iCyclone Chase Report

storm	**Hurricane BERYL**		
location	**Quintana Roo, Mexico | Texas, USA**		
date	**05-08 July 2024**		
chasers	**Josh Morgerman, Erik Sereno, Erik Fox**	**author**	**Josh Morgerman**

Overview

Hurricane BERYL struck Mexico's Yucatan Peninsula on the morning of 05 July 2024, and then the central Texas coast on the morning of 08 July 2024.

The author was in both impact zones to observe the cyclone's passage and collect data.

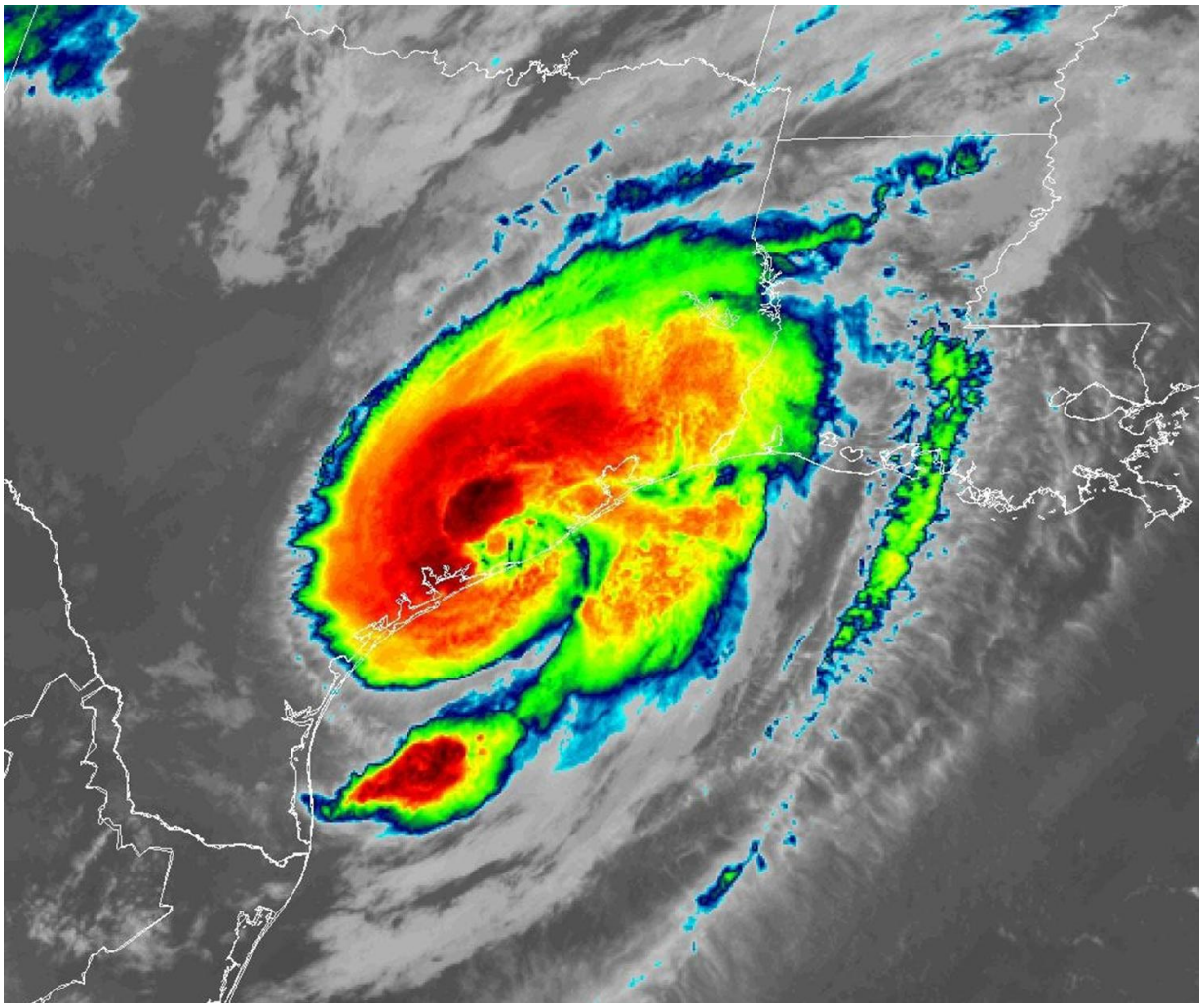
Highlights:

Quintana Roo, Mexico

- These **minimum sea-level pressures** were measured (all dates **05 July**):
  - **Tulum (20.2003N 87.4609W): 988.5 mb** at **6:08 am EST (1108Z)**
  - **Puerto Aventuras (20.5076N 87.2264W): 988.9 mb** multiple times **5:34 - 5:39 am EST (1034Z)**
- **Comment:** The system was disorganized and structurally incoherent at the surface. Hurricane winds were not observed.

Texas, USA

- These **minimum sea-level pressures** were measured (all dates **08 July**):
  - **Matagorda (28.6928N 95.9577W): 980.1 mb** at **3:57 & 4:17 am CDT (0857Z & 0917Z)**
  - **Sargent (28.7786N 95.6389W): 982.1 mb** multiple times **4:39 - 4:51 am CDT (0939Z)**
  - **Palacios (28.7160N 96.2109W): 984.5 mb** at **4:25 & 4:27 am CDT (0925Z & 0927Z)**
  - **Port Lavaca (28.6407N 96.6130W): 995.2 mb** at **3:29 & 3:54 am CDT (0829Z & 0854Z)**
- **Comments**
  - The hurricane had a solid core at landfall in Texas.
  - A well-defined eye passed over **Matagorda** from ~2:45 to ~5:15 am CDT, with dead-calm conditions observed from at least ~3:30 to ~4:15 am. The minimum pressure occurred during this calm. The leading side of the eyewall was much stronger than the backside. Damage across Matagorda was fortunately light.
  - **Sargent** was 19 n mi E of the center, so it experienced strong and prolonged onshore flow. This resulted in widespread, light-to-moderate wind damage across the town, as well as significant storm-surge inundation. Estimated by the author to be ~4-5 ft, this surge's impact was no doubt exacerbated by very low ground elevations across much of the town.



Infrared satellite image of Hurricane BERYL at 4:01 am CDT (0901Z) on 08 July—as it made landfall near Matagorda, Texas. (GOES-16 image.)

Landfall 1: Quintana Roo, Mexico

The author first documented Hurricane BERYL's landfall on the Yucatan Peninsula, in the Mexican state of Quintana Roo, on 05 July. Quality-controlled air-pressure data were collected in two locations:

- **Location A—Tulum**
- **Location B—Puerto Aventuras**

The hurricane seemed structurally incoherent at landfall. The author made his best efforts to thoroughly sample the core, driving up and down the highway between Tulum and Playa del Carmen as the hurricane came ashore. Using a combination of Mexican, Cuban, and Belizean radar data to guide his moves, he drove up from Tulum, then back down, then back up again, finally crossing from the eye into the N eyewall and ending up in Playa del Carmen after dawn. Despite all this, the author had trouble making sense of what he was seeing. Some of the strongest winds he observed seemed to occur **inside** the radar eye—accompanied by little or no rain—in the Xpu Ha/Puerto Aventuras area just before 6 am EST.

There was little damage from Tulum up to Playa del Carmen, and what damage the author could find was spotty, suggesting damaging winds were highly localized. For example, on Highway 307 near Xpu Ha, the author found a 100-meter stretch with felled trees and power poles (see **Figures 16-17**). Since they fell in different directions, it's assumed the damage was caused by a mesovortex or some other very localized disturbance. The author also saw at least one collapsed building façade (**Figure 18**).

