19980829 - NASA - LPS

DC-8 MISSION SCIENTIST REPORT (EJZ) 29 AUGUST 1998

Takeoff 190144 UTC/29 Aug Landing 025354 UTC/30 Aug

Mission objectives:

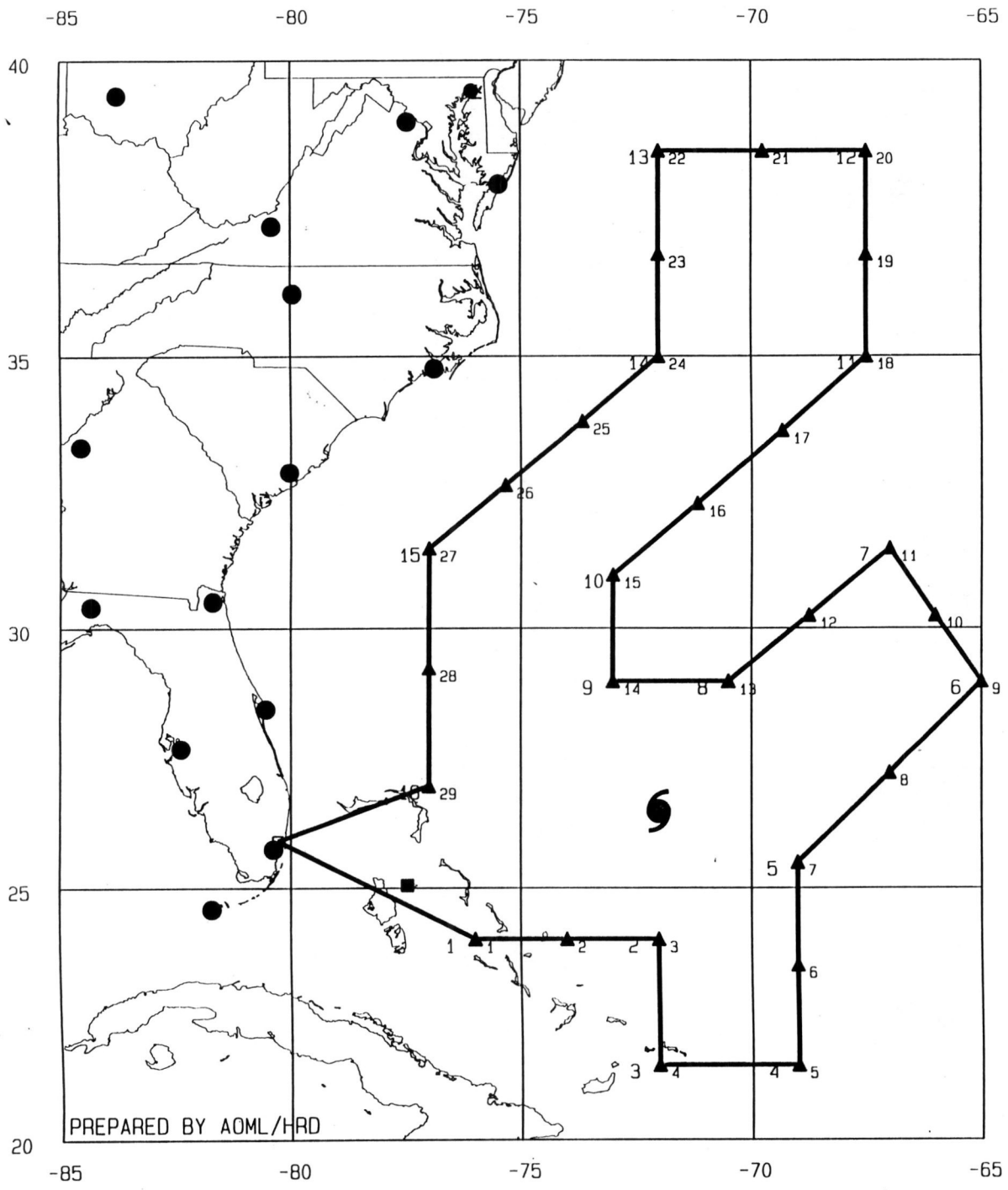
1. Execute a coordinated VME (Vortex Motion and Evolution) Experiment jointly between DC-8 and ER-2, and the two NOAA P-3's in Danielle. Result is 6 radial legs to 160 nm distance from storm, spaced 60 degrees apart, dropping sondes along each leg at 50, 75, 100, 130, and 160 nm for a total of 30 sondes. The NOAA P-3s (and the NOAA Gulfstream, in the more distant environment of the storm) also dropped sondes for a total of over 100. The P-3s obtained dual-Doppler data within a radius of 50 nm throughout the period.

