

Severe Weather

OCTOBER 24-26, 1982, ATLANTIC COAST STORM: A CHRONOLOGY AND INSIGHT

David B. Caldwell (1)
National Weather Service Forecast Office
5200 Auth Road
Washington, D.C. 20233

ABSTRACT

An intense storm hit the Mid-Atlantic coast on October 24-26, 1982. The sequence of events that led to the excellent forecast of the event by the Washington, D.C. Forecast Office is described.

1. INTRODUCTION

On Friday, October 22, 1982, most of the east half of the United States was dominated by a large high-pressure area centered over northwest Illinois. The central pressure was 1033 mb at 12Z (see Figure 1). This High was one of the major parameters in forecasting the storm that eventually developed along the Atlantic coast.

2. FRIDAY, OCTOBER 22.

On Friday evening, the extended forecast covered Sunday, October 24 through Tuesday, October 26. The progs indicated that a 1016-mb Low east of Florida near 30° N, 73° W at 12Z Monday, October 25 would move northeastward to a position near 34° N, 63° W by 12Z Tuesday, October 26. Assuming that cyclogenesis would take place and then the Low would move northeastward, another key factor at the time was the position and strength of the surface High centered in the upper midwest. The observed 500-mb chart at 12Z Friday showed a high-pressure ridge east of 70° W that would eventually block the eastward movement of the storm (This blocking trend was indicated to continue through the period covered by the 72 hour 500 mb spectral prog).

The limited fine-mesh model (LFM) 12Z run through 48 hours ending 12Z Sunday, October 24 indicated that the surface High would build to 1036 mb and be centered over southeast Ontario with the ridge extending from northeast Texas through the northeast United States and eastward along 40° N. A 1013-mb Low was also progged to be just off the coast of Florida. The 48-hour spectral model was in relative agreement with the LFM and the 60-hour spectral continued this trend.

3. SATURDAY, OCTOBER 23.

The 12Z surface analysis (Figure 3) indicated a quasi-stationary front over south Florida, which would eventually provide the necessary boundary on which the storm would develop. A 1033-mb High was centered over the southeastern Great Lakes with the ridge extending east along 40° to 45° N to just east of 60° W. The 12Z 500-mb chart indicated an increase in amplitude of the 500-mb trough over the southeast United States. A 500 mb High, 590 decameters, was still centered over the Atlantic near 25° N, 60° W. An apparent blocking pattern had developed (See Figure 3).

The 12Z Saturday LFM run indicated continued deepening of the upper trough, with a Low forming near the Georgia/South Carolina border by 12Z Sunday and nearly cut off from the main flow. The surface prog indicated a 1012-mb Low near 30° N, 78° W at 12Z Sunday (approximately 200 mi east of Jacksonville, FL.) with a strong gradient over the coast of the Carolinas. By 00Z Monday the upper Low was forecast to remain nearly cut off. The surface Low was forecast to move slightly northeastward to near 31° N, 77° W at 1011 mb, with a strong gradient from the South Carolina coast to southern Delaware. The 48-hour forecast for 12Z Monday showed very little change in the 500-mb pattern and moved a 1015-mb surface Low off the coast of North Carolina to near 33° N, 76° W. The strong surface gradient was weakened somewhat and showed very little northward progress.

The spectral surface progs handling of this system was very poor and persisted in keeping the Low south of 30° N and moving more to the east. The surface spectral model was disregarded for the most part, primarily because the blocking High observed to the east at 500 mb would

prevent much of an eastward translation.

The highest wind velocity forecast by model output statistics (MOS) (F012) at Norfolk, VA. was northeast at 27 kt at 18Z Sunday, October 24. This was considered strong enough to exceed gale force for the onshore area since it is a fact that the MOS tends to under-forecast winds in extreme events.

The Saturday evening forecasts for marine interests called this system a developing gale, and forecast it to reach gale force Sunday. The gale warnings for Sunday were issued in both the public and Chesapeake Bay-Coastal forecasts for the area from Chincoteague to Virginia Beach and the mouth of the Chesapeake Bay (see Figure 7). Between 18Z-21Z at 1010 mb Low developed on the quasi-stationary front near 26°N, 79°W.

4. SUNDAY, OCTOBER 24.

Sunday observations at 12Z indicated a surface High, pressure 1035-mb, centered over New York with a ridge eastward along 40° N to 55° W and another surface High near 30° N, 45° W (see Figure 4). A 1004-mb Low was located near 31° N, 75° W. The movement of the Low, plotted from the 21Z Saturday position to the 12Z Sunday position, was northeastward at approximately 20 kt. The stronger winds along the coast from South Carolina to Virginia were north to northeast at 15 to 22 kt with gusts between 25 and 32 kt (gale force is 35 to 48 kt sustained). A buoy north of the Low near 34.5° N, 72° W reported a northeast wind at 30 kt.

At 500 mb, the Low, 568 decameters, was closed and still nearly cut off (see Figure 5). The blocking High offshore had remained nearly stationary.

The 12Z Sunday LFM run forecast the Low to move northeastward at 15 to 20 kt and weaken somewhat. The 12Z Monday position was 36° N, 72° W, 1011 mb; then near 37° N, 66° W at 00Z Tuesday, 1010 mb; and near 39° N, 61° W, 1010 mb at 12Z Tuesday. This forecast turned out not to be accurate enough and would have led to a forecast of less severe conditions along the coast from Virginia to Delaware.

