iCyclone Chase Report – PRELIMINARY

storm	**Super Typhoon HAIYAN (YOLANDA)**		
location	Tacloban City, Leyte, Philippines		
date	08 November 2013		
chasers	Josh Morgerman, James Reynolds, Mark Thomas	**author**	Josh Morgerman

Location

We observed the passage of **Super Typhoon HAIYAN** in **Tacloban City, Leyte, Philippines**, at **11.2414N 125.0036E**. We rode out the storm in Hotel Alejandro, in the heart of the Downtown district.

As per radar (see **Radar** shots, below), the center of the cyclone crossed the Leyte coast between Tolosa and Dulag, very near the village of San Jose, at ~7 am PHT.

This landfall point is ~15 n mi S of downtown Tacloban City. The city was in the N eyewall and just a couple of miles from the edge of the eye.

The **Chase Map** shows **our location** (**green marker**) in relation to **Haiyan's center** at landfall (**red marker**), as per radar. (**Chase Map Detail** is a closer view.)

Figure 1: Chase Map

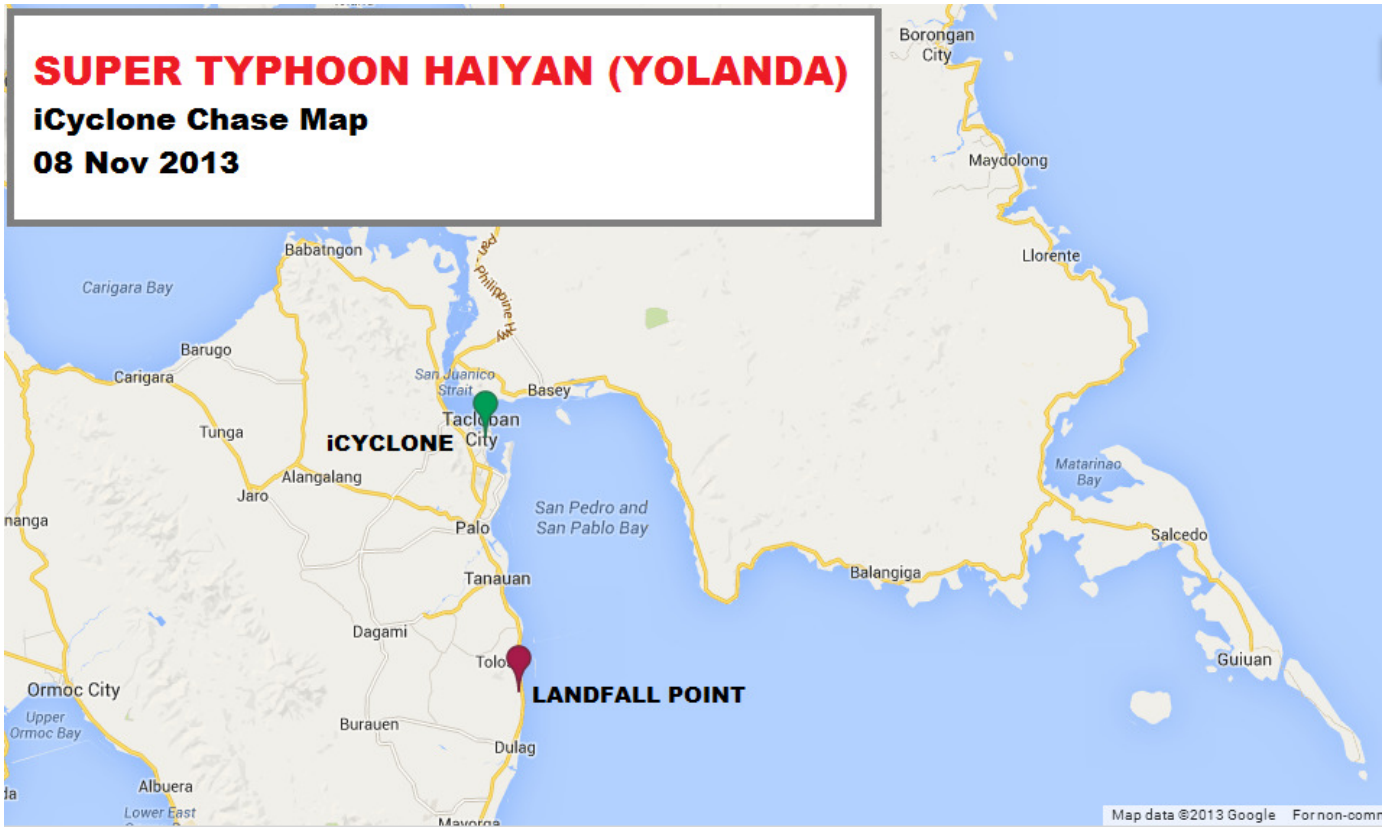

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Figure 2: Chase Map Detail

Overview

Haiyan was a **small, fast-moving, extremely violent cyclone** that made a direct hit on Tacloban City.

