**ESCAP/WMO Typhoon Committee**
**8th IWS/2nd TRCG Forum**


**Typhoon Haiyan approaching the Philippines**
*Copyright 2013 JMA/EUMETSAT*

http://www.popsci.com/article/science/big-pic-super-typhoon-haiyan-seen-space

# Report on TYPHOON HAIYAN Philippines

# Outline:

1. Meteorological Aspect of Typhoon Haiyan
2. Impacts
3. Summary of the Damages of PAGASA Synoptic Stations
4. Preliminary Assessment Report
5. Actions Undertaken During the Approach and Passage of Tyohoon Haiyan
6. Priority Activities
7. Historical TC Tracks in Visayas Area
8. Images of the Devastation
9. Video Footage

## Meteorological Aspects:

- **Typ. Haiyan (Yolanda) was the 9TH TC that made landfall and the 24th TC that entered or developed inside PAR in 2013.**

- **Haiyan (Yolanda) was already a Typhoon before it enter the Phil. Area of Responsibility (PAR)**

- **It gained more strength as it moved west northwestward at an average speed of 35 kph.**

- **Made 1st landfall at Guiuan, Eastern Samar, at 4:40 AM, Nov. 8, 2013.**

## Meteorological Aspects:

- Traversed the Leyte Gulf and made 2nd landfall in Tolosa, Leyte, at 7:00 Am then crossed Northern Leyte.

- Devastated Leyte and Samar Provinces due to storm surges of up to 7 meters and very strong winds of >200kph.

- Made 3rd landfall in Daanbatayan, Northern Cebu at 9:40 Am;

## Meteorological Aspects:

**Made 4th landfall in Bantayan island, Cebu at 10:40 Am. Haiyan then moved towards northern Panay.**

- **Made 5th landfall in Conception, Iloilo at 12:00 Noon then traverses northern Panay in the next 3 hours and was over Sulu sea at 3:00 Pm**

- **Severe damages in Northern Cebu and Panay island.**

- **Made the 6th landfall in Busuanga, Northern Palawan at 8:00 Pm.**

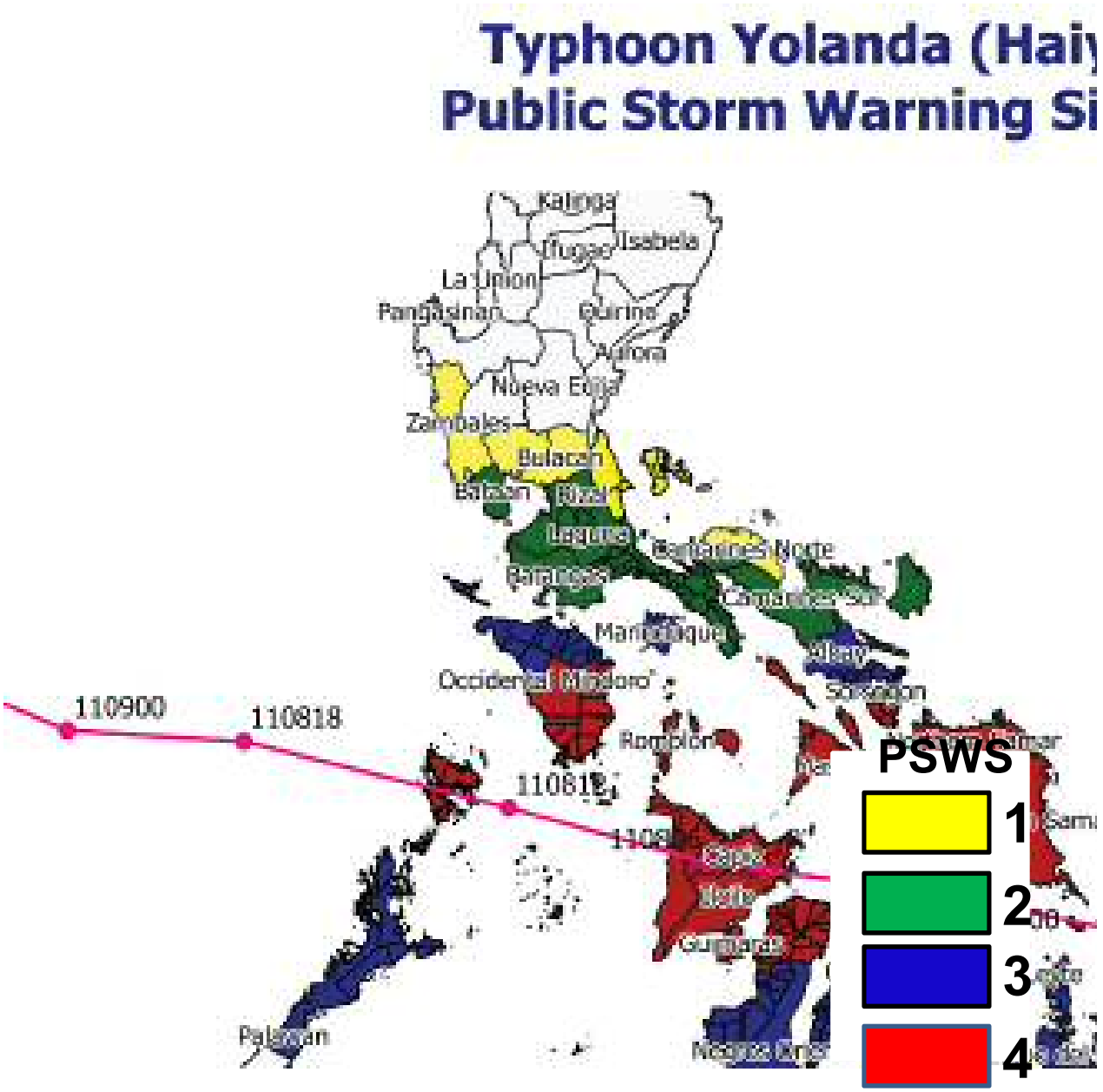
## Meteorological Aspects:

- **Actual movement of Typ. Haiyan (Yolanda) was predicted accurately. Issued the following warnings:**

  **- Issued 2 Advisory (every 11 AM, Nov. 6-7, 2013)**
  **- Issued initial Bulletin (Nov. 7/11Pm) even though it was still outside PAR**
  **- Issued 12 Severe Weather Bulletins**
  **- disseminated through OCD-NDRRMC, conduct press conferences, social network, including SMS, twitter and Facebook**

- **Issued hourly location and intensity of the typhoon through PTv 4, Website, Twitter, Facebook and Sms**

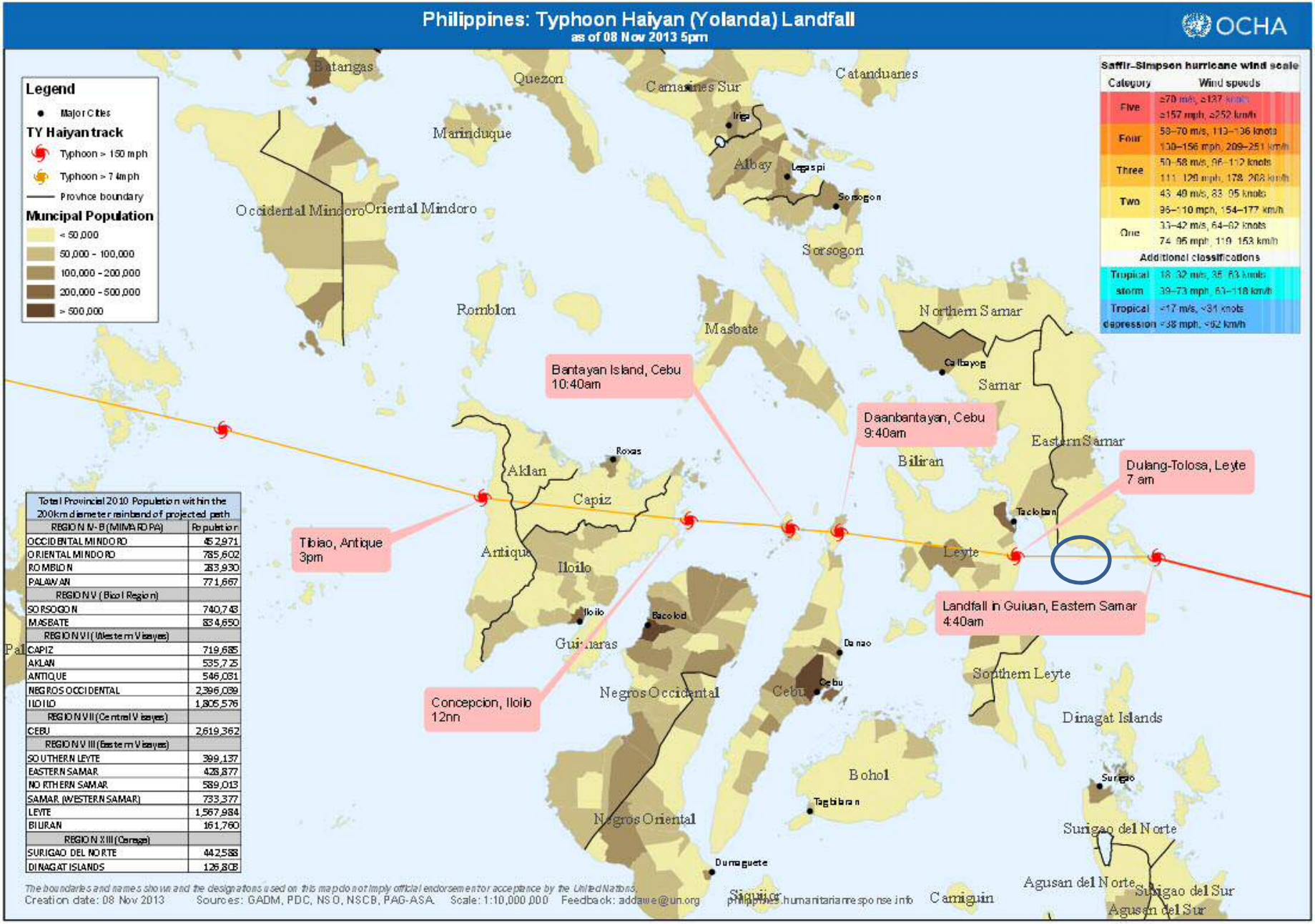
**Areas where Public Storm Warning Signals (PSWSs) were raised**



