SUMMARY OF 1987 ATLANTIC TROPICAL CYCLONE ACTIVITY AND VERIFICATION OF AUTHOR'S SEASONAL FORECAST

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(As of 24 November 1987)

DEFINITIONS

Atlantic Basin - The ocean area of the entire Atlantic including the Caribbean Sea and the Gulf of Mexico.

Hurricane - A tropical cyclone with sustained low level winds of 74 miles per hour (32 meters/s at 65 knots) or greater.

Tropical Cyclone - a large-scale circular flow occurring within the tropics and subtropics which has its stronger winds at low levels. This includes tropical storms, hurricanes, and other weaker rotating vortices.

Tropical Storm - a tropical cyclone with maximum sustained winds between 39 (17 m/s or 35 knots) and 73 (31 m/s or 65 knots) miles per hour.

Hurricane Day - any part of a day in which a tropical cyclone is observed or estimated to have hurricane intensity winds.

Named Storm Day - any part of a day in which a tropical cyclone is observed or estimated to have tropical storm or hurricane intensity winds.

Millibar - (abbreviated mb). A measure of atmospheric pressure. Often used as a vertical height designator. 200 mb is at a level of about 12 kilometers, 30 mb at about 23 kilometers altitude. Monthly averages of surface pressure in the tropics show maximum seasonal summer variations of about + 2 mb. These small pressure variations are associated with variations in seasonal hurricane activity. Average surface pressure is slightly over 1000 mb.

El Nino - (EN) - a 12-18 month period in which anomalously warm sea surface temperatures occur in the eastern half of the equatorial Pacific. Moderate or strong El Nino events occur irregularly. Their average frequency is about once every 5-6 years or so.

QBO - Quasi-Biennial Oscillation. These letters refer to stratospheric (20 to 35 km altitude) equatorial east to west or west to east zonal winds which have a period of about 26 to 30 months or roughly 2 years. They typically blow for 12-16 months from the east and then reverse themselves and blow 12-16 months from the west and then back to the east again.

SLPA - Sea Level Pressure Anomaly. Caribbean and Gulf of Mexico Sea Level Pressure Anomaly in the spring and early summer has an inverse correlation with late summer and early autumn hurricane activity. The lower the pressure the more likely there will be hurricane activity.

ZWA - Zonal Wind Anomaly. A measure of upper level (~ 200 mb or 12 km altitude) west to east wind strength. Positive values mean winds are stronger from the west or weaker from the east than normal.

ABSTRACT

This paper summarizes tropical cyclone activity which occurred in the Atlantic in 1987 and verifies the author's seasonal forecast of this activity that was issued in late May and updated in late July. This forecast was based on the author's previous research (Gray, 1983, 1984a, 1984b and new research) which relates seasonal Atlantic hurricane activity to: 1) the El Nino (EN); 2) the Quasi-Biennial Oscillation (QBO) of equatorial 50 mb stratospheric wind; 3) the Caribbean Basin-Gulf of Mexico Sea-Level Pressure Anomaly (SLPA) in spring and early summary; and 4) lower latitude Caribbean Basin 200 mb zonal wind anomaly in June and July.

Information received by the author as of 28 May 1987 indicated that the 1987 hurricane season should have been a slightly below average year with about 5 hurricanes (6 is average), 8 hurricanes and tropical storms (10 is average), 20 hurricane days (25 is average) and 40 tropical storm and hurricane days (45 is average).

Updated information received by the author as of late July reinforced this prediction of a below average hurricane season. June and July data indicated that the 1987 season would be more suppressed than indicated by the late May forecast. The revised late July forecast called for 4 hurricanes, 7 systems of tropical storm or hurricane intensity, 15 hurricane days and about 35 days of hurricane and tropical storm intensity cyclones. This downward revision was primarily based on the observation that the rather weak El Nino event present in late May had not undergone further weakening by late July as a number of El Nino researchers had expected but had maintained itself and even strengthened somewhat. Caribbean basin June and July upper-tropospheric westerly winds were stronger than normal and supported the observation of the El Nino's likely influence on Caribbean basin winds and the consequent likely El Nino suppression of seasonal hurricane activity this season.

The actual number of hurricanes which occurred in 1987 was 3 (one below the late July forecast); the number of hurricanes and other tropical cyclones of tropical storm intensity was 7 (as forecast in late July); number of hurricane days was 7 (8 below late July forecast) and number of hurricane and tropical storm days was 36 (one above the late July forecast). There was only one intense cyclone in 1987. Only marginal Hurricane Floyd influenced the US - crossing the Keys of south Florida.

In terms of the overall intensity of tropical cyclones, the 1987 season was even more suppressed than the above numbers indicate. The global environmental factors of the El Nino and the stratospheric QBO winds were both unfavorable for intense hurricane activity this season. The odds are high that next season should be significantly more active than this season or 1986's hurricane activity has been.