Key observations (all times in this document **PHT**):

- **Very destructive winds** didn't start until about 6:30 am—**only 45 minutes** before the **center's closest approach** (~7:15 am).
- **Highest winds** occurred **near or after** the center's closest approach.
- The **storm surge rose very suddenly and rapidly,** and it peaked **near or after** the center's closest approach. The hotel flooded to a depth of ~4 ft. If the elevation at this location is truly 26 ft—as indicated by USGS—that suggests a storm surge of **up to ~30 ft**. It's possible the elevation may have been as low as 15 ft, in which case, the surge was ~20 ft. *(See more about this below, under **Calibration**.)*
- Very destructive winds and storm-surge inundation lasted **only a few hours—a short-duration event** compared with a typical tropical-cyclone passage.

We deployed two devices for measuring air pressure. Lowest pressures and times are as follows:

- **Device 1: 960.8 mb at 7:12 am**
- **Device 2: 960.3 mb at 7:20 am**

Please note that all observations, aside from air-pressure data, are **preliminary** and are subject to change upon review of the time-stamped video footage. See more below Re: the air-pressure readings.

Air Pressure Discussion

Devices

We deployed two devices in our hotel—both Kestrel 4500s. The sampling rate was one reading per 30 seconds.

Calibration

USGS data indicate the ground elevation at the hotel is ~26 ft. Before the storm, we attempted to verify this with a three-block walk to the waterfront—to "eyeball it"—but it was difficult to assess with confidence. Given this, we used 26 ft as our value.

Device 1 was deployed in a small drawer in the hotel lobby, on the ground floor. Since it was several feet off the ground, the device was calibrated (for sea-level readings) using an altitude of 30 ft.

Device 2 was deployed in our fourth-floor room. To calibrate this device, we used the air pressure from Device 1 as a reference, setting the altitude in Device 2 so the air pressure matched Device 1 (~60 ft).

Disruption of Device 1

Sometime after 7:30 am, storm surge flooded the hotel lobby, knocking over the piece of furniture holding Device 1. The drawer holding Device 1 was submerged for a time—until the storm died down and we were able to retrieve it. It's unclear what effect this may have had on the air-pressure data—and there are no obvious irregularities in the trace that can help identify when the disruption occurred. However, this disruption happened **after** the lowest pressure was reached and the center was moving away from the city.

Lowest Pressure & Intensity

Both instruments had low pressures around 960 mb in the cyclone's N eyewall, just a couple of miles outside of the eye. At the time, the typhoon was estimated to have a central pressure possibly under 900 mb.

The center was only ~15 n mi away at the time, suggesting an incredible gradient of ~4 mb/n mi.

If this seems implausible, then either the central-pressure estimates were too low or our equipment wasn't accurate. The healthy corroboration between our two instruments, spaced four stories apart, gives some confidence to those readings—but not 100%.

The cyclone was extremely severe, with very high winds that completely defoliated—and in some instances debarked—trees across the city and region, suggesting the intensity was not overestimated.

But perhaps the central pressure didn't need to be so exceptionally low to cause these winds. The cyclone's relatively small RMW, as well as very strong high pressure to the N, are two factors which may have contributed to augmenting the cyclone's winds.

