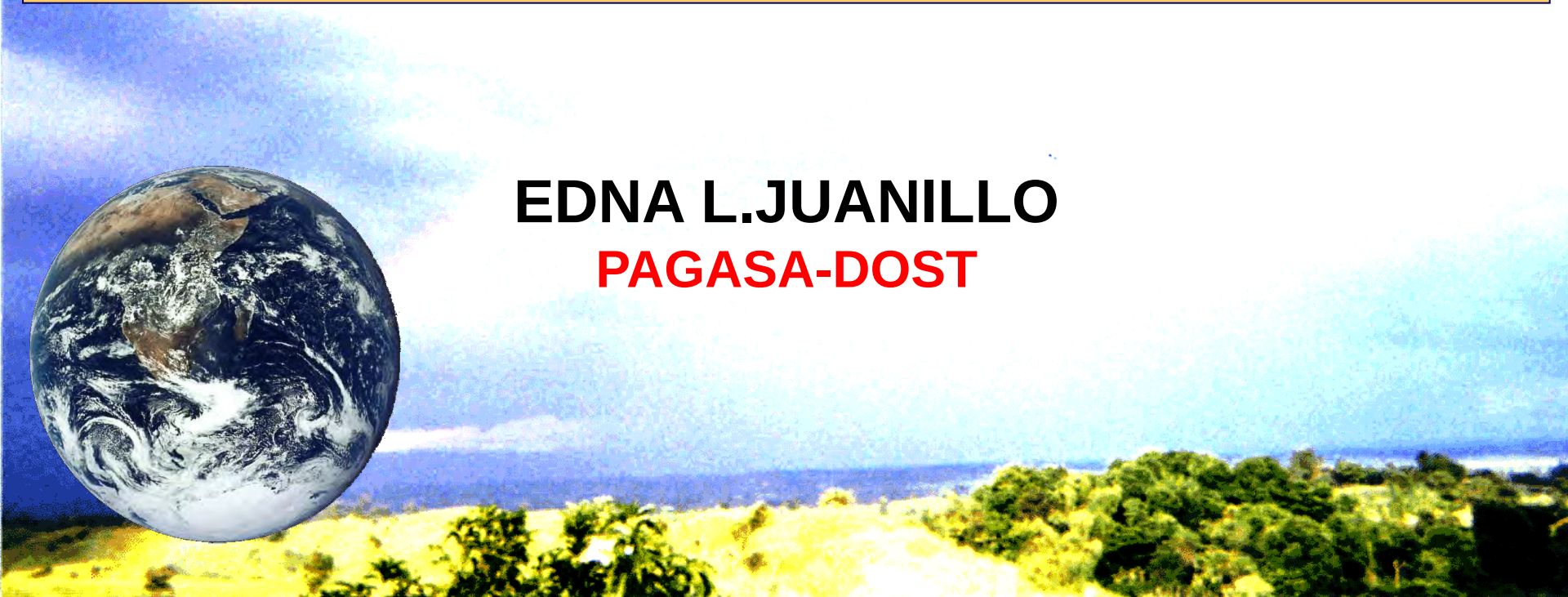
APPLICATIONS OF SPACE-BASED INFORMATION IN THE PHILIPPINES

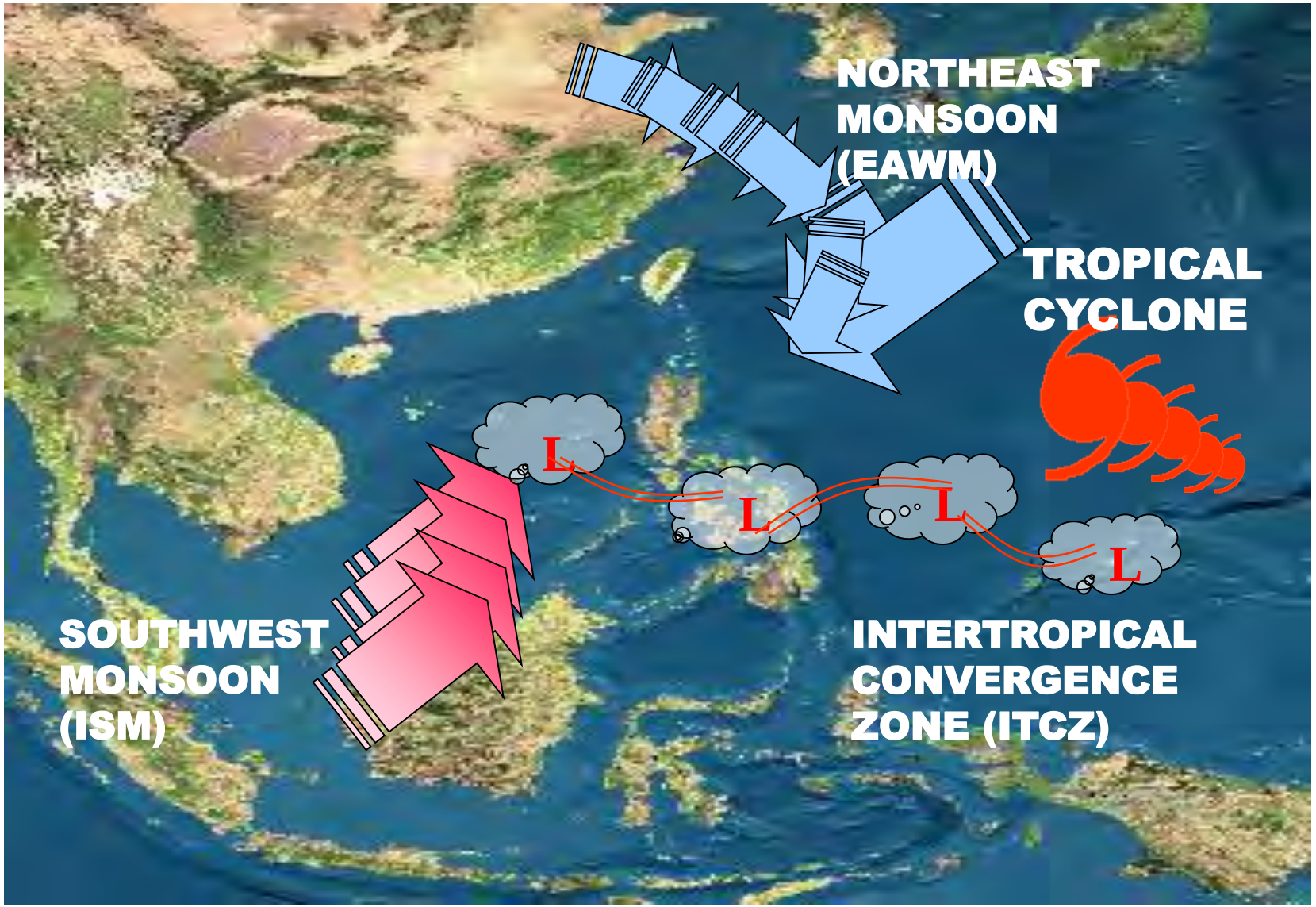


EDNA L.JUANILLO

PAGASA-DOST

- **Archipelago, composed of 7,100 islands with low lying areas**
- **Highly susceptible to sea level rise**
- **Among the longest coastlines in the world with 32,400 kms (susceptible to storm surges)**

Weather Causing Phenomena in the Philippines



