2002 Tropical Atlantic Activity Report

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The hurricane season is basically over (technically on Dec 1st), so it is time for my annual Season Summary. I sent out about 50 updates to this mailing list (which has grown from about 4 subscribers in 1996 to 230 subscribers in 2002, not to mention the updates being posted on several websites) over the past 6 months; now it's time for the final one. This report is structured in the following manner: 1) the Saffir-Simpson Scale, 2) Lifetimes and Intensities, 3) Climatology and Statistics, and 4) Landfall.

As usual, my data (which in large part comes from The National Hurricane Center and Unisys Weather) and typing could contain errors, so if you see a mistake, please point it out to me.

1. Saffir-Simpson Scale of Tropical Cyclone Intensity

CATEGORY	WINDS (kts)	PRESSURE (mb)
Depression	< 35	N/A
Tropical Storm	35-63	N/A
1	64-82	> 980
2	83-95	965-979
3	96-113	945-964
4	114-135	920-944
5	> 135	< 919

2. Lifetimes and Intensities

NAME	DATES OF ACTIVITY	MAX WIND (kts)	MIN PRES (mb)
ARTHUR	14 JUL - 16 JUL	50	997 (N)
BERTHA	04 AUG - 09 AUG	35	1008 (N)
CRISTOBAL	05 AUG - 08 AUG	40	999 (N)
DOLLY	29 AUG - 04 SEP	55	994 (N)
EDOUARD	01 SEP - 06 SEP	55	1002 (N)
FAY	05 SEP - 08 SEP	50	998 (N)
TD7	07 SEP - 08 SEP	30	1009
GUSTAV	08 SEP - 12 SEP	80	960 (N,H)
HANNA	12 SEP - 14 SEP	45	1001 (N)
ISIDORE	14 SEP - 26 SEP	110	934 (N,H,M)
JOSEPHINE	17 SEP - 19 SEP	50	1004 (N)
KYLE	20 SEP - 12 OCT	75	980 (N,H)
LILI	21 SEP - 04 OCT	125	938 (N,H,M)
TD14	14 OCT - 16 OCT	30	1002

In the previous chart, the N, H, and M that follows some storms denote what statistic they contributed to; Named storm (TS+), Hurricane (CAT1+), Major hurricane (CAT3+).

The winds and pressures reflect the data as posted in the operational advisories, NOT the final “best-track” data that will be available from the NHC in the post-season timeframe.

3. Climatology and Statistics

The average annual number of tropical disturbances (for the period 1944-2000) is:
9.9 named storms
5.9 hurricanes
2.5 major hurricanes

This year, the numbers were near the average:
12 named storms (15 in 2001)
4 hurricanes (9 in 2001)
2 major hurricanes (4 in 2001)

A fairly unique aspect of the past season was the non-uniformity of the activity. No storms formed in June, October, or November, only one formed in July, three formed in August, and *eight* formed in September, making it the most active month *ever* in recorded Atlantic Basin history. More amazingly, the first hurricane of the season [Gustav] only formed on September 11th, three days *after* the climatological peak of the season, and the last one [Lili] formed on Sep 30th. (Recall that last season also had a late start: Erin became a hurricane on Sep 8th.)

Kyle was also worthy of mention in this section. He lasted for 22 days (with 15.25 Named Storm Days), the 3rd longest-lasting storm in the Atlantic (behind Ginger '71 and Inga '69). In the process, he strengthened and weakened repeatedly, reaching TS-status four separate times and hurricane-status just once. Of the four hurricanes, half of them [Isidore, Lili] formed (i.e., became hurricanes) in the tropics… the other half formed in the subtropics or mid-latitudes.

For the fourth year in a row, the Atlantic Basin has not experienced a CAT5 hurricane (the last one was Mitch in October 1998).

There were a total of 54.00 "named storm days" (days during which a named storm was present). 10.75 of those days were "hurricane days", and 2.50 of those days were "intense hurricane days". This is 80.5% of the climatological mean, i.e., this season was about 1/5 *less* active than the "normal" season (last time there was a season below 100% was 1997). The average numbers (for the period 1944-2000) are 46.6 named storm days, 23.9 hurricane days, and 4.7 intense hurricane days.

Here is a summary of the season (VERY brief):

Unlike last season's A-storm (Allison), Arthur was rather benign. He formed a few miles south of Cape Hatteras, NC on the trailing end of a cold front and headed east-northeast from there over open ocean, eventually losing tropical characteristics just south of eastern Newfoundland.

Bertha formed just off the Mississippi Delta in LA and headed inland. She dissipated over land, but exited over western LA, re-intensified to a Tropical Depression, then drifted into Padre Island, TX… same place that Bret hit in 1999 as major hurricane. She quickly dissipated over TX.

The third storm of the season also had non-tropical origins. Cristobal formed about 4° east of Savannah, GA from the same trough that spawned Bertha the day before. Three days later, he was absorbed by a mid-latitude trough.

Dolly was the first purely tropical system… forming near 10N 32W (deep tropics in the eastern Atlantic) from a tropical wave. She headed WNW, then curved northward at about 54W shortly after which she dissipated due to strong vertical shear.

Edouard formed about 2° east of Daytona Beach, FL, completed a small cyclonic loop, then moved over the northern FL peninsula. He exited and headed into the northern Gulf of Mexico, but strong vertical shear kept the storm from re-developing.

Fay, another short-lived mid-latitude storm, formed about 3.5° east of Corpus Christi, TX and drifted inland, dissipating over TX.

