Mission Summary

980919I1 Hurricane Georges
Synoptic Flow- Eyewall Drop Experiment

Scientific Crew (43RF)	
Chief Scientist	Michael Black
Radar/Doppler Scientist	Peter Dodge
GPS Dropsonde	Chris Landsea
Workstation	Peter Dodge
AXBT,/Observer	Shirley Murillo
Aircraft Crew (43RF)	
Pilots	McKim, Tennesen
Flight Director	Jack Parrish
Navigators	Strong, O'Mara
Systems Engineer	Terry Lynch
AVAPS Operator	Jeff Smith

Mission Briefing:

NOAA-43 was to be part of a 3-aircraft synoptic flow experiment along with NOAA-42 and the G-IV. We planned to depart Barbados at 1730 UTC to a point 100 miles east of Hurricane Georges' center, perform a figure 4 pattern at 10 kft, dropping GPS sondes in and around the eyewall, with a third south-to-north pass before climbing to max. (~20 kft) altitude for the synoptic pattern to the northeast of Georges and returning to Barbados for follow up missions. NOAA-42 also was to depart Barbados near the same time as 42, first sampling the environment to the south and west of Georges, then flying a figure 4 through the eye and returning to Barbados. The G-IV, taking off from St. Croix, was to sample the environment to the north and west of Georges and land in Bermuda. Georges was forecast to be a minimum category 3 storm centered near 15° N, 54° W (ENE of Barbados) and heading to the WNW at 10-15 kts.

Mission Synopsis:

Takeoff from Barbados was at 1744 UTC and NOAA-43, the first GPS drop was at 1826 in-route to the initial point of the figure 4 at 1911 UTC, ~50 nm to the west of the eye. We performed the figure four pattern by first heading east through the eye at 1920, then after an downwind leg to 50 nm north of the center, we flew through the eye at 1957 and finished 50 nm to the south at 2008 UTC. From there, N43 turned around, heading back through the eye at 2019, circled in the eye to record video, before heading outbound finishing the inner core work 50 nm north of Georges at 2037 UTC. Flight-level winds were 140 kts in the eastern and western eyewall, 150 kts in the northern eyewall and 125 kts in the south eyewall. The minimum central pressure was 940 mb as measured by GPS eye drop at 2021 UTC (943 mb was recorded from an eye drop at 1957 UTC but the drop was not in the center). Hurricane Georges had a well-defined, closed, and nearly symmetrical eyewall as viewed by the belly radar and the tail radar showed echo tops as high as 18 km. The eye was almost completely clear except for some shallow cumulus above the sea surface. The eyewall was visually spectacular, with detailed and complex structure, a pronounced outward slope, and cirrus overhang. Clear patches below flight level showed large gradients in the sea-state, ranging from large swell with no wind-driven breakers to huge foam patches with long streaks of wind-driven spray. A total of 12 GPS sondes were dropped within 50 nm of the eye, 8 in the eyewall and 4 at the endpoints of the pattern. The eyewall drops recorded detailed wind structure with pronounced dual low-level (850-925 mb) maxima. In addition the GPS drops , NOAA-43 deployed 8 AXBT's around the center, 4 at the endpoints at 50 nm radius and 4 in the eyewall. After finishing the figure four, we climbed to maximum altitude and resumed the synoptic pattern at 2037 UTC, flying the proposed pattern to the north and east of Georges, dropping 13 more sondes (26 mission total) before landing back at Barbados at 0257 UTC on September 20.