What are the manifestations/signals of global warming in the Philippines?

- The annual average mean temperature has risen by about 0.62 C during the last 56 years..

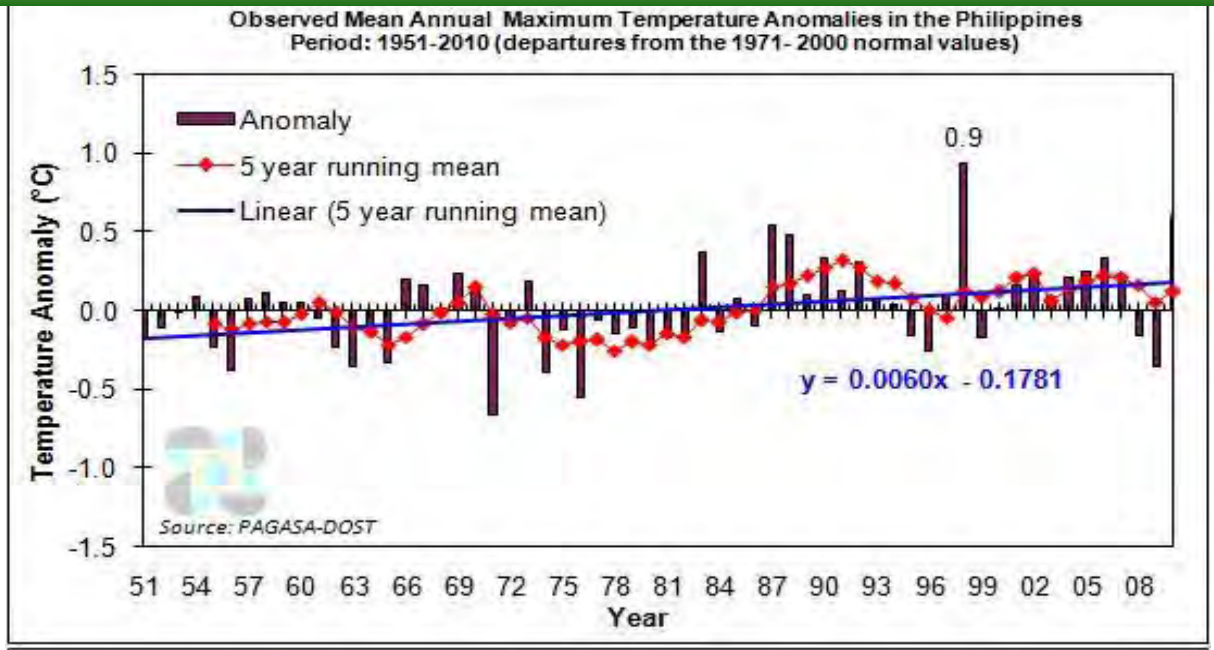
- In the Philippines, there are trends of increasing number of hot days and warm nights, but decreasing number of cold days and cool nights. Both maximum and minimum temperatures are generally getting warmer.

