Mission Summary
980821H Aircraft 42RF
Bonnie Three-Aircraft Synoptic Flow

Scientific Crew (42RF)

Lead Scientist	P. Black
Radar	F. Marks
Workstation	P. Leighton
GPS sonde scientist	M. Black
AXBT scientist	J. Cione
Observer	W. Bracken

Mission Briefing:

This flight was part of a 3-plane (one NOAA WP-3D Orion aircraft, NOAA G-IVSP Gulfstream jet aircraft and NASA DC-8 aircraft), synoptic-flow mission to drop GPS sondes in the environment around a developing tropical storm. This flight was the second in a series. This mission dropped 4 GPS sonde/AXBT pairs into the developing eyewall. A drop was made in the eye, and 4 additional AXBT/GPS sonde pairs were dropped during transit of a strong feeder band to the northeast of the center. Interesting drops were also obtained in the eye and in the dry slot on the west side between the eyewall and feeder band. The flight was flown at max altitude 500-450 mb, except for the Figure 4 pattern in the inner core which was flown at 550 mb (15 kft). The purpose of the flight was to provide improved initial conditions for track models and to discern the inner core structure of a tropical storm as it develops into a hurricane.

Mission Synopsis

The flight departed Grantly Adams International in Barbados at 1745 UTC, 21 August and landed at St. Croix International (TISX) at 0245 UTC, 22 August. A total of 23 GPS sondes and 9 AXBTs were dropped during this mission, from 20 kft (15 kft in the inner core), 8 of which were coincident. No AXBTs or GPS sondes failed. The Figure 4 legs were oriented SE-NW and SW-NE. Maximum flight-level wind in the inner core was 54 kt, 64 kt in the northern feeder band, 50 kt at the surface and 60 kt at 850 mb. Minimum central pressure was 988 mb and the eye-like diameter was 20 nm. Storm motion was 285° at 11 kt.

A major feeder band consisting of numerous imbedded thunderstorms was observed spiraling into the center from the SE, E, through NE, N and NW as we approached the storm from the east. A prominent clear slot was observed between the eyewall and feeder band on the east side of the storm. Strongest eyewall convective bands, with echo tops extending to 16 km altitude,were on the NW, W and SW sectors of the eyewall, flanked on the outer side by numerous thin convective bands. An eyewall band existed in the east sector but thinner, and flanked only by a sharply defined stratiform circular boundary. A strong CB developed within the clear eye region on the north side as we exited to the NW, rotating around to the SW by the time we flew out of range.

Doppler radar showed a strong low level wind max of over 63 kt on the north side of the center within the eye location at 500 mb. The 500 mb center seemed to be displaced about 12 km north of the surface center, which could be clearly identified by a swirl in the low clouds within the 500 mb eye.

Excellent tail Doppler and lower fuselage radar data were also obtained (3 radar composites were transmitted to NHC in real-time, but no EVTD wind fields were sent). We also collected some

good F/AST data along a N-S line of convection 10 nm W of the west eyewall. Cloud microphysics data were also collected (good ice data in the rainbands W of the center and rain data in the inner core).

The 9 successful AXBT launches reported SSTs between 28.9-29.4C. Estimates of ocean mixed layer depth ranged between 42-70 m. 8/9 AXBTS were launched within the Figure 4 pattern within active regions of convection (in the eyewall and principal feeder band).