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1. 1987 Atlantic Tropical Cyclone Activity

The 1987 Atlantic hurricane season officially ends on 30 November. There were only three hurricanes (maximum sustained wind $\geq$73 mph) and 7 hurricane days during 1987. This is considerably below the last 40 year seasonal average of 6 hurricanes and 25 hurricane days. Combined hurricane and tropical storm activity (tropical storms are tropical cyclones with maximum sustained surface winds between 39-72 mph) was also below average. This season had 7 tropical cyclones of tropical storm or greater intensity (10 is average) and 36 tropical storm and hurricane days (45 is average). But, in terms of cyclone intensity, seasonal activity for this year was lower than these numbers indicate. Seasonal activity in 1987, as also in 1986, ranks as a very suppressed hurricane season. Global environmental circulation conditions in 1987 were generally unfavorable for Atlantic tropical cyclone activity.

Table 1 and Fig. 1 gives a summary of all 1987 Atlantic season tropical cyclones of tropical storm or greater intensity. Beside the few number of tropical cyclones also note the general lack of intensity of tropical cyclones during 1987. Only one tropical cyclone (Hurricane Emily) has a central pressure of less than 987 mb (29.14 inches of mercury). Emily's lowest pressure was 958 mb (28.29 inches of mercury). Emily was the only cyclone of 1987 with a maximum sustained wind greater than 65 knots (75 mph). The season's other two hurricanes (Arlene and Floyd) were just marginally intense hurricanes.

The 1987 season was characterized by there being many more tropical storms of lesser intensity than there were hurricanes. The ratio of tropical storm and hurricane days to hurricane days in the average season is 45 to 25. In 1987 this ratio was 36 to 7. Section 5 gives a general comparison of the 1987 season with previous seasons in terms of Hurricane Destruction Potential.

TABLE 1

The 1987 Tropical Cyclone Season

Cyclone of Tropical Storm Intensity	Maximum Sustained Winds (knots)*	Minimum Sea Level Pressure (mb)	Dates	No. of Hurricane Days	No. of Hurricane and Trop. Storm Days
1. Unnamed Tropical Storm	40	1008	9 Aug -10 Aug	0	1
2. HUR Arlene	65	987	11 Aug -25 Aug	2	7
3. TS Bret	45	1000	18 Aug -22 Aug	0	5
4. TS Cindy	45	1000	7 Sept -10 Sept	0	4
5. TS Dennis	45	1000	10 Sept -17 Sept	0	8
6. HUR Emily	110	958	20 Sept -10 Sept	4	7
7. HUR Floyd	65	993	10 Oct -13 Oct	1	4
			TOTAL	7	36

* 1 knot equals 1.15 miles per hour.

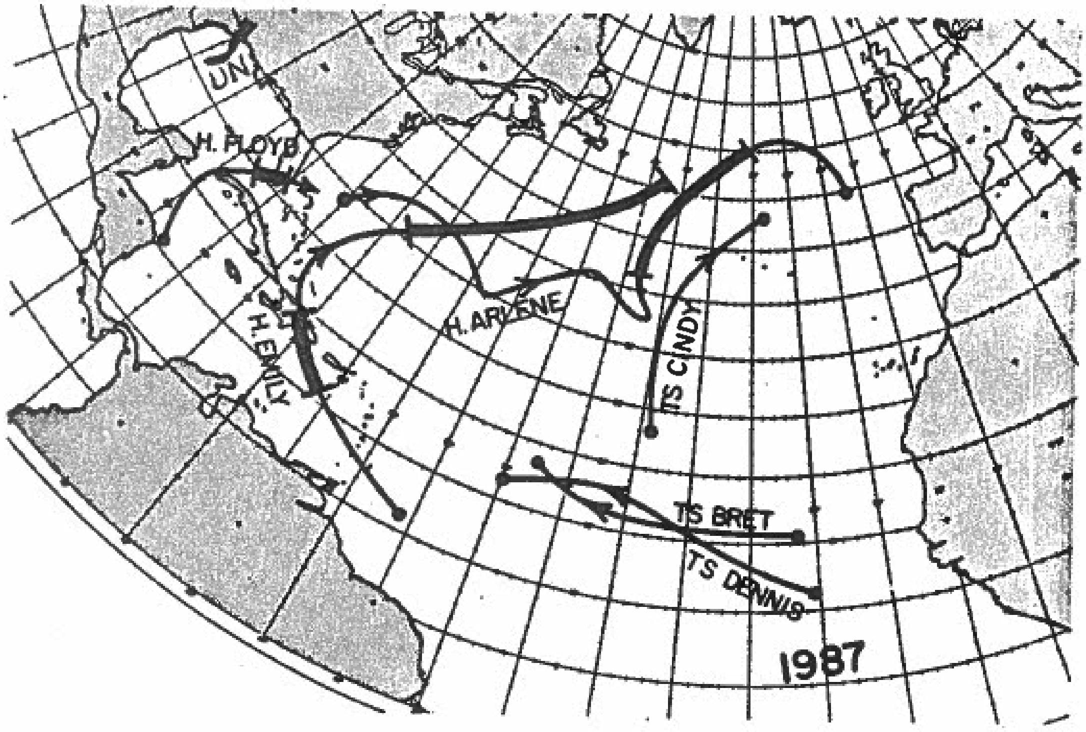

Fig. 1. Tracks of tropical cyclones for 1987. Lines indicate the periods of tropical storm intensity (maximum sustained winds with 39-72 mph), thick lines the periods of hurricane intensity (maximum sustained winds greater than 73 mph).

