# FORECAST OF ATLANTIC SEASONAL HURRICANE ACTIVITY FOR 1990

By

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(This forecast is based on ongoing research by the author and his research colleagues at Colorado State University, together with new April-May 1990 meteorological information)

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## DEFINITIONS

Atlantic Basin - The area including the entire Atlantic Ocean, the Caribbean Sea and the Gulf of Mexico.
Hurricane - A tropical cyclone with sustained low level winds of 74 miles per hour (33 $ms^{-1}$ or 64 knots) or greater.
Tropical Cyclone - (TC) - A large-scale circular flow occurring within the tropics and subtropics which has its strongest winds at low levels, including hurricanes, tropical storms and other weaker rotating vortices.
Tropical Storm - A tropical cyclone with maximum sustained winds between 39 (18 $ms^{-1}$ or 34 knots) and 73 (32 $ms^{-1}$ or 63 knots) miles per hour.
Named Storm - A hurricane or a tropical storm.
Hurricane Destruction Potential (HDP) - A measure of a hurricane's potential for wind and storm surge destruction defined as the sum of the square of a hurricane's maximum wind speed for each 6-hour period of its existence.
Hurricane Day - Any part of a day during which a tropical cyclone is observed or estimated to have hurricane intensity winds.
Named Storm Day - Any part of a day during which a tropical cyclone is observed or estimated to have attained tropical storm or hurricane intensity winds.
Millibar - A measure of atmospheric pressure which is often used as a vertical height designator. Average surface values are about 1000 mb; the 200 mb level is about 12 kilometers and the 50 mb is about 20 kilometers altitude. Monthly averages of surface values in the tropics show maximum summertime variations of about $\pm$ 2 mb which are associated with variations in seasonal hurricane activity.
El Nino - (EN) - A 12-18 month period during which anomalously warm sea surface temperatures occur in the eastern half of the equatorial Pacific. Moderate or strong El Nino events occur irregularly, about once every 5-6 years or so on average.
Potential Damage (PD) - Potential damage from a hurricane's wind and ocean surge. Damage is assumed to increase with the square of the Saffir-Simpson 1 to 5 intensity scale.
QBO - Quasi-Biennial Oscillation. A stratospheric (16 to 35 km altitude) oscillation of equatorial east-west winds which vary with a period of about 26 to 30 months or roughly 2 years; typically blowing for 12-16 months from the east, then reverse and blowing 12-16 months from the west, then back to easterly again.
Saffir-Simpson (S-S) Category - A measurement scale (1 to 5) of a hurricane's wind and ocean surge intensity. 1 is the weakest hurricane, 5 the most intense hurricane.
SLPA - Sea Level Pressure Anomaly. Deviation of Caribbean and Gulf of Mexico sea level pressure from long term average conditions.
ZWA - Zonal Wind Anomaly. A measure of upper level ($\sim$ 200 mb) west to east wind strength. Positive values mean winds are stronger from the west or weaker from the east than normal.

1 knot = 1.15 miles per hour = .515 meters per second.

ABSTRACT

This paper presents details of the author's forecast of tropical cyclone activity for the Atlantic Ocean region (including the Caribbean Sea and the Gulf of Mexico) during 1990. This forecast is based on the author's ongoing research which relates the amount of seasonal Atlantic tropical cyclone activity to five factors: 1) the El Nino (EN); 2) the Quasi-Biennial Oscillation of equatorial stratospheric wind (QBO); 3) Gulf of Mexico and Caribbean Basin Sea-Level Pressure Anomalies (SLPA); 4) lower latitude Caribbean Basin 200 mb Zonal Wind Anomalies (ZWA) and 5) July-September West African rainfall (AR) amounts.