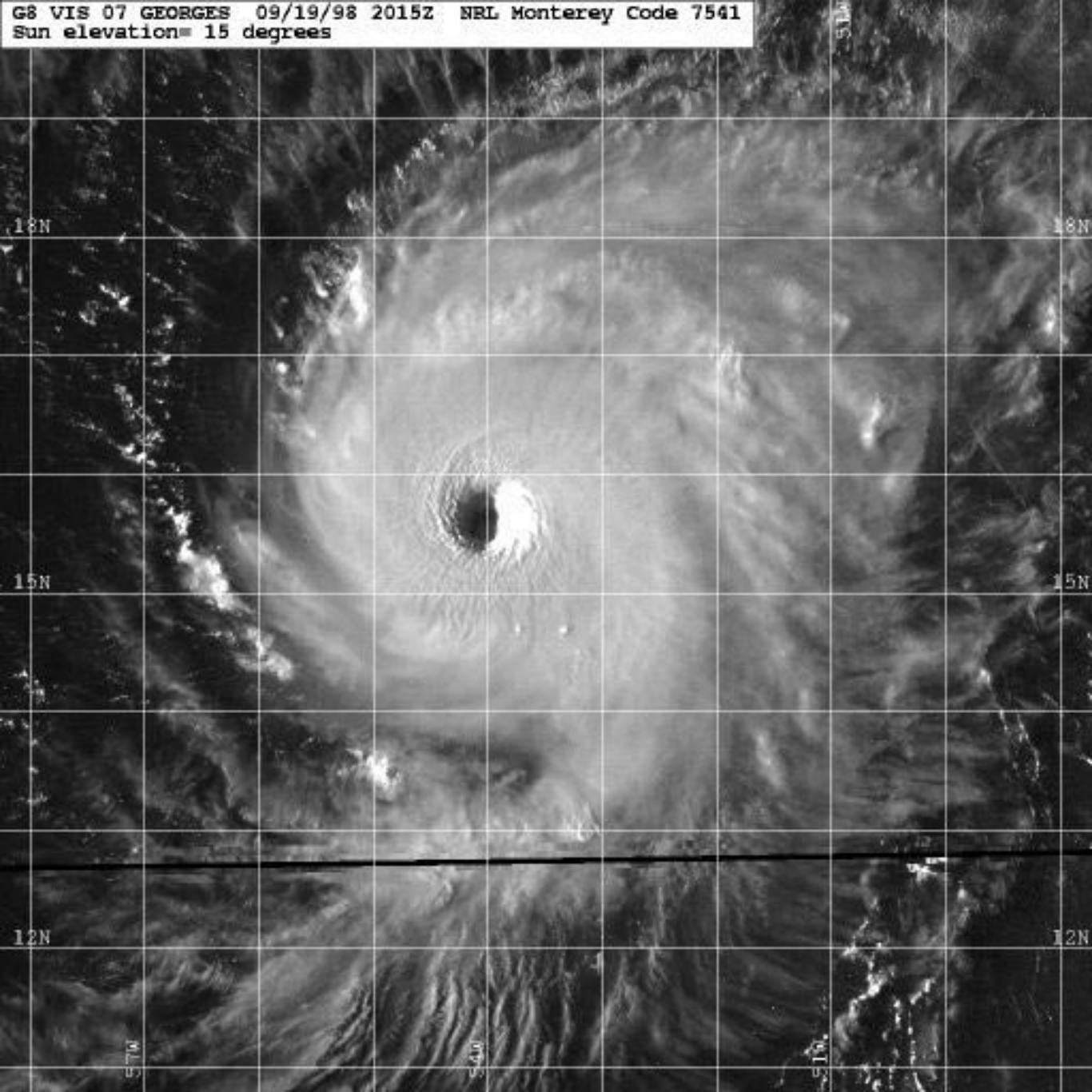
Evaluation:

