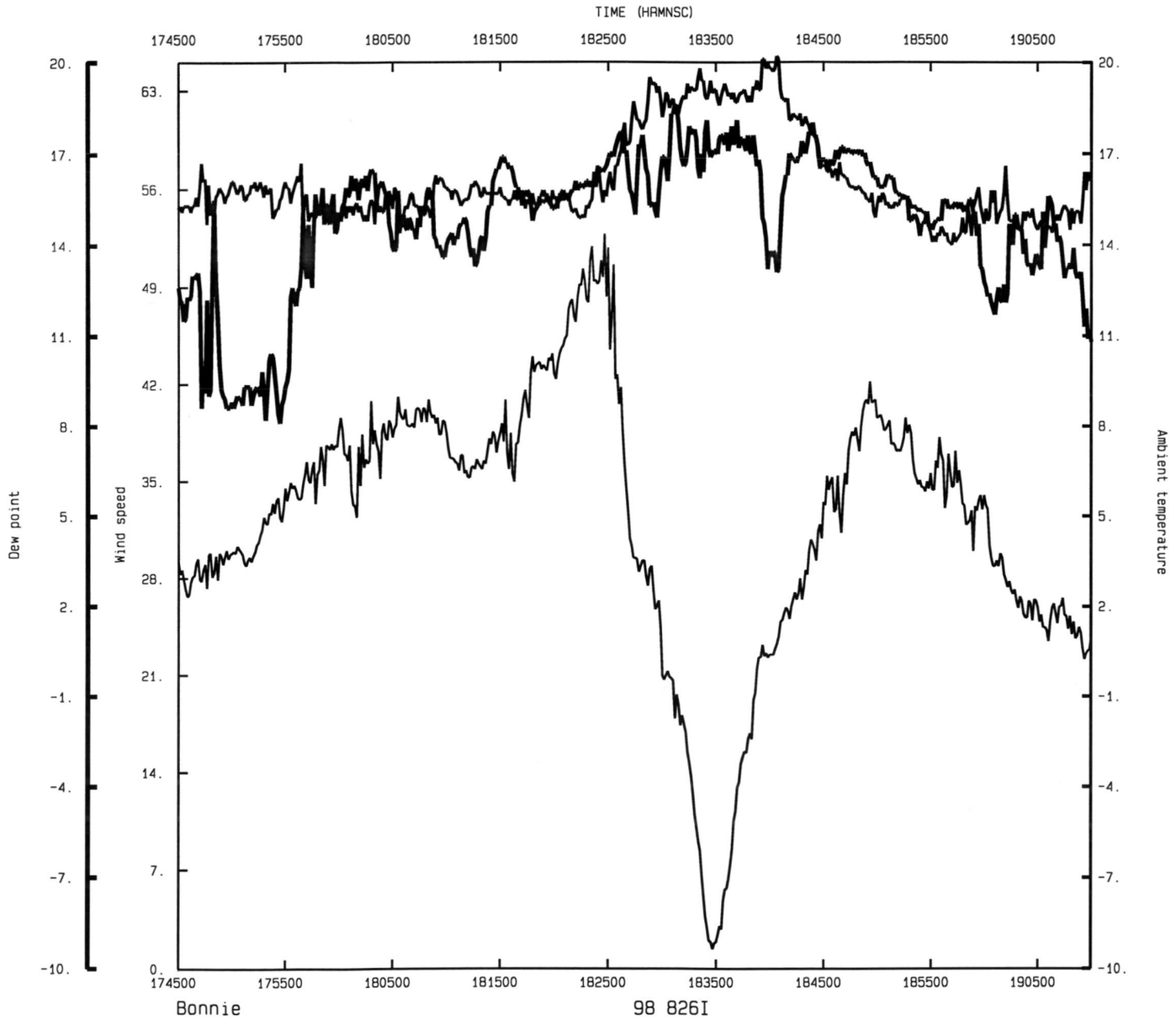

LONGITUDE W
81.00
80.00
79.00
78.00
77.00
76.00
75.00
37.00
36.00
35.00
34.00
33.00
32.00
31.00
LATITUDE N
213000
214500
220000
211500
203000
204500
210000
Bonnie
98 826I
20: 30: 00Z-22: 00: 00Z
WIND IN KNOTS
LONGITUDE W


LONGITUDE W
81.00
80.00
79.00
78.00
77.00
76.00
75.00
37.00
36.00
35.00
34.00
33.00
32.00
31.00
LATITUDE N
220000
221500
223000
224500
230000
231500
233000
Bonnie
98 826I
22: 00: 00Z-23: 30: 00Z
WIND IN KNOTS
LONGITUDE W