The LFM Forecast the 500-mb closed Low to move almost due north to near Hickory, NC at 12Z Monday and at 00Z Tuesday to be north of Hickory near the Virginia/North Carolina border. At 12Z the Low was forecast to weaken to a trough and shift eastward as it rejoined the main flow.

At 18Z Sunday (see Figure 6), the surface Low was near 32° N, 78° W. Winds along the Carolina/Virginia coast had increased to 25 to 30 kt with gusts to 45 kt and the coastal waters forecast was updated to raise

gale warnings along the coast from Chincoteague to Cape Henlopen and on the Chesapeake Bay south of Windmill Point (see Figure 7).

Initially, the LFM forecast would appear to be acceptable (it had previously done a reasonably good job), but several factors indicated it was not quite accurate.

Some of these factors were:

- 1) Satellite data between 12Z and 20Z Sunday indicated a definite northward progression at approximately 10 kt.
- 2) The presence of the 500-mb ridge to the east would appear to force the upper Low to move more northward (this was supported by the LFM) and therefore the surface Low would be steered more northward.
- 3) Several 18Z ship reports were showing 45-kt sustained winds.
- 4) Central pressure at 18Z was 1000 mb, 7 mb lower than the LFM 00Z forecast.
- 5) Pressure falling rapidly along the North Carolina coast implied a more northward movement.
- 6) Report from Frying Pan tower, an automated gage off the coast of North Carolina and about 100 ft above sea level, of winds sustained 75 kt with gusts to 85.

Based on these factors, it was decided that the 5 PM offshore and high seas forecasts should reflect a developing storm with a more northward track than the LFM showed. Storm warnings were raised along the coast from Chincoteague to Virginia Beach and the mouth of the Chesapeake Bay. Gale warnings were issued elsewhere along the coast of Maryland and Delaware, with storm conditions included for Monday. (Storm warnings were also issued along the North Carolina coast).

...Significant observations after 18Z Sunday, October 24 ...

19Z...Pressure falling rapidly at Wilmington, NC, peak wind northeast 37 kt. Cape Hatteras NC, sustained wind northeast 35 kt, peak wind 50 kt. Norfolk, VA, peak wind northeast 47 kt. Occasional moderate rain along the coast from South Carolina to Virginia.

5. MONDAY, OCTOBER, 25

00z...Low 1000 mb near 33° N, 76° W (see Figure 8). Several ships reporting 45-kt winds and seas 15-20 ft. Moderate rain continued along the coast. 6-hour rainfall 1.70 in. at Cape Hatteras, NC.

03Z...Low near 33.5° N, 76° W, 998 mb, 9 mb lower than the LFM 00Z forecast.

06Z...Low near 34° N, 76° W, 996 mb, 11 mb lower than 00Z Monday LFM forecast and 15 mb lower than the 12Z Monday LFM forecast. Wind northeast at 40 kt with gusts to 60 kt at the mouth of the Chesapeake Bay. Peak wind 50 kt at Norfolk, VA. Six-hour rainfall 1.38 in. at Cape Hatteras, NC.

09Z...Low 996 mb near Cape Hatteras (near 35° N, 76° W). Pressure falling rapidly in eastern Virginia and Maryland. Coast Guard reports 50 kt sustained at Parramore Beach on the Virginia coast (see Figure 7). Gust to 60 kt at the mouth of the Chesapeake Bay.

12Z...Low 1000 mb near 36° N, 76° W (Figure 9) Northeast winds 35 kt, gusts to 50 kt, peak wind 65 kt, at Norfolk, VA. Twenty-four hour rainfall 2.00 in., sustained winds 45 kt with gusts to 70 kt at the mouth of the Bay; 50-kt winds at Ocean City, MD. Twenty-four hour rainfall at Hatteras 3.19 in.

18Z-22Z...Low near 36.5° N, 76° W. A number of Coast Guard reports along the Maryland, Delaware, Virginia coast report winds greater than 45 kt, 75 kt reported at Ocean City. Surface ridge over Ohio/Pennsylvania begins to break down and move eastward.

6. TUESDAY, OCTOBER 26.

00Z...Low near 38° N, 74° W, 1003 mb. Winds decreasing along the Maryland, Delaware, Virginia coast. 500-mb Low (Figure 10) no longer closed and now over central Virginia. Surface ridge continues to move east. Winds below gale force along the mid Atlantic coast.

12Z...Low 1008 mb near 38° N, 72° W (Figure 11). 500-mb Low over New Jersey (Figure 12). System now carried as an offshore gale.

The system continued to move eastward and weaken.

7. CONCLUSION

The case described was one where the National Meteorological Center issued an excellent 3 to 5 day forecast. When used in conjunction with the initial conditions it was possible to make a reasonable assumption of what these conditions would look like using the shorter range progs. This, combined with a knowledge that the Low would develop in an area favorable for intensification, made it possible to make a reasonable prediction of offshore gale development 72 hours out.

Once the system had developed, a tremendous amount of weight was given to the observed data. In fact, the models on the 12Z Sunday run, if followed, would have underforecast the event.

Based on the various observations, the initial 12-18 hours of the 5 PM Sunday forecast was made with very little use of the guidance. The movement of the system was a compromise between the LFM and satellite and pressure-fall data. Use of satellite and pressure falls would have been the best forecast. This was a case where almost all of the observations were of high quality which is not always the case.

Join Us!

