Preliminary Report
Hurricane Ismael
12-15 September 1995

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Hurricane Ismael, a short-lived Category 1 hurricane on the Saffir/Simpson Hurricane Scale that made landfall near Topolobampo, Mexico, resulted in a large loss of life in the Gulf of California.

a. Synoptic History

Satellite imagery showed a poorly organized area of cloudiness and showers centered about 150 n mi south of the coast of Guatemala on 9 September. The tropical disturbance moved slowly west-northwestward for the next couple of days without signs of development. On 12 September a cloud system center became evident in satellite imagery, and analysts from both the NESDIS Synoptic Analysis Branch (SAB) and the NHC began Dvorak classifications at 1200 UTC on this day.

Convective banding became organized and the "best track" (Figure 1 and Table 1) indicates that a tropical depression formed at 1800 UTC 12 September about 300 n mi south-southwest of Manzanillo, Mexico. The depression began to move toward the northwest near 7 knots.

Deep convection increased near the center, and satellite intensity estimates suggest that the depression strengthened into Tropical Storm Ismael at 0000 UTC 13 September. The storm turned more toward the north, apparently in response to a mid- to upper-level low over Baja California observable in water vapor imagery.

Upper-level outflow became well-established as deep convection continued to develop on 13 and 14 September. It is estimated that Ismael strengthened into a hurricane while centered about 250 n mi south-southeast of the southern tip of Baja California at 0600 UTC 14 September. Satellite analysts at both SAB and NHC indicated hurricane intensity at this time. On the 14th a poorly-defined eye became visible in satellite pictures, and Ismael is estimated to have reached a maximum intensity of 70 knots by 1200 UTC.

Forward motion of the hurricane increased to 18 knots on the 14th as the hurricane was steered by the mid- to upper-level trough to the west and a deep-layer-mean ridge to the east. Ismael made landfall near 0400 UTC 15 September in the vicinity of Topolobampo, Mexico.

The tropical cyclone weakened rapidly as the circulation moved over the Sierra Madre Mountains of northern Mexico, and it dissipated by 0000 UTC 16 September. However, considerable

moisture from Ismael quickly spread over the southwestern U.S. and continued eastward through the mid-Atlantic states.

b. Meteorological Statistics

Best track positions and intensities were derived primarily from Dvorak technique estimates. Figures 2 and 3 show the curves of minimum central pressure and maximum one-minute wind speed, respectively, versus time, along with the observations on which they are based. Table 2 lists ship reports with tropical storm force winds in the vicinity of Ismael.

c. Casualty and Damage Statistics

Newspapers reported 105 deaths and several more missing in association with Ismael. According to limited records of casualties along the west coast of Mexico available at the NHC, this makes Ismael the fifth deadliest eastern Pacific hurricane this century. Many of those who died were on fishing boats that encountered strong winds and high seas in the Gulf of California. The Associated Press reported thousands homeless as a result of the hurricane and about 5000 "rickety houses" destroyed. Some of the worst damage was in the village of Topolobampo, Mexico, located a few miles to the south of Los Mochis. Houses and telephone poles were knocked down in Los Mochis, but no deaths were reported there.

d. Forecast and Warning Critique

Since Ismael was a short-lived cyclone, there were only a limited number of official forecasts that were verified. During the time when Ismael was a tropical storm or hurricane, the average official track forecast errors were 57 (9 cases), 166 (7 cases), 311 (5 cases) and 445 (3 cases) n mi at 12, 24, 36 and 48 hours. These were two to three times as large as the NHC historical (1988-1994) average, but not atypical for northward moving storms.