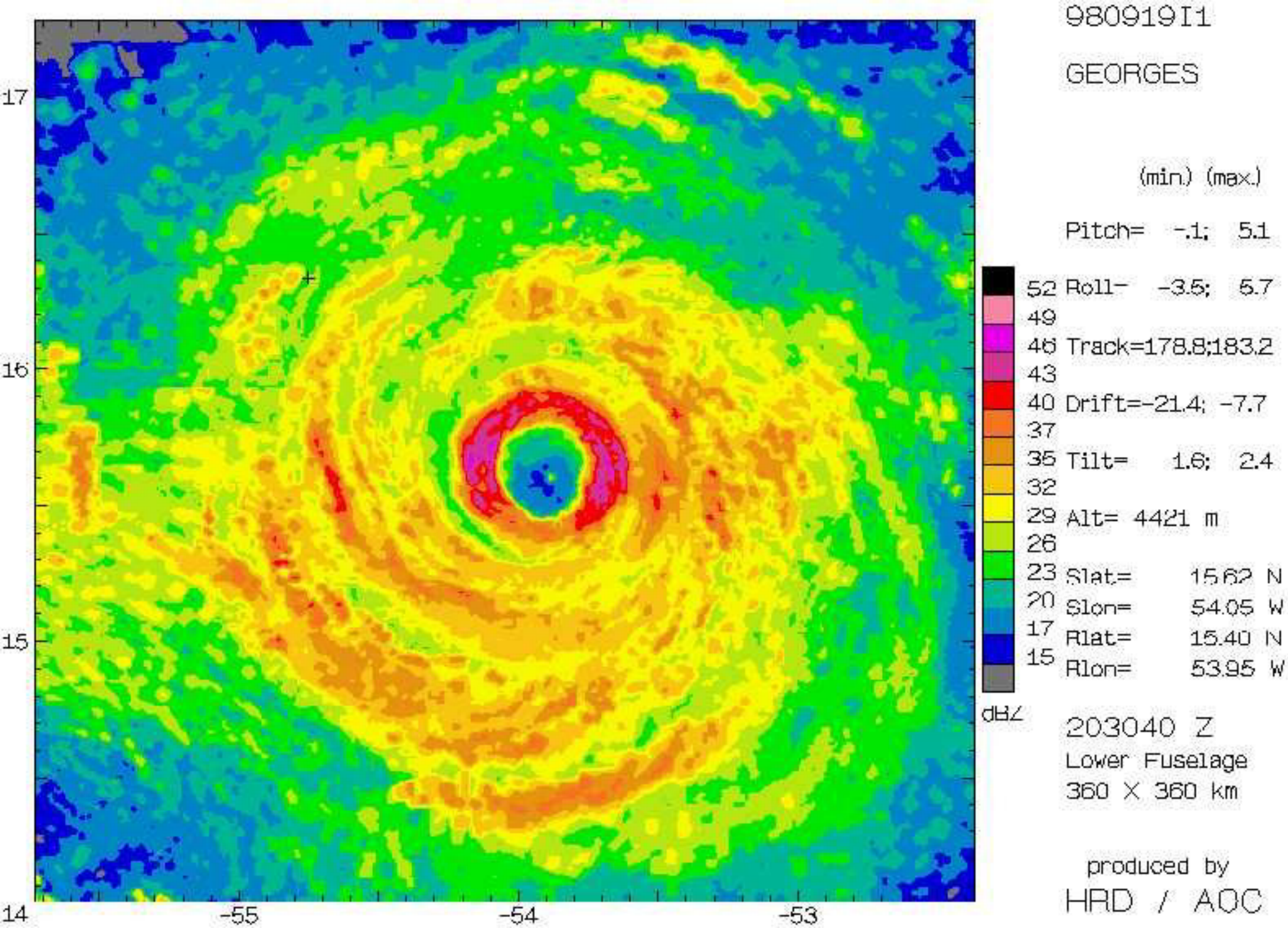
Overall, the mission was highly successful providing both excellent synoptic coverage (with the other P-3 and the G-IV) and good inner core (both P-3s) observations with Doppler radar and GPS dropsondes. The radar and visual presentation was spectacular. We transmitted to TPC/NHC an Extended Velocity Track Display (horizontal Doppler wind analyses) at the 1 km and 3 km altitudes and 3 lower-fuselage radar composites. Real-time (as opposed to time lapse) video was recorded from the nose, right, left, and downward-looking cameras during each of the 3 eye penetrations, including a complete circle in the eye near 2020 UTC.