2. Obtain the first of two days of data from LASE, MACAWS, and dropsondes in the clear inflow region on the south side of the storm. The idea is to repeat the pattern tomorrow, with more time available for an extended version, since we will not be doing the VME experiment.

RESULTS:

All objectives were met, although with the one major disappointment that the ER-2 returned to base before reaching the storm due to an autopilot failure. About 33 dropsondes (from HRD) were used as part of the VME pattern, while about 6-7 (NASA's) were used in the ladder pattern on the south side for inflow. The VME pattern was interrupted after the first leg to do the inflow pattern, then we re-entered the storm on the east side to resume and complete the VME pattern. The storm structure was not well-organized at our level in either wind or rainbands or eyewall. one point, at 0013 UTC, the wind circulation at our level was displaced far to the southwest of the NOAA center. Max winds at our level were barely 40 knots, and not at any consistent radius from the center. The failure rate on the drops was about 20 percent for winds and zero (!) for thermodynamics. The storm structure was mapped by the combination of aircraft in a very complete fashion. The interruption in our pattern, about 2.5 hours, was approved in pre-mission coordination with the HRD scientists and was notthought to be a significant issue. Except for the failure the winds on two successive drops on the SW corner, all important objectives were met for the VME.

The points for the clear-air "ladder" pattern were moved about 50 miles west of their briefed position, based on a satellite image. Drops were made successfully. There was an unusually long delay in obtaining ATC clearance to change altitudes as we attempted to climb from 190-250 and from 250-350.Coordination with four ATC centers complicated the issue. Nevertheless the clear air inflow pattern was successful; LASE obtained very good data, and
MACAWS especially liked the 19K' flight level.



FLIGHT TRACKS
DANIELLE

980829np.ftk

RAWINSONDES 9807

- Regular
- 12Z only
- 00Z only
- Infrequent
- Infrequent - 00Z
- Infrequent - 12Z