In the early stages of Ismael, most track prediction models indicated a westward or northwestward motion away from land (for example, see Fig. 4). Only the GFDL model consistently predicted a northward motion toward Mexico. Unfortunately, confidence in the GFDL in the eastern Pacific was low due to experience with previous storms which were erroneously forecast to move northward by the GFDL. In 1994, the deep-layer BAM had the lowest forecast errors at most time periods. The NHC official forecasts for Ismael, even though large, were still less than the forecast errors from the deep-layer BAM at all time periods. Although it cannot easily be determined how many of the Mexican rawinsonde data were included in the NMC model initializations, forecasters received data from the closest upper-air stations of Socorro, Mazatlan and Empalme intermittently. Data from Socorro and Empalme were missing from NHC upper-air plots for 1200 UTC on 12-15 September and from

Mazatlan at 0000 UTC on 13 September. No upper-air soundings were taken from the Baja peninsula. This lack of sufficient upper-air data likely contributed to poor initializations. Even with complete Mexican rawinsonde data, however, recurving storms near Baja are usually difficult to forecast, in part due to the sparsity of upper-air data between Mexico and Hawaii.

Intensity forecasts showed a slight negative bias (i.e., intensity was underestimated) on 13 September, and a positive bias (i.e., intensity was overestimated) thereafter. The positive bias was a result of the cyclone moving over land and weakening faster than forecast.

Usual uncertainty exists in determining the best track intensity when only satellite estimates are available. It is interesting to note from Figure 3 that the intensity estimates from the Air Force Global Weather Central never exceeded 45 knots.

Table 3 lists the watches and warnings issued by the Government of Mexico.

Table 1. Preliminary best track, Hurricane Ismael, 12-15 September 1995.

Date/Time (UTC)	Position Lat. (°N)	Lon. (°W)	Pressure (mb)	Wind Speed (kt)	Stage
12/1800	14.8	106.7	1009	30	Trop. Depression
13/0000	15.4	107.1	1005	35	Tropical Storm
0600	16.0	107.4	1002	40	"
1200	16.5	107.7	1000	45	"
1800	17.4	108.0	995	50	"
14/0000	18.3	108.1	990	60	"
0600	19.4	108.2	985	65	Hurricane
1200	20.8	108.5	983	70	"
1800	22.6	108.8	984	70	"
15/0000	24.4	109.0	986	70	"
0600	26.2	109.1	990	60	Tropical Storm
1200	28.3	109.2	1000	45	"
1800	30.5	109.0	1008	30	Trop. Depression
16/0000					Dissipated
14/1200	20.8	108.5	983	70	Minimum Pressure
Landfall: Topolobampo, Mexico 15/0400	25.6	109.1	988	70	Hurricane

Table 2. Ship encounters of 34-knot or higher winds, Hurricane Ismael, 1995.

Tropical Cyclone	Ship Call Sign	Date Mo/Da	Time UTC	Position LatN LonW	Wind (kt) Dir/Speed	Pressure (mb)
Ismael	**LAOQ2**	9/13	2300	21.1 108.3	080/40	1006.5
	OULL2	9/14	0000	19.9 106.0	120/35	1005.1
	LAOQ2	9/14	0200	20.6 107.6	130/50	1005.0
	LAOQ2	9/14	0500	20.2 107.0	130/40	1003.0
	3ECQ9	9/14	0500	19.9 106.6	130/59	1003.0
	ELC05	9/14	0600	19.7 106.1	130/39	1007.0
	ELOC5	9/14	1200	20.4 107.1	150/36	1003.0
	M/V CALIFORNIA	9/14	1800	22.2 106.1	180/45	1008.0

Table 3. Watch and warning summary, Hurricane Ismael, September 1995.

Date/Time (UTC)	Action/Location
14/0300	Tropical Storm Warning issued from Manzanillo to Cabo Corrientes and for Las Islas Marias
14/0900	Tropical Storm Warning extended northward on the Mexican mainland to Los Mochis and for the Baja peninsula south of 25°N
14/0900	Hurricane Watch issued for the Mexican mainland from Mazatlan to Los Mochis and for the Baja peninsula south of 25°N
14/1200	Hurricane Warning issued for the Baja peninsula from La Paz southward
14/1500	Hurricane Warning issued for the Baja peninsula south of 25°N
14/1800	Hurricane Warning issued for the Mexican mainland from Mazatlan to Los Mochis
14/2100	Hurricane Warning extended northward on the Mexican mainland to Guaymas
15/0600	Tropical Storm Warning discontinued from Manzanillo to Mazatlan and for Las Islas Marias
15/1200	All watches and warning discontinued

