Comments from the Best Track Change Committee on the 1954 Atlantic Hurricane Season

**(Reponses in boldface from Chris Landsea and Sandy Delgado – January 2015)**

General comments:

1. Please include the available upper-air charts for systems where there is some question about how tropical the system is, either during extratropical transition or tropical transition (for example, the first two proposed new storms for this year). The Historical Weather Maps have 500 mb charts available, which, thanks to weather ships, may include data away from land areas, and there are other sources of upper-air data available. This information will help in the re-analysis decision making.

**The 500 mb upper air charts have been included in the files for relevant systems (e.g., Storms #1 and #2).**

2. Please remove any damage, casualty, and/or flooding descriptions from the daily metadata unless they are specifically needed to help determine tracks or intensities.

**These have now been removed.**

1954 Storm #1 (new):

1. The committee concurs with adding this system to HURDAT, pending the resolution of the issues below.

**Agreed.**

2. The committee does not concur with the proposed genesis location and time over Florida on 27 May. The system does not appear to have a well-defined circulation at either 1800 UTC 27 May or 0000 UTC 28 May. Instead it looks like an elongated trough at both times. Please consider changing the genesis time and location to over the Atlantic on 28 May.

**Agreed. Genesis is now indicated to have occurred at 12 UTC on the 28th over the western Atlantic.**

3. In the metadata summary, there is mention of a ship on 29 May with 35 kt and a pressure of 1005 mb. There is a passage “this pressure may have been slightly too low, but it is believed to have been reasonably accurate”, which is confusing. Please clarify this.

**This observation and discussion have now been removed, as they were not very relevant to the analyzed intensity.**

4. The ship report of 40 kt and 997 mb at 0600 UTC 30 May suggests a central pressure in the 990-995 mb range. Was this taken into account in the proposed intensity for this time?

**As it is not known whether the ship was at or inside the RMW, analyzing the central pressure is not justified. However, the 997 mb peripheral pressure was used to arrive at a low end intensity estimate, as described in the metadata.**

5. Please re-check the time of extratropical transition, as the 1200 UTC 30 May microfilm map is ambiguous on whether the system had completed transition. On one hand, the plotted temperatures suggest a temperature gradient across the cyclone. On the other, the plotted winds suggest that the approaching cold front was still west of the cyclone.

**It does appear that the cold front was still west of the cyclone. However, a warm front had developed in the northern semicircle of the system, as evidenced by the strong temperature and wind direction contrast. This is now indicated in the metadata writeup.**

1954 Storm #2 (new):

1. The committee concurs with adding this system to HURDAT, pending the resolution of the issues below.

**Agreed.**

2. Please re-examine in detail the period from 17-20 June. The committee has several issues with the proposed early part of the life-cycle:

a. While a low pressure area was present on 17 June, the surface observations do not show strong winds until 1200 UTC 18 June. In addition, the circulation appears elongated during this time. Perhaps the genesis occurred later than 1800 UTC 17 June?

**Agreed to have genesis begun at 00Z on the 18th.**

b. If the proposed genesis time on 17 May is accepted, the proposed genesis position of 26.0N 80.8W looks wrong given the southeast winds in Miami at the time.

**Agreed to have genesis begun at 00Z on the 18th.**

c. On 19 May, multiple observations from Palm Beach showed southwest winds and a pressure near 1009 mb when the proposed center position is well to the west. Is it possible that the system was still elongated with a new center near the Florida east coast?

**It is likely that the system was somewhat elongated. The position on the 19th and early on the 20th are shifted toward the east a bit to better accommodate the Palm Beach observations.**

d. What is the basis for the proposed weakening on 19-20 June? Are the observations complete enough to justify this?

**Agreed that the observations are too sparse to be conclusive. No weakening now shown on the 19th to the 20th.**

2. The 18 June daily metadata mentions a ship with east winds 35 kt near 24.8N 80.6W at 1800 UTC, source microfilm. The scanned version of the microfilm map does not seem to have this observation. Please explain or correct this.

**This was a typo, as the ship was at 26.6N 79.0W, which is now corrected.**

3. Please either provide stronger evidence that tropical-storm force winds affected the North Carolina coast, or please remove the statement in the metadata summary mentioning this. Neither the North Carolina Climatological data nor the Climatological Data National Summary mentions any impact of this system in North Carolina other than rain and a tornado.

**This statement has been toned down and now indicates that tropical storm force winds may have impacted the coast.**

1954 Storm #3, Alice:

1. Please contact the Meteorological Service of Mexico for any information they have on this system. This could include any analyzed maps they have prior to 24 June that might help pin down the genesis.

**We were able to obtain the analyzed maps from the Meteorological Service of Mexico for the 22nd through the 27 of June. The maps on the 22nd to the 24th, however, did not provide any additional information that could be helpful for the genesis.**

2. The committee does not concur with the proposed changes in the genesis time. While it agrees that the current HURDAT is unrealistic, there is no data in the Bay of Campeche to support the proposed changes.

