

SEVERE WEATHER NOTE

A 'WHIRLWIND' OCCURRENCE IN NORTHERN CHESAPEAKE BAY

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ABSTRACT

During an outbreak of abnormally cool air on 17 July 1987 a small, short-lived vortex occurred near the mouth of the Susquehanna River in northern Chesapeake Bay. The vortex event happened simultaneously with a rawinsonde sounding that had been launched only 15 minutes before from a site 3 miles away. Atmospheric conditions paralleled those recently described for cold air waterspouts over Lake Erie.

1. INTRODUCTION

Instability in the lower boundary layer can trigger various vortex phenomena such as dust devils and waterspouts. Usually such events occur at times between the standard upper-air observations and at locations considerably removed from rawinsonde stations.

This short report chronicles a vortex event due to lower boundary layer instability that occurred very close to a rawinsonde site at exactly the time a sounding was in progress.

2. THE EVENT

At approximately 1715 GMT 17 July 1987, the U.S. Army Atmospheric Sciences Laboratory (ASL) Met Team at Aberdeen Proving Ground (APG) was notified that a "whirlwind" had occurred on a small beach next to the Concord Point Lighthouse in Havre de Grace, MD about 3 miles north of the Team's location (see Fig. 1).

An eyewitness account described the event as a "whirlwind" which formed about 60 feet from shore and began to disturb the surface of the water. It started drifting westward toward the shore and sucking water into the air. As it made landfall, it picked up a number of trash bags filled with approximately 25 lbs of brush, lifted them approximately 20 feet into the air, and then scattered them along the beach. Witnesses said the bags rotated closely around one another at the ground, then gradually separated as they rose in a funnel-shaped manner.

Next, the funnel moved further onto the beach and picked up a small 150 lb sailboat (sail furled) which was lying midway between another sailboat and an ultralight aircraft that were separated by about 120 feet. The vortex lifted the sailboat about 10 feet into the air, rotated it 90° and flipped it on its side 20 feet away, damaging the mast. After this accomplishment, it moved southeastward back offshore and dissipated.

This entire sequence of events lasted only a matter of seconds. According to witnesses, there was no visible con-

nection between the funnel at the surface and the base of the clouds.

3. THE SYNOPTIC SITUATION

At 1500 GMT 17 July 1987, a high pressure system, associated with a record-breaking cold continental polar (cP) air-mass, was centered over north-central Pennsylvania. The ridge axis extended north-south about 80 miles west of APG (see Fig. 2). Weak cold air advection was occurring at 850 mb with north winds. The 850-mb thermal trough was located over the east coast while the 850 mb ridge was located along the Appalachians (see Fig. 3). The 500-mb trough was offshore and negative vorticity advection (NVA) was occurring at this level. Record low temperatures had occurred at Baltimore-Washington International Airport (BWI) the past two mornings with readings of 59°F and 58°F, respectively. The ASL Met Team recorded a low temperature of 55°C on 17 July 1987.

Surface observations taken at 1700 GMT (Table 1) indicated cumulus clouds at an estimated height of 5000 feet. Calm wind at Phillips Field (APG) and onshore winds at the ASL Met Team and at BWI implied weak convergence along the western Bay shore. (The bay breeze had begun at the Met Team Location about 1545 GMT.) At 1700 GMT, the ASL Met Team was taking its normal afternoon rawinsonde observation just over 3 miles to the south of the vortex site (Fig. 1). Air temperature at the ASL Met Team location was

Table 1. The 1700 GMT hourly observations nearby the "whirlwind" event. The ASL Met Team observation taken about 2 miles east of the Phillips Field (APG) observation has been added to the list.

Hourly Observations for Maryland

43M	SA	1655	25	SCT	7 M/79/62/0000/E037/MTN TOP WND 0000 =
ADW	SA	1655	45	SCT	7 264/81/54/3506/031 =
APG	SA	1700	50	SCT	7 264/79/59/0000/031 =
BWI	SA	1653	55	SCT	12 263/81/57/0909/031 =
FME	SA	1655	25	SCT	6H E133/81/62/3504/032 =
HGR	SA	1646	40	SCT	82/54/0000/033
NHK	SA	1655	30	SCT	250 -SCT 7 260/82/54/3604G09/ 030 =
SBY	SA	1652	40	SCT	10 261/80/54/0308/030
ASL	SA	1655	50	SCT	7 269/81/57/0905/032

