

UPDATED (as of 30 July 1984)
FORECAST OF ATLANTIC SEASONAL HURRICANE
ACTIVITY FOR 1984

By
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(This updated forecast is based on background material contained in the Colo. State Univ. Dept. of Atmospheric Science forecast report with the same title which was issued by the author on 24 May 1984. This updated forecast is based on new June and July 1984 meteorological information)

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ABSTRACT

This short paper discusses the author's updated forecast of the amount of seasonal hurricane activity which can be expected to occur in the Atlantic Ocean region in 1984. This updated forecast is based on the author's previous research (Gray, 1983) which relates seasonal amount of Atlantic hurricane activity to the three factors: 1) the El Nino (EN); 2) the Quasi-Biennial Oscillation of equatorial stratospheric wind (QBO); and 3) the Caribbean Basin and Gulf of Mexico Sea-Level Pressure Anomaly (SLPA).

Information received by the author as of 24 May 1984 indicated that hurricane activity in 1984 can be expected to be slightly above normal, with about 7 hurricanes (6 is normal), 10 hurricanes and tropical storms (9 is normal), and 30 hurricane days (25 is normal). Predictions were also given in terms of the probability of specific numbers of hurricanes, hurricane days, etc.

This paper updates the original forecast based on new meteorological data that has been gathered in June and July of this year. This new information does not indicate any significant changes to the earlier forecast.

1. INTRODUCTION

The reader is referred to the 34 page paper of 24 May 1984 which is titled, "Forecast of Atlantic Seasonal Hurricane Activity for 1984" for background information on the methodology of the author's Atlantic seasonal forecast for this year. Other background information on this subject is contained in the Colorado State University Dept. of Atmospheric Science Report No. 370 (July 1983, 101 pp.) which will be published later this year by the American Meteorological Society in its Monthly Weather Review journal.

The hurricane season is now nearly two months old and no named storms have occurred. This should not be taken to indicate that the 1984 season will not be a very active one, however. Climatologically the hurricane season does not really get started in earnest until about the 10th of August. It reached a peak around the 10th of September and remained very active until about the 20th of October (see Fig. 1). A number of other active hurricane years have not had their first named storm until well into August. Some seasons with two or more June and July storms have not proven to be active seasons.

For instance 1980 had 11 named storms but no storms in June or July. 1950 had 13 named storms but the first storm did not occur until the 13th of August. 1949 also had 13 storms with the first one not coming until the 21st of August. The first of the 8 named storms in 1967 did not occur until late August. Other active storm seasons in which hurricane activity has been suppressed in June and July are 1971, 1969, 1963, and 1955. Seasons with below normal hurricane activity but having two or more named storms prior to the 1st of August include 1982 (2), 1968 (3), 1960 (2), and 1959 (4).

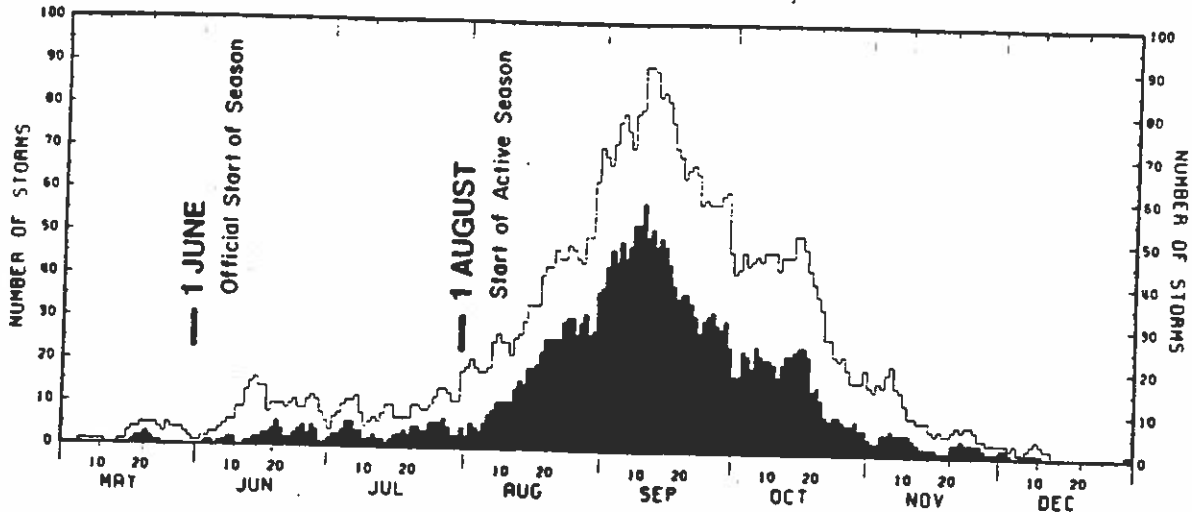


Fig. 1. Number of tropical storms and hurricanes (open curve) and hurricanes (solid curve) observed on each day, May 1, 1886 through December 31, 1980 (from Neumann, et al., 1981).