**Agreed to retain the original HURDAT.**

3. It is noted that there is a pressure of 1008 mb at Campeche, Mexico on the 0000 UTC 23 June microfilm map, suggesting a low pressure area between there and the city of Carmen to the southwest. Are microfilm maps available for the period prior to 23 June?

**Maps for the 22nd and 23rd are included from the Meteorological Service of Mexico and the Historical Weather Maps. The microfilm maps prior to 23 June show nothing of interest.**

4. Is the 999 mb pressure at Laredo, Texas a central pressure or not? Did it occur simultaneously with the reported 37 kt winds? This could have an impact on the attempts to analyze the landfall intensity from the Laredo ob. If it is not a central pressure, please remove the portions of the metadata summary that use it as one.

**We were able to obtain more detailed information from the Surface Weather Observations via the EV2 website. About 15 hours after landfall, a 999 mb peripheral pressure (with simultaneous 37 kt NE winds – the peak winds measured) was recorded at Laredo, Texas. Using the Ho et al. pressure-decay model, this suggests a central pressure of at most 975 mb at landfall and it may have been substantially deeper. (975 mb suggests maximum winds of 85 kt from the south of 25N Brown et al. pressure-wind relationship for intensifying cyclones and 82 kt from the north of 25N relationship.)**

5. The committee has some issues with the landfall intensity in northeastern Mexico:

a. The Climatological Data National Summary Annual issue states that the Brownsville sounding on the morning of 25 June had 130 kt winds at 3000 ft. First of all, the original rawinsonde report needs to be found to ensure this is correct. Second, if correct, this needs to be examined in relation to where it was in the cyclone. Was the balloon in the radius of maximum wind (RMW)? If so, perhaps an intensity could be inferred from the observation using modern reduction techniques? If the balloon was not in the RMW, which is a distinct possibility given the proposed track, what does this observation imply for the landfall intensity?

**Mike Brennan obtained the raw data for this sounding and it is confirmed to be 131 kt at 3000 ft/900 mb (and 100 kt at 850 mb). It is possible that the rawindsonde was blown into the eyewall after launch and thus this observation can be adjusted to the surface to estimate the wind at that location. If the sonde was over the ocean, this would convert to about 100 kt, while over land it would be about 85 kt. Given these pieces of information, a substantially stronger hurricane is indicated than previously indicated in HURDAT (70 kt). A very uncertain intensity value of 95 kt is chosen at the time of landfall, but it may have been more intense.**

b. The attempt to work backwards to a landfall intensity using the Laredo data needs to be redone after it is better determined whether the Laredo data represents a center passage.

**The more detailed Laredo data does not allow for determination of robust central pressure either around 06Z on the 26th near Laredo, not at landfall. These central pressure values have thus been removed.**

1954 Storm #4, Barbara:

1. Can some statement about the origin of the storm be included in the metadata summary? Apparently both a cold front and a tropical wave were in the area before genesis.

**Done.**

2. Please re-examine the intensity near the time of landfall in Louisiana. The committee has the following concerns:

a. It is unclear whether the 1003 mb central pressure in Lake Charles was actually a central pressure. Is the raw record of observations available?

**Yes, the Surface Weather Observations for Lake Charles, LA were obtained. These indicated a double minimum were recorded: 1003 mb with NNE 21 kt at 1028Z, followed for the next several hours by continued but weaker N to NE winds with the pressure rising a millibar, followed by a near-180 degree wind shift and 1003 mb with 4 kt S wind at 1728Z. The first minimum of pressure suggests a central pressure of about 999 mb at 1028Z (also about the time of landfall), given the inland location and overland exposure of the winds. Thus 999 mb is included as a central pressure at landfall. 999 mb suggests maximum winds of 47 kt from the intensifying subset of the north of 25N Brown et al. pressure-wind relationship. The second minimum in pressure at Lake Charles was when the center crossed this town. This indicates a central pressure of about 1002 mb at that time and this value is now added into HURDAT at 18Z.**

b. There are observations of 1004 mb at Morgan City, Louisiana and 1003 mb at Grand Isle, Louisiana. The latter had simultaneous 41 kt winds according to Connor. Both of these stations are a significant distance from the proposed track, yet the pressures are as low as at Lake Charles.

**No additional observations could be found for Morgan City. The Weather Observations from the Grand Isle Coast Guard Station were obtained. Comparison of these station pressure measurements against Burrwood and New Orleans for about 15 observations over three days indicates a distinct low bias of about 4 mb at Grand Isle. Thus the likely true lowest pressure observed at Grand Isle was about 1007 mb.**

c. Can data be found for Lafayette, Louisiana? Observations from that station are available on the microfilm maps, but there is information on the minimum pressure.