Barograms—Clean

Following are clean barograms for both devices—plotted for the same time period (for easy comparison), and excluding some non-representative pressure spikes:

Figure 3: Barogram—Device 1 (CLEAN)

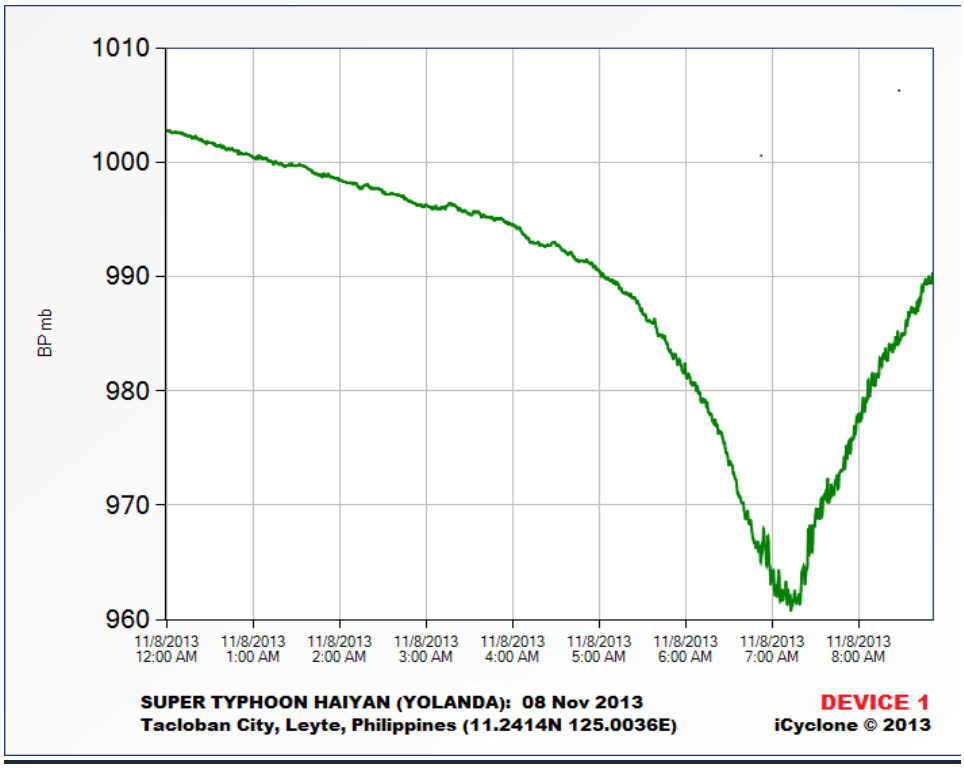
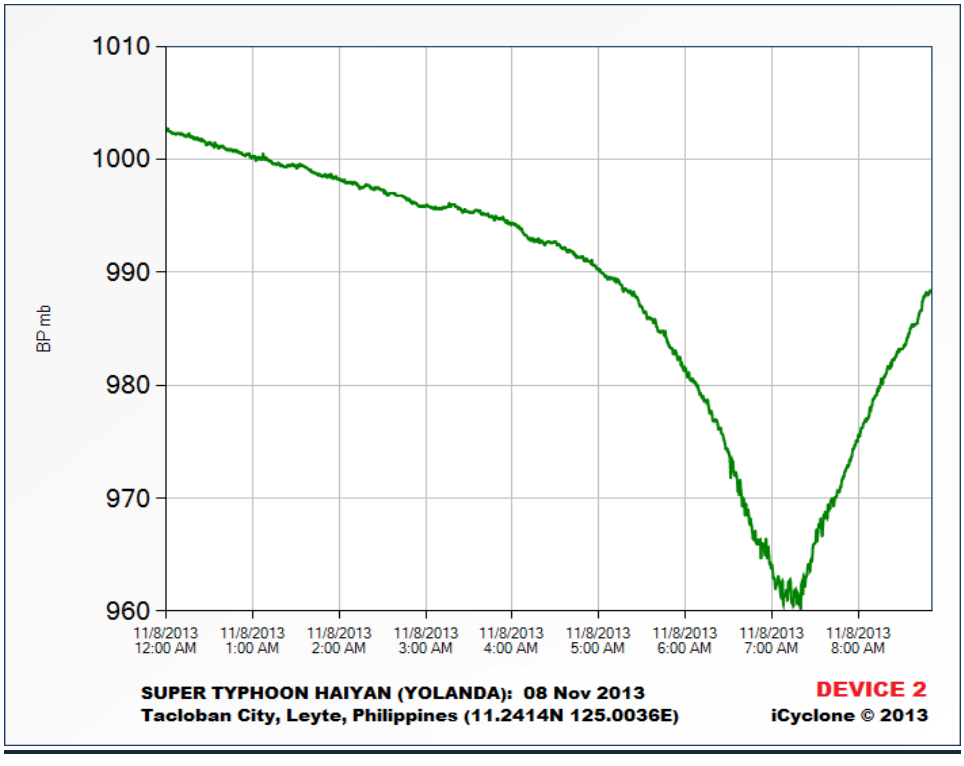


