



Marine Weather Review

North Atlantic Area

September through December 2001

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Introduction

From September through November, low-pressure systems tracked northeast from the Canadian Maritimes to the vicinity of Greenland and Iceland before turning east. With the exception of late September and early October, high pressure of varying strength was present off the coast of western Europe. By early December the high pressure shifted to the British Isles and

strengthened, forcing low-pressure systems moving off the U.S. East Coast and the Maritimes to turn north or even northwest toward Greenland and the Davis Strait.

There was considerable tropical cyclone activity during the first three months, with eight named systems either moving into or forming in MPC's waters north of 31°N. and west of 35°N. Three of these were of subtropical origin, forming from cut-off occluded

lows in the far southern MPC waters. The others either moved around the west and north sides of the subtropical ridge and weakened, were absorbed by, or became extratropical lows (those found outside the tropics, typically associated with fronts).

Tropical Activity

Hurricane Erin: Erin, the first hurricane of the Atlantic season, moved northwest into MPC's

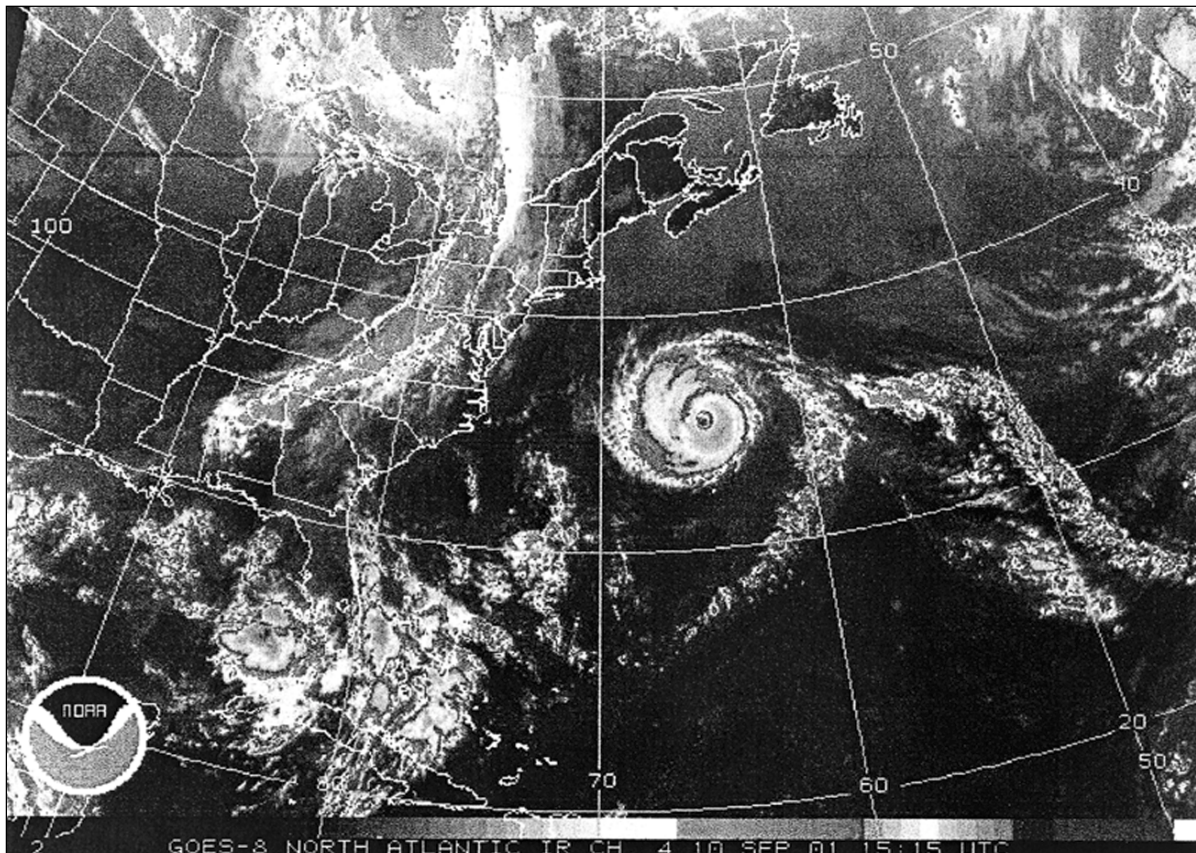


Figure 1 - GOES-8 enhanced infrared satellite image of Hurricane Erin valid 1515 UTC September 10, 2001. Colder, higher cloud tops such as in the central dense overcast and spiral cloud bands around the center or "eye" of Erin appear near 35°N 65°W.



waters just east of Bermuda on the morning of September 9 and attained a peak intensity with maximum sustained winds of 105 kt with gusts to 130 kt near 33.3°N. 63.3°W. at 0000 UTC September 10. Erin was the strongest tropical cyclone to affect MPC's waters during this season. Figure 1 is an enhanced infrared satellite image of Erin, still near maximum strength about 15 hours later, with a well-defined "eye." Erin subsequently turned northeast and weakened before re-intensifying as an extratropical storm by 0000 UTC September 16 (Figure 2). As the center passed to the west, the seas at Buoy 44141 (42°N. 56°W.) jumped from 3.5 meters (11 ft) to 9.5 meters (31 ft) during the 10-hour period ending at 1000 UTC September 14. The maximum wind reported by a ship was a southwest wind of 45 kt from the **SeaLand Pride** (WDA3673) near 36°N. 61°W. at 0000 UTC September 13. Buoy 44140 (43.7°N. 51.8°W.) reported a southwest wind of 35 kt with 6.5-m seas (22 ft) at 2100 UTC September 14. The system is shown at maximum intensity as an extratropical storm in the second part of Figure 2. The QuikScat image in Figure 3 is valid about 7.5 hours later, indicating winds of 50 kt or higher south and southeast of Cape Farewell, with even some 70 kt wind barbs. The storm subsequently passed east of Greenland and weakened on the 16th.

Hurricane Felix: Like Erin, Felix moved into MPC's waters as a hurricane, shown in Figure 2.

Unlike Erin, Felix peaked in strength while south of 31°N., was in a slow weakening trend, and followed a more east-northeast track while in MPC's area. The center passed east of 35°W. by 0600 UTC September before weakening to a tropical storm near 35°N. 31°W. at 1200 UTC September 17. At that time, the ship **C6PW2** reported a northeast wind of 35 kt and 7-m seas (23 ft) near 38°N. 34°W. A high-pressure ridge east and north of the center halted further eastward progress at that time. At 0600 UTC September 19 the system weakened to a remnant low near 35°N. 31°W.