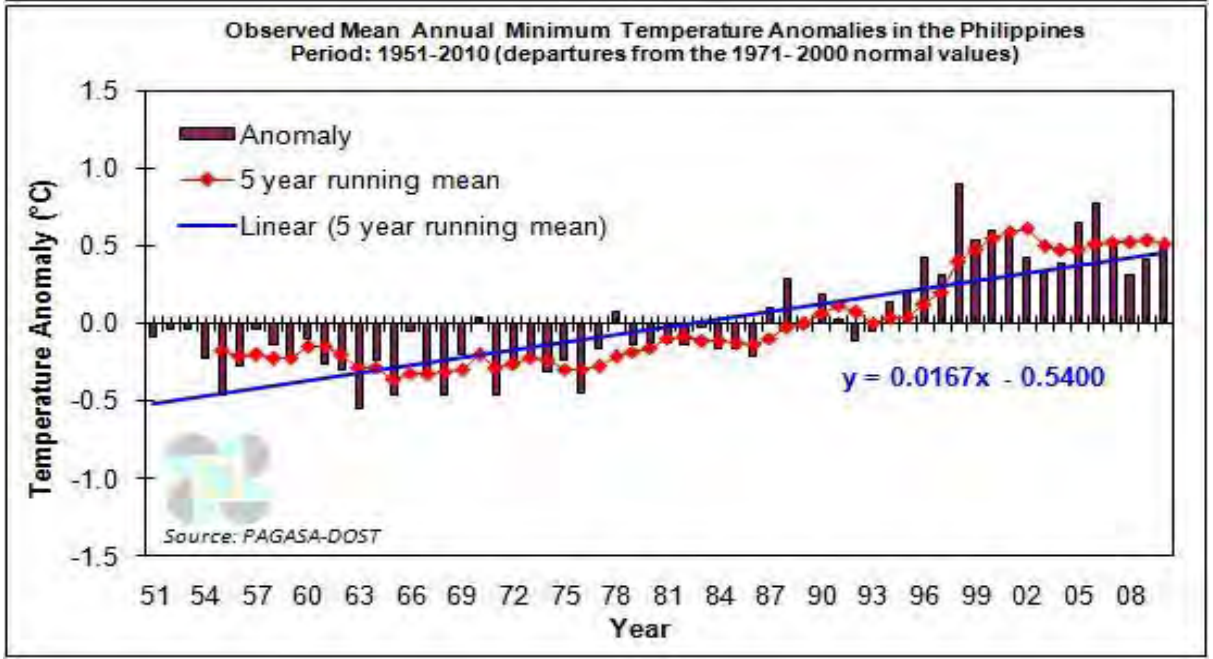
What are the manifestations/signals of global warming in the Philippines?

- Other extreme weather/climate events like intense rains have been seen to be more frequent in some parts of the country.

- ❑Tropical cyclones greater than 150 kph are seen to be more during El Nino

Maximum & Minimum Temperature



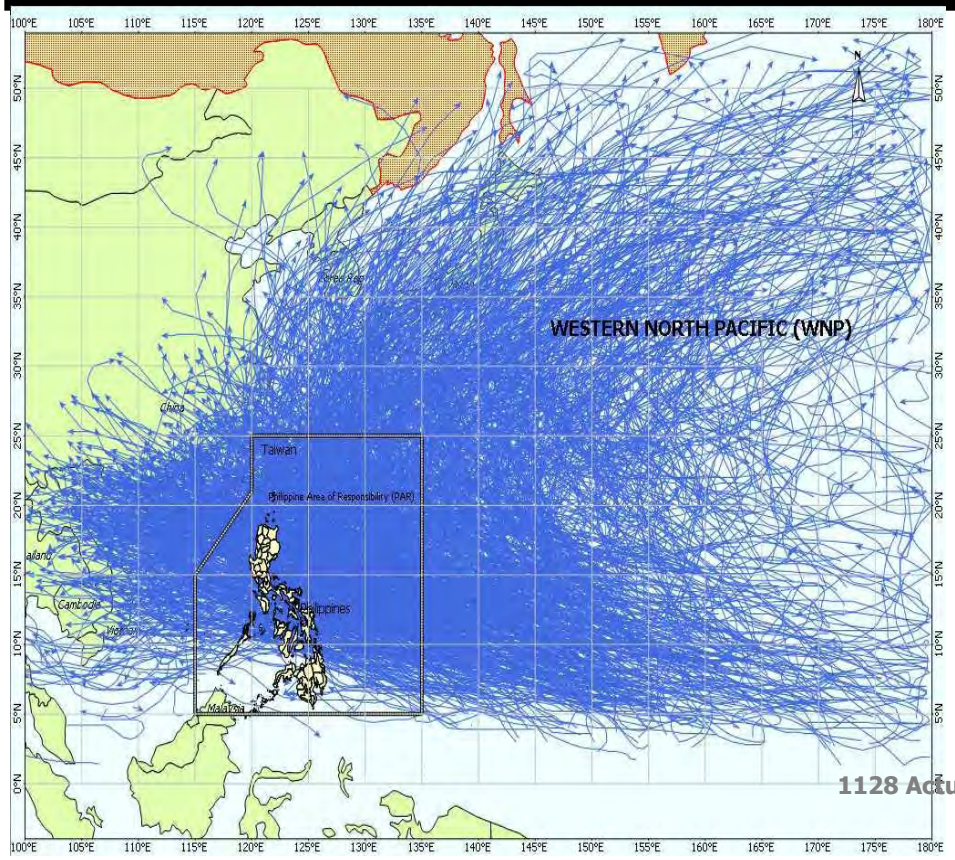


An increase of 0.36° C from 1951-2010 (60 years)

Rate of increase almost 3 times higher compared with the maximum temperature

An increase of 1.0° C from 1951-2010 (60 years)

PHILIPPINE VULNERABILITIES TO GLOBAL WARMING/ CLIMATE CHANGE



VISITED BY AN AVERAGE
20 Tropical Cyclones
EVERY YEAR

With the projected increase in temperature this could mean much stronger and more intense tropical cyclones.

