

# ICYCLONE CHASE REPORT

<b>storm</b>	Hurricane KARL		
<b>location</b>	Veracruz, Veracruz, MEXICO		
<b>date</b>	17 September 2010		
<b>chasers</b>	Josh Morgerman	<b>author</b>	Josh Morgerman

## Location

I rode out the cyclone in the extreme NW outskirts of the city of **Veracruz**, at **19.216N 96.228W**.

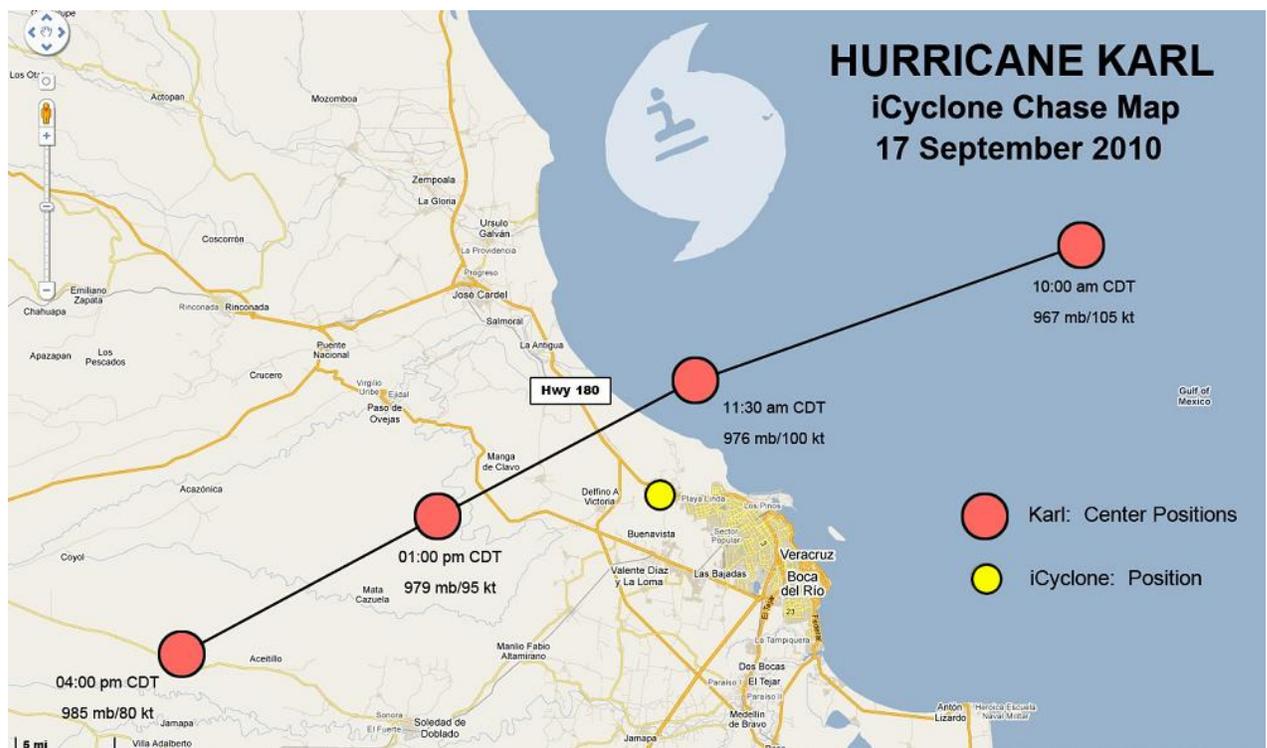
This location is:

- Approx. 4 mi NW of the Veracruz city center.
- Between 3 and 4 mi SE (left) of the path of the center of Karl's eye.

I arrived at the location at 11:30 am CDT, just as Karl's center was crossing the coast approx. 7 mi to the N.

**Figure 1** shows **my location** (yellow dot) in relation to **Karl's center** (red dots), as per NHC advisory (operational) positions.

