

# The Experimental Graphical Tropical Weather Outlook: 2007 Results and Changes for 2008

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## 1. Introduction

The National Hurricane Center (NHC) issues a Tropical Weather Outlook (TWO) four times daily that highlights areas of disturbed weather in the tropics and provides a qualitative assessment of the potential for these features to develop into tropical cyclones (TCs). During the 2007 hurricane season, NHC launched a new *experimental* graphical Tropical Weather Outlook (GTWO). The GTWO is a web-based graphic that supplements the text-only TWO by showing the most recently available geostationary satellite imagery and highlighting disturbances of interest in that image. Each disturbance of interest is numbered, with text descriptions of each system provided beneath the graphic. Active TCs are also shown on the graphic in the form of a cyclone symbol (i.e., an "L" for tropical depressions, a tropical storm symbol or a hurricane symbol). Text descriptions for the disturbances and active cyclones also appear in a pop-up window whenever a user moves the mouse pointer over the system.

As part of the experimental product process, the GTWO was tested and evaluated during the 2007 hurricane season. This assessment included the routine issuance of an experimental version of the product, internally testing possible enhancements to the product, and gathering user input via an online survey. This paper provides a description of the results from the 2007 season, along with future plans for 2008.

## 2. Feedback, Survey Results, and Web Statistics

Just over 2200\* surveys on the GTWO were completed during the 2007 hurricane season. In addition to the surveys, NHC received approximately 600 e-mails about the product. A majority, 62%, of the survey respondents were individuals, indicating that the product successfully reached the general public. Nearly 1500 of these surveys were completed during the first two months of the product release, indicating that the GTWO was instantly used and evaluated. By comparison, 960 surveys regarding possible changes to the 3-day and 5-day TC track graphic with the cone of uncertainty were completed in a two-month period during the 2004 hurricane season.

Results from the survey indicate that the GTWO was extremely popular and user-friendly. Specifically, users gave the product an average rating of 8.9 and 9.6 (on a scale from 1 to 10) in terms of technical quality and ease of use, respectively. Nearly 90% of respondents rated the product as a 9 or 10 in terms of ease of use. Two-thirds of respondents said they used the product daily or several times per day, and an overwhelming majority (98%) of respondents that provided an answer felt that the GTWO was an appropriate product for the NHC to issue. The most common suggestions for improvements were 1) more frequent updates to the product, 2) the ability to distinguish between areas of disturbed weather based on their potential for tropical cyclogenesis, 3) improved satellite imagery, and 4) inclusion of a motion vector for each of the disturbances.

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\* As of November 25, 2007

There were approximately 5.6 million web hits on the product during the 2007 hurricane season (as of November 25). The GTWO almost instantly became the most popular routinely-issued (i.e. excluding storm graphics) NHC product based on total web hits. In fact, the GTWO surpassed the operational text TWO in terms of web page hits within 30 days of its initial launch on July 15.

### 3. Probabilistic Genesis Forecasts

While not a part of the formal experimental GTWO product, NHC also tested in-house probabilistic TC genesis forecasts during the 2007 hurricane season. The purpose of this exercise was to determine if there was sufficient skill in forecasting tropical cyclogenesis and whether such a forecast could be used as the basis for categorical genesis forecasts in later versions of the GTWO.

NHC forecasters subjectively assigned a probability of genesis (0 to 100%, in 10% increments) to each area of disturbed weather mentioned in the text TWO. The assigned probabilities represented the forecaster's assessment of the chance that TC formation would occur during the ensuing 48-h period. These experimental probabilistic forecasts remained "in-house" and were not released to the public. The genesis forecasts were verified based on TC development from the final NHC best-track data. A more detailed description of the probabilistic genesis forecast and its verification is presented in Brown et al. (2008).

The results of the probabilistic genesis forecast verification suggest that NHC has skill at categorizing disturbances into three bins based on their potential for genesis (low, medium, and high (Tables 1 and 2). That is, the verification indicates that it is possible to distinguish between three broad categories of genesis likelihood in both the Atlantic and eastern North Pacific basins. For example, disturbances with a low probability underwent genesis on average less than 10% of the time in

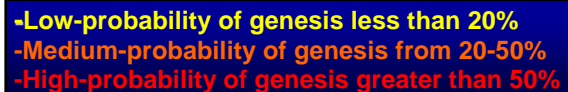
both basins, while disturbances in the high category underwent genesis greater than 60% of the time on average in both basins. These results were used as the basis for development of a three-tiered color-coded genesis probability forecast that will be included in the GTWO starting in 2008.