HIGHLY SUSCEPTIBLE TO TYPHOONS –
LOCATED WITHIN PACIFIC TYPHOON BELT AREA

DOST-PAGASA METEOROLOGICAL SATELLITE FACILITY

- NOAA AVHRR RECEIVING SYSTEM
- MTSAT GROUND RECEIVING SYSTEM
- CMACast (fengyun) RECEIVING SYSTEM
- MODIS GROUND RECEIVING SYSTEM
- Suomi NPP Receiving System

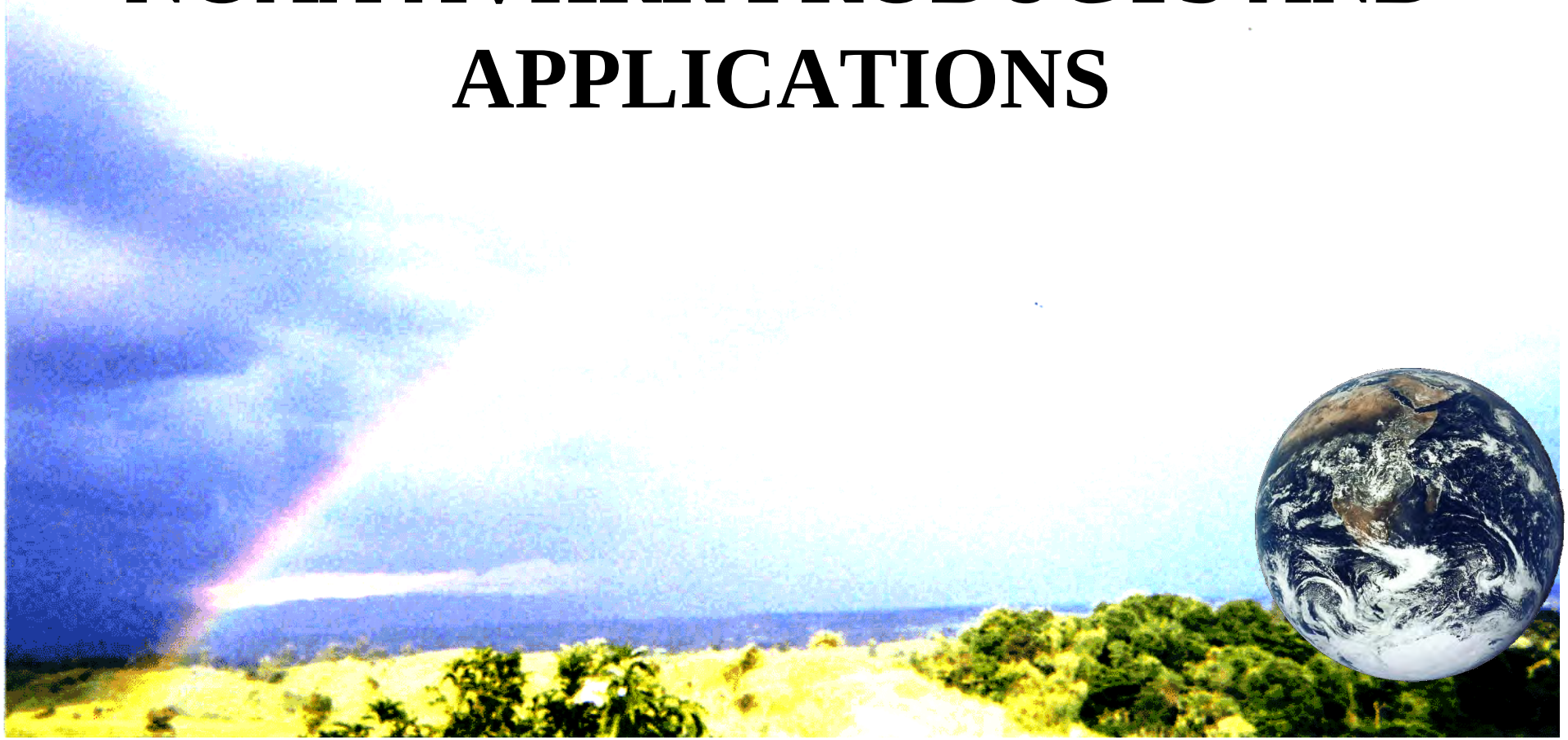
PAGASA Meteorological Satellite Facility