▲ DROP LOCATIONS

VORTEX MOTION AND EVOLUTION EXPERIMENT

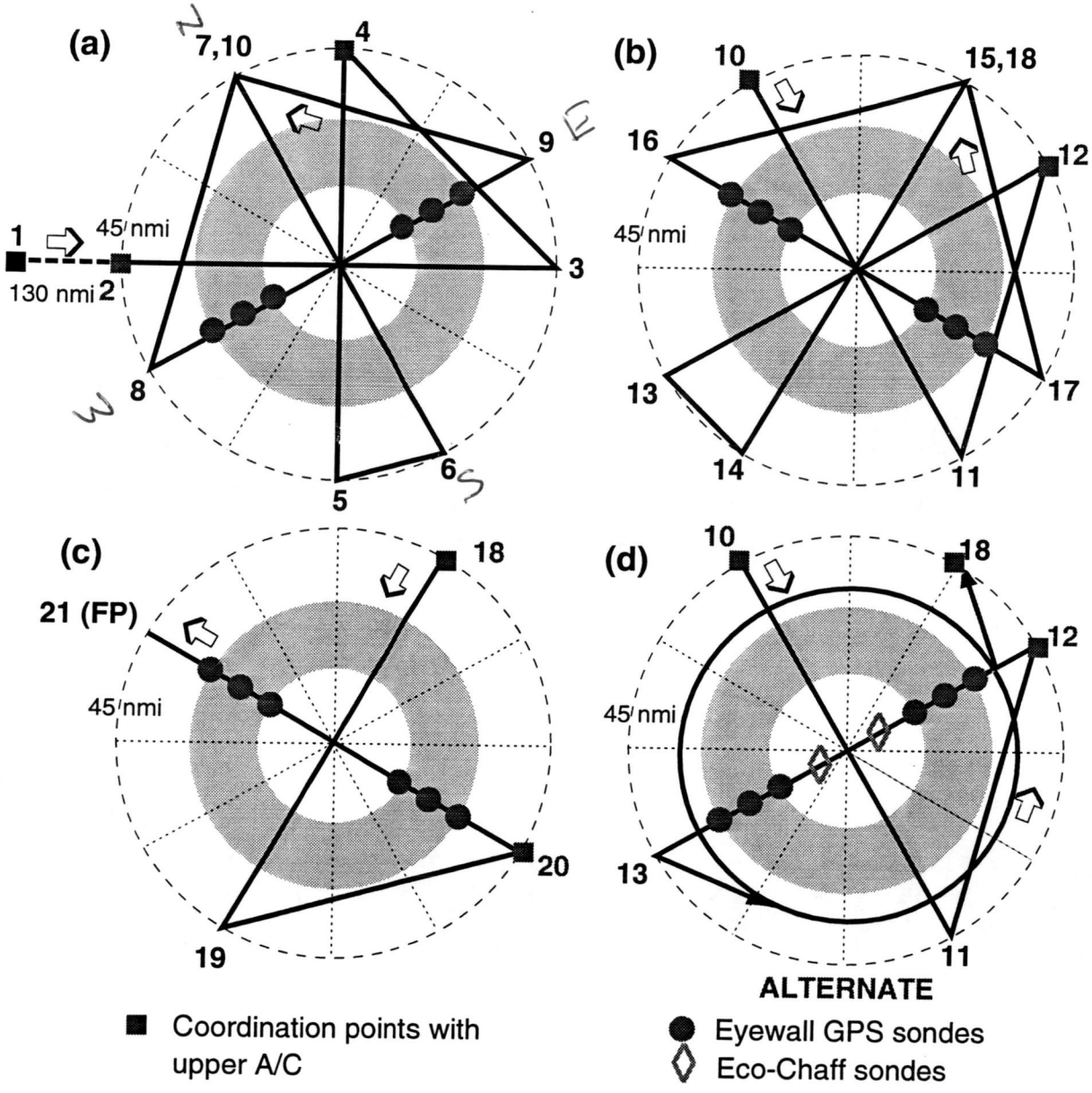
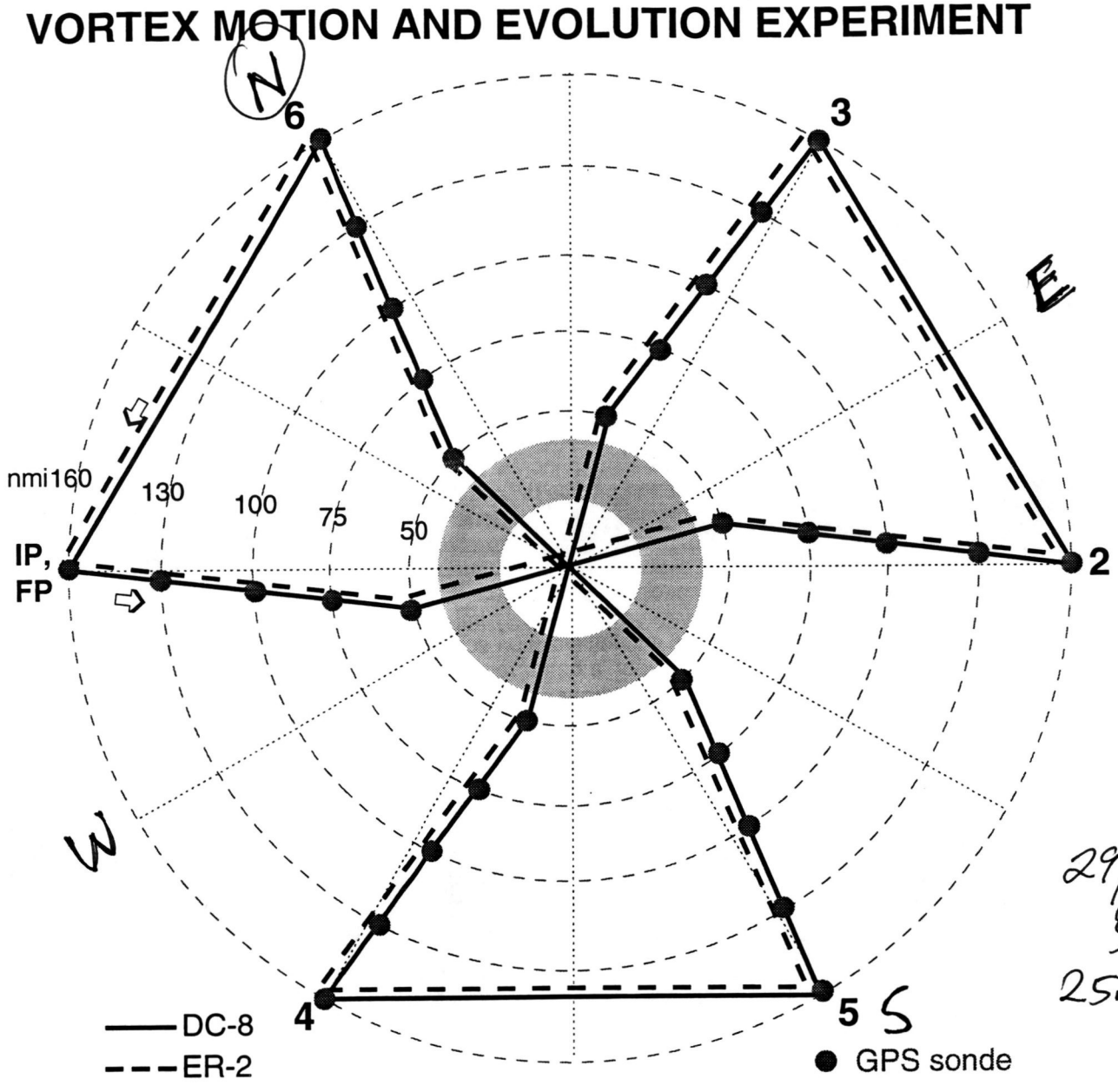