Information received by the author up to 4 June 1990 indicates that the 1990 hurricane season can be expected to have about 7 hurricanes, 11 total named storms of at least tropical storm intensity, about 30 hurricane days and a Hurricane Destruction Potential of 90. It is also expected that there should be three major hurricanes of Saffir/Simpson intensity category 3, 4 or 5. This means that the 1990 Atlantic hurricane season will likely be an above average hurricane season, especially as regards to the average hurricane activity of the 1970s and 1980s. This season's hurricane enhancement is due to the expected favorable influences of a westerly phase stratospheric QBO and expected near normal African rainfall. Drought conditions prevailed in Africa from 1970-87. The probability of the inhibiting influence of a strong or moderate El Nino event now appears to have receded for this year. The warm water event which developed in the central Pacific during November 1989 to March 1990 has greatly weakened and is not now judged to have the potential to develop into a significant El Nino event for this year's hurricane season.

This forecast will be updated on 3 August, before the start of the most active part of the hurricane season. The updated 3 August forecast will make use of June and July data and should be more reliable.

## 1. Introduction

The Atlantic basin (including the Atlantic Ocean, Caribbean Sea and Gulf of Mexico) experiences a larger seasonal variability of hurricane activity than any other global hurricane basin. The number of hurricanes per season can be as high as 12 (as in 1969), 11 (as in 1950, 1916), 10 (1933), 9 (as in 1980, 1955), or as low as zero (as in 1914, 1907), 1 (as in 1919, 1905), or 2 (as in 1982, 1931, 1930, 1922, 1917, 1904). Until recently there has been no objective method for indicating whether a coming hurricane season was likely to be an active one or not. Recent and ongoing research by the author and his colleagues (Gray, 1984a, 1984b, 1989, 1990; Gray, et al., 1987; Landsea, 1990) indicates that there is a surprising 3-5 month hurricane predictive signal available for the Atlantic basin from global and regional predictors which are generally not operative in the other global hurricane basins or in the middle latitudes.

## 2. Factors Known to be Associated With Atlantic Seasonal Hurricane Variability

The author's Atlantic seasonal hurricane forecast is based on the current values of indices derived from two global and three regional scale predictive factors which the author has previously shown to be statistically related to seasonal hurricane variations. Current values of these predictive factors are available either by early June, the official start of the hurricane season, or early August, the start of the more active part of the hurricane season. The five predictive factors are:

a) The direction of the stratospheric Quasi-Biennial Oscillation (QBO) which circles the globe over the equator. On average, there is nearly twice as much Atlantic hurricane activity during seasons when equatorial winds at 30 mb and 50 mb (23 and 20 km altitude respectively) blow from a relatively westerly direction as compared when they are from a relatively easterly direction. This season's QBO winds will be from a relatively westerly direction. This should be an enhancing influence on the 1990 Atlantic hurricane activity.

b) The presence or absence of a moderate or strong El Nino warm water event in the eastern tropical Pacific. Atlantic hurricane seasons during moderate or strong El Nino events average only about 40 percent as much hurricane activity as occurs during non-El Nino seasons. This difference is related to the stronger upper tropospheric (200 mb or 12 km) westerly winds which typically occur over the Caribbean Basin and western Atlantic during El Nino seasons. Currently 1990 is not expected to have a strong or moderate El Nino. El Nino activity is thus judged not to be a significant inhibiting influence on this season's hurricane activity.

c) Sea Level Pressure Anomaly (SLPA) in the eastern Caribbean Basin. Other factors aside, negative pressure anomalies in the eastern

Caribbean basin in late spring and early summer are typically associated with active hurricane seasons and vice-versa. Pressure anomalies for April and May this year indicate near normal pressure conditions. This is now judged to be a neutral factor in this season's hurricane activity.

d) Lower latitude Caribbean Basin upper tropospheric (~ 200 mb or 12 km altitude) west to east or zonal wind anomaly (ZWA) in non-El Nino seasons. Stronger 200 mb zonal wind anomalies are associated with a suppression of seasonal hurricane activity and vice-versa. Although April-May ZWA values show only a weak correlation with the following season's hurricane activity, they do help monitor El Nino type influences in the lower Caribbean basin. April-May 1990 ZWA are near normal. This is presently judged to be a neutral factor.

