

## Storminess Analysis for 2009

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### Summary

*There is a 67% probability that 2008 represented a single peak and that storminess levels will drop significantly in 2009. In this case, 2009 will not produce an extreme year in either major Atlantic hurricanes or major U.S. tornados.*

*There is a 33% probability that 2008 was the first year of a double peak and that storminess levels for 2009 will match those observed in 2008. This severe weather may take the form of hurricanes producing a minimum of 5 major Atlantic hurricanes (Category 3 or greater) or it may take the form of tornados producing a minimum of 24 major U.S. tornados (Enhanced Fujita scale EF4-EF5).*

As a result of the variability in the output of the storminess analysis, I will make no definitive forecast for 2009. I cannot rule out that 2008-2009 may be a double peak or that 2009 may express itself as a severe tornado year in the U.S.

### Background

In 2006, a relationship between major (Saffir/Simpson category 3-4-5) Atlantic hurricanes and major (Fujita scale F4-F5) U.S. tornados was studied. A strong natural short-term cycle was observed overlaying the long-term multi-decadal cycle of hurricane activity. This research was presented in a paper titled "The Art of Forecasting Extreme Weather Events" at the Second International Conference on Global warming and the Next Ice Age sponsored by Los Alamos National Laboratory in July 2006. From this research, a forecasting tool was developed called the storminess model.

[http://meteo.lcd.lu/globalwarming/SantaFE2006\\_conference/LANLClimateConfAbstracts.pdf](http://meteo.lcd.lu/globalwarming/SantaFE2006_conference/LANLClimateConfAbstracts.pdf)

Yearly storminess levels were computed for each year from 1950 to 2006. These were tabulated as the sum of the number of major Atlantic hurricanes (Category 3 or greater) for a given year combined with the sum of the number of major U.S. tornados (F4 or F5) divided by 7.47 (a weighting factor). Trend analysis of storminess levels uncovered the presence of a short term cycle. The level of storminess intensity vibrates between extremely intense years and fairly quiet years. When the storminess level falls below a lower threshold, it will rise quickly until it exceeds an upper threshold resulting in an extreme weather year.

The storminess forecasting tool has been tested twice with perfect results. In 2006, it was used to sound an all-clear signal after the last peak was over. This was done in a background of hysteria following the intense 2004/2005 hurricane seasons. In 2008, the tool was used to accurately predict the onset of the next peak. This was done 1 1/2 years in advance of the start of the 2008 hurricane season. These tests demonstrated the power of the storminess analysis.

Due to the very large spread in prediction outcomes, I offered no forecast for the year 2007. The variability in predictive outcomes is the same reason why I will make no forecast for the year 2009.

## Storminess Analysis

The year 2008 was a peak year in storminess.

The year produced 5 major Atlantic hurricanes. The first major hurricane Bertha was a Category 3 and the other four were Category 4 hurricanes. This hurricane season was relentless and long. This was the first time that five major hurricanes (Bertha, Gustav, Ike, Omar and Paloma) formed in consecutive months (July - November). Six consecutive storms (Dolly, Edouard, Fay, Gustav, Hanna and Ike) struck the U.S. mainland. Tropical storm Fay was the first storm in recorded history to make landfall in Florida four times, producing a significant flooding event across the state.

The other aspect of storminess is major U.S. tornados. The United States is unlike any other country in the world because it is the planet's tornado playpen. No other country experiences the size of tornados or the sheer number that devastates the United States each year. *Currently, 2,176 tornados have been reported in the United States in 2008 (of which 1,621 were confirmed through October), with 125 confirmed fatalities.* As a comparison to the rest of the world, tornados outside the U.S. produced a total of 9 fatalities (3 in France, 2 in Bangladesh, 2 in Poland, 1 in Russia and 1 in China).

The year 2008 produced 9 EF-4 and 1 EF-5 tornados in the U.S. Combining the number of major Atlantic hurricanes with the number of major U.S. tornados indicates 2008 was an extreme weather year.

Extreme weather years appear as either single or double peaks. There were 8 single peaks (years: 1953, 1955, 1957, 1961, 1969, 1974, 1990 and 1999) and 4 double peaks (years: 1964-1965, 1984-1985, 1995-1996 and 2004-2005) since 1950.<sup>1</sup> Therefore there is a 67% probability that 2008 was a single peak and a 33% probability that 2008 was the first year of a double peak.

It has been long recognized that a long-term multi-decadal cycle of hurricane activity exist. I assert that there is also a long-term multi-decadal cycle in tornado activity. When these cycles are combined in storminess analysis, they produce 4 long-term phases: hurricane, tornado, mixed and quiet. The present hurricane phase began in 1995. This means that we are 14 years into the current phase and that phase may soon be coming to an end. It is not possible to predict the type of phase we will soon be transitioning into because from 1950 to the present we still have not completed one full cycle. I suspect that the next phase will be "mixed". But that observation is only a hunch. In the mixed phase, peaks may either take the form of extreme hurricanes years or extreme tornado years. But not both. And they can turn on a dime. A double peak might have the first year expressed in a large number of violent hurricanes and the following year expressed in a large number of violent tornados. (This occurred in 1964-1965)

On 1 February 2007, the United States transitioned from using the Fujita scale to measure tornado intensity to using the Enhanced Fujita scale. In other words, we changed the yardstick used to measure tornados. Since the storminess analysis is designed using the Fujita scale, the change represents a major challenge to the continued use of the storminess analysis as a forecasting tool. Major tornados were defined as F4 and F5. Now they are by default being defined as EF4 and EF5. But they are not the same. An F4 tornado was defined as a tornado with a minimum wind speed of 210 mph (3 second gust). An EF4 tornado is defined as a tornado with a minimum wind speed of 168 mph. The new scale also readjusts damage assessment criteria. The driver behind this change is Fujita's initial wind speed estimates have been found to be highly inaccurate. In general, Fujita scale wind speed estimates overshoot actual wind speeds by significant margins. Refer to <http://www.spc.noaa.gov/faq/tornado/ef-scale.html> .

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<sup>1</sup> The year 1950 was also a peak but because of a lack of tornado history for the year 1949, it is not possible to determine if the peak was a single or double. Therefore it was not incorporated into the analysis of peaks.

In order to continue the storminess analysis, a means must be developed to translate between the historical database using the Fujita scale and the new Enhanced Fujita scale for major tornados. One method is to compare the relative frequency of tornados using these two measuring techniques. In the Fujita scale the relative frequency of F4 tornados is 1.1% and F5 tornados is <0.1%. In the Enhanced Fujita scale, the relative frequency of EF4 tornados is 0.7% and EF5 tornados is <0.1%. If the two scales were the same; the frequency for F4 & F5 would be the same as EF4 & EF5. But they are not. A crude method to force this adjustment is to use tornado relative frequency. Taking that approach, the number of major tornados using the Enhanced Fujita scale (EF4 & EF5) in a given year is approximately equal to 0.64 times the number of major tornados using the Fujita scale (F4 & F5).