Hurricane Gabrielle: Figure 2, shows Tropical Storm Gabrielle moving on a northeast track toward MPC's offshore waters. At 0000 UTC September 16 the **Lykes Discoverer** (WGXO) near 32°N. 80°W. reported a north wind of 50 kt and 8-m seas (27 ft). The **Discoverer** was one of several ships reporting winds of 50 kt west and northwest of the center through 1200 UTC September 16. **Frying Pan Shoals** (FPSN7) at 33.5°N. 77.5°W. reported a north wind of 45 kt at 1800 UTC September 15. Winds reached 35 kt from the northeast at Buoy 41004 (32.5°N. 79.1°W.), along with seas to 4.5 meters (15 ft) at 0600 UTC September 16. Gabrielle then intensified to a hurricane near 33°N. 71°W. at 0000 UTC September 17 and developed maximum sustained winds of 70 kt with gusts to 85 kt near 35°N. 67°W. twelve hours later, before

beginning to weaken. Gabrielle became an extratropical storm near 43°N. 55°W. at 0600 UTC September 19 with a 976-mb central pressure. The ship **MZGK7** near 46°N. 42°W. encountered south winds of 55 kt eighteen hours later. The system continued to move northeast and re-intensified east of Labrador. By September 22, it had weakened east of Greenland and turned southeast.

Hurricane Humberto: Humberto entered MPC's forecast area near 31°N. 68°W. at 1200 UTC September 23 as a strong tropical storm and became a hurricane six hours later while continuing to move north at about 10 kt. The maximum strength was reached at 1200 UTC September 26 near 41°N. 59°W., with maximum sustained winds of 90 kt and gusts to 110 kt. The system then turned east and weakened to an extratropical gale near 41°N. 42°W. at 0000 UTC September 28. At that time the ship **PGBO** south of the center near 39°N. 40°W. reported southwest winds of 35 kt and 5-m seas (17 ft).

Hurricane Karen: Karen began as a frontal wave of low pressure that underwent initial rapid intensification in the 24-hour period ending at 0000 UTC October 12. Figure 4 depicts the system as an intense occluded cyclone, which, after initial weakening, re-intensified while losing its frontal structure. The Tropical Prediction Center (TPC) classified it as a subtropical storm (Figure 4) before naming it Tropical Storm

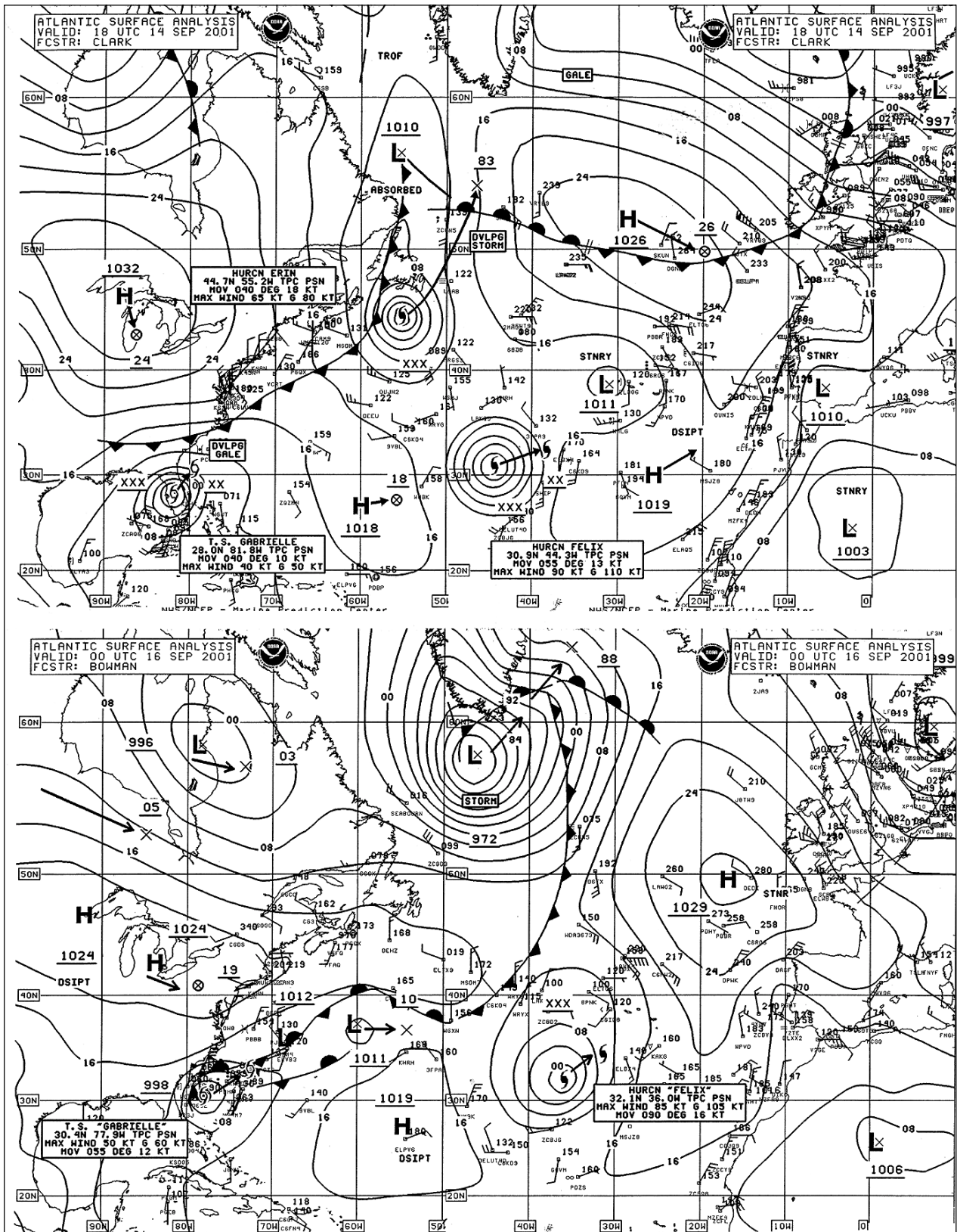


Figure 2 - MPC North Atlantic surface analysis charts valid 1800 UTC September 14 and 0000 UTC September 16, 2001.