Fig. 10. Sample Lower Aircraft Flight Pattern

• Note 1.	True airspeed calibration is required.
• Note 2.	Unless there is a conflict with the USAF aircraft, the lower NOAA aircraft will operate at FL 100 (10,000 ft or 3 km). Eyewall drops may be required at the discretion of the lead mission scientist. As many as 3 drops per penetration, with spacing of 10-30 km, may be requested.
• Note 3.	The **IP** is at 130 nmi (240 km) radius from the storm center. The pattern may be entered at any compass heading, but will always be 90° upwind of the entry point of the upper aircraft. Radial legs are 45 nmi (83 km) long.
• Note 4.	The **IP** and coordinating points (**CP**) must be reached simultaneously with the lower aircraft. The lower aircraft is responsible for ensuring that these points are reached simultaneously.
• Note 5.	Airborne Doppler radar scans continuously perpendicular to the track on radial penetrations at radii<50 nmi (95 km) , and F/AST during the rest of the pattern.
• Note 6.	Aircraft should not deviate from the pattern to find the wind center in the eye.

NASA 817/806

VORTEX MOTION AND EVOLUTION EXPERIMENT



29/20Z
6
25.5, 71.0

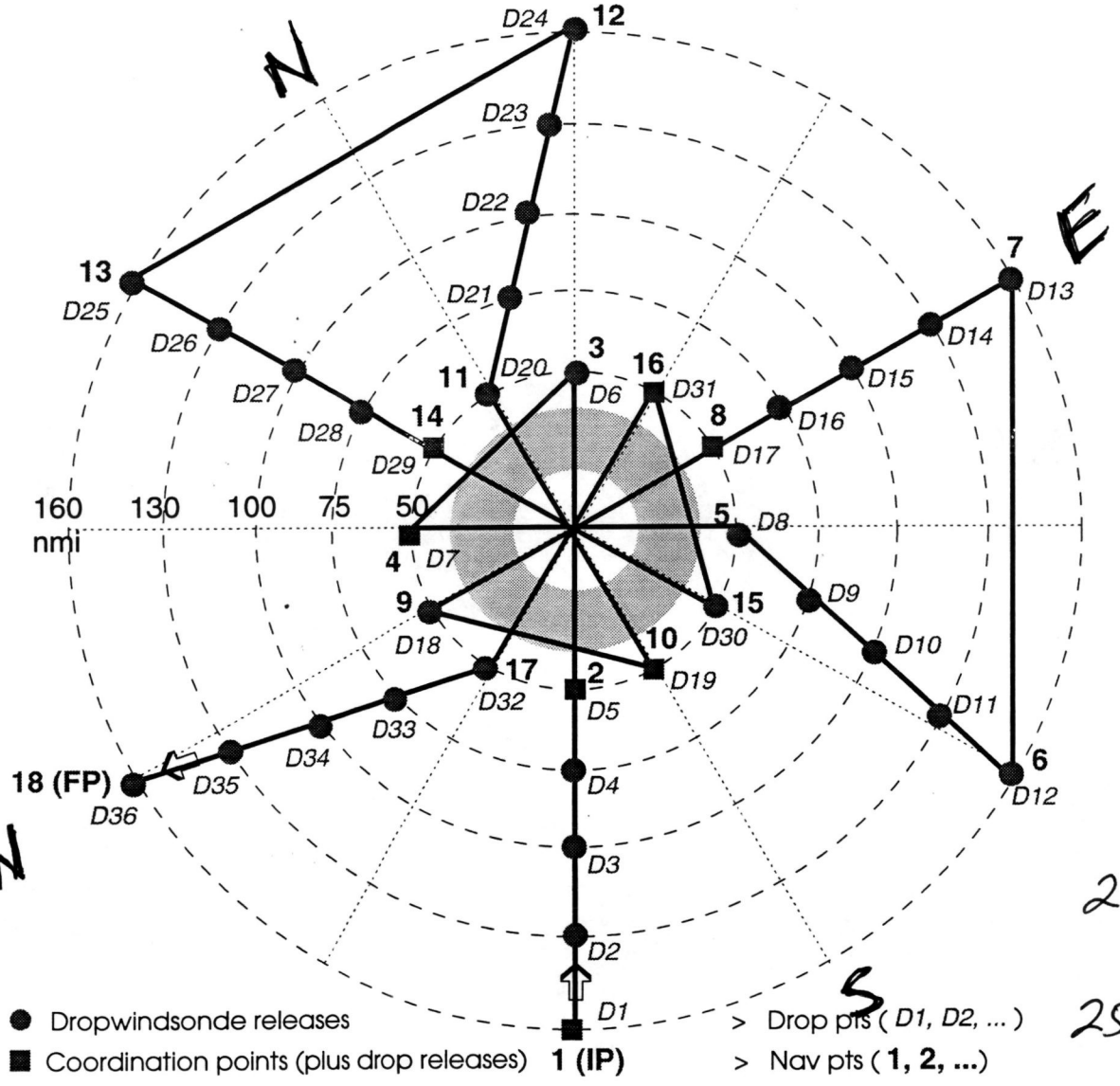
Fig. 11. Sample DC-8 and ER-2 Flight Pattern

• Note 1.	Aircraft should begin pattern at approximately the same time as the two WP-3D's, but precise coordination is not required.
• Note 2.	Aircraft should not deviate from pattern to find the wind center in the eye.
• Note 3.	The pattern may be entered at any compass heading, but entry azimuth should be 90° upwind of that for the upper WP-3D aircraft.
• Note 4.	DC-8 should attain the 200-mb level (about 41,000 ft [FL 410) as early in the mission as possible and climb as possible to maintain the highest altitude for the duration of the pattern.
• Note 5.	Dropwindsondes may pose a hazard to the WP-3D or WC-130 aircraft. Therefore, positive communication with these aircraft must be obtained before sondes are released.
• Note 6.	Total pattern length is approximately 1600 nmi (2960 km).