e) West African rainfall (AR). There is substantially more Atlantic hurricane activity, particularly intense hurricane activity when July through September West African rainfall is above average as compared to those seasons when it is below average. The long running west African drought of 1970-87 caused a great suppression of intense hurricane activity during that 18 year period. This drought may now be breaking up. During 1988-89 more rain fell during July, August and September in the west African countries of Senegal, southern Mauritania, Gambia, and western Mali than in any two consecutive year periods since the middle 1960s. In association with the rain in 1988-89, there was a substantial increase in intense hurricane activity with five Saffir/Simpson category 4-5 hurricanes. African rainfall information through May and other evidence such as SST conditions off of West Africa, the UK Meteorological Office global western Sahel summer simulation with April data, and a number of other pieces of related information indicate that we should expect the western Sahel region of West African to experience near normal amounts of precipitation for this season. This year should not be a drought year. It is expected that precipitation amounts will be more in line with the amount of precipitation experienced in the last two seasons of 1988-89. This implies substantially more precipitation than occurred during the typical drought years of 1970-87 and a general increase in hurricane activity, particularly intense hurricane activity over what occurred during the average 1970-87 drought year. West African rainfall in 1990 is thus judged not to be an inhibiting influence on Atlantic hurricane activity.

3. Characteristics and Further Discussion of Five (EN, QBO, SLPA, ZWA, AR) Predictors for the 1990 Hurricane Season

a) <u>El Nino</u>. The central Pacific began experiencing an anomalous warming of its sea surface in November 1989. This warming trend continued through March 1990. This was thought by many to be the precursor of a significant El Nino event. But newer April and May data has shown that this warming has much abated and no significant warming event is now expected for this hurricane season. Although a weak warm water anomaly presently exists in the central Pacific and to some extent in the eastern Pacific, most El Nino experts (as of late May) are of the opinion that the probability of a strong or moderate El Nino during August through October of this year is nil. The Southern Oscillation Index has gone positive in May. It is only the strong and moderate events which have been observed to give a large suppression to Atlantic hurricane activity. In previous weak warm events of the last 40 years such as 1951, 1960-61, 1963, 1969, and 1979-80 hurricane activity has been quite high. Weak El Nino events have thus not been an inhibiting influence on Atlantic tropical cyclone activity in the past. The El Nino correction for this season is thus taken to be neutral.

b) QBO. Tables 1 and 2 show the absolute and relative value of the current and extrapolated 30 mb (23 km) and 50 mb (20 km) stratospheric QBO zonal winds near 10°N for the 1990 hurricane period. These estimates are based on a combination of the QBO relative wind alteration and annual wind cycle variations at the low latitude stations of Balboa (9°N), Curacoa (12°N), Trinidad (11°N), and Barbados (13°N). Note that during the primary August through October hurricane season that 30 and 50 mb stratospheric winds are expected to be in a westerly phase. This results in the absolute values of the QBO winds being only weakly from the east and also that 50 to 30 mb zonal wind shears be very small. These are favorable conditions for enhanced low latitude hurricane formation and for intense hurricane activity when formation occurs. Most intense hurricanes develop at latitudes equatorwards of 20°.

TABLE 1

April through October 1990 observed and extrapolated absolute value of stratospheric QBO zonal winds (U) in the critical latitude belts between 8-12°N as obtained from lower Caribbean basin stations of Curacao, Barbados, Trinidad, and Balboa. Values in m $s^{-1}$ (as supplied by James Angell and Colin McAdie).

| | Observed | | Extrapolated | | | | |
|---|---|---|---|---|---|---|---|
| Level | April | May | Jun | Jul | Aug | Sept | Oct |
| 30 mb (23 km) | +2 | -1 | -3 | -4 | -3 | -5 | -2 |
| 50 mb (20 km) | -14 | -17 | -16 | -14 | -9 | -2 | +3 |

TABLE 2

Same as Table 1 but for the relative zonal wind where the annual wind cycle has been removed. Values in m $s^{-1}$.

