19980826H1-LPS

Mission Summary
Bonnie
980826H Aircraft 42RF

Scientific Crew (42RF)

Lead Project Scientist _____ Gary Barnes (U Hawaii)
Radar Scientist _____ Fran k Marks
AXBT Scientist _____ Todd Kimberlin (CSU)
Dropwindsonde Scientist_____ Sim Aberson
Boundary-Layer Scientist___ Derek Wroe (U Hawaii)
Workstation Scientist_____ Paul Leighton

Mission Briefing:

At 1200 UTC on 26 August Hurricane Bonnie was projected to be a 32.5 N and 77.8 W, only 200 nm off the North Carolina coast and moving NNW at 11 kts. We briefed the N42RF crew for the Rainband Thermodynamic Structure Experiment (p. 55 in HFP) with a take off at 1000 UTC from MacDill AFB. The initial point (IP) in the pattern was 100 nm SW of the center (31.3 N, 79.2 W). We planned SW-NE traverse of the center to a point 100 nm NE of the center. From there we planned a spiral inflow pattern starting NE of the storm, passing between rainbands to the eyewall NW of the center. After passing through the center the pattern called for a spiral out to the south and east to a point 100 nm S of the center. After a leg downwind to a point 100 nm E of the center we would repeat this inflow-outflow spiral pattern in the other two quadrants. Each spiral would include 10 GPS sondes and 3 AXBTs roughly evenly spaced. If there was time we would then run tracks towards either Wilmington (KLTX) or Moorehead City (KMHX) WSR-88D radars for dual-Doppler coverage. If N43RF was tasked to fly in the developing disturbance near Cuba we would also fly legs parallel to the coast to map the onshore and offshore winds.

Mission Synopsis:

Take off occurred at 1020 UTC and we did proceed to the initial point. Radar revealed that Bonnie was a concentric system with an inner eyewall with a radius of 15-20 nm. and an outer ring at a radius of 50-55 nm. The inner ring was a weak stratiform semicircle while the outer ring contained vigorous convective scale features, especially on the north and west sides of the hurricane. The first spiral inflow pattern was started to the north of the eye and lengthened in an attempt to capture the complex situation. About 12 GPS sondes were deployed on this first spiral along with three AXBTs. Sondes were dropped in the amorphous eye and the spiral pattern was repeated, this time toward the east and south of the circulation center. Completion of this second spiral (another 14 GPS sondes and 3 AXBTs) placed the aircraft south of the center. A leg was flown north to the eye, then extended to the northwest to near the South Carolina coast. Here the aircraft reversed course and flew a spiral toward the center covering the flow from offshore. Another 12 GPS sondes and 3 AXBTs were deployed. A fourth spiral was then flown toward the east and south of the center, but this part of the pattern was truncated because of numerous GPS sonde failures. The other three spirals met with a much higher success rate with respect to the GPS sondes.

12 3
14 3
12 3

The co-lead project scientists then decided to fly a figure "4" to document the evolution of the slow moving hurricane and leave the coastal monitoring to 43 RF which was now approaching Bonnie. The figure "4" was to place the aircraft roughly north of the center and along a radial from the Morehead City radar to the center of the storm. At the start of this pattern, which was adjacent to a vigorous convective rainband with supercells type signatures, we suffered a problem forcing the shutdown of number four engine. While repairs were effected we dropped a GPS sonde very near one of the strong cells. After the engine was restarted we picked up the figure "4" pattern 80 nm. northeast of the center and tracked into the eye along the Morehead City radar radial. The eye had now undergone significant evolution , taking the form of a "6", with the lower circle of the "6" having a radius of about 30 -40 nm. 80 nm. southwest of the center we turned and tracked towards a point 80 nm. south-southeast of the center along a radial to the eye and Wilmington's radar. As we tracked in from the southeast we noticed another band had formed inside the radius of the old eyewall. We flew over the radar at 12,000 feet, turning in the northwest corner of the eyewall and retraced our pattern to the eye. we exited to the southwest and at 80 nm. climbed to fuel efficent altitude for the ferry back to Macdill AFB. During the figure "4" both GPS sondes and AXBTs were deployed on either side of significant convection.

Evaluation:

Overall the experiment went very well since we completed three spirals into the storm and collected supporting flight level data around Bonnie. The GPS operator did a marvelous job meeting the frequent launch times set by the experiment (every 2-3 minutes). We did lose a fourth spiral due to sonde failures. AOC should receive kudos for solving both a radar and the aforemetioned engine shutdown problem with a minimum of lost time. It is difficult to monitor all the sondes when the operator is busy with baselining and launching at such a frentic pace. We need to devise a way to monitor sonde quality during very demanding situations.

Problems:

Problems include:

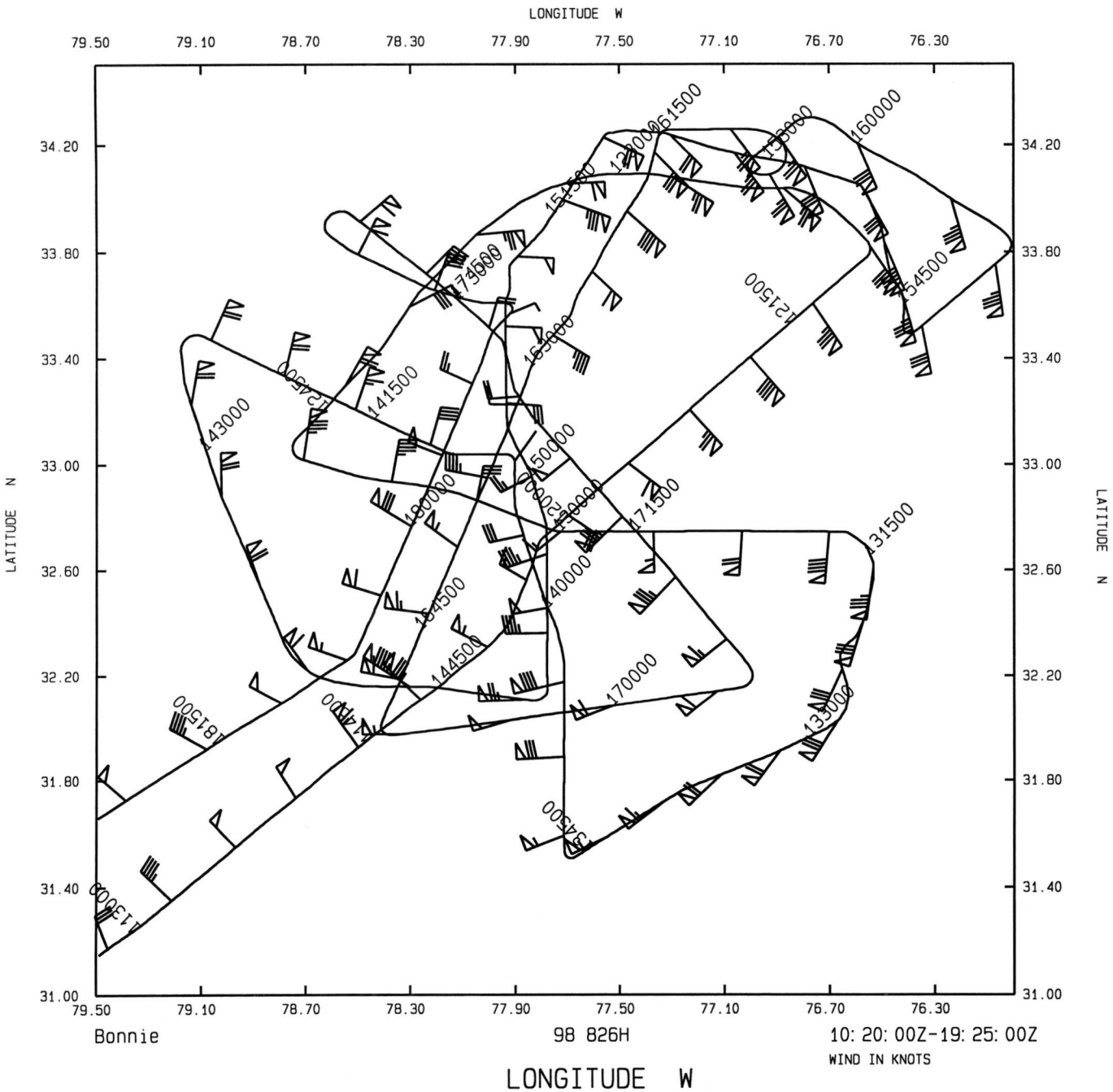
(1) numerous GPS failures, especially on the fourth spiral,