# Philippines: Typhoon Haiyan (Yolanda) Landfall

**as of 08 Nov 2013 5pm**

OCHA




| Total Provincial 2010 Population within the 200km diameter rainband of projected path | |
|---|---|
| REGION IV-B (MIMAROPA) | Population |
| OCCIDENTAL MINDORO | 452,971 |
| ORIENTAL MINDORO | 785,602 |
| ROMBLON | 283,930 |
| PALAWAN | 771,667 |
| REGION V (Bicol Region) | |
| SORSOGON | 740,743 |
| MASBATE | 834,650 |
| REGION VI (Western Visayas) | |
| CAPIZ | 719,685 |
| AKLAN | 535,725 |
| ANTIQUE | 546,031 |
| NEGROS OCCIDENTAL | 2,396,039 |
| ILOILO | 1,805,576 |
| REGION VII (Central Visayas) | |
| CEBU | 2,619,362 |
| REGION VIII (Eastern Visayas) | |
| SOUTHERN LEYTE | 399,137 |
| EASTERN SAMAR | 428,877 |
| NORTHERN SAMAR | 589,013 |
| SAMAR (WESTERN SAMAR) | 733,377 |
| LEYTE | 1,567,984 |
| BILIRAN | 161,760 |
| REGION XIII (Caraga) | |
| SURIGAO DEL NORTE | 442,588 |
| DINAGAT ISLANDS | 126,808 |



Creation date: 08 Nov 2013 Sources: GADM, PDC, NSO, NSCB, PAG-ASA Scale: 1:10,000,000 Feedback: addawe@un.org philippines.humanitarianresponse.info

# Observed Sustained Winds and Gustiness

**Sustained Winds:**

| | |
|---|---|
| Guiuan, Samar | 86 knots (160 kph)(910.0 hPa)[4:00Am, Nov. 8] |
| Roxas, Capiz | 70 knots (130 kph)(972.5 hPa)[2:00Pm, Nov. 8] |
| Coron, Palawan | 30 knots (55 kph) [6:00Pm, Nov. 8] |
| San Jose, Mindoro | 40 knots (75 kph) (991.1 hPa)[7:35Pm, Nov.8] |

**Gustiness:**

| | |
|---|---|
| Guiuan | 53 m/s (195 kph)[4:10Am, Nov. 8] |
| Roxas City | 58 m/s (205 kph)[1:50Pm, Nov. 8] |
| Tacloban City | 55 m/s (200 kph)[6:00Am, Nov. 8] |
| Coron | 44 m/s (160 kph)(971.0Hpa)[8:00Pm, Nov. 8] |
| San Jose | 33 m/s (120 kph) [7:30Pm, Nov. 8] |
| Borongan | 35 m/s (125 kph) [6:10Am, Nov. 8] |
| Cebu City | 35 m/s (125 kph) [9:40Am, Nov. 8] |

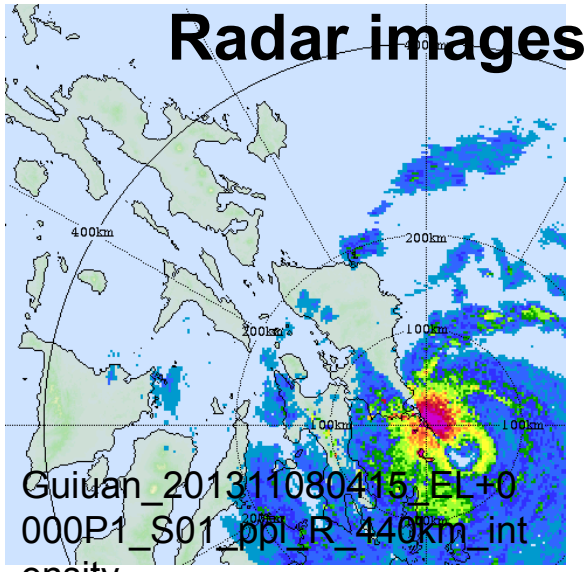
# Observed data from PAGASA stations

| PAGASA STATION | 24-HR RAINFALL (mm/hr) | MSLP (hpa) | Direction | Sustained Wind (km/h) | Dir/Gust |
|---|---|---|---|---|---|
| Mactan | 24.2 | 988.4 | 240 | 126 | 240/126kph |
| Romblon | 26.6 | 993.8 | 030 | 43 | 360/105kph |
| Masbate | 35.4 | 994 | 070 | 32 | 040 / 90kph |
| Borongan | 100.8 | 996 | 140 | 50 | 040/ 126kph |
| Calapan | 223.8 | 998 | 080 | 22 | 080/72kph |
| Dumaguete | 9.8 | 998 | 180 | 18 | 360/54kph |
| Catarman | 81.5 | 998.2 | 090 | 32 | 040/86kph |
| Puerto Princesa | 125.7 | 1000.7 | 220 | 25 | 340/50kph |
| Legazpi City | 37.9 | 1001 | 060 | 25 | 050/83kph |

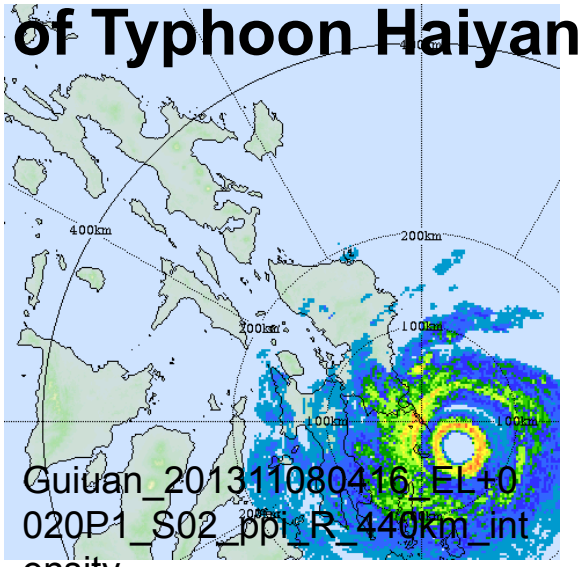
# 24-Hour Rainfall Recorded

| NOVEMBER 8, 2013 | |
|---|---|
| CALAPAN, ORIENTAL MINDORO | 223.8 mm |
| PUERTO PRINSESA, PALAWAN | 125.7 mm |
| TAYABAS, QUEZON | 105.8 mm |
| ROXAS CITY | 94.0 mm |
| **NOVEMBER 9, 2013** | |
| PUERTO PRINSESA, PALAWAN | 119.8 mm |

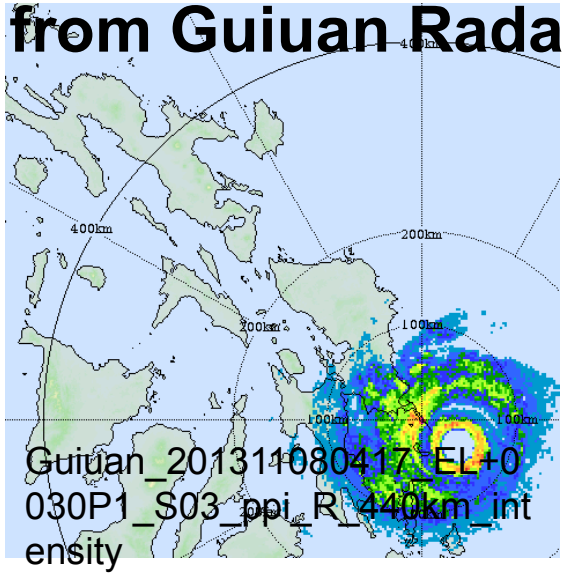
# Radar images of Typhoon Haiyan from Guiuan Radar