If you are interested and concerned about operational meteorology, join and participate in the National Weather Association. Annual dues are just \$20.00. Send your name, address and any particulars as to your occupation, affiliation and main meteorological interests to:

NATIONAL WEATHER ASSOCIATION
4400 STAMP ROAD, ROOM 404
TEMPLE HILLS, MD 20748

Name: _____

Address: _____

Dues enclosed (\$20.00 per year). _____ THANK YOU!

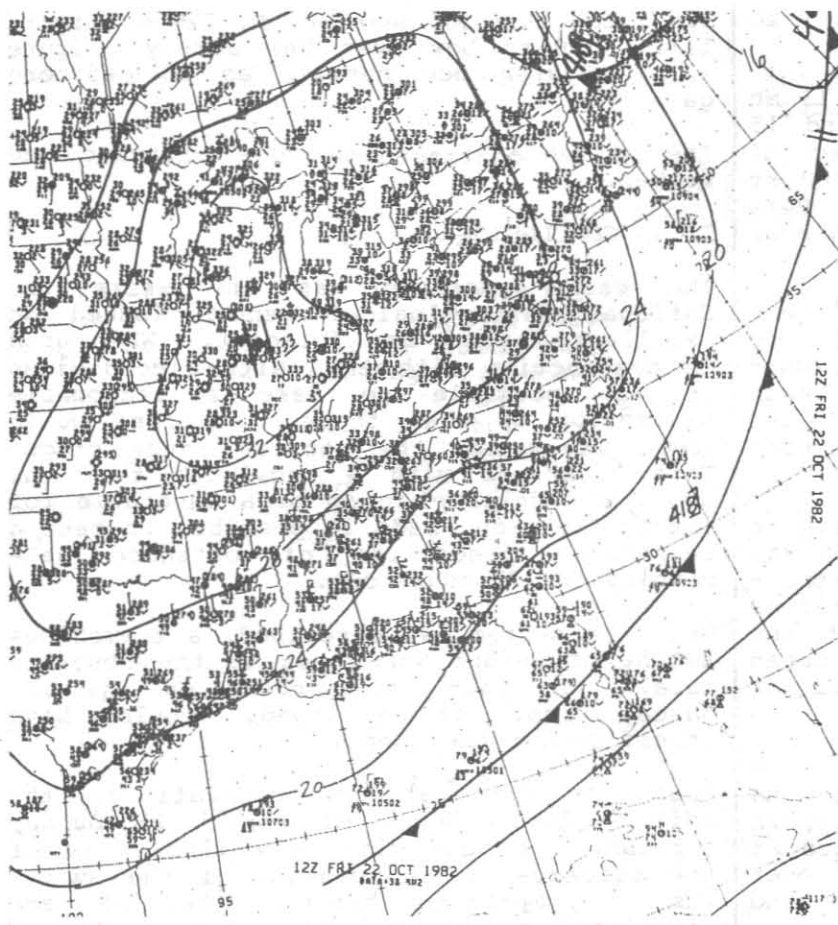


Figure 1. 12Z Friday, October 22, surface analysis.

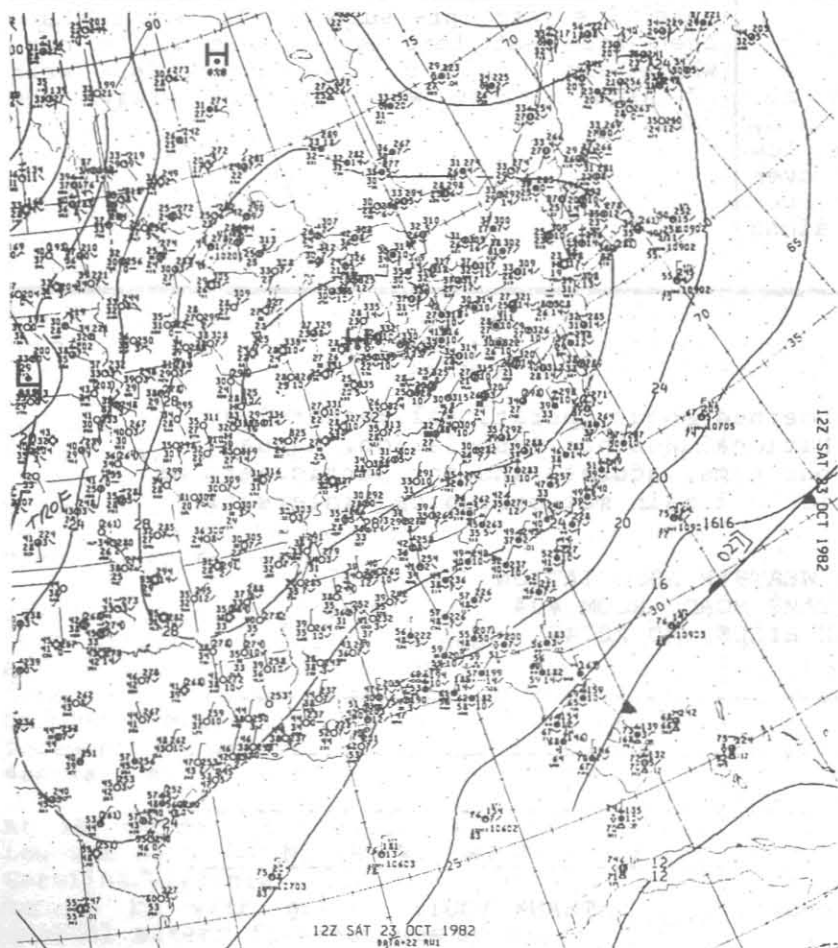


Figure 2. 12Z Saturday, October 23, surface analysis.