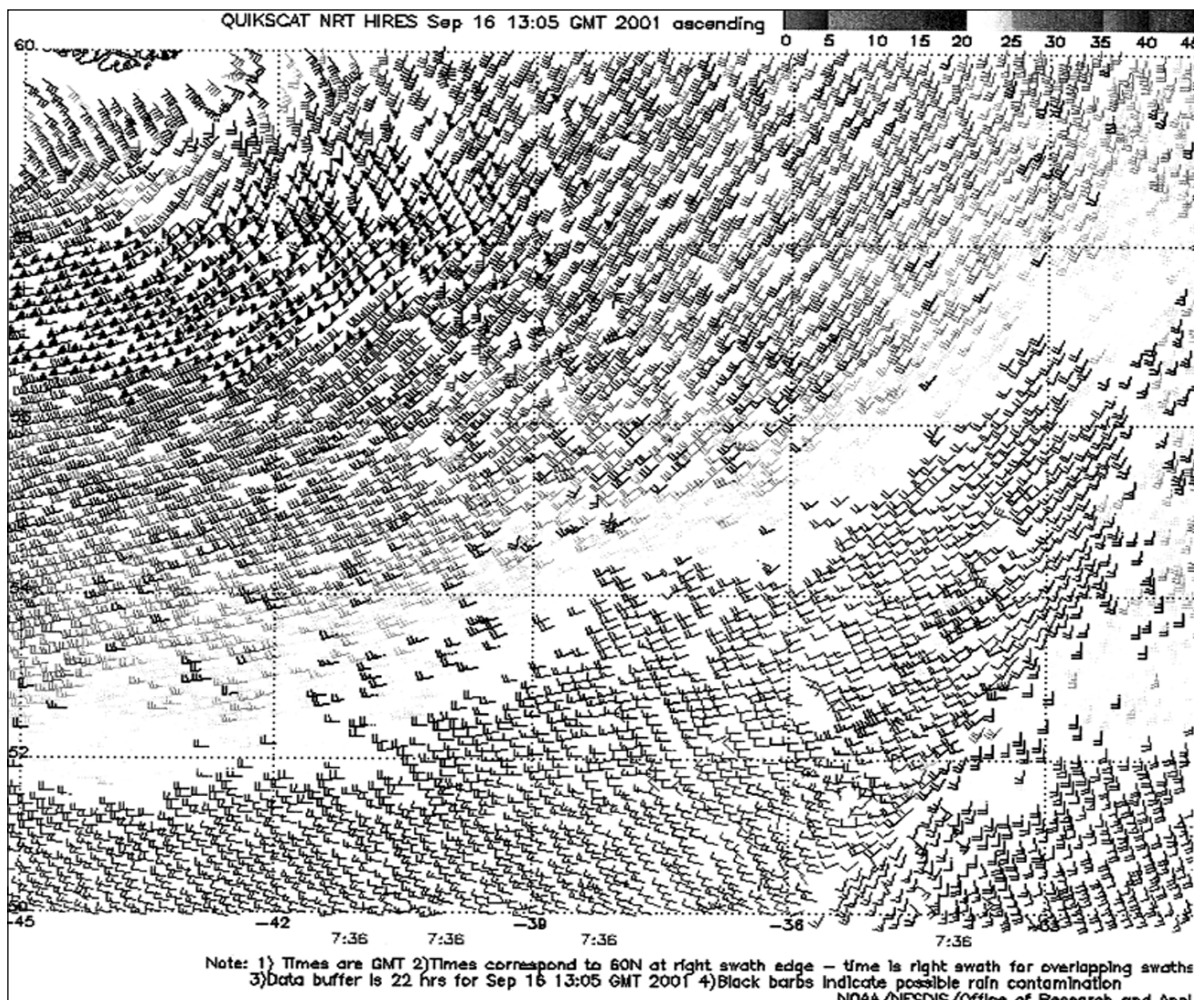


Figure 3 -High-resolution QuikScat scatterometer winds valid at 0736 UTC September 16, 2001. The resolution of the wind barbs is 12.5 km, versus 25 km in regular QuikScat imagery. Image is courtesy of NOAA/NESDIS Office of Research and Applications.

Karen at 1200 UTC October 13. Figure 5 is a QuikScat image valid about the time of the first analysis in Figure 4, showing winds to 60 kt on the backside of the system. Figure 6 is a satellite image valid at 2215 UTC October 13 showing Karen with indications of a central area or ring of convection around an “eye.” Karen was upgraded to a hurricane shortly before that time. At 0600 UTC October 14 Karen reached peak intensity near

39°N, 64°W., with maximum sustained winds of 70 kt and gusts to 85 kt, before weakening to an extratropical gale over the Canadian Maritimes on October 15 and continuing to move north.

Tropical Storm Lorenzo:

Lorenzo moved northwest to a position near 31°N, 46°W. at 1200 UTC October 30 before turning to the north-northeast and was only a minimal tropical storm with

maximum sustained winds of 35 kt and gusts to 45 kt. Lorenzo then became extratropical and merged with an approaching cold front on October 31.

Hurricane Noel:

The development of Noel was similar to that of Karen. Low pressure developed on a northeast to southwest oriented front near 35°N, 43°W. early on November 1 and drifted southwest before