Guiuan_201311080415_EL+0000P1_S01_ppi_R_440km_intensity

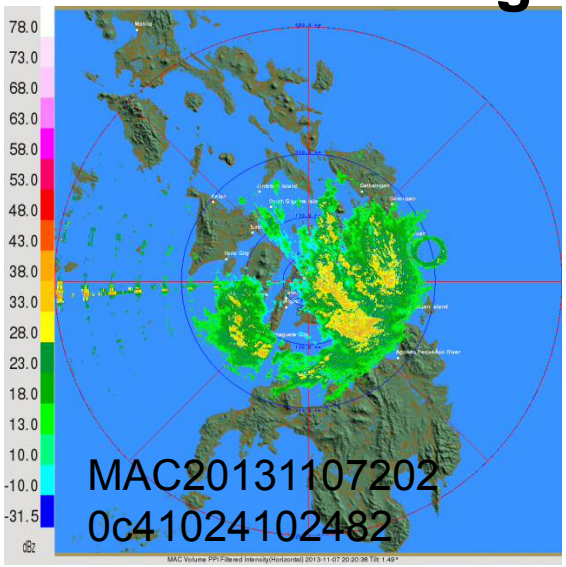



Guiuan_201311080416_EL+0020P1_S02_ppi_R_440km_intensity

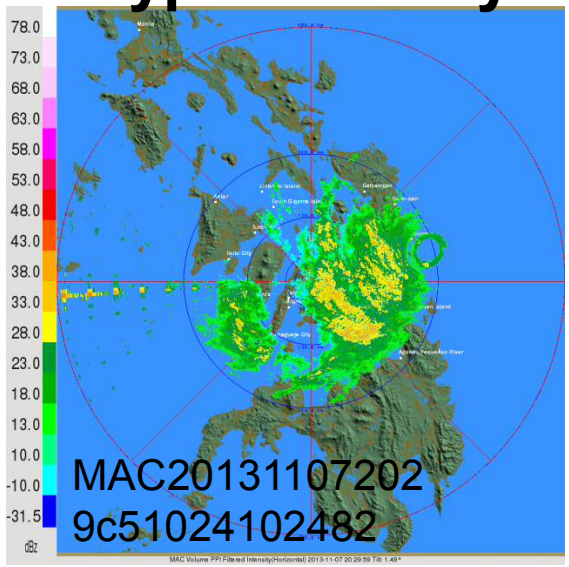



Guiuan_201311080417_EL+0030P1_S03_ppi_R_440km_intensity

# Radar images of Typhoon Haiyan from Mactan Radar




MAC201311072020c41024102482

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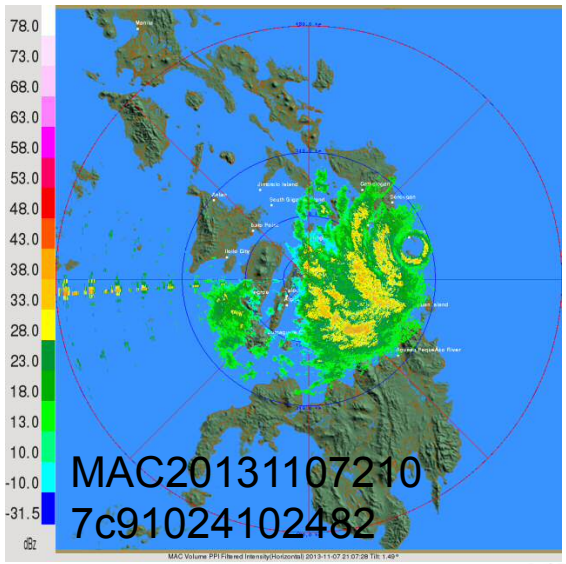


