**Best Track Committee Re-Analysis Comments for 1952**

General comments:

1. The committee needs additional information regarding the various reported aircraft winds. In past years, these have been a mix of estimates and measurements made through the drift method. Unfortunately, for most of the winds in this submission, it is not clear how these winds were derived. Some of the winds look quite unrealistic, such as the 90-130 kt winds reported in Hurricane Baker when the central pressure was 993 mb. Were these estimates? The committee’s dilemma is that if these winds were measured by the drift method (**and the flight level is known**), they should be given some credence even though they are well above what should have occurred for a system with such a central pressure. There are numerous cases of this issue through the 1952 submissions, and the committee needs more information on each one to make its decisions.

**Flight-level winds during this era in hurricanes conditions were extremely unreliable, due to the cumbersome, subjective, and uncertain way these data were manually calculated, not instrumentally provided. Please see page 4444 from Hagen et al. JClimate (2012) for more details on flight-level data. To summarize how these “flight-level” winds were calculated: every 15 minutes the navigator told the flight aerologist the location of the plane as best he could determine by dead reckoning or, occasionally, Loran radio signals. Based upon how much fuel was being used and the rpm of the engines, one could determine roughly how far the plane should have traveled in that 15 minutes. The distance, as calculated by the difference between the actual location of the plane versus were it should have been based upon fuel consumption and rpm, divided by the 15 minutes of time provides the flight-level wind speed – calculated manually by the flight aerologist. The values obtained, however, were extremely poor, as the dead reckoning approach became completely unreliable as one moved over the open ocean away from landmarks. Additionally, the Loran signal tended to not be available in heavy rain conditions and the absolute accuracy of the values when obtained were on the order of 10 nm. Errors in knowing the distance the plane should have covered coupled with errors in knowing the actual position even with Loran coverage meant that the flight-level winds obtained had tremendous error bars – +/- 50%. Moreover, it should also be noted that the untrustworthiness of these winds became apparent to the forecasters of the early 1960s (once the first pressure-wind relationship was used in operations), as it became routine to only record the maximum surface winds and to completely disregard the flight level-winds. Thus the flight-level winds are not considered in the best track intensity determination for this era.**

2. In this year and others to follow, it would help the committee if more information could be found on the decision-making of the forecasters at the time. For example, the February system was **not** included in the original Monthly Weather Review (MWR) article on the 1952 season, but it was added to the tracks book in its 1959 incarnation. It was also called a tropical storm in both the Florida and National Climatic summaries. The question then becomes why was this system not originally included in the 1952 write-up? Any information that can be found on this or other similar situations would be most appreciated.

**The reason for the system’s non-inclusion initially and then introduction into the track book in 1959 remains a mystery. As we get closer to the modern era, we can ask the surviving hurricane forecasters themselves, but as we discovered in asking them about 1969’s Hurricane Camille, the memories of these long ago events fade and are often at odds with the available facts. We will continue to dig deeper for systems like this and others to see if we can determine why they were (or were not) included in the database. This discrepancy also may have arisen due to the fact that there were two separate entities that influenced the original best tracks of this era - the U.S. Navy and U.S. Weather Bureau. Although there was collaboration, their records may not have always matched. (C. Neumann, personal communication). Based on what Charlie Neumann said, the Navy was in charge of the best tracks from 1946-1964, although they usually just went with what the USWB post-season write-up said. For winds, aircraft flight-level winds calculations were often placed into the best tracks. The Navy took these pretty literally until the first pressure-wind relationship papers were published.**

**One possible example of this disagreement between agencies can be found in the February 2 daily metadata paragraph for Storm #1. From USWB- communication (possibly between New Orleans office and Miami office)… “02/2205Z: Your estimate of closed low in Caribbean [is] completely unfounded on basis of our reports. There [is] a closed low centered over western Mississippi at 1830Z with [a] warm front [extending] into [a] sharp trough along [a] Burwood/Isle of Pines/Manzanillo/ line and [a] cold front extending from [the] low to just south of Vera Cruz. Tropical storms do not form in February” (KMIA WBAS).**

1952 Storm #1:

 1. The committee is currently split on what to do with this system. Available upper-air data (provided by an archive at Iowa State University) suggests the cyclone was at least partly involved with a low-mid-level baroclinic zone (warm front?) when it crossed Florida, and that very strong jet stream winds were occurring in advance of the cyclone. This suggests the cyclone was a frontal low for at least part of its life. On the other hand, the surface temperature gradient near the system was weak, it had a tight wind core characteristic of a tropical cyclone (albeit one that does not seem very circular), and the upper-air data lacks the spatial and temporal resolution to show the details of the cyclone’s thermal structure.

 1a. The committee is looking at three options: First, keeping the cyclone in HURDAT with something close to the current proposed changes in track and intensity. Second, removing the cyclone from HURDAT due to its being frontal. Third, modifying the proposed track to show the system as frontal crossing Florida, then evolving into a tropical cyclone over the Atlantic.