### 4. Changes to the GTWO and TWO for 2008

Based on the success of the GTWO during the 2007 hurricane season, the results of the probabilistic genesis forecast verification, and comments from users, the following changes to the GTWO will be implemented during the 2008 hurricane season:

1) The 2008 version of the GTWO will be issued four times per day.

2) The 2008 version of the GTWO will include a three-tiered, color-coded, categorical genesis forecast.



**-Low-probability of genesis less than 20%**  
**-Medium-probability of genesis from 20-50%**  
**-High-probability of genesis greater than 50%**

3) The issuance times for the TWO and GTWO will be changed to 0000, 0600, 1200, and 1800 UTC. In previous years, the Atlantic TWO was issued at 5:30am, 11:30am, 5:30pm, and 10:30pm, ET while the Pacific TWO's were issued at 4am, 10am, 4pm, and 10pm, PT.

Examples of the new 2008 version of the GTWO are shown in Figures 1 and 2, or can be viewed via the following hyperlinks:

[http://www.nhc.noaa.gov/gtwo-example/200710110200PM.atl/contents\\_atl.shtml](http://www.nhc.noaa.gov/gtwo-example/200710110200PM.atl/contents_atl.shtml)

[http://www.nhc.noaa.gov/gtwo-example/200710140800PM.epac/contents\\_epac.shtml](http://www.nhc.noaa.gov/gtwo-example/200710140800PM.epac/contents_epac.shtml)

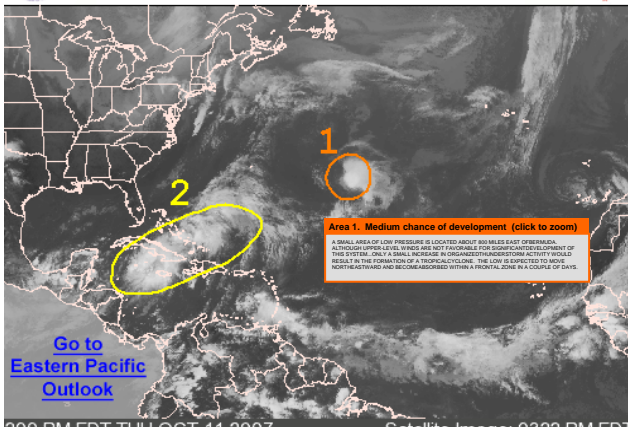
	Expected %	Verifying %	Number of Fcsts.
0-10% (Low)	5	3	389
20-50% (Med.)	28	18	263
60-100% (High)	71	66	53

Table 1. Binned Forecast Reliability Table for the Atlantic basin. The expected percentage is an average of all the forecast probabilities within the bin.

	Expected %	Verifying %	Number of Fcsts.
0-10% (Low)	6	6	179
20-50% (Med.)	26	47	162
60-100% (High)	70	90	29

Table 2. Binned Forecast Reliability Table for the eastern North Pacific basin. The expected percentage is an average of all the forecast probabilities within the bin.

 **Experimental Graphical Tropical Weather Outlook** 



200 PM EDT THU OCT 11 2007 Satellite Image: 0322 PM EDT  
 Color indicates probability of tropical cyclone formation within 48 hours. Outlined areas denote current position only.  
 Low <20%    Medium 20-50%    High >50%

The highlighted and numbered areas, if any, indicate current locations of weather systems discussed in the Tropical Weather Outlook below.

