

**Comments on the Re-Analysis of the 1959 Manzanillo Mexico Hurricane—
WITH RESPONSES FROM ANDREW HAGEN & JOSH MORGERMAN**

General Comments:

1. The Committee thanks Josh, Andy, and their collaborators for the excellent work they did on the re-analysis of this cyclone.

Thank you very much.

2. In the past, the Committee has followed a principle of not changing the existing HURDAT track when there is not conclusive data. The existing track for this system (appended to the end of the comments) looks very problematic, and it is very difficult to smoothly merge it with the proposed changes. Therefore, there will be an exception to that rule for this system, with the modified HURDAT not giving a lot of weight to the original HURDAT entry.

Agreed.

3. Has the archive of all of the relevant observations and publications been completed? In particular, the Committee would be interested in seeing the Boletin Hidrologico No. 16 published by the Mexican government with the associated damage accounts.

Yes, all sources cited in the reanalysis can be found in the Dropbox folder linked to at the beginning of the [Sources](#) section: <http://goo.gl/PRhXGk>

For the Boletin Hidrologico No. 16, we worked off of a transcript of this document provided in the Appendix of the Lozoya book, [El huracan del 59](#). In the Dropbox folder, [Boletin_Hidrologico_No16.pdf](#) is a scan of these pages of the book. (We were unable to track down the original Boletin Hidrologico document but believe this transcript is fine for our purposes.) Of course, quotes of the Boletin Hidrologico in our reanalysis are translations from the original Spanish.

Specific Comments:

1. The Committee general concurs with the proposed revisions to the track positions. Is there a way to smooth through the apparent kink in the track that occurs in the last 12 hours before landfall?

The recommended positions that were submitted as of 02.20.15 were:

10/27 00Z: 18.4N, 105.1W

10/27 06Z: 18.7N, 104.7W

10/27 12Z: 19.1N, 104.4W

We have re-revised this to 18.8N, 104.7W (smoothing).

The 12Z landfall position should remain at 19.1N, 104.4W based on the observations near the time of landfall. Based on the available data at 00Z and 06Z, the 00Z position is a little more confident than the 06Z position, so the 06Z position can be adjusted slightly for smoothing if need be. Although the 06Z position could be adjusted either north to 18.8N or west to 104.8W, the former is selected for a

re-revised 06Z position of 18.8N, 104.7W. Data from landfall indicate that the hurricane may have slowed down temporarily for a couple of hours right around the time of landfall. This re-revised track indicates a faster motion from 00Z-06Z and a slower motion from 06Z-12Z. Overall though, the line is now smoother despite showing more deceleration from 00Z to 12Z. The data also allow for the 00Z position to be adjusted by 0.1 degree (if deemed necessary by the committee for smoothing purposes), but this has not been recommended or implemented here.

2. The Mariners Weather Log has a ship report at 2100 UTC 23 October of 40 kt and 1005 mb near 15.4N 98.8W. Could this be added to the list of observations?

This observation has now been added to the Excel spreadsheet of observations. Please note that the ship shows up in COADS with ship identifier 237, with gales at 18Z and 00Z, as it traveled toward the ESE, passing N of the tropical storm.

3. There are several aspects of the landfall that need more clarification:

3a. Could a distance scale be added to the zoomed-in map of the landfall area?

We've added a distance scale (in nautical miles) to the zoomed-in Landfall Map,—please see attached. When using the interactive Google map mentioned in the [Interactive Map](#) section (link: <http://goo.gl/tM5rfc>), the map's distance tool can be used to measure any distances in statute miles or kilometers.

3b. The estimated eye diameter is 11 n mi, and the estimated forward speed at landfall is 5-6 kt. This suggests that some part of the landfall area should have had a calm of 1-2 hours duration. Are there any accounts of such a long calm period from the Manzanillo area? Any such information would help pin down the landfall area and eye size.

We are not aware of any additional accounts aside from the ones mentioned in our sources, which are discussed in the metadata write-up. Today the city of Manzanillo stretches around most of Manzanillo and Santiago Bays—however in 1959 the city was apparently much smaller, and confined closer to the actual port area (coordinates: 19.052222N 104.315833W), which was at the right edge of the eye. While the exact location of Mr. Luis Garcia Castillo is unknown, we suspect he was in or near the port area.