**Given that the system was in February, it is reasonable to ascertain how tropical the cyclone was. Early on February 3rd while the cyclone was making landfall over Florida, there were abundant surface temperature, dewpoint and wind observations. These indicate that the system had a minor east-west temperature gradient across its center, but no north-south gradient. Also there was very little dewpoint gradient across the cyclone. The wind and pressure structure was somewhat elongated north-south, but did exhibit a strong pressure gradient and winds near the center. It should be noted that the north winds on the west side of the cyclone were very weak for the entire duration of its lifetime, as the system was embedded within the warm sector of a large extratropical cyclone with fairly large southerly flow. Nevertheless, north winds with the cyclone and a closed circulation were present throughout, and the analysis indicates that a substantial peak intensity (60 kt) was reached for this tropical storm. Thus the system was not a pure tropical cyclone, but did have some hybrid characteristics. Overall, it is likely that if one had satellite imagery, that today this system would be considered a subtropical storm. After obtaining the new observations and revisiting the reanalysis, keeping the system as a tropical cyclone while crossing Florida is retained.**

 2. The committee request that detailed (hourly or better) observations be obtained from Palm Beach, Fort Lauderdale, and (if possible) the Dry Tortugas. This should help analyze the surface structure of the system.

**In the EV2 on-line system from NCDC (not available during the original reanalysis), we were able to obtain hourly observations from the following locations: Dry Tortugas Light Station, Key West WBAS, Key West WBO, Sombrero Key Light Station, Alligator Reef Light Station, Carysfort Reef Light Station, Miami WBAS, Miami WBO, Fort Myers WBAS, West Palm Beach WBAS, Jupiter Inlet Light Station, and Vero Beach WBAS. Unfortunately, the Fort Lauderdale Naval Air Station had closed in 1946 and had not reopened as Broward County International Airport until 1953, thus no Fort Lauderdale observations are available. These did help substantially in analyzing the surface structure of the system.**

 3. If the system is kept in HURDAT, the committee favors keeping the original genesis time and location. It believes the evidence is strong enough that the system existed on 2 February.

**Agreed to retain the original genesis time on the 2nd of February.**

 4. The committee concurs with the proposed changes in intensity regardless of whether the system is kept in HURDAT.

**Agreed.**

 5. What data from Cuba is available for this system?

**Cuba did not report any tropical storm force winds for this system.**

 Further feedback from the committee – May 2015: After a lot of deliberation, we have reached a decision of what to do with the February 1952 system. The consensus is to call it a low pressure area from the Caribbean across Florida until 1200 UTC 3 February, than call it a tropical storm similar to what is in HURDAT now and to what you have proposed.

**Agreed.**

1952 Storm #2, Able:

 1. The committee has concerns that the proposed reductions in intensity are too great, and it is based on the various aircraft reported winds. Were these estimated or measured through the drift method? If it is the former, then the proposed reductions may be reasonable. However, if it is the latter, the proposed reductions are far less justifiable. Please provide the committee with a list of all the flight-level winds in this storm that were measured. It should be noted other hurricanes in HUDAT have had central pressures near 1000 mb at hurricane intensity, so the relatively high central pressures do not automatically justify a downgrade.

**Agreed to reduce the reductions. All aircraft winds of this era are manual estimates and cannot be considered instrumentally measured like we consider them today. Flight-level winds during this era in hurricanes conditions were extremely unreliable, due to the cumbersome, subjective, and uncertain way these data were manually calculated, not instrumentally provided. In this particular case, the available records were sometimes unclear if they were reporting a flight-level or a surface wind. For the cases that it is ambiguous, these are now explicitly mentioned and used in the reanalysis.**

 2. Do the proposed track changes on 24-25 August create a relatively smooth speed and direction?

**These have been reviewed and do provide smooth speed and direction.**

 3. The lowest recon pressure on 25 August was 1006 mb. The 18Z 25 August microfilm map suggests this was measured with a simultaneous 20-25 kt wind. Is this correct, and if so, should a lower pressure be used for the intensity determination?

**It is agreed that this was a peripheral, not a central pressure. The text from the ATS was ambiguous, but the microfilm observations clarified the situation. The intensity is increased from the first reanalysis draft.**

 4. The 28 August daily metadata does not mention a recon flight near 1200 UTC that day, but the 1200 UTC microfilm map shows what looks like aircraft data near the center. Please clarify what this data is.

**At 1230Z on the 27th, aircraft reconnaissance measured 1003 mb with 10 kt SE winds. A 1002 mb central pressure is added into HURDAT at 12Z. This has now been added into the metadata writeup.**

 5. The microfilm map for 1800 UTC 29 August shows what looks like an ob of 50 kt and 998 mb. Is this correct, and if so, can it be reconciled with the other reported 998 mb central pressures?