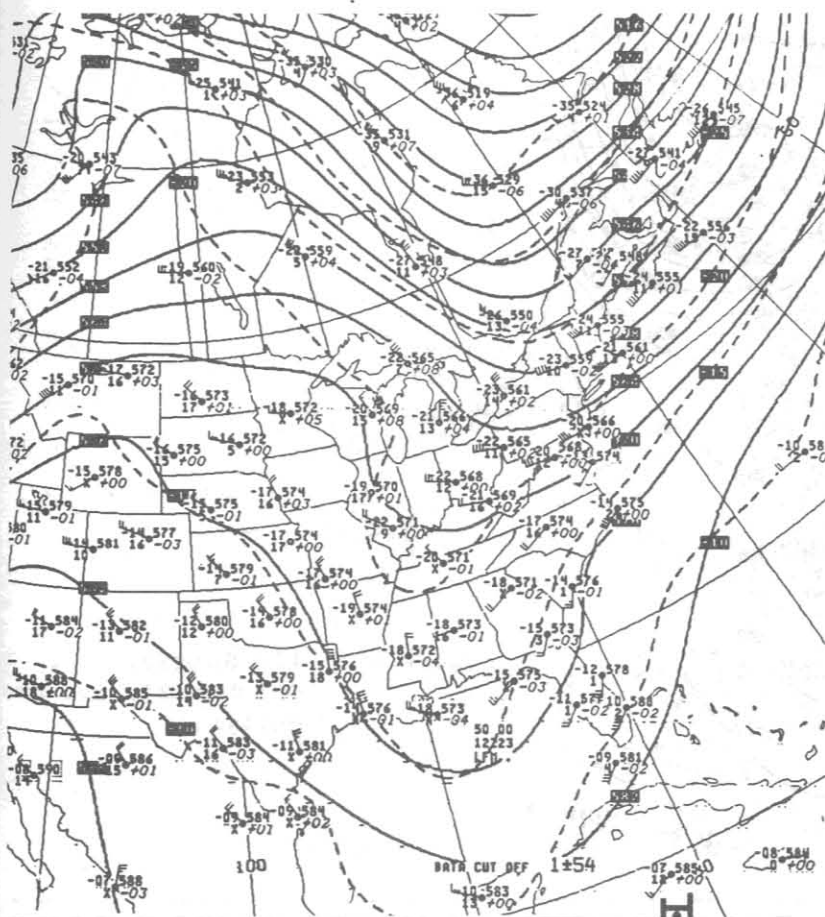


Figure 3. 12Z Friday,
October 23, 500-mb
analysis.

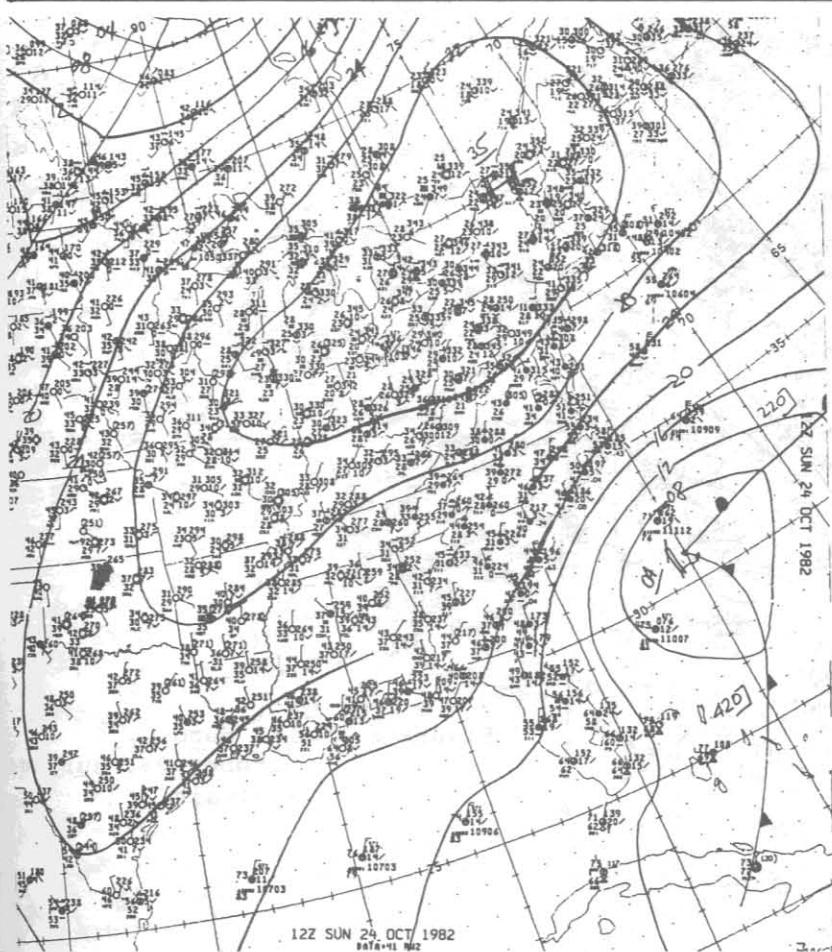


Figure 4. 12Z Sunday, October 24,
surface analysis.