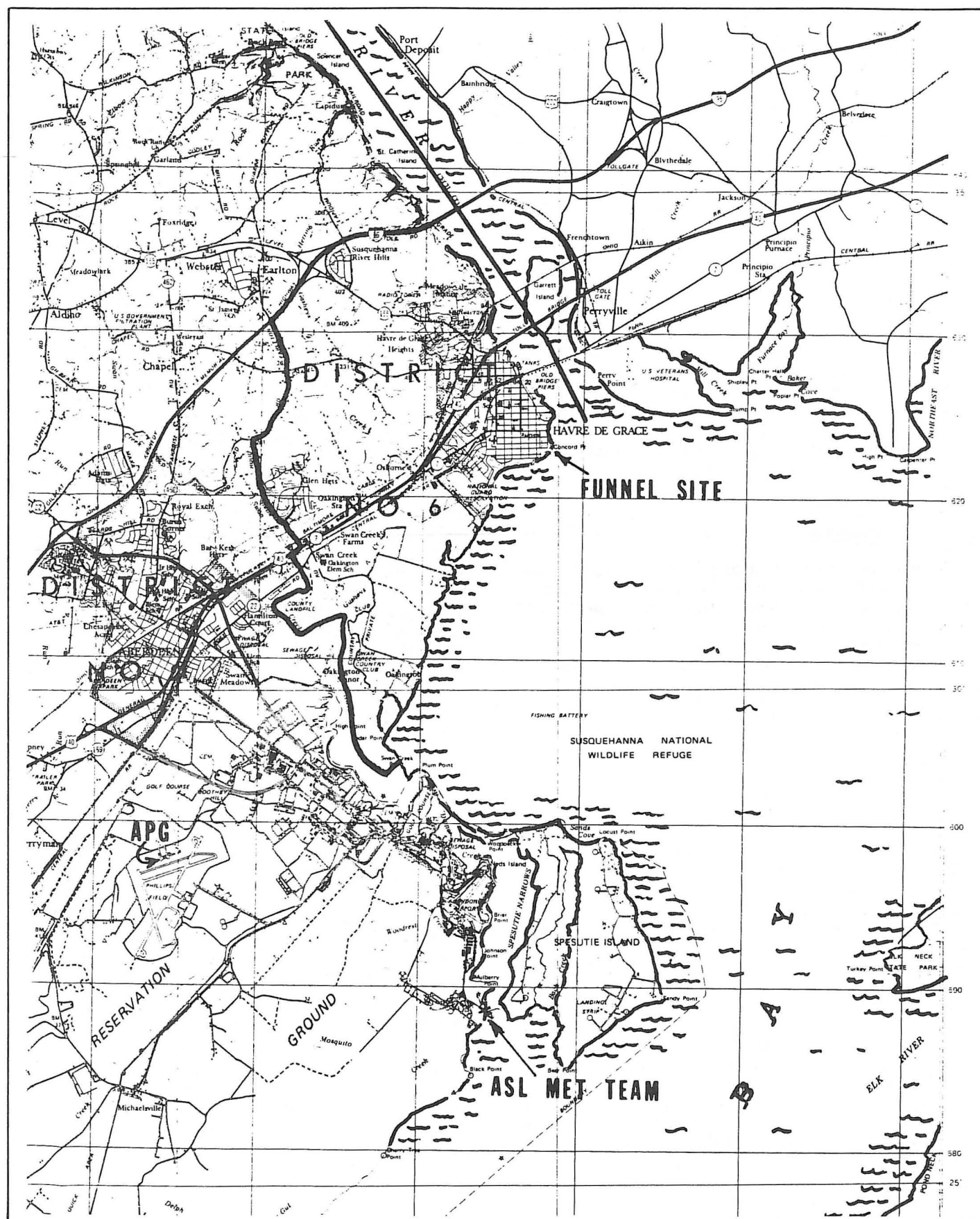


Fig. 1. A map of the Susquehanna River mouth area in northern Chesapeake Bay showing the location of the funnel-shaped "whirlwind" approximately 3 miles north of the ASL Met Team facility on Aberdeen Proving Ground, MD.