**The 998 mb pressure was recorded at 1815Z with 50 kt E winds. Thus the 998 mb minimum pressure reported was instead a peripheral pressure. This is now so changed.**

 6. Is the 999 mb pressure at Columbia, South Carolina at 1200 UTC 31 August the lowest pressure for the passage of Able, or just the pressure at the time of the ob? Please clarify this.

**We were able to obtain the hourly Columbia, SC observations from the EV2 website. The lowest pressure for the station was obtained at 1130Z with 998 mb and N 28 kt. This has now been added into the writeup.**

1952 Storm #3 (new):

 1. The committee concurs with adding this system to HURDAT pending the resolution of an issue regarding the thermal structure. The cyclone originated from a frontal low, and even as it was making landfall a tongue of very dry air is present west of the system. This is shown by dewpoints in the 40’s and 50’s northwest of the low, and dewpoints in the lower 60’s as far south as northern Florida – quite dry for August. This raises some doubts as to whether the system totally shed its frontal character before landfall. In that light, it is interesting that the South Carolina Climatological Data apparently called this system an extratropical low in the quote in the 28 August daily metadata. Please re-examine the thermal structure using detailed surface obs (e. g. Myrtle Beach, South Carolina) and any available upper air data. Perhaps this system should be better classified as a subtropical cyclone than a tropical cyclone?

**Hourly observations from Myrtle Beach, SC were obtained from the EV2 website. This showed a minimum pressure of 1001 mb with NNW 6 kt winds at 0230Z on the 28th. While the surface temperatures at Myrtle Beach remained relatively constant near 70F in the 24 hours up to landfall, the dewpoint significantly rose and reached 70F at the time of landfall despite winds out of the north the entire time. The dry dewpoints were well – about 200 nm – west of the cyclone at the time of landfall. The 500 mb temperatures rose significantly in the near vicinity of the cyclone between the 27th and 28th, suggesting that the system was a developing tropical or subtropical cyclone. It is now noted that if satellite imagery were available for this system, it is possible that it would have been designated as a subtropical cyclone as the radius of maximum wind was on the order of 100 nm.**

 2. In the 28 August daily metadata, there are quotes from the North Carolina and South Carolina Climatological Data publications, as well as quotes from something labeled “climo”. What is the source of these latter quotes, which don’t seem to match the former quotes very well?

**These were additional quotes from the same publication, but not labeled clearly. This has been clarified.**

 3. In the metadata summary, there is a sentence “A closed circulation likely existed by this time because of the large pressure gradient that existed”? How does a pressure **gradient** imply a closed circulation?

**A closed circulation likely existed by this time because of the very low pressure (1003 mb) observed within an environmental pressure of about 1011 mb for a system moving about 12 kt, though no ships were present within the southern semicircle to confirm this.**

 4. Please better explain the proposed 50 kt peak intensity and why the 60 kt ship report is at least somewhat disregarded. The detailed obs from Myrtle Beach could be useful in better establishing the central pressure.

**Although the highest observed wind was 60 kt from a ship, there were two other 35 kt ship observations straddling the 60 kt ship. Moreover, the ship reported 15 kt winds at subsequent times which compared with other observations much more reasonably. Thus it is likely that this measurement from the ship was in error and significantly biased high. With two other 40 kt ship reports in cyclone’s northern quadrant at the same time, the intensity is analyzed to be 45 kt. This is also the cyclone’s peak intensity.**

 5. In the metadata summary, it states “There are no available observations of gale force winds from any coastal station”. However, in the 28 August daily metadata, an observation of 45 kt and 1004 mb is mentioned as a land station highlight. Please clarify this. Is it possible that the station in question is Frying Pan Shoals, North Carolina? If so, is any additional data available for it?

**Yes, this is Frying Pan Shoals, which has now been so clarified. There were other synoptic time observations from the lightship, but none were as significant at the 00Z 28th measurement.**

1952 Storm #4, Baker:

 1. Here is another storm with large proposed reductions in the intensities on 2-6 September based mainly on ignoring the reported winds in favor of the central pressures. Again, please provide the committee with a list of which aircraft winds were measured during this storm. It should be noted that a fix in the microfilm data on 8 September explicitly says 136 kt winds measured by the single drift method. What was the flight level of these winds, and how much weight should be put on them for intensity determination?

**All aircraft winds had already been provided within the excel databases. All aircraft winds of this era are manual estimates and cannot be considered instrumentally measured like we consider them today. Flight-level winds during this era in hurricanes conditions were extremely unreliable, due to the cumbersome, subjective, and uncertain way these data were manually calculated, not instrumentally provided. Thus the flight-level winds are not considered in the best track intensity determination for this era.**

 2. The evidence for the earlier genesis on 30 August is a little thin. Has the ship that reported the 1004 mb pressure been checked to see if the pressure is good? If the ship report is good, is the proposed position too far west? Are any microfilm maps available for 30-31 August? Please-re-examine this.