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Figure 1 shows BERYL's track across the Caribbean Sea and into Mexico's Yucatan Peninsula. **Figure 2** is a zoomed-in view. The **Sensor Locations A** (**purple star**) and **B** (**black star**) are marked.

Figure 1: Chase Map—Mexico Landfall

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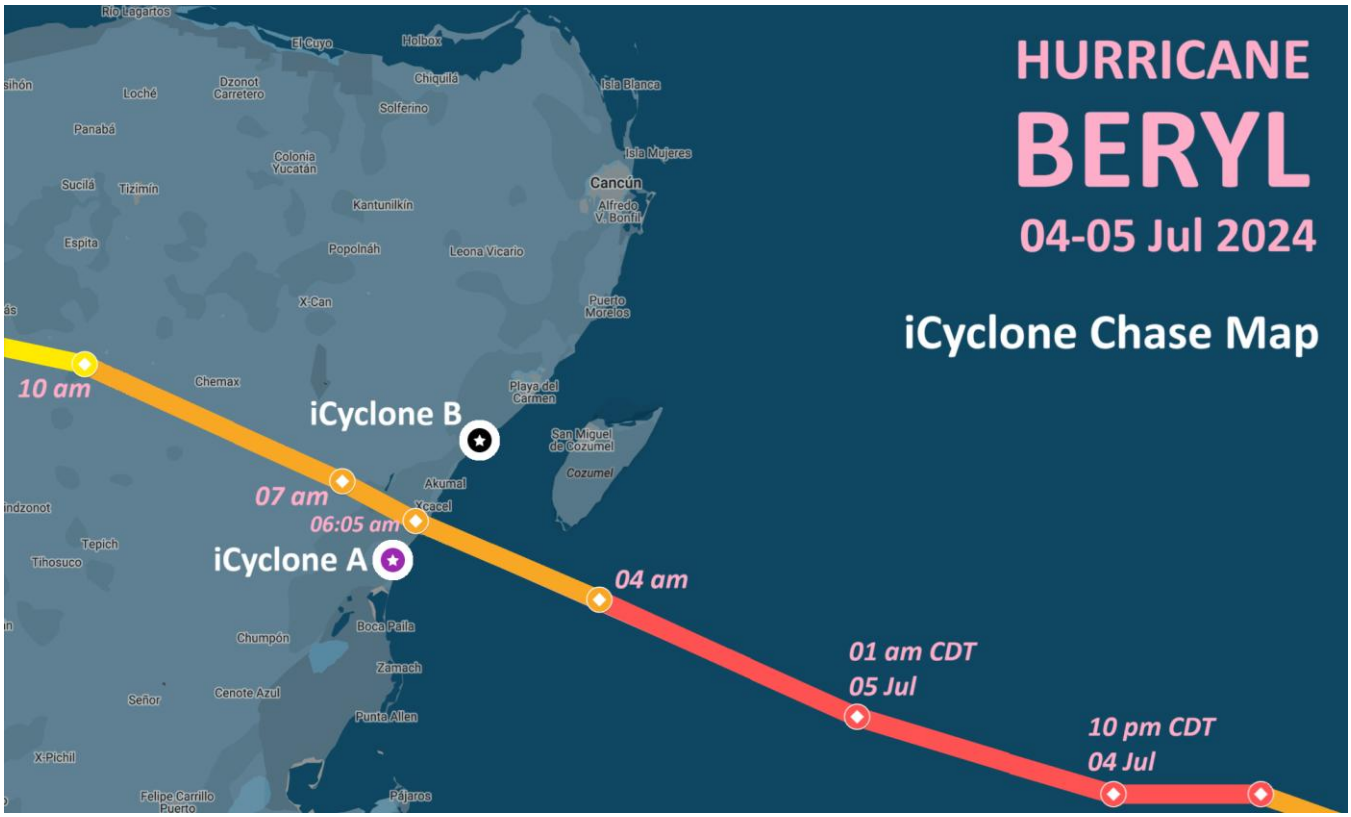
Figure 2: Chase Map—Mexico Landfall (Detailed)



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Tulum (Location A)

Location

The author deployed a sensor at **20.2003N 87.4609W.** This is a protected patio area of a private apartment complex, ~7 n mi SW of the hurricane's center at its closest approach (per NHC advisories).

Calibration

The ground elevation at the measuring location was estimated by geographer James Hyde to be **38 ft** above sea level. The device—a Kestrel DROP D3—was deployed in a protected patio at ground level, so it was calibrated with a reference altitude of 38 ft. Sampling rate was one reading per 30 seconds (2/min).

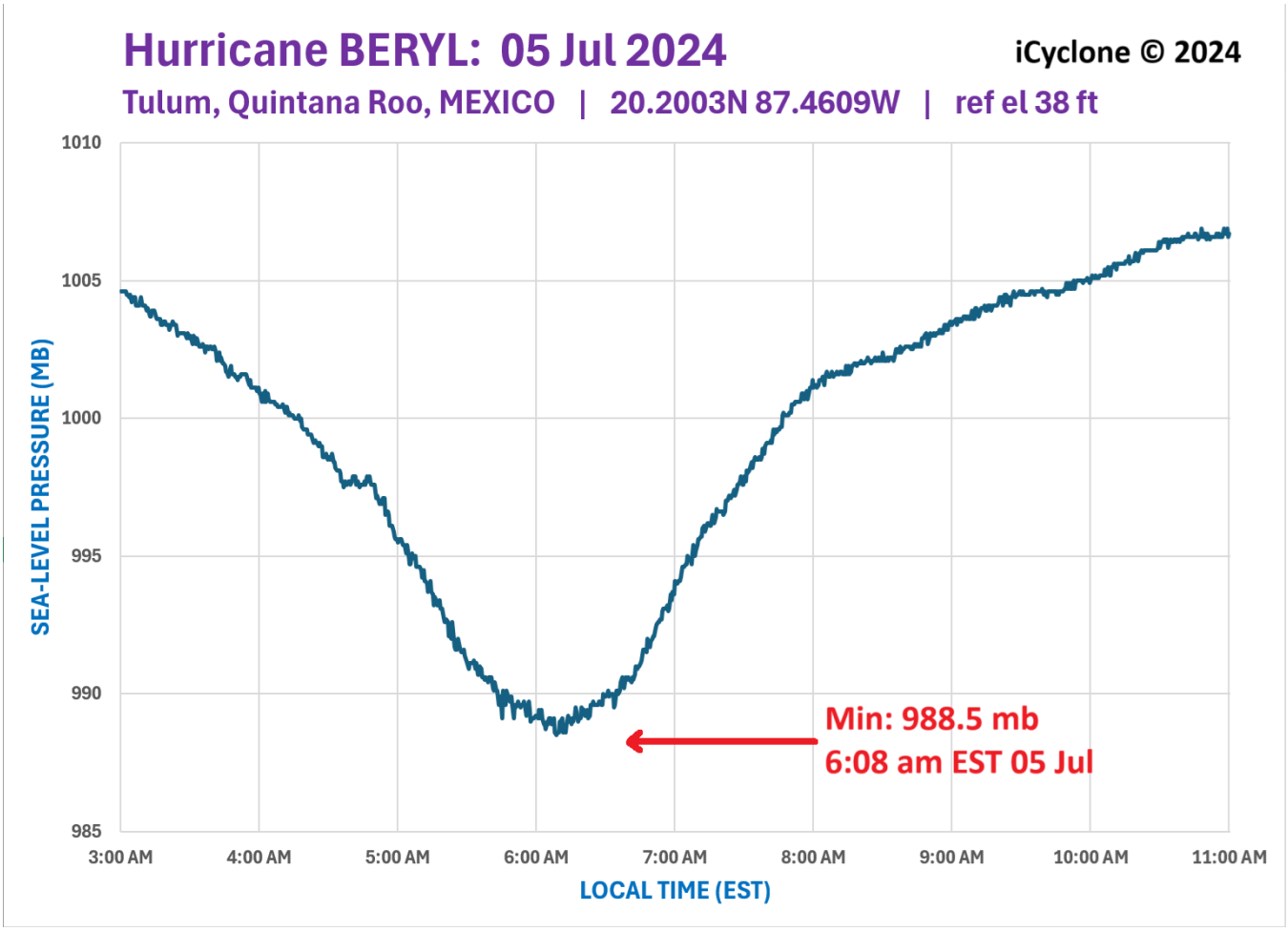
Device Bias & Correction

An early-season check of the device's accuracy—using the Mesonet-grade station on the author's property as a reference—revealed a high bias of +1.5 mb. Given this, 1.5 mb was subtracted from all pressure readings collected with this device. The data shown in this report reflect this correction.

