**Best Track Committee Re-Analysis Comments for 1937**

General comments:

1. As with the 1936 submissions, the majority of the storms need binder maps and data for the pre-genesis and post-dissipation/extratropical transition (ET) times.

**Done. Additional maps/data obtained for Storm #1 – June 28th, July 3rd; Storm #3 – August 23rd; Storm #4 – September 15th; Storm #6 – September 12th; Storm #7 – September 22nd; Storm #8 – September 19th; Storm #9 – September 25th; Storm #10 – September 28th, October 4th.**

2. There are several instances where the committee feels the proposed intensities at the time of ET are too high. These proposed intensities are based on the Landsea north of 35N wind pressure relationship, and the committee is not sure this relationship fully accounts for the structural changes that occur during ET. It may be worthwhile to define a new wind-pressure relationship for systems undergoing ET based on modern data, with the caveat that any such relationship will need to take the forward speed into account.

**It would be best to adjust individually the cases where the intensities are too high. The Landsea et al. north of 35N pressure-wind relationship is specifically for systems that are still tropical cyclones. For those that are ET (or about to become ET), then it would be appropriate to use an intensity lower than that suggested by the pressure-wind relationship. Developing a brand new pressure-wind relationship – 86 years into the reanalysis efforts – would introduce a discontinuity into the HURDAT database beginning in 1937. Thus while such a project may be useful to consider for the future, at this juncture it would be counterproductive.**

1937 Storm #1:

1. The committee notes that the Historical Weather Maps (HWM) analyze this system as a frontal low near Cape Hatteras, and the plotted data suggest there was some temperature gradient near the system if not through its center. Please analyze the core thermal structure to ensure this was not a hybrid frontal low.

**It is noted that the Historical Weather Maps analyzed the cyclone as frontal on the 31st (and 30th). However, inspection of the temperature gradient across the system shows a weak (~5 F) temperature change near the center with a fairly symmetric wind/pressure structure. Thus on the 30th and 31st the system is retained as a tropical cyclone. The timing of extratropical transition is moved ahead six hours from that originally proposed and is now indicated to be at 00Z on the 1st.**

2. Although a ship in the Gulf of Mexico reported 52 kt winds on 29 July, 50 kt was chosen for the revised intensity. Please explain this and consider increasing the intensity to 55 kt.

**Agreed to boost intensity to 55 kt, given the 52 kt ship observation.**

3. There is a typo in the quotation in the 29 July metadata – “sight” should be “slight”.

**Corrected.**

4. The 59-kt wind at Cape Hatteras in should normally be the weaker part of the cyclone suggests the possibility hurricane-force winds existed over the water east of the center. Are there any ships in this area that rule out the possibility this was a hurricane at that time? The Hatteras OMR might also be useful to help determine the pressure as the center passed (e. g. what was the wind at the time of the Hatteras minimum pressure?).

**It is possible that the system was a hurricane at the time of the closest approach to North Carolina and this is now explicitly mentioned in the writeup. It may be that the strong winds on the normally weak side of the cyclone is an indication of extratropical transition going on. Thus without explicit confirmation of hurricane intensity, the reanalysis peaks the intensity at 60 kt – the same as that shown originally in HURDAT. (Both the Florida and North Carolina Climatological Data publications were obtained for July and August 1937. However, the Original Monthly Records are unavailable. The former publications, unfortunately, do not indicate what the winds were at Hatteras at the time of the minimum pressure.)**

5. The data from the ship **Clare** with the 997 mb pressure on 31 July looks a little strange. First, it reports northwest winds 50 kt and then it encounters the northeastward-moving center while moving southward, suggesting that the northwest winds were measured somewhere to the north or northeast of the center. This sequence may make more sense for a baroclinic cyclone than a tropical cyclone, so please re-examine this in light of point 1.

**It is agreed that the system was in the process of extratropical transition late on the 31st. The timing of extratropical transition is moved ahead six hours from that originally proposed and is now indicated to be at 00Z on the 1st. (Of course, the exact timing of extratropical transition in HURDAT is somewhat arbitrary, given that in reality extratropical transition is a gradual process occurring – in this case – over about a day in duration, rather than an abrupt exact change occurring between synoptic times.)**

6. The committee concurs with the introduction of an extratropical phase, although it notes that the proposed location would unclimatological for that time of year. This issue can be re-visited after the analysis for point 1.

**The system is indicated to be extratropical around 00Z on the 1st near latitude 38N. HURDAT originally did not have an extratropical phase for this system, even though it progressed all the way to 47N.**

1937 Storm #2:

1. The committee concurs with the proposed reduction in intensity on 2-4 August. However, the metadata summary is a bit wishy-washy on whether the system was a tropical cyclone at that time. Please re-write it to strengthen the arguments.