**The ship, without an identification number, only apparently provided this one observation. There are no microfilm maps for the 30th or 31st (too far east for the maps they used then). Therefore, it is agreed to keep genesis at 06Z on the 31st as originally provided in HURDAT.**

 3. Regarding the aircraft data on 2 September, there is a passage in the metadata summary that states “we cannot show a hurricane with a 1003 mb central pressure”. Yes, you could, if the data suggested that was the case. The best reason for removing the 1003 mb as a central pressure is that it was apparently reported at a location that does not match either of the center position estimates from this mission. Please re-write this portion of the metadata summary to better make this argument. Can it be determined what wind the aircraft was experiencing at the time of the 1003 mb pressure?

**Agreed. It is unknown what the winds were when the plane reported the 1003 mb pressure.**

 4. Given the issues with the aircraft winds, what is the basis for the short-lived 70-kt intensity on 2 September? Is the data really good enough to show this 5-kt bump?

**Agreed to remove the 5 kt bump.**

 5. What is the basis for the stated sizes of the radius of maximum winds (RMW) from 3-6 September in the metadata summary? None of this information is in the daily metadata, and the microfilm data has nothing to show the RMW size during this time except for one report of eye diameter on 6 September.

**These had been in the excel data file, but are now explicitly added to the daily summary.**

 6. In the 7 September daily metadata, are the maximum winds on the Navy fix 100 kt or 140 kt? Please clarify this.

**The information we have is ambiguous as to the value. This is now clearly stated.**

 7. In the metadata summary “the 40 intensity” should probably be “the 40 kt intensity”.

**This was removed, as it was part of September 30th.**

8. From Pasch: What was the basis for the 996 mb central pressure at 1800 UTC 1 September in the revised HURDAT?

**This was incorrectly placed at that date/time bin. It should instead have been included at 18Z on the 2nd, though the summary discussion was accurate. This has now been corrected.**

1952 Storm #5 (new):

 1. The committee is currently split on whether to add this system to HURDAT due to the concern that it more resembles a decaying baroclinic low than a tropical or subtropical cyclone. What is the key characteristic or data for this system that suggests it was a tropical or subtropical cyclone?

**The key piece of information that distinguishes this system as a tropical (subtropical) cyclone versus a decaying baroclinic low is the presence of several four gales located between 60 and 120 nm from the cyclone’s center. Additionally, the westward motion of the cyclone on 8 September is not consistent with the behavior of an extratropical cyclone. With satellite imagery available today, this system likely would be characterized as a subtropical storm.**

 2. Is there any evidence that this system acquired an inner wind core? It is noted that the cyclone passed near the Azores. Is there any data available from those islands to resolve the structure?

**No other observations are available from the Azores for this system.**

 3. What is the basis for the 50 kt peak intensity on 9 September? It is noted that there are no ship reports of more than 40 kt, and the normal wind pressure relationship may not work normally in this quasi-baroclinic system.

**Agreed to reduce down the peak intensity to 45 kt, based upon the two 40 kt ship reports on the 9th.**

1952 Storm #6, Charlie:

 1. Please provider binder maps for 19-21 September for this system.

**Synoptic maps have been provided for September 19th through the 21st.**

 2. The early history of this system is confusing, and the committee is split on what to do with it. There is little definitive evidence that a closed circulation existed prior to 23 September, to the point that we probably wouldn’t include that part of the track if this was being introduced as a new system. There is also no convincing evidence that the system was a tropical storm before crossing the Dominican Republic. Finally, the original account in the MWR stated that the center dissipated and then re-formed near the Turks and Caicos, a scenario which is at least partly supported by the data and by climatology. Comments from Pasch: “Although the metadata discussion states ‘Sufficient observations at 18Z on the 22nd indicate that a closed circulation was not yet present, and the 22nd of September is removed from HURDAT.’, I don’t think the surface data clearly show that the system lacked some westerly winds at 1200 and 1800 UTC 22 September. I think those first 2 points in HURDAT should be retained.” Before the committee gives a decision, it needs the information given in the points below:

 2a. The main evidence for a circulation on 23 September is a 1200 UTC ship report of 30 kt and 1010.8 mb south of the eastern end of the Dominican Republic. Has this ship been quality checked, especially the pressure?

**Fortunately, the ship shows up nearly every six hours in COADS as #12931. The observation (1010 mb with, actually, 25 kt) was the peak encountered by the ship as the ship was quickly moving south-southeastward. A wind shift from E 15 kt (at 00Z 23rd) to SSE 15 kt (at 18Z 23rd) was recorded. However, the ship does not provide evidence that the system had a closed circulation on the 23rd nor tropical storm intensity.**

 2b. Detailed hourly obs from Santo Domingo and any other station in the Dominican Republic are needed to determine if a closed center actually crossed the island. Has the Meteorological Service of the Dominican Republic been contacted to find out what they know about the system?