Figure 4: Barogram—Device 2 (CLEAN)



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Barograms—Raw

Following are barograms of the raw data. Notice that the two devices ran for different periods—and also Device 2 had some odd pressure spikes which are not considered representative:

Figure 5: Barogram—Device 1 (RAW)

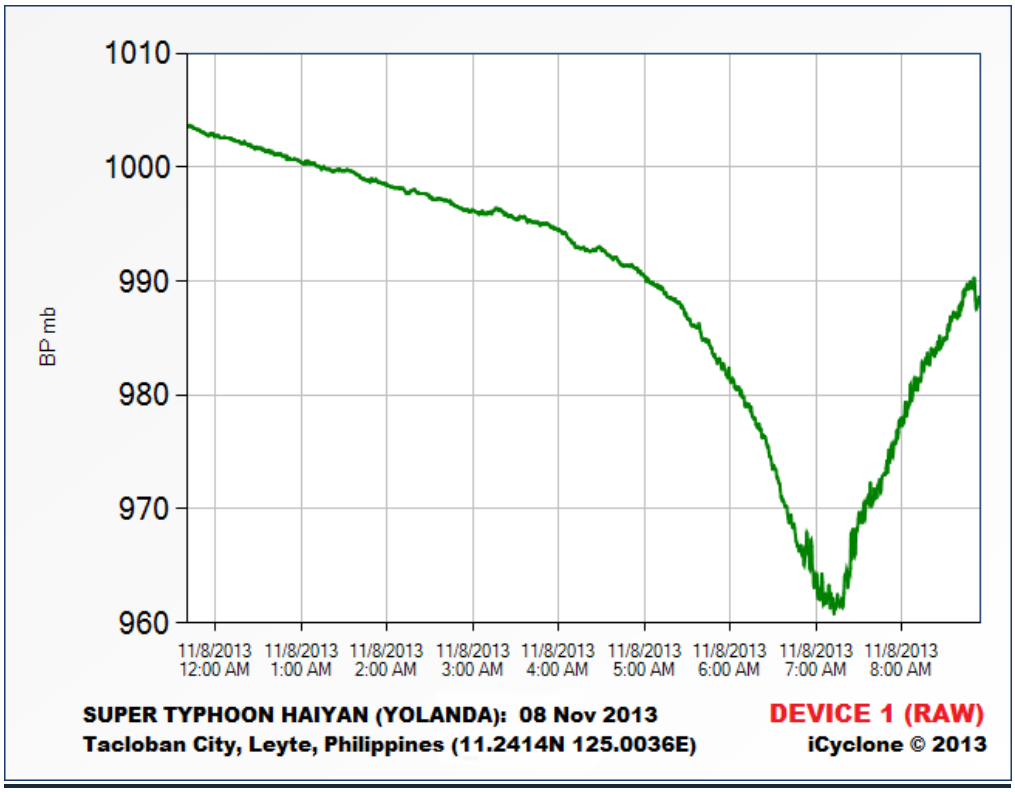
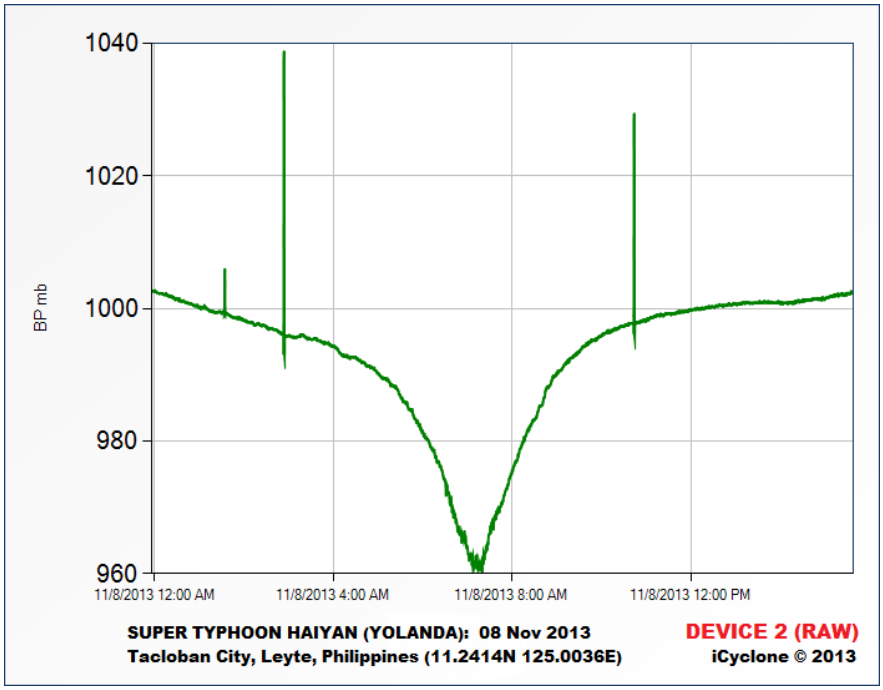