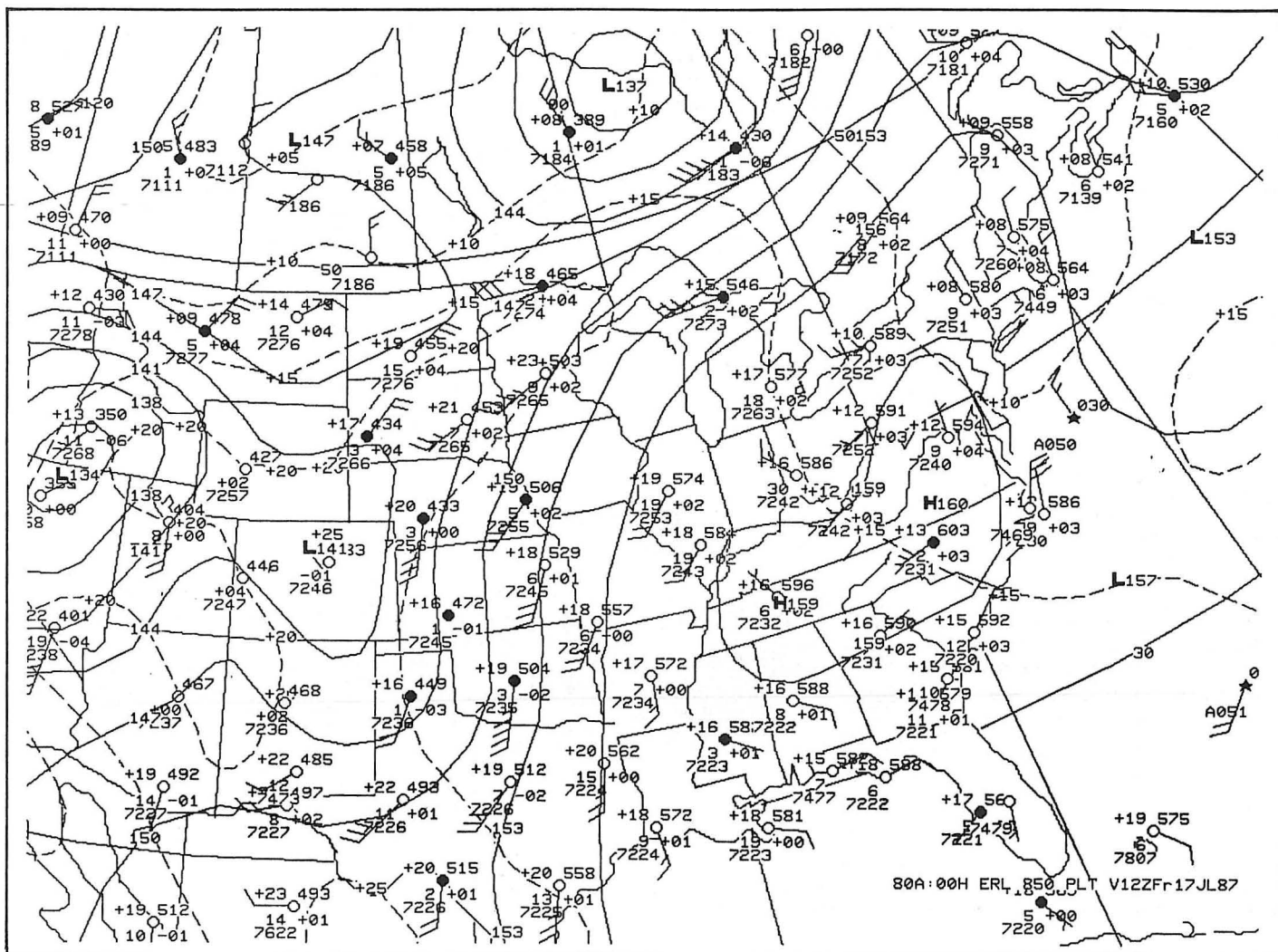


Fig. 3. The NMC 1200 GMT 850 mb analysis for 17 July 1987.