**The Meteorological Service of the Dominican Republic has no additional information regarding this system. It is noted that at 18Z on the 23rd, when the tropical storm was supposedly at is closest approach to Santo Domingo and Port Au-Prince that both stations had higher pressures than the 22nd at 18Z (1010 mb on the 23rd versus 1009 mb on the 22nd at both stations). Thus this is evidence that a tropical storm did not form in the Caribbean and make landfall on Hispaniola.**

 2c. On the 0000 UTC 24 September microfilm map that Santo Domingo has north winds and 1012 mb, while a ship north of the Mona Passage has south-southeast winds and 1009 mb. The latter pressure suggests the possibility of a closed center, albeit one to the east of the current and proposed positions. Has this ship been quality checked?

**The ship – from COADS – has no identifier, so a time series cannot be provided. However, the balance of the evidence indicates that the system formed just northeast of Hispaniola, around 00Z on the 24th. Thus genesis has been delayed by 42 hours, a major alteration.**

 3. In the 25 September daily metadata, there is a mention of a center fix from a ship. Is this ship in COADS and what is known about it?

**This observation from the ship “Barbara” is found only in notes written in the microfilm. The ship is not available in COADS.**

 4. In the 25 September daily metadata, is there something missing in the sentence “…on 24 September and the southeastward into low latitudes of the jet stream at 200 mb”?

**The word “movement” was accidentally left out, but it is now so included.**

 5. While the aircraft measured central pressure on 25 September was 993 mb, the structure of a well-defined circular 10 n mi eye suggest at least the possibility that the cyclone was a hurricane at the time, and committee thinks the proposed reductions in intensity are too large. Is it known how these aircraft winds were determined? Perhaps 65 kt would be a better intensity at the time of the aircraft fix?

**It is agreed that hurricane intensity at the time of the center fix (17Z) is appropriate. Intensity is now set to 60 kt at 12Z and 70 kt at 18Z (both up 5 kt from the first draft). Flight-level winds during this era in hurricanes conditions were extremely unreliable, due to the cumbersome, subjective, and uncertain way these data were manually calculated, not instrumentally provided.**

 6. Is it possible that extratropical transition occurred earlier than what is currently proposed? Perhaps it could be moved up to the first synoptic time after the center crossed the north wall of the Gulf Stream?

**Agreed to move up the extratropical transition time by an additional 12 hours to 06Z on the 28th.**

 7. In the metadata summary, there is a section discussing a possibly bad aircraft pressure on 27-28 September. Please re-write this for clarity.

**Re-written for clarity.**

1952 Storm #7, Dog:

 1. The committee concurs with the proposed earlier genesis time.

**Agreed.**

 2. The committee concurs with the proposed downgrade of the peak intensity of a tropical storm pending the resolution of the methods used to get the reported aircraft winds. (Pasch wrote: I question the downgrade of this TC from a hurricane to a tropical storm. There were reconnaissance observations of hurricane force winds and a minimum pressure of 997.6 mb on 26 September. While that pressure is relatively high, it could still support minimal hurricane strength.) It is noted that while the metadata states explicitly that 68-kt flight-level winds were “measured”, it does not mention the flight level, and it is not clear if these were the maximum winds the aircraft encountered.

I don’t have the microfilm image from the 26th, but the height of the ob is often plotted next to the ob on microfilm. Another place to check for the height of the flight-level would be the ATSR Navy book. Today for these low-level flights, we’d typically be multiplying by 0.80 or 0.75 as per Franklin et al. (2003). Multiplying a 68 kt by 0.80 would give 54 kt surface winds.

**Typically, the Navy aircraft would fly below cloud base (~0.5 to 1 km) for tropical storms and low end hurricanes to provide daytime fixes, including a center, central pressure, calculated peak flight level winds, and visually-estimated peak surface winds. Flight-level winds during this era in hurricane conditions were extremely unreliable, due to the cumbersome, subjective, and uncertain way these data were manually calculated, not instrumentally provided. It is agreed to bump up the intensity slightly (from 55 kt to 60 kt) at the peak of the system (late on the 26th and early on the 27th). However, for a system with 998 mb central pressure (suggesting maximum winds of 51 kt from the Brown et al pressure-wind relationship) that has a large inner core (70 nm diameter, ~50 nm RMW) and slow moving (7 kt), it is not realistic for a tropical cyclone to have peak winds of hurricane force. If it were small in size and/or exhibiting a fast forward speed, then it could be justifiable going considerably above the pressure-wind relationship suggested value. As it is, going with 60 kt for a 998 mb central pressure for a large, slow moving cyclone is somewhat of a stretch to justify.**

 3. Is it possible the system weakened to 25 kt earlier than currently proposed on 30 September? On a related note, the metadata summary for 29 September might want to mention the 1200 UTC ship report with 1009 mb and 20 kt, which suggests the system still existed at that time.