Minimum

This device recorded a minimum sea-level pressure of **988.5 mb** at **6:08 am EST** (1108Z) on 05 July.

Figure 3: Barogram—Tulum (Location A)



Puerto Aventuras (Location B)

Location

The author deployed a sensor at **20.5076N 87.2264W.** This is nestled between buildings in a strip mall on Highway 307, ~15 n mi NE of the hurricane's center at its closest approach (per NHC advisories).

Calibration

The ground elevation at the measuring location was estimated to be **33 ft** above sea level. The device—a Kestrel DROP D3—was deployed at ground level, so it was calibrated with a reference altitude of 33 ft. Sampling rate was one reading per 30 seconds (2/min).

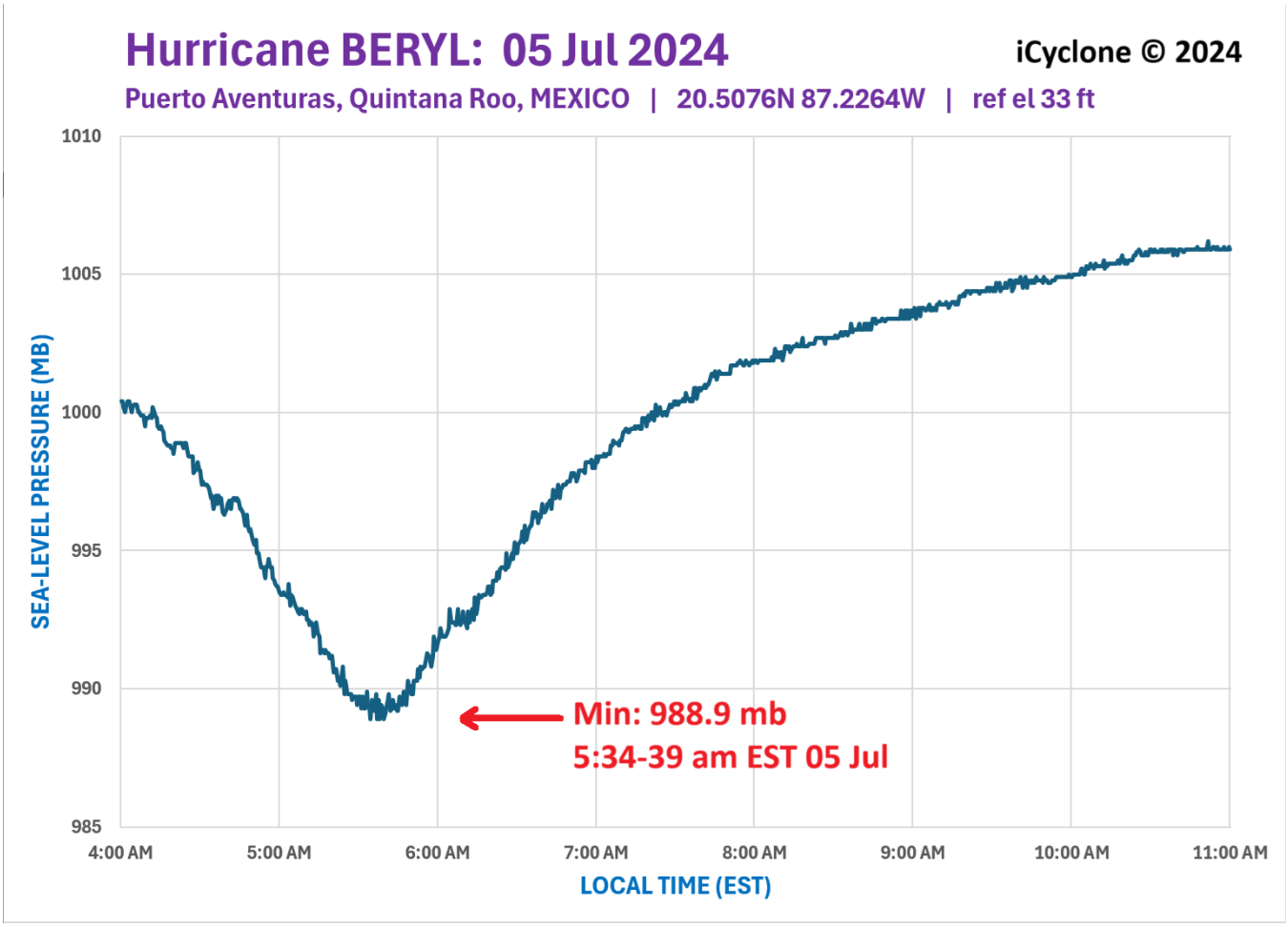
Device Bias & Correction

An early-season check of the device's accuracy revealed a high bias of +1.0 mb. Given this, 1.0 mb was subtracted from all pressure readings collected with this device. The data shown in this report reflect this correction.

Minimum

This device recorded a minimum sea-level pressure of **988.9 mb** multiple times from **5:34 to 5:39 am EST** (1034Z to 1039Z) on 05 July.

Figure 4: Barogram—Puerto Aventuras (Location B)



Landfall 2: Texas, USA

The author also documented Hurricane BERYL's landfall on the central Texas coast on 08 July. Quality-controlled air-pressure data were collected in four unique locations:

- **Location A—Matagorda**
- **Location B—Sargent**
- **Location C—Palacios**
- **Location D—Port Lavaca**

The author rode out the hurricane at **Location A—on the waterfront in Matagorda Harbor.** The leading edge of the eyewall was vigorous, bringing hurricane conditions from ~1:00 or ~1:15 am until ~2:45 am CDT, when the eye arrived and conditions calmed. The author recalls a true, dead calm from at least ~3:30 to ~4:15 am, during which time crickets and frogs could be distinctly heard and the harbor was glassy smooth. The backside of the eyewall reached Matagorda at ~5:15 am, but it was milder than the front side in terms of both winds and precipitation. Wind damage in and around Matagorda was relatively light—mostly just a few downed trees and branches.

Impacts in **Sargent** were heavier. Because this low-lying community was well E of the center, it had strong onshore flow, resulting in widespread light-to-moderate wind damage and a significant storm surge. Estimated by the author to be ~4-5 ft, this surge tore up the coast road, inundated many streets and homes, displaced some vehicles and structures, and left large piles of debris (see **Figures 20-36**).

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Figure 5 shows BERYL's track across the Gulf and into Texas. **Figures 6 and 7** are closer views. The **Sensor Locations A** (**purple star**), **B** (**blue star**), **C** (**dark-blue star**), and **D** (**black star**) are marked.