The next three sections discuss how new June and July 1984 meteorological information on the Quasi-Biennial Oscillation (QBO), El Nino, and Caribbean Basin Sea-Level Pressure Anomaly (SLPA) update information to the author's original 1984 seasonal forecast which was made on 24 May 1984.

2. QUASI-BIENNIAL OSCILLATION (QBO) INFLUENCE

Information on the equatorial stratospheric zonal winds from Balboa, C.Z (9°N), Ascension Island (8°S), and Singapore (1.5°N) in June and July 1984 does not cause the author to alter his original assessment made in late May that the 1984 hurricane season will be one in which the 30 mb QBO equatorial stratospheric easterly zonal winds (with the annual cycle removed) slow down and change over to a westerly direction (see Fig. 2). These wind changes are expected (as previously discussed in the 24 May forecast) to be associated with a small enhancement of 1984 hurricane activity to the extent of about one hurricane, and 5 hurricane days.

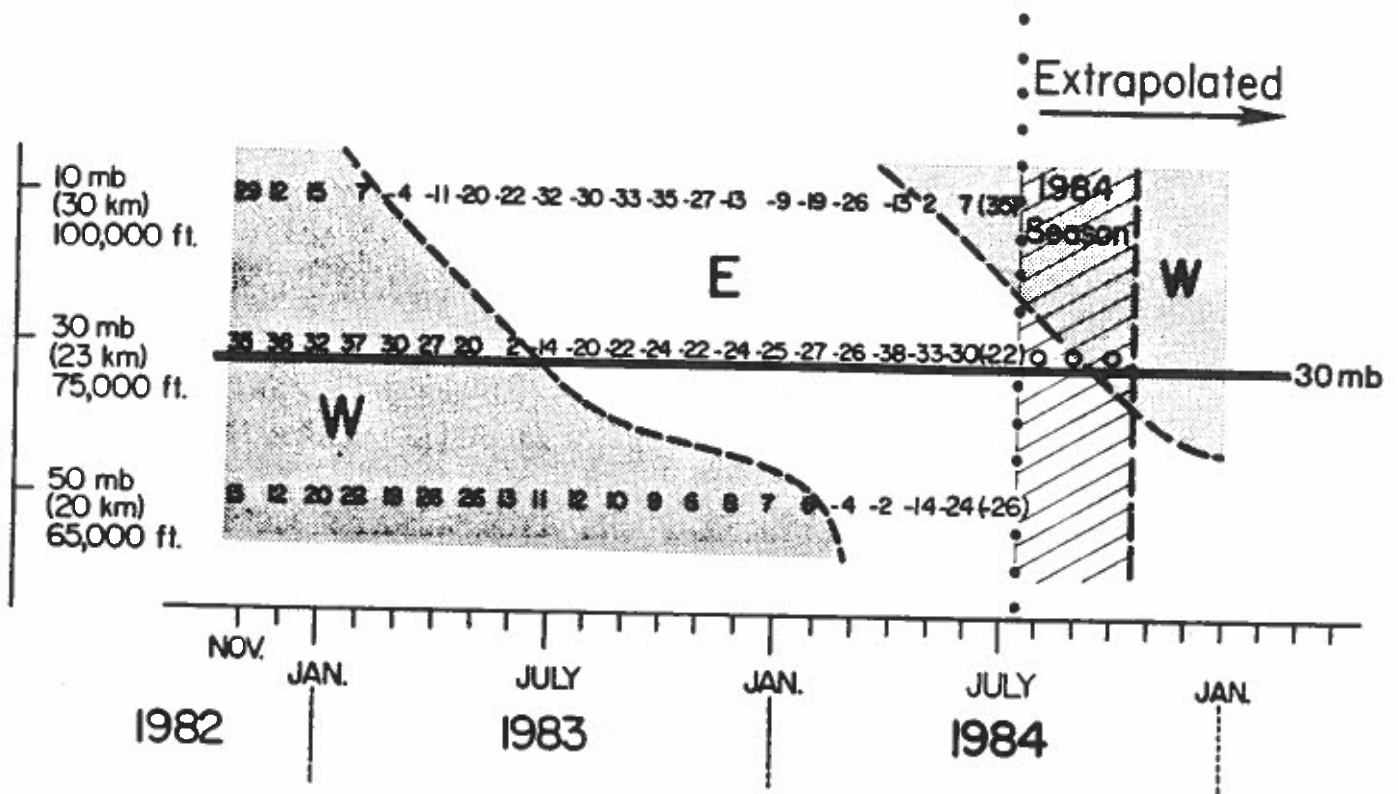


Fig. 2. Vertical cross-section of recent stratosphere monthly average QBO west to east or zonal wind (in knots). This figure represents an average of the Balboa, C.Z. (9°N) and Ascension (8°S) rawinsondes. The annual cycle has been removed from each sounding before averaging. May values are in parentheses. Winds from a westerly direction have been shaded. Information beyond 29 July 1984 has been extrapolated.