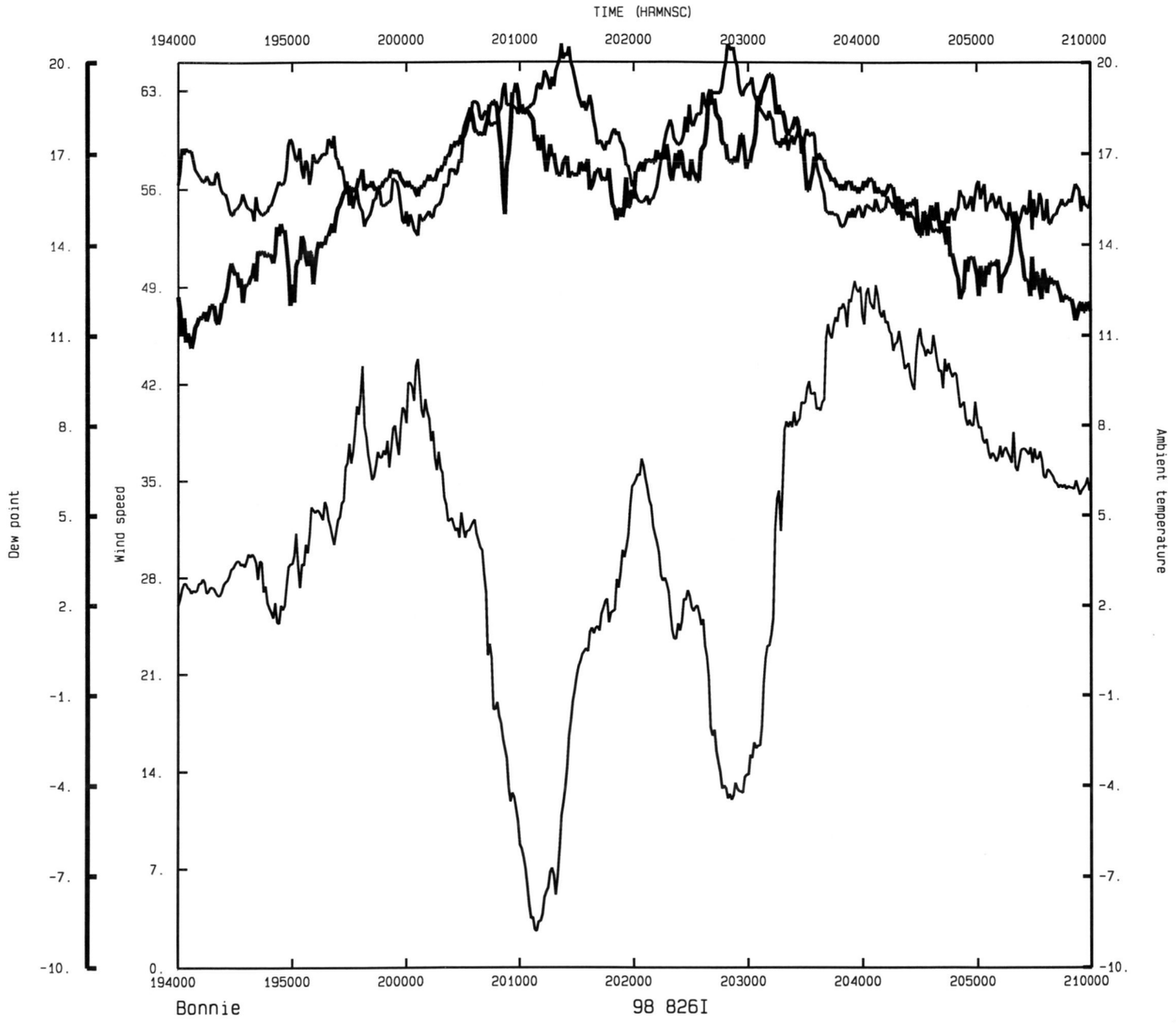

TIME (HRMNSC)
150001
160001
170001
180001
190001
200001
210001
220001
230001
240001
Pressure
900.
840.
780.
720.
660.
600.
540.
480.
420.
360.
300.
Wind speed
63.
56.
49.
42.
35.
28.
21.
14.
7.
0.
Radar altitude
10000.
9000.
8000.
7000.
6000.
5000.
4000.
3000.
2000.
1000.
0.
Bonnie
98 826I
TIME (HRMNSC)
NOAA/HRD


TIME (HRMNSC)
160000
161000
162000
163000
164000
165000
170000
171000
172000
173000
174000
Dew point
20.
17.
14.
11.
8.
5.
2.
-1.
-4.
-7.
-10.
Wind speed
63.
56.
49.
42.
35.
28.
21.
14.
7.
0.
Ambient temperature
20.
17.
14.
11.
8.
5.
2.
-1.
-4.
-7.
-10.
98 826I
TIME (HRMNSC)