| | Observed | | Extrapolated | | | | |
|---|---|---|---|---|---|---|---|
| Level | April | May | Jun | Jul | Aug | Sept | Oct |
| 30 mb (23 km) | +10 | +12 | +14 | +15 | +15 | +13 | +11 |
| 50 mb (20 km) | -13 | -11 | -6 | 0 | +4 | +8 | +10 |

c) SLPA. Table 3 shows April-May 1990 Sea Level Pressure Anomaly (SLPA) for the most relevant tropical stations. April-May SLPA was near normal for the special 5-station low latitude average. These SLPA are derivations from the last 40-year average. The low latitude stations are more relevant to the forecast. The high Gulf of Mexico pressure anomalies are of less significance.

TABLE 3

April-May 1990 Average Eastern Caribbean Basin Sea-Level Pressure Anomalies (SLPA) - in mb (as kindly supplied by Colin McAdie of NHC).

| Low Latitude | SLPA | | Gulf of Mexico-Caribbean Basin | SLPA |
|---|---|---|---|---|
| San Juan | -0.3 | (19.5°N,66°W) | Brownsville | -0.1 |
| Curacao | +0.2 | (12°N,69°W) | Merida (Mex.) | +0.7 |
| Barbados | -0.5 | (13.5°N,60°W) | Miami | +0.5 |
| Trinidad | +0.2 | (11°N,62°W) | San Juan | -0.3 |
| Cayenne | +0.1 | (5°N,52.5°W) | Curacao | +0.2 |
| | | | Barbados | -0.5 |
| Average | -0.1 | | Average | +0.1 |

d) ZWA. Although not explicitly used in the 1 June forecast, the Lower Caribbean Basin 200 mb zonal wind anomaly (ZWA) for April-May 1990 give some indication of future tropospheric wind shear conditions. ZWA conditions also monitor the possible influence of a Pacific El Nino warm water event on Caribbean Basin upper tropospheric wind conditions. Table 4 shows that the upper tropospheric ZWAs for April and May are near zero. These ZWA values indicate that any possible hurricane influences from the weak central Pacific SST warming event now in progress has not shown a typical El Nino influence on Caribbean Basin upper tropospheric winds. In strong and moderate El Nino events 200 mb ZWA anomaly conditions in the lower Caribbean Basin are strongly positive.

e) AR. African Rainfall (AR) is a new forecast parameter that we are including in this year's forecast for the first time. Atlantic intense hurricane activity is much enhanced when the Sahel region of West Africa (shaded area in Fig. 1) has above average summer precipitation and much suppressed when precipitation in this region is below average. The striking differences in Atlantic hurricane activity between wet and dry West African rainfall years is illustrated in Fig. 2. Analysis by Landsea (1990) is showing that slightly more than half of the year to year variance of the Atlantic Seasonal Hurricane Destruction Potential (HDP) over the last 40 years can be explained by the seasonal variance of West Africa July through September precipitation. We are finding that there are predictive signals in

TABLE 4

April-May 1990 Caribbean Zonal Wind Anomaly (ZWA) in m $s^{-1}$ (as supplied by Colin McAdie of NHC).

| Station | |
|---|---|
| Balboa (9°N, 80°W) | -2 |
| Kingston (18°N, 77°W) | -2 |
| Curacoa (12°N, 69°W) | +2 |
| Barbados (13.5°N, 60°W) | +2 |
| Trinidad (11°N, 62°W) | 0 |
| Average | 0 |