**It is agreed to indicate 25 kt earlier (12Z) than in the first draft of the reanalysis. It is also agreed to mention the 1009 mb and 15 kt S (the HWM plotted obs in mph in this era) in the metadata summary for 29 September.**

 1952 Storm #8 (new):

 1. The committee does not concur with adding this system to HURDAT at this time. The most troubling aspect of the submission is that the ship which was close enough to the center to report low pressures did not observe tropical-storm force winds. Please double check the pressures from the ship in question if the data to do so is available in COADS. How do the pressures look when the ship is in the Bermuda High or elsewhere in the high latitudes?

**Additional COADS ship observations were obtained through the 2nd of October. Comparison with other ships and the Cape Verde Islands reveals that the pressure on this ship likely had little to no bias. Additionally, the ship recorded a 24 hr change of 12 mb, from 1000 mb to 1012 mb, indicative of a substantial pressure gradient being present. While the ship only recorded a maximum of 25 kt, it moved across the southwestern semicircle of the cyclone, which would be expected to have the weakest winds.**

 2. Has the Meteorological Service of the Cape Verde Islands been contacted for additional information? It appears the cyclone came close enough to affect them.

**The Meteorological Service of the Cape Verde Islands has no additional information regarding this system.**

 3. The northwesterly winds on the 28 September map between 15-20N and 25-30W suggest the possibility the cyclone moved northward from 28-30 September. Please investigate this alternate track possibility.

**Agreed that the cyclone turned northward on the 28th and continued in that direction until dissipation after 12Z on the 30th.**

1952 Storm #9, Easy:

 1. Please clarify the reasoning for the revised peak intensity of 85 kt. On one hand, the observed central pressure of 968 mb would support the original 95 kt intensity, or maybe a 90 kt intensity. The “measured” flight-level winds do not support those intensities, although again the flight level is not given and it not clear if the “measured” winds were the highest encountered. Why was the peak intensity reduced in this case?

**It is agreed to bring the peak intensity to 90 kt. The peak intensity is based upon the 968 mb central pressure in conjunction with a slow forward speed. Flight-level winds during this era in hurricanes conditions were extremely unreliable, due to the cumbersome, subjective, and uncertain way these data were manually calculated, not instrumentally provided.**

 2. There appears to be a typo in the 12 October daily metadata: “in the eater areas of the Caribbean”.

**Typo corrected.**

 3. Was the possible relationship between Hurricanes Easy and Fox mentioned in the 12 October metadata investigated?

**The possibility of Easy and Fox being the same system as was mentioned in the ATS was investigated. However, the passage of about nine days between the demise of Easy and the formation of Fox as well as the lack of any coherent surface features during that time period suggests that the two systems were independent.**

1952 Storm #10, Fox:

 1. Once again, the committee needs a list of the aircraft winds for this storm which were measured.

**Winds were not actually measured by an instrument. Flight-level winds were “calculated” manually (with a human, a pen and paper). Surface winds were estimated visually.**

**Oct 21 2050Z : 50 kt flight-level winds were encountered**

**Oct 22 1730Z : 50 kt NNW flight-level at 600 ft at 17.1N, 82.2W**

**Oct 22 (1730-1845Z): Max flight-level (600-800 ft) wind encountered on flight 80 kts S (993 mb central pressure – low-level penetration at 1745Z at 17.2N, 81.9W).**

**Oct 22 1815Z: 40 kt WNW flight level 600 ft at 16.6N, 82.0W**

**Oct 22 1845Z: 45 kt ESE flight level 600 ft at 17.5N, 81.3W**

**Oct 23 15Z: 80 kt SSE flight-level 600 ft and 995 mb at 18.7N, 81.3W**

**Oct 23 (pm): 80-85 kt flight-level encountered in periphery when circumnavigating (unlikely the eyewall).**

**Oct 24 1530Z: flight-level 100 kt WNW at 300 ft and 987 mb at 1530Z at 21.5N, 81.0W**

**Oct 24 1534Z: 920 mb central pressure at 21.8N, 80.9W (max flight-level wind encountered 130 kts 20 nmi SW of the – presumably near 300-400 ft).**

**Oct 25 1305Z: Center fix – 100 kt max flight-level winds encountered at 500 ft.**

**Oct 26 1630Z: 95 kt max flight-level wind**

**Oct 26 2118Z: 65 kt observed in the northeast quadrant on this fix (unclear whether flight-level calculated or surface estimated).**

**Oct 26 30 kt NW**

**Oct 26 35 kt NW**

**Oct 26 60 kt 60 kt SE**

**Oct 27 1437Z: 45 kt (max flight-level encountered) in southeast quadrant. 1008 mb lowest pressure encountered and no closed circulation reported.**

 2. In the metadata summary, there is a section discussing the intensity on 21 October and the associated aircraft fix. Please re-write this to better state the reasoning for reducing the intensity. The current version has too many ifs about possible pressure biases and navigation errors. For example, why would the center location based on a ship report be trusted more than an aircraft center fix?