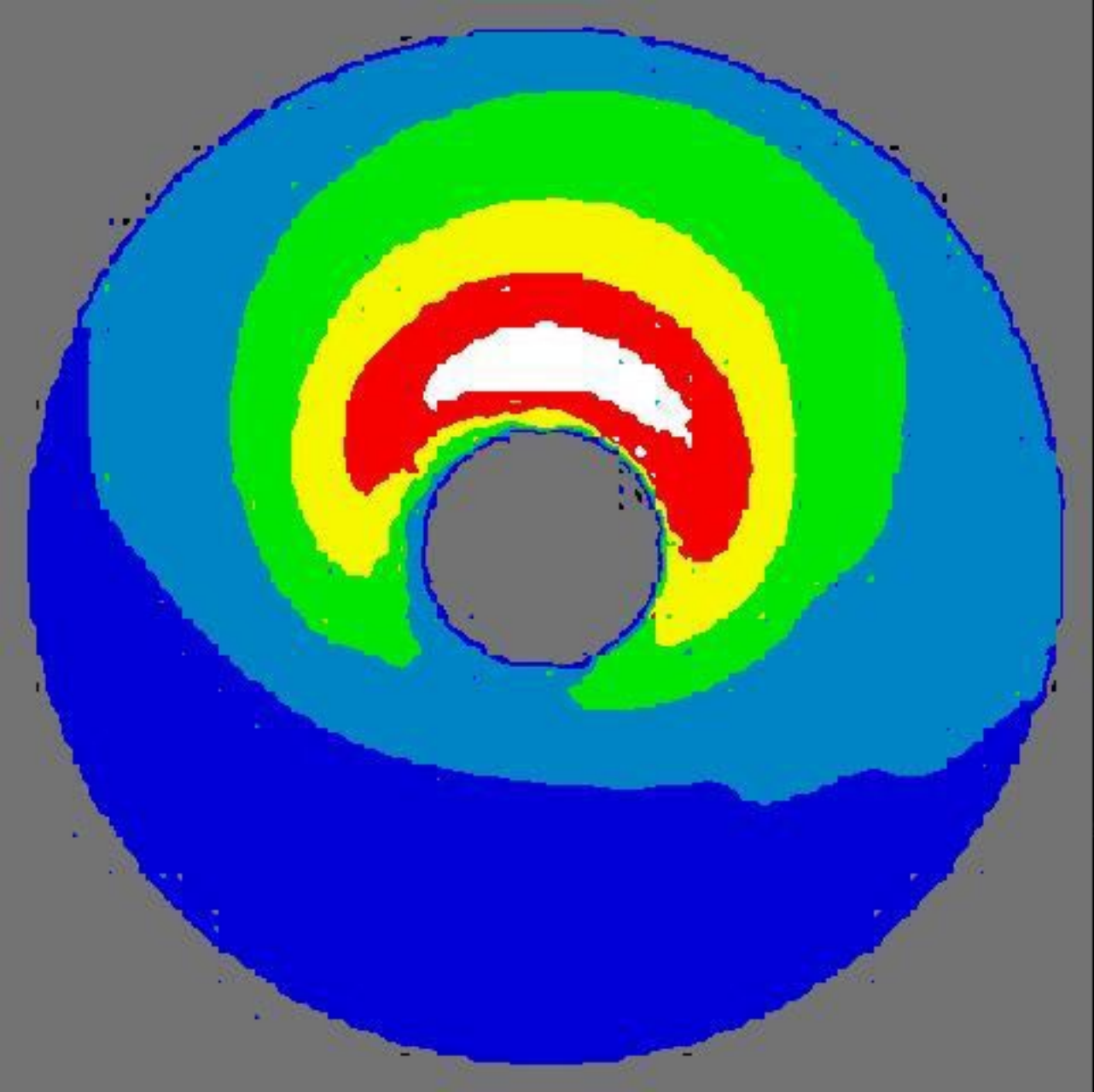
Problems:

The data and radar systems performed flawlessly, as did the GPS AVAPS and HAPS systems. The only drawback was the failure of most (6 of 8) of the GPS eyewall dropsondes failure to transmit winds all the way to the sea surface. This problem was encountered in Hurricane Guillermo (Eastern Pacific 1997), a storm of similar strength to Georges. Extreme turbulence and/or precipitation may be partially responsible for the failures and will have to be investigated. In weaker storms, the sondes transmitted down to the sea surface much more frequently. Nevertheless, the combinations of synoptic data, Doppler radar, video, and GPS sonde coverage provides for a tremendous data set.

Michael Black


G8 VIS 07 GEORGES 09/19/98 2015Z NRL Monterey Code 7541
Sun elevation= 15 degrees
18N
15N
12N
57W
54W
51W


980919I1
GEORGES
(min.) (max.)
Pitch= -.1; 5.1
Roll= -3.5; 5.7
Track=178.8;183.2
Drift=-21.4; -7.7
Tilt= 1.6; 2.4
Alt= 4421 m
Slat= 15.62 N
Slon= 54.05 W
Rlat= 15.40 N
Rlon= 53.95 W
52
49
46
43
40
37
35
32
29
26
23
20
17
15
dBZ
203040 Z
Lower Fuselage
360 X 360 km
produced by
HRD / AOC
17
16
15
14
-55
-54
-53