**Surface Weather Observations were obtained for Lafayette, which allowed for filling in of the missing operational maps. However, this did not change any of the conclusions or revisions to the reanalysis.**

d. The proposed decrease from 50 kt to 35 kt in 6 hours looks a little unrealistic since the storm is making landfall over the Louisiana marshes.

**Agreed. Will indicate 40 kt at 18Z on the 29th.**

3. The committee does not concur with the deletion of the 1800 UTC 30 July point. While the circulation over Texas has become elongated, it is still present.

**Agreed, the 18Z 30th position is retained.**

1954 Storm #5, Carol:

1. Does the Meteorological Service of the Bahamas have any additional data on this system?

**No additional observations were available from the Meteorological Service of Bahamas for the early stages of Carol.**

2. In the 26 August daily metadata, please re-phrase “The intensity this day…”.

**Done.**

3. On 27 August, the Navy Annual Tropical Storm Report (ATSR) mentions a plane circling in the center around 0615 UTC near 29.4N 75.5W with an 850 mb height of 4680 ft or 1426 m. This yields a central pressure around 1002 mb. Please add this fix to the daily metadata and to the spreadsheet. This may also require changing the number of fixes with pressure in the metadata summary.

**Added.**

4. The summary of Carol in the climatological Data National Summary mentions a ship in the eye on the afternoon of 30 August. Can any data be found from this ship?

**Unfortunately, no.**

5. The metadata summary mentions an aircraft pressure of 960 mb on 30 August that is not in the daily metadata. Please add this.

**Added.**

6. Are more detailed observations available from the lightships at Frying Pan Shoals and Diamond Shoals? It seems likely that more extreme conditions occurred between the 6-hourly observations.

**The Original Records from these two lightships were obtained from the EV2 website. While it is very likely that more extreme conditions occurred between the 6-hourly observations, the observers only recorded measurements once every six hours.**

7. Please clarify the extreme conditions mentioned for Cape Hatteras, North Carolina. The long text passage – which needs a reference – mentions a 78 mph gust. However, the land observations section says 68 kt sustained, which matches the table in the Climatological Data. Perhaps that part of the text passage should be revised or deleted?

**After obtaining the Surface Weather Observation, the original value recorded for fastest mile was 78 mph (68 kt) at 0321Z, but this was crossed out and replaced with 72 mph (63 kt). The 78 mph value is also shown in the Surface Weather Observation form, but as a gust that occurred 0326Z. It is likely that the table that appears in the Climatological Data did not include this revised value for the fastest mile.**

8. In the 31 August daily metadata, please include the lowest pressure at Block Island, Rhode Island – 965 mb.

**Done.**

9. The committee tentatively concurs with the landfall intensities in New England. However, there are some questions that need to be answered before 100 kt is officially entered into HURDAT:

a. Block Island measured an 87-kt fastest mile wind, which apparently converts to an 84-kt 1-minute average. Are the anemometer height and exposure of the station known? Jarvinen’s analysis of the track and RMW has the RMW passing over Block Island, and thus it is disturbing that the winds are so far below 100 kt.

**The anemometer height was 9 m above the ground on a roof. If the RMW was just a few nautical miles smaller than the 22 nm estimated by Jarvinen, then it would be consistent with observing 84 kt 1-min winds at Block Island. As the peak winds were observed at nearly the same time as the minimum pressure at Block Island, Quonset, and Providence, none of these three locations were inside the RMW. Based upon the track of Carol relative to these three stations, it indicates an RMW between 15-22 nm, with best estimate of about 20 nm.**

b. There is some confusion over the minimum pressure at the Suffolk County Air Force Base (now known as Francis Gabreski Airport). The table in the Climatological Data National Summary does not have a pressure. The transcription of the SWO record in the binder says 966 mb, while Jarvinen, the 31 August daily metadata, and the spreadsheet say 960 mb. Since this station was apparently in the western side of the eye, this needs clarification. Please provide the full SWO record from this station.

**The original Surface Weather Observations were obtained for Suffolk County AFB. 966 mb was the lowest hourly observation (at 1427Z). The form, fortunately, was very explicit about the lowest pressure observed at the station: “LOWEST PRE 624 [962.4 mb] 0850E [1350Z] EYE PASSING OVR STN”. Note that this measurement was also accompanied by 26 kt NE wind, helping to corroborate a substantially lower central pressure at landfall. This is now corrected and clarified in the writeup.**

c. Can the original data for the 957 mb pressure in Groton, Connecticut be found and included in the metadata?

**The Surface Weather Observations from Groton, CT were obtained, but they indicate “STATION CLOSED DUE TO STORM” on August 31st (and was closed as well on September 1st-2nd). Brian Jarvinen was contacted, but he does not remember the original source and none of the references he had provided the observation.**

d. Please re-check the 22 n mi RMW provided by Jarvinen and Ho et al. While there is no obvious reason to think it is wrong, another look at it won’t hurt.