(2) a radar reboot needed that lost about 18 minutes of data, and

(3) a faulty engine temperature sensor which forced shutdown of number 4 engine for 10 minutes.

Approximately 13 of 16 AXBTs were successful and 45 of 55 GPS drops were mostly successful. Sondes that started with an ID starting with 97 had the majority of problems.

Gary Barnes and Frank Marks
26 August 1998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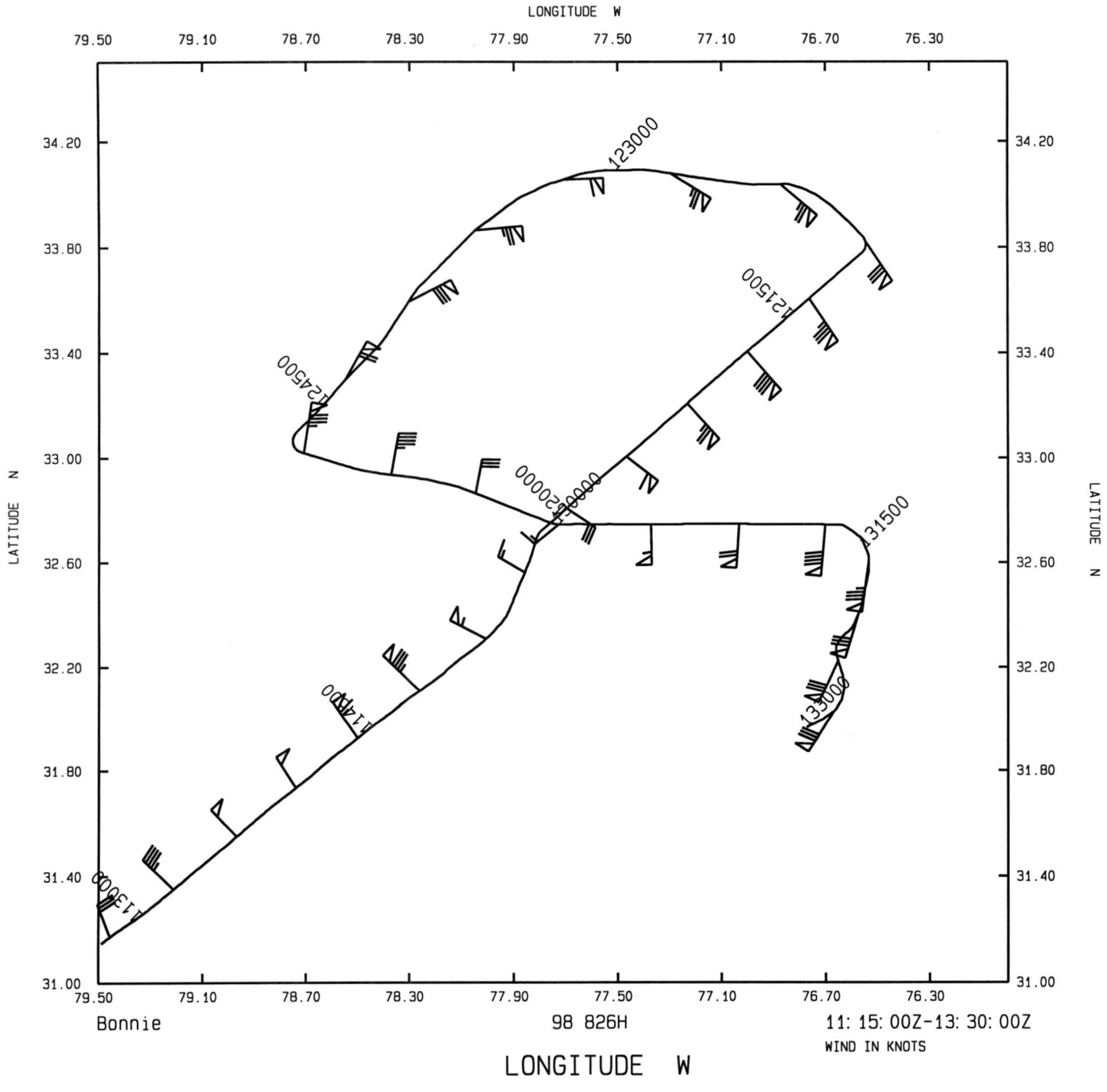
79.10
78.70
78.30
77.90
77.50
77.10
76.70
76.30
34.20
33.80
33.40
33.00
32.60
32.20
31.80
31.40
31.00
LATITUDE N
Bonnie
98 826H
10: 20: 00Z-19: 25: 00Z
WIND IN KNOTS
LONGITUDE W


