iCyclone Chase Report

storm	**Hurricane PAMELA**		
location	**Sinaloa, Mexico**		
date	**13 October 2021**		
chasers	**Josh Morgerman, Erik Sereno**	**author**	**Josh Morgerman**

Overview

Hurricane PAMELA struck the Mexican state of Sinaloa, just N of Mazatlan, on 13 October 2021.

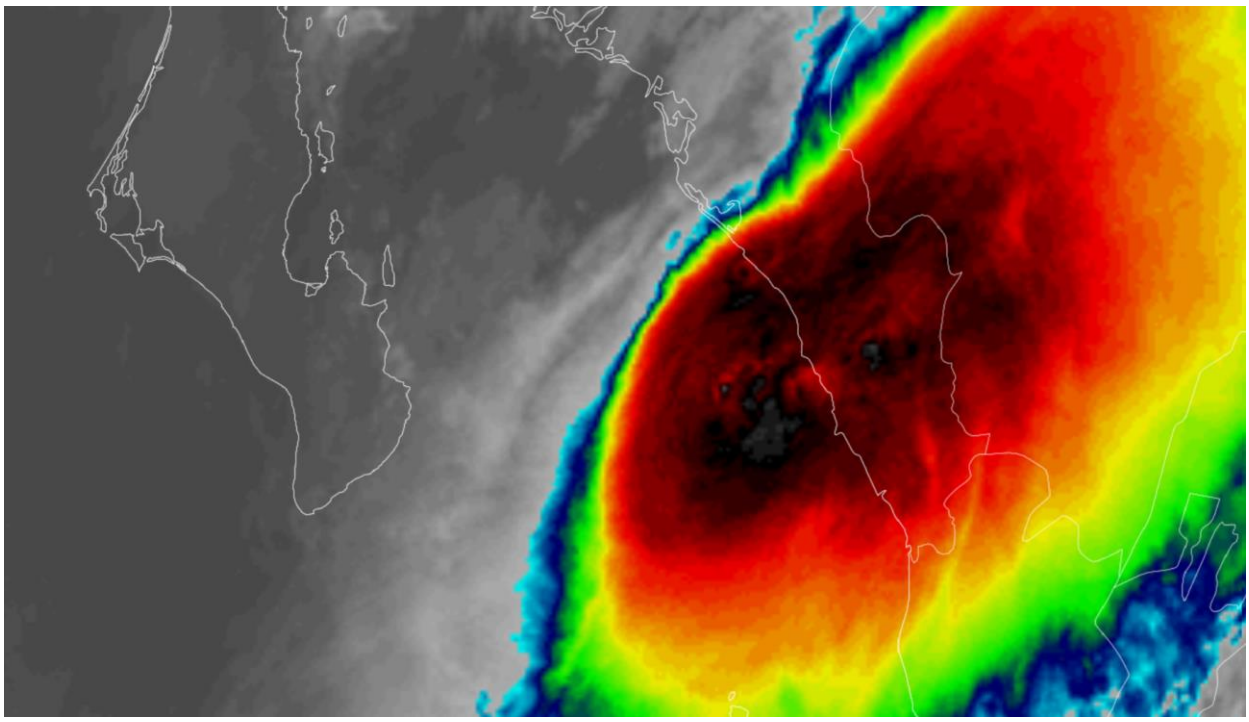
The author was in **Mazatlan** (23.2390N 106.4448W) as the hurricane approached. Just before landfall, he drove NW, up the coast, to **Marmol de Salcido** (23.4839N 106.6098W) to collect data in the eye.

Key observations:

- **Minimum Pressures**
  - **Mazatlan: 996.3 mb at 5:07 and 5:12 am MDT (1107Z and 1112Z) 13 Oct.** Strong winds and heavy rain at the time of this minimum suggest the **eye missed the city to the NW.**
  - **Marmol de Salcido: 990.8 mb at 6:08 and 6:46 am MDT (1208Z and 1246Z) 13 Oct.** Relatively calm winds and little rain at this time suggest this minimum occurred **in the eye.**

Key conclusions from the author's data and observations:

- **Eye Path.** A portion of the diffuse eye apparently passed over **Marmol de Salcido,** bringing some calming of the winds and cessation of rainfall between 6 and 7 am MDT.
- **Structure.** PAMELA was relatively mild, and structural features (eye, eyewall) were not sharply defined. The author was able to drive through the eyewall into the eye without much trouble.
- **Lightning.** PAMELA produced almost nonstop lighting in Mazatlan, as it approached the coast.
- **Damage.** Despite being over 30 n mi SE of the landfall point (per the NHC's operational track), Mazatlan experienced significant wind and flooding impacts.