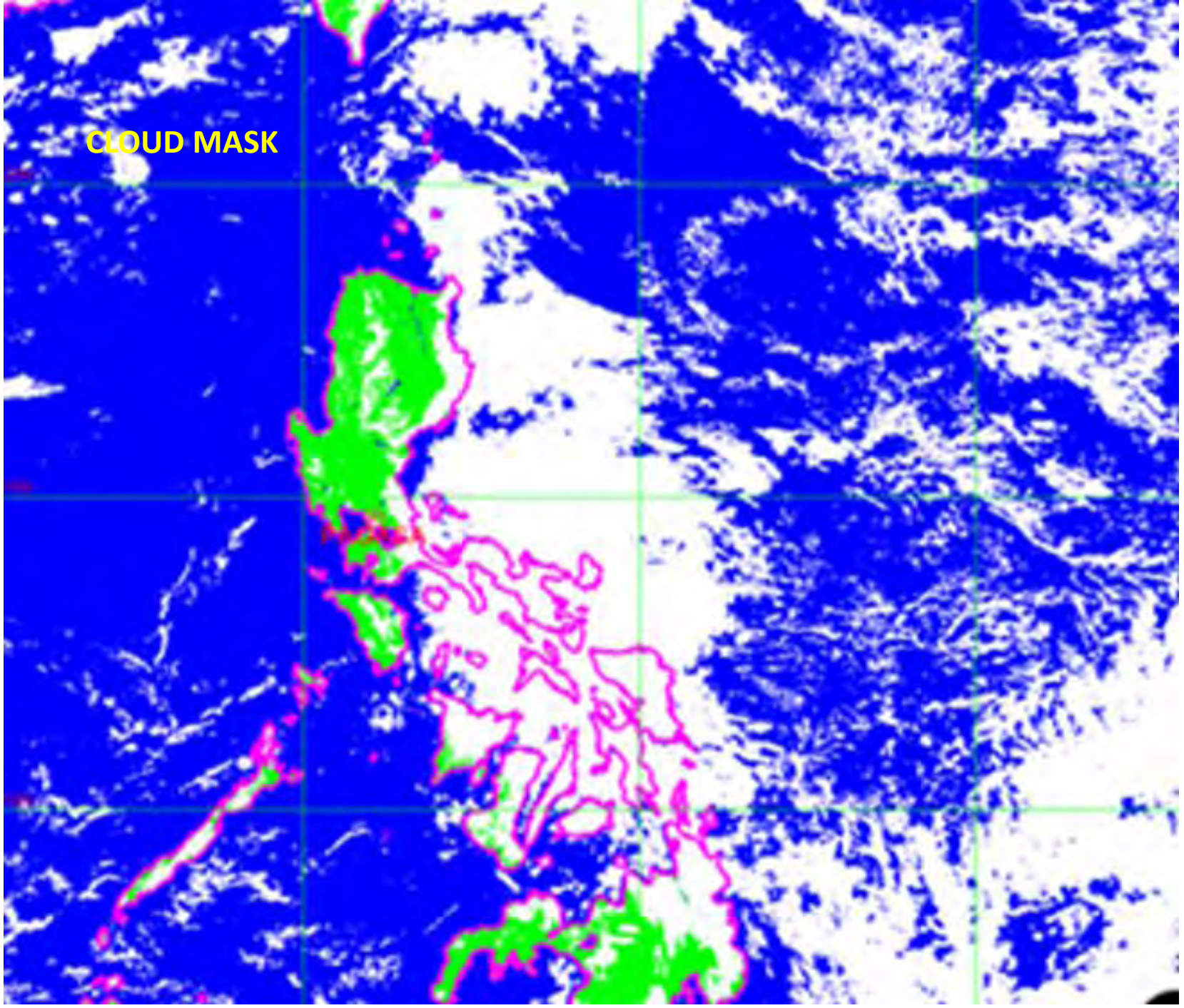

MTSAT Antenna

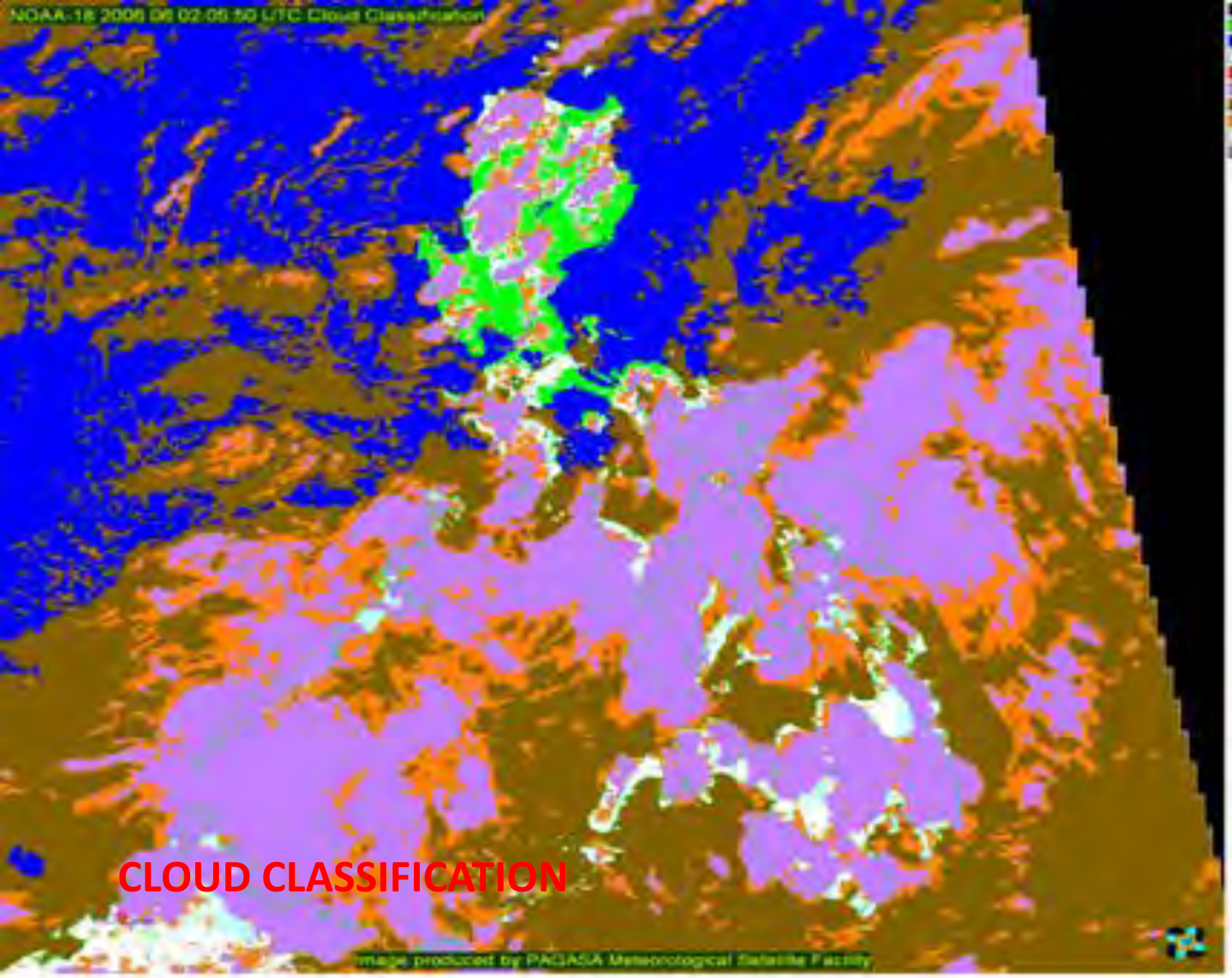
Installation of Antenna and Radome atop
the Weather and Flood Forecasting Center,
BIR Road, Diliman, Quezon City.