4 of 4

N43RF

VORTEX MOTION AND EVOLUTION EXPERIMENT



29/20Z
G
25.5, 71.0

Fig. 9. Sample Upper Aircraft Flight Pattern

• Note 1.	True airspeed calibration is required.
• Note 2.	During the ferry to the **IP**, aircraft will climb to the 500 mb level (about FL 180). The 400 mb level (about FL 250) should be reached as soon as possible and maintained throughout the remainder of the pattern, unless icing or electrical conditions require a lower altitude.
• Note 3.	The pattern may be entered along any compass heading. The **IP** and coordinating points (**CP**) must be reached simultaneously with the lower aircraft. The lower aircraft is responsible for ensuring that these points are reached simultaneously.
• Note 4.	There are **no** scheduled drops in the eye. It may be desirable to make a drop during the second pass of each figure-4, assuming clearance from the lower aircraft and USAF reconnaissance aircraft. GPS-sonde frequencies should be coordinated with USAF aircraft. All drops are to be made after turns.
• Note 5.	Airborne Doppler radar scans continuously perpendicular to the track on radial penetrations at radii<50 nmi (95 km) , and F/AST during the rest of the pattern.
• Note 6.	Aircraft should not deviate from the pattern to find the wind center in the eye.

3 of 4

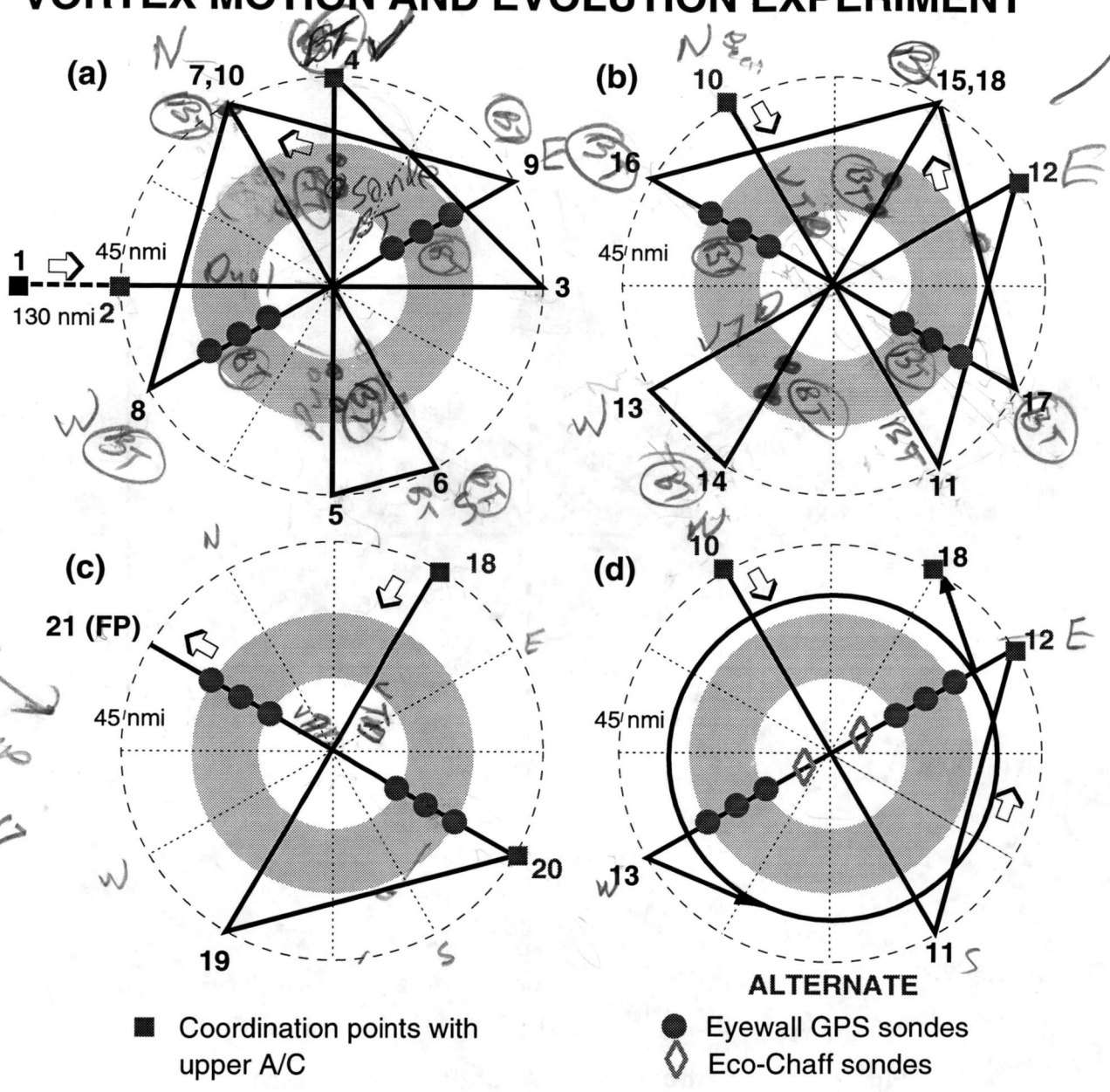


Fig. 10. Sample Lower Aircraft Flight Pattern

• Note 1.	True airspeed calibration is required.
• Note 2.	Unless there is a conflict with the USAF aircraft, the lower NOAA aircraft will operate at FL 100 (10,000 ft or 3 km). Eyewall drops may be required at the discretion of the lead mission scientist. As many as 3 drops per penetration, with spacing of 10-30 km, may be requested.
• Note 3.	The **IP** is at 130 nmi (240 km) radius from the storm center. The pattern may be entered at any compass heading, but will always be 90° upwind of the entry point of the upper aircraft. Radial legs are 45 nmi (83 km) long.
• Note 4.	The **IP** and coordinating points (**CP**) must be reached simultaneously with the lower aircraft. The lower aircraft is responsible for ensuring that these points are reached simultaneously.
• Note 5.	Airborne Doppler radar scans continuously perpendicular to the track on radial penetrations at radii<50 nmi (95 km) , and F/AST during the rest of the pattern.
• Note 6.	Aircraft should not deviate from the pattern to find the wind center in the eye.