**Figure 1: Chase Map**



# ICYCLONE CHASE REPORT

## Chronology & Observations

### Instrumentation & Data Collection

Meteorological data were collected using a **Kestrel 4500NV** mounted to the roof of the car. Data were recorded **every 2 seconds**.

- **Air Pressure.** **Figure 2** is a barogram for the ~1.5-hour period during which Karl's center reach its point of closest approach to my location. (The sample period is very brief because I was not in a fixed location until ~11:30 am CDT, when the center was making landfall.)
  - **Please Note:** *The instrument was calibrated for an altitude of 20 ft ASL. I have not been able to precisely verify the altitude of my chase location—however, given that it may have been closer to ~68 ft ASL, the pressure readings below and in **Figure 2** may be 2-3 mb too low.*
- **Wind.** The instrument was mounted to the roof of the car—however, the anemometer apparently malfunctioned and the wind data are unfortunately not usable.

### Observations

All times are **local (CDT)**. **Blue text** indicates the apparent passage of the eye; **red text** indicates significant events or changes:

#### 17 September 2010

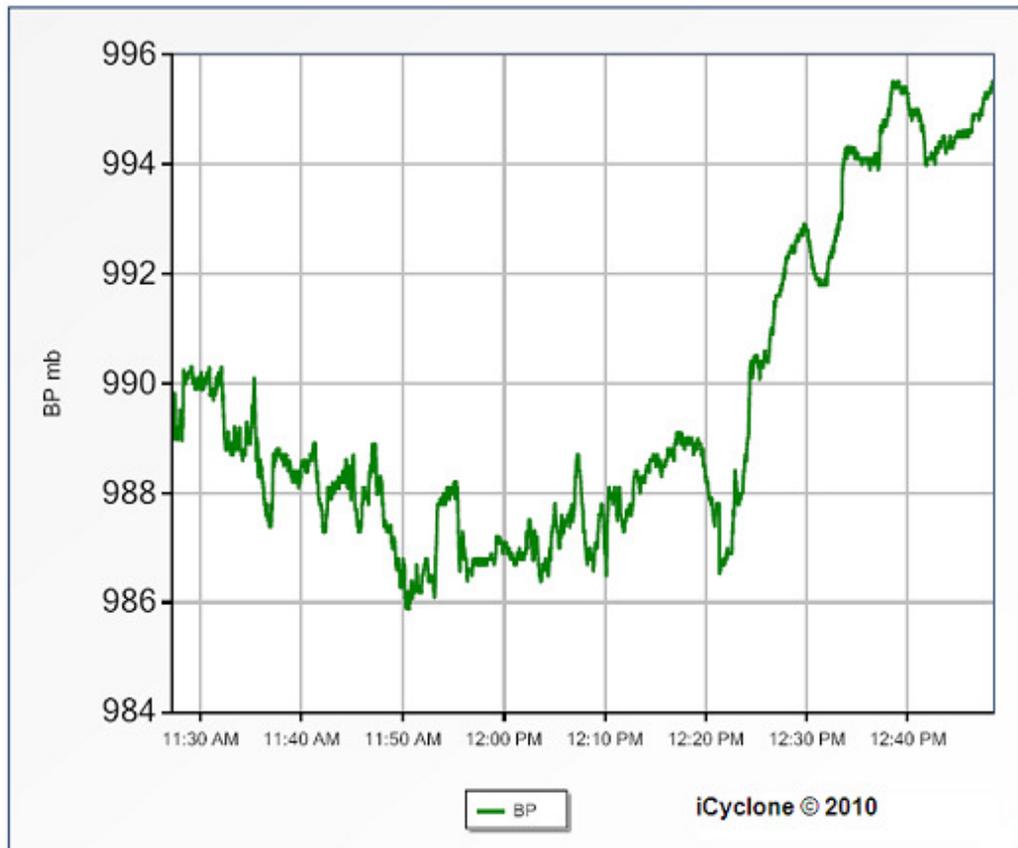
- **11:30 am**
  - **Precip/sky:** Moderate rain; overcast
  - **Wind:** **Gusty, damaging**
  - **Pressure:** **990.1 mb**
  - **Note:** The wind was becoming violent, blasting heavy ceramic tiles from the roofs of many buildings and propelling them horizontally across streets.
- **11:50 am**
  - **Precip/sky:** Light rain; overcast
  - **Wind:** Moderate
  - **Pressure:** **985.9 mb (lowest)**
- **12 noon**
  - **Precip/sky:** Very light rain (almost stopping); **very bright sky to the NW**
  - **Wind:** **Slacking**
  - **Pressure:** **987.1 mb**
  - **Note:** The brightness to the NW was apparently the SE edge of the eye.
- **12:10 pm**
  - **Precip/sky:** **No rain;** very bright sky to the NW
  - **Wind:** **Sudden, damaging burst**
  - **Pressure:** **986.5 mb**
  - **Note:** This damaging burst of wind was sudden and isolated—seeming to interrupt the lull of the eye. More roof tiles went flying.
- **12:15 pm**
  - **Precip/sky:** No rain; low clouds moving quickly overhead; very bright sky to the NW
  - **Wind:** Variable in strength, **with periods of light wind & near calm**
  - **Pressure:** **988.6 mb**
- **12:20 pm**
  - **Precip/sky:** Light rain; sky still bright to the NW
  - **Wind:** **Rapidly increasing, damaging**
  - **Pressure:** **988.2 mb**
  - **Notes:**