**Numerous ship observations agree with each other (and disagree with the aircraft) that the center at 18Z must be significantly south of the recon fix.**

**Original HURDAT 18Z: 15.4N, 81.2W 50 kt 1003 mb**

**Revised HURDAT 18Z: 16.0N, 81.6W 45 kt**

**Recon fix 2050Z: 17.4N, 82.2W 1003 mb 50 kt**

**Interp revised HURDAT 2050Z: 16.1N, 81.7W 47 kts. This is over 1.3 degrees SSE of the fix.**

**Farthest possible NNW that the HURDAT position could have been at 18Z based on sfc data: 16.9N, 82.0W.**

**Based on the ship obs alone, the center is estimated near 16.0N, 81.6W at 18Z, which is 0.6 degrees NNW of original HURDAT. The observations allow the center to be placed as far NNW at 16.9N, 82.0W.**

**Based on a revisitation of ship obs from 00Z, it is possible that the center could have been as far NNW as 17.4N, 82.2W by 00Z.**

**Based on a careful/detailed reassessment of all data on the 21st and 22nd, the 1003 mb pressure has been added back into HURDAT at 18Z on the 21st. Additional track changes have been implemented as well from 10/21 06Z – 10/22 18Z. Since we are treating that 1003 mb as a central pressure, more weight is placed on the 2050Z recon fix for position. The recon fix was 17.4N, 82.2W. The revised interpolated 2050Z position provided in the first draft 16.1N, 81.7W. The revised interpolated 2050Z position provided in this current draft is 16.8N, 81.9W. It is ok to have the fix 0.6 degrees off from the interpolated HURDAT position (taking into account possible navigation error as well as the possibility of a large center/RMW.**

 3. In the 23 October daily metadata, was the hurricane southeast or southwest of Grand Cayman at the time of the aircraft fix? Also, there seems to be something missing in “Severe continuous and continuous heavy rain…”.

**Southwest. This has been corrected in the metadata. The first “continuous” should be “turbulence”. This has been corrected.**

 4. Please contact Perez to get definitive information on the data from the weather station at Cayo Guano del Este. The pressure mentioned in the MWR is precise enough to suggest it was a measurement and not an estimate. If necessary, please contact NCDC to see what information they have from this station. Also, please ask Perez for the appropriate metadata on the Cayo Guano del Este station, including the elevation of the instruments.

**Ramon Perez and Maritza Ballester from Cuba have been contacted for more additional information about this station. Unfortunately, thus far they have not been able to provide any more insight. NCDC has no information for this station.**

 5. Is it possible that the proposed decrease in intensity from 125 kt to 80 kt while the cyclone is over Cuba is too large, even though it is supported by the inland decay model? Do the observations from Cuba support such a decrease?

**It is agreed to not weaken the hurricane as much after landfall. However, observations over Cuba support a rather quick weakening. The new intensity after six hours after landfall is 85 kt.**

 6. Has the Meteorological Service of the Bahamas been contacted for additional information on Fox?

**The Bahamian Meteorological Service has been contacted, though they have not been able to provide any additional information regarding this hurricane.**

 7. There are detailed sequences of observations on two microfilm images at 0300 and 0600 UTC 26 October. What station or stations are these obs from?

**The Excel spreadsheet of observations indicates they are from Eleuthera near 25.1N, 76.2W.**

 8. In the metadata summary, there is a discussion of an aircraft fix late on 25 October. Please re-write this for clarity.

**Re-written for clarity.**

 9. In the metadata summary, there is a section discussing how an aircraft pressure on 26 October seems to be wrong. What is the other data indicating this fix was in error and can that data be used to make a central pressure estimate for HURDAT?

**The other data is the 85 (kt or mph) south wind from Cat Island at either 15Z or 16Z. During its trek through the Bahamas, the surface data has been equally weighted with the aircraft data, as some of the aircraft data appeared suspect and the aircraft fixes were slightly off in position from where the surface data would suggest. Part of the inconsistency may have been due to a rather large eye, which may have made determining the exact center problematic. Unfortunately, the other data cannot be used to make a central pressure estimate for HURDAT unless 994 mb is treated as a central pressure. Based upon the other observations available, this does not appear to be reasonable.**

1952 Storm #11 (new):

 1. The committee concurs with the addition of this system, pending the resolution of when and if it may have acquired the wind field of a tropical or subtropical cyclone. While many ships reported low pressures near the center, most of the reported strong winds were at large distances from the center until 28 November. Can it be better determined at which point an inner wind core may have formed?