A summary of Atlantic tropical cyclones which occurred during 1987 are as follows:

1) An Unnamed Tropical Storm formed in the northwest Gulf of Mexico on 9 August. This was a marginal tropical storm. It was officially determined to be of tropical storm intensity only in post season analysis. This unnamed tropical storm system moved northwestward onto the Texas coast and dissipated a day after it formed. Although Texas off-shore oil rigs received tropical storm intensity sustained winds (45 mph), tropical storm winds were not felt along the US coast.

2) Hurricane Arlene developed into a named tropical storm near the Brahams Islands on 11 August. Arlene then remained at tropical storm intensity while moving slowly towards the east-northeast for the next 11 days. It then began a rapid movement to the northeast and intensified to minimal hurricane intensity during the 22nd and 23rd of August a few hundred miles to the west of the Azores. Arlene had a minor impact on Bermuda. This was the only affected land area.

3) Tropical Storm Bret developed near the Cape Verde Islands on 18 August. It moved almost directly westward as a weak named storm before it encountered upper-tropospheric westerly winds. These westerly winds acted to dissipate Bret over the central Atlantic at a latitude of about 18°N.

4) Tropical Storm Cindy formed in early September from a tropical wave coming off West Africa. It remained a weak tropical storm throughout its lifetime. Cindy encountered an unusually strong mid-Atlantic trough soon after it formed. This trough acted to steer Cindy to the north until it weakened and took on extratropical characteristic near the Azores Islands 6 days after forming.

5) Tropical Storm Dennis followed a similar track and had similar intensity and other characteristics as Tropical Storm Bret three weeks earlier. Dennis also weakened to a tropical depression in the mid-Atlantic due to upper-tropospheric westerly winds. It then moved rapidly northward and merged with an extratropical cyclone moving eastward within the upper-level westerly circulation.

6) Hurricane Emily was the only reasonably strong tropical cyclone of the 1987 hurricane season with minimum central pressure reaching 958

mb (~28.3 inches of mercury) and maximum sustained surface winds of 110 knots (~125 mph). Emily was the first hurricane to occur in the Caribbean since 1981. It did substantial damage in the Dominican Republic and to Bermuda. Emily reached maximum intensity just south of the Dominican Republic in late September. It greatly weakened as it passed over Hispaniola Island. It emerged with maximum winds of only 40 knots. Emily then moved rapidly northeastward and reintensified into a hurricane south of Bermuda. Emily gradually weakened over the colder waters of the North Atlantic and became an extratropical cyclone in the middle latitudes.

7) Hurricane Floyd was a weak October hurricane with maximum winds of about 75 mph for 12 hours as it passed through the Florida Keys. Floyd formed in the western Caribbean on the 9th and 10th of October. It then moved northward over the western tip of Cuba, through the Florida Keys and then northeastward where it became extratropical while merging with a large low pressure system between Florida and Bermuda.

2. Known Factors Associated with Atlantic Seasonal Hurricane Variability

The author's Atlantic seasonal hurricane forecast is based on the characteristics of two global and two regional environmental factors which the author has previously shown to be statistically related to seasonal hurricane variations. These are:

a) The presence or absence of a moderate or strong El Nino warm water event in the eastern tropical Pacific off of Peru. Seasons during which an El Nino event are present are usually suppressed hurricane seasons.

b) The direction of the 50 mb (~ 20 km altitude) stratospheric or QBO winds which circle the globe over the equator. On average, there is nearly twice as much hurricane activity in seasons when QBO winds are from a relative westerly direction as compared with seasons when they are from a relatively easterly direction.

c) The Caribbean Basin-Gulf of Mexico Sea Level Pressure Anomaly (SLPA). Other factors aside, the lower the spring-early summer sea surface pressure anomaly the generally greater the Atlantic seasonal hurricane activity and vice-versa.

d) Lower latitude Caribbean Basin upper tropospheric (~ 200 mb or 12 km altitude) west to east Zonal Wind Anomaly (ZWA). The stronger the 200 mb zonal winds are from the west the generally greater the suppression of hurricane activity and vice-versa.