Locations

The author documented the passage of Hurricane PAMELA's core from two locations in the Mexican state of Sinaloa.

Locations B: Sensor Location

Prior to landfall, the author deployed a data sensor in **Mazatlan (23.2390N 106.4448W).** This location is a hotel in the city's "Golden Zone," just off the "Malecon" (the city's waterfront promenade).

This location is also ~16 n mi SE of **Location A** and ~33 n mi SE of the hurricane's landfall point (per NHC advisory positions).

Location A: Chase Location

The author penetrated the hurricane's eye in the small village of **Marmol de Salcido (23.4839N 106.6098W).** This location is next to an inland lake, less than a mile from the open coast.

This location is ~16 n mi SE of the hurricane's landfall point (per NHC advisory positions). **This location apparently experienced the eye.**

The author drove into PAMELA's core to reach this location, penetrating through turbulent conditions and arriving at ~5:50 am MDT to relative calm.

The **Chase Map** shows **Location B** (**hotel symbol**) and **Location A** (**star**) in relation to **PAMELA's track** (pink), per NHC advisory positions. (**Chase Map (Close)** is a zoomed-in view.)

Figure 1: Chase Map

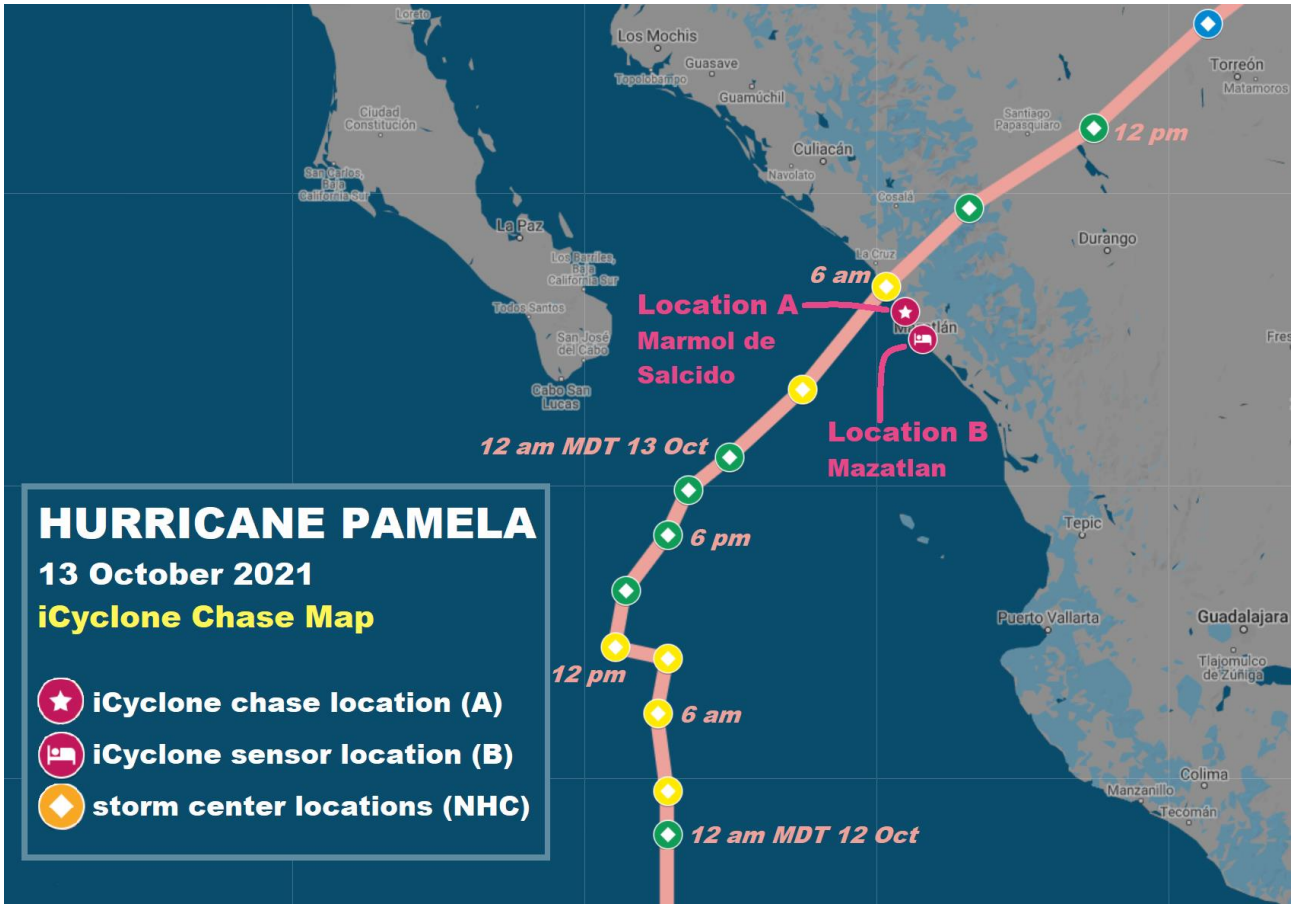
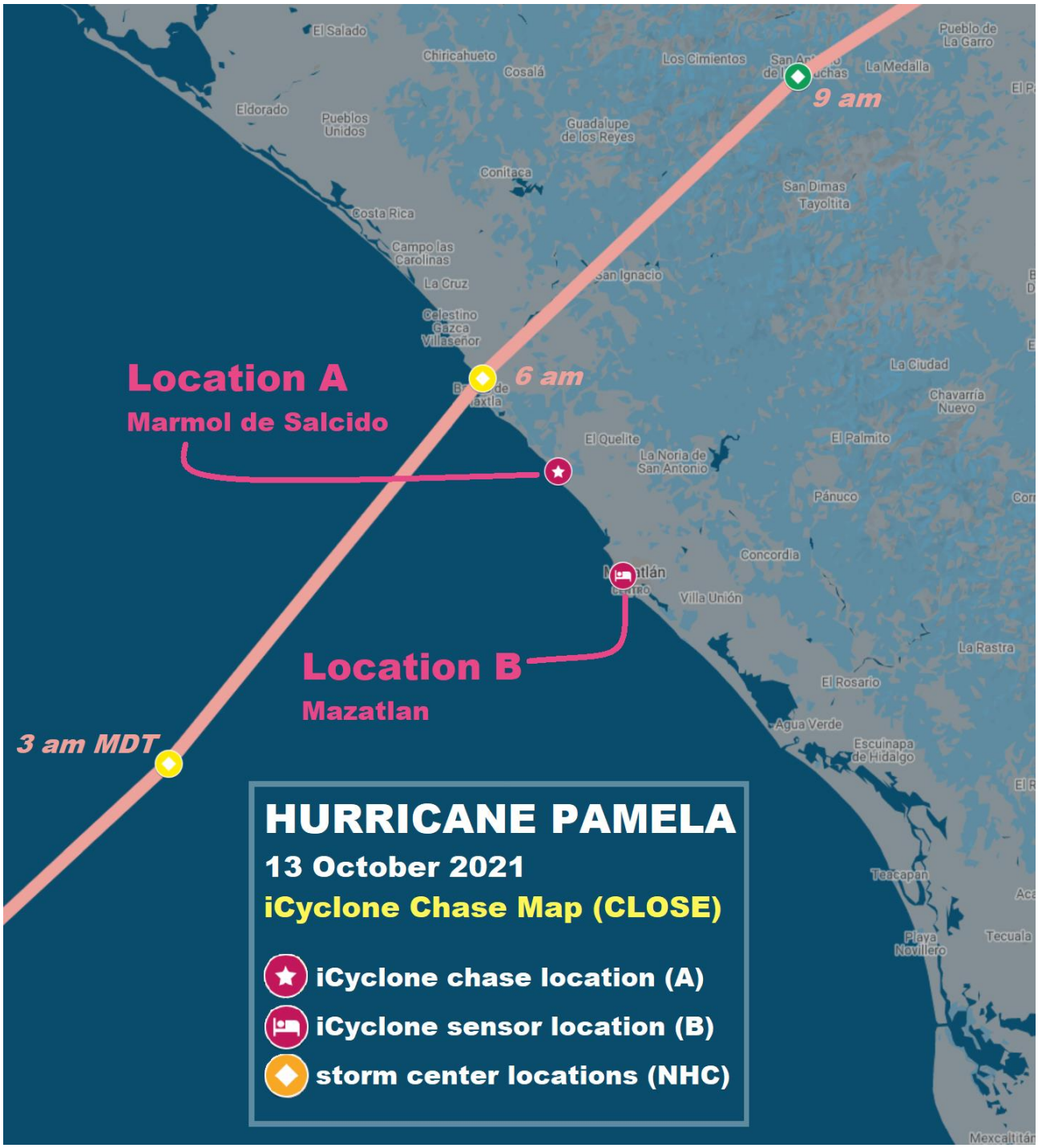


Figure 2: Chase Map (Close)



Observations & Chronology

Starting early evening on 12 October, the author began observing PAMELA's approach in **Mazatlan (Location B),** deploying a sensor to collect data starting after 12 midnight on 13 October.