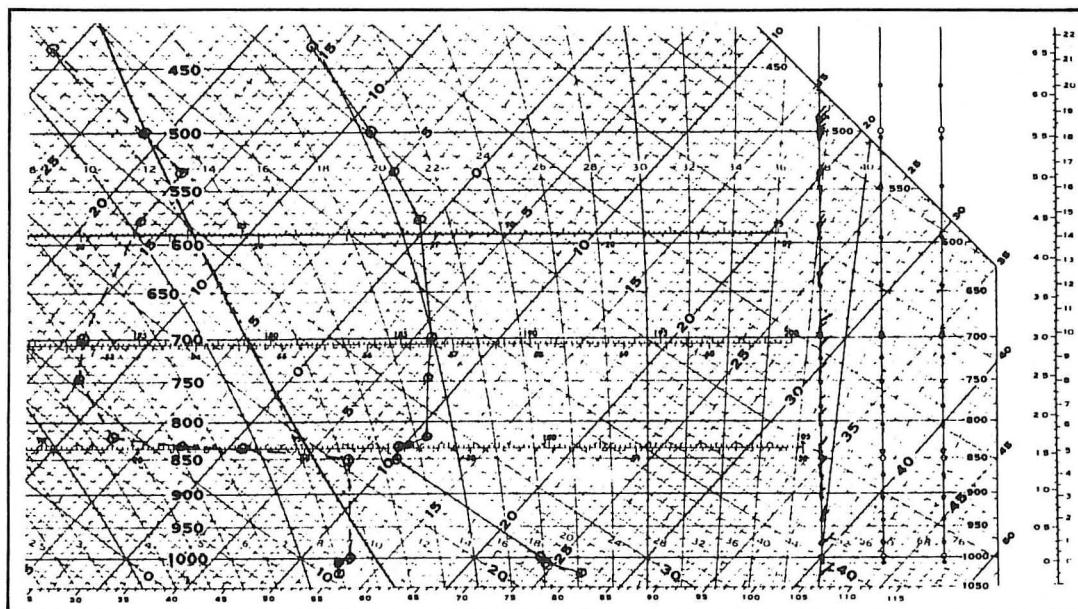


Fig. 4. Skew-T plot of the 1700 GMT sounding at the ASL Met Team facility.

cloud), it had the potential to cause property damage and harm to human beings. Such phenomena originate in lower boundary layer instability when cold air advection occurs over warm water. Diagnostic conditions over Lake Erie and Chesapeake Bay appear to be quite similar.

NOTES AND REFERENCES

1. Mr. Charles Clough is a supervisory meteorologist with the U.S. Army Atmospheric Sciences Laboratory (ASL). He is station chief of the ASL Meteorological Team at Aberdeen Proving Ground, Maryland and is also a Lieutenant Colonel in the U.S. Air Force Reserve, Air Weather Service. He graduated with a B.S. degree in mathematics from the Massachusetts Institute of

Technology in 1961, obtained basic meteorological training at M.I.T. under the U.S. Air Force Institute of Technology in 1962, and received the M.S. degree in Atmospheric Science from Texas Tech University in 1983. He began work with ASL in 1982.

2. Mr. Paul Sisson is a civilian meteorologist with the U.S. Army Atmospheric Sciences Laboratory (ASL). He is stationed with the ASL Meteorological Team at Aberdeen Proving Ground, Maryland. He graduated with a B.S. degree in meteorology and a B.S. degree in mathematics from Lyndon State College in 1982. He began work with ASL in 1983.

3. Kieltyka, Frank, 1987: *Cold Air Waterspouts Over Lake Erie*. Eastern Region Technical Attachment 87-9, National Weather Service, N O A A, U.S. Department of Commerce, 2 pp.

The Cloud Chart 1, 2, 3 1-88

The Cloud Chart 1, 2, 3, NWA publication 1-88 is now available. It is composed of three 12 × 24 charts showing various cloud types, the weather they bring, cloud weather-lore and optical phenomena, and contains more than three dozen color photographs with accompanying text and state locations.

The three chart collection sells for \$7.50 to NWA members and \$9.00 to nonmembers. Shipping and handling charges are included in this special offer.

To order chart, send check to: The Cloud Chart 1, 2, 3, NWA, 4400 Stamp Road, Room 404, Temple Hills, MD 20748.

Script Slide Satellite Training 2-88

The training program, prepared by NESDIS, on "polar orbiter imagery interpretation" has been delayed, but should be available in early August. The Script-Slide Training Program, publication 2-88, contains 76 slides and a comprehensive script that addresses many aspects of basic satellite imagery interpretation from a polar orbiter perspective. However, the information can also be used for understanding geostationary satellite imagery, as well.

Worldwide examples show synoptic scale storm systems, jet streams, tropical cyclones, thunderstorms, land and ocean

features, and basic cloud identification. One section describes the differences in imagery characteristics among various AVHRR channels. The package concludes with a "test" so viewers can determine how well they understood the material.

The cost of \$70.00 for NWA members and \$82.00 for nonmembers includes postage and handling. To order package, send check to: Script-Slide Training Program 2-88, NWA, 4400 Stamp Road, Room 404, Temple Hills, MD 20748.