Figure 5: Chase Map—Texas Landfall

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Figure 6: Chase Map—Texas Landfall (Closer)

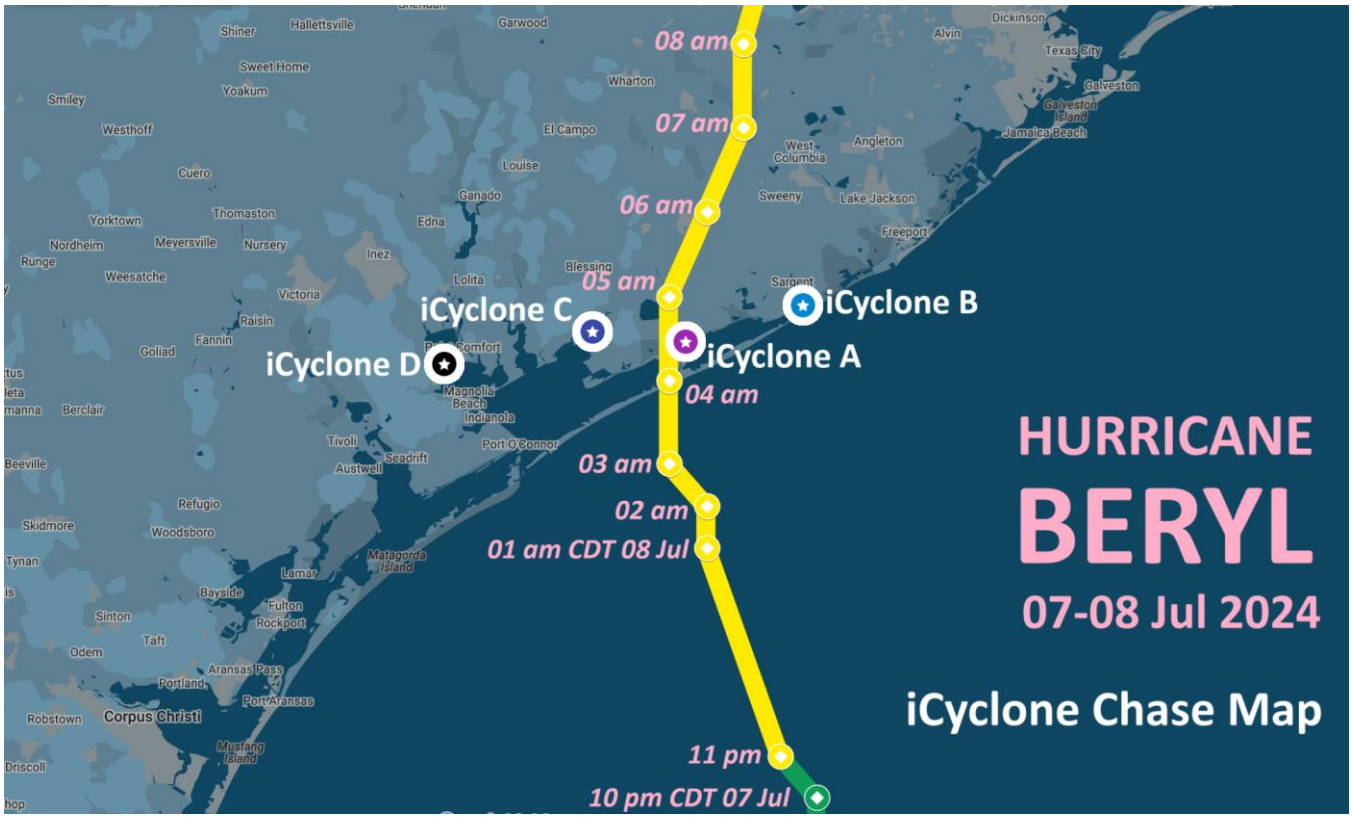
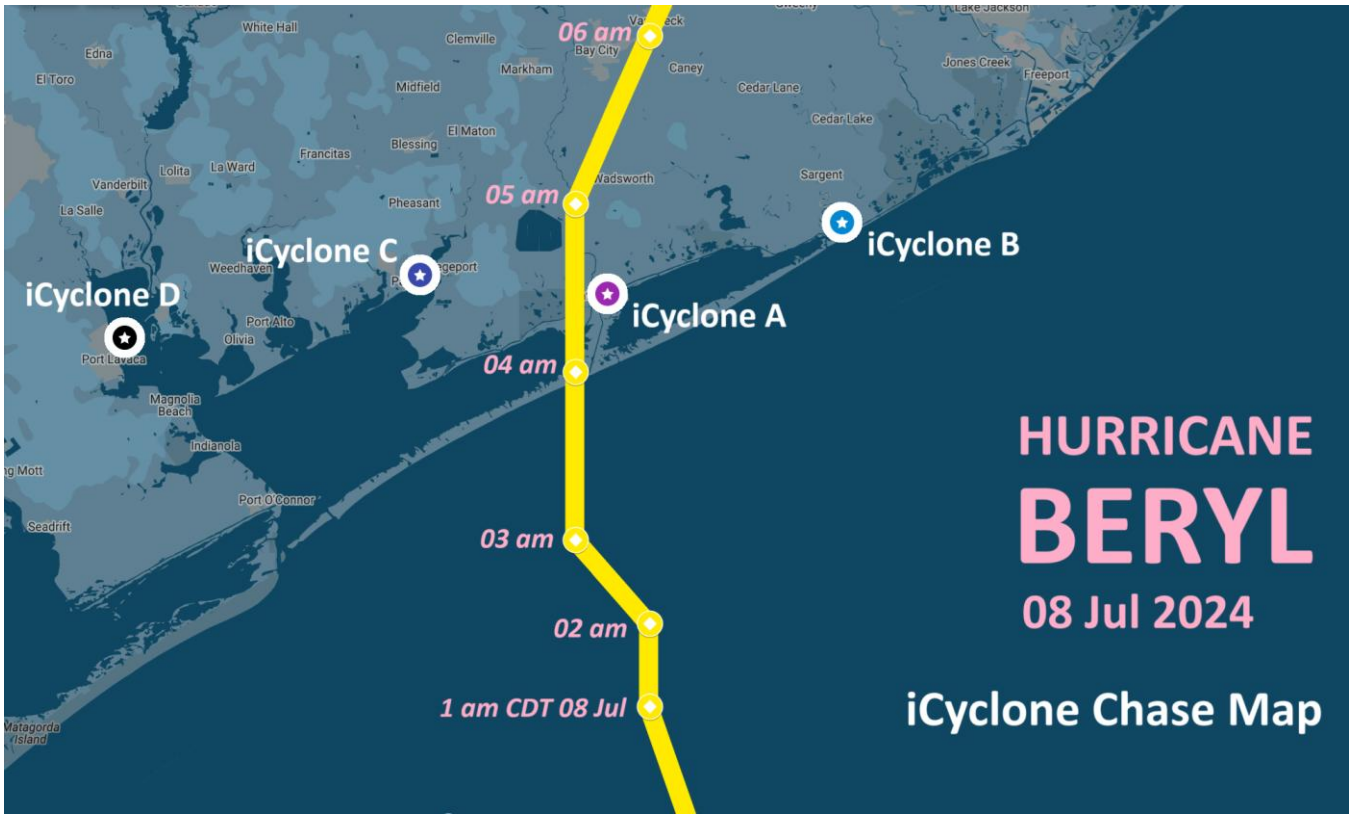


Figure 7: Chase Map—Texas Landfall (Closest)



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Matagorda (Location A)

Location

The author deployed a sensor at **28.6928N 95.9577W.** This location is the protected deck of a waterfront building in Matagorda Harbor. This location was very close to the hurricane's operational track per NHC advisories (within ~2 n mi), and it was near the center of the eye.