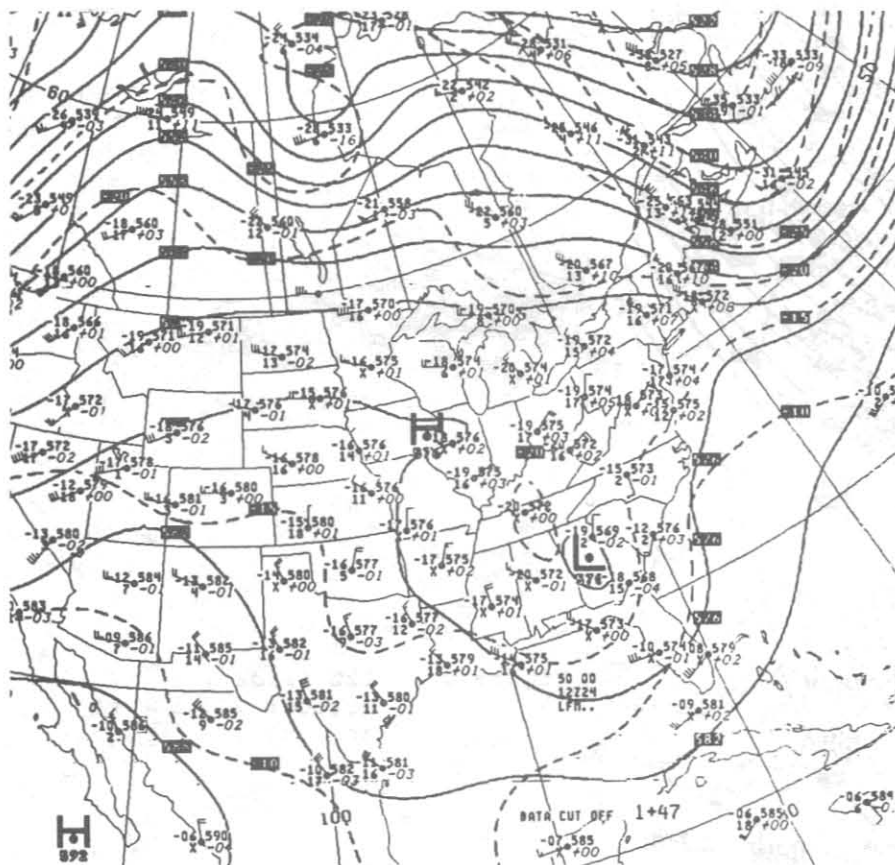


Figure 5. 12Z Sunday, October 24, 500-mb analysis.

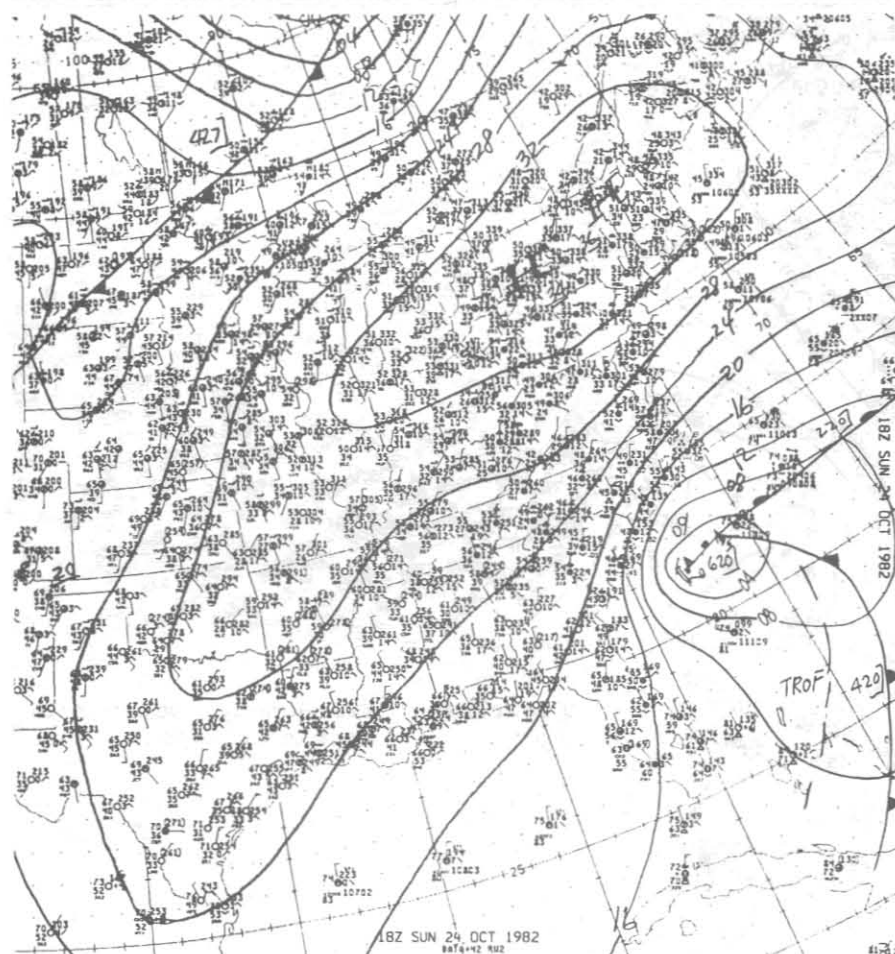


Figure 6. 18Z Sunday, October 24, surface analysis.