**Agreed.**

2. The justification for keeping the intensity at 50 kt on 7 August looks too weak since a) there were two separate 50 kt observations, and b) neither of which were apparently in the southeastern side of the storm where the strongest winds might be expected. Please consider raising the peak intensity to 55 kt or higher.

**Agreed to boost the peak intensity to 55 kt.**

3. The committee concurs with the rest of the proposed changes.

**Thank you.**

1937 Storm #3:

1. The HWM for 24 August suggests a circulation exists near the Leeward Islands (west wind at Guadeloupe and lower pressure at St. Martin) even though a low is not formally analyzed. Please note this in the metadata summary.

**Done.**

2. In the 25 August metadata, should “Windward” actually be “Leeward”?

**Yes, so changed.**

3. The committee is split on the proposed reduction in intensity on 26-27 August. On one side, there are no direct observations of tropical-storm-force winds or low pressures. On the other, the data appears insufficient to resolve a small center like the one seen at landfall in Florida. Based on the latter, the original HURDAT intensities should be kept.

**Agreed.**

4. On a related note, is it possible even the proposed track is too far south? The HWM suggests a center near 23N 70W on 26 August, and a 1009.1 mb pressure near 25N74W on the 27 August HWM also supports a more northward track on those days. Please re-examine this.

**Agreed that the first revised track was too far south. The new track is farther north now and closer to the original HURDAT.**

5. Is there any more information on why Grady Norton’s report suggested the 995 mb pressure in north Daytona Beach might not be the lowest pressure experienced? This could be significant, because if this was not a central pressure the landfall intensity should be increased. The committee notes that today north Daytona Beach and Ormond Beach are adjacent with no significant distance between them, but it is not clear if that were the case in 1937.

**We are unable to find out why Norton suggested the 995 mb pressure might not be the lowest experienced. It sounded like he was not sure either. Because of the uncertainty, the intensity is raised to 60 kt on the 30th before and at landfall with a statement included that the system may have been a hurricane.**

5a. On a related note, “Ormond City” in the metadata summary should be “Ormond Beach”.

**Done.**

6. Please re-examine the intensity of the system near Apalachicola. The Monthly Weather Review (MWR) states that “heavy squalls” associated with the cyclone may have caused a ship to sink south of Panama City. While there is no evidence of tropical-storm-force winds or wind damage over land at that time, this does not preclude such winds over water. Data from the Apalachicola OMR might help with a central pressure estimate. The committee notes that the HWM for 31 August show environmental pressures of 1015 mb or higher near the system, so the central pressure might not have to be very low to support tropical-storm-force winds over water.

**Apalachicola recorded 10 kt W with 1014 mb at 12Z on the 31st, based upon the HWM. Lowest pressure at Apalachicola for the month was 1011 mb on the 28th, not in association with this cyclone (Florida Climatological Data). Peak 5 min winds at that station were 24 kt S (MWR, Florida Climatological Data). Based upon the impacts over water, it now analyzed that the cyclone maintained tropical storm intensity through late on the 31st, with these winds primarily occurring over the Gulf of Mexico.**

1937 Storm #4:

1. The committee does not concur with the proposed lowering of the intensities on 11-12 September. While the committee recognizes there are no observations to support the original HURDAT intensities, the observations on those days appear to be too far from the center (75-105 n mi) to justify any changes.

**Agreed to keep original HURDAT intensities on those dates.**

2. The metadata summary mentions a “log” from a shift that passed relatively near the center on 11 September. Is there an actual log that is not just a collection of COADS data, or should this be better phrased as a “time series”?

**Agreed.**

3. The section of the metadata summary that deals with ET should be re-written to be more concise. Also, a hand-plotted surface chart for 14 September should be added to the binder.

**Both items are done.**

1937 Storm #5 (new):

1. The committee is currently split on whether to add this system to HURDAT. On one side, the relatively compact structure and the motion toward the northwest suggest the possibility it was a tropical or subtropical cyclone (similar to Noel of 2001). On the other hand, the cyclone had a frontal origin, and the HWM show abundant cooler air north of the system on 10-11 September, with dewpoints in the 50’s and 60’s over southern New England. The binder map plots have the ship-report temperatures plotted on them, but not the dewpoints. If the ship dewpoints are available, please plot them on the maps so the committee can better determine the frontal nature of the cyclone.

**Ship dewpoints are not available in COADS. Air temperatures and SSTs are available and have been plotted.**

2. Please clarify the explanation of why 60 kt was chose for the peak intensity. Given the observed low pressures, is it possible the cyclone was stronger?