**The available observations make knowing the precise value of the RMW at landfall difficult. However, as peak winds were observed at nearly the same time as minimum pressure at Block Island, Quonset, and Providence, none of these three locations were inside the RMW. Based upon the track of Carol relative to these three stations, it indicates an RMW between 15-22 nm, with best estimate of about 20 nm.**

10. Pending the resolution of point 9, the committee does not concur with downgrading Connecticut to Category 2 impacts. If the center passed over Groton, this would have brought the northeastern eyewall over southeastern Connecticut. Please make a stronger case of why this should be Category 2, or keep the Category 3 classification.

**Agreed to retain Category 3 impact for Connecticut.**

11. Please re-examine the HURDAT central pressures (both current and proposed) at 1800 UTC 31 August and 0000 UTC 1 September. The Climatological Data National Summary table has observations from Milford, New Hampshire (968.2 mb), and Newport, Vermont (966.8 mb), with lower pressures that those in HURDAT. The latter observation is listed in the spreadsheet.

**Agreed to indicate 970 mb at 18Z August 31st, based upon a blend of 968 mb at Milford at 1740Z, 975 mb at Manchester at 1750Z, and 977 mb at Concord at 1815Z. After obtaining the Surface Weather Observations for Newport, the 967 mb sea level pressure reported in the Climatological Data National Summary is incorrect. The 967 mb was the station pressure, with no sea level pressure provided.**

12. What is the significance of the remark about the SLOSH model and the cold water in the metadata summary. Please better explain why this is important or delete it.

**It is to be noted that the SLOSH runs assume a standard tropical/subtropical sea surface temperature and unstable boundary layer. The cold water and stable conditions that occur around New England would reduce the sustained winds being observed at the surface. Thus the SLOSH winds for this case are likely to be an overestimate.**

13. Please delete the “as usual” comment in the metadata summary regarding the RMW impact an area with no observations.

**Done.**

1954 Storm #6, Dolly:

1. Please re-examine the proposed earlier genesis in both time and location. While it is clear that a low pressure area existed earlier than the current HURDAT, it is unclear whether the system was a tropical depression or just a low. Also, both the proposed and current HURDAT positions for 0600 UTC 31 August are hard to reconcile with the east winds seen at the eastern tip of the Dominican Republic on the 0600 UTC microfilm map. Are there any detailed observations from Puerto Rico that may help with this part of the analysis?

**It is agreed that the evidence for an earlier genesis is too tenuous, given the sparse observations available and the data shown. Genesis is thus delayed to 12Z 31st, when it is quite certain that the system had formed. (All available observations from Puerto Rico have been obtained.)**

2. Please re-examine the data from the aircraft mission on the afternoon of 31 August. While the plane reported a center position with a 1011 mb pressure at 2108 UTC, an ob at 1919 UTC had the same pressure with 30 kt winds to the northeast of the fix. This suggests the possibility the fix was in error. How does the aircraft position compare to that determined from ship data? It should be noted that numerous ship obs at 1200 UTC suggested a central pressure of 1009-1010 mb.

**It is agreed that the 1011 mb value from the aircraft reconnaissance was not a central pressure, given the peripheral pressures of the same value reported by a ship and also by the aircraft itself earlier in the flight. Unfortunately, ships at 18Z were too sparse to directly compare versus the aircraft fix position.**

3. Please re-examine both the track and intensity on 1 September. On the track side, a couple of ship reports indicate that the 1200 and 1800 UTC positions (which were already adjusted a bit to the east of the original track) need to be adjusted a little farther to the east. For example, the ship on 1 September 1300 UTC observation at 29.5N 70.0W of north 45 kt suggests that the 1200 UTC center position should be east of the revised best track location of 28.8N 70.0W. Also a ship report at 2100 UTC of northwest 30 kt at 31.3N 70.2W would support an 1800 UTC location a bit to the east of the best track position of 31.7N 70.1W. On the intensity side, the ship with 996 mb and 50 kt at 1500 UTC suggests the possibility of a central pressure near 990 mb, although this is difficult to reconcile with the 994 mb aircraft fix a few hours later.

**Agreed to move the positions on the 1st a little farther to the east. The possibility of a central pressure of about 990 mb around 15Z on the 1st is now mentioned in the metadata writeup.**

4. One factor not noted in the metadata summary is that on 1 September Dolly seemed to be embedded in an area of high environmental pressure. How might this affect the proposed intensities?

**It is agreed that this is a significant factor and is now mentioned in the metadata writeup. Intensifies on the 1st and 2nd are now all boosted up 5 kt from that in the draft reanalysis.**

5. In the 3 September daily metadata, are all of the ship reports listed necessary?

**Agreed to trim this down to one peak wind observation (of at least 35 kt) and/or one peak pressure (of at most 1005 mb) observation every synoptic time.**

1954 Storm #7, Edna:

1. Please reverse the order of Edna and the proposed early September storm. Edna should be storm #7 and the new system should be storm #8.