3. Characteristics of Known Seasonal Hurricane Predictors During 1987

a) El Nino. A weak to moderately intense Pacific El Nino event began in the autumn of 1986 and has continued through the 1987 season. Figure 2 shows that eastern and central Pacific tropical sea surface temperature (SST) anomalies (°C) for the last 15 days of September 1987. Note that positive SST anomalies of 2-3°C are present over a very broad region of the eastern half of the Pacific. These warm SST anomalies have lasted longer and are generally larger than a number of El Nino researchers had anticipated in late May.

This El Nino event started much later in the year (early autumn, 1986) than the typical El Nino event. It appeared to reach a peak in winter (February-March, 1987) and was thought to have been slowly but

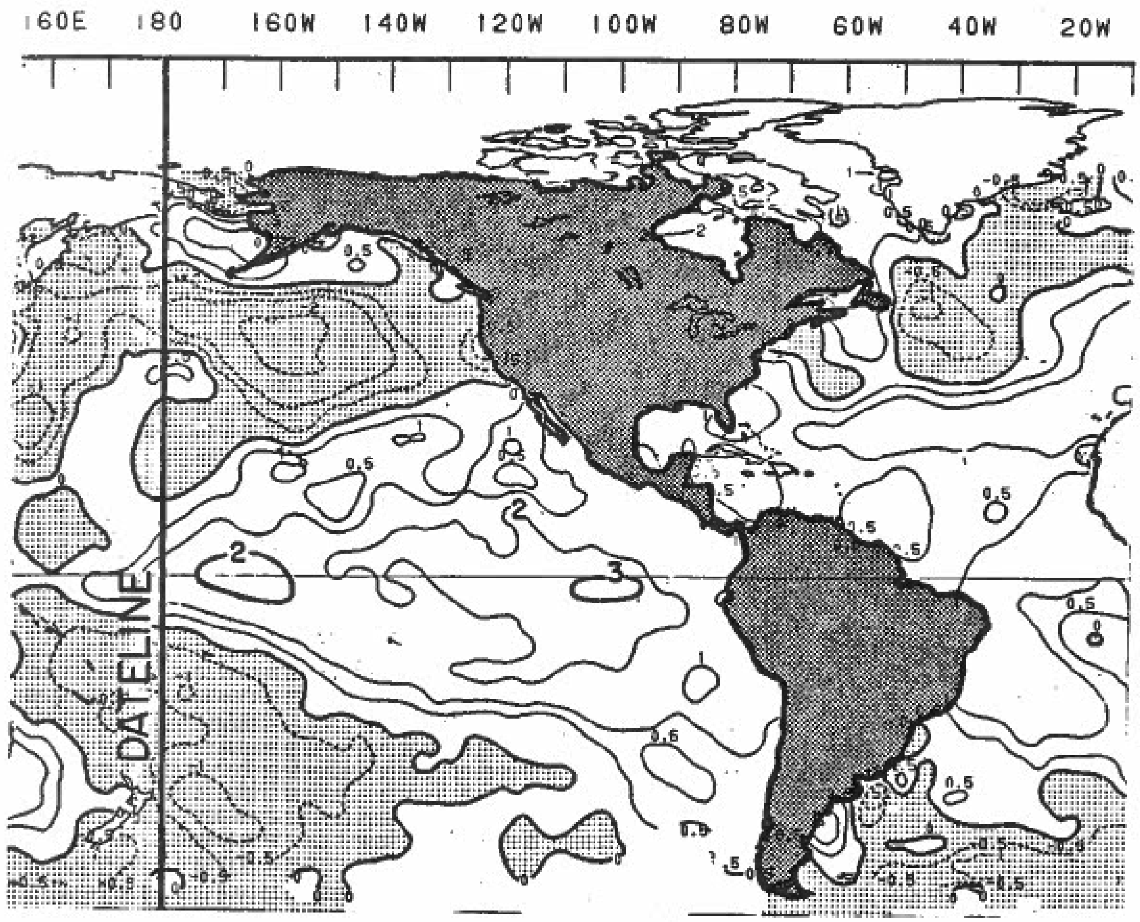

Fig. 2. 16–30 September 1987 Sea Surface Temperature Anomaly (SST) in °C. Dotted areas show cold anomaly (-), unshaded areas positive anomaly (+) - from NOAA blended SST anomaly analyses.

steadily weakening in late May. This weakening was anticipated to continue and that the coming 1987 season would be only marginally influenced by such an event. This general reasoning did not hold up. Although the ocean surface temperature off of Peru cooled in April and May from the values in February and March, sizeable areas of positive

SST anomalies remained in the central Pacific. These warm SST anomalies then regenerated somewhat since May. This resulted in 1987 being a moderate El Nino hurricane season. The Southern Oscillation Index (SOI) of the sea-level pressure difference between Tahiti and Darwin, Australia has remained low during the 1987 season. August, September, and October values of SOI were -2.2 mb, -1.8 mb, and -0.9 mb respectively. El Nino and low values of the SOI are typically related. Also note from Fig. 2 that tropical Atlantic SST anomaly were somewhat above normal for 1987. Atlantic SST anomaly and hurricane activity is not as well related as some hurricane specialists believe.