98091911

GEORGE

191121 Z to
200822 Z

69
59
51
43
33
18

Alt 3000 m

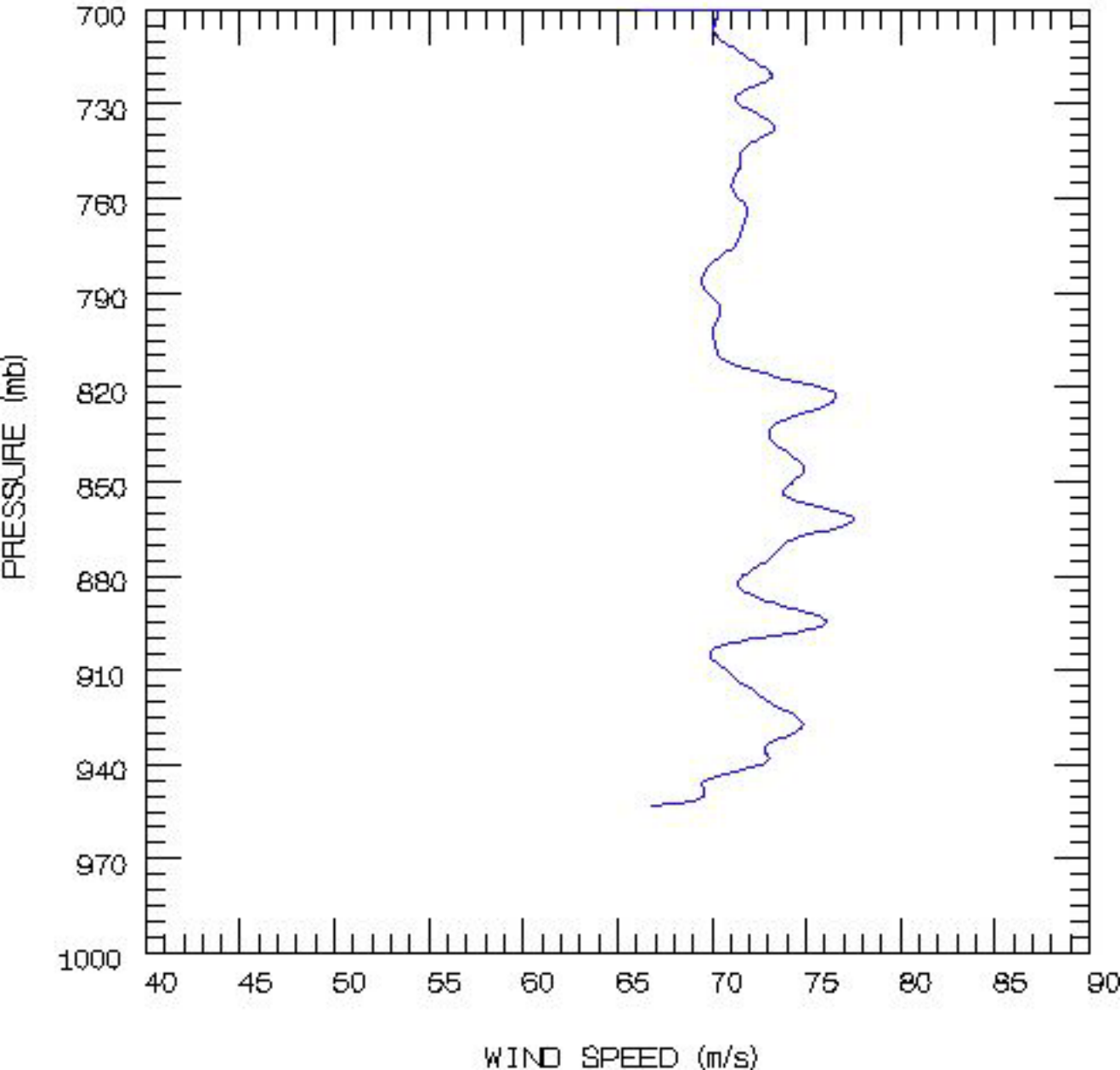
m/s

Slat 15.52 N
Slon 53.87 W

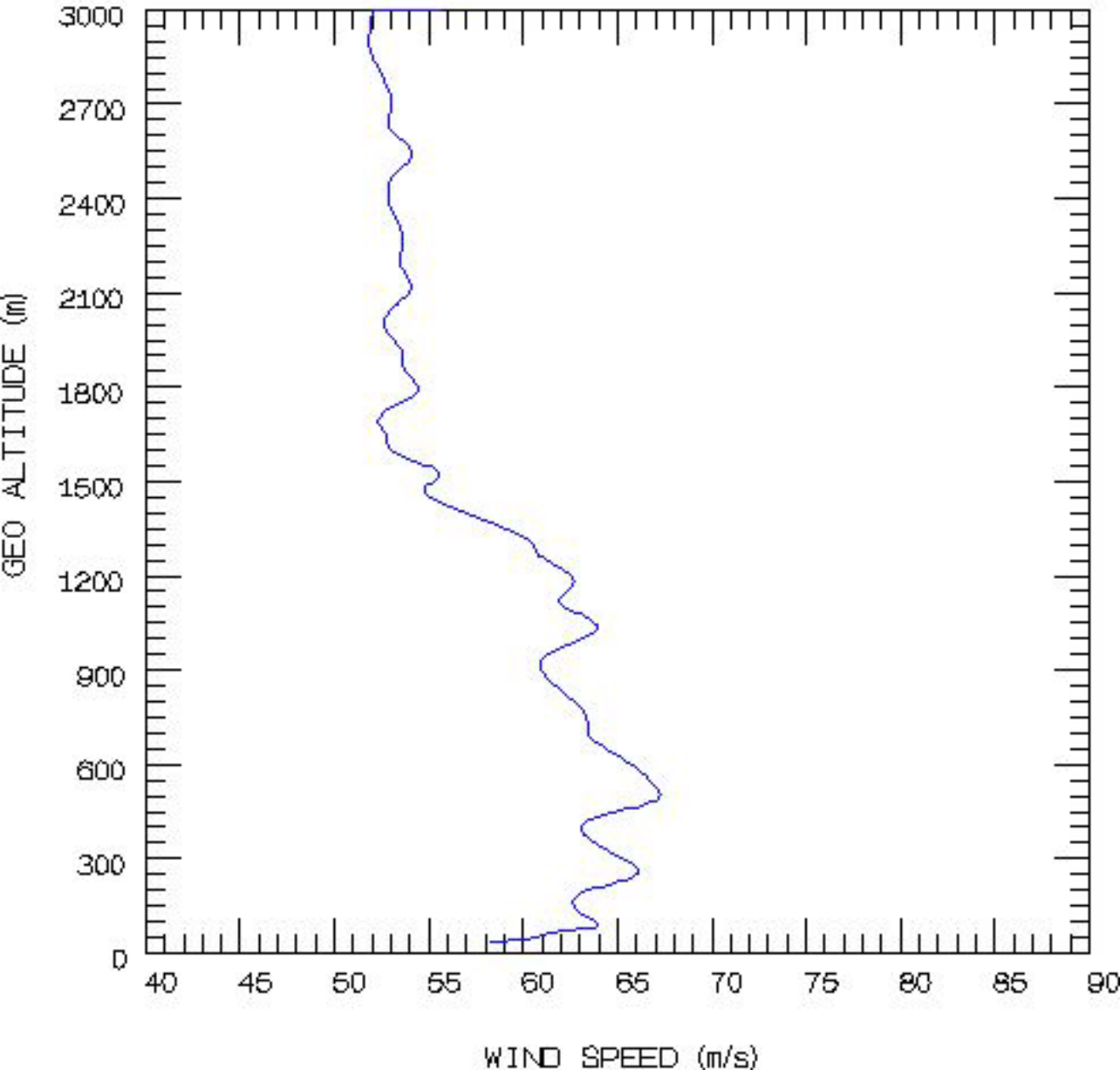
180 X 180 km

produced by
HRD / AOC

DROPSONDE DATA PLOT 202806 UTC 19 SEP 1998
Sonde ID: 982430041 15.81 N 54.03 W



DROPSONDE DATA PLOT 195900 UTC 19 SEP 1998
Sonde ID: 973840053 15.36 N 53.95 W



DROPSONDE DATA PLOT 191827 UTC 19 SEP 1998
Sonde ID: 974730061 15.50 N 53.99 W