# ICYCLONE CHASE REPORT

- The wind increased very suddenly at this point and reached damaging speeds—blasting numerous roof tiles off of buildings, tearing branches off trees, and sending large debris (a big piece of sheet metal, a garbage can, etc.) flying down the street.
- The pressure took a sharp dip of almost 2.5 mb just as the damaging winds resumed—from **989.0 mb** at 12:19 pm to **986.6 mb** at 12:21 pm. (See **Comments**, below.)
- **12:45 pm**
  - **Precip/sky:** Moderate rain; overcast (no more brightness on NW horizon)
  - **Wind:** Gusty, strong
  - **Pressure:** **994.5 mb**
- **12:55 pm**
  - **Precip/sky:** **Heavy rain;** overcast
  - **Wind:** Gusty, strong
  - **Pressure:** **996 mb (extrapolated)**
- **1:15 pm**
  - **Precip/sky:** Heavy rain; sky brightening
  - **Wind:** Slacking
  - **Pressure:** **~1000 mb (approx.)**

**Figure 2: Barogram**

HURRICANE KARL: 17 Sep 2010  
Veracruz, VER, Mexico (19.216N 96.228W)



# iCYCLONE CHASE REPORT

## Damage

Wind damage at my chase location (the extreme NW outskirts of the city) was moderate. The streets were littered with thousands of broken ceramic roofing tiles, pieces of sheet metal, and other debris. Street flooding from heavy rains was moderate to extensive.

### **Across the rest of metro Veracruz (including the city center)...**

**Wind damage** across the city was light to moderate. There were lots of uprooted deciduous trees throughout the city center, as well as broken signs, some mangled gas-station canopies, and a few incidents of smashed plate-glass windows. Along the city's waterfront, some palm trees were downed or stripped.

Generally, wind damage decreased as you went further S across the city, and the "damage gradient" was quite sharp: N areas (like my chase location) experienced widespread moderate wind damage, whereas Boca del Rio, less than 10 mi to the SE, saw very little wind damage.

Because the cyclone crossed the coast N of the city center, the strongest winds in Veracruz blew offshore and there did not appear to be significant **storm-surge damage** in the city. However, the beaches were a dreadful mess.

**Freshwater flooding** was extensive, with many boulevards and intersections across the city inundated and impassible hours after the storm passed—and streets that weren't flooded were blocked by fallen trees.