b) <u>QBO Wind Direction</u>. Figure 3 shows QBO zonal wind speeds during the last three hurricane seasons. It can be seen that during the 1987 hurricane season that 50 mb QBO winds were from the east. This is as predicted. Information on the QBO going back to 1950 indicates that easterly QBO winds are typically associated with more suppressed hurricane seasons and somewhat less intense hurricanes than when QBO winds blow from a relatively westerly direction. Easterly QBO winds during 1987 are considered to be an important contributing influence in explaining why 1987 was an inactive hurricane year and why the tropical cyclones of 1987 which did form were generally weak.

c) <u>Sea-Level Pressure Anomaly (SLPA)</u>. Table 2 gives information on SLPA during the 1987 season. Pressure anomaly was about neutral throughout the Caribbean-Gulf of Mexico region. As SLPA is largely unrelated to the QBO and the EL Nino (Gray, 1984a), SLPA may be considered to be a separate and largely independent contributing factor to hurricane suppression. SLPA appears to have had little contributing influence to making 1987 a suppressed hurricane season.

TABLE 2

1987 Sea Level Pressure Anomaly (SLPA) for Six Key Caribbean Basin-Gulf of Mexico Stations Plus Trinidad (in mb). (1 mb = .0295 inches of mercury)

	April-May	June-July	Aug	Sept	Oct
Brownville(26°N)	+2.0	+0.5	+0.5	+0.7	+2.7
Merida*(21°N)	+1.1	+0.4	+1.5	+1.5	+2.1
Miami(25.5°N)	-0.1	+0.6	+0.7	+0.3	+0.1
San Juan(18.5°N)	-2.1	-0.7	-0.4	-0.1	-0.7
Curacao(12°N)	-1.4	-0.7	-0.3	+0.1	-0.4
Barbados(13.5°N)	-1.1	-0.7	-0.6	0.0	-0.5
6-Station Mean	-0.3	-0.1	+0.2	+0.4	+0.5
Trinidad(11°N)	-0.4	0.0	-0.1	+0.6	+0.1

d) Upper-tropospheric Zonal Wind Anomaly (ZWA). Table 3 shows lower Caribbean Basin 200 mb west to east zonal wind anomaly for the period of June-July through October. Note that 200 mb winds were 3-4 m/s (or 6-10 knots) stronger than average from the west for the period of June through August. This higher westerly wind anomaly also held into early September. This is considered to have been a contributing

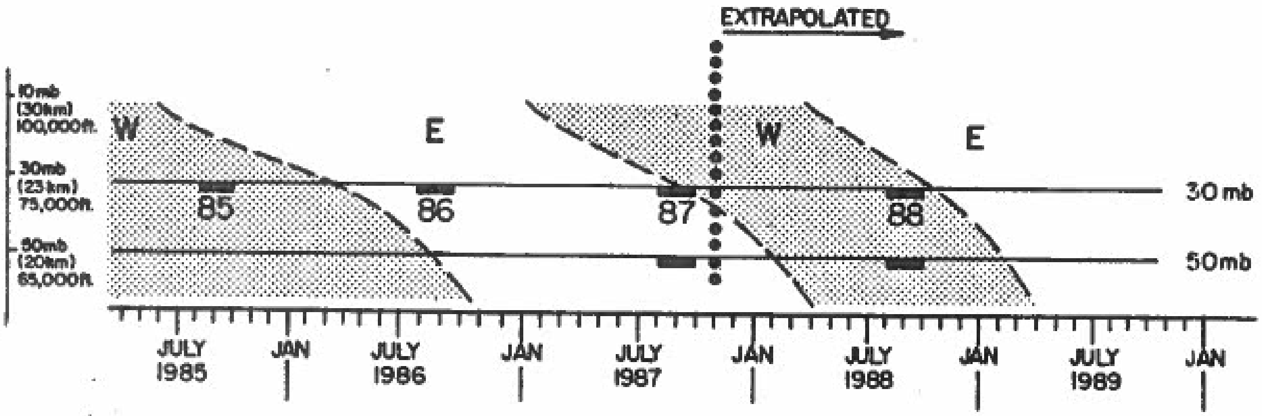

Fig. 3. Vertical cross-section of recent stratosphere monthly average QBO zonal wind (in knots). This figure represents an average of the Balboa, C.Z. (9°N) and Ascension (8°S) rawinsondes. The annual cycle has been removed from each sounding before averaging. Winds from a westerly direction have been shaded. Thick horizontal lines show the active portion of each hurricane season for 1985-1988. Values beyond October 1987 have been extrapolated.

TABLE 3

Lower Caribbean Basin 200 mb Upper Tropospheric Zonal Wind Anomaly (ZWA) in m/s.