As the hurricane's core neared the coast, the author and his partner drove NW, to **Marmol de Salcido (Location A)**, where he continued to make observations while also deploying a sensor to collect data in the eye.

Location B: Mazatlan

Key observations and data, along with ***analysis:***

- Starting **early evening on 12 October, outer rainbands** produced intermittent periods of heavy rain in the city, with the **first heavy downpour** occurring at **~6:20 pm MDT.**
- **Just after 8 pm,** another extremely **heavy downpour** flooded city intersections. Winds at this time were no stronger than a moderate breeze.
- Starting around **10 pm, winds became noticeably stronger.**
- **Sometime after 12 midnight 13 October**, l**ightning** began and became remarkably frequent by **~2:30 am.**
- **By 3 am,** there was **heavy rain and nearly continuous lighting and thunder.**
- **By 3:30 am, strong winds and heavy rain** pelted the city.
- **Between 4 and 5 am,** heavy rain continued as **winds got stronger and started to cause damage.** The author observed—and was almost stricken by—a large restaurant canopy that blew down the street. Winds seemed to be blowing from the SE, roughly parallel to the coast, at this time.
- The minimum air pressure, **996.3 mb,** occurred at **5:07 and 5:12 am MDT.** *(See more below, under **Air Pressure Data,** Re: instrument calibration and data collection.)*
    - ***Since strong winds and heavy rain accompanied the minimum pressure, it's clear the hurricane's eye passed well NW of the city.***
- The author **departed Mazatlan** a little after **5 am** to head NW, further up the coast. By this time, **flash flooding** made some routes out of the city impassable.

Trek from Location B (Mazatlan) to Location A (Marmol de Salcido)

Key observations:

- From **~5:15 to 5:45 am MDT,** the author and his chase partner **drove NW,** up Highway 50. Conditions on the road were **stormy and turbulent,** with strong winds and heavy rain most of the way. Conditions improved as they neared their destination.

Location A: Marmol de Salcido

Key observations and data, along with ***analysis:***

- By the time the author and his partner exited the highway and approached the village—at **~5:45 am MDT**—winds had **calmed considerably and the rain had almost completely stopped.**

- **At 5:50 am,** they stopped the car next to an inland lake near the town, and the author deployed a sensor.

- The minimum air pressure, **990.8 mb,** occurred at **6:08 and 6:46 am MDT.** During this time, winds were mostly 10 to 20 knots, with little or no rain.

    - ***This pronounced improvement in conditions, combined with a minimum pressure much lower than Mazatlan's, suggests the author had driven into the hurricane's eye.***

- **At 6:55 am,** when data collection stopped, conditions were roughly the same: breezy and overcast, with little or no rain.

Trek from Location A (Marmol de Salcido) to Location B (Mazatlan)

Key observations and ***analysis:***

- **At 7 am MDT,** the author and his partner departed Marmol de Salcido and **drove SE** down the coast, back toward Mazatlan. **Conditions deteriorated along the way.**

- **Just before 8 am,** they arrived back in Mazatlan to **windy, rainy conditions.**

    - ***This deterioration of conditions as the author drove SE suggests they exited the eye and entered the hurricane's (weakened) SW eyewall.***

Air Pressure Data

The author collected quality-controlled air-pressure data at two locations using Kestrel 4500s.

- **Location B: Mazatlan.** This device was deployed on the counter of a second-floor hotel room well before the hurricane arrived.

- **Location A: Marmol de Salcido.** This device was deployed on the ground, next to an inland lake. Unfortunately, the author didn't arrive at this location, calibrate, and begin data collection until 5:55 am MDT—**during** the passage of the calm eye. Therefore, the entire eye was not sampled.

The sampling rate for both instruments was one reading every 30 seconds (2/min).