Figure 6: Barogram—Device 2 (RAW)



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More Imagery

Figure 7: Radar—Far

Cebu radar at 07:00:59 am PHT, showing Haiyan's center making landfall on the Leyte coast. At this time, Tacloban City (black square) was in the N eyewall. The lowest pressure in the city occurred ~15 minutes later.

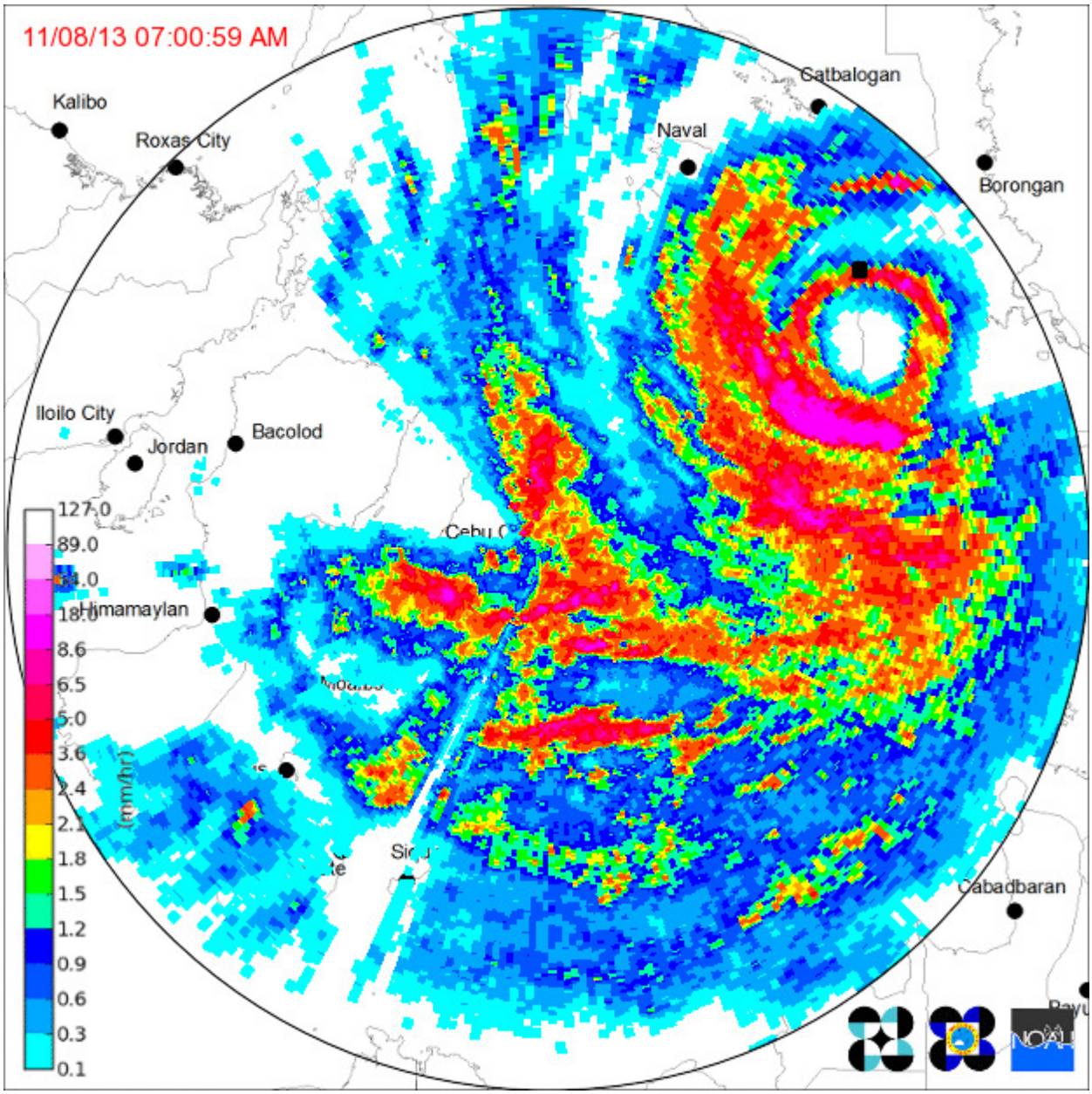
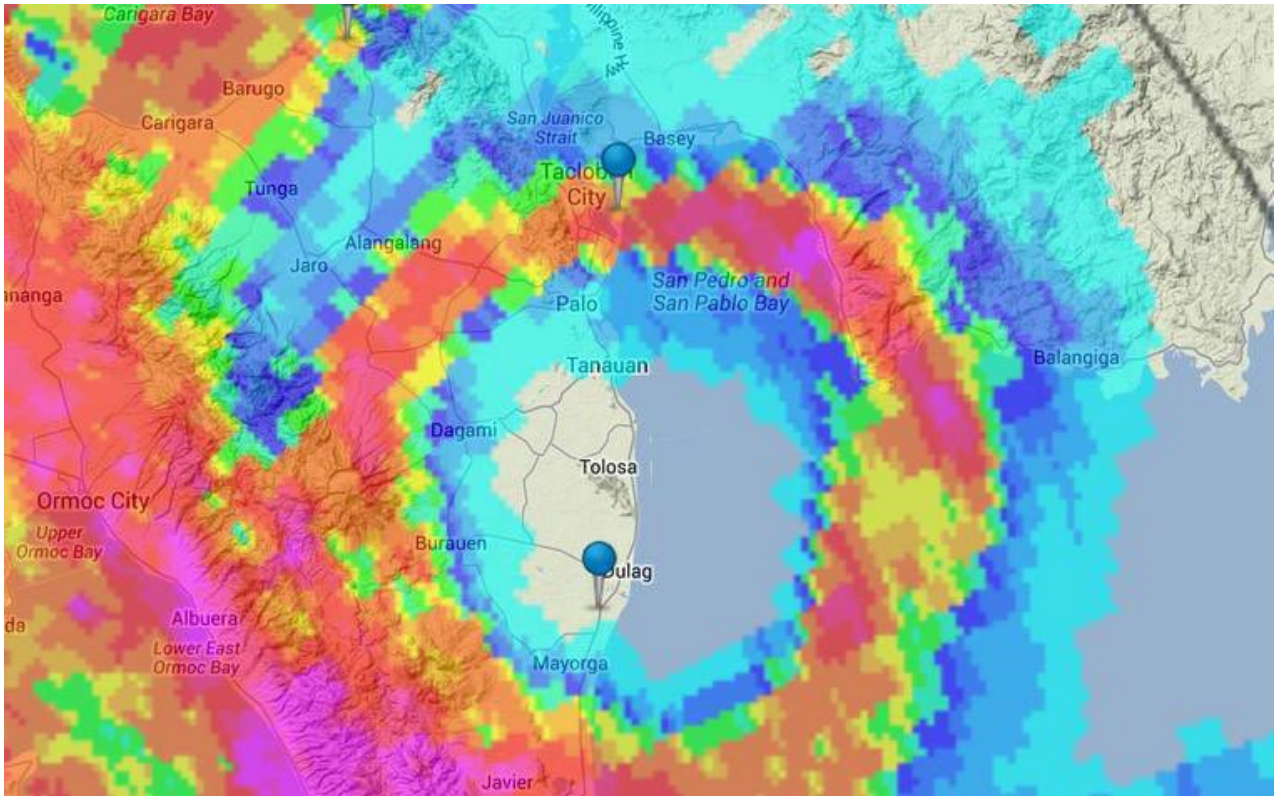


Figure 8: Radar—Close

Close-up of Cebu radar, showing Haiyan's center making landfall and Tacloban City in the N eyewall.



Questions or Feedback?

Get in touch:

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