Gustav, who was destined to become the first hurricane of the season, formed between the Bahamas and Bermuda as a Subtropical Depression. He moved northwest toward the NC coast, but was picked up by a trough, just shy of reaching the coast. Through baroclinic enhancement, he became the first hurricane about 5° east of southern MD and was rapidly whisked northeastward by the trough and subsequently absorbed into it.

Hanna formed in the central Gulf of Mexico from a broad area of disturbed weather that was allowed to "brew" for a while. She was in weak steering flow, but meandered westward, then northward into the MS/AL border, doing little more than producing heavy rain.

Isidore had meager beginnings… having formed almost over land (near Trinidad) from a disorganized tropical wave. As the depression moved along the northern coast of South America, it weakened and dissipated into an open wave. However, the remnant disturbance headed northwest and reorganized a day later south of Haiti. Just two days later, he became the second hurricane of the season and rapidly intensified south of Cuba to become the first major hurricane of the season. He then headed west toward the Yucatán Peninsula, then dove south into a fairly populated area. To make matters worse, he ended up completing a small loop over land, exiting the Yucatán just a few miles west of where he entered, then proceeded north into the Gulf of Mexico. At this point, the size of Isidore was incredible, his circulation at least the diameter of the entire Gulf. Most likely, it was the immense size that prevented him from strengthening over the Gulf before hitting the eastern LA coast (for those who are interested, this is called inertial stability).

Josephine was a weak storm that formed in the central north Atlantic, moved northeast, and dissipated… perhaps only noticed by a few ships in popular shipping lanes.

Kyle is a storm for the record books. He formed in the central Atlantic from an extratropical Low. His first move was a cyclonic loop that lasted four days, then headed west, reaching hurricane strength shortly after completing the loop. This westward motion would last for five days, then the next nine days were spent drifting and meandering south and southwest of Bermuda, followed by four days of a more "normal" track along the southeast U.S. seaboard. What makes the longevity more amazing is how little area the storm covered in that time; the other record-holders traversed much longer distances.

Lili was the third and final storm to come from the deep tropics (she would become the 4th hurricane and 2nd major hurricane of the season). Her origins and track were classic, forming from a tropical wave near 10N 45W, passing through the central Caribbean, rapidly intensifying over the Gulf of Mexico, and making landfall on the southern U.S. coast. By far, the most interesting aspect of Lili was the rapid intensity changes that occurred in the Gulf. In the central Gulf, the central pressure fell 32mb in the 24 hours prior to peak intensity, then immediately rose 44mb in the following 24 hours. It will be some time until we fully understand what happened in those couple days… events such as this prove how little we know about rapid intensity changes.

On September 23-26, there were three active named storms... Isidore, Kyle, and Lili. There were many examples of two named storms being present at the same time.

4. Landfall

There were nine landfalling storms this year... seven of which made landfall on the U.S. It is also interesting to note that those seven landfalling storms hit five different states (TX, LA, MS, FL, and SC)… leaving thirteen coastal (Gulf, Atlantic) US states relatively unscathed. Also, we saw the first hurricane landfall (Lili) on the U.S. since Irene in 1999. There had been 21 non-U.S.-landfalling hurricanes between Irene and Lili.

The first column is the storm name, second column is the date of landfall, third column is the approximate time of landfall (UTC or Zulu), fourth column is maximum sustained winds (kts) at landfall, and the fifth column is the nearest location to landfall (*preliminary* storm-related deaths and damages are shown in parentheses).

STORM	DATE & TIME		WIND	LOCATION
BERTHA	8/5	0400	35	Port Sulfur, LA, USA (1 death, minor damage)
	8/9	0900	25	Padre Island, TX, USA
EDOUARD	9/5	0000	35	Daytona Beach, FL, USA
FAY	9/7	1200	45	Palacios, TX, USA
GUSTAV	9/12	0400	70	Fourchu, Nova Scotia, Canada (1 death, minor damage)
	9/12	0900	65	Margaree, Newfoundland, Canada
HANNA	9/14	1400	45	Moss Point, MS, USA (3 deaths, $230 million)
ISIDORE	9/20	2100	85	Las Martinas, Pinar del Río, Cuba
	9/22	2200	110	Telchac Puerto, Yucatán, Mexico (6 deaths)
	9/26	0700	55	Grand Isle, LA, USA
KYLE	10/11	1600	40	Charleston, SC, USA
LILI	9/23	2200	50	Union Island, Grenadines (4 deaths)
	10/1	1600	85	San Juan y Martínez, Pinar del Río, Cuba (4 deaths)
	10/3	1400	85	Pecan Island, LA, USA ($700 million)
TD14	10/16	1300	30	Cienfuegos, Cienfuegos, Cuba

Hurricane Season 2003 begins June 1; the first names in the lineup are Ana, Bill, and Claudette. There are no new names in the upcoming season compared to the last rotation of these names in 1997 (i.e., no names were retired in 1997).

A ZIP file of tracking data for each storm (8 kb):
http://www.mcwar.org/gallery/tropics/stormtracks02.zip

A PostScript image of 2002 Atlantic storm tracks (2512 kb):
http://www.mcwar.org/gallery/tropics/atl_storm_plot_2002.ps

This Season Summary in PDF format (152 kb):
http://www.mcwar.org/gallery/tropics/02_atltrop.pdf

All of the above files (and others) can be found and downloaded from:
http://www.mcwar.org/gallery/tropics/tropics.html

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