	June-July	Aug	Sept	Oct
Balboa (9°N)	+5	+5	+1	+2
San Andres (12 1/2°N)	+3	Miss	-1	+1
Curacao (12°N)	+5	+5	+2	-1
Barbados (13 1/2°N)	+4	+2	+1	0
Trinidad (11°N)	+5	+2	-1	+2
Average	+4.4	+3.5	+0.4	+0.8
Kingston, Ja. (18°N)	+9	+3	+1	+2

factor to the suppression of 1987 Atlantic hurricane activity. It is likely that these upper-tropospheric wind anomalies were associated with the El Nino event. These 200 mb wind anomalies are thought to be the primary physical mechanism whereby the Pacific El Nino influences the Atlantic tropical cyclone activity.

4. Verification of Author's Seasonal Prediction

Table 4 gives a summary of the author's end of May seasonal forecast and the end of July updated forecast and the seasonal verification. In terms of the updated forecast, the number of hurricanes was over forecast by one and the number of hurricane days was over forecast by 8. Number of tropical storms and hurricanes and number of days of tropical storms and hurricanes verified very well however. This small overforecast of hurricane activity is believed to be due to the unexpected prolongation and strength of the 1986-1987 El Nino event. This was not anticipated at the time of the late May forecast. It is no

TABLE 4

Forecast and Verification of 1987 Seasonal TC Forecast

	Original Forecast as of 26 May 1987	Revised Forecast as of 28 July 1987	Observed Verification
No. of Hurricanes (Average Season 6)	4	4	3
No. of Named Storms (Hurricanes and Tropical Storms) (Average Season 10)	8	7	7
No. of Hurricane Days (Average Season 25)	20	15	7
No. of Hurricane and Tropical Storm Days (Average Season 45)	40	35	36

surprise that 1987 was a suppressed hurricane season. Based on general circulation factors it should have been a suppressed hurricane season. Of the four known global and regional factors which can be statistically related to seasonal hurricane activity three (QBO, EN, and ZWA) showed suppressing influences on seasonal hurricane activity.

Verification of Previous Season Forecasts. Table 5 gives the three previous years in which this seasonal forecast has been formally made.

During the last four years in which the author has made his seasonal forecast, the variance of observed seasonal hurricane activity from the seasonal climatological or seasonal average has been appreciably larger than the variance of the author's forecast from observed activity. Table 6 gives the ratio of the author's forecast variance from observation to the variance of individual season activity from climatology for the four years of 1984 through 1987. This table shows that the observed yearly variance from climatology during 1984-87 has been considerably larger than has the variance of the author's forecasts from observation. The late July forecasts have been superior to the late May forecasts. Forecasts for 1984-1987 have thus been a significant improvement over climatology, the previous only objective seasonal prediction that was available.

TABLE 5

Author's Previous Prediction vs. Observed Tropical Cyclone Activity for 1984-1986.

1984	Predicted 24 May and in 30 July Update	Observed
No. of Hurricanes	7	5
No. of Hurricane Days	30	21
No. of Hurricane and Tropical Storms	10	12
No. of Hurricane and Tropical Storm Days	45 (implied from hurricane forecast)	61

1985	Prediction as of 28 May 1985	Updated Prediction of 27 July 1985	Observed
No. of Hurricanes	8	7	7
No. of Hurricane Days	35	30	29
No. of Hurricane and Tropical Storms	11	10	11
No. of Hurricane and Tropical Storm Days	55 (implied from hurricane forecast)	50	60

1986	Original Forecast as of 29 May 1986	Revised Forecast as of 28 July 1986	Observed
No. of Hurricanes	4	4	4
No. of Named Storms (Hurricanes and Tropical Storms)	8	7	6
No. of Hurricane Days	15	10	13
No. of Hurricane and Tropical Storm Days	35	25	27

TABLE 6

Ratio of variance of author's seasonal forecast from observation to the variance of observed seasonal cyclone activity from climatology for the seasons of 1984 through 1987.

	No. of Hurricanes	No. of Hurricanes and Tropical Storms	No. of Hurricane Days
For Late May Forecast	2.25/3.75 (.60)	2.25/7.5 (.30)	72.5/125 (.58)
For Late July	1.25/3.75 (.33)	1.5/7.5 (.20)	38.75/125 (.31)

5. Comparison of the 1987 Hurricane Season With the Last 40 Years in Terms of Hurricane Destruction Potential (HDP)

The wind and storm surge destruction of a hurricane or tropical storm is better related to the square of the storm's maximum winds than to the maximum winds by themselves. The potential destruction from the hurricane's high winds and from the hurricane's storm surge might be termed Hurricane Destruction Potential (HDP). As previously discussed by the author (1987) HDP might be directly related to the square of the hurricanes maximum wind and to the time period that these high winds exist. We define Hurricane Destruction Potential (HDP) as:

$$(V_{max})^2 \text{ for all } V_{max} > 65 \text{ knots}$$

for each 6-hour period a hurricane is in existence. This square of each hurricane's maximum sustained winds at every six-hour period can be added up for all hurricanes of a season and expressed as a seasonal Hurricane Destruction Potential (HDP). This has been done for 1987 and past hurricane seasons.