LONGITUDE W
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79.10
78.70
78.30
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77.50
77.10
76.70
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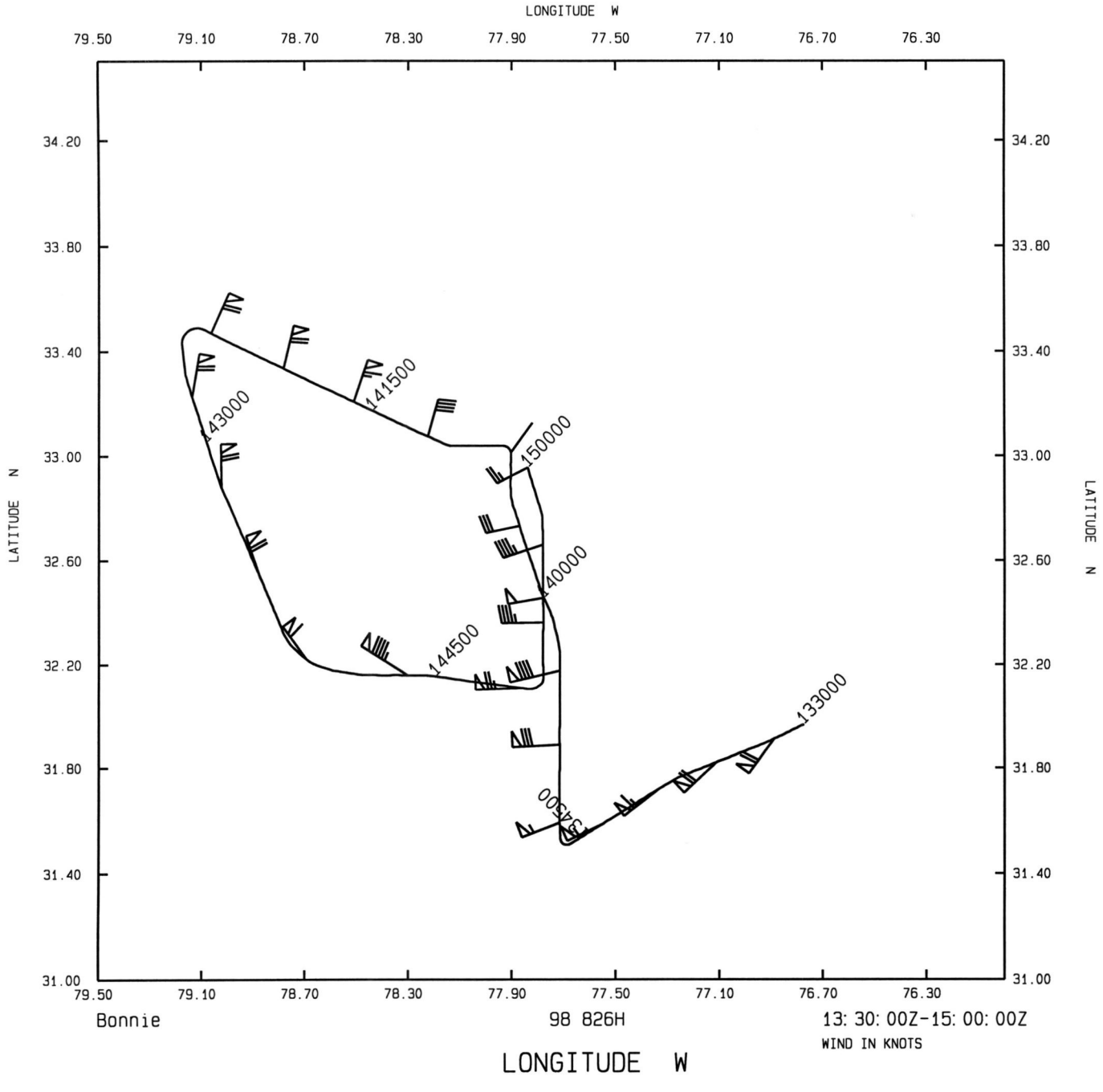
34.20
33.80
33.40
33.00
32.60
32.20
31.80
31.40
31.00
LATITUDE N
123000
124500
125000
131500
133000
114500
113000
Bonnie
98 826H
11: 15: 00Z-13: 30: 00Z
WIND IN KNOTS
LONGITUDE W


LONGITUDE W
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78.30
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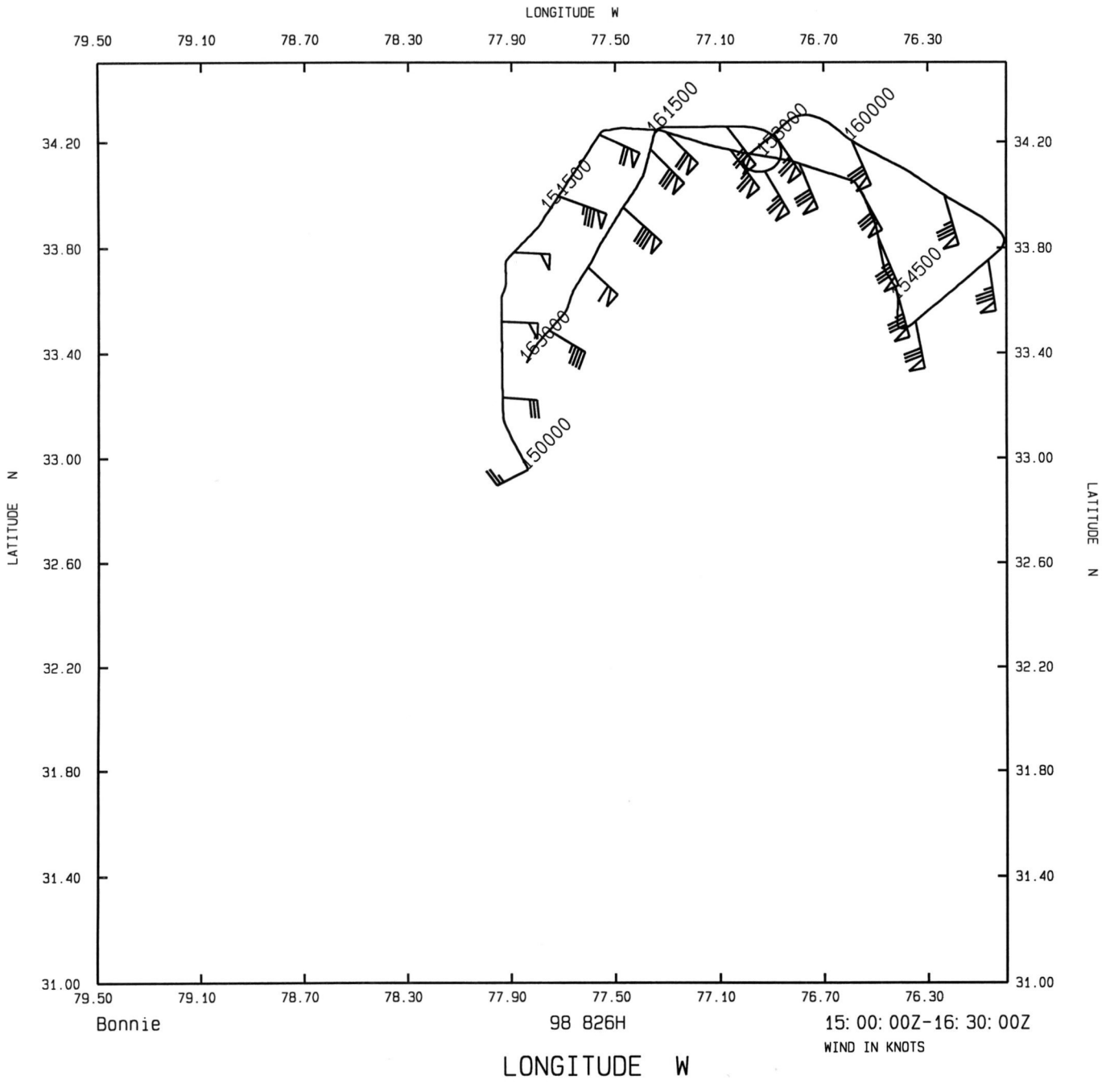