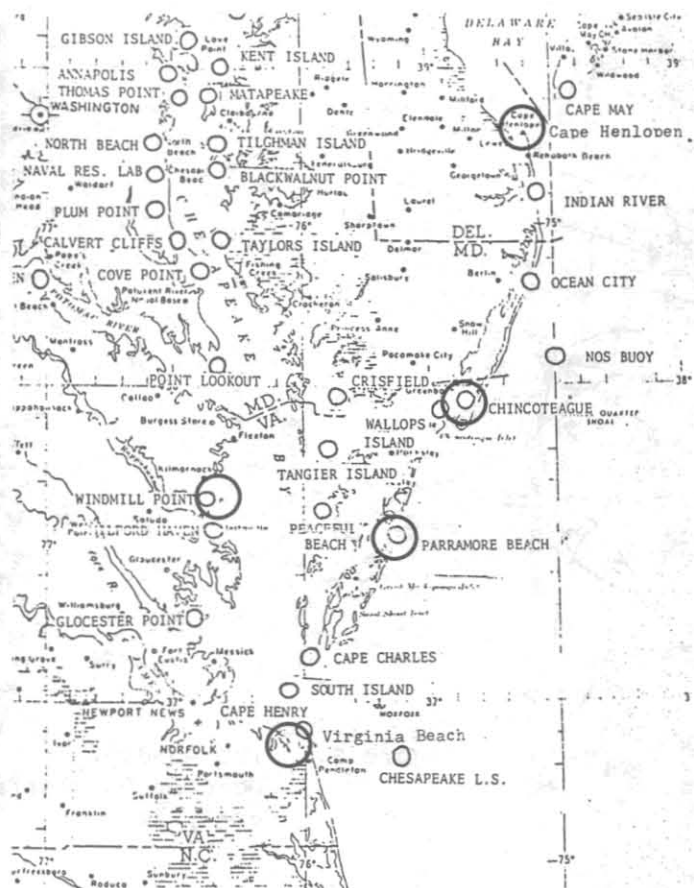


Figure 7. Map of Chesapeake Bay and Maryland, Virginia and Delaware Coast.

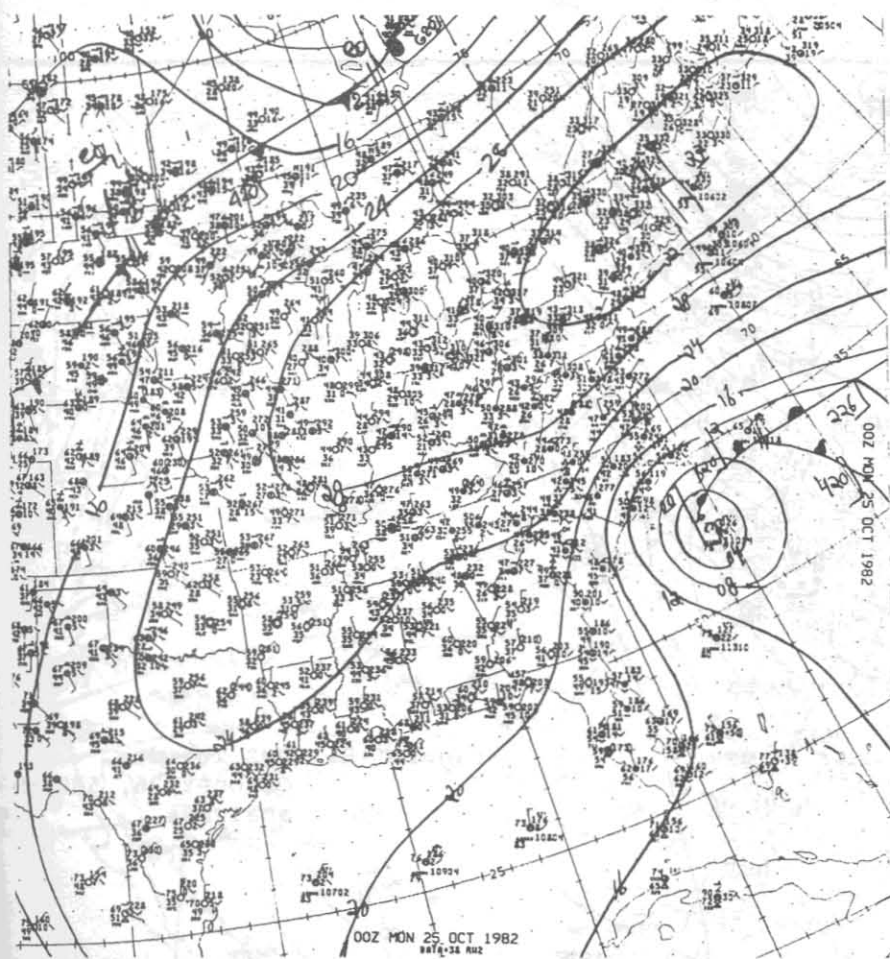


Figure 8. 00Z Monday, October 25, surface analysis.