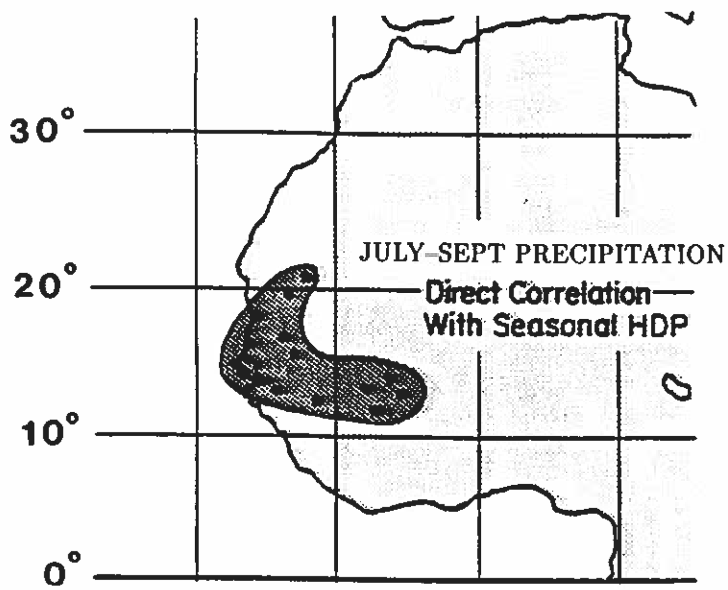


Fig. 1. Location of rainfall stations which make up the western Sahel precipitation index. The shaded area roughly defines the latitudinal bands of the Sahel which extends eastward to the Sudan.

African rainfall data through May which help specify future mid-July through mid-September western Sahel rainfall. This is the critical period for African spawned intense hurricane development. Analyses of precipitation throughout Africa through May of this year indicates that western Sahel precipitation will be near normal.

We are now actively engaged in new research on West African rainfall and its influence on Atlantic hurricane activity and how such seasonal rainfall may be forecast. A new project paper by C. Landsea (1990) on this subject should be issued this summer. The long

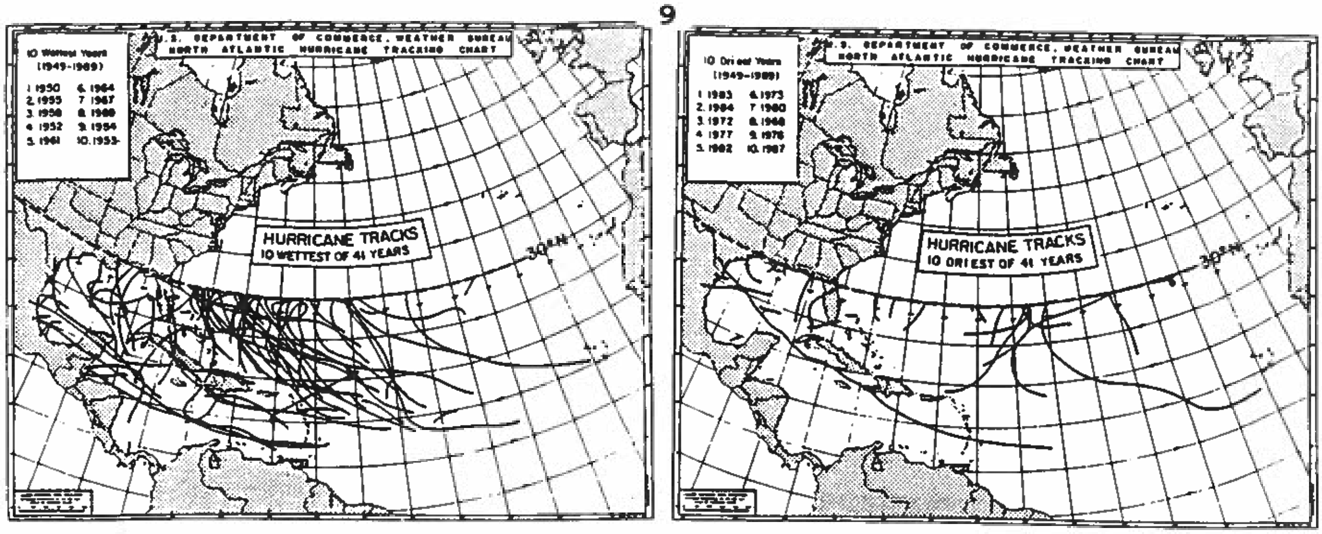


Fig. 2. Contrast of hurricane intensity storm tracks during 10 of 41 (1949-89) of the wettest western Sahel years with 10 of 41 of the driest years.

running Sahel drought of 1970-87 may be breaking up. If this assessment is correct then African rainfall this coming season should favor an enhancement of Atlantic intense hurricane activity over what has occurred during the drought years of 1970-87.