VORTEX MOTION AND EVOLUTION EXPERIMENT

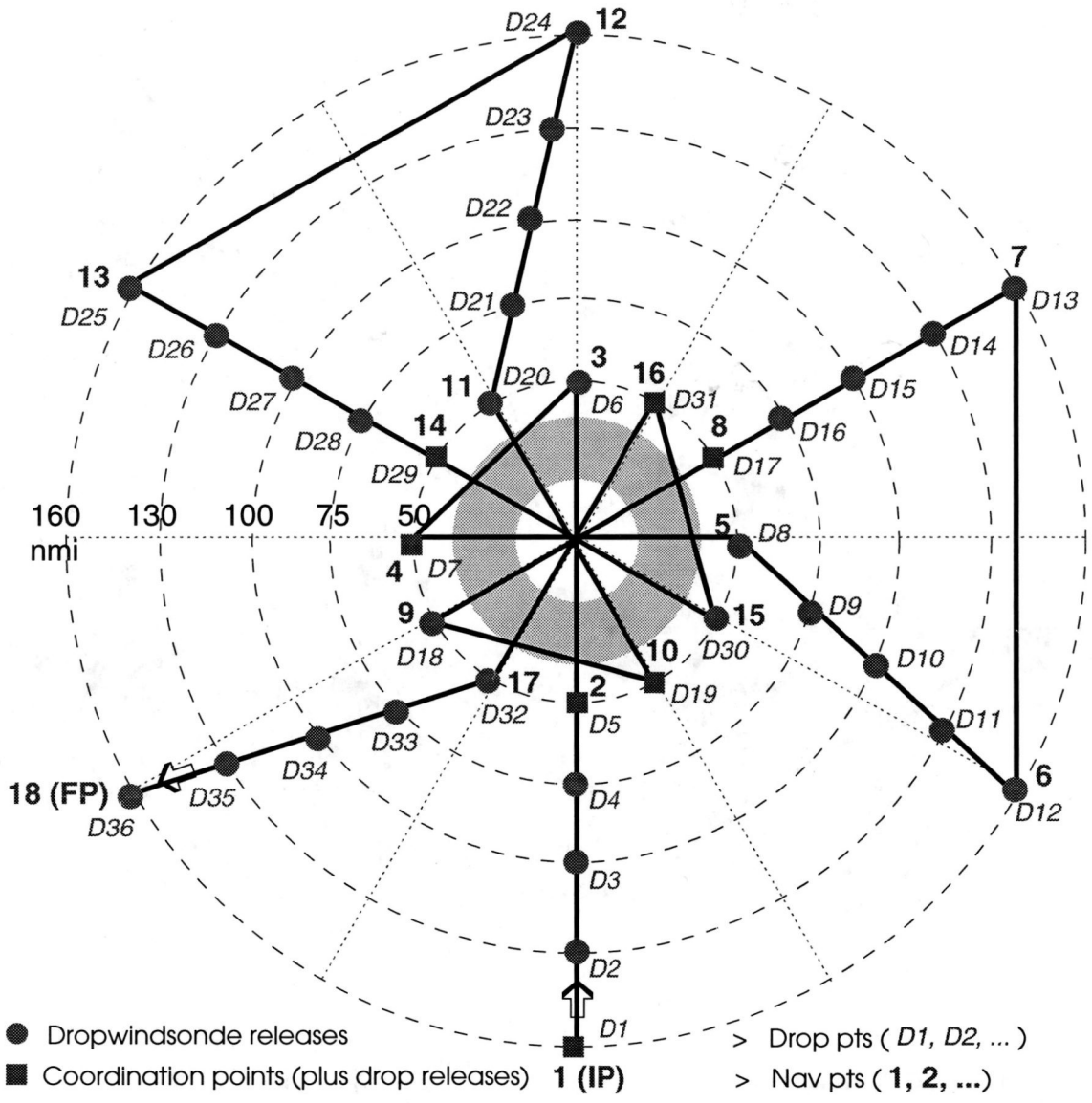


Fig. 9. Sample Upper Aircraft Flight Pattern

• Note 1.	True airspeed calibration is required.
• Note 2.	During the ferry to the **IP**, aircraft will climb to the 500 mb level (about FL 180). The 400 mb level (about FL 250) should be reached as soon as possible and maintained throughout the remainder of the pattern, unless icing or electrical conditions require a lower altitude.
• Note 3.	The pattern may be entered along any compass heading. The **IP** and coordinating points (**CP**) must be reached simultaneously with the lower aircraft. The lower aircraft is responsible for ensuring that these points are reached simultaneously.
• Note 4.	There are **no** scheduled drops in the eye. It may be desirable to make a drop during the second pass of each figure-4, assuming clearance from the lower aircraft and USAF reconnaissance aircraft. GPS-sonde frequencies should be coordinated with USAF aircraft. All drops are to be made after turns.
• Note 5.	Airborne Doppler radar scans continuously perpendicular to the track on radial penetrations at radii<50 nmi (95 km) , and F/AST during the rest of the pattern.
• Note 6.	Aircraft should not deviate from the pattern to find the wind center in the eye.