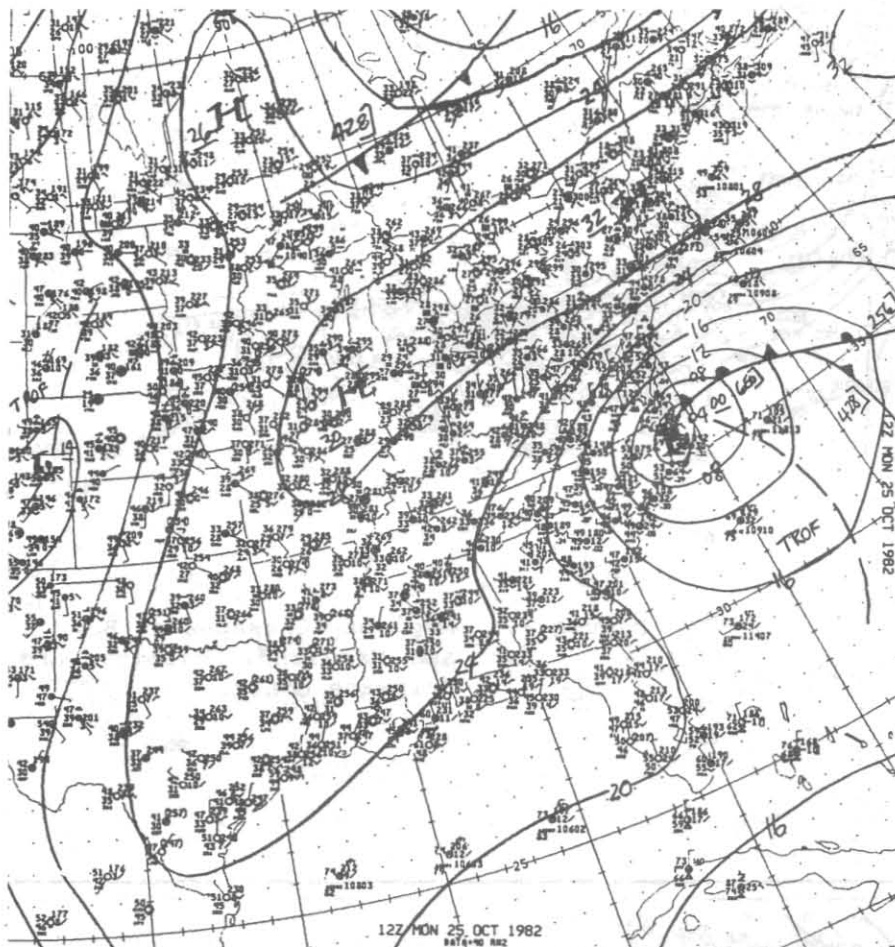


Figure 9. 12Z Monday, October 25, surface analysis.

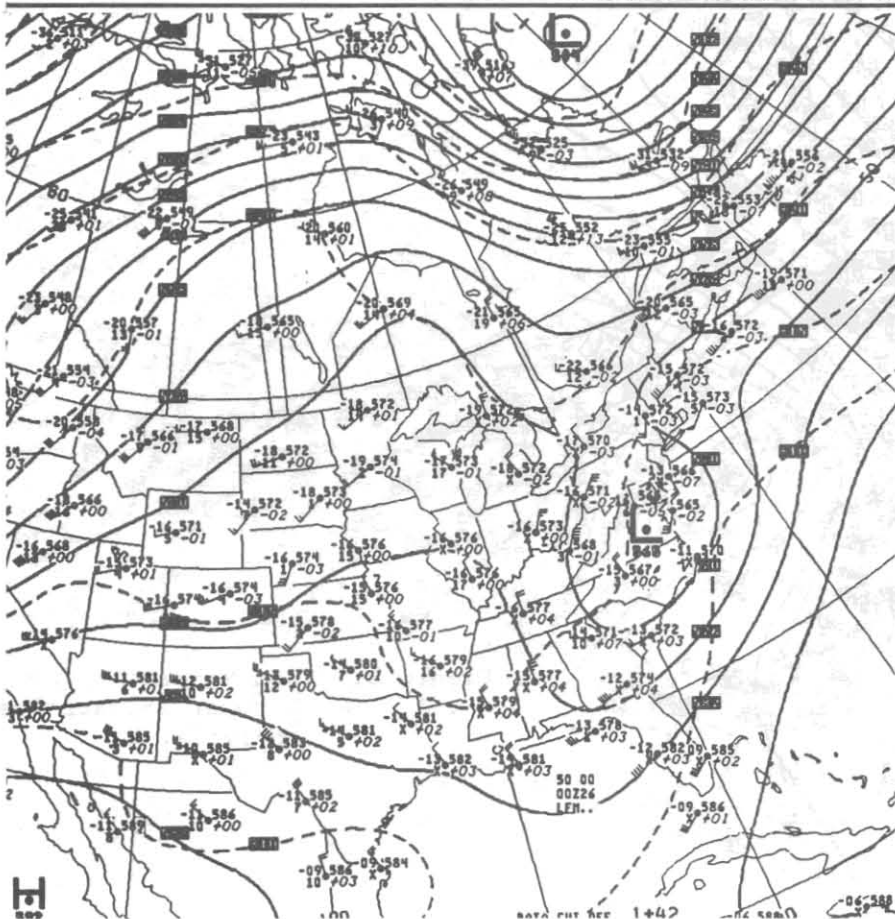


Figure 10. 00Z Tuesday, October 26, 500-mb analysis.