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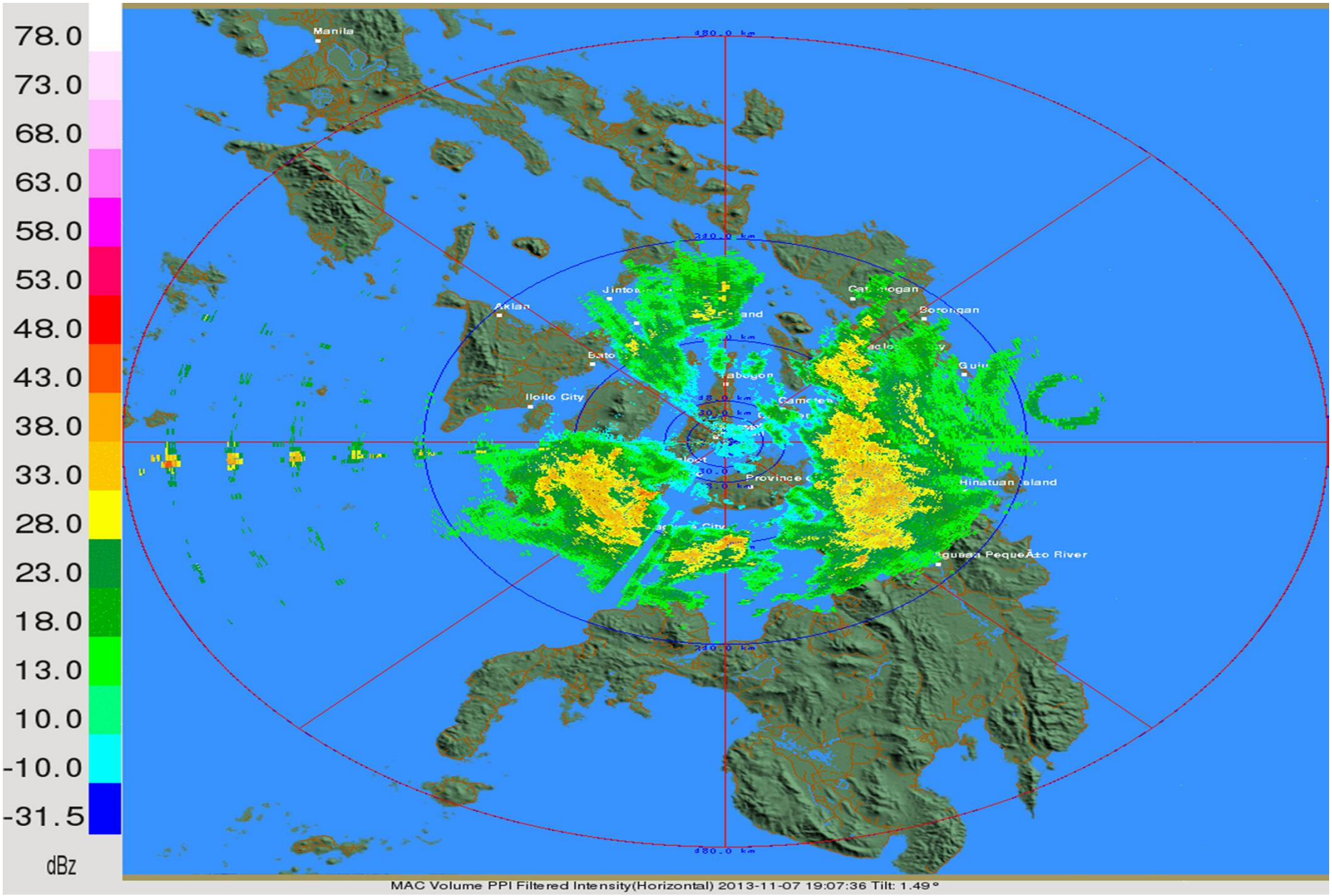
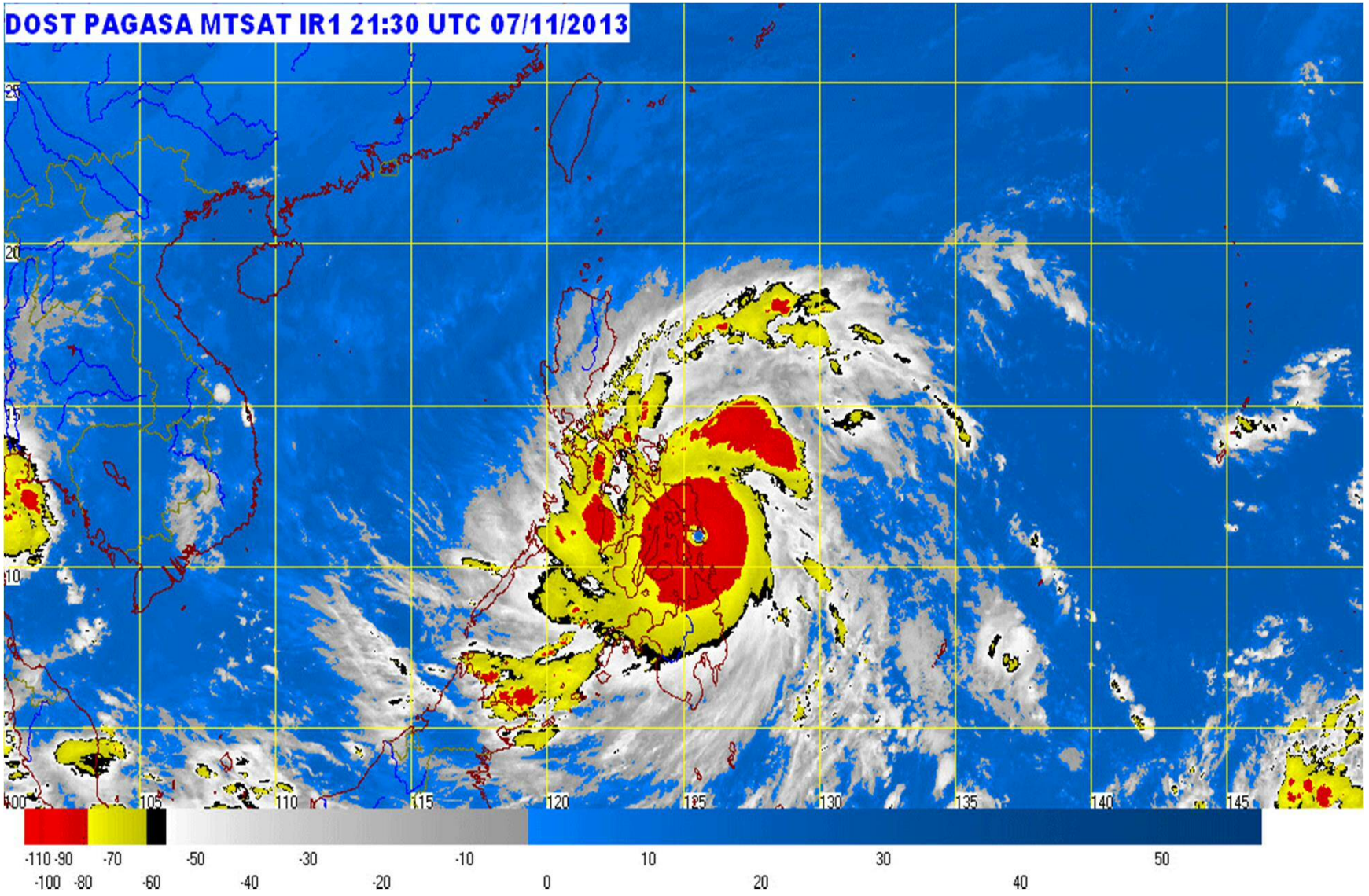
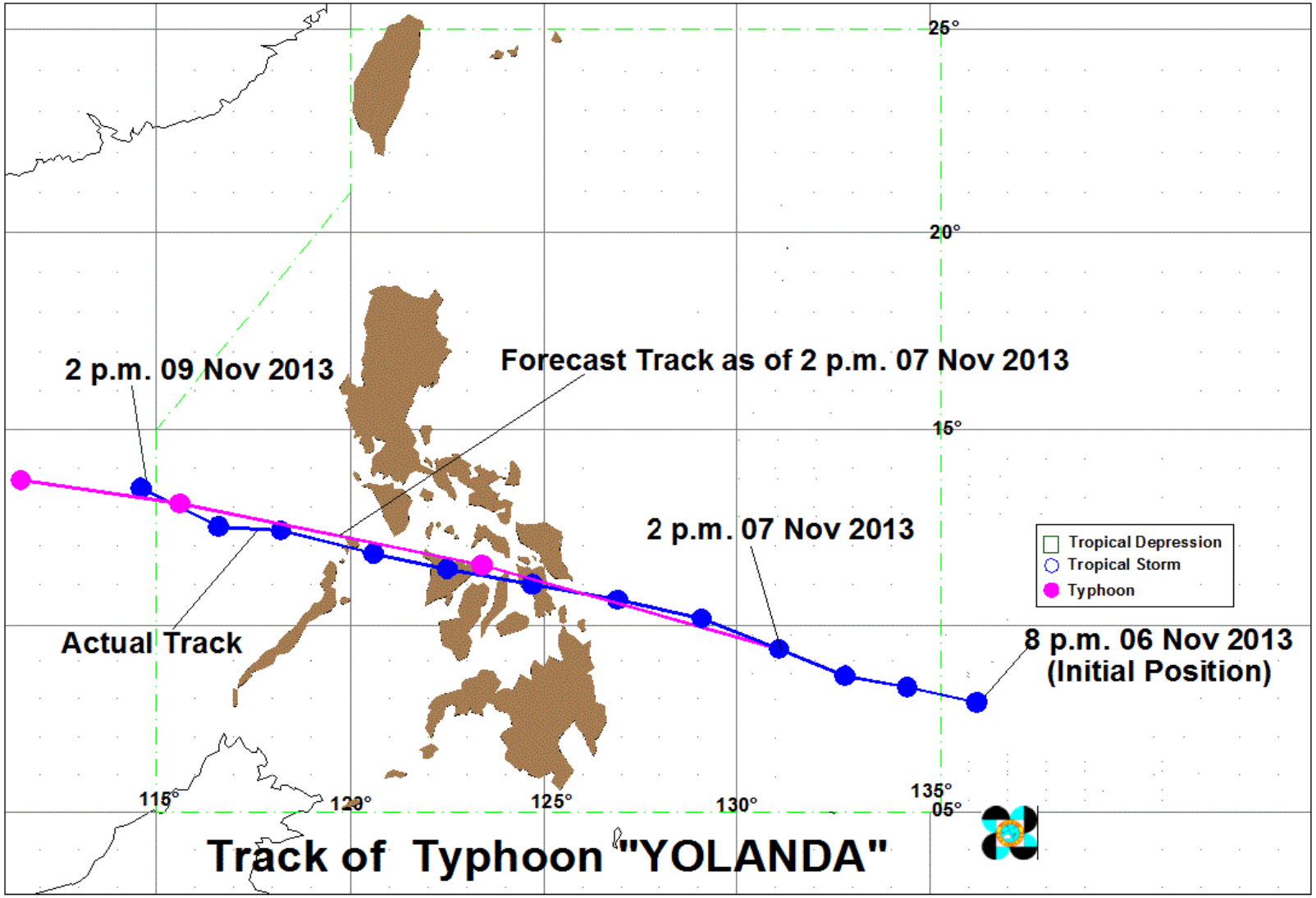



**Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA)**

# MTSAT ANIMATION NOVEMBER 8-9, 2013



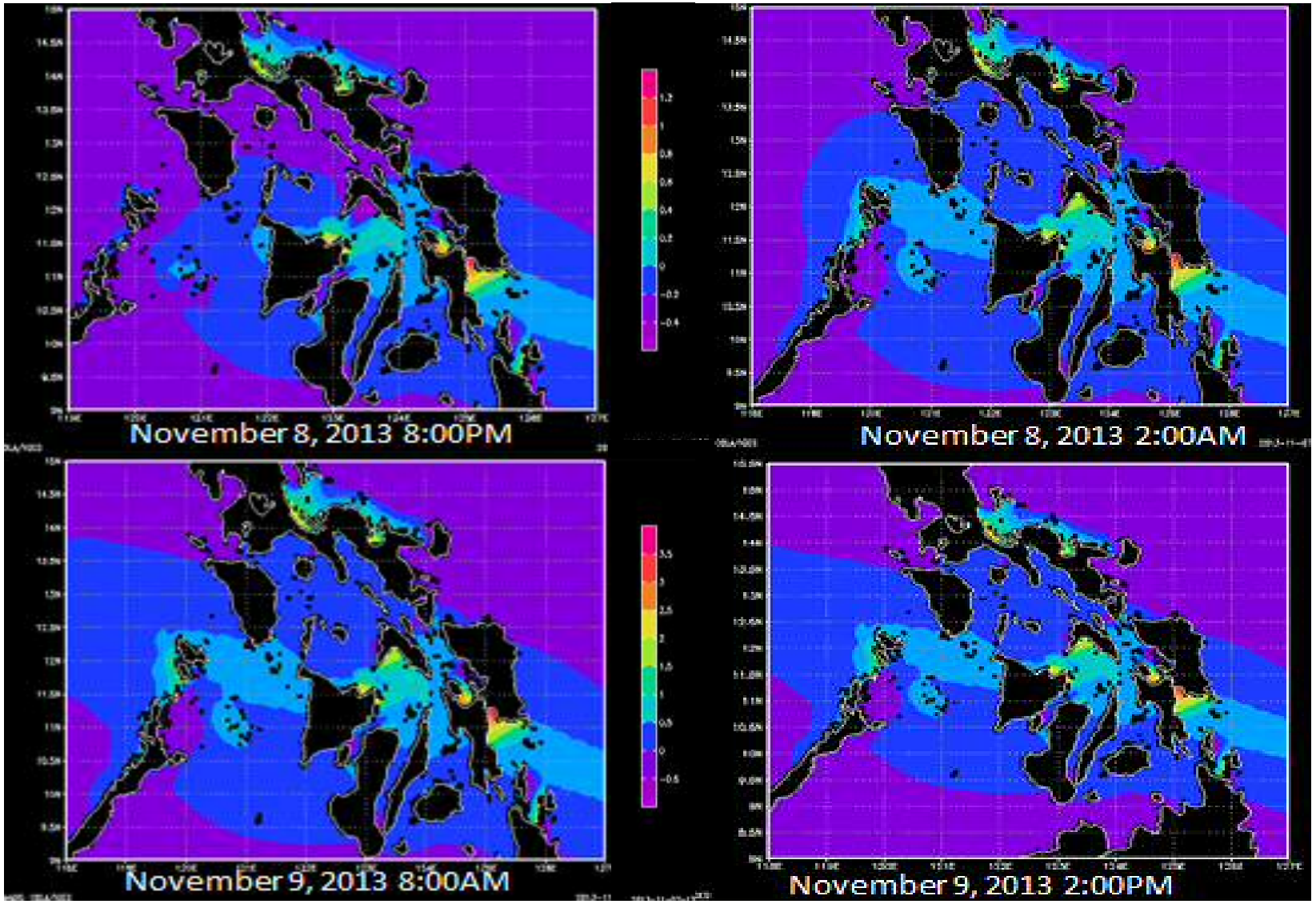
# Forecast Track vs. Actual Track



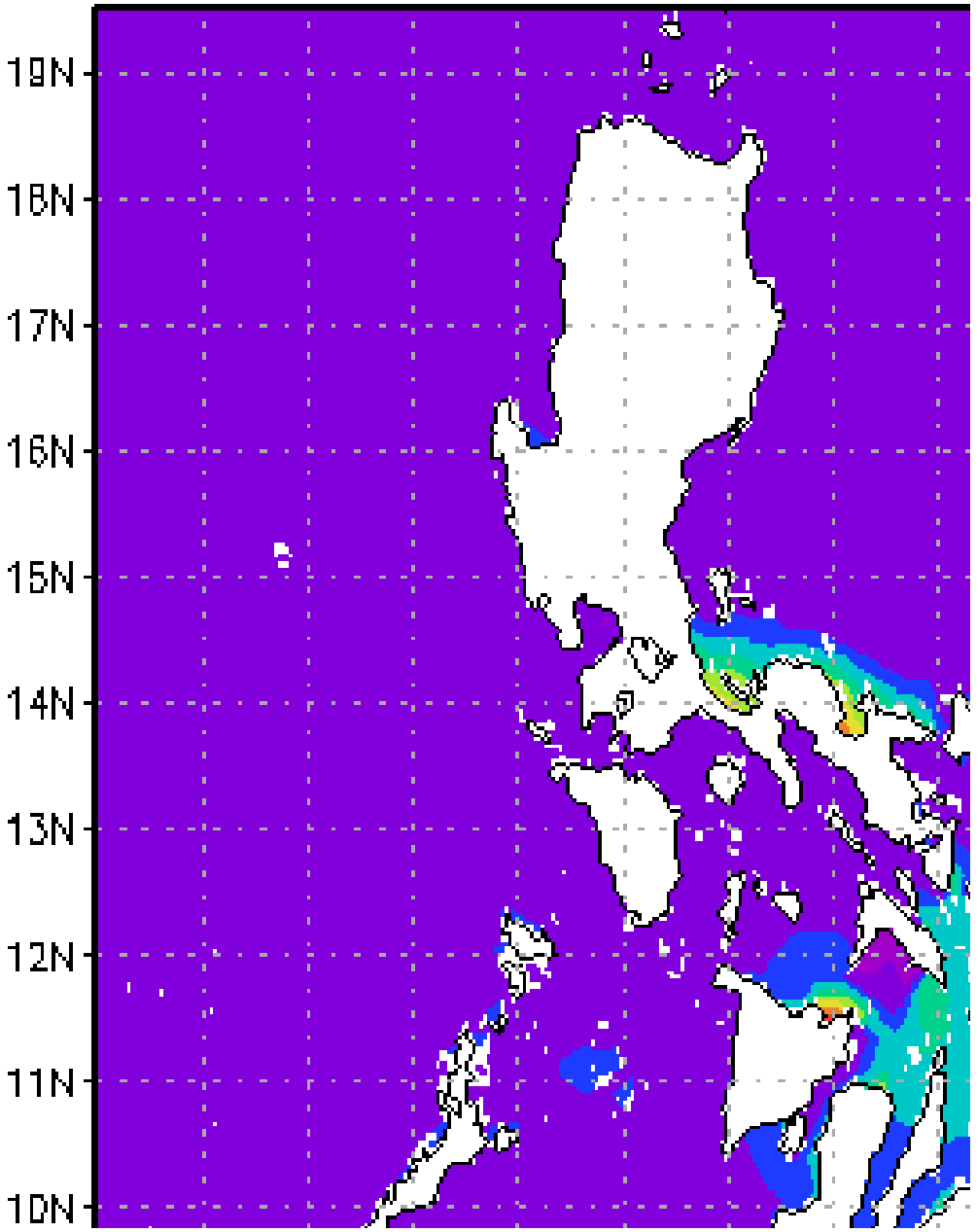

Actual track

Forecast track

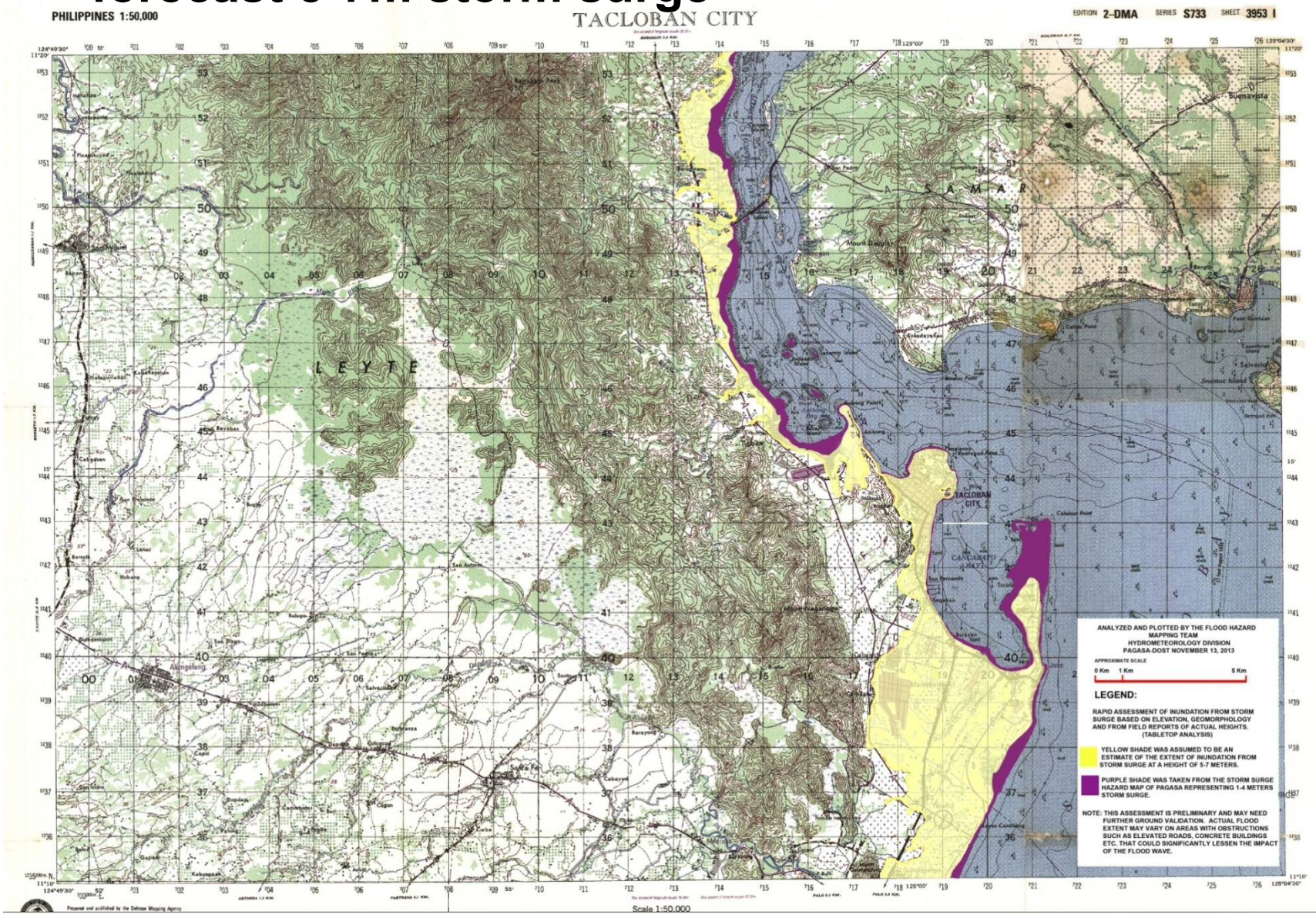
# Forecast Storm Surge, Initial run time: 8:00AM, 07 Nov 2013 (JMA model)