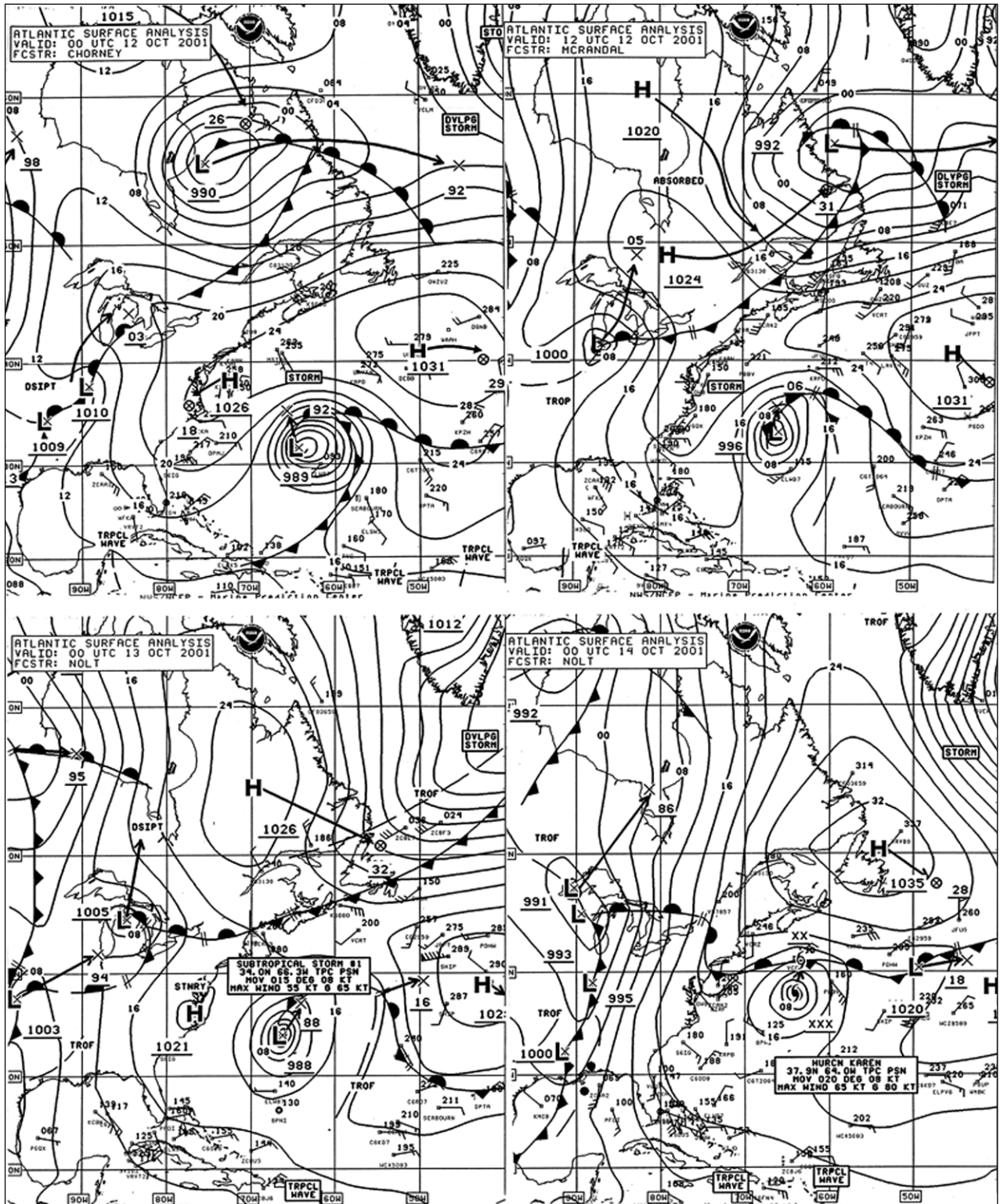


Figure 4 - MPC North Atlantic surface analysis charts (Part 2) valid 0000 UTC and 1200 UTC October 12, and 0000 UTC October 13 and 14, 2001. The time interval between charts is 12 hours, except 24 hours between the third and fourth charts.



turning northwest and intensifying to an occluded storm analyzed with 984-mb central pressure near 34°N. 50°W. at 1800 UTC November 3. The system then drifted north and weakened to a gale at 1200 UTC November 4 (Figure 7), before re-intensifying and developing tropical characteristics such as persistent convective clouds near the center (Figure 8). Based on a report of a southwest wind of 65 kt from the

ship **Tellus (WRYG)** near 37°N. 50°W. at 1400 UTC November 5, TPC upgraded the system to Hurricane Noel in a 1600 UTC November 5 advisory. Six hours later the ship **ELRT2** near 36°N. 48°W. encountered southwest winds of 35 kt and 8-m seas (27 ft). The system weakened to a tropical storm near 40°N. 50°W. at 0000 UTC November 6 before merging into a developing extratropical storm over the

Canadian Maritimes. The first analysis in Figure 9 has the remains of Noel near 47°N. 47°W., where they are about to be absorbed.

Hurricane Olga: Like Karen and Noël, Olga formed from a low on a front, this time south of MPC's waters, which initially developed into an occluded cut-off low. This system subsequently lost its frontal structure as it drifted into MPC's

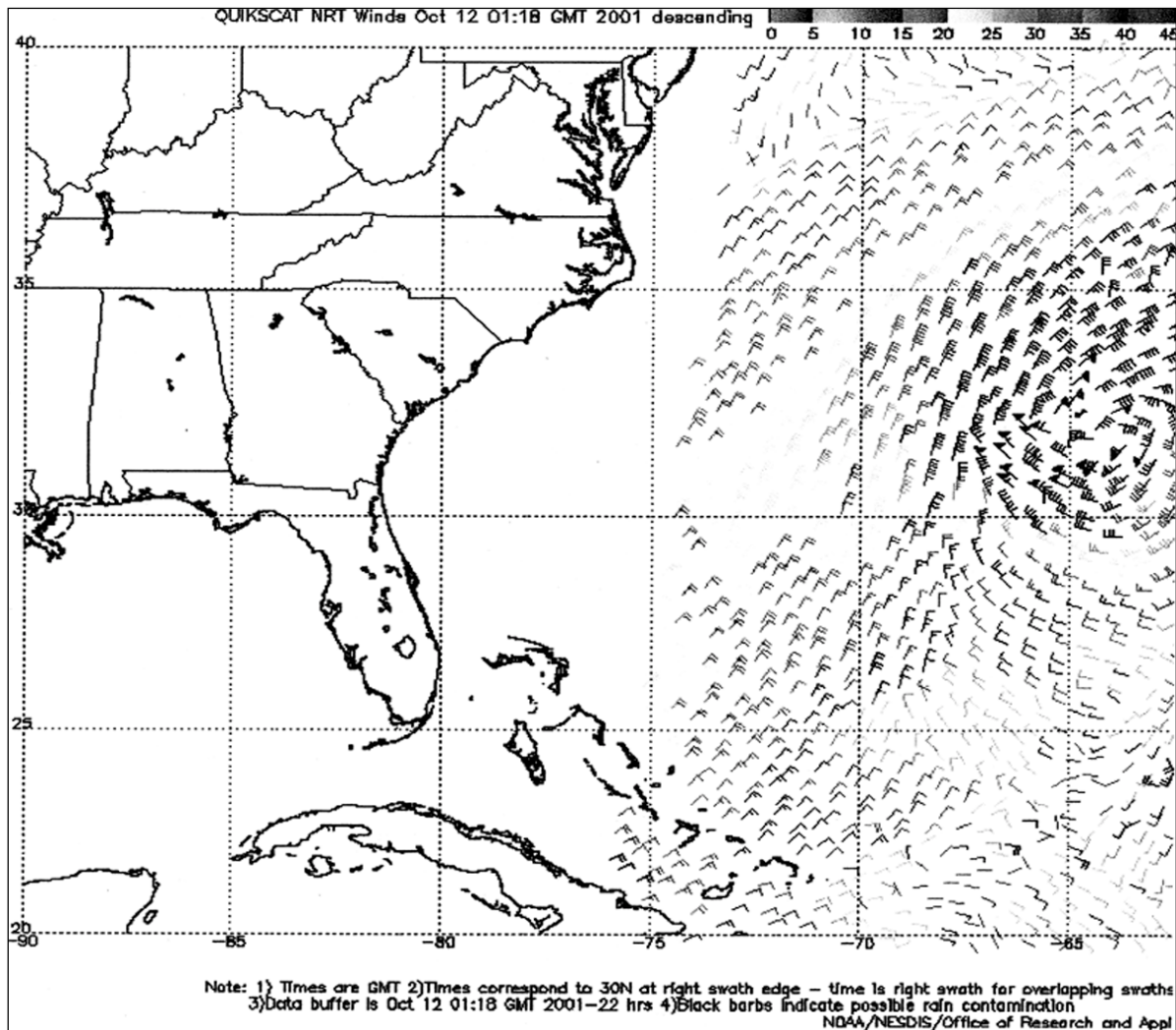


Figure 5 - QuikScat satellite-sensed scatterometer winds valid about 0000 UTC October 12. Image is courtesy of NOAA/NESDIS Office of Research and Applications.