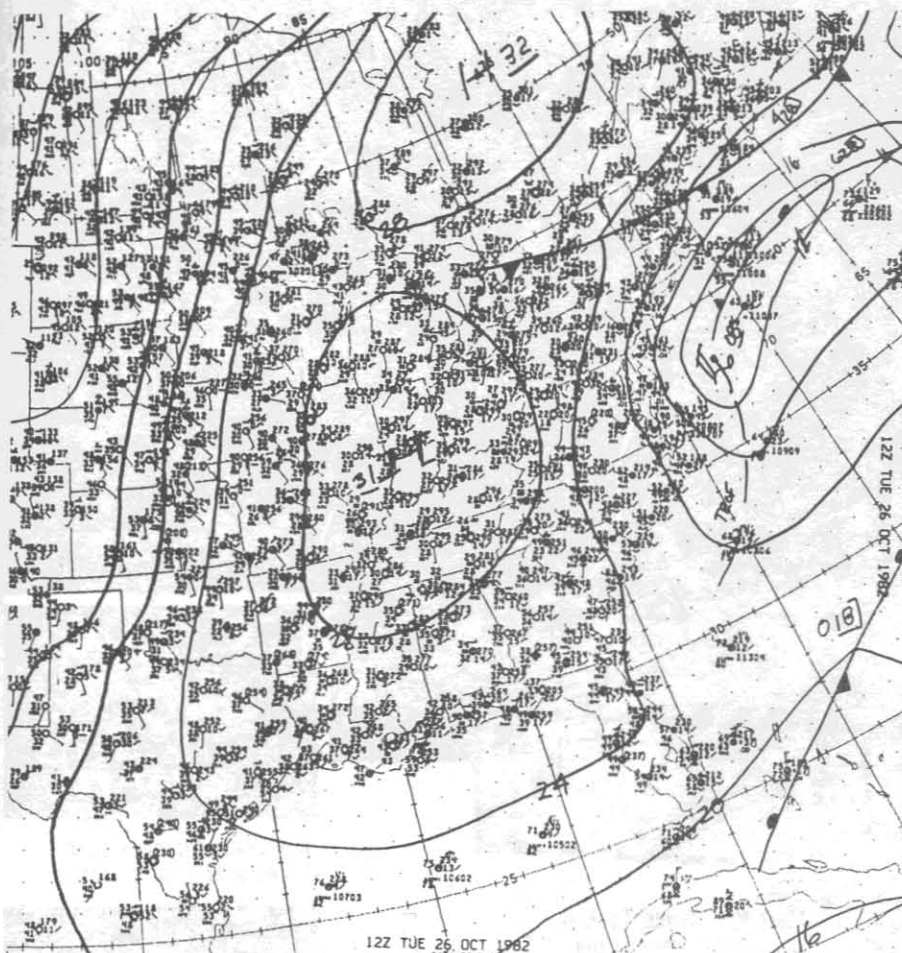


Figure 11. 12Z Tuesday, October 26, surface analysis.

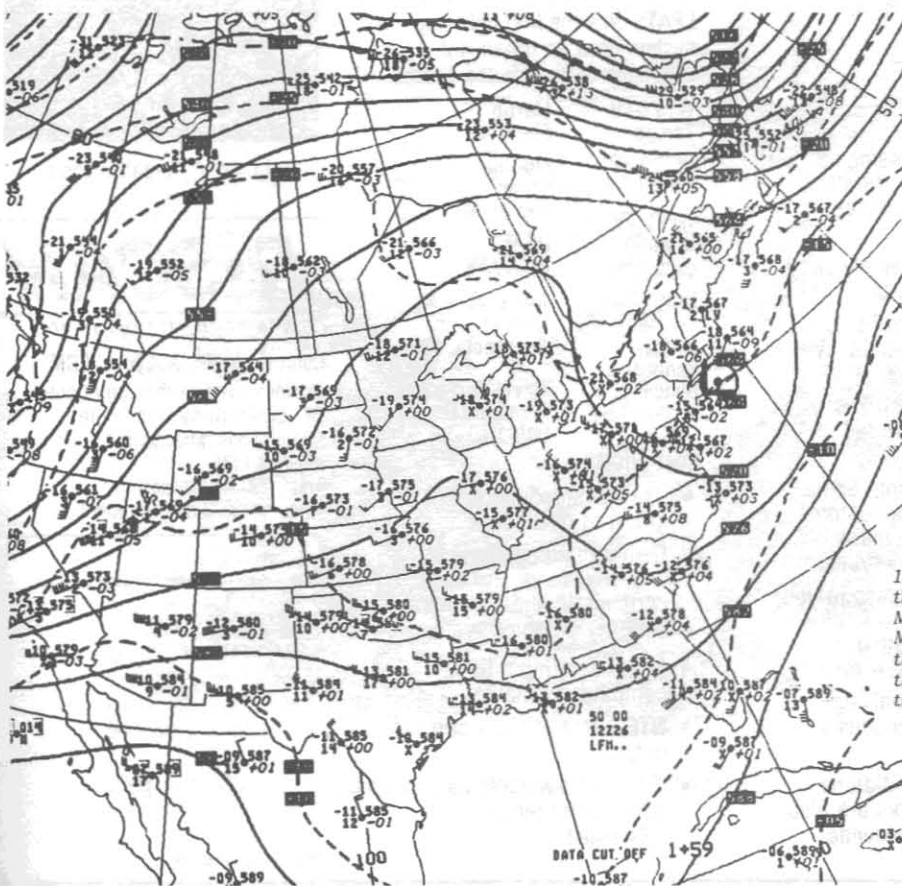


Figure 12. 12Z Tuesday, October 26, 500-mb analysis.

Footnotes

1. David B. Caldwell received his B.S. Degree from the District of Columbia Teacher's College with majors in Mathematics and Science. He did post graduate study in Meteorology at Pennsylvania State University. He entered the National Weather Service in 1976. Before coming to the WSFO at Washington, D.C., David was a forecaster at the WSFO's St. Louis, Missouri and Omaha, Nebraska.