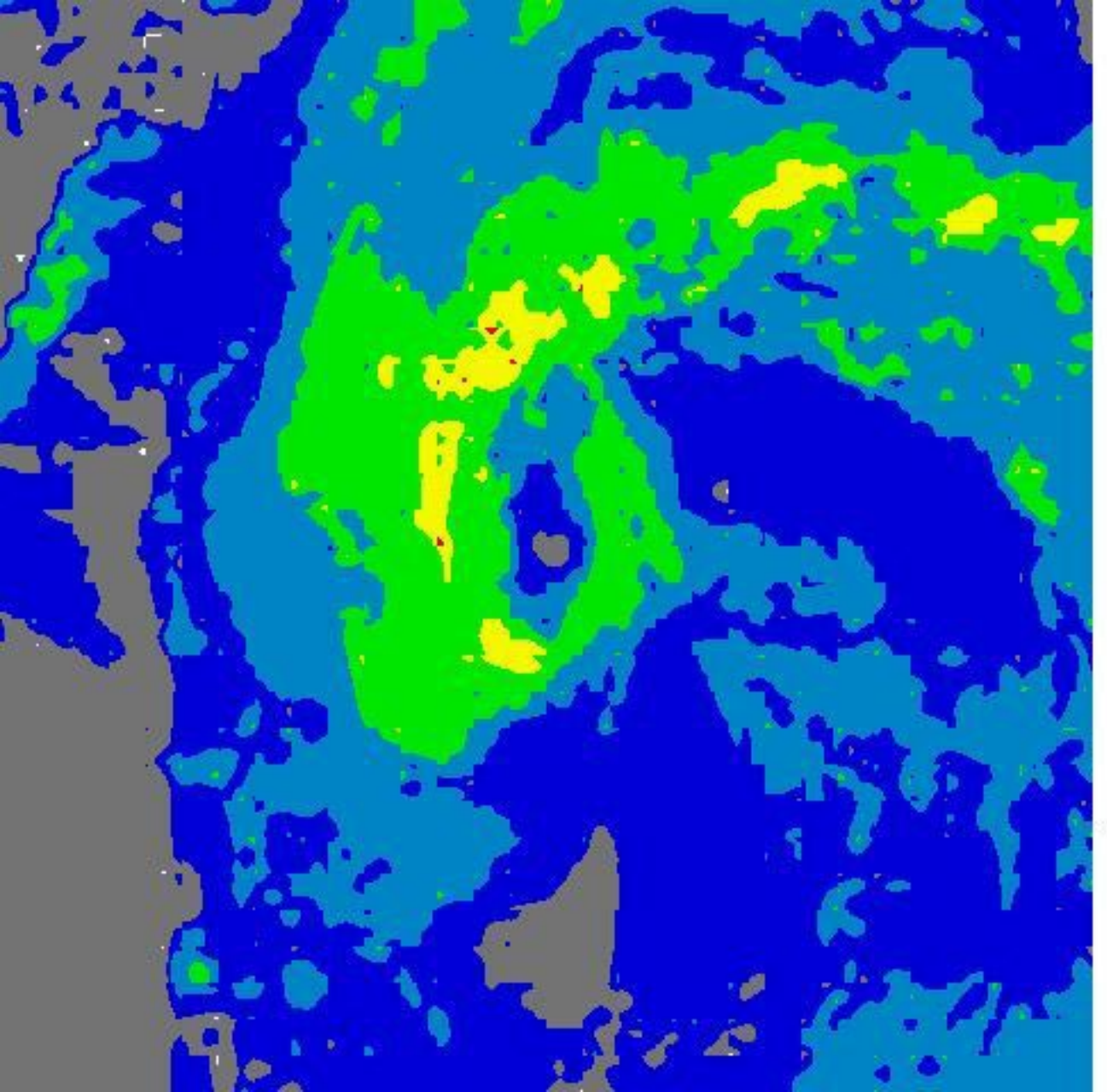
Evaluation:

This flight is part of another landmark 3-plane synoptic flow experiment for determining the environmental flow structure of the atmosphere around a developing TC while also determining the oceanic thermal structure beneath the inner core.

Problems:

Difficulties were encountered in deploying GPS sonde pairs on either side of the convective eyewall during the SW-NE transit due to sonde failure (particularly from the new batch of sondes) in the aircraft and subsequent AVAPS crash. Significant lag times were encountered between launches due to probe problems, which lead to missed drop points in the eyewall. Occasional difficulties were encountered with the operation of the HRD workstation for transmission of GPS sonde data in real time (several sondes could not be transmitted in real time due to acquisition failure by the workstation.

Peter G. Black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