Calibration

To ensure sea-level pressure readings, each device was calibrated as follows:

- **Location B: Mazatlan.** This location is just off the city's waterfront promenade. The author visually estimated the ground elevation to be **17 ft**—therefore, the reference altitude (30 ft) was the 17 ft elevation plus additional height to account for the device being in a second-floor hotel room.

- **Location A: Marmol de Salcido.** The author deployed the device on the ground, next to an inland lake. The lake is less than a mile from the open coast and was assumed to be sea level—so determining elevation was simple. The author used a reference altitude of **0 ft.**

Minimums

As follows:

- **Location B (Mazatlan): 996.3 mb at 5:07 and 5:12 am MDT (1107Z and 1112Z)**

- **Location A (Marmol de Salcido): 990.8 mb at 6:08 and 6:46 am MDT (1208Z and 1246Z)**

    - **Note:** The author didn't begin data collection until this location was well into the eye, and there was no clear pressure trend during the hour data were collected—therefore, it's possible the 990.8 mb doesn't represent the true minimum at this location.

The complete data are graphed in **Figures 3** and **4**.

Figure 3: Barogram—Location A

The minimum pressure of 990.8 mb occurred at 6:08 and 6:46 am MDT, as the eye passed over Marmol de Salcido.

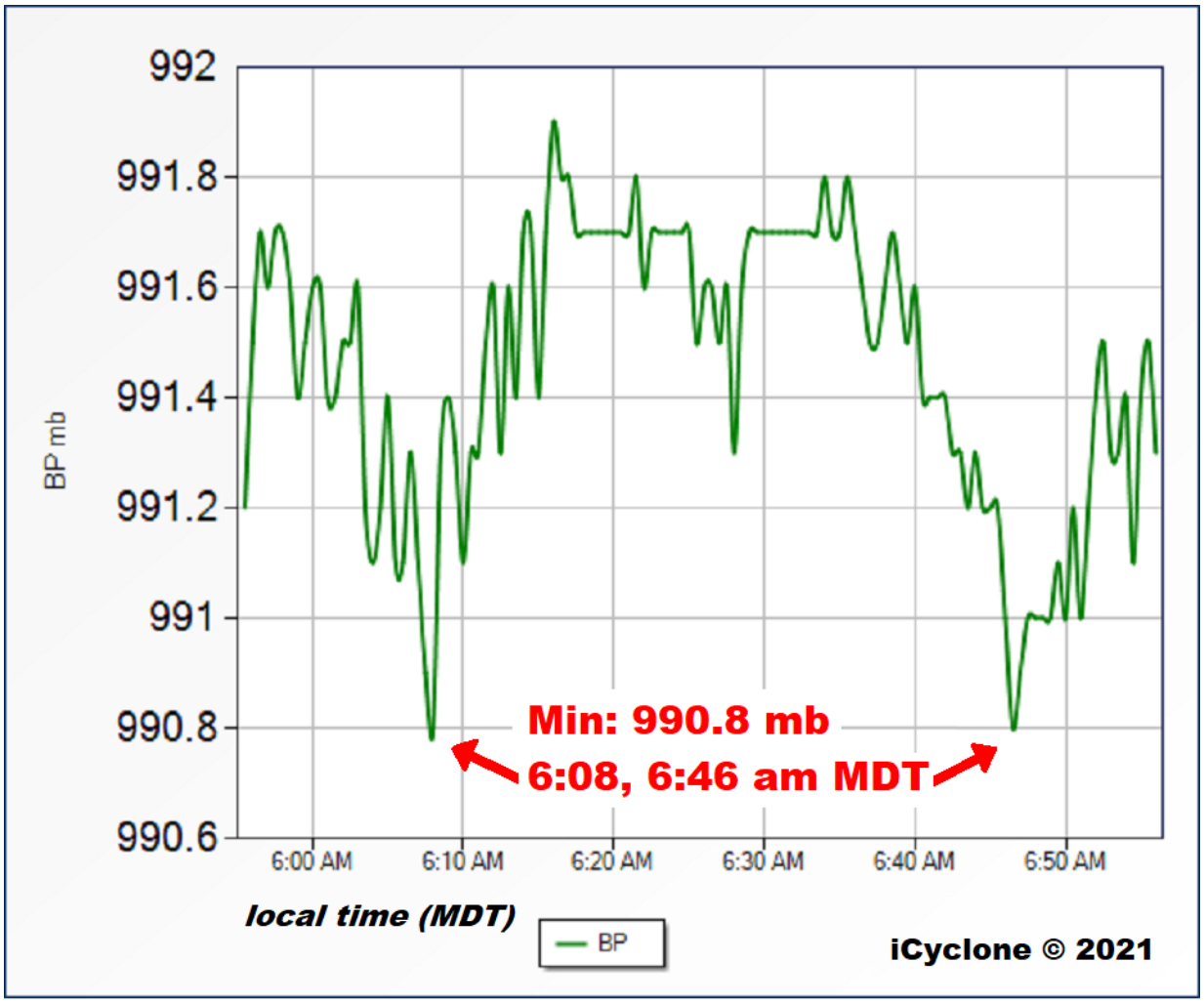
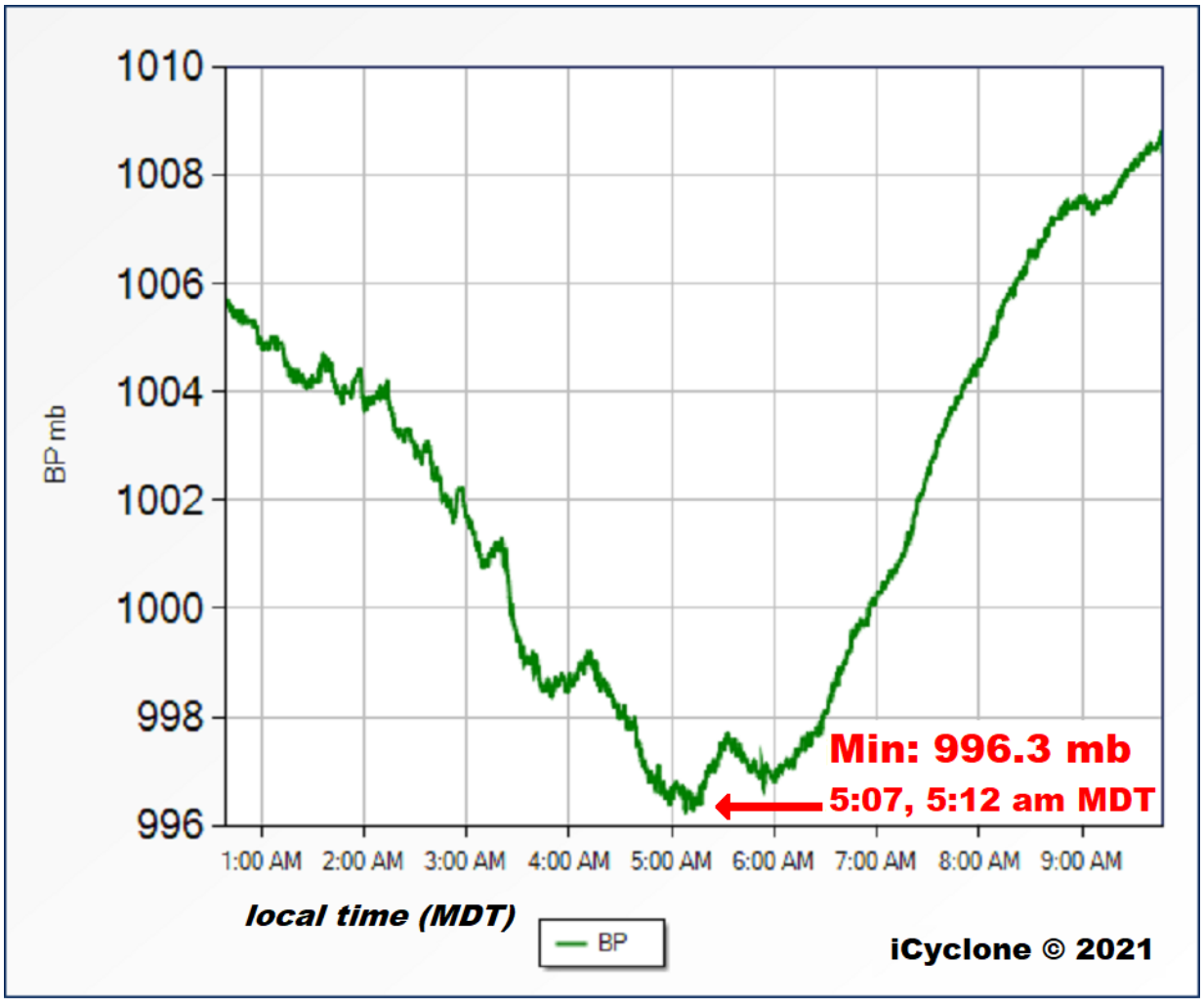


Figure 4: Barogram—Location B

The minimum pressure in Mazatlan was 996.3 mb at 5:07 and 5:12 am MDT. This minimum occurred as the eye passed NW of the city.