77.50
77.10
76.70
76.30
34.20
33.80
33.40
33.00
32.60
32.20
31.80
31.40
31.00
LATITUDE N
143000
141500
150000
140000
144500
133000
132500
Bonnie
98 826H
13: 30: 00Z-15: 00: 00Z
WIND IN KNOTS
LONGITUDE W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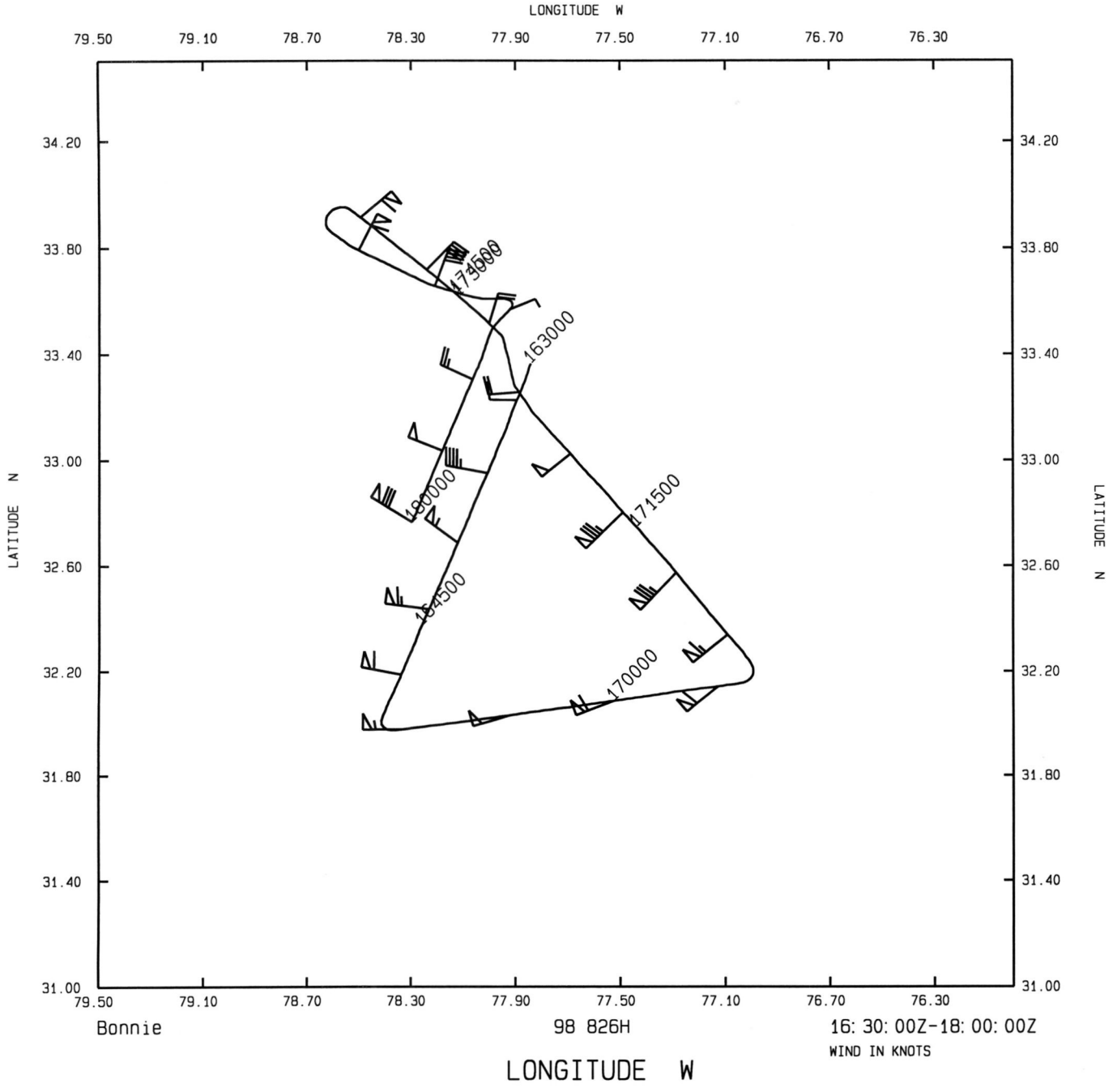
79.10
78.70
78.30
77.90
77.50
77.10
76.70
76.30
34.20
33.80
33.40
33.00
32.60
32.20
31.80
31.40
31.00
LATITUDE N
161500
160000
154500
150000
Bonnie
98 826H
15: 00: 00Z-16: 30: 00Z
WIND IN KNOTS
LONGITUDE W