## 4. Author's 1990 Forecast

The author's Atlantic seasonal forecast scheme is of the following form:

$$\begin{pmatrix}\text{Predicted Amount}\\ \text{of Hurricane}\\ \text{Activity per Season}\end{pmatrix} = \begin{pmatrix}\text{Average}\\ \text{Season}\end{pmatrix} + \underbrace{(\ QBO + EN + SLPA + ZWA + AR\ )}_{\text{Adjustment Terms}} \qquad (1)$$

where

QBO = 30 mb and 50 mb Quasi-Biennial Oscillation equatorial zonal wind corrections, positive for west phase, negative for east phase.

EN = El Nino influence. Warm East Pacific water reduces hurricane activity, cold water enhances it.

SLPA = Average SLPA for April-May, from selected Caribbean-Gulf of Mexico stations. Reduce if SLPA is significantly above average, add if significantly below average. Make no correction when SLPA is near normal (between -0.4 and 0.4 mb).

ZWA = Zonal Wind Anomaly at 200 mb (12 km) for five low latitude upper air Caribbean stations. Hurricane activity is inversely correlated with this parameter. Applied only in non-El Nino years.

AR. = African rainfall. Heavy summertime West African rainfall is associated with an increase of both the number and the intensity of Atlantic hurricanes. Reduced rainfall with a decrease in hurricane number and intensity.

A synthesis of the five forecast factors as discussed in section 3 leads to the author's 1990 seasonal forecasts for the number of hurricanes, named storms, hurricane days, named storm days, Hurricane Destruction Potential (HDP), and major hurricanes for the coming 1990 hurricane season (see Table 5).

It is anticipated that the upcoming 1990 hurricane season will be about as active as were the 1988 and 1989 seasons. This means that hurricane activity will be somewhat above the average hurricane season of the last 40 years but distinctly above average compared to the mean conditions of the last 20 years. If this forecast is verified, then this would be the third consecutive year that hurricane conditions have been above average. This is an indication of changing westerm Sahel rainfall conditions.

Table 6 gives a comparison of this season's Atlantic hurricane forecast with the observed hurricane activity of recent years. This season is forecast to have a substantially greater amount of hurricane activity than occurred during most of the hurricane seasons of 1970s and 1980s except for 1988-89 and in particular more activity than occurred during the 6-year period of 1982-87 when Atlantic hurricane activity was unusually low. As was observed in 1988 and 1989 there is a good probability of the occurrence of at least three Saffir/Simpson category 3, 4, or 5 hurricanes during 1990. Intense hurricanes are much more prevalent in seasons when West Africa is not in drought and when 30 and 50 mb stratospheric QBO winds are from a relatively westerly direction. 1990 will be one of these seasons.

Statistical analysis is presently underway by my research colleagues Professors Paul Mielke and Kenneth Berry to give more precise mathematical weighting factors to the combination of these five forecast parameters. It is anticipated that this new statistical information will be available by the time of the 3 August updated forecast.

It appears that we may have turned a corner since 1988 and will now see a return to a period of more active and intense hurricane seasons as were experienced in the period of the late 1940s through the 1960s. There were five category 4-5 hurricanes during 1988-89. We have not previously had two consecutive seasons with as many intense hurricanes since 1960-61.

