

Tropical Cyclone Report  
Hurricane Isidore  
14-27 September 2002

Lixion A. Avila  
National Hurricane Center  
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**Revised on 2 July 2003 to add more U.S. casualties.**

Hurricane Isidore was a slow-moving tropical cyclone that hit western Cuba as a category 1 hurricane (on the Saffir-Simpson Hurricane Scale) and the northern Yucatan Peninsula as a category 3 hurricane. It made landfall on the Louisiana coast as a strong tropical storm.

a. Synoptic History

A tropical wave moved off the coast of Africa on 9 September accompanied by a large area of thunderstorms. The convective activity decreased significantly as the system moved toward the west-southwest during the next few days, but the wave maintained a good low-cloud signature and cyclonic rotation. As the wave approached 50° West, the shower activity began to increase and an upper-level anticyclone became evident over the system. By 1800 UTC 14 September, there was enough convection and rotation to classify the system as a tropical depression as it approached Trinidad and the northern coast of Venezuela. The depression moved west-northwestward and its development was halted by its interaction with land. By 1800 UTC 15 September, the system had degenerated into a tropical wave in the eastern Caribbean Sea. However, as the wave entered the western Caribbean Sea, it redeveloped a closed circulation and regained tropical depression status at 1200 UTC 17 September, about 120 n mi south of Kingston, Jamaica.

The depression became Tropical Storm Isidore around 0600 UTC 18 September, and, embedded within a weak steering current, the tropical cyclone moved very slowly toward the northwest, passing just west of Jamaica. Isidore then moved very slowly toward the west-northwest across the Cayman Islands and became a hurricane at 1800 UTC 19 September. Its winds reached 90 knots around 0600 UTC 20 September as it was nearing the southwest coast of the Isle of Youth, Cuba. Although the minimum pressure continued to drop, Isidore's winds decreased a little bit and the hurricane made landfall near Cabo Frances in western Cuba at 2100 UTC 20 September with maximum winds of 75 knots. For more than 12 hours, Isidore relentlessly pounded western Cuba. The hurricane then moved west and southwestward toward the Yucatan Peninsula. Isidore re-strengthened and reached its maximum intensity of 110 knots at 1800 UTC 21 September. However, its minimum central pressure of 934 mb occurred at 1200 UTC 22 September, just before landfall near Puerto Telchac on the north coast of Yucatan.

Isidore meandered for 24 to 36 hours over northern Yucatan and weakened to a minimal tropical storm. It then moved northward over the Gulf of Mexico where the circulation expanded but the cyclone never redeveloped an inner core of strong winds. Isidore made landfall with winds of

55 knots and a minimum pressure of 984 mb just west of Grand Isle, Louisiana at 0600 UTC 26 September. Once it moved inland, Isidore weakened to a tropical depression and moved north-northeastward across the southeastern United States, producing torrential rains. It became an extratropical storm over southwestern Pennsylvania at 1800 UTC 27 September, and was then absorbed into a frontal zone.

The “best track” chart of the tropical cyclone’s path is given in Fig. 1a and 1b, with the wind and pressure histories shown in Figs. 2 and 3, respectively. The best track positions and intensities are listed in Table 1.

#### b. Meteorological Statistics

Observations in Isidore (Figs. 2 and 3) include satellite-based Dvorak technique intensity estimates from the Tropical Analysis and Forecast Branch (TAFB), the Satellite Analysis Branch (SAB) and the U. S. Air Force Weather Agency (AFWA), as well as flight-level and dropwindsonde observations from flights of the 53<sup>rd</sup> Weather Reconnaissance Squadron of the U. S. Air Force Reserve Command and the NOAA hurricane reconnaissance plane. Fixes from various Cuban radars, as well as data from the Cancun radar received at the NHC in real time were very useful in tracking Isidore. Data from the NOAA high altitude jet was used to analyze the environment surrounding the hurricane and was ingested by numerical models.

Isidore was upgraded to tropical depression status based on a fix provided by a reconnaissance plane. It was a report of a poorly defined center of 1009 mb with 20 to 25 knot southwesterly winds at 1500 feet around 1800 UTC 14 September. It was downgraded to a tropical wave in the eastern Caribbean Sea the next day, when a reconnaissance plane could not find a closed circulation.

Isidore moved very close to the south of Cayman Brac, which reported sustained winds of 42 knots with gusts to 61 knots at 0325 UTC 19 September. During the time Isidore was moving nearby the Isle of Youth, the eye contracted to 8 n mi, and based on data from a dropsonde in the eyewall, surface winds were near 90 knots. Thereafter, there was a slight weakening as suggested by data from a reconnaissance aircraft. In fact, the official best track over Cuba was adjusted with data provided by the Cuban Weather Service. Surface observations from Cuba and a post-analysis of aircraft and dropsonde data suggest that Isidore crossed Cuba with 75-knot winds and not with the 85 knots indicated operationally. The minimum pressure measured in western Cuba was 970 mb at Isabel Rubio, and that station experienced gusts to 75 knots at 2140 UTC 20 September and about 554 mm (21.7 in) of rain. Several locations in the area reported the calm of the eye. There was a strong storm surge along the south coast of Cuba in Playa Cajio, south of Habana and in Ensenada de Cortes, Pinar del Rio. When Isidore was already in the Gulf of Mexico, rainbands over Cuba produced a wind gust of 86 knots in an isolated tornado in the town of Candelaria at 1600 UTC 23 September.

Isidore’s peak intensity of 110 knots at 1800 UTC 21 September, was a compromised between adjusted aircraft flight-level winds and satellite estimates. Although the winds remained unchanged, the central pressure continued to drop to a minimum of 934 mb at 1200 UTC 22

September. At this time, the cloud pattern looked the best one imagery and the three satellite agencies reported T-numbers of 6.5 on the Dvorak scale, corresponding to 127 knots. However, aircraft data did not support such intensity.

The maximum winds reported by a station in Yucatan were gusts to 70 knots, with a minimum pressure of 969.9 mb at Merida around 2350 UTC 22 September as the western eyewall moved through the area. Fig. 4a and 4b are radar images showing the eye of Isidore making landfall in western Cuba and Yucatan, respectively.