Calibration

The author visually estimated the ground elevation to be **2 ft** above sea level. The device—a Kestrel Meter 5500—was deployed in an unsealed cooler on a second-floor deck, ~9 ft above the ground, so it was calibrated with a reference altitude of 11 ft. Sampling rate was one reading per 30 seconds (2/min).

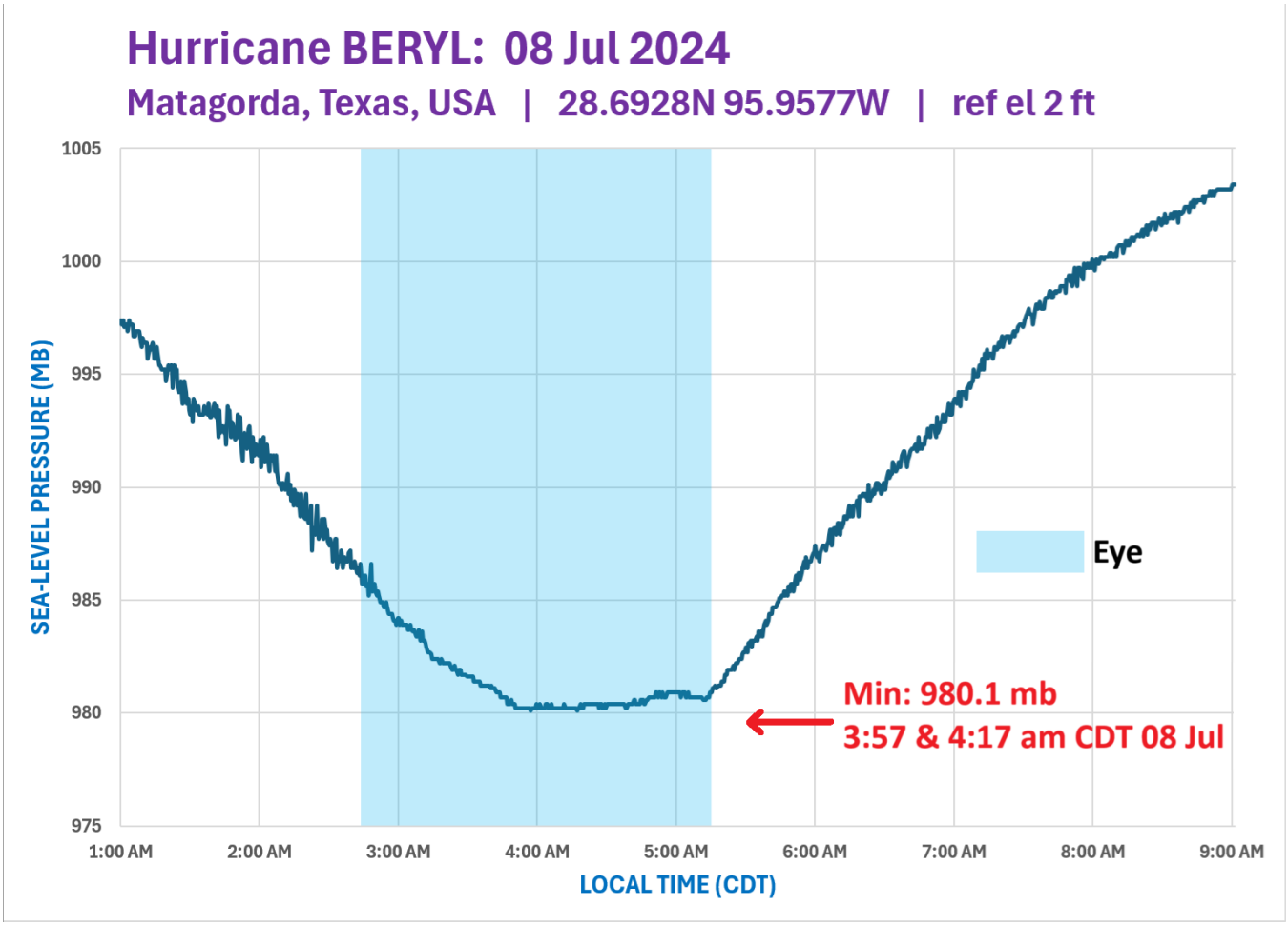
Device Bias & Correction

An early-season check of the device's accuracy—using the Mesonet-grade station on the author's property as a reference—revealed a high bias of +1.8 mb. Given this, 1.8 mb was subtracted from all pressure readings collected with this device. The data shown in this report reflect this correction.

Minimum

This device recorded a minimum sea-level pressure of **980.1 mb** at **3:57 and 4:17 am CDT** (0857Z to 0917Z) on 08 July, while inside the calm eye of the hurricane.

Figure 8: Barogram—Matagorda (Location A)



Sargent (Location B)

Location

The author deployed a sensor at **28.7786N 95.6389W.** This is a small guest house next to a larger waterfront house on Caney Creek—19 n mi E of the hurricane's center at its closest approach (per NHC advisories).

Calibration

The author visually estimated the ground elevation to be **3 ft** above sea level. The device—a Kestrel DROP D3—was deployed on a shelf, ~6 ft above the ground, so it was calibrated with a reference altitude of 9 ft. Sampling rate was one reading per 30 seconds (2/min).