ABNT20 KNHC DDHMM  
 TWOAT TROPICAL WEATHER OUTLOOK  
 NWS TPC/NATIONAL HURRICANE CENTER MIAMI FL  
 200 PM EDT THU OCT 11 2007

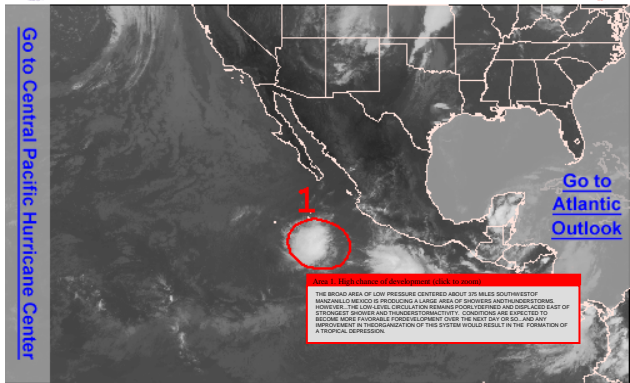
FOR THE NORTH ATLANTIC...CARIBBEAN SEA...AND THE GULF OF MEXICO...

1. A SMALL AREA OF LOW PRESSURE IS LOCATED ABOUT 800 MILES EAST OF BERMUDA. ALTHOUGH UPPER LEVEL WINDS ARE NOT FAVORABLE FOR SIGNIFICANT DEVELOPMENT OF THIS SYSTEM... ONLY A SMALL INCREASE IN ORGANIZED THUNDERSTORM ACTIVITY WOULD RESULT IN THE FORMATION OF A TROPICAL CYCLONE. THE LOW IS EXPECTED TO MOVE NORTHEASTWARD AND BECOME ABSORBED WITHIN A FRONTAL ZONE IN A COUPLE OF DAYS.
2. SHOWER ACTIVITY EXTENDS FROM THE NORTHWESTERN CARIBBEAN SEA ACROSS CUBA...THE BAHAMAS...AND INTO THE ATLANTIC FOR A FEW HUNDRED MILES. UPPER-LEVEL WINDS ARE UNFAVORABLE FOR DEVELOPMENT.

ELSEWHERE...TROPICAL CYCLONE FORMATION IS NOT EXPECTED DURING THE NEXT 48 HOURS.

Figure 1. Example of the 2008 version of the GTWO for the Atlantic basin including categorical genesis forecasts.

 **Experimental Graphical Tropical Weather Outlook** 



800 PM PDT SUN OCT 14 2007 Satellite Image: 0352 PM PDT  
 Color indicates probability of tropical cyclone formation within 48 hours. Outlined areas denote current position only.  
 Low <20%    Medium 20-50%    High >50%

The highlighted and numbered areas, if any, indicate current locations of weather systems discussed in the Tropical Weather Outlook below.

ABPZ20 KNHC DDHMM  
 TWOEP TROPICAL WEATHER OUTLOOK  
 NWS TPC/NATIONAL HURRICANE CENTER MIAMI FL

800 PM PDT SUN OCT 14 2007

FOR THE EASTERN NORTH PACIFIC...EAST OF 140 DEGREES WEST LONGITUDE

1. THE BROAD AREA OF LOW PRESSURE CENTERED ABOUT 375 MILES SOUTHWEST OF MANZANILLO MEXICO IS PRODUCING A LARGE AREA OF SHOWERS AND THUNDERSTORMS. HOWEVER...THE LOW-LEVEL CIRCULATION REMAINS POORLY DEFINED AND DISPLACED EAST OF THE STRONGEST SHOWER AND THUNDERSTORM ACTIVITY. CONDITIONS ARE EXPECTED TO BECOME MORE FAVORABLE FOR DEVELOPMENT OVER THE NEXT DAY OR SO...AND ANY IMPROVEMENT IN THE ORGANIZATION OF THIS SYSTEM WOULD RESULT IN THE FORMATION OF A TROPICAL DEPRESSION.

ELSEWHERE...TROPICAL CYCLONE FORMATION IS NOT EXPECTED DURING THE NEXT 48 HOURS.

Figure 2. Example of the 2008 version of the GTWO for the eastern North Pacific basin including categorical color-coded genesis forecasts.

## 5. References

Brown, D., Franklin, J., and J. Rhome, 2008: Verification of the National Hurricane Center's Experimental Probabilistic Tropical Cyclone Genesis Forecasts. AMS 26<sup>th</sup> Conf. on Hurricane and Tropical Met., Orlando, FL, 28 April – 2 May 2008.