Highest Storm surge output by the JMA model



# Estimated extent of inundation resulting from the forecast 5-7m storm surge

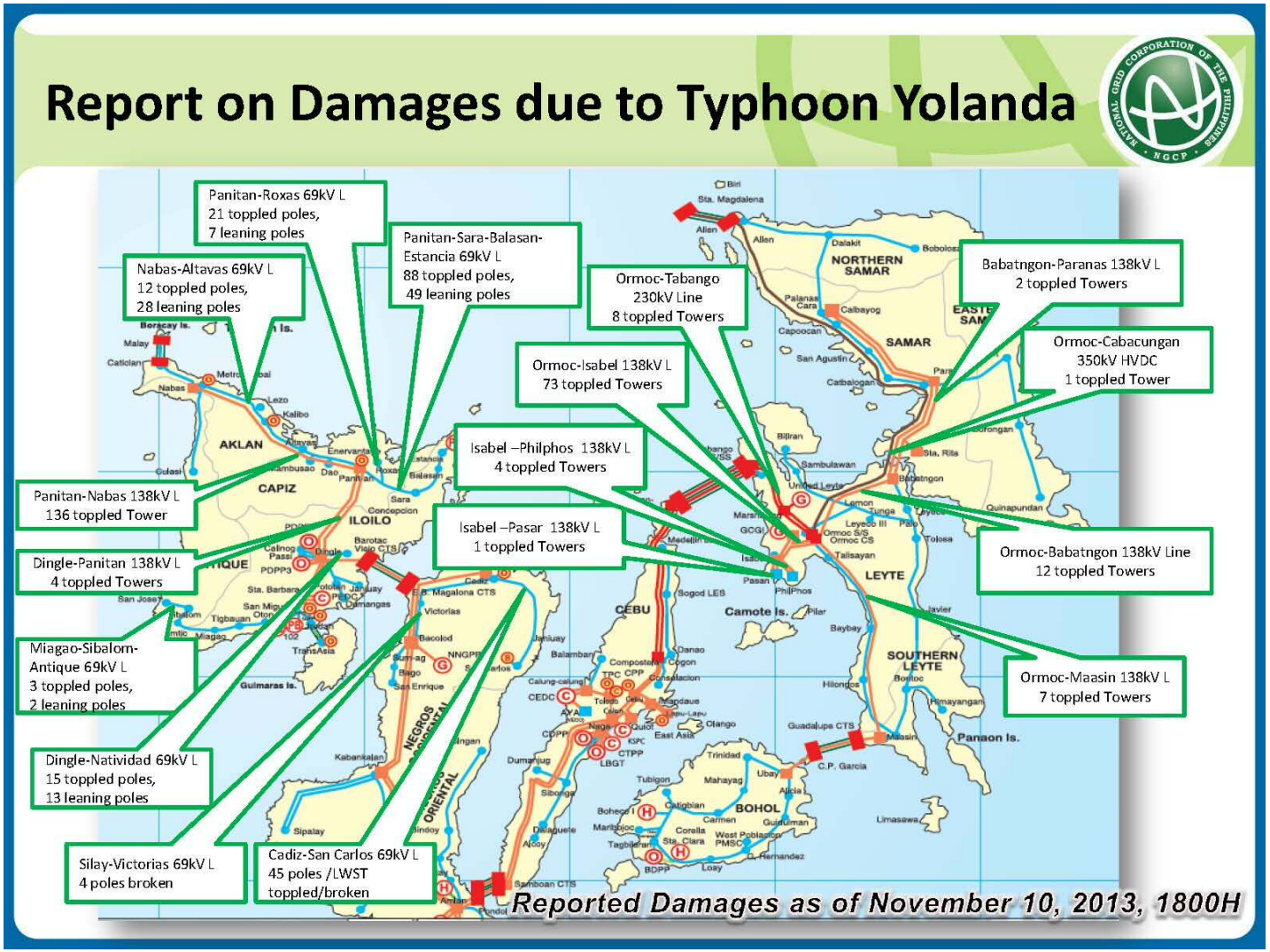


IMPACTS

# Tacloban City




# **Impacts:** Toppled towers of National Grid Corporation of the PH




**Toppled:**

- 200 transmission towers
- 2000 poles

**Estimated cost of damage:**

- PhP5 billion (USD119 M)

Source: NGCP

# Impacts: Damaged PAGASA Doppler radar in Guiuan, Eastern Samar

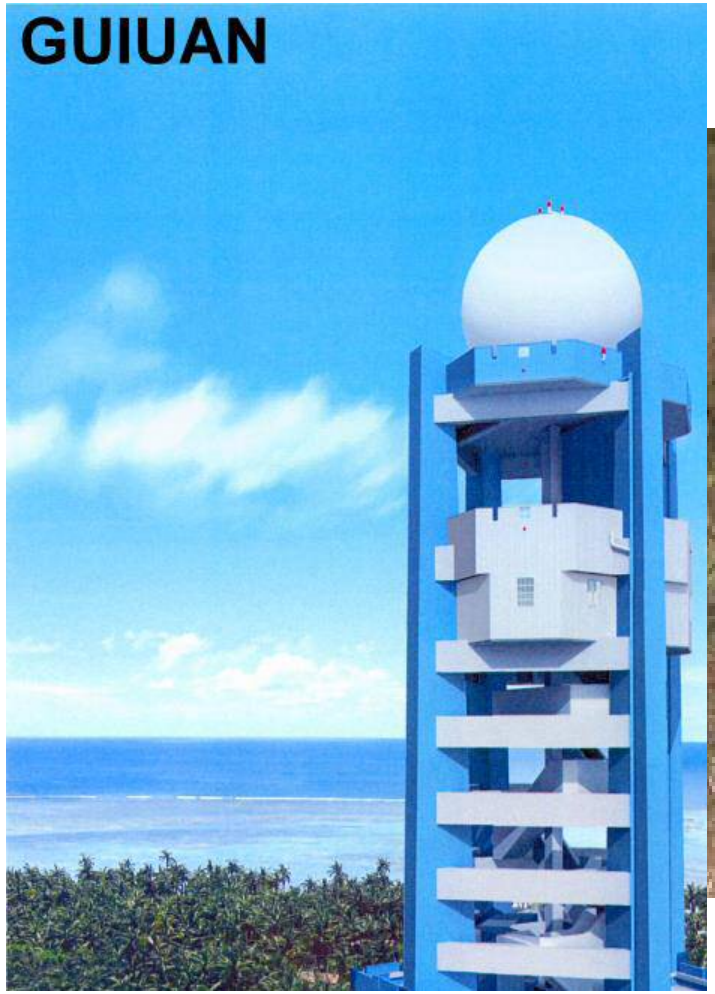



photo - credit: AFP Central Command from their Facebook page: https://www.facebook.com/media/set/?set=a.356701284467306.1073741835.323973651073403&type=1

# **Impacts:** Damaged PAGASA synoptic stations (source: PAGASA Storm Chasers)

location of the container van which was carried away by the storm surge

PAGASA Tacloban synoptic station

PAGASA Guiuan synoptic & radar station

# Impacts of TY "Haiyan" (Yolanda)

## Affected Population

| Families | Person | Baranggays | Municipalities | Provinces |
|---|---|---|---|---|
| 2,317,553 | 10,884,242 | 11,984 | 574 | 44 Provinces |

## Casualties

| Dead | Injured | Missing |
|---|---|---|
| 5,560 identified | 26,136 | 1,757 |

## Damage (PhP)

| TOTAL |
|---|
| P30,600,369,130.21 ($ 700M) |

***Source**: NDRRMC,*
*as of 6 Am, 25 November 2013*
*SitRep #40*

# Summary of Damaged PAGASA (synoptic & agromet) stations

| Station | Damage |
|---|---|
| 1. Tacloban Synoptic | Building and Equipment totally damaged – operation suspended |
| 2. Coron Synoptic | Building and Equipment totally damaged – operation suspended |
| 3. Guiuan Radar and Synoptic | Radome and parabolic antennae blown by strong gusts of Typhoon Yolanda; old building and equipment damaged |
| 4. Catbalogan Synoptic | Building partially damaged |
| 5. Borongan synoptic | no communication |
| 6. Maasin synoptic | communication shutdown during passage of Typhoon Yolanda |
| 7. Roxas synoptic | Observer quarter and station unroofed; power line and PLDT (telephone) connection cut down; thermometer shelter unroofed, antennae connection and wirings were lost. |
| 8. Cuyo synoptic | radio antennae bent down |
| 9. San Jose (Occidental Mindoro) synoptic | thermometer shelter unroofed |
| 10. Mambusao Agromet | Perimeter shelter of station and thermometer shelter damaged, outside gutter pulled down |
| 11. Visca Agromet | Thermometer shelter flat down, rain gauge damaged; sunshine instrument realigned. |