Later, when a weakened Isidore was heading for Louisiana, it reached 55-knot winds based on data from the “*Deepwater Pathfinder*”, which reported sustained winds of 56 knots with gusts to 71 knots and 20 ft waves at 1743 UTC 27 September. Because Isidore was a large tropical cyclone, there were numerous observations from ships of tropical storm force winds. Some of these observations are given in Table 2

The Belle Chase Naval Air Station in Louisiana experienced northeast winds of 50 knots with gusts 60 knots at 0155 UTC 26 September. This is the highest wind reported by any station as Isidore made landfall in the Louisiana coast. The highest storm surge reported along the U.S. coast was 8.3 feet and occurred at Rigoletes, Louisiana and at Gulfport Harbor, Mississippi. Additional selected surface observations from land stations and data buoys are given in Tables 3 and 4.

#### c. Casualty and Damage Statistics

Press reports indicate that there were 2 indirect deaths attributable to Isidore in Merida, Mexico. One was electrocuted by a downed power line, another died in a weather-related car crash. Five direct and one indirect deaths occurred in the United States. On 22 September, a man drowned in a rip current near Port Fourchon, LA and another drowned in the surf at Manatee County Beach, FL; both of these deaths occurred while Isidore was near the north coast of the Yucatan peninsula. A man drowned in a vehicle parked near a casino in Mississippi when storm surge inundated the parking lot. Another man died when a tree fell across his car in eastern Mississippi, and a man drowned after driving into 10 feet of water in Clarksville, Tennessee. An indirect death occurred in Mississippi when a man suffered from a cardiac arrest and could not be reached by rescuers due to flood waters.

Damage from Isidore in Jamaica was mainly related to torrential rains. Western Cuba and Yucatan were severely damaged by the hurricane primarily the agriculture and cattle industry. According to Tropical Cyclone Reports from the weather services of Cuba and Mexico, numerous houses and power lines were damaged by wind.

In the United States, the Property Claim Services Division of the Insurance Services Office reports that insured losses due to Isidore totaled 165 million dollars. Using a two to one factor for insured to overall damage gives a total damage estimate of \$330 million. Most of the damage occurred in Louisiana.

d. Forecast and Warning Critique

Average official track errors (with the number of cases in parentheses) for Isidore were 32 (31), 55(31), 73(29), 101(27), and 177(23) n mi for the 12, 24, 36, 48, and 72 h forecasts, respectively. These errors are lower than the average official track errors for the 10-yr period 1992-2001 of 43, 81, 115, 148, and 222, respectively. Table 5 which includes the track model errors indicates that the NCEP global model (GFS) performed remarkably well with errors lower than the official forecast errors. Furthermore, the U.S. Navy global model (NGPS), which has been upgraded this hurricane season, performed even better than the GFS. These two global models captured the anomalous southward track of Isidore over Yucatan. This uncommon southward track was not taken into consideration in the official forecast and may have been the cause of errors larger than these two models.

Average official intensity errors were 9, 16, 22, 30, and 46 kt for the 12, 24, 36, 48, and 72 h forecasts, respectively. These errors are higher than the average official intensity errors over the 10-yr period 1992-2001 which are: 7, 11, 14, 16, and 19 kt, respectively. Because the official track forecast kept Isidore over water a continued strengthening was indicated. Instead, Isidore moved over Yucatan and weakened, causing large intensity errors. The official intensity forecasts were correct in not predicting a rapid intensification after Isidore moved back over the Gulf of Mexico and headed for Louisiana.

Due to Isidore's track near many land areas, a large number of watches and warnings were issued and coordinated with various countries from the Caribbean region. They are summarized in Table 6.

Table 1. Best track for Hurricane Isidore, 14-27 September, 2002. Positions and pressures given during the tropical wave stage are representative values for the low-level vorticity center.

Date/Time (UTC)	Latitude (°N)	Longitude (°W)	Pressure (mb)	Wind Speed (kt)	Stage
14 / 1800	10.0	60.5	1009	25	tropical depression
15 / 0000	10.2	62.4	1009	25	"
15 / 0600	10.6	64.3	1009	25	"
15 / 1200	11.2	66.4	1009	25	"
15 / 1800	12.3	68.5	1009	25	tropical wave
16 / 0000	14.2	70.5	1009	20	"
16 / 0600	15.0	71.9	1008	20	"
16 / 1200	15.5	73.2	1008	20	"
16 / 1800	15.7	74.5	1008	20	"
17 / 0000	15.8	75.3	1008	25	"
17 / 0600	15.8	76.1	1008	25	"
17 / 1200	15.9	76.8	1008	30	tropical depression
17 / 1800	16.3	77.4	1006	30	"
18 / 0000	16.7	77.7	1006	30	"
18 / 0600	17.1	78.1	1006	35	tropical storm
18 / 1200	17.7	78.5	1004	40	"
18 / 1800	18.7	78.6	1001	45	"
19 / 0000	19.3	79.3	998	50	"
19 / 0600	19.7	80.4	990	50	"
19 / 1200	19.9	80.9	990	60	"
19 / 1800	20.4	81.7	983	65	hurricane
20 / 0000	20.7	82.3	979	75	"
20 / 0600	21.1	83.0	967	90	"

Date/Time (UTC)	Latitude (°N)	Longitude (°W)	Pressure (mb)	Wind Speed (kt)	Stage
20 / 1200	21.5	83.5	966	85	"
20 / 1800	21.8	84.0	965	75	"
21 / 0000	22.1	84.3	964	75	"
21 / 0600	22.3	85.1	964	85	"
21 / 1200	22.0	85.8	955	100	"
21 / 1800	21.9	86.1	946	110	"
22 / 0000	22.1	86.5	947	110	"
22 / 0600	22.0	87.4	936	110	"
22 / 1200	21.9	88.2	934	110	"
22 / 1800	21.6	88.9	935	110	"
23 / 0000	21.0	89.4	950	100	"
23 / 0600	20.6	89.6	952	70	"
23 / 1200	20.1	89.6	960	60	tropical storm
23 / 1800	20.3	89.4	968	50	"
24 / 0000	20.5	89.3	980	35	"
24 / 0600	21.0	89.5	985	45	"
24 / 1200	21.7	89.7	987	50	"
24 / 1800	22.1	89.8	988	50	"
25 / 0000	23.0	89.7	987	50	"
25 / 0600	24.2	89.7	987	50	"
25 / 1200	25.4	90.2	990	50	"
25 / 1800	26.3	90.4	988	55	"
26 / 0000	27.5	90.3	989	55	"
26 / 0600	29.1	90.3	984	55	"
26 / 1200	30.0	89.9	985	55	"
26 / 1800	32.2	89.8	988	40	"