LONGITUDE W
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78.70
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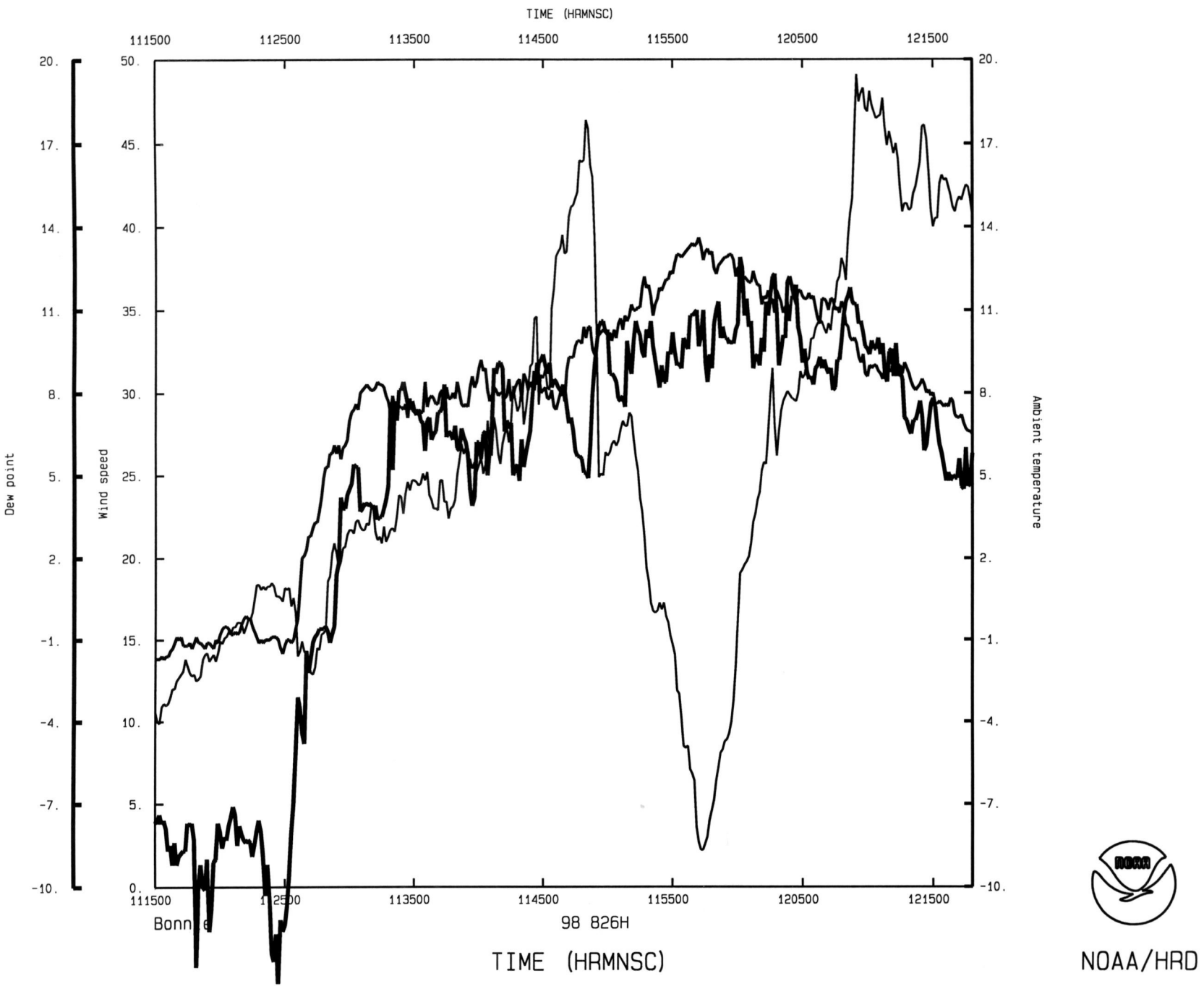
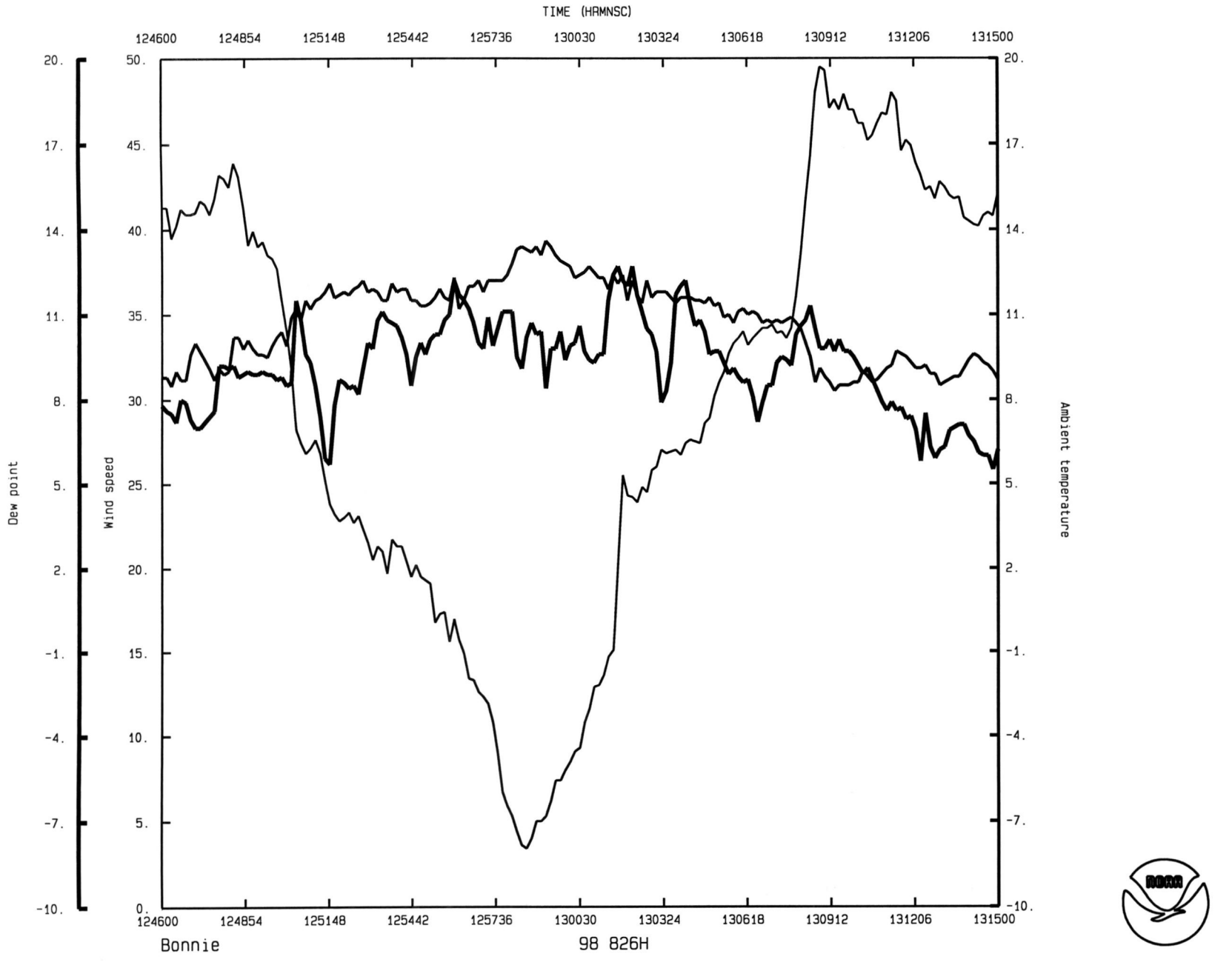
76.70
76.30
34.20
33.80
33.40
33.00
32.60
32.20
31.80
31.40
31.00
LATITUDE N
174500
163000
170000
171500
164500
170000
Bonnie
98 826H
16: 30: 00Z-18: 00: 00Z
WIND IN KNOTS
LONGITUDE W