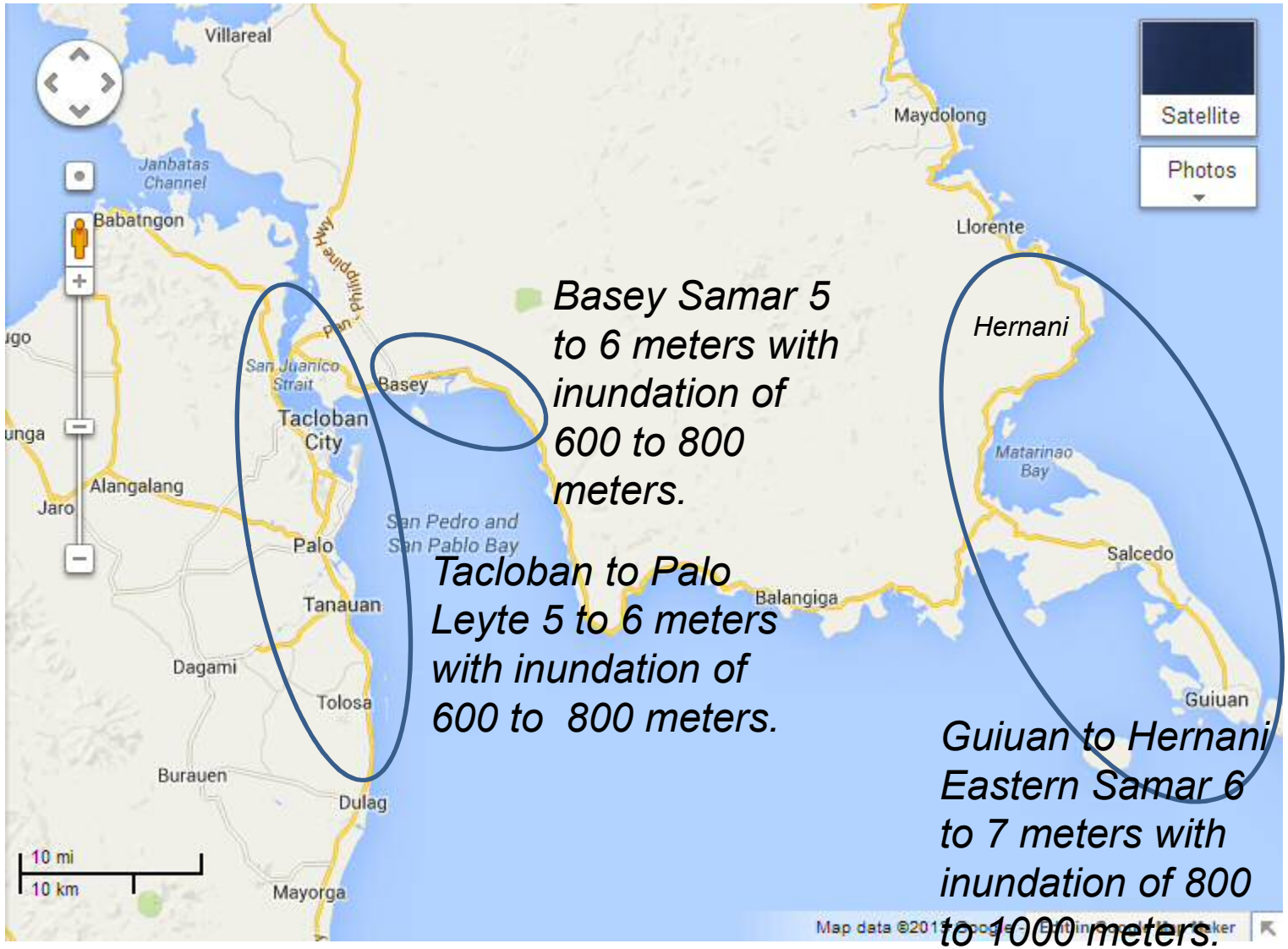
# Preliminary Assessment Report

**(STORM CHASER Team)**

1. Typhoon Haiyan made landfall in Guiuan Eastern Samar specifically over Homonhon & Suluan Islands. The last recorded pressure before landfall at Guiuan station was 910.0 hPa. At this pressure, the equivalent **maximum sustained wind is 240kph** near the center and **gustiness up to 280kph.**
2. Based on interviews and actual observations in the area, the eye of Typhoon Haiyan passed between municipalities of Dulag and Tolosa, Leyte between 6am to 7am of Nov 8, 2013.
3. Two (2) RADOME at Guiuan Station were blown into away by strong winds on Nov 8, 5am. The maximum observed wind coming from NE was 53 mps ( 195 kph).
    - ❖ Air-conditioning unit at the new radar, window panes and other electronic equipment were destroyed.
    - ❖ Power house was unroofed. Temporary shelter (tent) was set up.
4. Solar panels (3) for temporary lighting system and radio communication (SSB) at DOST R8 and Catbalogan and Guiuan stations; repaired water line at Guiuan station; repaired generator set of Tacloban station; repaired genset at Catbalogan and Catarman stations.

# Measured storm surge heights

## (STORM CHASER Team)



# Action Undertaken during the approach and passage of Typhoon "Haiyan"

- Nov. 5(11am) and 6(11am): Issued Weather Advisory regarding the approaching Typhoon Haiyan.

- Nov. 6 (11pm): Issued Regular Severe Weather Bulletin even though it was still outside the Philippine Area of Responsibility (PAR).

- Nov. 6: The Department of Science and Technology (DOST) as Vice-Chair of the National Disaster Risk Reduction and Management Council (NDRRMC), initiated NDRRMC members to convene and conducted press conference after the meeting for the preparations and early evacuation in areas to be affected by TYP Haiyan.

- PAGASA highlighted that this is a strong typhoon wherein Public Storm Warning Signal No. 4 (highest warning signal) will be issued.

- Nov. 6 - 9: PAGASA Conducted Press Conferences and Briefings every 6 hours starting 5:00PM, Nov. 6.

- Frequent briefing at Malacanang.

- The President broadcasted in tri-media about the strong typhoon Yolanda (Haiyan) 12 hours before landfall.

- Hourly updates on the location and intensity of the typhoon ( Ptv 4, posted in website, twitter, facebook and SMS)

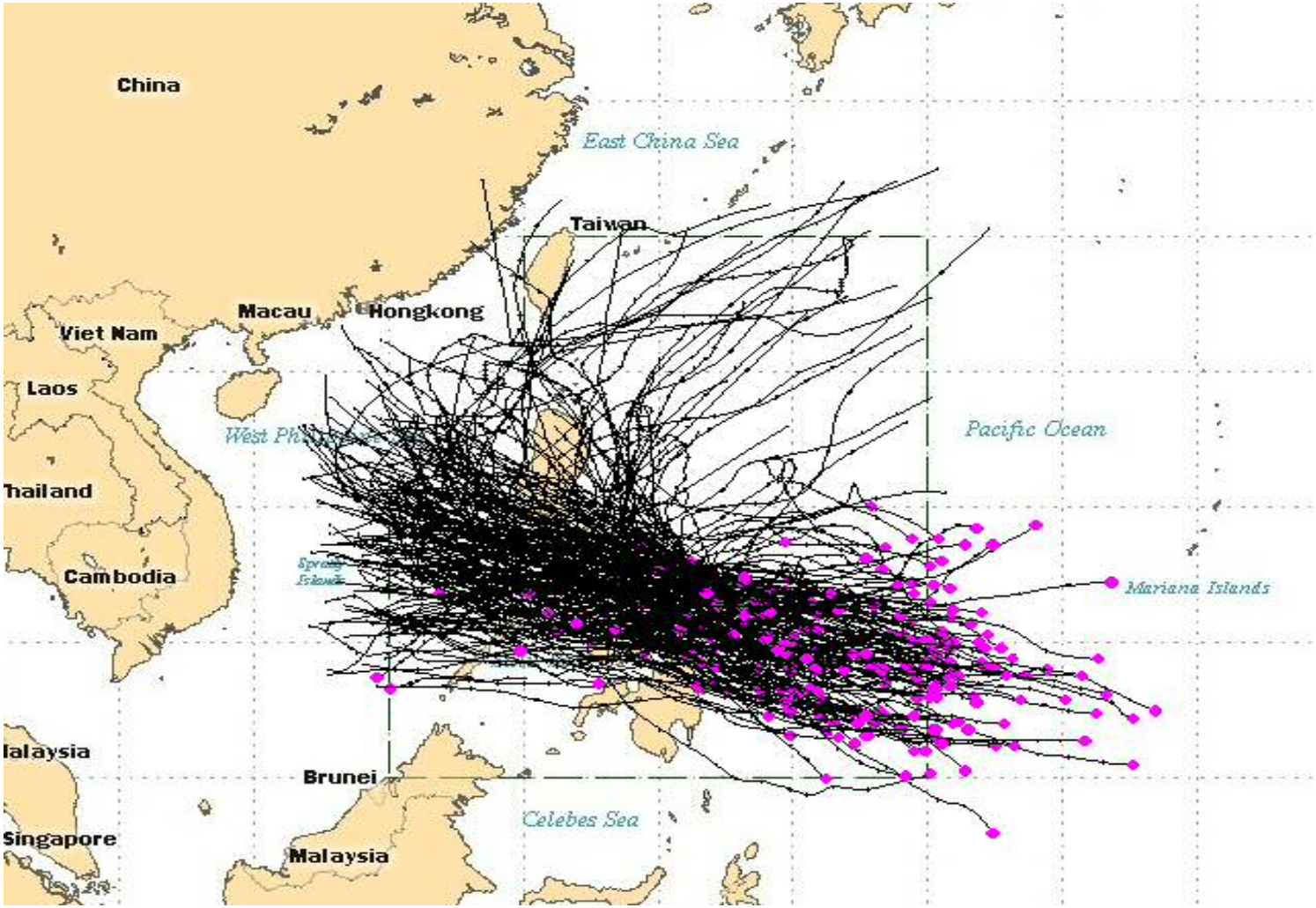
- Deployed a team of Storm Chasers to Sorsogon who proceeded to Guiuan after the typhoon passage.