**The system had subtropical characteristics, which is justification for not going as high as the pressure-wind relationship would suggest. Additionally, the lowest lifetime pressure occurred at 17Z on the 11th at 36N, with the system in the process of becoming extratropical (seven hours later is when the system is labeled as “extratropical”).**

1937 Storm #6 (originally #5):

1. The committee concurs with the proposed upgrade in intensity based on the observations from the ship **California Express**, including the 959 mb observation at 7 AM EST 15 September. However, the MWR (pg. 333) mentions a ship (the **Glendene**), supposedly within 0.5 degrees of the **California Express**, reported 1005 mb at the same time. These reports are hard to reconcile. Is the **Glendene** observation additional evidence that the system had a small inner core at that time, or are there errors in both the meteorological and positional data at that time? It should be noted that despite the low pressures and possible very strong pressure gradients there are no reports of hurricane-force winds from the ships on 15 September. Please look into this.

**The navigational errors in the 1930s were still quite high, especially over the open Atlantic like the hurricane was for most of its lifetime. Thus it is likely that one or both ships may be in position error by 50 or even 100 nm. If the ships are in actuality farther apart, then there is no discrepancy. This is now discussed in the metadata and the upgrade in intensity is retained.**

2. The metadata summary mentions “observations and commentary” from a ship that passed closed to the center on 17 September. Please include the commentary in the daily metadata for 17 September.

**Done.**

3. Please re-examine the position and intensity around 1200 UTC 19 September. The ship **City of Newport News** encountered the center at 46W after 1200 UTC, suggesting the track needs to be adjusted westward. Also, an 85 kt intensity for a system nearing the completion of ET may be too high.

**Agreed to adjust positions westward on the 19th. Agreed to go with 80 kt at 12Z on the 19th and 75 kt at 18Z (first extratropical position point).**

1937 Storm #7 (originally #6):

1. While there is no direct evidence of a closed low in the Bay of Campeche on 15 September, the HWM show a ship and two Mexican stations with west winds. Please mention this in the metadata summary.

**Done.**

2. Can the positions on 16 September be shifted to the west or northwest to better fit the report of E wind 25 kt/mph at 1200 UTC and NW wind 20 kt/mph at 1900 UTC?

**Agreed, so changed.**

3. The metadata summary covering the Florida landfall could use re-writing for clarity.

**Done.**

1937 Storm #8 (originally #7):

1. Please provide a new binder map for 20 September, as the current map is centered on the wrong area.

**Done.**

2. The committee notes that some eastern Atlantic tropical cyclones can have large cyclonic envelopes from the beginning – e. g. Danielle of 2010. It recommends that the metadata summary be re-written to place less emphasis on the cyclone size.

**Agreed.**

3. Regarding the 20 September ship reports, is there enough data from the ships in COADS to determine which of them might have reported an incorrect position?

**It appears as though there is not enough data to determine which of them might have reported an incorrect position. Both were MWR observations and neither of the ships was found in COADS.**

4. The committee has concerns with the time of ET in both the original HURDAT and the proposed revision. This is based on 1) an unclimatological position south of the north wall of the Gulf Stream, and 2) ships near the center late on 25 September that suggest little temperature gradient. Please re-examine the timing of ET to see if it can be moved back 6-12 hours.

**Agreed, ET transition time is now set at 06Z on the 26th, six hours after that originally shown in HURDAT.**

5. Please re-examine the intensity of this system near the time of extratropical transition.

**Agreed, observations are consistent with reducing the intensity to 75 kt at 00Z on the 26th (down from 80 kt) and to 70 kt at 06Z at the time of extratropical transition (down from 80 kt originally).**

6. Please provide a plotted map for 1200 UTC 27 September to better justify the proposed earlier dissipation.

**After replotting and reconsideration, the data are too ambiguous to remove the 27th and 28th from HURDAT as a high latitude extratropical cyclone. The dissipation after 12Z on the 28th as originally shown in HURDAT is retained.**

1937 Storm #9 (originally #8):

1. Can the binder maps on 26-28 September be replaced with versions that are zoomed out a bit? The current versions make it harder to see the overall synoptic situation.

**Done.**

2. The HWM for 26 September suggests a weak low or vorticity center over the northwestern Caribbean. This should be mentioned in the metadata summary discussion on the genesis.

**Agreed.**

3. The COADS data shows a 1006 mb ship report at 0600 UTC 27 September. Was this discarded as bad? Please clarify this and include it in the daily metadata if it is good. Note that this observation suggests the possibility that the cyclone became a tropical storm around this time or earlier.

**Yes, that ship’s barometer is biased too low. Another ship (HO007168) which was less than 1 degree from that ship at both 26/18Z and at 27/06Z suggests the 1006 mb ship is on the order of about 7 mb too low.**

4. The committee concurs with the proposed earlier time of ET, although it has some concerns about the lack of data near the core. Please add note about the uncertainty of the ET time to the metadata summary.

**Done.**

5. In the metadata summary, who is “Hector” mentioned by Perez? Please provide a reference and add it to the list of references on the project web site (http://www.aoml.noaa.gov/hrd/hurdat/References.html).