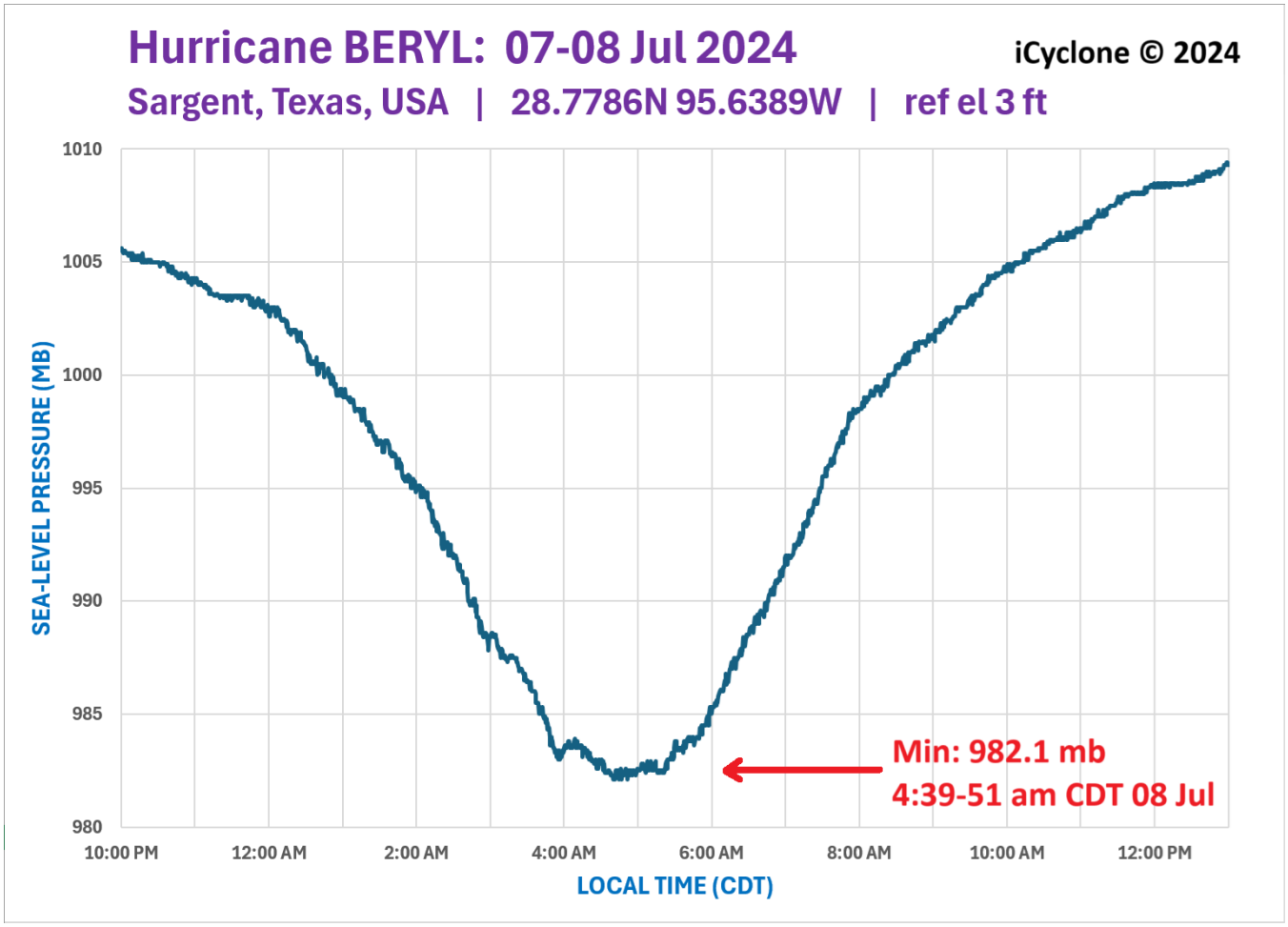
Device Bias & Correction

An early-season check of the device's accuracy revealed a high bias of +1.0 mb. Given this, 1.0 mb was subtracted from all pressure readings collected with this device. The data shown in this report reflect this correction.

Minimum

This device recorded a minimum sea-level pressure of **982.1 mb** multiple times from **4:39 to 4:51 am CDT** (0939Z to 0951Z) on 08 July.

Figure 9: Barogram—Sargent (Location B)



Palacios (Location C)

Location

The author deployed a sensor at **28.7160N 96.2109W.** This is a ground-floor room in the Deluxe Inn Motel on 1st Street—11 n mi W of the hurricane's center at its closest approach (per NHC advisories).

Calibration

The ground elevation at the measuring location was estimated by geographer James Hyde to be **6 ft** above sea level. The device—a Kestrel DROP D3—was deployed on a counter in the hotel room, ~2 ft above the ground, so it was calibrated with a reference altitude of 8 ft. Sampling rate was one reading per 30 seconds (2/min).

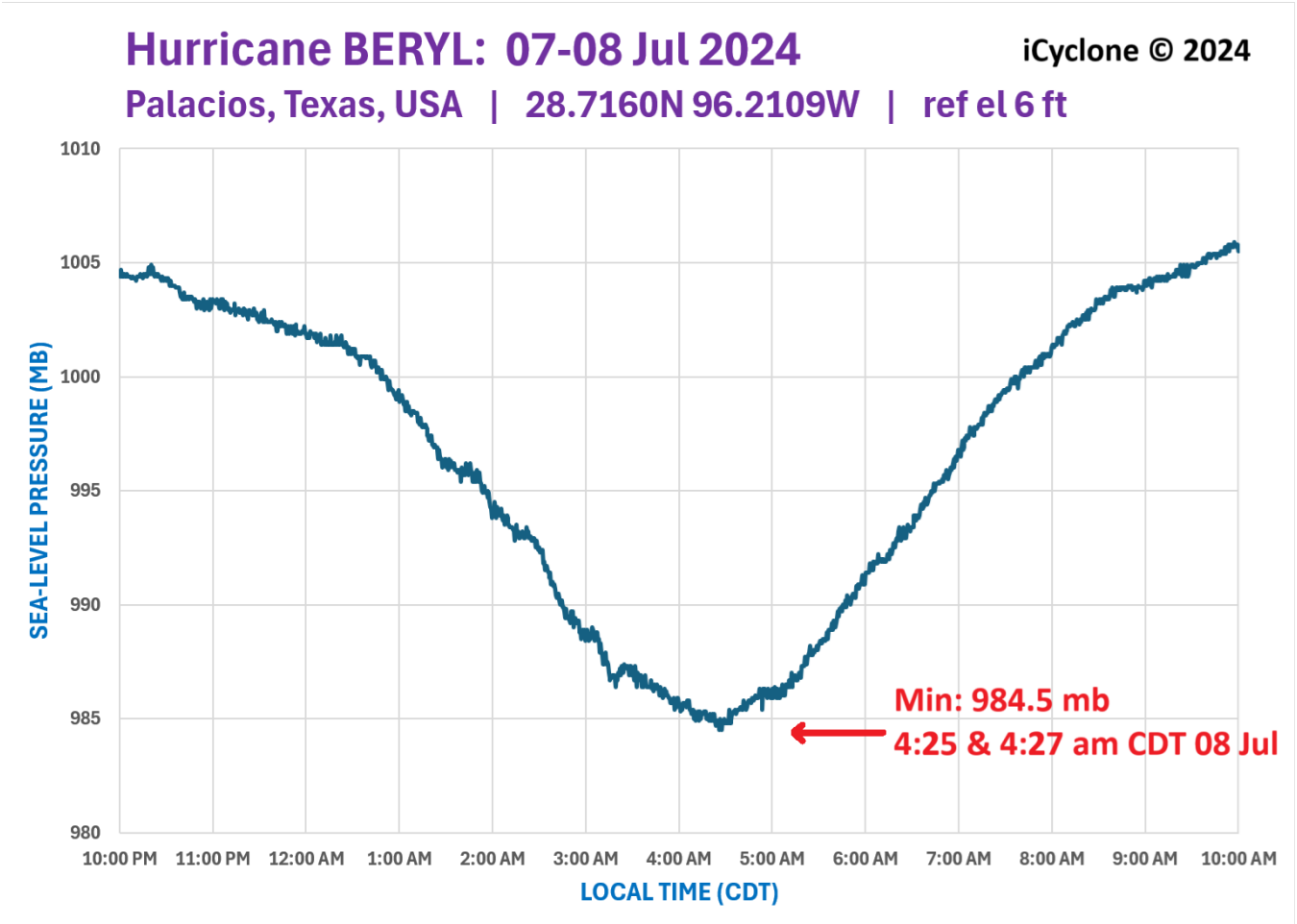
Device Bias & Correction

An early-season check of the device's accuracy revealed a high bias of +1.5 mb. Given this, 1.5 mb was subtracted from all pressure readings collected with this device. The data shown in this report reflect this correction.

Minimum

This device recorded a minimum sea-level pressure of **984.5 mb** at **4:25 and 4:27 am CDT** (0925Z and 0927Z) on 08 July.

Figure 10: Barogram—Palacios (Location C)



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Port Lacava (Location D)

Location

The author deployed a sensor at **28.6407N 96.6130W.** This is the ground-floor elevator hall of the waterfront Holiday Inn Express & Suites Port Lavaca, ~32 n mi W of the hurricane's center at its closest approach (per NHC advisories).

Calibration

The author visually estimated the ground elevation to be **4 ft** above sea level. The device—a Kestrel DROP D3—was deployed in a decorative planter in the corner, ~2 ft above the ground, so it was calibrated with a reference altitude of 6 ft. Sampling rate was one reading per 30 seconds (2/min).