Date/Time (UTC)	Latitude (°N)	Longitude (°W)	Pressure (mb)	Wind Speed (kt)	Stage
27 / 0000	33.0	89.0	992	20	tropical depression
27 / 0600	35.0	86.5	995	20	"
27 / 1200	39.1	82.9	998	20	"
27 / 1800	40.9	79.5	999	20	extratropical
28 / 0000					absorbed
22 / 1200	21.9	88.2	934	110	minimum pressure
20/ 2100	22.0	84.1	964	75	landfall at Cabo Frances, Western Cuba.
22/ 2100	21.3	89.3	936	110	landfall at Puerto Telchac, Yucatan, Mexico.
26/ 0600	29.1	90.3	984	55	landfall just west of Grand Isle, LA.

Table 2. Selected ship reports with winds of at least 34 kt for Isidore, 14-27 September, 2002.

Date/Time (UTC)	Ship call sign	Latitude (°N)	Longitude (°W)	Wind dir/speed (kt)	Pressure (mb)
19/0600	PFRO	18.6	78.8	150/46	1004.0
20/0200	ELWX5	25.0	80.0	140/33	1012.8
20/0600	C6FM7	22.7	87.4	100/35	1006.0
20/2100	PDHU	24.5	83.4	080/37	1005.0
20/2100	ZCAQ8	20.2	81.1	230/35	1005.1
21/0600	C6MF5	23.1	80.6	100/40	1010.2
21/0900	LAZK4	23.4	86.9	030/37	1002.0
21/1200	PCAW	20.8	83.8	150/39	1002.0
21/1200	LAZK4	24.1	87.7	050/38	1002.0
22/0000	PFOH	21.5	84.7	180/39	1000.0
22/0300	C6YE	24.3	86.4	070/44	1000.5
22/0900	C6YE	23.4	85.7	100/44	999.4
22/1200	C6FM6	25.0	89.7	050/42	1003.0
22/1500	C6YE	22.0	85.6	120/36	1001.4
23/0600	PGFE	19.8	95.2	310/39	1005.8
23/0900	PGFE	19.9	95.3	320/39	1005.8
23/1200	WPPO	26.6	89.5	090/40	1005.5
23/1200	VSCX4	26.2	89.2	080/34	1007.5
23/1500	VSCX4	26.7	90.1	070/37	1010.4
23/1500	PGFE	20.0	95.5	320/45	1006.9
23/1800	PGFE	19.9	95.6	310/41	1005.0
23/2100	PGFE	20.0	95.7	310/39	1004.2
23/2100	VSCX4	27.6	92.0	050/35	1010.0
24/0000	PGFE	20.0	95.8	320/45	1004.5
24/0600	PGFE	19.9	95.6	310/45	1007.2
24/0900	PGFE	19.6	95.1	290/45	1005.0
24/1100	DGNB	25.0	84.9	130/35	1007.3
24/1200	C6FM6	26.9	88.5	050/53	1006.0
24/1200	PGFE	19.5	94.7	290/41	1004.2
24/1200	H3GQ	27.2	90.5	040/44	XXXX
24/1500	PGFE	19.6	94.6	300/45	1005.8
24/1800	PGFE	19.6	94.5	290/41	1005.1



Date/Time (UTC)	Ship call sign	Latitude (°N)	Longitude (°W)	Wind dir/speed (kt)	Pressure (mb)
24/1800	WGMJ	27.7	89.0	090/44	1005.5
24/1800	3FZQ7	28.2	88.4	040/34	1006.0
24/2100	PGFE	19.7	94.4	280/47	1002.7
24/2300	H3GQ	26.1	87.5	120/38	XXXX.X
25/0300	DA367	27.9	92.4	040/37	1005.0
25/0300	DGNB	27.0	90.2	070/35	1002.7
25/0400	DGNB	27.0	90.5	070/37	1002.7
25/0600	H3GQ	25.7	86.1	130/39	1005.0
25/0600	PGFE	20.0	94.0	290/39	1006.0
25/0700	DGNB	27.3	91.4	050/37	1001.2
25/0900	PGFE	20.0	93.9	290/44	1004.1
25/1200	DGNB	27.4	92.8	010/39	1001.4
25/1200	PGFE	20.1	93.9	290/41	1006.0
25/1200	VSXC4	28.4	94.5	030/35	1010.4
25/1200	CGJN	29.2	87.5	100/35	1004.8
25/1300	DGNB	27.5	93.0	340/41	1001.4
25/1400	DGNB	27.5	93.1	340/39	1001.9
25/1500	PGFE	20.5	93.7	290/39	1007.1
25/1500	DGNB	27.6	93.1	320/43	1002.7
25/1500	VSCX4	27.5	94.4	030/35	1006.5
25/1600	DGNB	27.6	93.2	340/37	1002.6
25/1800	DGNB	27.6	93.4	350/37	1002.3
25/1800	WRFJ	27.6	85.1	130/37	1008.3
25/1800	H3GQ	22.8	85.1	160/40	1005.0
25/1800	C6JN	29.0	87.3	120/39	1003.4
25/1800	C6YE	23.3	86.5	180/44	1002.0
25/1900	DGNB	27.7	93.6	350/37	1002.3
25/2000	DGNB	27.7	93.8	350/37	1002.1
25/2100	DGNB	27.7	94.0	350/39	1002.3
25/2100	C6FM7	27.8	94.1	080/35	999.0
25/2100	C6JN	28.9	87.2	120/39	1000.0
25/2100	LANR5	27.0	94.2	010/37	1001.9
25/2300	DGNB	27.6	94.4	350/35	1003.0
25/2300	3FZQ7	26.9	86.4	160/45	992.0