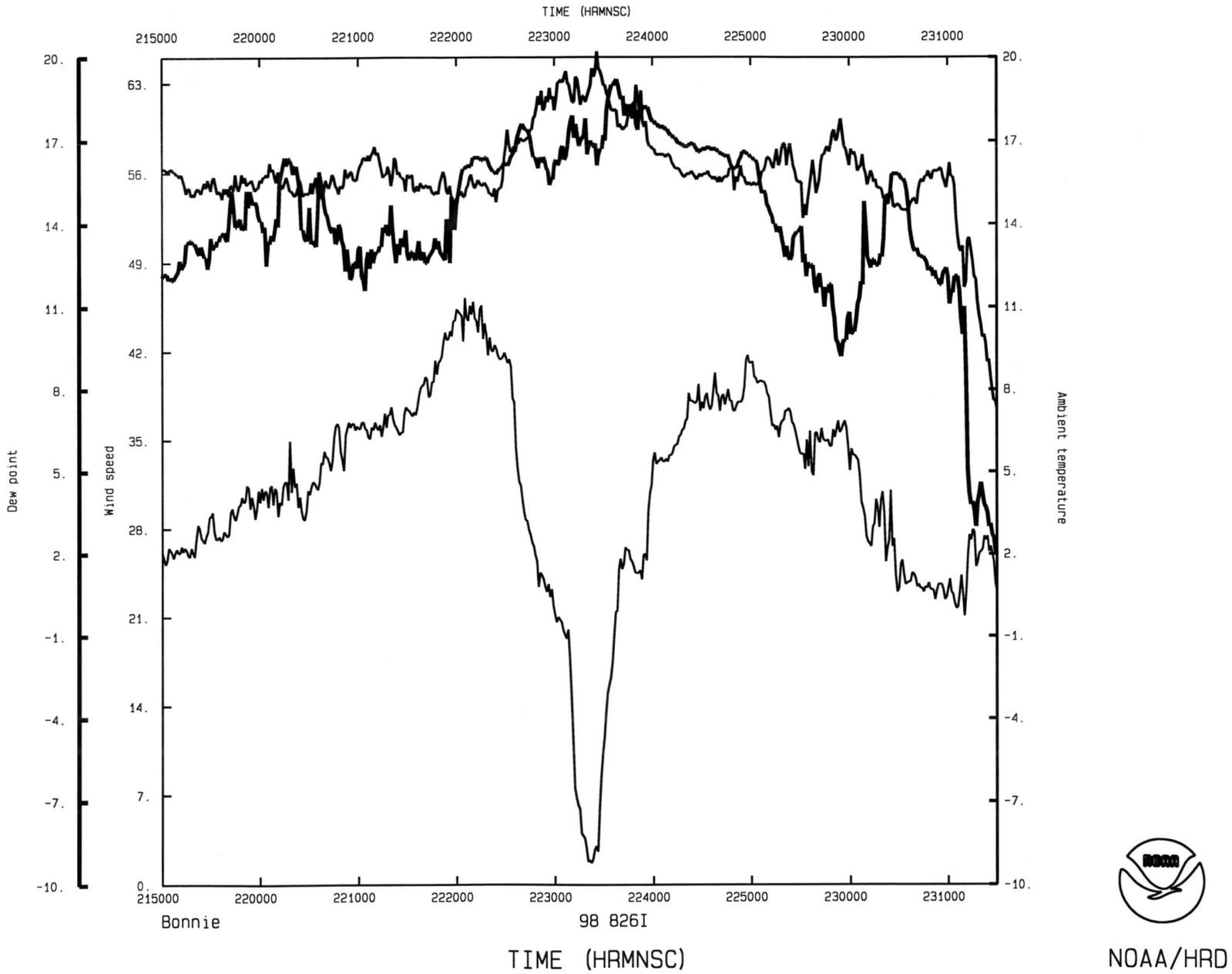
NOAA/HRD


TIME (HRMNSC)
174500
175500
180500
181500
182500
183500
184500
185500
190500
Dew point
20.
17.
14.
11.
8.
5.
2.
-1.
-4.
-7.
-10.
Wind speed
63.
56.
49.
42.
35.
28.
21.
14.
7.
0.
Ambient temperature
Bonnie
98 826I
TIME (HRMNSC)

NOAA/HRD


TIME (HRMNSC)
194000
195000
200000
201000
202000
203000
204000
205000
210000
Dew point
20.
17.
14.
11.
8.
5.
2.
-1.
-4.
-7.
-10.
Wind speed
63.
56.
49.
42.
35.
28.
21.
14.
7.
0.
Ambient temperature
Bonnie
98 826I
TIME (HRMNSC)

NOAA/HRD


TIME (HRMNSC)
215000
220000
221000
222000
223000
224000
225000
230000
231000
Dew point
20.
17.
14.
11.
8.
5.
2.
-1.
-4.
-7.
-10.
Wind speed
63.
56.
49.
42.
35.
28.
21.
14.
7.
0.
Ambient temperature
Bonnie
98 826I
TIME (HRMNSC)

NOAA/HRD