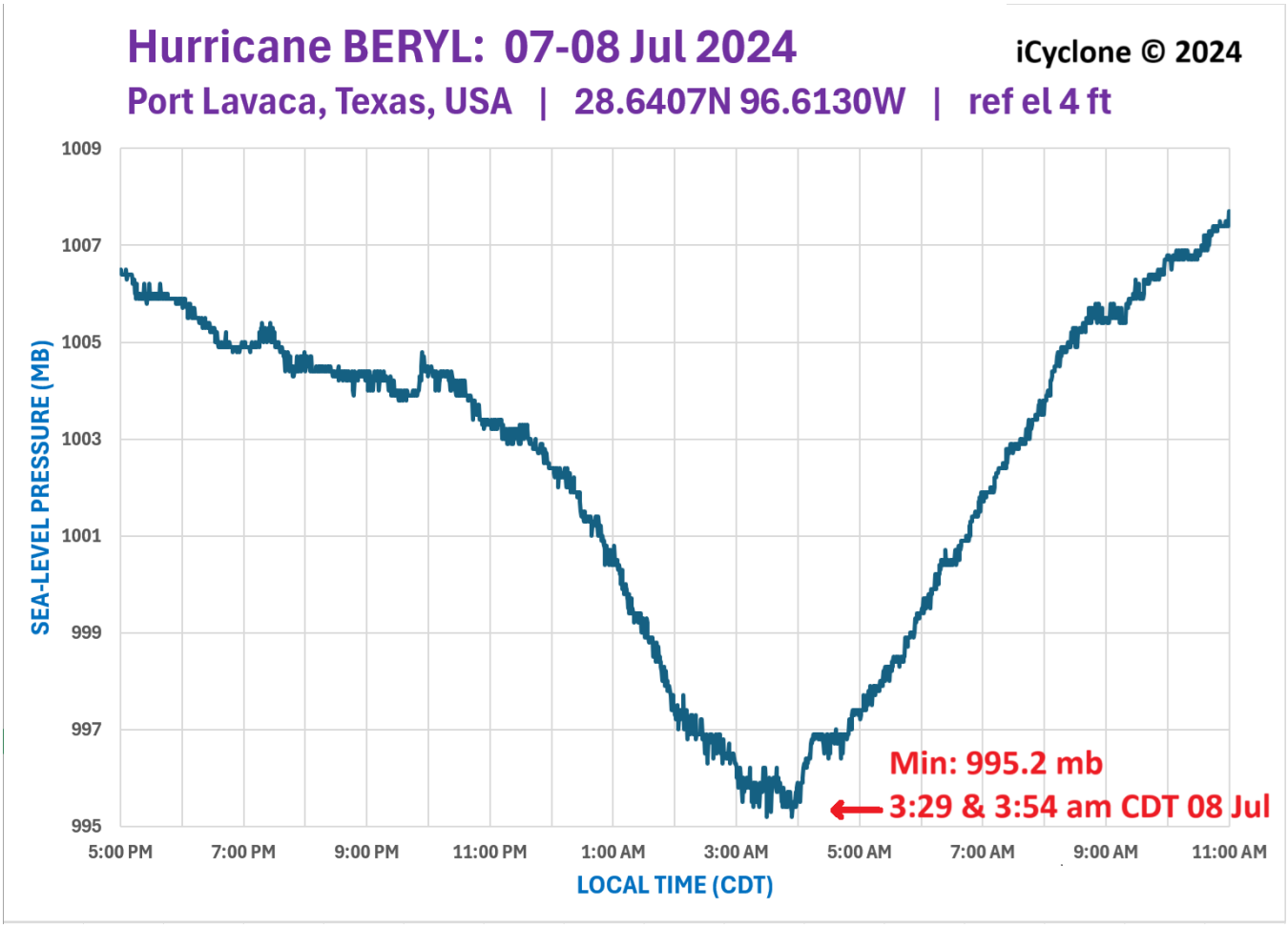
Device Bias & Correction

An early-season check of the device's accuracy—using the Mesonet-grade station on the author's property as a reference—revealed zero bias, so no corrections were made to the readings from this device.

Minimum

This device recorded a minimum sea-level pressure of **995.2 mb** at **3:29 and 3:54 am CDT** (0829Z and 0854Z) on 08 July.

Figure 11: Barogram—Port Lavaca (Location D)



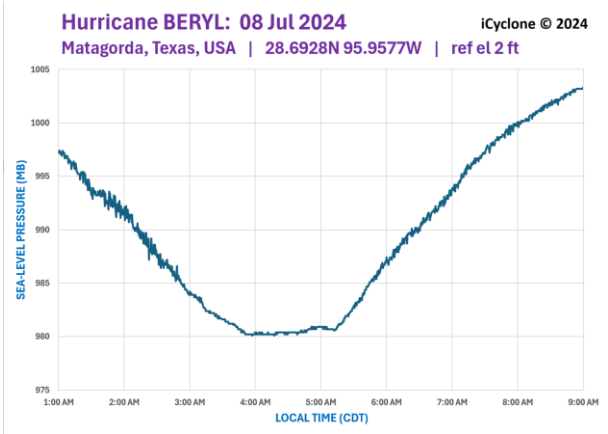
Figures 12, 13, 14, & 15: All Barograms—Comparison

Below are barograms from all four locations—A, B, C, and D—this time with the same x axis (01 to 09 am CDT 08 July) and y axis (975 to 1005 mb).

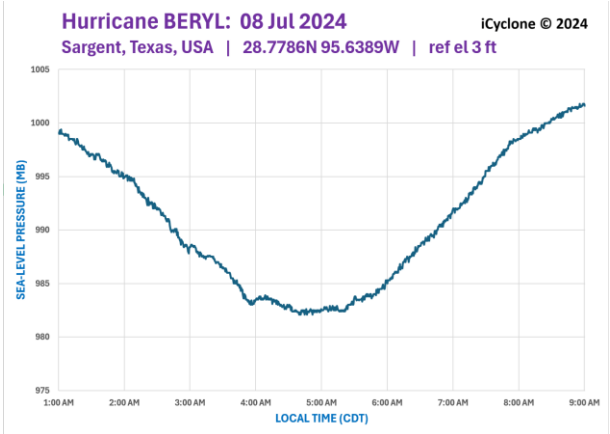
As to be expected, Matagorda (A) had the lowest minimum pressure, as it was in the eye and closest to the exact center, and Port Lavaca (D) had the highest minimum pressure, as it was furthest from the center.

But somewhat surprisingly, the minimum pressure at Sargent (B) was lower than the minimum pressure at Palacios (C), despite Sargent being further from the center than Palacios.

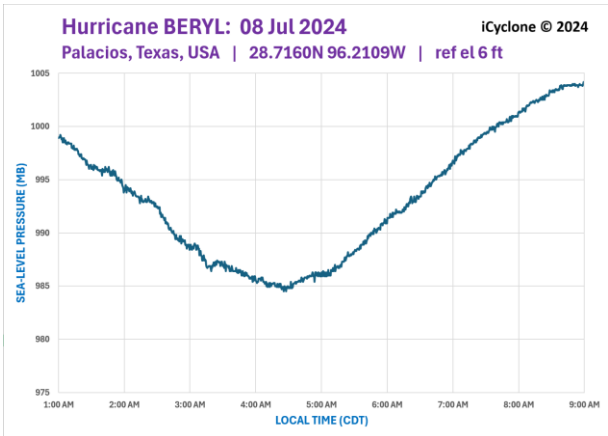
Matagorda (Location A)



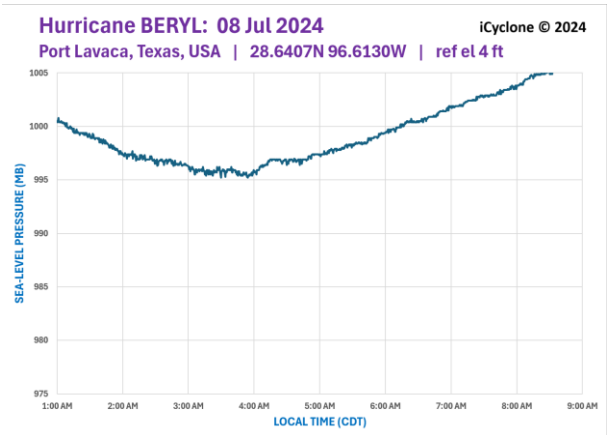
Sargent (Location B)



Palacios (Location C)



Port Lavaca (Location D)



Images—Quintana Roo, Mexico

Figures 16 & 17: Wind Damage Along Highway 307 Near Xpu Ha

Wind damage on Mexico's Yucatan Peninsula was mostly very light. But there were some isolated pockets of heavier damage. A 100-meter stretch of Highway 307 near Xpu Ha had several downed palms and power poles. They fell in different directions, suggesting a localized disturbance or mesovortex struck the area.