Figure 4 shows each year's seasonal values of Hurricane Destruction

Potential (HDP) for the last 41-year period of 1947 through 1987. Note that by the standard of HDP, 1987 was the second most inactive hurricane season of the last 41 years. Only the hurricane season of 1983 was more inactive than 1987. There was also an El Nino and easterly QBO winds present in 1983 in addition to high sea-level pressure anomaly in the Caribbean Basin.

Figure 4 also shows how active the hurricane seasons were during the 23-year period of 1947-1969 in comparison with the last 18-year period. Since 1970 hurricane intensity has by the standard of HDP been very low. Although the number of named storms and hurricanes per season has averaged only 16 and 28% higher respectively during the period of 1947-1969 compared with 1970-1987 the Hurricane Destruction Potential (HDP) has been more than twice as great.

Hurricanes of the 1947-1969 period were on average more intense than the hurricanes since 1970. The average number of hurricane maximum wind reports greater than 100 knots (115 mph) per season has been over three and a half times greater during 1947-1969 as compared with the period since 1970.

As aircraft reconnaissance data has been available since 1947, comparissons of the period 1947-1969 with 1970-1986 are considered to be reliable. There have been, on average, about 2.7 times as many reports of maximum winds greater than 90 knots per season (~103 mph) in the earlier 1947-1969 period as compared with the later period and over 3.6 times as many reports of winds greater than 120 knots (~138 mph) per season in the earlier as compared with the later period. These are

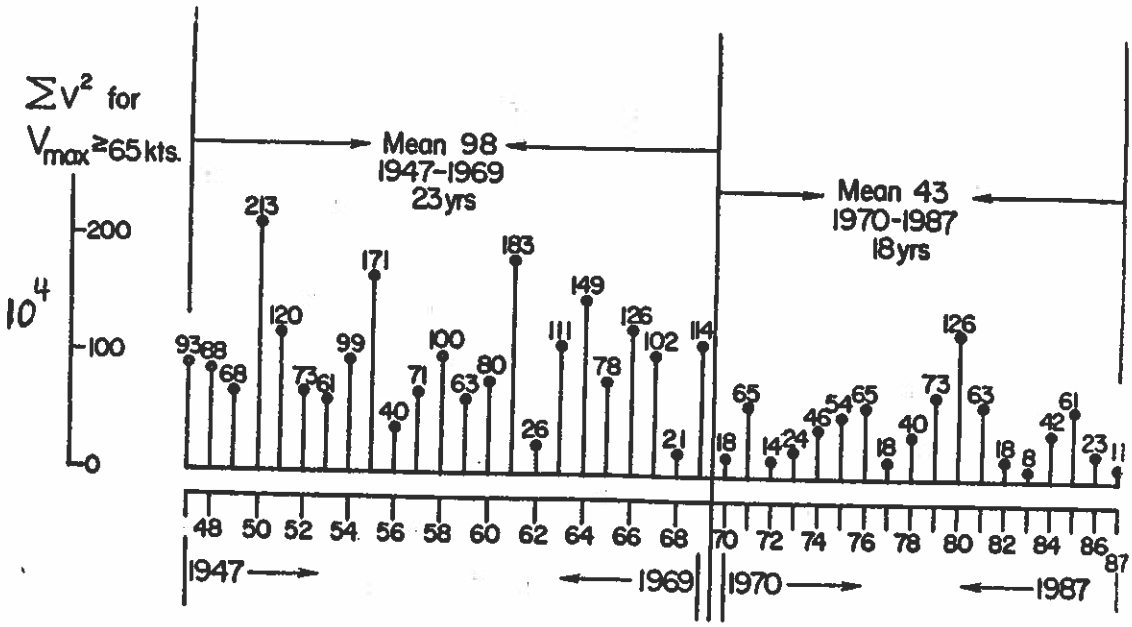

Fig. 4. Seasonal variation in Hurricane Destruction Potential (HDP) defined as the sum of all hurricane maximum wind speeds squared for each 6-hour observing period throughout the hurricane season. Units 10^4kts^2.

striking differences. They are also substantiated in the statistical analysis of measured minimum surface pressure.

The most intense hurricanes usually form at low latitudes from disturbances propagating westward from Africa. This more inactive hurricane period from 1970 is well associated with the extended period of west African drought as seen in Fig. 5. It is noted that the reduction in precipitation in the Sahel region of West Africa has continued through the 1987 season.

The more recent 1970's and 1980's period of lower number of intense hurricanes is also well associated with higher Caribbean basin surface pressure and greater Caribbean basin 200 mb (12 km or 40,000 ft) westerly zonal winds as compared with the period of the 1950's and 1960's.