Date/Time (UTC)	Ship call sign	Latitude (°N)	Longitude (°W)	Wind dir/speed (kt)	Pressure (mb)
26/0000	C6JN	28.8	87.1	110/50	998.3
26/0000	PFAS	27.5	87.5	130/37	995.6
26/0000	C6YE	25.3	87.0	180/45	1008.5
26/0000	WRFJ	27.7	85.8	130/38	1002.7
26/0200	DGNB	27.5	94.9	340/35	1004.9
26/0300	C6JN	28.8	87.1	120/50	995.4
26/0300	GOVL	25.5	85.9	170/34	1002.5
26/0600	PEBP	26.6	84.4	140/41	1006.8
26/0600	WRFJ	28.0	85.4	130/42	1003.5
26/0600	GOVL	25.8	86.6	180/34	1000.8
26/0600	C6JN	28.8	87.0	140/49	995.0
26/1200	C6YE	29.2	87.6	150/36	994.0
26/1500	C6JN	28.6	87.0	200/40	997.0
26/2100	C6JN	30.1	88.6	220/38	995.4

Table 3. Selected buoy and C-MAN observations for Isidore 14-27 September.

Location	Minimum Sea Level Pressure		Maximum Surface Wind Speed			Storm surge (ft) <sup>c</sup>	Storm tide (ft) <sup>d</sup>	Total rain (in)
	Date/time (UTC)	Press. (mb)	Date/time (UTC) <sup>a</sup>	Sustained(kt) <sup>b</sup>	Gust (kt)			
<b>Gulf of Mexico</b>								
42002 (25.2°N 94.4°W)			25/2000	34	42			
42003 (25.9°N 86.0°W)	25/2100	1000.2	26/0000	38	48			
42039 (28.8°N 86.1°W)	26/0800	998.0	26/0800	38	45			
42040 (29.2°N 88.2°W)	26/0900	989.5	26/0030	39 *	51			
42041 (27.5°N 90.5°W)	26/0500	988.6	26/0700	34	40			
42007 (30.1°N 88.8°W)	26/1200	987.1	26/0310	46 *	58			
CSBF1 (29.7°N 85.4°W)	26/1300	1001.1	26/0800	40	50			
BURL1 (28.9°N 89.4°W)	26/0900	984.7	25/2300	46	59			
DPIA1 (30.3°N 88.1°W)	26/0900	989.5	26/1000	42	52			
GDIL1 (29.3°N 90.0°W)	26/0900	986.6	26/0440	37 *	62			

<sup>a</sup> Date/time is for sustained wind when both sustained and gust are listed.

<sup>b</sup> Except as noted, sustained wind averaging periods for C-MAN and land-based ASOS reports are 2 min; buoy averaging periods are 8 min.

<sup>c</sup> Storm surge is water height above normal astronomical tide level.

<sup>d</sup> Storm tide is water height above National Geodetic Vertical Datum (1929 mean sea level).

\* 10-min

Table 4. Selected surface observations for Isidore, 14-27 September, 2002.

Location	Minimum Sea Level Pressure		Maximum Surface Wind Speed			Storm surge (ft) <sup>c</sup>	Storm tide (ft) <sup>d</sup>	Total rain (in)
	Date/time (UTC)	Press. (mb)	Date/time (UTC) <sup>a</sup>	Sustained (kt) <sup>b</sup>	Gust (kt)			
<b>Jamaica</b>								
Kingston	18/0900	1007.5	18/1045		41			
Cotton Tree Gully								27.2
Mount Nelson								18.9
Cedar Valley								18.9
<b>Cayman Islands</b>								
Cayman Brac	19/0325	1001.0	19/0325	42	61			
<b>Cuba</b>								
<i>Isla de la Juventud</i>								
78324 Punta del Este	20/1000	1000.6	20/1310	50	71			24.6
78321 La Fe	20/1500	999.9	20/1045	54	72			19.6
78309 Cuba-Francia	20/1100	999.5	20/1235	43	71			13.9
78221 Nueva Gerona	20/1100.	1004.2	20/1200	45	67			17.9
<b>Pinar del Rio</b>								
78310 Cabo San Antonio	21/0600	991.4		37	57			14.6
78315 Pinar del Rio	21/2100	990.9	20/2150	46	63			13.9
78317 Paso Real	21/2220	995.7	21/1745	38	50			14.0
78313 Isabel Rubio	21/2140	<b>970.0</b>	22/0030	54	74			21.7
78312 Santa Lucia	21/0000.	992.6						6.3
78316 La Palma	21/0000	993.6	22/0130		53			
78318 Bahia Honda	21/0000	1001.9	22/1540	53				6.0
78314 San Juan	21/2140	990.4	21/0045	37	58			17.6
78311 La Bajada								22.3
<b>Mexico</b>								
<b>Yucatan</b>								
Merida	23/0000	969.9	22/2350	43	70			5.8
<b>United States</b>								
<b>Alabama</b>								
Dauphin Island	26/1300	989.5						
Mobile State Docks							5.9	

Location	Minimum Sea Level Pressure		Maximum Surface Wind Speed			Storm surge (ft) <sup>c</sup>	Storm tide (ft) <sup>d</sup>	Total rain (in)
	Date/time (UTC)	Press. (mb)	Date/time (UTC) <sup>a</sup>	Sustained (kt) <sup>b</sup>	Gust (kt)			
Middle Bay Light House						6.1		
Brookley Field	26/1343	992.0	26/1129	40	50			
Bay Minette								11.0
Mobile	26/1410	991.0	26/1226	42	50			8.7
Semmes	26/1345	991.0						11.9
<b>Louisiana</b>								
Belle Chasse Naval Air	26/1053	985.1	26/0155	50	60	7.48		
New Orleans	26/1207	985.1	26/0525	35	42			
New Orleans Int. Airp.	26/1147	985.8	26/0757	40	47			7.5
Boothville	26/0953	985.8	26/0440		37			5.3
East Lake Pontchartrain			26/0510		36			
Slidell	26/1226	985.1						4.4
Rigoletes						8.3		
Sea Rim State Park			25/2144		35			
<b>Mississippi</b>								
Gulfport	26/1359	987.1	26/0725		43	8.26		5.5
Pascagoula	26/1316	989.9	26/1310		35			4.8
Kessler	26/1200	987.1	26/0155		41			
Point Cadet								
<b>Florida</b>								
Pensacola	26/1153	995.0	26/0258		44		5.2	9.1
Pensacola Naval Air (NPA)			26/1256		43			6.7
Destin			26/1221	35	45			6.1
Eglin Air Force (VPS)			26/1340		46			
Hurlburt Field (HRT)			26/0839		49			
Pensacola Beach			26/0130		55			
Perdido Key			26/0330		47			
Pensacola Escambia			26/0830		49			
Fort Walton Beach			26/0807		44			
Apalachicola (ASOS)			26/1258		38			
Panama City (ASOS)			26/0653		35			

Same legend as in Table 3 apply.