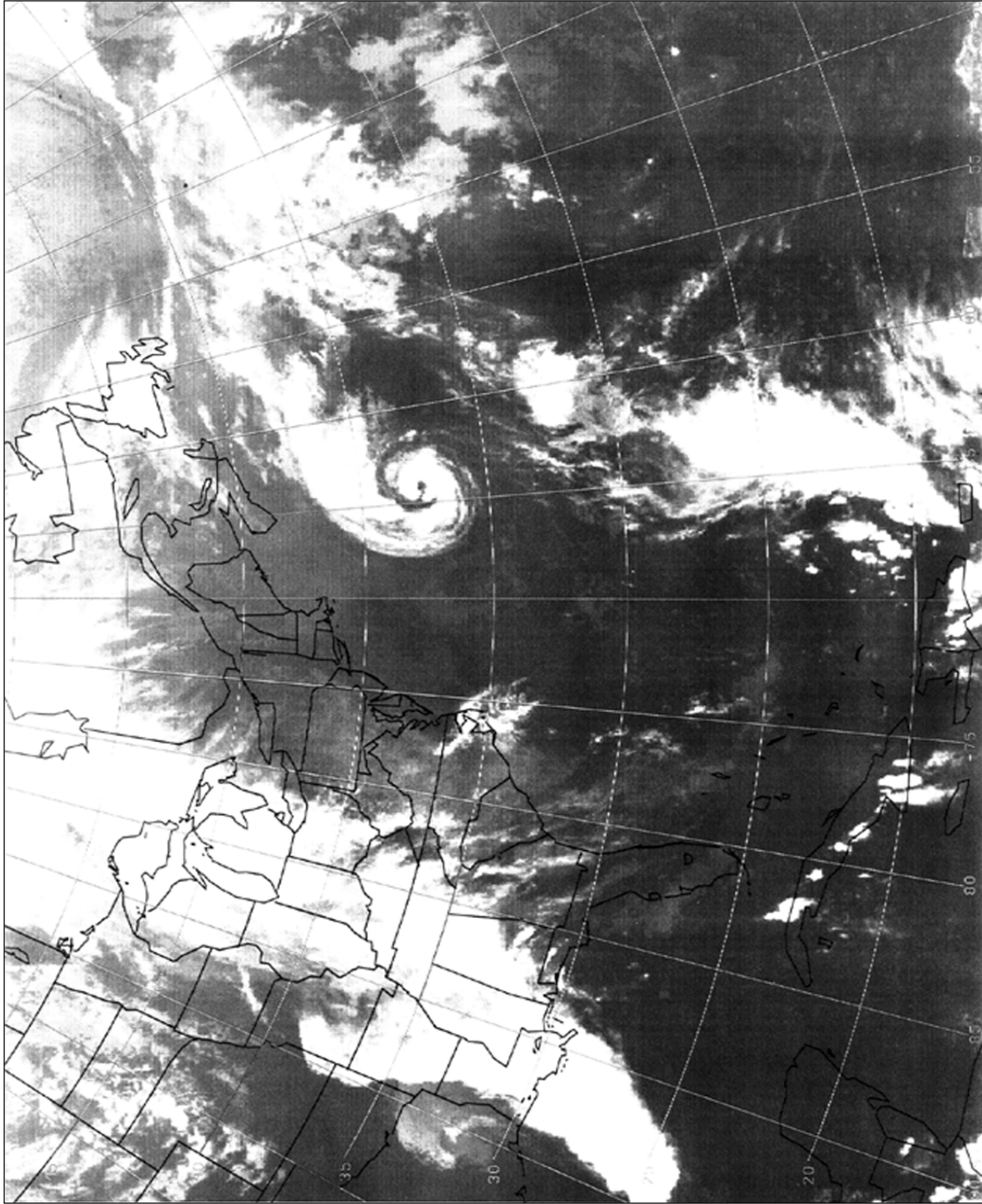


Figure 6 - GOES infrared satellite image valid at 2215 UTC October 13, 2001. Satellite senses temperature, which is displayed in various shades of gray, ranging from white (cold) to black (warm) in this type of image.

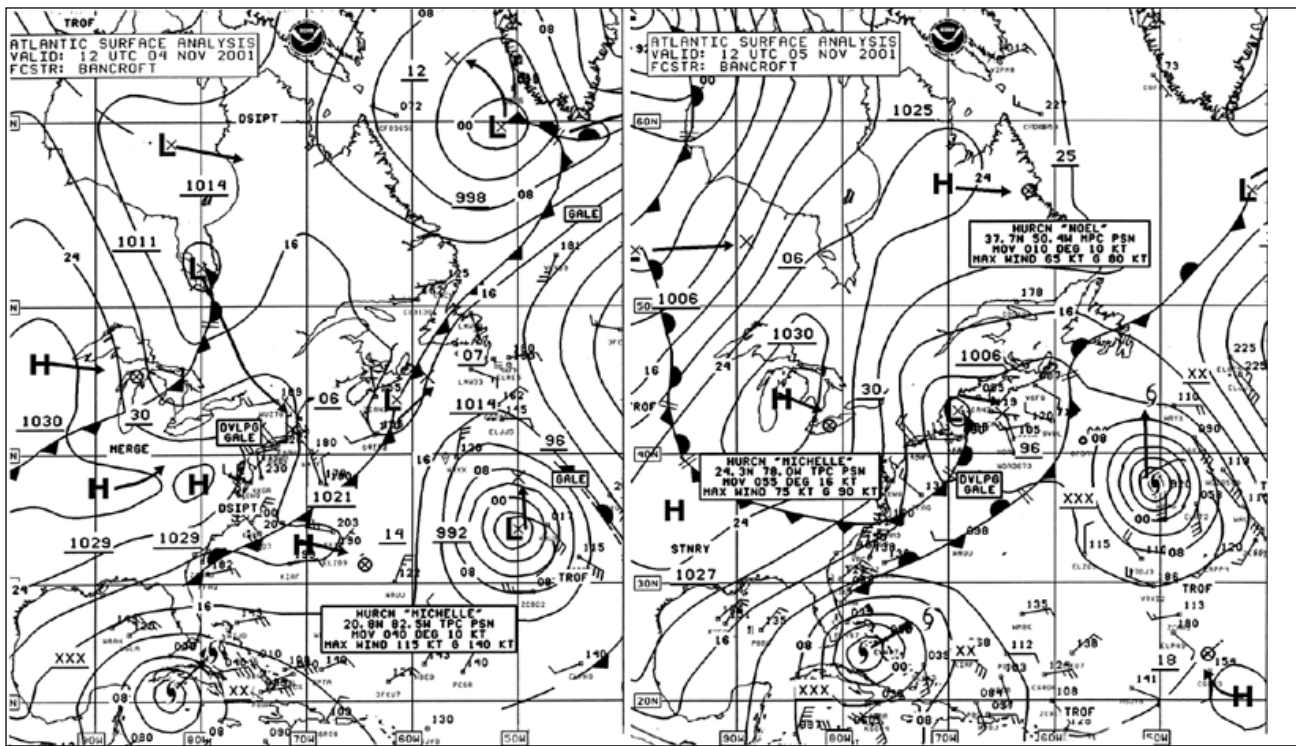


Figure 7 - MPC North Atlantic surface analysis charts (Part 2) valid 1200 UTC November 4 and 5, 2001.

waters late on November 24 and continued to intensify, with TPC classifying it as a subtropical storm (Figure 10). With a strong high-pressure ridge to the north, a large area of gale to storm force northeast winds developed north and west of the center. Several gale-force reports are plotted in Figure 10. The highest wind reported by a ship was a north wind of 55 kt, along with 10-m seas (33 ft) from the **Liberty Sun (WCOB)** near 31°N. 56°W. at 1800 UTC November 25. The storm continued to intensify during the next two days while remaining nearly stationary, with TPC upgrading it to Hurricane Olga near 31.5°N. 56°W. at 2100 UTC November 26. The intensity peaked late on the 27th when maximum sustained winds reached 80 kt with gusts to 100 kt. The

500-mb analysis in Figure 11, with the same valid time as Figure 10, shows this system nearly vertically stacked. A 500-mb ridge building to the north eventually forced Olga to move southwest and weaken. By early on the 29th Olga weakened to a tropical storm south of MPC's area.

