

P1.37 RE-ANALYSIS OF THE SEPTEMBER 18, 1936 AND GREAT ATLANTIC HURRICANE OF SEPTEMBER 14, 1944 IN VIRGINIA

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1. INTRODUCTION

The decades of the 1930s and 1940s were very active ones for hurricanes in the Middle Atlantic region, particularly the coast of Virginia. Two of the more significant storms to directly affect the Virginia coast in that period were the hurricanes of September 18, 1936 and the Great Atlantic Hurricane of September 14, 1944.

The National Hurricane Center's (NHC's) North Atlantic hurricane database (HURDAT) of six-hourly positions and intensities was created in the 1960s in support of the Apollo space program to help provide statistical track forecast guidance for tropical storms and hurricanes (Jarvinen et al. 1984). This database is the official record for tropical cyclone intensities in the Atlantic basin. A re-analysis of both the 1936 and 1944 hurricanes reveals a discrepancy within the HURDAT database.

HURDAT does not indicate the 1936 hurricane had a direct impact on the Virginia coast and indicates that the Great Atlantic Hurricane of 1944 directly affected Virginia as a Category 3 storm. However, a re-analysis of available surface observations and storm surge information indicate that the 1936 hurricane was a Category 1 storm for Virginia and the 1944 hurricane was a Category 2 storm.

2. DATA SOURCES AND METHODOLOGY

Sources of information for this re-analysis include monthly and daily airways surface observations, and newspaper articles from the Washington Post and the Norfolk Virginian-Pilot. Ship reports were obtained from the Monthly Weather Review. Surface wind data were converted from hourly averaged winds and/or five-minute averaged winds to one-minute sustained wind estimates using the method described in Powell et. al, 1996. One-minute sustained winds are used in the NHC HURDAT database.

3. DETERMINATION OF PRESSURES AND ONE MINUTE SUSTAINED WINDS ALONG THE TRACK FROM SHIP AND LAND-BASED OBSERVATIONS

Ship and land-based surface observations

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from northeastern North Carolina and Virginia and the adjacent coastal waters provided the basis for determining the exact track and the intensity of both the 1936 and 1944 hurricanes at their closest approach to the Virginia coast. Synoptic surface maps were constructed from the available surface airways and ship observations every 6 hours from 0000 UTC September 18 through 1800 UTC September 18 for the 1936 storm and for 1200 and 1800 UTC September 14 for the 1944 storm. The maps helped to define the track of the storm relative to the Virginia coast.

4. THE SEPTEMBER 18, 1936 HURRICANE

According to the best track data, the center of the 1936 hurricane tracked offshore within 35 nm of the Virginia coast around 1500 UTC 18 September. HURDAT indicated that maximum sustained winds were 85 kt at that time. There were several ships in the vicinity of the storm at its closest approach to the Virginia coast. Two ships, the *El Lago* and *William Rockefeller*, reported Beaufort Force 12 - hurricane force winds in the lower Chesapeake Bay. In addition the conversion of hourly surface winds from wind measuring instruments yielded estimated one-minute sustained winds of 73 kt at the Norfolk Naval Air Station. Winds at Cape Henry, VA. were estimated at 64 kt before the anemometer spindle and cups were blown away at 1637 UTC.

The storm surge from the 1936 hurricane was concentrated in the lower Chesapeake Bay and was generally 1.5 m - 1.8 m. The highest surge of 2.0 m occurred at the downtown Norfolk tide gage. At the northern end of the bay the strong northerly winds resulted in "blow out" conditions with water levels up to 1.5 m below Mean Lower Low Water (MLLW) in Baltimore.

Figure 1 shows the location of land based observing stations and ships in the coastal waters of North Carolina and Virginia used in the re-analysis of the September 1936 hurricane. Times of lowest barometric pressure are indicated for all land stations and ships. For all of the observations, wind direction and speed is at the time of lowest pressure. The best track positions from 0000 UTC September 18 through 1800 UTC September 18 are also indicated.