Table 5. Preliminary forecast evaluation (heterogeneous sample) for Isidore, 14-27 September, 2002. Forecast errors for tropical storm and hurricane stages (n mi) are followed by the number of forecasts in parentheses. Errors smaller than the NHC official forecast are shown in bold-face type.

Forecast Technique	Forecast Period (h)				
	12	24	36	48	72
CLP5	44 (30)	96 (28)	164 (26)	240 (24)	384 (20)
GFDI	33 (32)	58 (30)	87 (28)	115 (26)	188 (22)
GFDL	34 (29)	<b>52 (27)</b>	85 (25)	119 (23)	<b>164 (20)</b>
LBAR	38 (30)	84 (28)	137 (26)	201 (24)	327 (20)
AVNI	<b>27 (30)</b>	<b>43 (28)</b>	<b>55 (26)</b>	<b>68 (24)</b>	<b>116 (20)</b>
AVNO	35 (30)	<b>45 (28)</b>	<b>63 (26)</b>	<b>75 (24)</b>	<b>122 (20)</b>
AEMI	<b>28 (26)</b>	<b>49 (25)</b>	73 (23)	<b>99 (22)</b>	<b>155 (19)</b>
BAMD	38 (30)	67 (28)	91 (26)	133 (24)	242 (20)
BAMM	46 (30)	77 (28)	99 (26)	139 (24)	247 (20)
BAMS	57 (30)	95 (28)	123 (26)	161 (24)	256 (20)
NGPI	42 (33)	60 (31)	80 (29)	<b>100 (27)</b>	<b>133 (23)</b>
NGPS	34 (33)	<b>45 (31)</b>	<b>57 (29)</b>	<b>78 (27)</b>	<b>105 (23)</b>
UKMI	38 (32)	74 (30)	101 (28)	132 (26)	209 (22)
UKM	<b>31 (16)</b>	<b>50 (15)</b>	100 (14)	121 (13)	194 (11)
A98E	42 (30)	74 (28)	98 (26)	131 (24)	258 (20)
A9UK	45 (15)	77 (14)	118 (13)	158 (12)	283 (10)
GUNS	<b>31 (33)</b>	<b>53 (31)</b>	<b>72 (29)</b>	<b>95 (27)</b>	<b>151 (23)</b>
GUNA	<b>29 (32)</b>	<b>47 (30)</b>	<b>64 (28)</b>	<b>85 (26)</b>	<b>140 (22)</b>
OFCL	32 (31)	55 (31)	73 (29)	101 (27)	177 (23)
NHC Official (1992-2001 mean)	43 (2199)	81 (1965)	115 (1759)	148 (1580)	222 (1272)

Table 6. Watch and warning summary for Isidore, 14-27 September, 2002.

Date/Time (UTC)	Action	Location
18/0300	Tropical storm warning issued	Jamaica
18/0300	Tropical storm watch issued	Cayman Islands
18/1500	Tropical storm warning issued	Little Cayman and Cayman Brac
18/1500	Hurricane watch	Cuba from Villa Clara westward including the Isle of Youth.
18/1800	Tropical storm warning extended	Grand Cayman
19/0000	Hurricane warning issued	Cienfuegos and Villa Clara westward including the Isle of Youth.
19/0000	Hurricane watch extended	to include Santic-Spiritus and Ciego de Avila
19/0900	Tropical Storm warning discontinued	Jamaica
19/2100	Tropical storm watch issued	Lower Florida Keys west of the seven mile bridge including Dry Tortugas.
19/2100	Hurricane watch discontinued	Cuba east of Matanzas
20/1100	Tropical storm warning discontinued	Cayman Islands
20/1500	Tropical sorm watch discontinued	Lower Florida Keys west of the seven mile bridge including Dry Tortugas
20/1500	Tropical storm warning and a hurricanes watch	Yucatan from Progreso to Tulum including Cozumel
21/0900	Hurricane warning issued	Cabo Catoche to Progreso and Cozumel
21/1100	Hurricane warning extended	Tulum to Cabo Catoche
21/1200	All warnings discontinued	except for Pinar del Rio and the Isle of Youth
22/1000	Hurricane warning extended	Yucatan from Progreso to Campeche
22/1500	all warnings discontinued	Cuba for Pinar del Rio and the Isle of Youth.
23/0545	Tropical Storm warning issued	Mexico from Campeche to Veracruz

23/0545	Hurricane warning discontinued	Mexico from Tulum to Cabo Catoche
23/1500	Hurricane warning replaced by tropical storm warning	Cabo Catoche to Veracruz
24/1500	Hurricane watch issued	Cameron Louisiana to Pascagoula Mississippi.
24/1500	Tropical storm warning issued	High Island Texas to Destin Florida.
24/2100	Tropical storm warning discontinued	Mexico west of Campeche
25/1500	Tropical storm warning extended	along the Florida coast to St. Marks
25/1500	all warnings discontinued	Yucatan
26/0900	Hurricane watch discontinued	Cameron to Pascagoula
26/1500	Tropical storm warning discontinued	west of Morgan City, Louisiana
26/1800	Tropical storm warning discontinued	west of the mouth of the Mississippi River.
26/2100	All coastal warnings discontinued	mouth of the of the Mississippi River to St. Marks