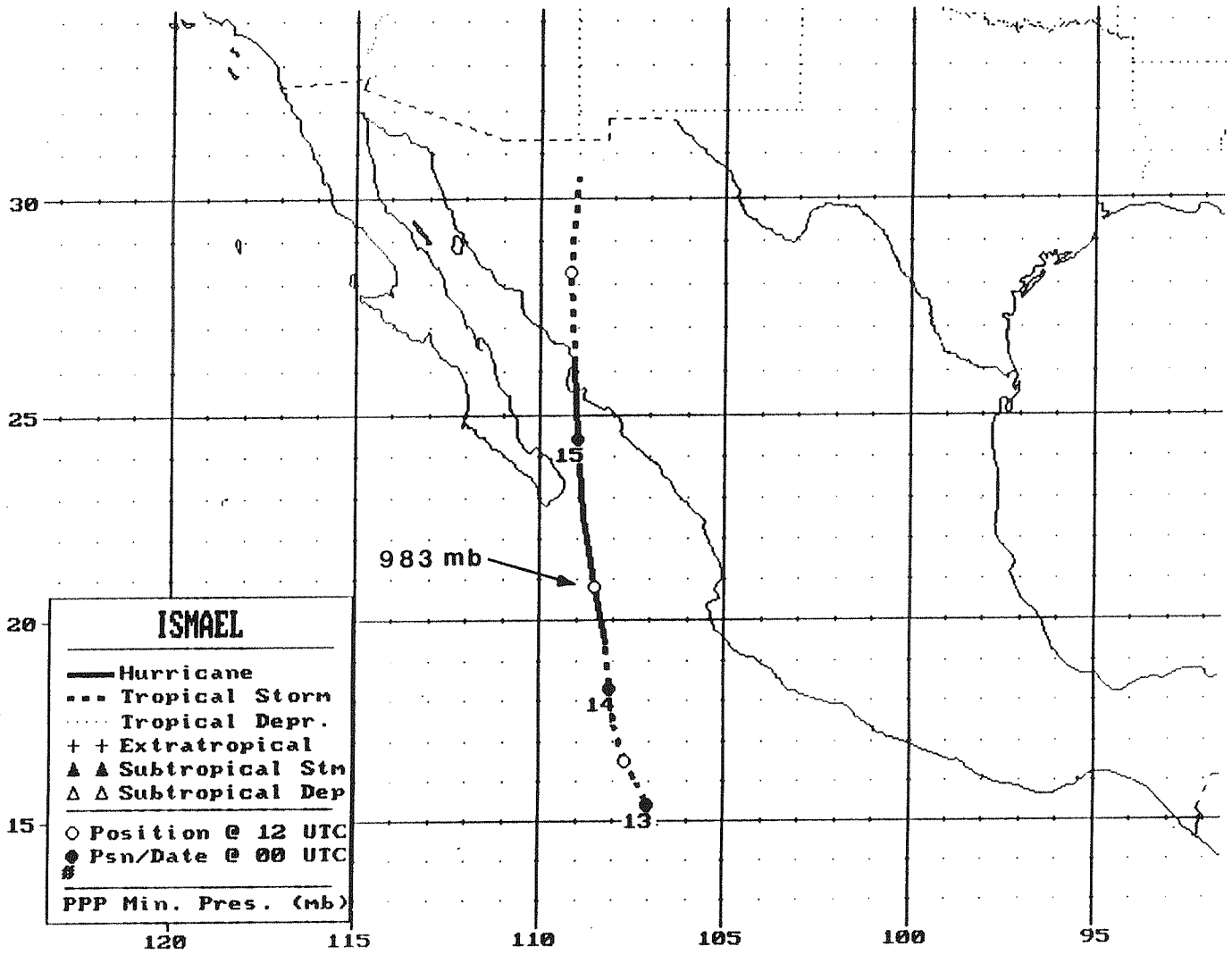

Figure 1. Best track positions for Hurricane Ismael, 12-15 September 1995.