 1a. The microfilm map shows a report from the ship Saxonster (sic?) with south winds 30 kt and 999 mb at 1200 UTC 26 November. An interesting part of this report is that the ship shows a three-hour pressure change of plus 3 mb, suggesting a pressure near 996 mb three hours earlier. If correct, this might support the existence of an inner core. Can additional data be found for this ship, and has the pressure been quality checked?

**It turns out that this ship – the Saxon Star - did report a few times in COADS, but that it was reported 10 degrees too far north and 10 degrees too far west. Those positions are not possible, given the abundant nearby observations at those locations. A time series is now obtained for this ship, between the microfilm and corrected position COADS observations. This has allowed for some change of track, but also a 992 mb central pressure obtained – from a WSW 15 kt wind with 994 mb pressure at 06Z. This indicates that the system did develop an inner core on the 26th within a warm, low temperature gradient environment. Thus tropical transition is now indicated to have occurred around 00Z on the 26th.**

 2. A ship reported temperatures of 64-65F northwest of the center on 26 November. Has there been a quality check made for these temperatures, which at the moment appear too cold?

**This ship is available within COADS - #70002 – exhibited temperatures of 69F at 00Z 25th, 68F at 06Z, 70F at 12Z, 72F at 18Z, 64F at 00Z 26th, 65F at 06Z, 72F at 12Z, and 70F at 18Z. The values do not appear unreasonable within the time series and they also match fairly well the other ships in the vicinity. However, the ship at the time of the 64F reading is about 300 nm from the center of the cyclone. Thus it appears that these cooler temperatures are not within the inner core of the system.**

 3. Is there aircraft data on the microfilm map for 1200 UTC 27 November on the western side of the storm? If so, has that been evaluated as part of the analysis?

**The aircraft measurements have now been added and considered in the reanalysis. An aircraft measured 40 kt N surface winds in the western periphery of the cyclone at 1025Z. These are consistent with the 12Z position and the 50 kt intensity analyzed.**

 4. The proposed track shows a distinct kink on 30 November. Does the data require this, or can it be smoothed out?

**Agreed to smooth out the kink at 00Z on November 30th.**

 5. Is it possible that the proposed intensities on 29-30 November could be reduced 5 kt?

**Agreed. Intensities are dropped by 5 kt on the 29th and 30th.**

1952 Additional Notes:

1. Suspect #4: Please re-examine this system on 15-16 July. The reported pressures – both in the recon data and on the maps – indicate that a closed pressure low was present at some point over the northwestern Gulf of Mexico. This suggests the possibility that a closed wind circulation was present, although the data indicate it was never well defined. Please examine the observations in Louisiana for additional impacts, and please provide more detailed observations for Galveston and Corpus Christi. The latter may help determine if some small center moved onshore before dissipating. This system seems to have been more than just a garden-variety tropical wave, as it produced tornadoes well inland after landfall.

**Hourly observations from Galveston and Corpus Christi were obtained from the EV2 on-line site. These revealed the peak winds recorded in Galveston and Corpus Christi were straight-line winds (likely related to a squall line) with no evidence of a closed circulation. The Louisiana State Climatological Data writeup was obtained as well. This revealed significant rainfall, but no indication of a tropical storm.**

 2. Suspects #8 and #10: The committee concurs with leaving these systems out of HURDAT. They seem to be very close spatially on 10 September. Are they related, or possibly one and the same system? Please clarify this.

**Agreed to leave these systems out. It is possible that they are one and the same system, which is now so mentioned.**

 3. Suspect #12: The committee concurs with leaving this system out of HURDAT. Please add the dates of the 35 kt ship reports to the write-up.

**Agreed.**

 4. Suspect #13: Please provide the microfilm maps for this case. What were the reported winds on the ship at the time of the 1007.5 mb pressure? The committee concurs with leaving this system out of HURDAT pending the resolution of these items.

**The microfilm maps for this case are now provided.**

 5. Suspect #14: The committee concurs with leaving this system out of HURDAT. However, it would like to have a full set of the microfilm maps made. Question from Pasch: Do the data clearly show that the cyclone that crossed the Florida peninsula on 20-21 October was frontal?

**The microfilm maps for this case are now provided. Yes, the system was frontal moving across Florida.**

 6. Suspect #15: Please create a full set of microfilm maps for this case. While the committee concurs with leaving this system out of HURDAT, it should be noted that the 1007 mb observed pressure had a simultaneous 20 kt wind.

**The microfilm maps for this case are now provided. The wind accompanying the 1007 mb pressure is now noted.**

 7. Suspect #18: The write-up should note there is a ship report of 1006.8 mb and 25 kt on the 6 December Historical Weather Map. Otherwise, the committee concurs with leaving this system out of HURDAT.

**So noted.**

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

**Agreed.**