3c. The lowest pressure on the ship **Mary Barbara** was recorded near 1115 UTC. On the other hand, the ship **Cacalilao** (in Manzanillo Harbor) and the director of the Manzanillo observatory both reported a minimum pressure near 1210-1230 UTC. If the position of the **Mary Barbara** is shown correctly on the map, these observations are no more than a couple of nautical miles apart. This makes it hard to understand the one hour difference in the observed minimum pressures. Is it possible that the UTC times of these data are not correct? Is it possible that the **Mary Barbara** was in a position other than that shown on the map, so it might have encountered the eye earlier than the other two stations? Please clarify this if possible.

The UTC times are correct. Although the forward speed averaged over 6 or 12 hours was around 5 kt, one possible explanation is that the hurricane may have slowed down temporarily to 2 or 3 kt for an hour or two during the time of landfall. All three obs (MARY BARBARA, CACALILAO, and Manzanillo)

were all definitely inside the RMW, and they all were very near the right edge of the eye. Without a high time-resolution barometer trace, it is difficult to know what the pressures were at all times within 1 hour before and 1 hour after the minimum pressure was recorded. It is interesting to note that MARY BARBARA's pressure had only recovered slightly to 963 mb by 1200Z after recording its minimum of 958 mb at 1115Z. We'd like to emphasize that we estimated the locations of the two ships as best we could, given the available information. These locations should not be deemed 100% precise and definite.

3d. It is also hard to reconcile the wind and pressure reports from the **Cacalilao**, where the lull in the winds to 60 kt occurred at least 80 minutes after the minimum pressure. Can a pressure be located for the time that the winds on the ship dropped to 60 kt?

Agreed, it is difficult to reconcile. It is very likely that the 963 mb observation recorded by the CACALILAO was in fact a minimum pressure observation, based on observations from the MARY BARBARA and Manzanillo along with knowledge of the locations of the three observations (MARY BARBARA, CACALILAO, and Manzanillo). The reported timing of this minimum pressure observation does not make sense alongside the reported wind speeds and wind shifts that were experienced. These observations were obtained from the MWL write-up, not actual barograph or anemometer traces. Those traces are not available. Perhaps the write-up contains a mistake and maybe the 963 mb pressure reading was recorded after 1210Z and during the lull.

3e. Pending the resolution of the above issues, the Committee concurs with the landfall intensity being reduced to 120 kt. It is possible that 115 kt may be better given the landfall central pressure near 955 mb, but that can be re-evaluated if the preceding issues can be resolved.

Thank you. Given its importance, we re-examined the 65 m/s (126 kt) official observation recorded by the Manzanillo Observatory anemometer. We once again called the Observatory's ex-supervisor, Mr. Raul Martinez Venegas (successor to Mr. Alejandro Ramos, the supervisor at the time of the hurricane). In this most-recent conversation (01.15.16), Mr. Venegas asserted that Mr. Ramos told him the 65 m/s was the maximum 1-minute wind speed measured by the anemometer—and there were higher estimated and unregistered peak gusts. We'd previously been told the 65 m/s was a peak gust of several seconds' duration, but this revised interpretation (that it was a 1-minute wind) makes much more sense, given that 65 m/s is listed in the "maximum wind" column of the official document. Assuming the 65 m/s (126 kt) was a 1-minute wind, this leads us to strongly favor 120 kt as the landfall intensity. We do not favor a higher intensity (such as 125 or 130 kt) due to 1) the height of the Observatory (on a hill, 45-50 m ASL), 2) uncertainties regarding the exposure of the anemometer due to nearby hills and mountains, 3) ongoing ambiguity over whether the reading was a peak gust or 1-minute wind, and 4) the pressure data from this hurricane (no readings lower than 958 mb).

4. The Committee notes that the account of the passage of the eye over the **Mary Barbara** in the Mariners Weather Log is unclear to whether the minimum pressure was measured during the apparent eye passage. The original account by Zeluff in the Proceedings of the Merchant Marine Council states clearly that the minimum pressure and the lull both occurred about 0415 ships time (1115 UTC).