Other Significant Events of the Period

Western Atlantic/Canadian Maritimes Storm of 7-8

November: Referring again to Figure 9, the 960-mb storm shown in the second analysis formed from the merger of the low over Nova Scotia with the secondary system at 39°N. 58°W., the remains of Tropical Storm Noel and the storm center near 30°N. 63°W. which was formerly

Hurricane Michelle. At 0600 UTC November 7 the ship **ELRT2** near 36°N. 57°W. reported a south wind of 60 kt. The **Atlantic Cartier (C6MS4)** encountered southeast winds of 60 kt near 46°N. 49°W. at 1800 UTC November 7. The buoy 44140 (43.8°N. 51.7°W.) at that time reported 7.5-m seas (25 ft). The **Sea-Land Developer (KRRH)** reported seas to 9.5 meters (31 ft) along with 35-kt southwest winds, also at that same time. This was the strongest storm in terms of central pressure in the western North Atlantic during this four-month period. The system subsequently moved north-northeast and weakened, before re-intensifying while passing east of Greenland by November 10.

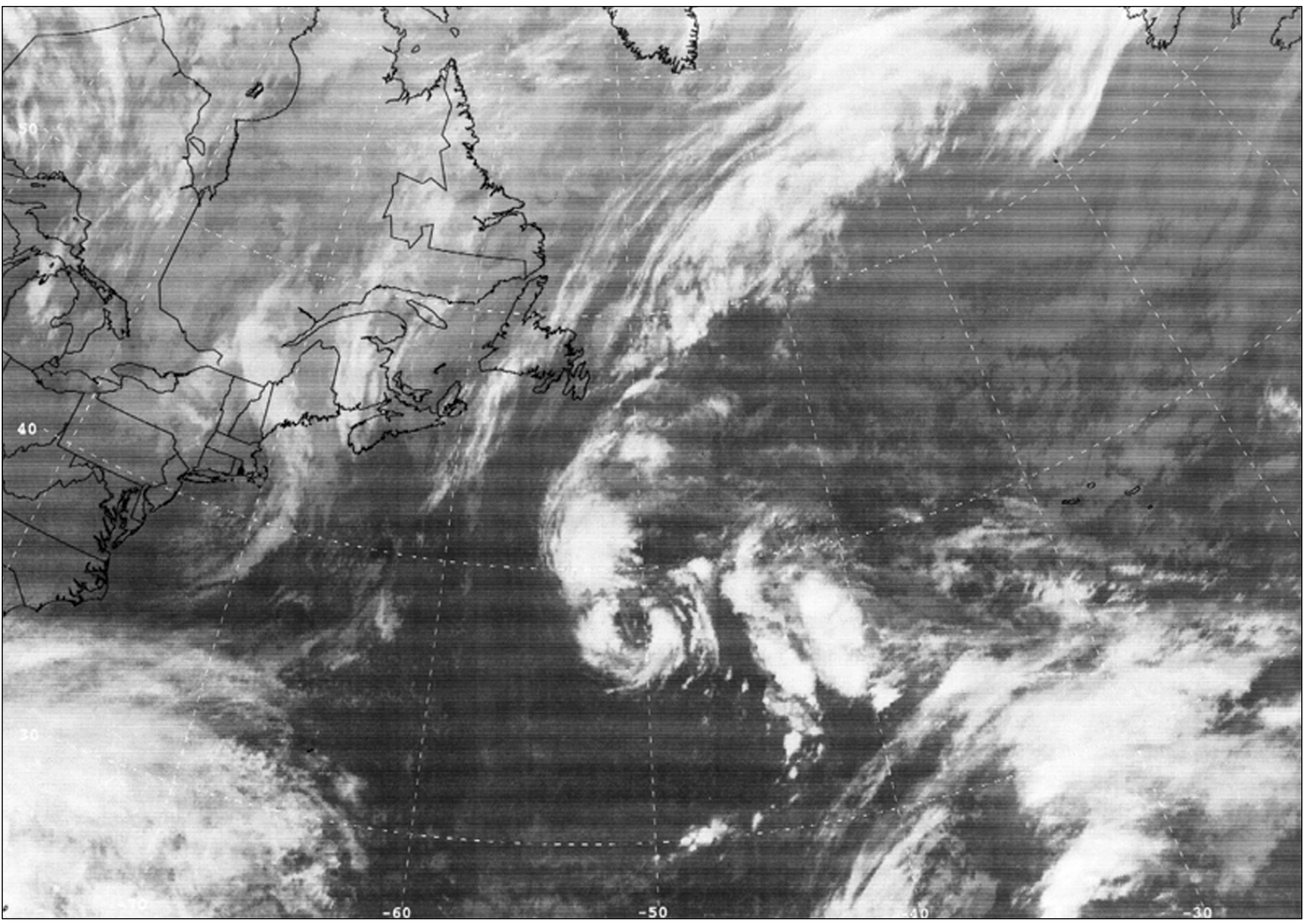


Figure 8 - GOES-8 infrared satellite image valid 1215 UTC November 5, or approximately the valid time of the second analysis in Figure 7.