**Done.**

2. The committee concurs with the removal of 2-4 September from HURDAT.

**Agreed.**

3. The ATSR indicates that an invest mission was flown into the system that was previously included as the early part of Edna on 3 September. That should be noted either here or in the additional systems section.

**Agreed, this is added into the additional systems section.**

4. The observations from the ship Bulk Oil on 5 September are not in the spreadsheet. Please add them.

**These are now added in.**

5. Does the Meteorological Service of the Bahamas have any additional data on this system?

**The Meteorological Service of the Bahamas has no additional information on this system.**

6. In the 7 September daily metadata, part of the quote from the Monthly Weather Review reads “The center very close to…”. Is this a transcription error or part of the original text?

**This was a transcription error, which is now corrected.**

7. Please re-examine the pressure data on 7 September, as the various ship and aircraft pressure reports show some disagreement. At 1200 UTC, the ship Canadian Hilamoor reported 998.3 mb and 35 kt at a positon that seems to be near the center, perhaps inside the RMW. A couple of hours later, an aircraft reported a central pressure of 1001 mb. The data log from this flight also shows a 1002 mb pressure with hurricane force winds and an earlier 1001 mb pressure with tropical-storm force winds. Is it possible that the reported central pressure is too high? Has the ship been checked to see if its pressures are erroneous? Note that a similar issue occurs regarding the later recon flight, where the aircraft-reported central pressures of 992 and 990 mb somewhat disagree with would could be extrapolated from a 993 mb/65 kt ship report.

**Two additional observation for the ship – the *Canadian Hilander* – were also available at 12Z on the 6th and 21Z on the 7th, which match well the pressures and winds from nearby measurements. The 65 kt ESE surface winds along with the 1002 mb peripheral pressure strongly indicate that the 1001 mb was not a central pressure. Based upon the ship, a central pressure of 995 mb is added into HURDAT at 12Z on the 7th. The later observation at 21Z on the 7th of 993 mb with 65 kt N winds from the *Hawaiian Fisherman* appear to be reasonable given comparison of this ship versus other measurements at 00Z 7th. However, the same ship report 991.5 mb with 15 kt E three hours later at 00Z on the 8th. This is the basis for 990 mb central pressure, which does concur with the aircraft reconnaissance.**

8. On 8 September, the 975 mb/120 kt report from the ship S.S. Fairland does not seem to be in the spreadsheet.

**The observation is now in the spreadsheet.**

9. The committee has several issues on the proposed landfall intensity of 100 kt:

a. Please further investigate the report of a 940 mb pressure at Woods Hole, Massachusetts. The most likely source of this report would be the Woods Hole Oceanographic Institution, which in theory should have accurate instruments. Please contact them to see if any information is available for Edna.

**WHOI has been contacted, but at this point have no information about this measurement.**

b. Please re-examine the proposed 20 n mi RMW as originally given by Ho et al. There are conflicting signals on the size of the RMW. First, the center went near or over Martha’s Vineyard, and the transcription of the obs from Nantucket suggest it was outside the RMW. Since these station are just over 20 n mi apart, this supports a smaller RMW. On the other hand, the strongest winds at Martha’s Vineyard apparently occurred an hour after the center passage, which given the rapid motion is not consistent with a 20 n mi RMW. The same thing was seen in Hyannis.

**After obtaining the Surface Weather Observations, it appears that Edna had an unusual structure. On its east side, Nantucket’s detailed observations clearly show that it was at or outside the RMW, giving an RMW of at most 25 nm. However, on the west side of Edna, very strong northwest winds were recorded at Block Island, Martha’s Vineyard, and Hyannis well after the minimum pressure were observed, suggesting an RMW on that side of at least 35 nm. A blend of these gives an average RMW of 30 nm, for purposes of comparing against climatology.**

c. Please provide copies of the SWO records for Martha’s Vineyard, Nantucket, Otis Air Force Base, and Hyannis. The additional detail may help to resolve the RMW issue.

**The Surface Weather Observations for all of these stations were obtained.**

d. Please contact the Taunton WFO to see if any additional data is available for eastern Cape Cod, including newspaper and anecdotal reports. Are there any Coast Guard stations in eastern Cape Cod that might have collected data from Edna?

**The Taunton WFO and the Northeast River Forecast Center were contacted regarding Edna, though they have no additional information for us to consider. There was one Coast Guard station that reported meteorological measurements in Massachusetts – Salem – though this was well west of the center of the hurricane.**

e. The greatest concern is that the reported winds from the landfall area. The RMW passed near or over Martha’s Vineyard, Nantucket, and Hyannis, and the maximum reported wind is a 105 kt gust. None of the sustained or fastest mile winds are close to 100 kt. While it is possible that stronger winds occurred, especially given the lack of data from eastern Cape Cod, the data currently suggests Edna was below Category 3 at landfall in New England.