TIME (HRMNSC)
111500
112500
113500
114500
115500
120500
121500
Dew point
Wind speed
Ambient temperature
20.
17.
14.
11.
8.
5.
2.
-1.
-4.
-7.
-10.
50.
45.
40.
35.
30.
25.
20.
15.
10.
5.
0.
98 826H
TIME (HRMNSC)

NOAA/HRD


TIME (HRMNSC)
124600
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125442
125736
130030
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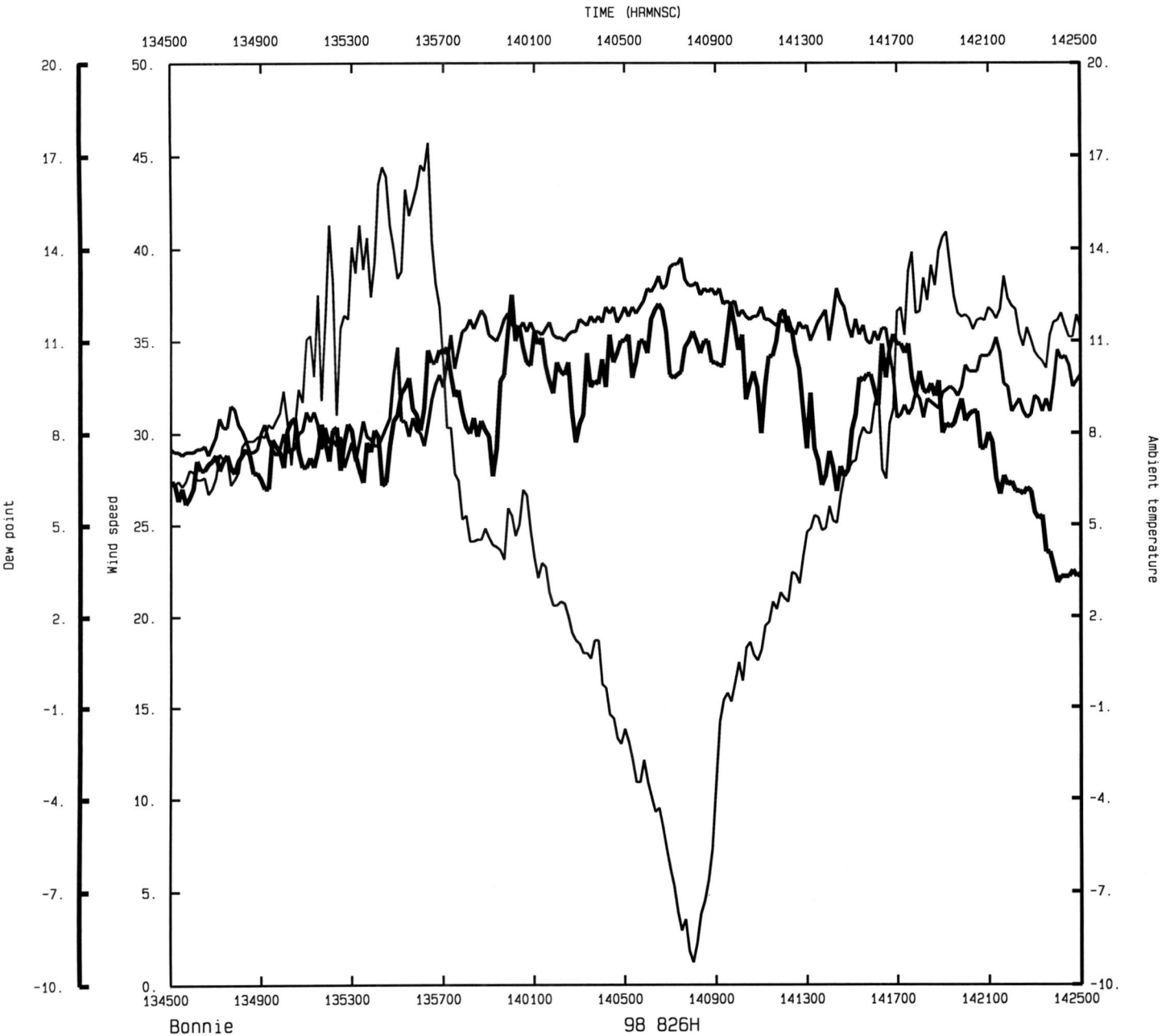
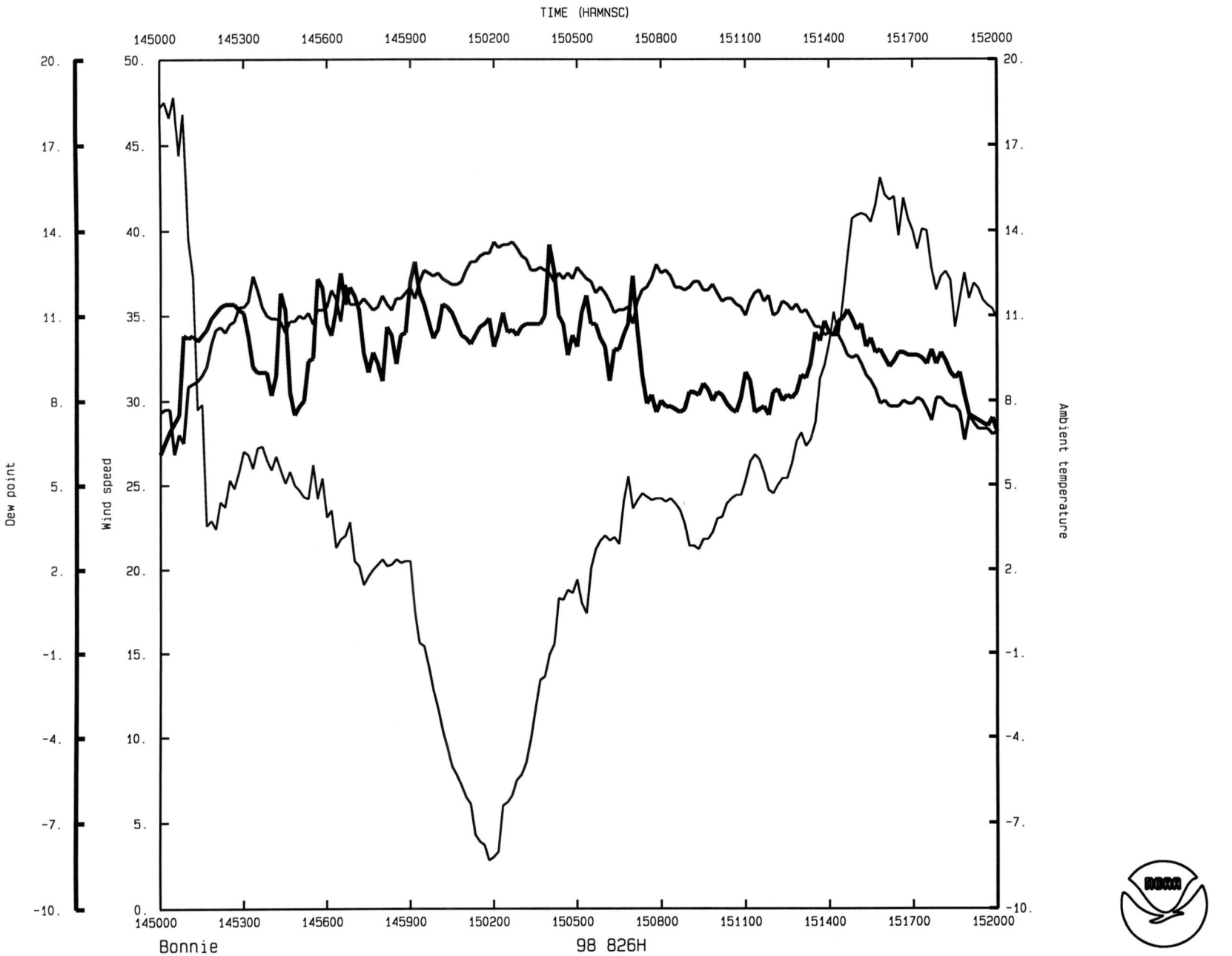
130618
130912
131206
131500
Dew point
20.
17.
14.
11.
8.
5.
2.
-1.
-4.
-7.
-10.
Wind speed
50.
45.
40.
35.
30.
25.
20.
15.
10.
5.
0.
Ambient temperature
Bonnie
98 826H
TIME (HRMNSC)
NOAA/HRD



TIME (HRMNSC)

NOAA/HRD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145600
145900
150200
150500
150800
151100
151400
151700
152000
Dew point
20.
17.
14.
11.
8.
5.
2.
-1.
-4.
-7.
-10.
Wind speed
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45.
40.
35.
30.
25.
20.
15.
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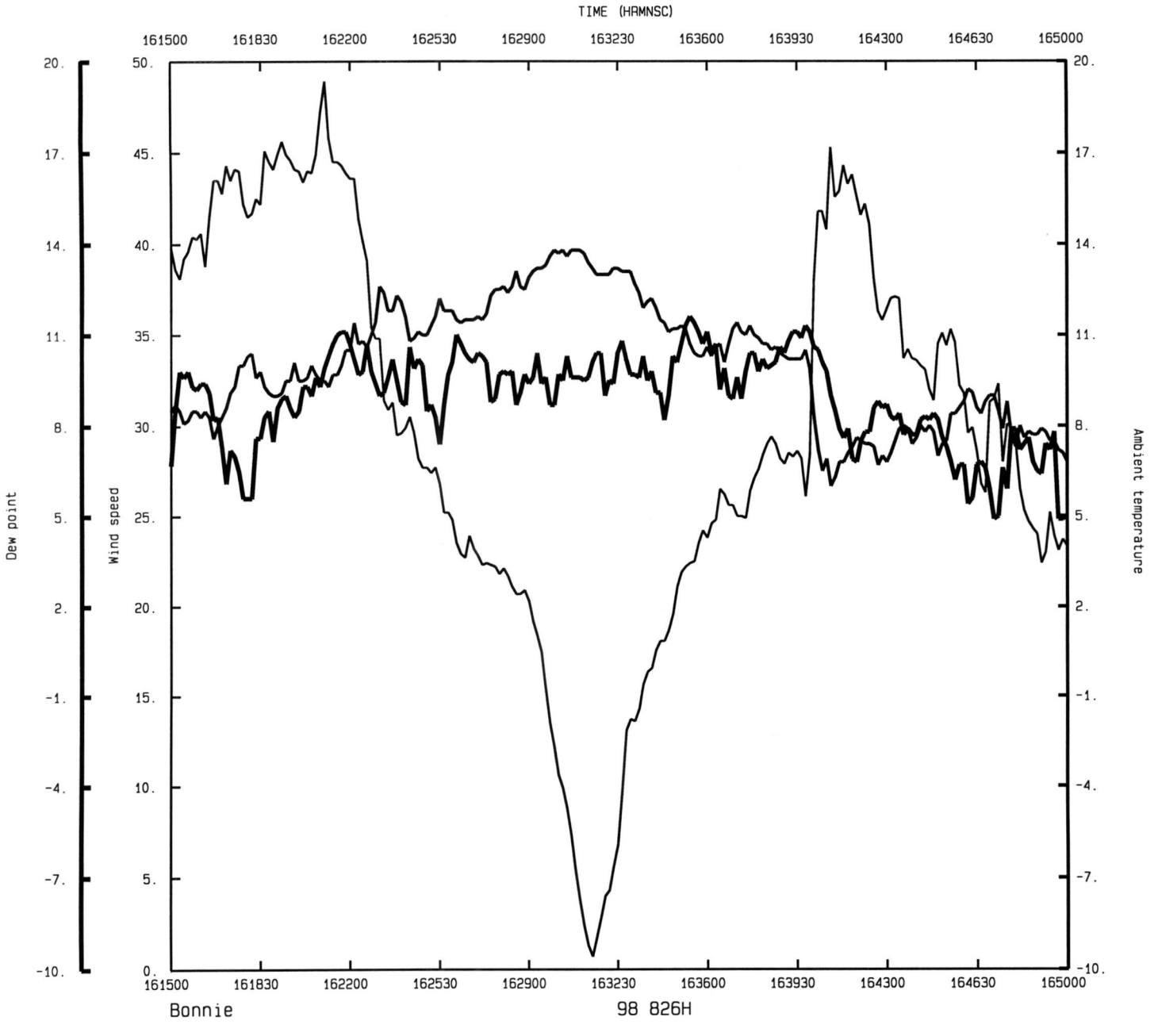
5.
0.
Ambient temperature
Bonnie
98 826H
TIME (HRMNSC)