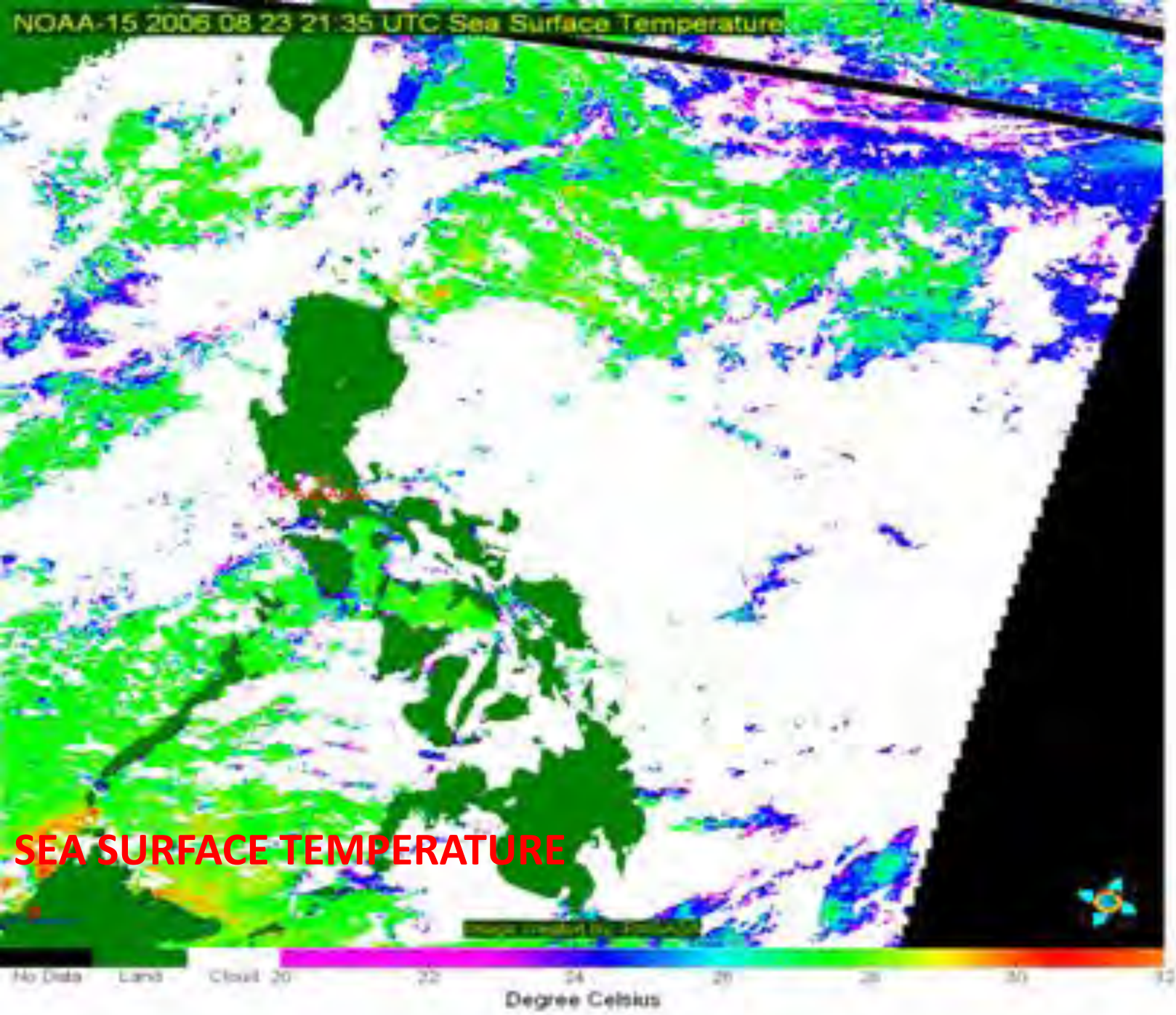

NOAA Antenna

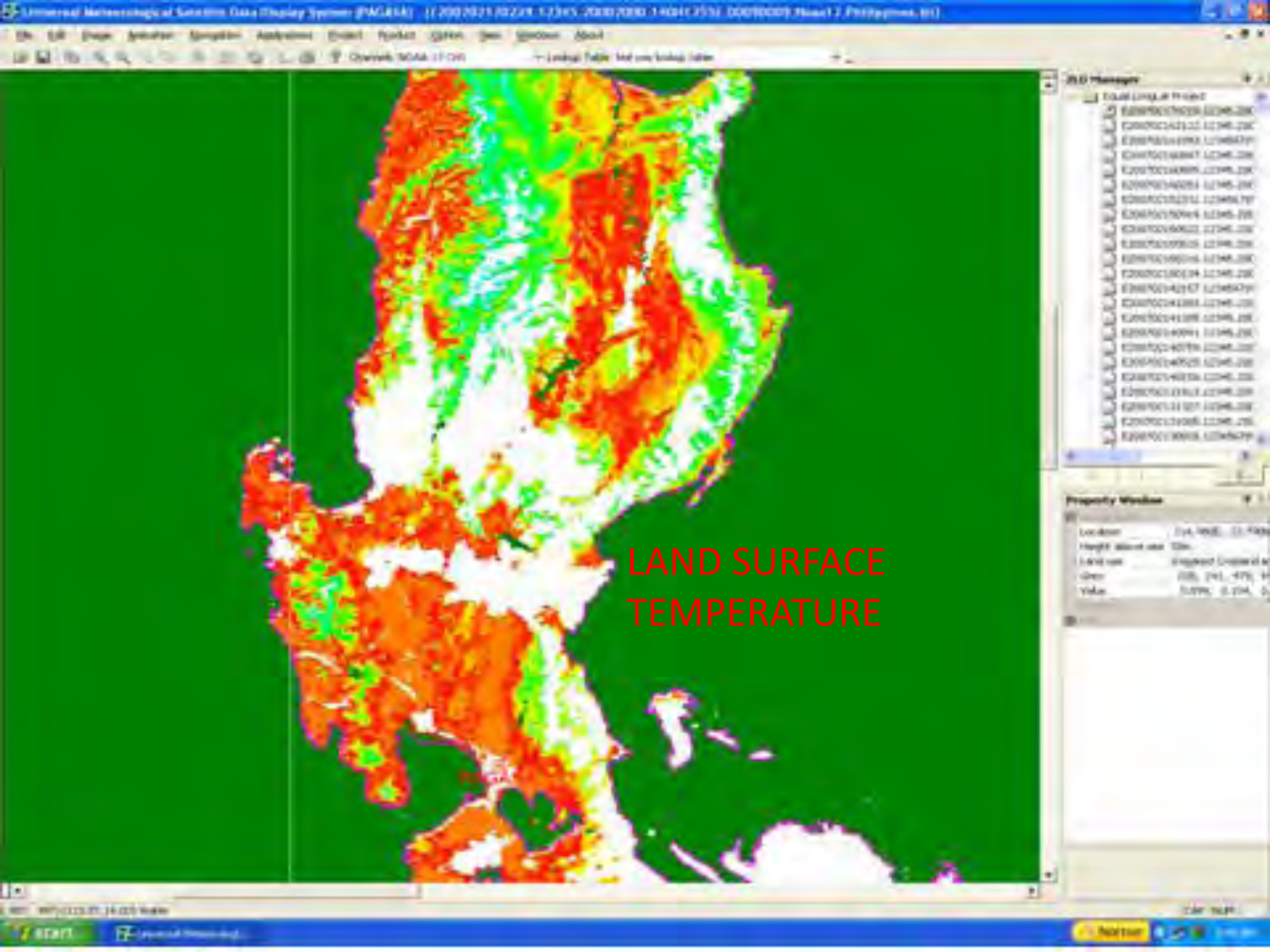