**Agreed. Given an average RMW larger than originally estimated, a landfall intensity of 95 kt is now assessed, making Edna a Category 2 hurricane at landfall.**

f. A final determination will have to wait for additional data and resolution of the RMW issue.

**Agreed. Given an average RMW larger than originally estimated, a landfall intensity of 95 kt is now assessed, making Edna a Category 2 hurricane at landfall.**

10. In the metadata discussion, line 17, change “a ship reported 992 mb with 15 kt E wind at 00 UTC on the 7th” to “a ship reported 992 mb with 15 kt E wind at 00 UTC on the 8th”.

**Corrected.**

1954 Storm #8 (new):

1. Please include whatever maps and analyses are available for the period 2-5 September so the committee can better understand the pre-genesis period.

**These have now been included.**

2. There are two ship reports that need clarification. First, please do a quality control check on the ship which reported 1005 mb on 7 September. Second, please clarify whether the ship near the center at 1200 UTC 6 September is reporting 1003 mb or 1013 mb. If it is the latter, the proposed intensities may need some revising.

**For the ship on the 7th, a comparison of the ship - #10551 – indicated no bias in four additional synoptic times with substantial numbers of neighboring ships. For the ship on the 6th - #4641 - comparison versus other nearby ships and a time series of the ship strongly suggests that the 1003 mb was in error and that 1013 mb shown in HWM was instead correct.**

3. Please add a comment on the thermal structure of the system.

**The following comment was added: “The cyclone was embedded on the 6th in quite warm air, well south of a warm frontal boundary, free of any baroclinic influences.”**

4. The committee concurs with the addition of this system to HURDAT pending resolution of the ship report issues.

**Agreed.**

1954 Storm #9, Florence:

1. The committee concurs with the proposed downgrade to a tropical storm.

**Agreed.**

2. That being said, given the ship report of 45 kt winds and the reported impact in Mexico, is it possible this system was stronger than 45 kt? Please consider a peak intensity in the 50-60 kt range.

**Agreed to indicate a peak intensity of 55 kt.**

3. Please contact the Meteorological Service of Mexico to see if they have more information on this storm.

**Mexico’s daily synoptic maps were obtained, as well as original observations for Veracruz (other stations in the vicinity of the system were not available). However, these observations provided no significant new data nor did they change the reanalysis.**

4. In the last sentence of the metadata summary please change “landfall in Veracruz, Mexico” to “landfall in the state of Veracruz, Mexico”.

**Done.**

1954 Storm #10, Gilda:

1. in the 26 September daily metadata, should the second “Ship highlights” actually be “Land highlights”?

**Changed.**

2. Please include the data from the 26 September reconnaissance mission in the spreadsheet file.

**Added.**

3. Guanaja, Honduras reported 50 kt near 1500 UTC 26 September. Is there sufficient information to show this was the peak intensity at the time? If not, it might be better to keep the original HURDAT intensities.

**Agreed to retain the original intensities on the 26th and retain the peak intensity of 60 kt.**

4. The Historical Weather Map for 1200 UTC 27 September shows an ob of SW 35 kt (mph?) and 1005.4 mb near the coast of Honduras. This is not in the spreadsheet or mentioned anywhere in the metadata. Please include it if it looks accurate.

**30 kt SW and 1005 mb at 12Z in Tela, Honduras has been added in.**

5. Please contact the Meteorological Services of Honduras, Belize, and Mexico for additional information on this system.

**Honduras and Belize had no additional information for this system. Mexico’s daily synoptic maps were obtained, as well as original observations for Campeche and Veracruz (other stations in the vicinity of the system were not available). However, these observations provided no significant new data nor did they change the reanalysis.**

1954 Storm #11, Unnamed:

1. The committee does not concur with the earlier proposed dissipation of the system. The 1200 UTC 6 October HWM shows the system still existing, and the a 964 mb observation on the 1800 UTC 6 October analysis looks most likely to be associated with the hurricane and not the large baroclinic low. Please either make a stronger case for the earlier dissipation or use the original HURDAT dissipation time.

**Agreed to retain original HURDAT dissipation time.**

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

**Agreed.**

1954 Storm #12, Hazel:

1. Has the period before 5 October been checked to see if the best track can be extended before the current starting time? Please provide binder maps for several days prior to 5 October.

**The period before 5 October had been checked to see about extending the best track backwards in time. However, no evidence surfaced that Hazel had begun before the 5th. The HWM tracks back to 1 October have now been included.**

1. There are two Navy aircraft fixes (998 and 997 mb) on the afternoon of 6 October which are included in the spreadsheet but not referenced in the daily metadata. They are also not fully referenced in the metadata summary. Please re-write these sections to properly reference these obs.

**These are now included in the daily and summary sections.**

1. Similar to point 2, there is a Navy aircraft fix (994 mb) on the afternoon of 7 October that is not referenced in either the daily metadata or the metadata summary. Please re-write these sections to properly reference this ob.