Power was out across the city immediately following the cyclone, so the traffic signals weren't working.

This all suggests that the Veracruz city center had a Cat-1 impact, with the heavier conditions occurring just N of the city center.

See damage photos from Veracruz under **Imagery**, below.

# ICYCLONE CHASE REPORT

## Comments

### Dimensions

Judging by several criteria, the cyclone was apparently very small:

- **Eye.** Judging from advisory positions and my pressure readings, the exact center of the eye made its closest approach at 11:50 am or 12 noon CDT, passing 3 or 4 mi from my location. Since I caught the extreme SE edge of eye, that suggests it was perhaps ~**6-8 mi wide**.
- **Wind Core.** It was quite **narrow**:
  - Destructive winds at my chase location were of very **short duration**, lasting no more than ~**1.5 or 2 hours**—from perhaps 11 or 11:30 am to maybe 12:45 pm CDT or so.
  - As mentioned above, the “damage gradient” was fairly sharp, so that the N outskirts of Veracruz had noticeably more wind damage than Boca del Rio, just SE of the city center.
- **Pressure Gradient.** It was very **sharp**:
  - The operational landfall pressure was **976 mb** (as per the 11:30 am CDT advisory).
  - My lowest pressure was **985.9 mb\*** (11:50 am CDT), just 3-4 mi SE of the center of the eye.
  - The Veracruz Airport’s lowest pressure was **996.6 mb\*\*** (11:54 am CDT), just 5-6 mi SE of my location, and just 8-10 mi SE of the center of the eye.

### Pressure Dips & Wind Bursts

Comparing my timestamped video footage with my air-pressure data, I noticed an interesting coincidence of sharp pressure dips and destructive bursts of wind—suggesting perhaps **small, localized disturbances or eddies**. (Refer to the barogram in **Figure 2**, as well as the video footage.)

- **Example 1.** The sudden and damaging gust at 12:10 pm CDT was preceded or accompanied by a dip of ~2 mb.
- **Example 2.** The sudden and damaging increase in the winds at 12:20 pm CDT (as the eye passed) was accompanied by a sharp dip of almost 2.5 mb: from **989.0 mb** at 12:19 pm to **986.6 mb** at 12:21 pm.

### The Edge of the Eye

Based on my observations and video, I was apparently “scraping” the SE edge of the eye from approx. 12 noon to 12:20 pm CDT. Some observations—all of which are captured in the video footage:

- Because I was skating right along the inner edge of the eyewall, the **calm was not uniform**—rather, it was interrupted by periods of strong wind and occasional violent gusts (for example, at 12:10 CDT).
- While the sky immediately overhead remained very dark, the **sky just to the NW was brilliantly lit** during this period.
- The **lull ended** abruptly at 12:20 pm CDT, when winds increased suddenly and stayed strong.

\* As mentioned under **Chronology & Observations—Instrumentation** (above), my barometer was calibrated for an altitude of 20 ft ASL. Given that my location’s altitude may have been closer to 68 ft ASL, it’s possible the 985.9 mb is 2-3 mb too low.

\*\* Source of Veracruz Airport data:

<http://www.wunderground.com/history/airport/MMVR/2010/9/17/DailyHistory.html?MR=1>.

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## Video Footage

You can see everything described above in my 5-minute video summary of the event.

Find it on the homepage of the **iCyclone Website** ([www.icyclone.com](http://www.icyclone.com)) or on **YouTube** ([http://www.youtube.com/watch?v=e-biiEZ\\_VC4](http://www.youtube.com/watch?v=e-biiEZ_VC4)).

All of the footage is timestamped in local time (CDT).

## Questions or Feedback?

Please get in touch:

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## Imagery

Damage pictures from in and around the Veracruz city center, taken 18 September 2010.



# iCYCLONE CHASE REPORT

## Imagery (cont'd)

Radar images of Karl making landfall (courtesy Servicio Meteorológico Nacional, Mexico):