TABLE 5
1990 PREDICTED SEASONAL HURRICANE ACTIVITY

(No. of Hurricanes per Season) = 6 + QBO + EN + SLPA + ZWA + AR

5.8 + (1.5) + (0) + (0) + (0) + 0 ≃ 7

(No. of Hurricanes and Tropical Storms) = 9 + QBO + EN + SLPA + ZWA + AR

9.8 + (1.5) + (0) + (0) + (0) + 0 ≃ 11

(No. of Hurricane Days) = 25 + 5 ( QBO + EN + SLPA + ZWA + AR )

25 (+5) + (0)+ (0) + (0) + (0) = 30

(No. of Named Storm Days) = 1.85[1] x (No. of Hurricane Days) ≃ 55

(Hurricane Destruction Potential - HDP)[2] = 75 + 15 (QBO + EN + SLPA + ZWA + AR)

75 + +15 + 0 + 0 + 0 + 0 = 90

(No. of Major Hurricanes)[3] = 2.5 + 0.8 (QBO + EN + AR) ≃ 3

+1.0 0 0

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1 The statistical ratio of the number of named storm days to the number of hurricane days for seasons of 30 hurricane days is 1.85.

2 The wind and storm surge destruction of a hurricane is better represented by the square of the storm's maximum winds than by the maximum wind itself. This potential for damage from hurricane winds and storm surge might be termed Hurricane Destruction Potential (HDP). We define Hurricane Destruction Potential (HDP) as the sum or $\sum (V_{max})^2$ for $V_{max}$ equal or greater 65 knots (74 mph) for each 6-hour period for all hurricanes that are in existence during a full season. Units are $10^4$ $knots^2$.

3 Hurricanes of Saffir/Simpson category 3, 4, or 5.

TABLE 6

Comparison of 1990 Hurricane Activity Forecast With Previous Years' Activity.

| | 5 June Forecast 1990 | 1989 | 1988 | Average Season 1982-87 | Average Season 1970-87 | Average Season 1950-69 |
|---|---|---|---|---|---|---|
| Hurricanes | 7 | 7 | 5 | 4.0 | 4.9 | 6.5 |
| Named Storms | 11 | 11 | 12 | 7.5 | 8.3 | 9.8 |
| Hurricane Days | 30 | 32 | 24 | 10.7 | 15.5 | 30.7 |
| Named Storm Days | 55 | 66 | 47 | 32.0 | 37.3 | 53.4 |
| Hurr. Dest. Pot. (HDP) | 90 | 108 | 81 | 27.0 | 42.7 | 100.0 |
| Major Hurricanes (Cat. 3-4-5) | 3 | 2 | 3 | 1.2 | 1.6 | 3.4 |

In view of historical records of the last few centuries indicating alternating periods of multi-decadal wet and dry conditions in West Africa, we should not be surprised that West Africa experienced a prolonged wet period during the late 1940-1950-1960s or a distinctive dry period during 1970-87; these variations appear to be natural and typical of the multi-decadal swings of West Africa rainfall patterns. Allowing that similar concurrent multi-decadal African wet periods and enhanced rates of Atlantic hurricane activity have occurred earlier in this century and in previous centuries, there is no need to invoke "Greenhouse" gas influences to explain these last two year changes in hurricane activity. There are many natural and non-man induced factors which can bring about multi-decadal climatic variability. Caution is advised to those attempting to infer that the recent increase in intense Atlantic hurricane activity in 1988 and 1989 may be related to the beginning influences of greenhouse gas warming. It almost assuredly is not.

A question has arisen over a possible hurricane-sunspot relationship. I have made correlations of sunspot numbers with various measures of Atlantic seasonal hurricane activity over the last 41 years and 89 years. Calculations have been made in both QBO east and west seasons over the last 41 years. I find no significant correlation.

If we have entered a new more active period of hurricane activity then the US east coast, Florida, and the Caribbean basin will be much more vulnerable to intense landfalling hurricanes than they have been during the recent 18-year period of 1970-87 when the Sahel region of West Africa was under a prolonged drought. Florida, in particular, has been very fortunate over the last 25 years in experiencing only minimal intense hurricane activity. By contrast, the US Gulf Coast has not seen such a similar reduction in intense landfalling hurricane activity in recent years. The Gulf Coast is much less sensitive to variations in West African rainfall and stratospheric QBO wind changes.

