1. INTRODUCTION

On 21 and 22 August, 1999, the Hurricane Research Division of the National Oceanographic and Atmospheric Administration (NOAA) conducted two single-plane experiments in Hurricane Bret with P-3 aircraft from NOAA’s Aircraft Operations Center (AOC). The flight pattern on the 21st was intended to survey the vortex and its environment, when Bret was a Category 4 hurricane, with winds > 63 m/s (Pasch, 1999). The flight on the 22nd occurred as Bret, now a Category 3 storm with surface winds still > 50 m/s, made landfall on the South Texas coast between Corpus Christi and Brownsville.

On both days there was a module where the aircraft flew upwind in the eye, just inward from the eyewall at flight level. The eyewall sloped inward below the aircraft so GPS sondes dropped during the pattern sampled the wind maxima at lower altitudes, finding winds > 74 m/s on the 21st, and > 70 m/s on the 22nd. Usually in hurricane penetrations the tail radar only slices the eyewall a few times as the aircraft quickly crosses the eye, but during the eye circles many sweeps were collected at close ranges (<5 km) that can provide details of the three-dimensional windfield in portions of the eyewall on successive days. We will present the radar reflectivity and wind fields to show the eyewall features the sondes fell through, with the goal of describing the variability of the windspeed maxima in the hurricane eyewall.

2. RADAR DATA ANALYSIS.

The tail Doppler radar antenna scanned forward and aft of the heading (F/AST, Jorgensen et al. 1996), yielding intersecting rays with a separation of ~45°. On the 21st data from the tail radar sweeps were combined to solve for the horizontal and vertical winds in a pseudo-dual Doppler analysis, using Gamache’s variational technique (Gamache, 1997). This technique applies two constraints: the windfield must closely satisfy the equation of continuity, and the projection of the windfield back on the Doppler rays must closely match the observed Doppler velocities. On 22 August the KBRO and KCRP WSR-88D’s collected full volume scans every 5 minutes, scanning from 0.5° to 19.5° in elevation. The WSR-88D data were added to create triple-Doppler analyses of the eyewall on 22 August. The winds were analyzed on domains with 0.75 km vertical and 0.5 to 1.0 km horizontal resolution.

3. RESULTS

The first eyewall circle on 22 August was from 2034 to 2054 UTC. 6 sondes were deployed in the eye-wall (Fig 1), one (2) in the east eyewall, three within 100 s on the inner edge of the west eyewall (3-5), and two in the west eyewall (6 and 7) as the aircraft headed for the Texas coast. Figure 2 shows a sweep from the tail radar at 204102, shortly before sonde #4 was launched. The aircraft was right up against the eyewall at ~ 3900 m.
4. ACKNOWLEDGEMENTS

The AOC flight crew and scientific staff aided us in many ways in collecting this data set. The MIC’s and staff at the Brownsville and Corpus Christi Weather Service Forecast Offices ensured that WSR-88D data were archived. The National Climatic Data Center responded quickly to requests for the WSR-88D data. Erin McCormick, a graduate student of the University of Miami, processed the Bret sonde data after the 1999 Hurricane Field Program.

5. REFERENCES