NOAA/HRD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161830
162200
162530
162900
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163600
163930
164300
164630
165000
Dew point
Wind speed
Ambient temperature
20.
17.
14.
11.
8.
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2.
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-10.
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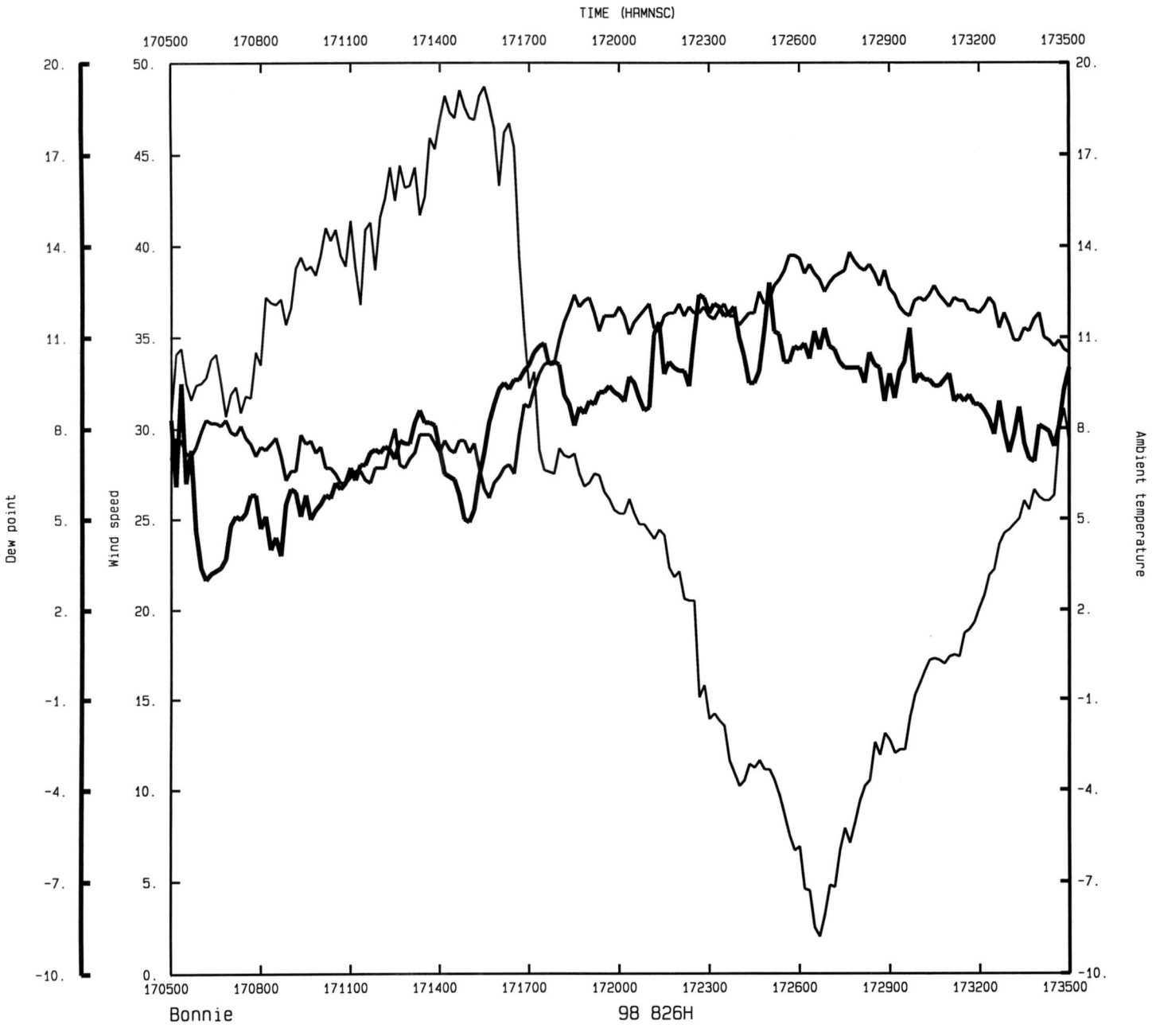
Bonnie
98 826H
TIME (HRMNSC)