- Sent two meteorologists from Central Office and Visayas PAGASA Regional Center (Nov. 6-11, 2013) to Iloilo to assist the station in the dissemination of warnings and conduct assessment after the typhoon passage.

- Nov. 12: A team of engineers and meteorologists was sent to Tacloban to assess the damages in the area and in the PAGASA stations. They also brought food and other emergency supplies for PAGASA personnel.

## Priority activities:

1. Immediate replacement of damaged monitoring instruments in the affected synoptic and agromet stations;
2. Enhancement of IECs with emphasis on the impacts of storm surges;
3. Formulation of an SOP for coastal hazards such as storm surge;
4. Conduct of a scientific assessment report on Ty Haiyan
5. Update of all hazard maps on floods, storm surge; Conduct risk mapping on storm surge prone areas;
6. Re-design construct/rehabilitate all damaged PAGASA stations
7. Establishment of all-weather, disaster-proof communication system
8. WMO-TC Mission in 13 to 17 Jan 2014




**TC TRACKS AT (08.0N-120.0E, 12.0N-127.0E) ALL MONTHS FR.1948-2012**
**A TOTAL OF 255 TROPICAL CYCLONES**

# Images of the Damage

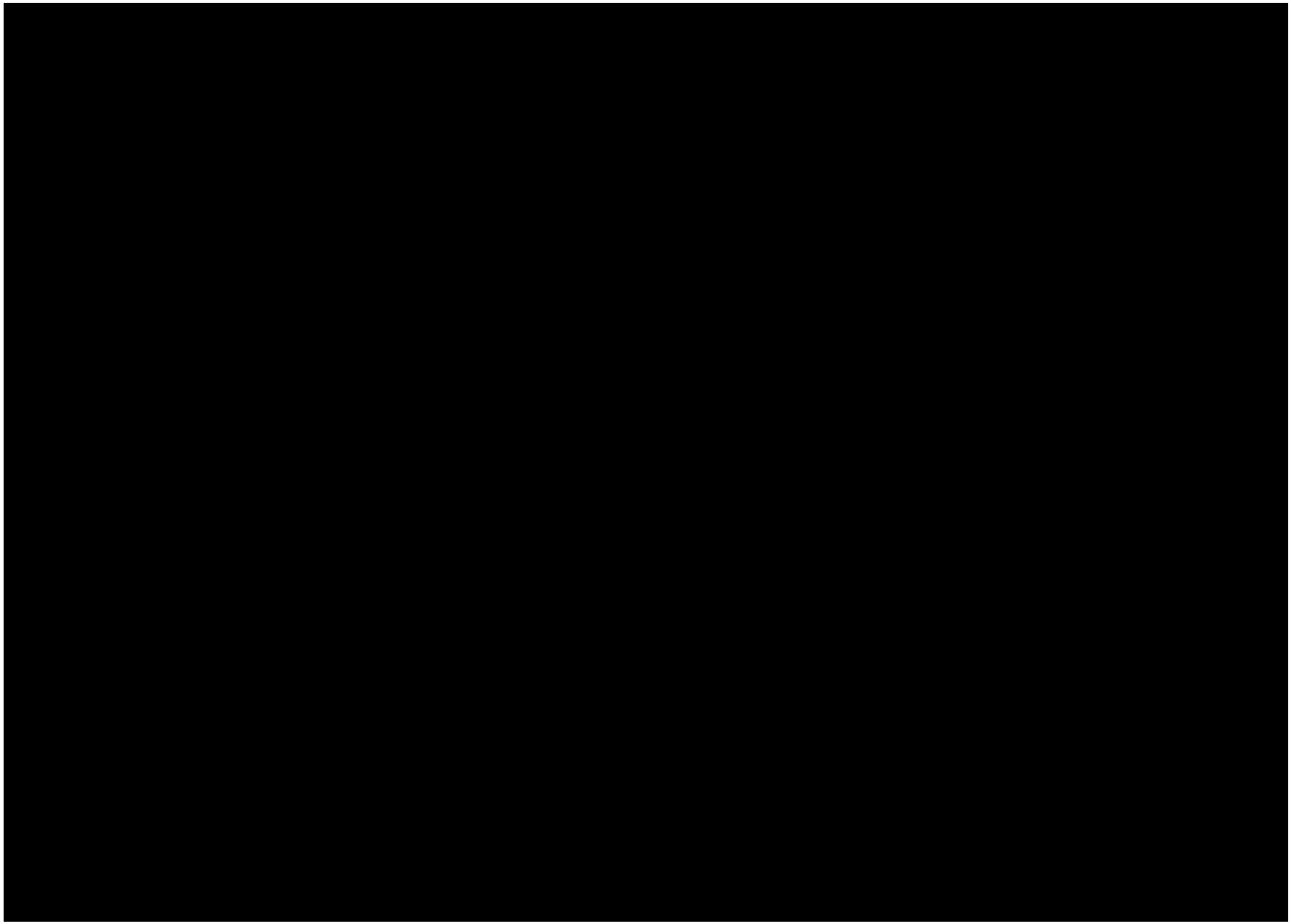
# Images of the Damage

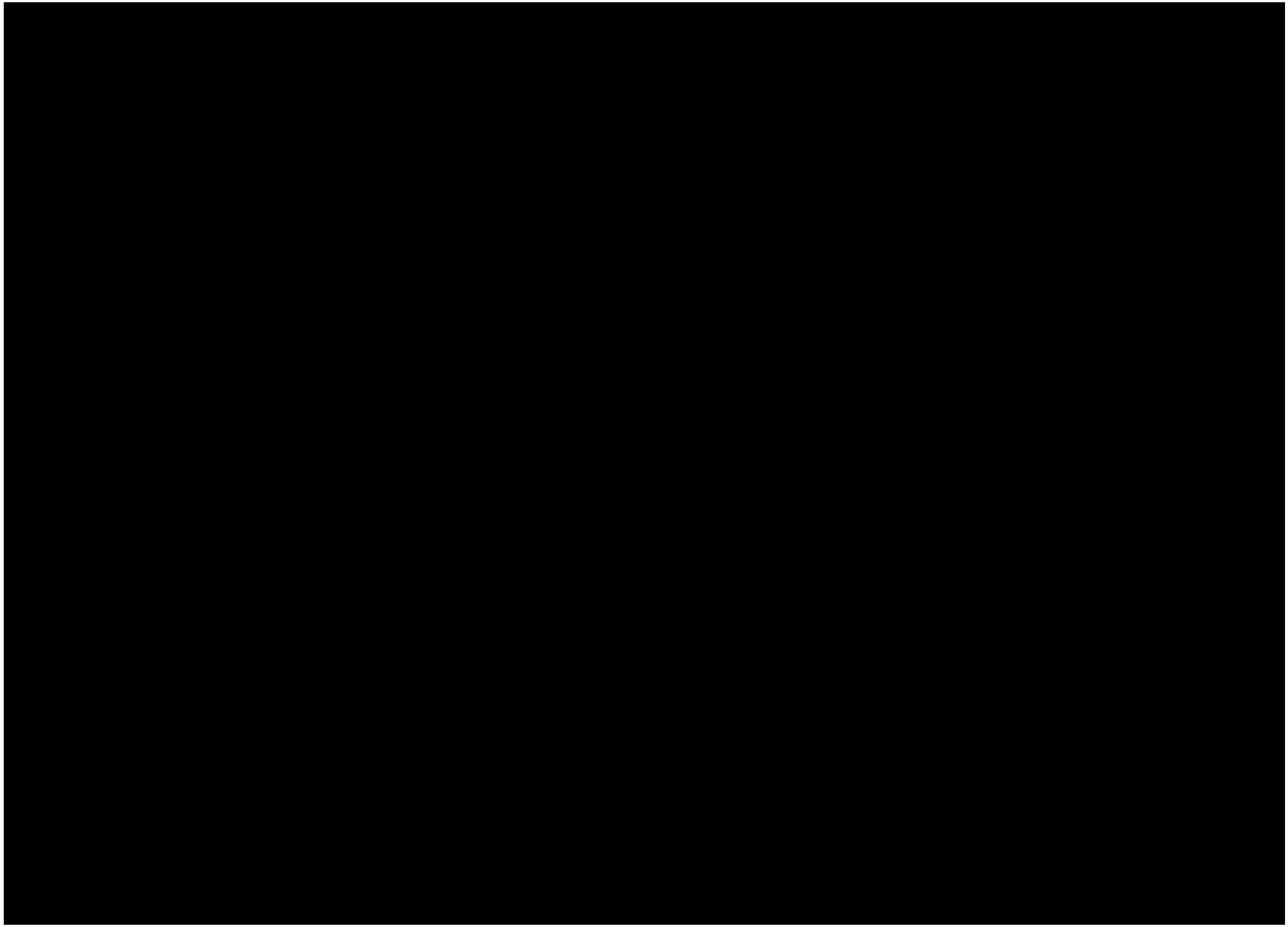
# Images of the Damage

# Images of the Damage

Parabolic antenna

# Images of the Damage





# Thank you.

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