**This is an unpublished compilation of Cuban tropical cyclone impacts that Ramon Perez has access to. Given that it is not readily available (nor has specific observations that would be helpful here), the reference to Hector has been removed.**

6. In the metadata summary, the ship **Gulfhawk** might be better referred to as “the Gulfhawk”.

**Done.**

1937 Storm #10 (originally #9):

1. The plotted map for 1200 UTC 1 October suggests an alternate scenario for this system – that there were actually two cyclones. The first was over the northwestern Caribbean Sea near western Cuba and a group of 1006-1007 mb ship reports. The second may have been forming near 26N 87W based on what seems to be a vorticity center and 1007 mb pressures in the ship data. If it was the case that there were two cyclones, it is possible that the northern system absorbed the southern system sometime on 1-2 October – similar to how Tropical Depression Ten of 1994 near western Cuba was absorbed by a larger low in the central Gulf of Mexico. Please investigate the possibility of there being two cyclones.

2. If the two-cyclone scenario does not prove viable, then the committee prefers to stick with something close to the original HURDAT. It does not concur with the proposed removal of 29 September – 1 October. The binder maps show what appears to be sufficient evidence of a cyclonic circulation over the northwestern Caribbean on 29-30 September to keep the system as a tropical cyclone, perhaps with a weaker intensity than what is currently in HURDAT.

**Agreed that this was in actuality two separate cyclones: a tropical depression from 28 September to 1 October and a tropical storm from 2 to 4 October. The writeup now reflects this and the former system is also added within the Additional Notes section.**

3. Regardless of what happens to the proposed track, the metadata summary on the 29 September – 1 October period has too much handwaving. Please re-write it for scientific precision.

**Done.**

4. Is there sufficient evidence to determine if the cyclone weakened to a tropical depression before landfall in Louisiana? The land stations on the northern Gulf coast seemingly did not come close to reporting gales from this system.

**The Louisiana Climatological Data did indicate a peak 5 min wind of 29 kt from Port Eads on the 2nd. Given the sparse nature of stations along the Louisiana coast (only New Orleans and Port Eads had anemometers), a 35 kt landfall intensity is reasonable.**

1937 Storm #11 (new):

1. The committee would like to see a plotted map for 1200 UTC 18 October. The data provided so far suggest the possibility that the system was still somewhat frontal at that time, and if so the genesis time and time of tropical transition may have to be delayed.

**Done. This does suggest that it began as an extratropical cyclone and is now noted as such on the 18th.**

2. The committee otherwise concurs with the addition of this system.

**Thank you.**

1937 Additional Notes:

1. System #1: The HWM suggest this system deepened on January 2-3 as it moved southwestward. While there is no obvious evidence it was a tropical storm, the committee recommends that the COADS data be obtained for this system.

**The COADS was obtained and plotted on January 2-3. The data are consistent with this being a large, occluded low.**

2. The MWR (page 210) mentions a former eastern Pacific system as a depression near Veracruz, Mexico on 27 May. Mexican obs on the HWM somewhat support this. Please obtain the COADS data for this time to farther investigate the system.

**COADS and HWM data was obtained. The observations do support lowered pressures in the southwestern Gulf of Mexico on the 26th through the 28th of May. However, there is no indication that there was a closed circulation present. This system is added into the Additional Notes section.**

3. System #2: The committee believes this system should be left out of HURDAT due to its unclimatological location and insufficient evidence. Should the term “overall outflow pattern” in the summary be “overall circulation”?

**Now System #3 - Yes, so changed.**

4. System #7: The HWM suggest that the pressures surrounding this system were relatively high, so a 1004 mb or lower central pressure would be sufficient for this to be a tropical storm. However, the MWR does not mention this system, which suggests it didn’t amount to much. Therefore, the committee does not favor adding it to HURDAT. If possible, please obtain the report history of the ship with the 1004 mb pressure to check its accuracy.

**Now System # 9 – This ship observation did not appear in COADS, so no time history is available. Moreover, there were no wind measurements greater than 20 kt for the lifetime of the system.**

5. System #13: Please obtain the COADS data for a closer look at this system.

**Now System #16 - COADS was obtained and the system plotted up from the 29th to the 31st of December. A few gales were observed on the 30th, but the structure is more of an occluded low with a large radius of maximum winds. Moreover, the temperature gradient across the system was about 5F south to north. The system elongated on the 31st, but was exhibited a couple of gale force winds. On January 1st, the system was absorbed into a frontal boundary. Thus while the cyclone exhibited some subtropical storm characteristics, it is judged to be more of an occluded low and not added into HURDAT.**

6. The committee concurs with leaving the rest of the possible additional systems out of HURDAT.

**Thank you.**