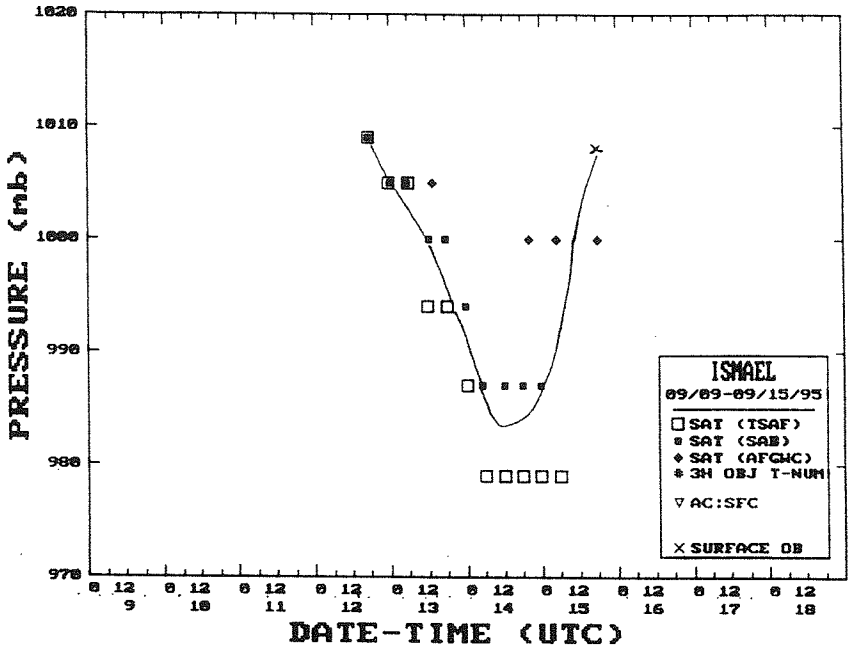

Figure 2. Best track minimum central pressure curve for Hurricane Ismael.

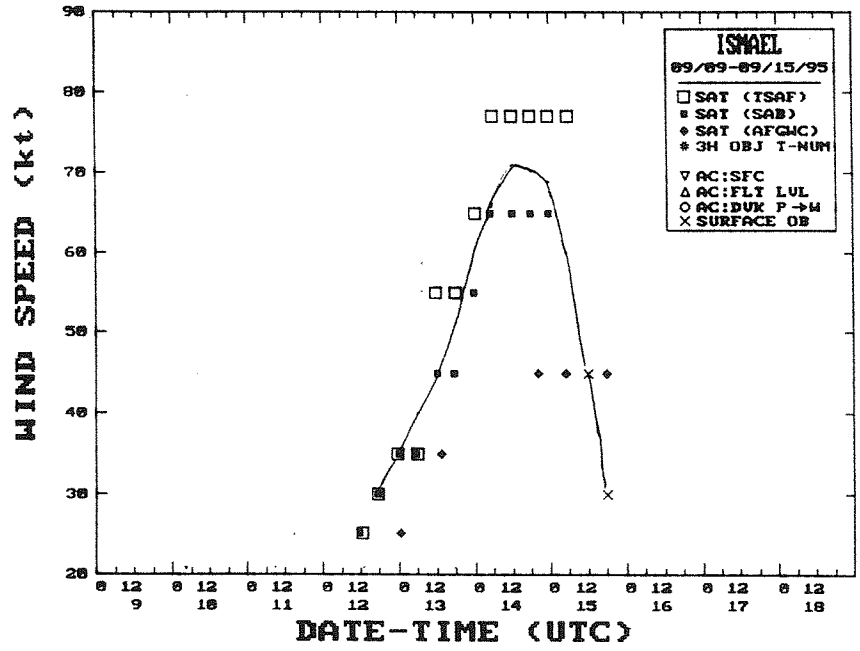

Figure 3. Best track maximum sustained wind speed curve for Hurricane Ismael.