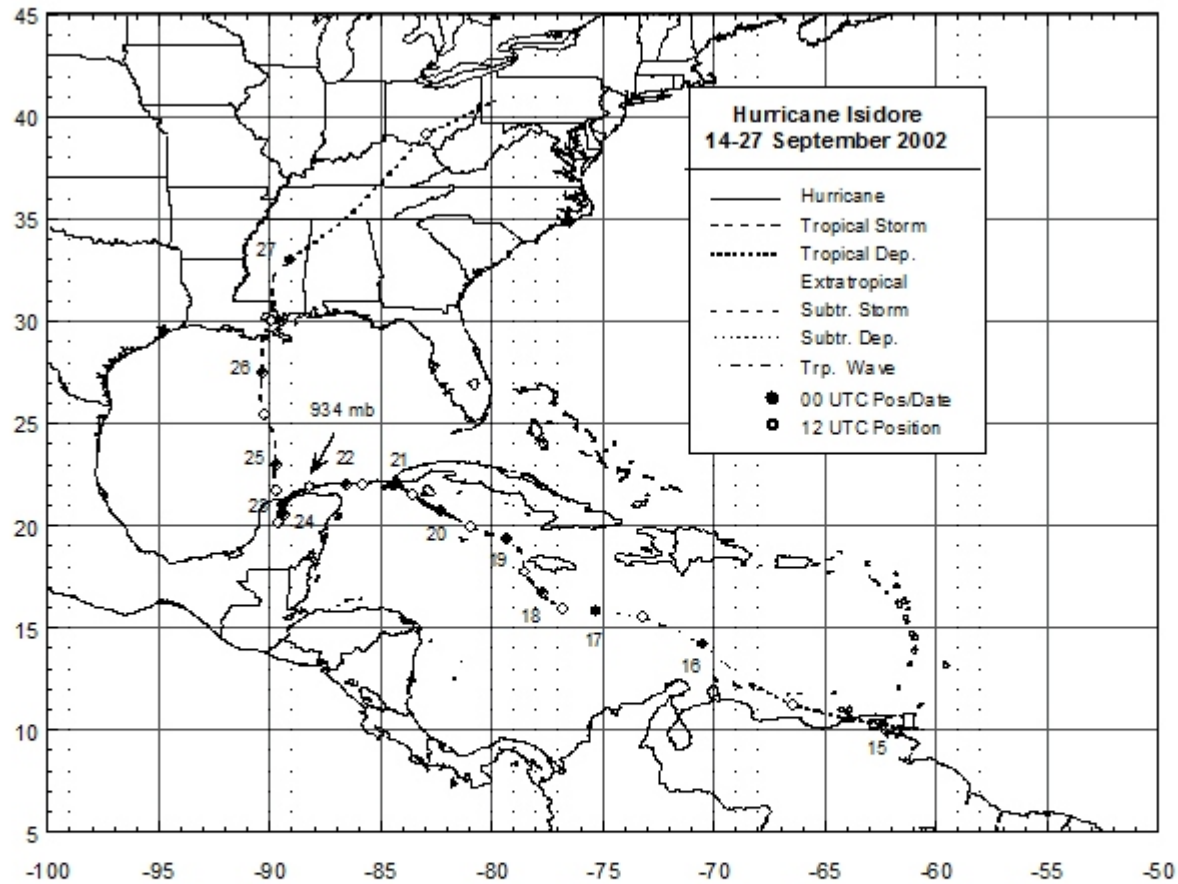


Figure 1a. Best track positions for Isidore, 14- 27 September 2002. Track after 0000 UTC 27 September is based on analyses from NOAA Hydrometeorological Prediction Center.

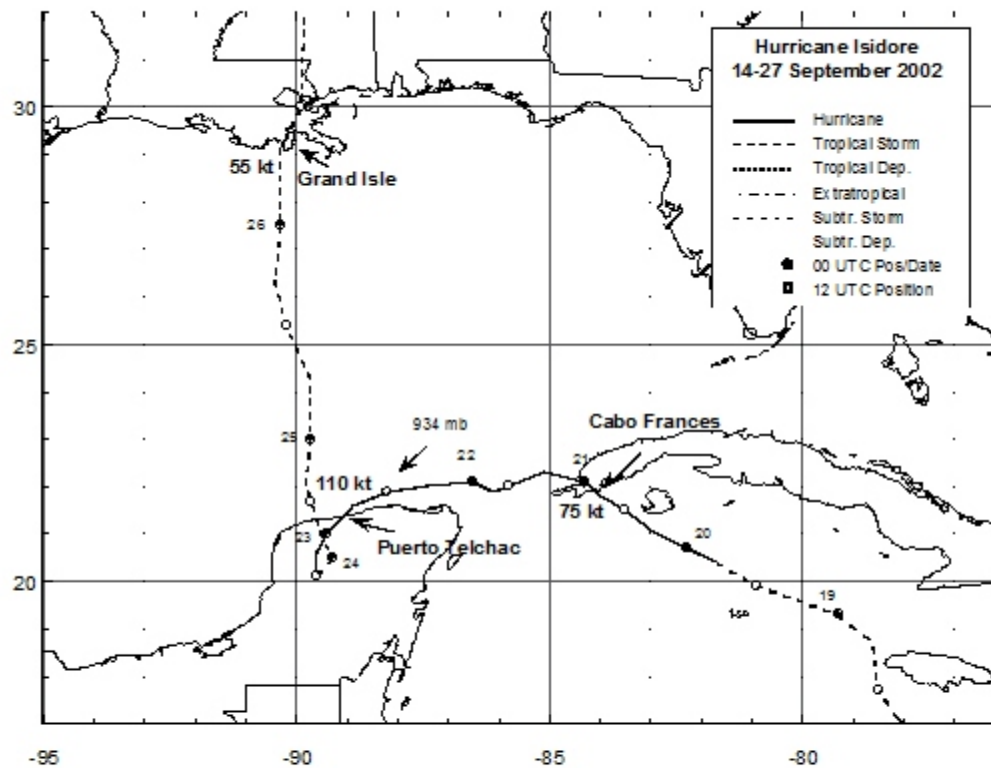


Figure 1b. Best track positions for Isidore, 14- 27 September 2002 denoting the landfall points.