Verification of the Author's Six Previous Seasonal Forecasts. Table 7 gives verification data for the author's previous seasonal forecasts. The late July forecasts have been superior to the late May forecasts and the forecasts of named storm activity have been the most successful. Except for last year these forecasts had been a significant improvement over climatology - the only objective seasonal prediction that had previously been available. This lack of accuracy in last year's forecast is attributed to the apparent breaking of the long running African Sahel drought which was not explicitly included in the author's earlier forecast scheme and for which the author did not properly account. A study of the last 40 years of hurricane seasons had shown that those seasons of easterly QBO wind and above average SLPA in April through July (as 1989 was) were usually suppressed hurricane seasons. Last year did not follow this pattern. This was most assuredly due to the very heavy amount of rainfall which fell in the western Sahel region of Africa during late July and through mid-September. Most intense hurricanes are spawned from Africa wave systems during periods when Africa rainfall conditions are above average. It was impossible to know before last year's forecast was made whether the relatively heavy Sahel rains of 1988 were a one year occurrence or whether 1988 represented the start of a longer term break in the Sahel drought. It is now clear that any Atlantic seasonal forecast scheme which fails to account for western Sahel rainfall will fail in those seasons in which a basic change from drought to wet or from wet to drought occurs.

## 5. Cautionary Note

It is important that the reader realize that the author's forecast scheme does not specifically predict which portion of the hurricane season will be most active or where within the Atlantic basin the storm will strike. Even if 1990 should prove to be an active hurricane season, there is no assurance that any of these hurricanes will necessarily strike along vulnerable US or Caribbean basin coastline.

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TABLE 7

Verification of the author's previous seasonal predictions of Atlantic tropical cyclone activity for 1984-1988.

| 1984 | Prediction of 24 May and 30 July Update | | Observed |
|---|---|---|---|
| No. of Hurricanes | 7 | | 5 |
| No. of Named Storms | 10 | | 12 |
| No. of Hurricane Days | 30 | | 18 |
| No. of Named Storm Days | 45 | | 51 |

| 1985 | Prediction of 28 May | Updated Prediction of 27 July | Observed |
|---|---|---|---|
| No. of Hurricanes | 8 | 7 | 7 |
| No. of Named Storms | 11 | 10 | 11 |
| No. of Hurricane Days | 35 | 30 | 21 |
| No. of Named Storm Days | 55 | 50 | 51 |

| 1986 | Prediction of 29 May | Updated Prediction of 28 July | Observed |
|---|---|---|---|
| No. of Hurricanes | 4 | 4 | 4 |
| No. of Named Storms | 8 | 7 | 6 |
| No. of Hurricane Days | 15 | 10 | 10 |
| No. of Named Storm Days | 35 | 25 | 23 |

| 1987 | Prediction of 26 May | Updated Prediction of 28 July | Observed |
|---|---|---|---|
| No. of Hurricanes | 5 | 4 | 3 |
| No. of Named Storms | 8 | 7 | 7 |
| No. of Hurricane Days | 20 | 15 | 5 |
| No. of Named Storm Days | 40 | 35 | 37 |

| 1988 | Prediction of 26 May and 28 July Update | | Observed |
|---|---|---|---|
| No. of Hurricanes | 7 | | 5 |
| No. of Named Storms | 11 | | 12 |
| No. of Hurricane Days | 30 | | 24 |
| No. of Named Storm Days | 50 | | 47 |
| Hurr. Destruction Potential (HDP) | 75 | | 81 |

| 1989 | Prediction of 26 May | Updated Prediction of 27 July | Observed |
|---|---|---|---|
| No. of Hurricanes | 4 | 4 | 7 |
| No. of Named Storms | 7 | 9 | 11 |
| No. of Hurricane Days | 15 | 15 | 32 |
| No. of Named Storm Days | 30 | 35 | 66 |
| Hurr. Destruction Potential (HDP) | 40 | 40 | 108 |

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