Data from several ships situated in the coastal waters of North Carolina and Virginia were used to yield a good estimate of the central pressure of the hurricane

and the existence of hurricane force winds in southeastern Virginia between 1100 and 1400 UTC September 18, just as the hurricane was at its closest point to the Virginia coast. (Fig. 1).

Hurricane force winds as indicated by the ships in the lower Chesapeake bay suggested that the hurricane had a large radius of hurricane force winds. Ho (1975) indicated that the 1936 hurricane exhibited an RMW of 35 nm at the time of closest approach to the Virginia coast.

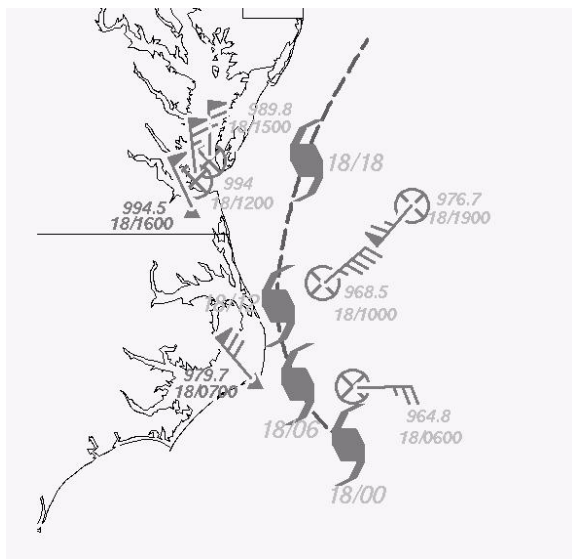


Figure 1. Land based observing stations and ships used in the re-analysis of the 1936 Hurricane. Times of the lowest pressure are indicated. Note the two ships in the lower Chesapeake Bay reporting hurricane force winds.

5. THE SEPTEMBER 14, 1944 HURRICANE

The best track data indicated that the center of the 1944 hurricane tracked offshore within 50 nm of the Virginia coast around 1700 UTC 14 September. HURDAT indicated that the storm was a Category 3 hurricane for both Virginia and North Carolina. The intensity was based on a pressure of 947 hPa at Cape Hatteras, N.C. at 1420 UTC 14 September. However, HURDAT indicates the winds were only 90 KT at 1200 UTC 14 September and 85 KT at 1800 UTC.

Estimated one minute sustained winds at Cape Henry, VA were 85 kt, Category 2 hurricane winds. One minute sustained winds at the Norfolk Naval Air Station and the Weather Bureau Office in downtown Norfolk were 57 and 59 kt respectively. Although sustained winds at these two locations were below hurricane force, gusts at both locations were 80-85 kt.

The storm surge from the 1944 hurricane in the lower Chesapeake Bay was less than that for the 1936 hurricane....around 1.5 m, the surge value typified by a Category 1 hurricane. The peak storm surge occurred at the time of low astronomical tide and as a result flooding in the lower Chesapeake Bay region was minimal. Thus the data do not appear to support the Category 3 distinction for Virginia in HURDAT.

Date	Time (UTC)	LAT (N)	LON (W)	Max Wind (kt)	Central Pressure (hPa)
9/18	0000	34.6	74.5	90	
9/18	0600	35.2	75.1	90	962
9/18	1200	35.9	75.3	85	965
9/18	1800	37.2	75.0	85	(968)

Table 2. Proposed Best Track central pressures for the 1936 hurricane. Current values are in parenthesis.

6. PROPOSED TRACK INFORMATION

Table 2 is a proposed addition to the central pressure portion of the best track of the 1936 hurricane based on a closer inspection of ship observations. The proposed changes for the 1936 and 1944 hurricanes will be presented to the NHC Best Track change committee for consideration.

7. REFERENCES

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