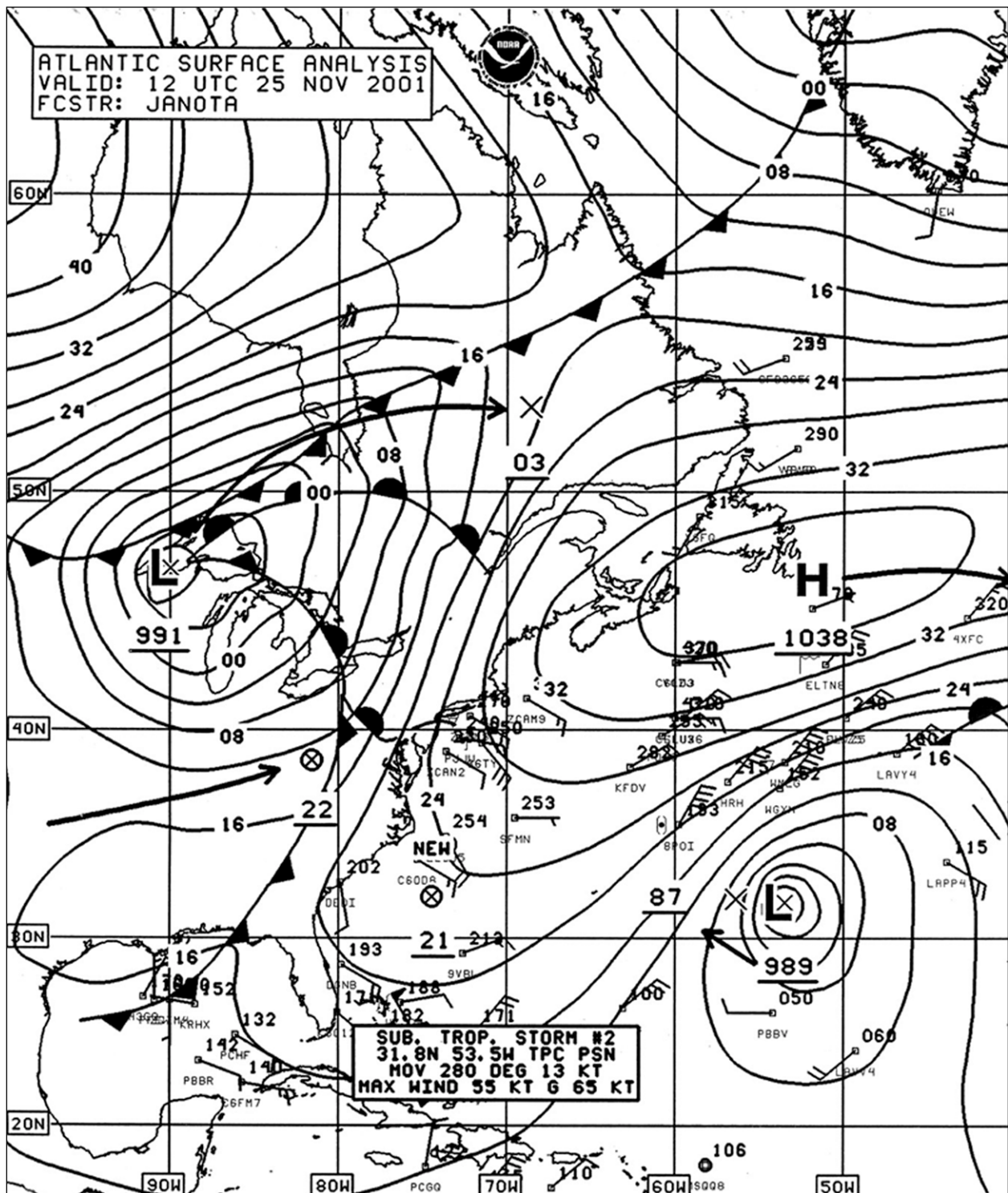


Figure 10 - MPC North Atlantic surface analysis chart (Part 2) valid 1200 UTC November 25, 2001.

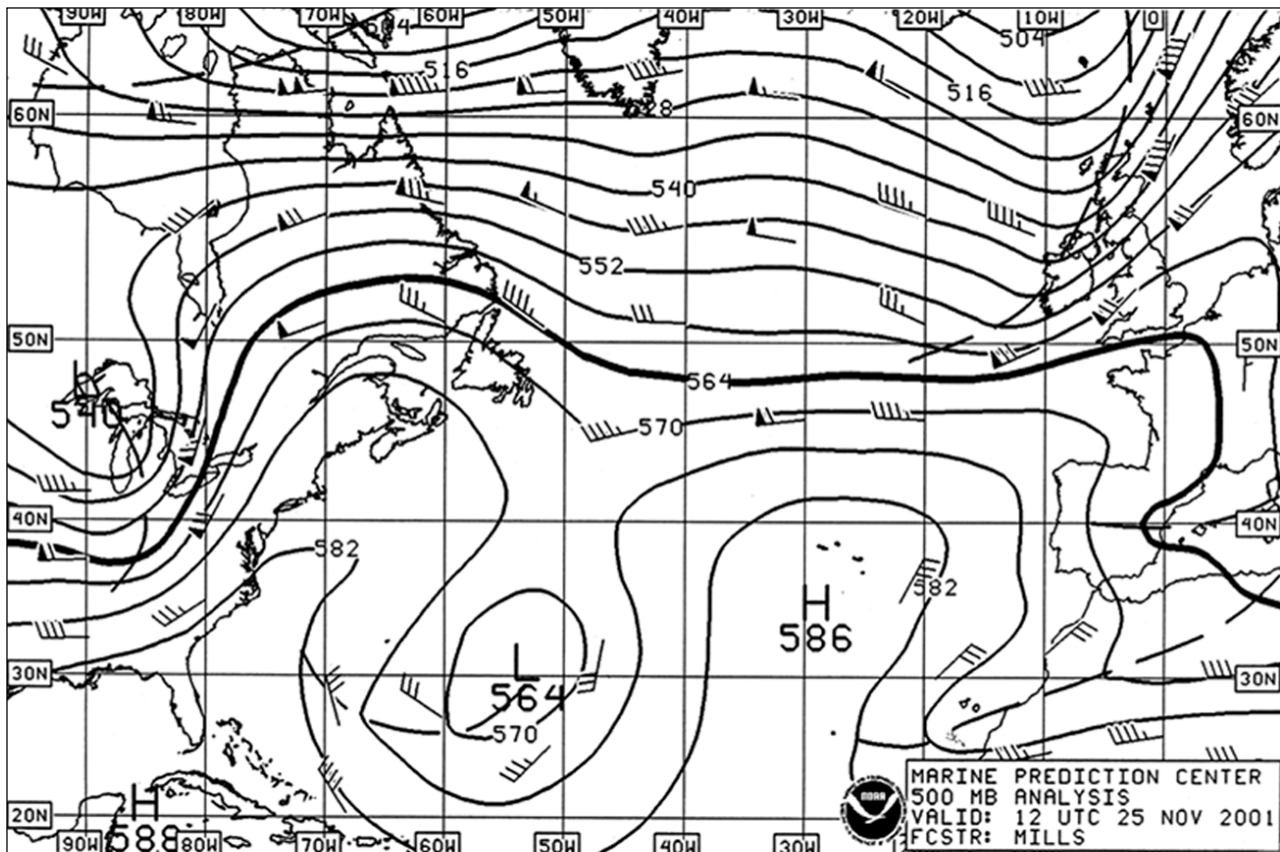


Figure 11 - MPC 500-mb analysis valid 1200 UTC November 25, 2001. Short-wave troughs are depicted as broken line segments.