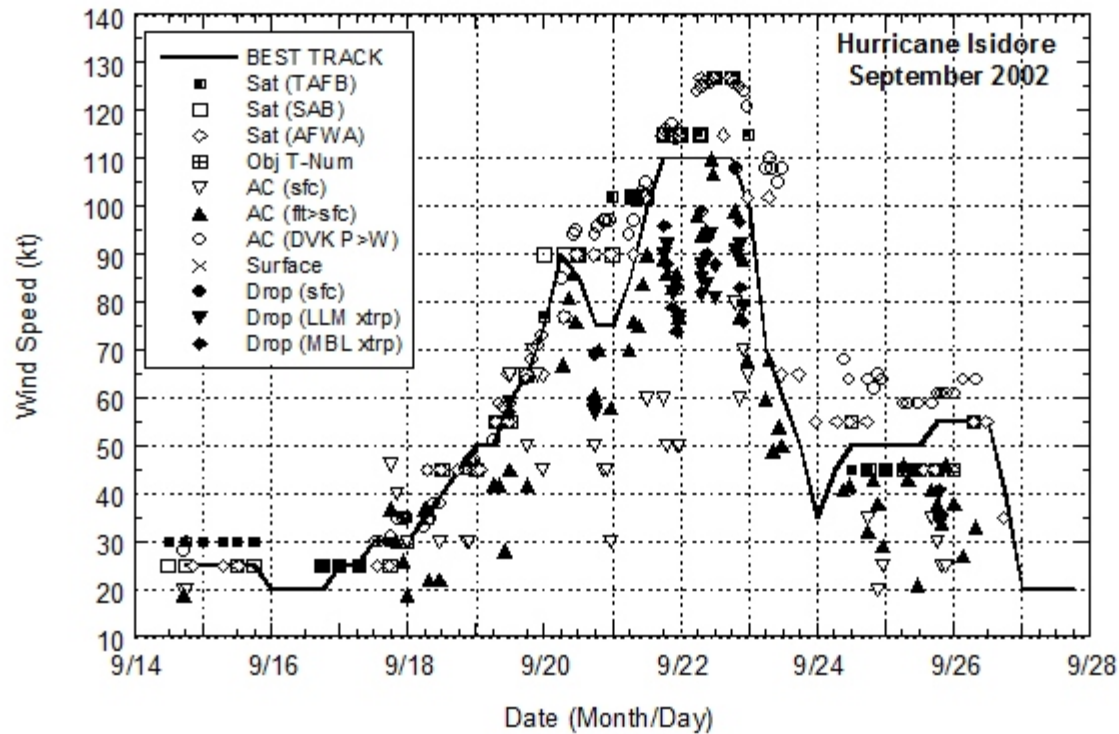


Figure 2. Selected wind observations and best track maximum sustained surface wind speed curve for Isidore, 14-27 September 2002. Aircraft observations have been adjusted for elevation using 90%, 80%, and 80% reduction factors for observations from 700 mb, 850 mb, and 1500 ft, respectively. Dropwindsonde observations include actual 10 m winds (sfc), as well as surface estimates derived from the mean wind over the lowest 150 m of the wind sounding (LLM), and from the sounding boundary layer mean (MBL).

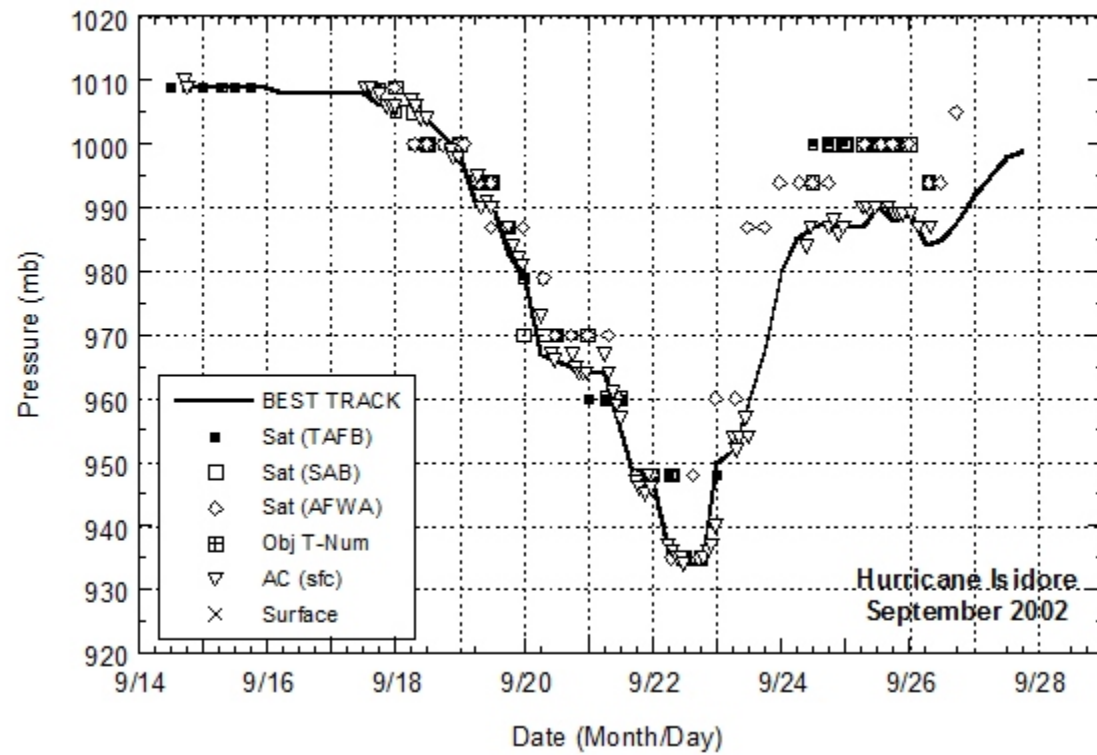


Figure 3. Selected pressure observations and best track minimum central pressure curve for Isidore, 14-27 September, 2002.