3. EL NINO INFLUENCES

The strong suppressing influence the recent large El Nino event of 1982-1983 had on Atlantic hurricane activity appears to be mostly gone. However, some large packets of small positive Sea Surface Temperature Anomaly (SSTA) remained in the Pacific during June and July, and the Southern Oscillation Index (SOI) has also not returned to the high values typical of anti-El Nino conditions. The author holds to his original assessment made at the end of May that the El Nino should cause (all other factors equal) a minor suppression of the Atlantic hurricane

season to the extent of one less hurricane, one less hurricane and tropical storm, and five less hurricane days. In addition, the northeast Pacific has had seven named cyclones by the end of July. This is an early season record for this region and may be another factor indicating that some residual El Nino influences are still present in the Pacific.

4. CARIBBEAN BASIN SEA LEVEL PRESSURE ANOMOLY (SLPA) INFLUENCE

Atlantic seasonal hurricane activity is inversely related to Caribbean Sea Level Pressure Anomaly (SLPA) in the period of April through July. The lower the SLPA, the more likely the hurricane season will be active.

Table 1 gives information on 1 April- 30 July 1984 Caribbean- Gulf of Mexico SLPA in mb. Data are derived from six key stations of this region. The average of these stations were substantially more than 1 mb below average in April. Values for May and June changed and were above normal. Values for July have returned to below normal conditions, however. Such negative July SLPA is consistent with the previous SLPA assessment in late May and indicates (all other factors equal) a slightly higher than normal level of hurricane activity by about one hurricane, one hurricane and tropical storm, and 5 hurricane days.

5. UPDATED 1984 SEASONAL PREDICTION

Table 2 gives the author's updated numerical estimates of each term of his three prediction equations for the 1984 season. These are the same estimates as previously given in late May. Number of hurricanes, number of hurricanes and tropical storms, and number of hurricane days are forecast to be 7 (1 above normal), 10 (1 above normal), and 30 (5 above normal) respectively. The 1984 hurricane season is still

TABLE 1

PRE-1984 HURRICANE SEASON
SEA LEVEL PRESSURE ANOMALY (SLPA) - IN MB
(FROM DATA SUPPLIED BY A. PIKE OF NHC)

	<u>APRIL</u>	<u>MAY</u>	<u>JUNE</u>	<u>JULY (1-30)</u>
BROWNSVILLE	-3.0	-0.4	+0.8	+0.2
MERIDA	-2.3	-0.3	+0.6	-1.0
MIAMI	-2.3	+1.8	+1.0	+0.1
SAN JUAN	-0.7	+0.7	-0.5	-0.6
CURACAO	-0.3	+0.7	-0.1	-0.6
BARBADOS	<u>+0.5</u>	<u>+0.1</u>	<u>+0.1</u>	<u>-0.9</u>
MEAN	-1.6	+0.4	+0.3	-0.5

TABLE 2

1984 PREDICTED SEASONAL HURRICANE ACTIVITY

$$\begin{aligned}
 &\left(\begin{array}{l} \text{PREDICTED NO.} \\ \text{OF HURRICANES} \\ \text{PER SEASON} \end{array} \right) &&= 6 + (QBO_1 + QBO_2) + EN + SLPA \\
 &&&= 6 + (0) + (+1) + (-1) + (+1) = \boxed{7}, \text{ 1 Above} \\
 &&& \hspace{10em} \text{Normal}
 \end{aligned}$$

$$\begin{aligned}
 &\left(\begin{array}{l} \text{PREDICTED NO. OF} \\ \text{HURRICANES AND} \\ \text{TROPICAL STORMS} \\ \text{PER SEASON} \end{array} \right) &&= 9 + QBO + EN + SLPA \\
 &&&= 9 + (0) + (-0) + (+1) = \boxed{10}, \text{ 1 Above} \\
 &&& \hspace{10em} \text{Normal}
 \end{aligned}$$

$$\begin{aligned}
 &\left(\begin{array}{l} \text{PREDICTED NO. OF} \\ \text{HURRICANE DAYS} \\ \text{PER SEASON} \end{array} \right) &&= 25 + 5 (QBO_1 + QBO_2) + EN + SLPA \\
 &&&= 25 + (0) + (+5) + (-5) + (+5) = \boxed{30}, \text{ 5 Above} \\
 &&& \hspace{10em} \text{Normal}
 \end{aligned}$$

predicted to be a season of slightly above normal hurricane activity. The statistical probabilities given in the late May forecast paper remain the same.

ACKNOWLEDGEMENTS

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