**This is now included properly in the daily and summary sections.**

4. A Navy plane was inside the eye at 1441 UTC 10 October. Unfortunately, it did not report a central pressure. However, it did report a geopotential height for an unknown pressure surface on an ob at 1500 UTC while still orbiting inside the eye. Can a surface pressure be estimated from the coded information in the Navy report? Note that there is an index that probably refers to the pressure of the geopotential height, but a copy of the code is needed to determine the pressure.

**The 1441 UTC fix was determined by radar and was not a penetration fix. (See October 11 microfilm printout.)**

5. Please edit the 12 October daily metadata to include only the point relevant to the strength of the cyclone during its passage over Haiti.

**The irrelevant quotation has now been removed.**

6. Please re-write the 15 October daily metadata for clarity.

**This has now been rewritten for clarity.**

7. Please re-examine the landfall location and intensity for the U. S. landfall, as there are two conflicting versions of what happened. The first is given by Seamon in the October 1954 Climatological Data National Summary. This version states that a 20-30 mile wide eye made landfall between Wilmington and Little River Inlet. This track is supported by the well-known pressure report of 938 mb at Tilgham Point/Little River Inlet and a second pressure of 945 mb at Holden Beach Bridge, North Carolina. The second version, given by Rhodes in the 1954 Climatological Data Annual Summary, has a 12 mile wide eye making landfall just northeast of Myrtle Beach with the eastern edge right at the Little River Inlet. This version is supported by the radar fixes from the last aircraft mission, which placed the center near or over Myrtle Beach. The metadata summary should include a mention of both scenarios, and a determination of which (if either) are correct.

**The two versions have now been included in full in the daily summaries. The landfall point has been adjusted one tenth to the west (to 78.6W), based upon all of the available observations including Navy radar fixes, pressure measurements, and eyewitness accounts of the eye. This is in South Carolina, just west of the South Carolina-North Carolina border. However, Rhodes’ suggestion that the center made landfall at North Island (79.3W) is not supported by any available information. Perhaps he was attempting to indicate where the eye first reached the coast (which is likely to be true). Landfall also did not occur at Myrtle Beach as the wind and pressure reports from that station, while incomplete, indicate that the station was inside the RMW but not near the center. Additionally, Rhodes’ estimate of a 12 mile wide eye is too small. The Navy reconnaissance reported 18 nm diameter eye at 07Z, which was about eight hours before landfall. The locations that reported a lull or calm inside the RMW suggested as large as a 40 nm diameter to the eye or maximum winds. Finally, the wind reports from Myrtle Beach - while incomplete - suggest an RMW of about 20 nm, which is the value analyzed for Hazel’s RMW at landfall.**

7a. If the center did make landfall over Myrtle Beach, this suggests the 938 and 945 mb pressures farther to the east are problematic, and so is the assessment of a category 4 intensity at landfall. Is a detailed record of the Myrtle Beach obs available to see if the station was actually inside the RMW?

**The center made landfall about 20 nm northeast of Myrtle Beach, so the 938 and 945 mb pressures are not problematic. Moreover, it was noted in the Rhodes report that the 938 mb was “Reported by fishing boat ‘Judy Ninda’ at Tilghman Point while in the eye of the storm. Aneroid compared at Wilmington and found reasonably accurate.” The wind reports from Myrtle Beach available from the Surface Weather Observations form, while incomplete, suggest an RMW of about 20 nm.**

7b. The Monthly Weather Review article states that the Tilgham Point pressure was measured at 1030 EST. Please add this time to the spread sheet.

**This now has been added.**

7c. The committee is not in favor in changing the SC4 landfall impact to SC3, especially given the possibility that the center actually made landfall in South Carolina. Please re-examine this proposed change after the landfall location is pinned down.

**It is agreed to retain SC and NC as both Category 4.**

8. There are also two conflicting versions of how Hazel evolved after landfall. The version generally used in U. S. publications is that Hazel became extratropical after landfall, with the Hazel center trackable well into southern Canada. On the other hand, Knox argues in a 1955 article in the Bulletin of the American Meteorological Society that the original Hazel center was absorbed by a second low over Pennsylvania, with the second low moving into Canada. The committee cannot currently resolve this due to the lack of temporal resolution in the data.

8a. Please construct detailed analyses of Hazel after its U. S. landfall with as high of a temporal resolution as possible. If necessary, a non-synoptic time best track point for extratropical transition could be added to HURDAT.