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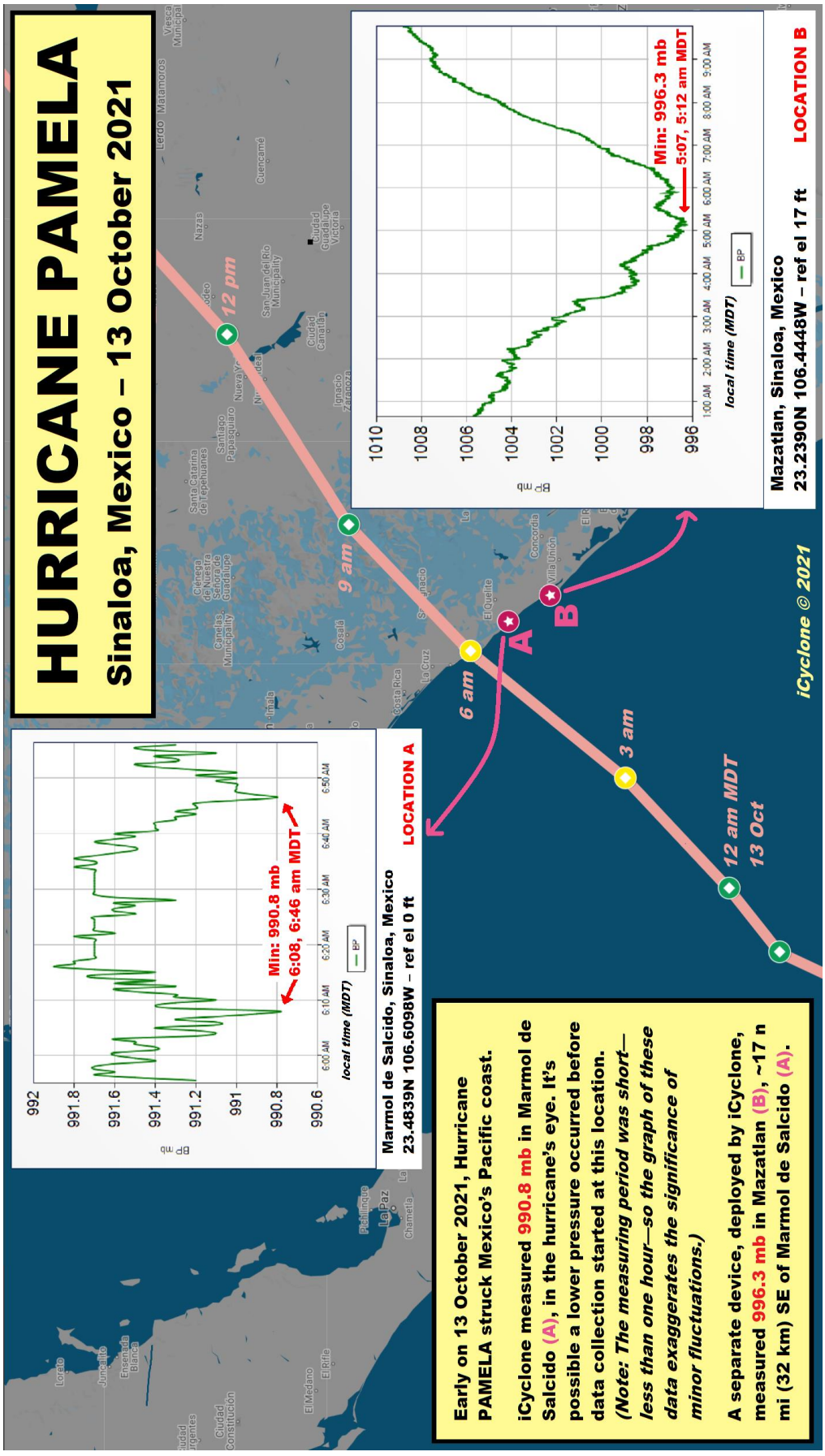
Summary (Infographic)



Impacts in Mazatlan

Although Hurricane PAMELA's center likely passed over 30 n mi NW of Mazatlan, impacts in the city were significant.