NOAA/HRD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Wind speed
Ambient temperature
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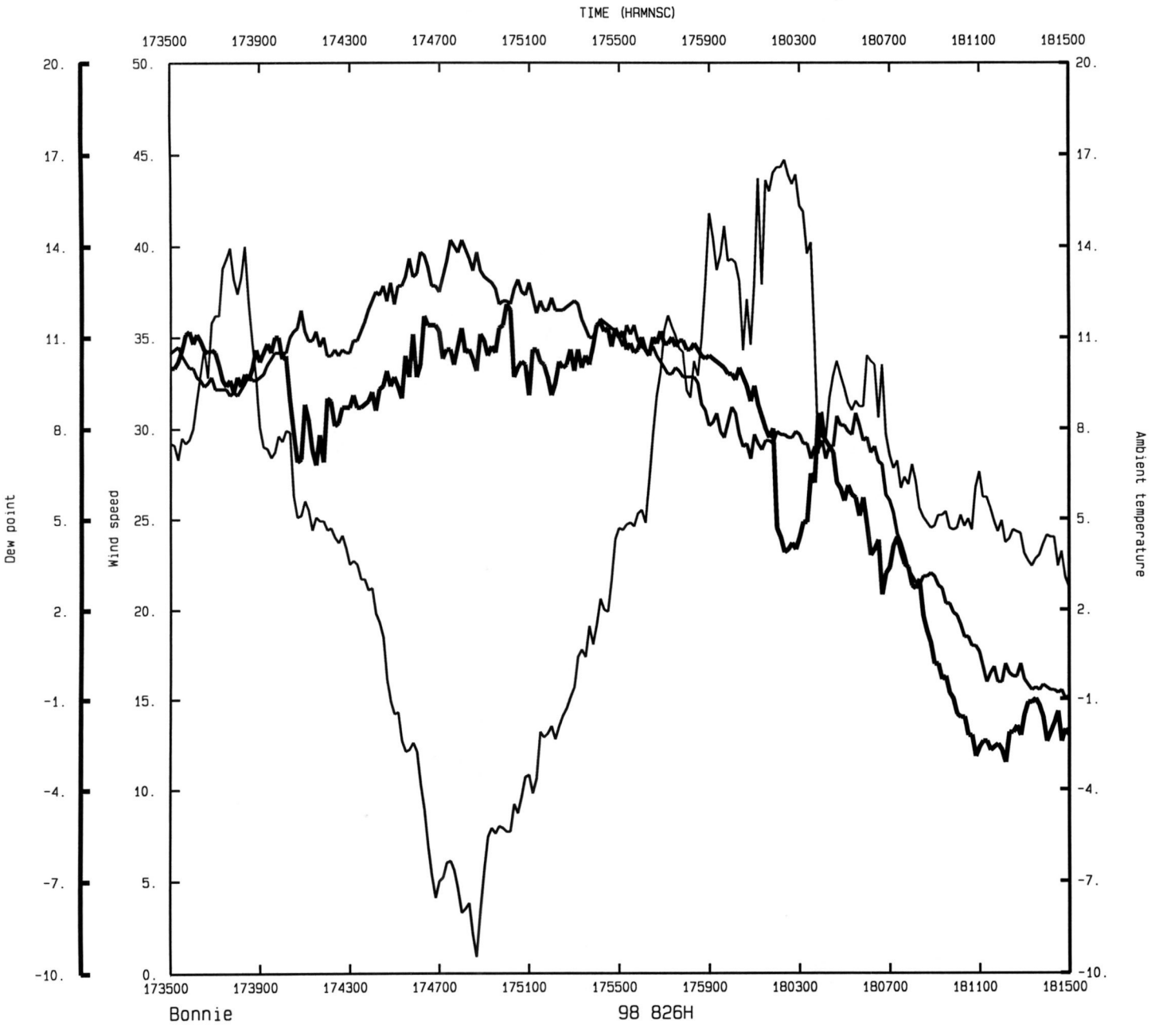
Bonnie
98 826H
TIME (HRMNSC)

NOAA/HRD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175900
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180700
181100
181500
Dew point
Wind speed
Ambient temperature
20.
17.
14.
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20.
15.
10.
5.
0.
Bonnie
98 826H
TIME (HRMNSC)

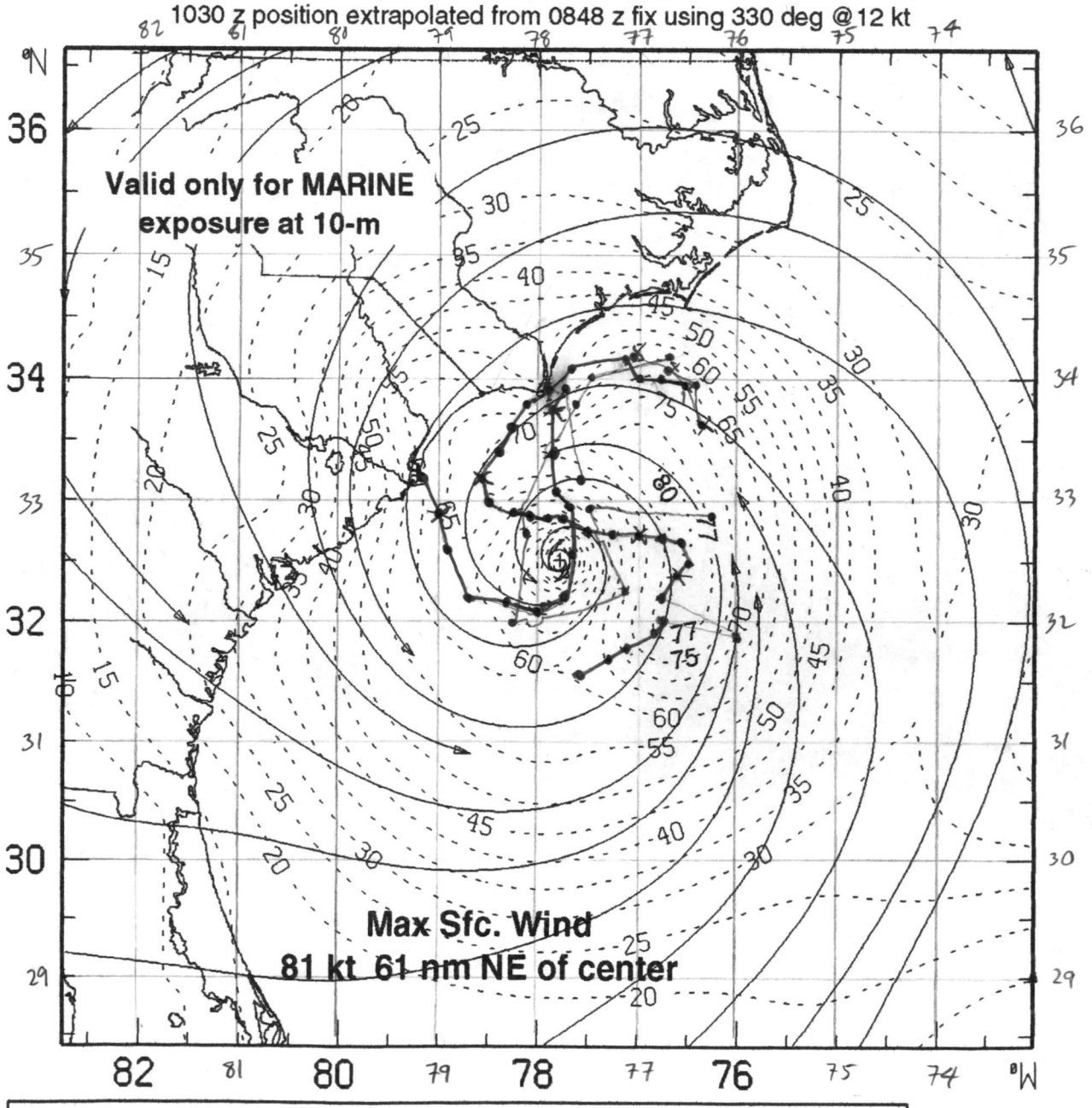
NOAA/HRD

ATTENTION: HURRICANE SPECIALISTS

Hurricane Bonnie 1030 UTC 26 August 1998

Max. 1-min sustained surface winds (kt) for marine exposure

Analysis based on AFRC C-130 Recon data from 700 mb adjusted to the sfc from 0600 -1000 z;
0605, 0848 z GPS Sonde Sfc Winds;
moored and drifting buoys, C-MANs, and ships from 0645 - 0900 z;
1030 z position extrapolated from 0848 z fix using 330 deg @12 kt



Experimental research product of :

NOAA / AOML / Hurricane Research Division