Figure 18: Wind Damage in Playa del Carmen

Wind damage on the Yucatan Peninsula was mostly light. Instances of significant damage were spotty and isolated. This commercial building in Playa del Carmen lost much of its façade.

Images—Texas, USA

Figure 19: Radar Image—4:02 am CDT: Eye Over Matagorda

Radar image showing the eye of Hurricane BERYL over Matagorda. The author's location is marked by the blue symbol. It was around this time that Matagorda was experiencing a dead calm and its lowest sea-level pressure (980.1 mb at 3:57 and 4:17 am). (Image: RadarScope)

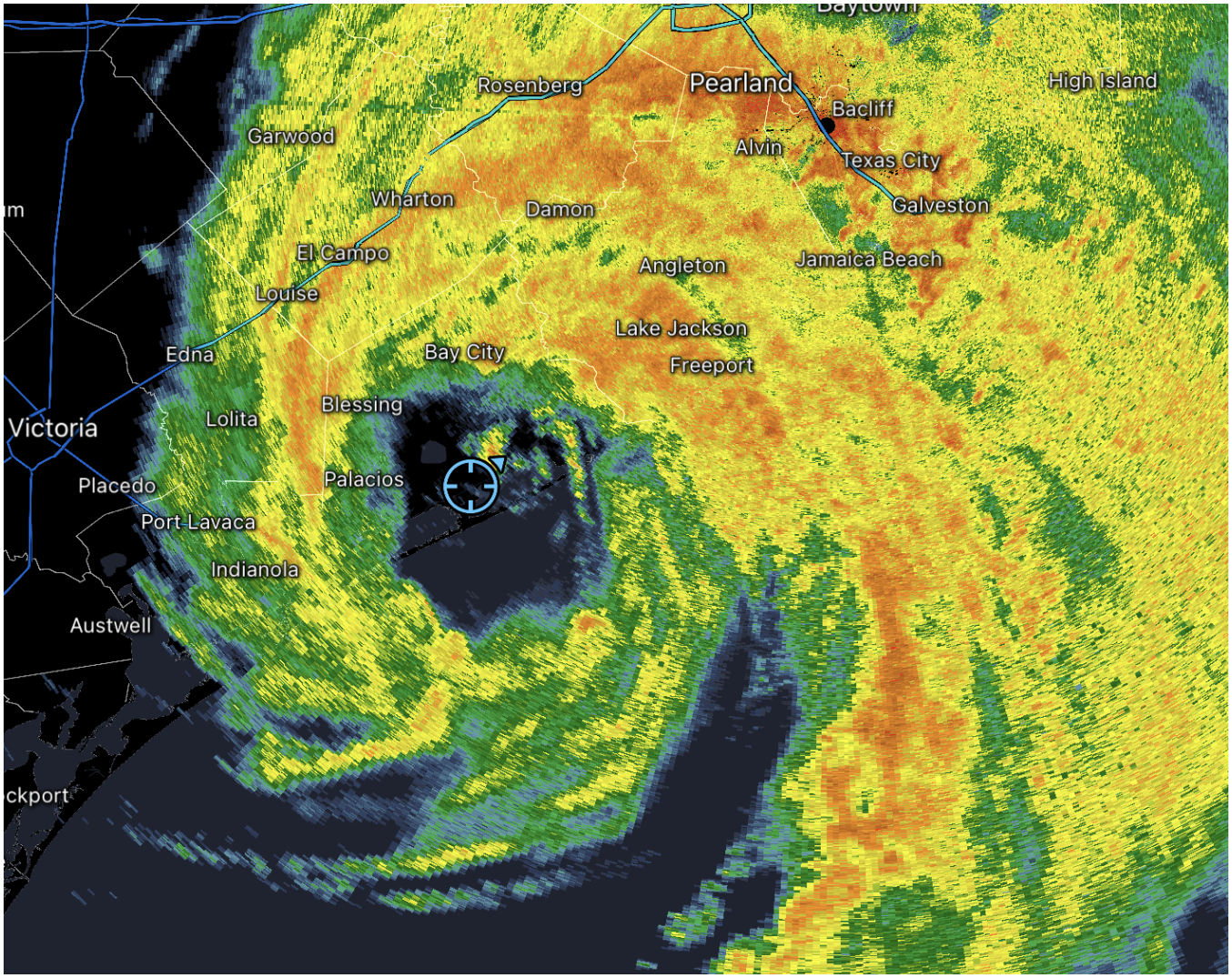


Figure 20: Sargent—Wind & Storm Surge Damage

There was widespread, moderate wind and storm-surge damage across Sargent.

Figure 21: Sargent—Wind & Storm Surge Damage

Poorly fastened roofs and lightweight carports were no match for BERYL's winds in Sargent.

Figure 22: Sargent—Wind & Storm Surge Damage

These vehicles near the beach in Sargent were probably flipped by storm surge, although wind may also have played a role.

Figure 23: Sargent—Wind & Storm Surge Damage

Another view of the flipped vehicles near the beach in Sargent.

Figure 24: Sargent—Storm Surge Damage

BERYL's storm surge wasn't especially high, but Sargent is so low-lying that even a few feet of water wreaked havoc, moving structures off their foundations and leaving large piles of debris.

Figure 25: Sargent—Storm Surge Damage

Another view of a shifted structure and other debris in Sargent.

Figure 26: Sargent—Storm Surge Damage

Another view of a shifted structure and other debris in Sargent.

Figure 27: Sargent—Wind & Storm Surge Damage

There was moderate but widespread wind and storm-surge damage across Sargent.

Figure 28: Sargent—Storm Surge Damage

Storm surge knocked this beach house off its foundation and pushed it several feet back in Sargent.

Figure 29: Sargent—Storm Surge Damage

Another view of the beach house in Sargent that was pushed off its foundation by storm surge.

Figure 30: Sargent—Wind & Storm Surge Damage

Most homes along the beach in Sargent survived BERYL's storm surge—but in many cases, the rushing waters bulldozed and gutted the first floor. This house also shows wind damage.

Figure 31: Sargent—Storm Surge Damage

As with many homes along the beach in Sargent, BERYL's storm surge flowed through the first floor of this one, gutting it and badly damaging the garage.

Figure 32: Sargent—Storm Surge Damage

BERYL's storm surge left major debris lines and huge piles of wreckage all over the low-lying town of Sargent.

Figure 33: Sargent—Wind & Storm Surge Damage

Hurricane BERYL's wind and storm surge left wreckage and debris all over Sargent.

Figure 34: Sargent—Wind & Storm Surge Damage

An apparent mobile home or RV in Sargent that was destroyed by Hurricane BERYL.

Figure 35: Sargent—Storm Surge Inundation

The inundation caused by Hurricane BERYL receded only slowly. By late afternoon, many areas of Sargent—including major streets—were still flooded.

Figure 36: Sargent—Storm Surge Damage

Hurricane BERYL's storm surge defaced and destroyed this beachside road, scattering pieces of pavement far from the road.

Questions or Feedback?

Get in touch:

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