There was widespread—but streaky—wind damage across the city. Many trees were felled, and in some places, windows were blown out and signs and canopies were destroyed.

Many streets around the city were flooded, and the Malecon—the city's waterfront promenade—was littered with debris apparently left by waves that came over the seawall.

Normally wind-resistant palm trees took a beating in Hurricane PAMELA. Many throughout Mazatlan were felled during the storm.

Tree damage in Mazatlan.

Tree damage in Mazatlan.

Tree damage and flooding in Mazatlan.

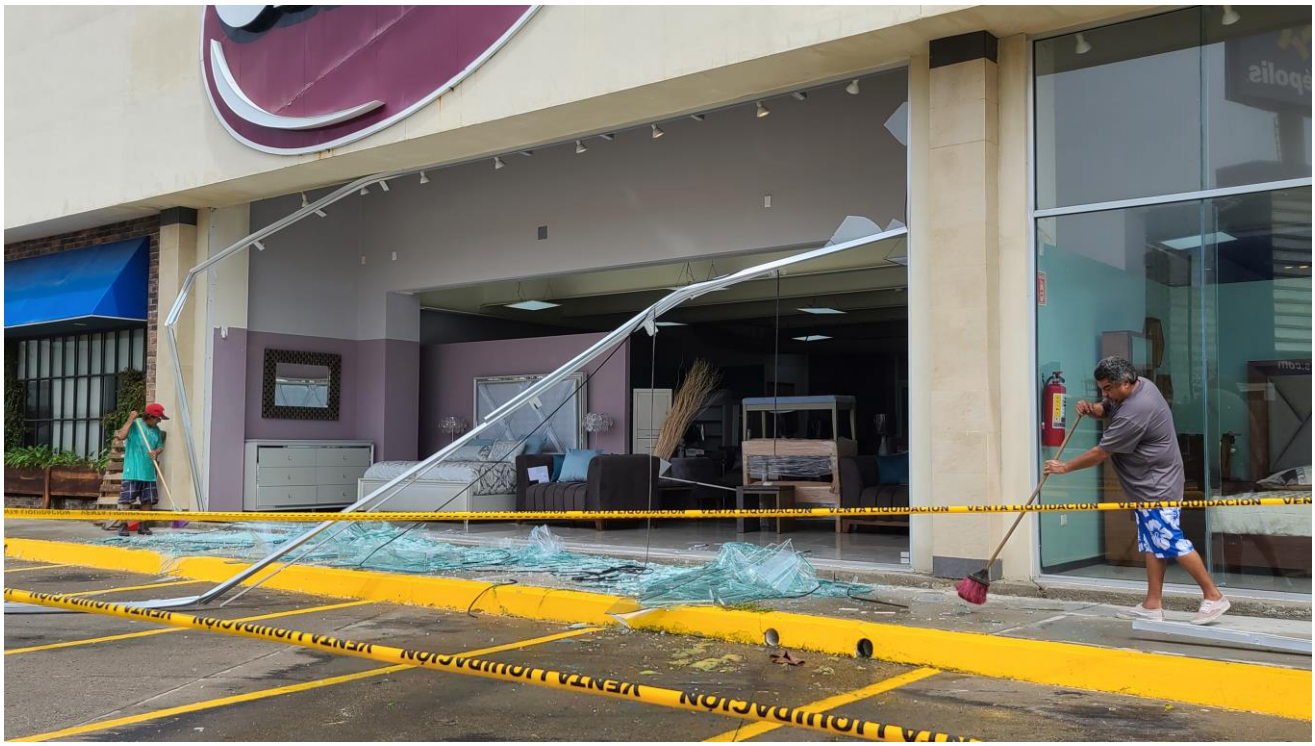
Destroyed restaurant signage in Mazatlan.

Destroyed signs in Mazatlan.

Extensive street flooding in Mazatlan.

Thrashed pam trees and windblown debris were the main sights in this major intersection in Mazatlan's "Golden Zone" the morning after Hurricane PAMELA.

Destroyed storefront in Mazatlan. The owner reported the windows seemed to blow outward, as if pressure came from the interior of the building.



Another view of the destroyed storefront.

Another view of the destroyed storefront.

Waves continued to crash along Mazatlan's famous Malecon the morning after Hurricane PAMELA.

Roughed up but still there. Mazatlan's city letters withstood Hurricane PAMELA, despite waves apparently crashing up over the seawall and onto the Malecon. (Notice the debris deposits.)

Questions or Feedback?

Get in touch:

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