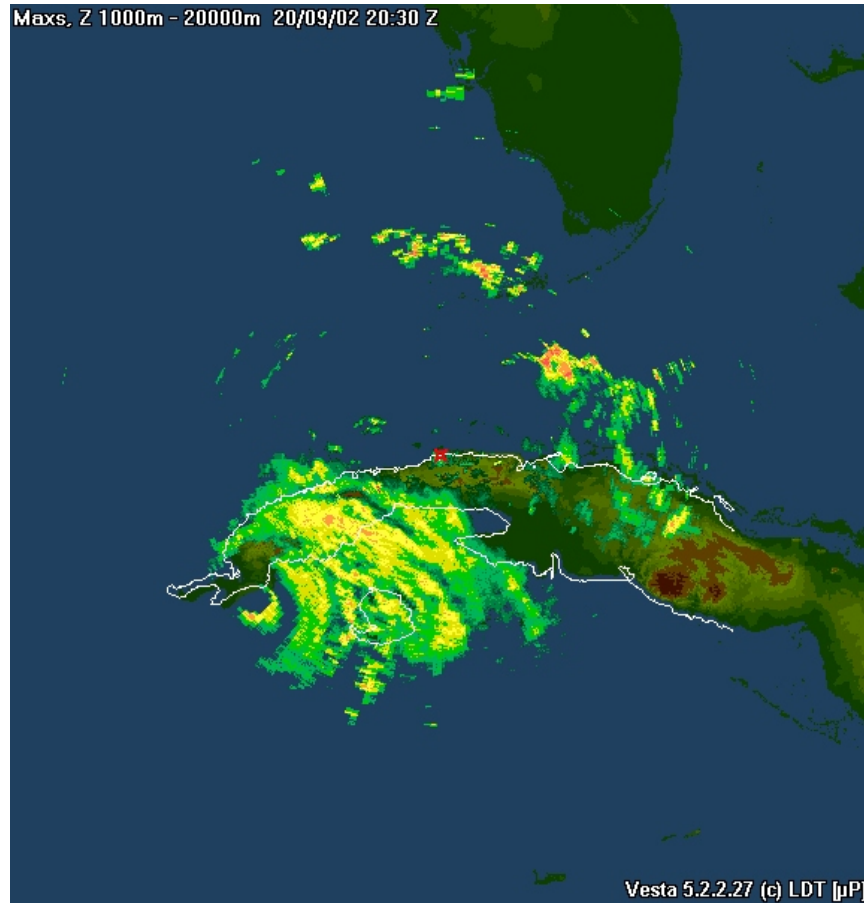


Fig. 4.a. Image from Havana radar provided by the Instituto de Meteorologia, Cuba during the time Isidore was making landfall in western Cuba.

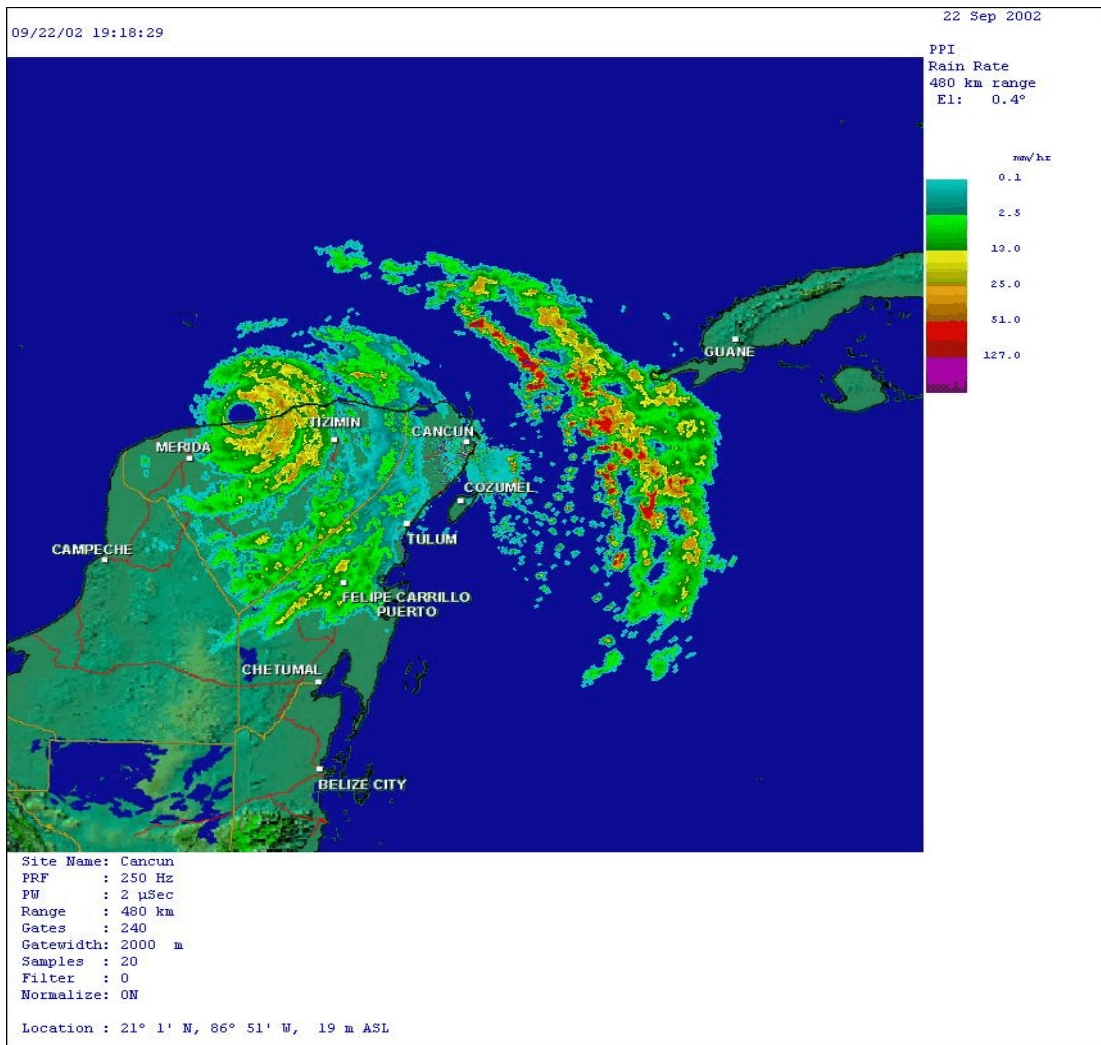


Fig. 4.b. Image from Cancun radar provided by the *Servicio Meteorologico Nacional* of Mexico during the time Isidore was making landfall near Puerto Telchac, Yucatan.