**Hourly observations were obtained from the region and analyzed, providing more data temporally and spatially than Knox had access to. The 2230Z October 15th map reveals the Hazel vortex was located near Washington, D.C. with cold frontal boundaries extending eastward and southward from the center as well as a stationary frontal boundary and considerable troughing extending north of Hazel. An hour later, the Hazel vortex could be seen at the Maryland-Pennsylvania border with considerably lower pressures along the stationary frontal boundary to the north. At 0030Z October 16th, the 984 mb pressure contour describes a large crescent shaped low extending from Lake Ontario down to the Pennsylvania-Maryland border. Despite the large amount of station data, it is unclear if there were two well-defined, separate lows – one in central Pennsylvania and one in western New York – or whether only one elongated, but very deep, low existed. Another hour later by 0130Z, the system consolidated into a single, well-defined low centered over western New York. Because the secondary low was apparently not well-defined, because it was transient (only an hour or two), and because the synoptic-scale cyclone that Hazel evolved into remained coherent late on the 15th and early on the 16th, the extratropical portion of Hazel’s track on these dates is retained similar to that indicated originally.**

9. Please contact the meteorological services of the Caribbean countries affected by Hazel to see what information they have available on the hurricane, as well as the Canadian Hurricane Center.

**The Caribbean countries have no further information regarding Hazel. The Canadian Hurricane Center (Chris Fogarty) has been contacted with regards to this system. (COMMENTS FROM FOGARTY TO BE INCLUDED HERE.)**

1954 Storm #13, Unnamed:

1. Can it be determined when this system was added to HURDAT and why? The case for it being there at all looks thin, to say the least. The committee would likely not add this system to HURDAT if it were not already there.

**This system was first added as a tropical storm in the Cry et al. (1959) Technical Memo. Another contemporary climatological account was Tannehill (1956) with seasonal summaries. Tannehill, however, did not include this system. Why Cry decided to include this as a new tropical storm was not discussed in his tech memo and will likely remain a mystery.**

2. In the 18 November daily metadata, it might be worth mentioning two obs or pressures near 1008 mb on the HWM at 1200 UTC.

**Agreed.**

3. The committee concurs with the proposed reduction in intensity.

**Agreed.**

1954, Storm #14, Alice #2:

1. Please provide a reference for the second paragraph of the metadata summary that begins “”Alice” was believed to be of hurricane intensity…”.

**This quotation was from the 1955 Navy aircraft reconnaissance book (ATSR).**

2. Regarding the observation from the ship Arawak on 1 January, the pressure is included in the spreadsheet but the wind is not.

**This is now added in.**

2a. The Arawak ob appears to be plotted as 75 kt on the 1800 UTC 1 January microfilm map? Is the correct wind 70 kt or 75 kt?

**The report received was Beaufort force 12. We typically indicate this to be 70 kt, but it appears that the microfilm map analyst chose 75 kt. 75 kt has now been so indicated within the daily summary.**

3. Please contact the Caribbean islands to see if they can provide more information, particularly regarding the times of the extreme conditions.

**The French (St. Martin and St. Barthelemy), British (Anguilla), and Dutch (St. Maarten and Saba) meteorological agencies in the Caribbean have been contacted, but have no additional information regarding this hurricane.**

1954 Additional Notes:

1. Please make sure copies of the HWMs and the microfilm maps are available for all of the additional suspects.

**All of the daily HWM maps for these 10 suspects have been now included. However, providing the same for the 6 hourly microfilm maps is beyond the scope of this project.**

2. Suspect #5: Please re-examine this system, including a detailed analysis of the surface frontal structure. The HWM analyze this system with a tropical storm symbol on 12-13 July, and on 13 July there are dewpoints above 70F both north and southwest of the system. This suggests the possibility the cyclone was non-frontal at that time. Also, the 12 July HWM shows what looks like a 50 kt wind well west of the center. Is this correct?

**After re-examining this system, it is agreed that it was a tropical storm and has now been added into HURDAT. The 50 mph (the HWM was plotted in mph, not kt) wind west of the center was accurate, though the site is slightly elevated, as it is from the Frying Pan Shoal tower measurement.**

3. Suspect #8: Please re-examine this system. On 16-17 September, there are many ship reports of 1005-1007 mb pressures. These reports are not central pressures, and they show pressures low enough to suggest a close circulation existed. The two most notable examples of this are a 20 kt/1006 mb ob at 1800 UTC 16 September and a 15 kt/1005 mb at 0000 UTC 17 September. In addition for the 1800 UTC 16 September hand-plotted map, it is unclear how many valid tropical-storm winds are actually plotted there. Three such winds are colored in, but there is a penciled in comment saying “one good gale”.

If these low pressure obs are reliable enough to show that a closed circulation existed, then please re-write the submission as a possible new tropical storm.

**Several ships do indicate a low enough pressure that a closed circulation would have to existed. In addition, there are at least a few legitimate gales while the system had a closed circulation (and was non-baroclinic throughout its entire lifecycle). Thus the system has been rewritten to indicate a new tropical storm.**

4. Suspect #9: Please note somewhere in the submission that the reconnaissance aircraft reported 1006 mb on 2 October.

**Done.**

4. The committee concurs with leaving the remainder of the suspect systems out of HURDAT.

**Agreed.**