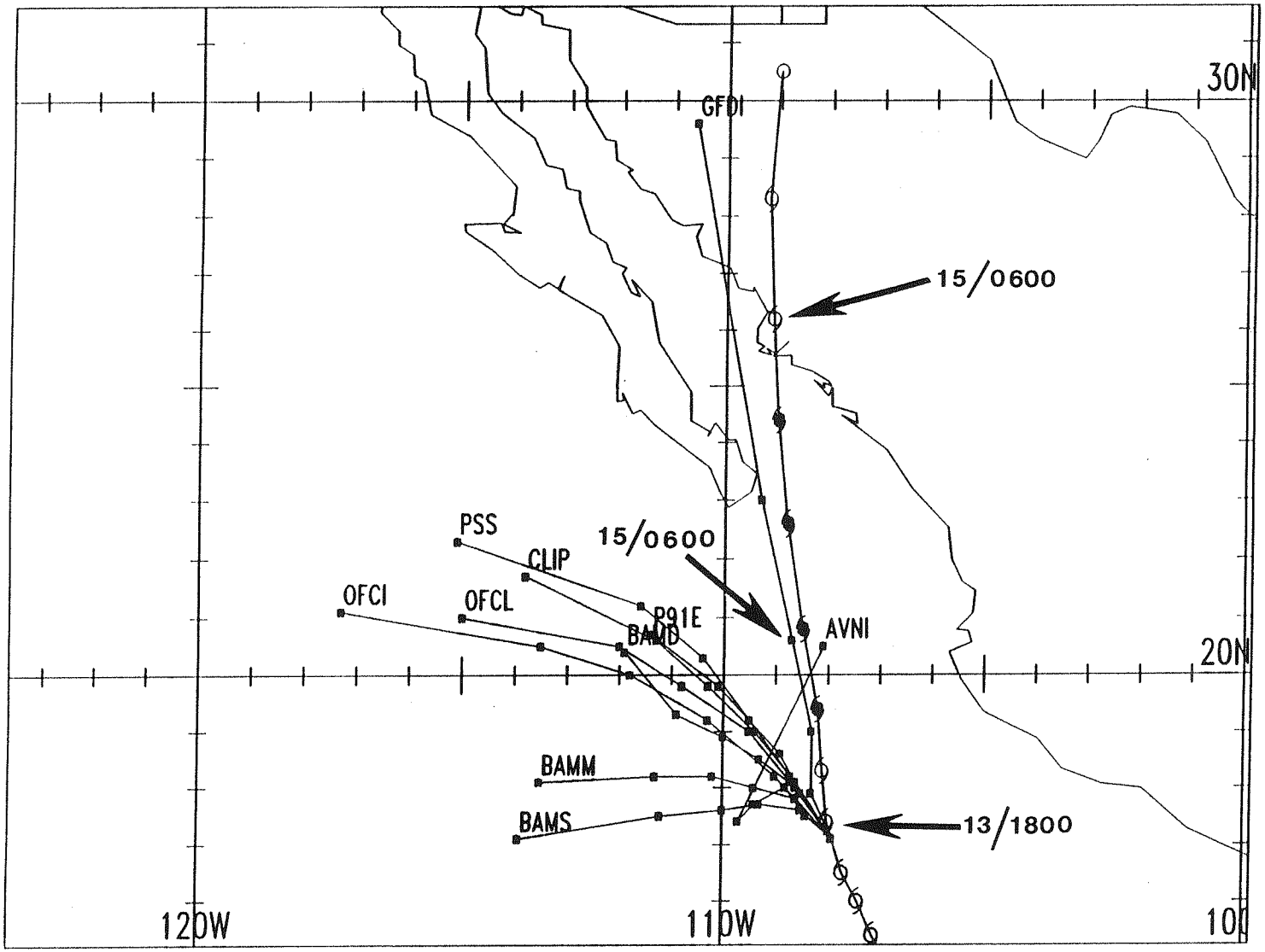

Figure 4. Track prediction models from 1800 UTC 13 September for Hurricane Ismael, 1995. The GFDI (an interpolated and extrapolated intermediate-time version of the GFDL) had the right direction for Ismael at this early time, but even it was very slow compared to the actual track. The GFDI predicted the hurricane to pass Topolobampo at about 60 hours after the initial time. Ismael arrived at about 34 hours.