The coastal populations of the US and Caribbean basin have been fortunate that intense hurricane activity has been so low since 1970. It is impossible to tell how long this downturn of intense hurricane activity and destruction potential will continue. It is to be expected

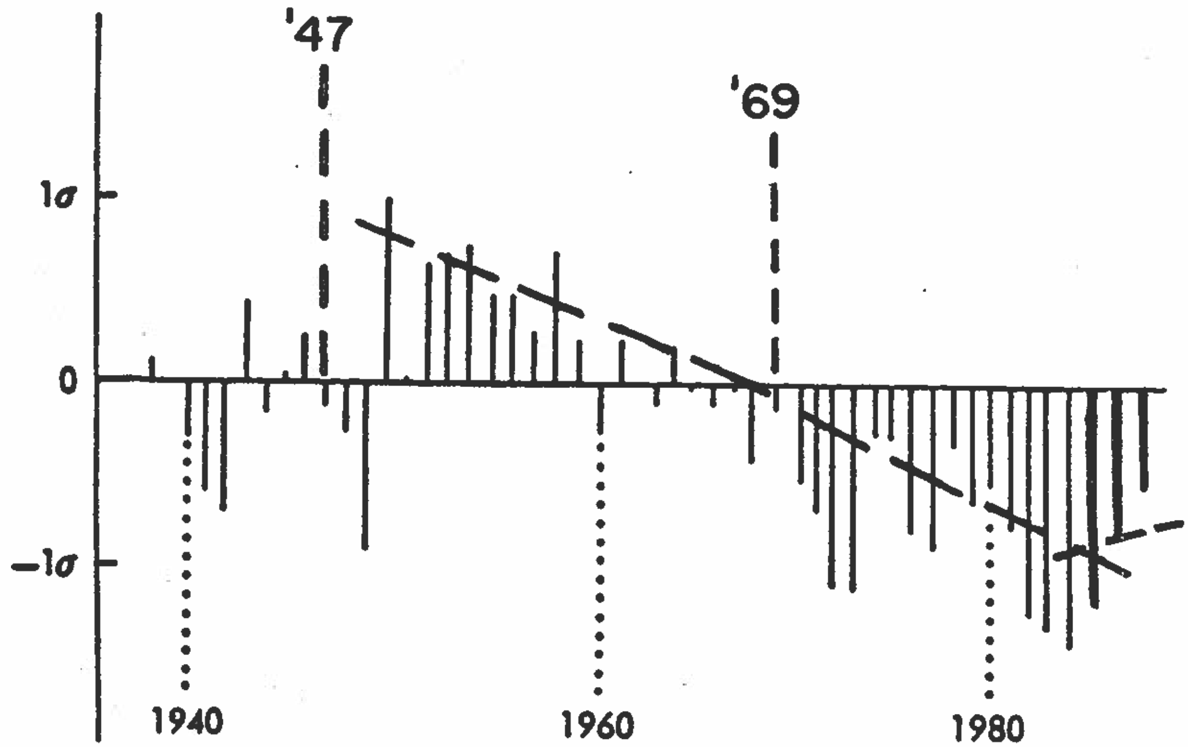

Fig. 5. Standardized annual rainfall for the Sahel (from P.J. Lamb, 1984).

that a return to more intense hurricane activity will occur when the atmosphere's global wind systems experience a change in their multi-decadal circulation. Such decadal circulation changes have occurred in the past and should be expected to occur again. At some future date we will likely see a return to a period of more intense hurricane activity. With the large increases of Atlantic Basin coastal populations and building construction which has occurred since 1970 and with the growth expected to occur in the future, it is to be expected that coastal populations may well be in store for many more hurricane related problems than have been experienced in the recent years. Coastal populations, real estate, insurance interests, etc. should be made aware of this likely future change in hurricane activity. This point has been well emphasized by Neil Frank the former director of the National Hurricane Center.

6. Outlook for 1988

Statistical odds favor a significantly more active 1988 hurricane season in comparison with 1987 or 1986. It is expected that the current El Nino event should have dissipated by next season. Lower stratospheric QBO winds in 1988 can be expected to be from a relatively westerly direction which is more favorable for hurricane activity (see Fig. 4). These two general circulation factors should in combination significantly alter the Atlantic seasonal hurricane activity for next season. From the vantage point of late November the author's best estimate is that 1988 will likely have an above average amount of hurricane activity (based on averages since 1970) and thus be much more active than the 1986 and 1987 seasons have been.

7. Acknowledgements

The author is very grateful to Arthur Pike of the National Hurricane Center for the 1987 meteorological information which he and his associates at the center have kindly furnished him and to James Angell and Keith Johnson of NOAA, Washington, DC for much 1987 stratospheric wind information. I also acknowledges the beneficial discussions I have had with a number of El Nino-Southern Oscillation researchers.

The author would also like to acknowledge the encouragement he has received for this type of forecasting research application from Neil Frank and Robert Sheets, former and current Directors of the National Hurricane Center (NHC) and the other forecasters at the National Hurricane Center.

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