We noticed this, too. There are small inconsistencies between the different MARY BARBARA accounts, and this aside, both accounts use imprecise language which makes interpretation difficult. We did our best to reconcile them. We believe probably the Zeluff version is the best, since it's the most in-depth

and gets into the most detail—and it was written in the first person by the actual captain. All versions are clear that the lowest pressure happened at 0415 ship time (1115Z). The Zeluff account (the most detailed one) suggests the sky lightened and the visibility improved around 1115Z or 1120Z. It also says “the eye passed over us about 0500 [1200Z].” If we’re understanding the account correctly, it means the minimum pressure roughly coincided with the beginning of the eye’s passage (~1115Z), and that the calm ended around 1200Z. The Mariners Weather Log suggests the eye was “encountered” at 1150Z but doesn’t mention start or end times for the calming, so it’s hard to interpret what is meant, exactly. (Saying the eye was “encountered” at that time suggests that the calming started then, but that would contradict Zeluff’s original version, and we believe this language might be simply editorial imprecision. Remember, this version was written by another person who is summarizing Zeluff’s account.) The accompanying data table in the Mariners Weather Log shows powerful hurricane winds at 1100Z and 1200Z, suggesting whatever calm happened between these two hour marks.

5. Please re-check the reported wind velocity of 75 kt in Colima. While this is not impossible, the Committee notes that the track is quite far from the city, especially when the effects of the mountains are taken into account. Is it possible that the track is close to Colima than currently proposed? Is it also possible that this wind speed is 75 km/hr instead of 75 kt? Please clarify this. Also, is a time available for this observation?

In the original document on the EDADS Website, the max wind at Colima on the 27th was reported as 38.4. This is the same document source/type that reported a maximum wind in m/s for Manzanillo, so it is believed that the 38.4 is a m/s value. This converts to 75 kt. The position at 18Z has been adjusted a little closer to the city of Colima (19.5N, 103.9W), and the 00Z position on the 28th has been adjusted as well.

6. The Committee notes that the use of the Kaplan-DeMaria inland decay model may be problematic for the mountains of western Mexico.

Agreed. One would assume that the hurricane should decay faster than the rate indicated by the Kaplan and DeMaria Inland Decay Model for a landfall in Mexico such as this case. This assumption was taken into account along with available observations.

7. Both the old and proposed tracks pass near the city of Guadalajara. What data is available from there as the system passed? Please include it in the write-up if it can be found.

The EDADS2 website contains the following observations from Guadalajara, and these have been added to the Excel spreadsheet of observations:

12 kt NE at 21Z on the 27th

7 kt NNE at 04Z on the 28th

6 kt WNW at 21Z on the 28th

8. Please provide more information on the extratropical transition for the last best track point over Mexico. While Dave Roth points out that a cold front had moved into northern Mexico at the time of landfall, such a transition even after landfall would still be most unusual.

We agree to remove the extratropical designation from the last point (06Z on the 28th). Although there is strong evidence that a cold front moved SSE through N Mexico on the 27th and 28th, there is no evidence that the former hurricane still possessed a closed circulation at 12Z on the 28th. In fact,

19591025, 0000, , HU, 16.0N, 102.7W, 90, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999,
19591025, 0600, , HU, 16.4N, 103.3W, 95, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999,
19591025, 1200, , HU, 16.7N, 103.9W, 100, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999,
19591025, 1800, , HU, 17.0N, 104.5W, 105, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999,
19591026, 0000, , HU, 17.2N, 105.1W, 110, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999,
19591026, 0600, , HU, 17.5N, 105.4W, 115, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999,
19591026, 1200, , HU, 17.8N, 105.5W, 115, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999,
19591026, 1800, , HU, 18.1N, 105.4W, 115, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999,
19591027, 0000, , HU, 18.4N, 105.1W, 120, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999,
19591027, 0600, , HU, **18.8N**, 104.7W, 120, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999,
19591027, 1200, , HU, 19.1N, 104.4W, 120, 955, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999,
19591027, 1800, , HU, **19.5N, 103.9W**, 70, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999,
19591028, 0000, , TS, **20.1N, 103.5W**, 45, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999,
19591028, 0600, , **TD**, 20.8N, 103.3W, 25, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999, -999,