North Atlantic Storm of 9-14 December: This storm is depicted in its most rapid phase of development in Figure 12. The central pressure dropped 24 mb, to 979 mb, in the 24-hour period ending at 1800 UTC December 10. This development certainly qualifies as a meteorological “bomb.” At 1200 UTC December 10 the ship **ELVG7** reported a west wind of 60 kt and 8-m seas (26 ft) near 40°N. 51°W. Figure 13 is a QuikScat image showing winds to 70 kt west and northwest of the center near 44°N. 39°W. Upon passing east of Newfoundland and approaching 35°W., the storm was forced north and slowed by a blocking

high over the British Isles. The **Fidelio (WQVY)** reported 13.5-m seas (45 ft), along with northwest winds of 55 kt, near 44°N. 44°W. at 0000 UTC December 14. The storm weakened near 49°N. 34°W. on the 14th but was replaced by another storm following a similar track on the 16th. This helped to maintain a long band of southeast gale to storm force winds from south of Greenland to near 40°N. 28°W. through December 18, with the strong high pressure persisting to the east. The **Lykes Liberator (WGXX)** near 47°N. 27°W. reported a southeast wind of 45 kt and 10.5-m seas (35 ft) at 1800 UTC December 17.

East Coast Storm of 18-19 December: This system developed near Long Island at 1800 UTC December 18 and moved slowly north-northeast across the Canadian Maritimes through the 19th before turning more northwest and weakening, blocked by strong high pressure to the east. The central pressure bottomed out at 965 mb near 46°N. 57°W. at 1200 UTC December 19. The **Sea-Land Motivator (WAAH)** reported northwest winds of 45 kt and 13-m seas (42 ft) near 39°N. 62°W. at this time. The highest wind reported by a ship was a northwest wind of 60 kt from **VCRT** near 44°N. 58°W., also at 1200 UTC December 19. ⚓

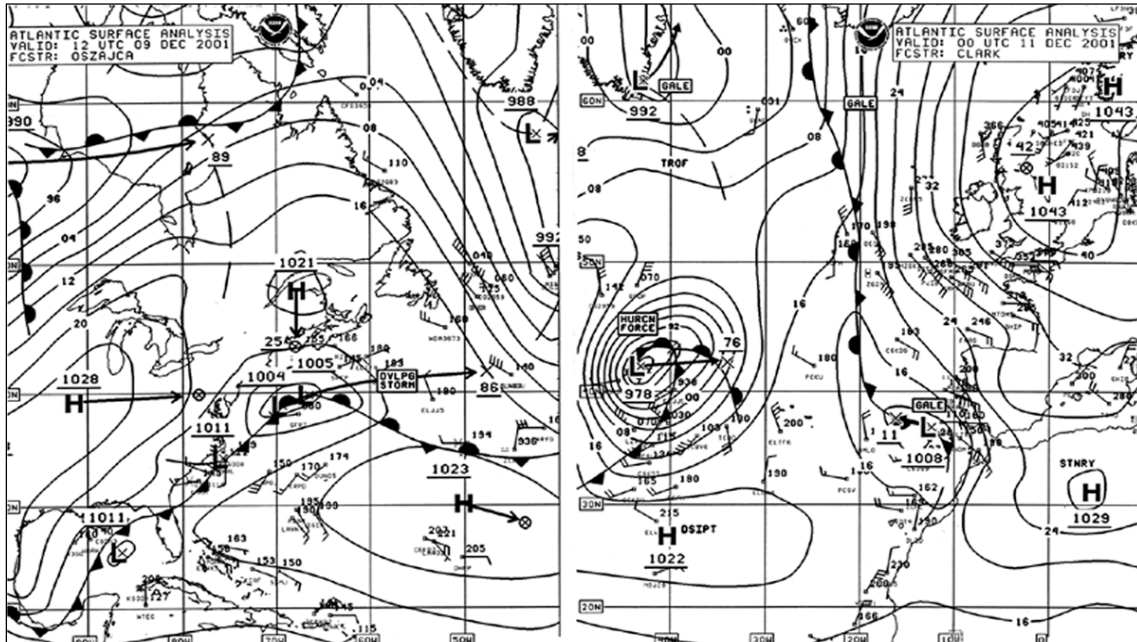


Figure 12 - MPC North Atlantic surface analysis chart (Part 2) valid 1200 UTC December 9 and a second surface analysis (Part 1) valid 0000 UTC December 11, 2001.

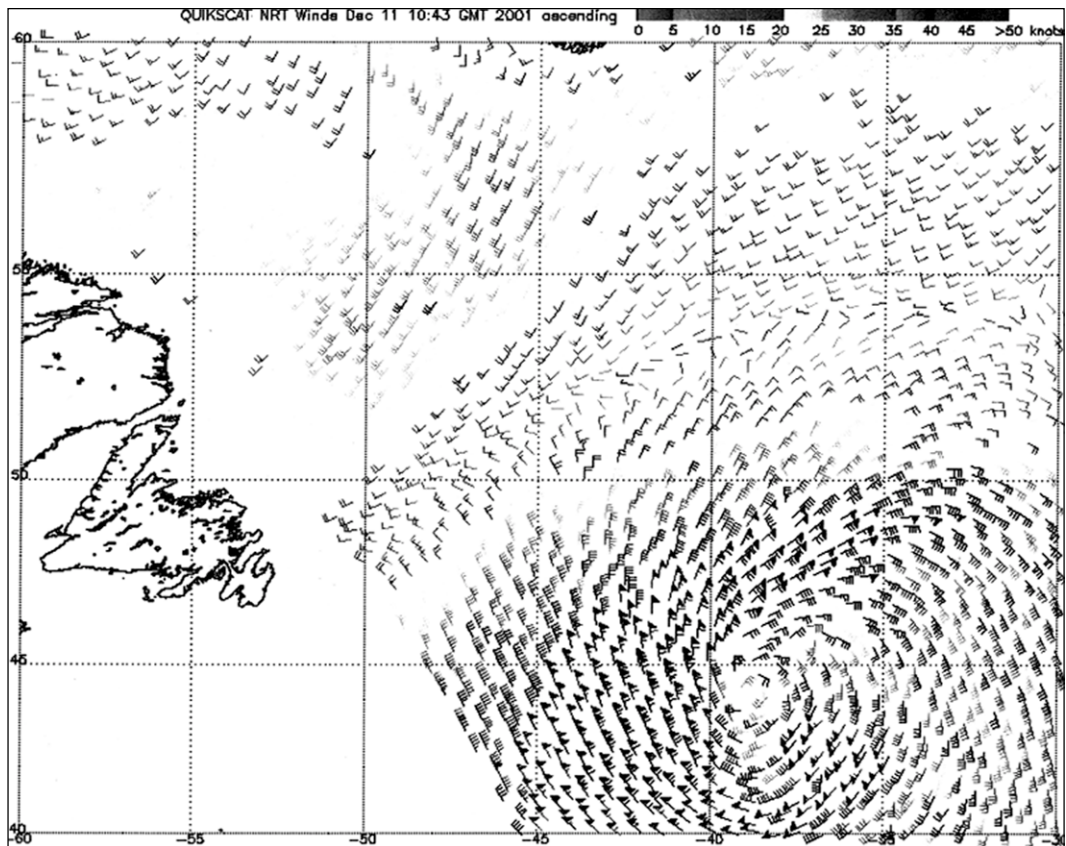


Figure 13 - QuikScat scatterometer winds valid about 0745 UTC December 11, 2001. Imagery is from NOAA/NESDIS Office of Research and Applications (North Atlantic Storm of 9-14 December).