NOAA AVHRR PRODUCTS AND APPLICATIONS

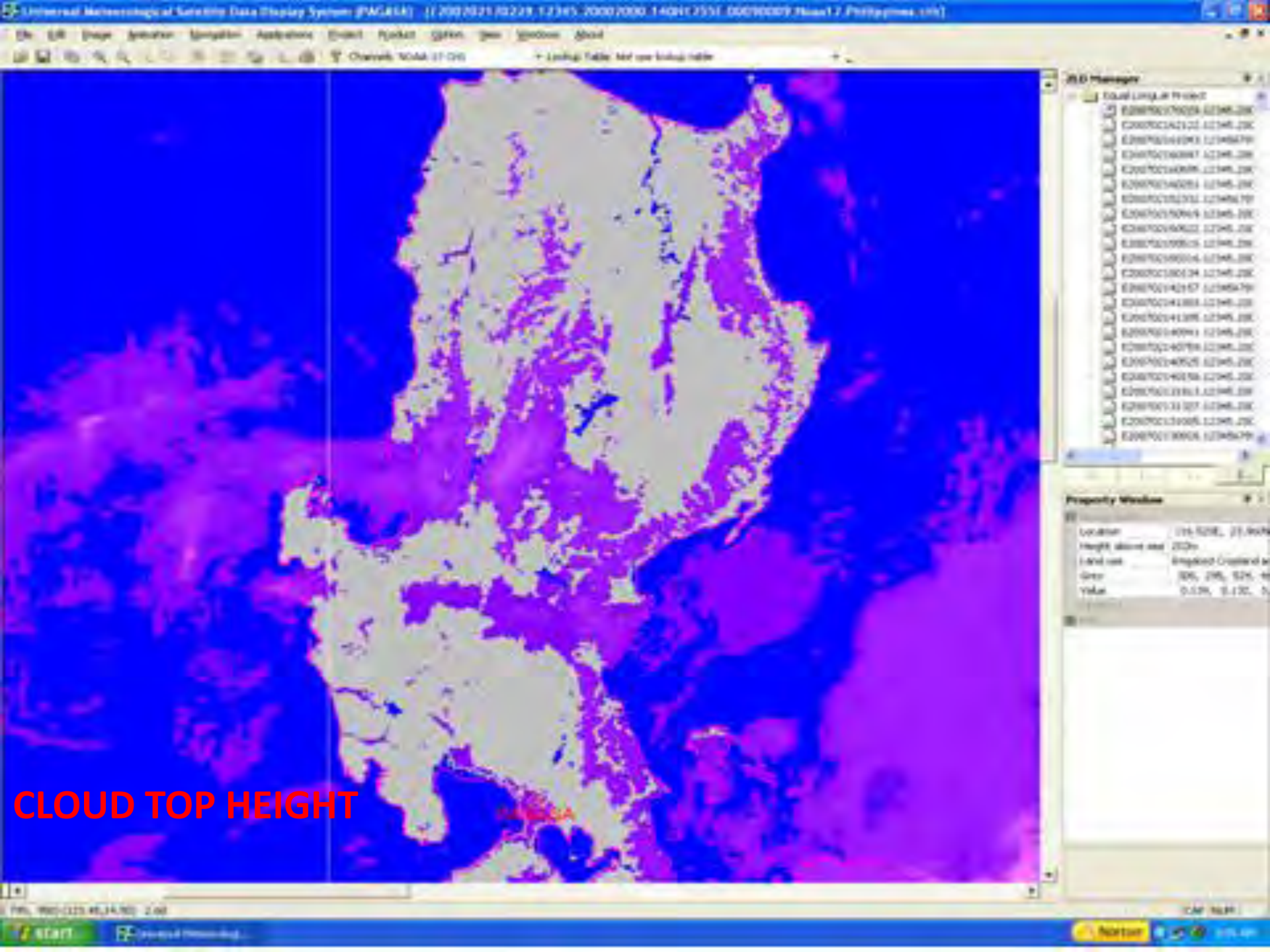


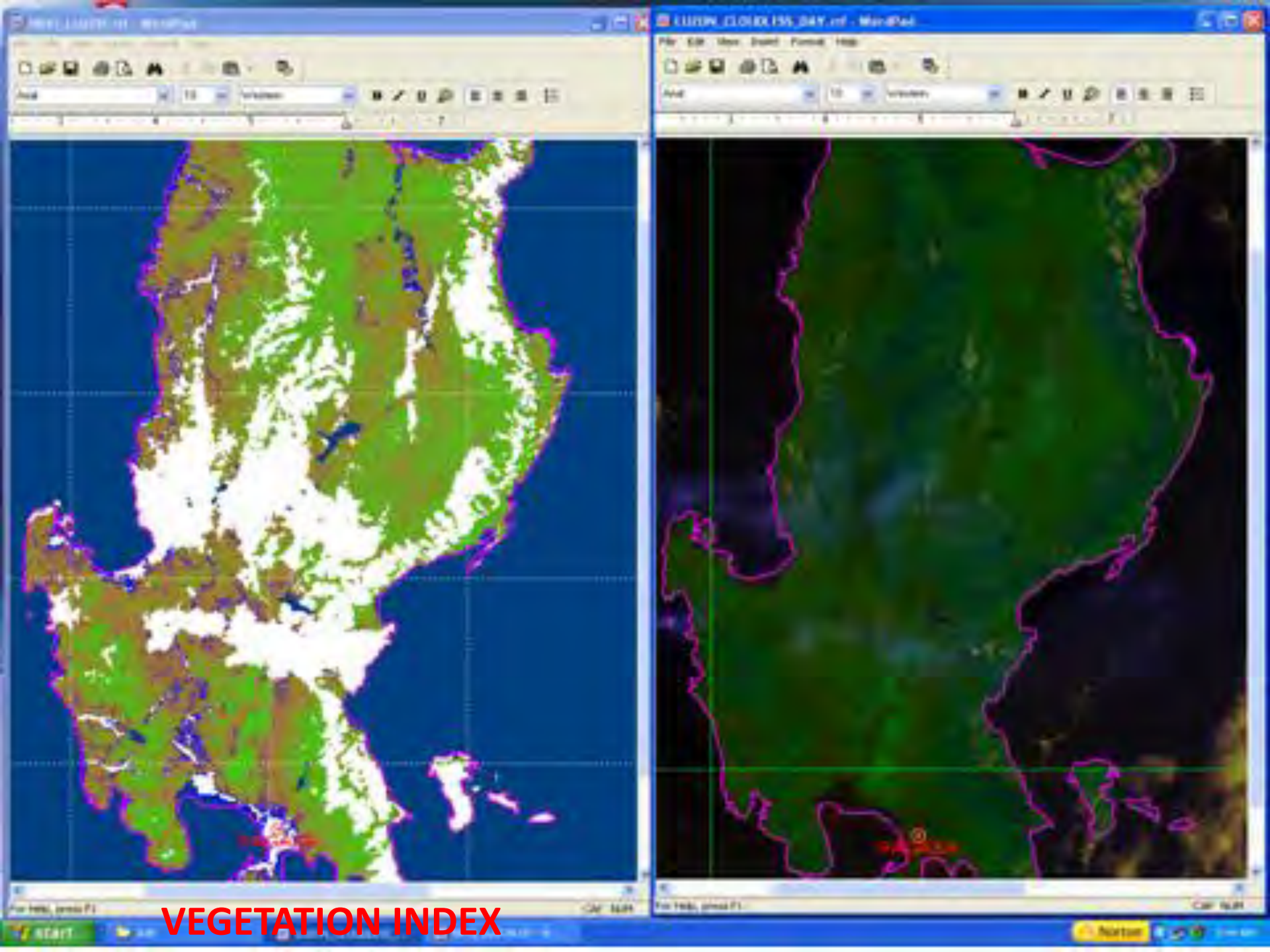

CLOUD MASK

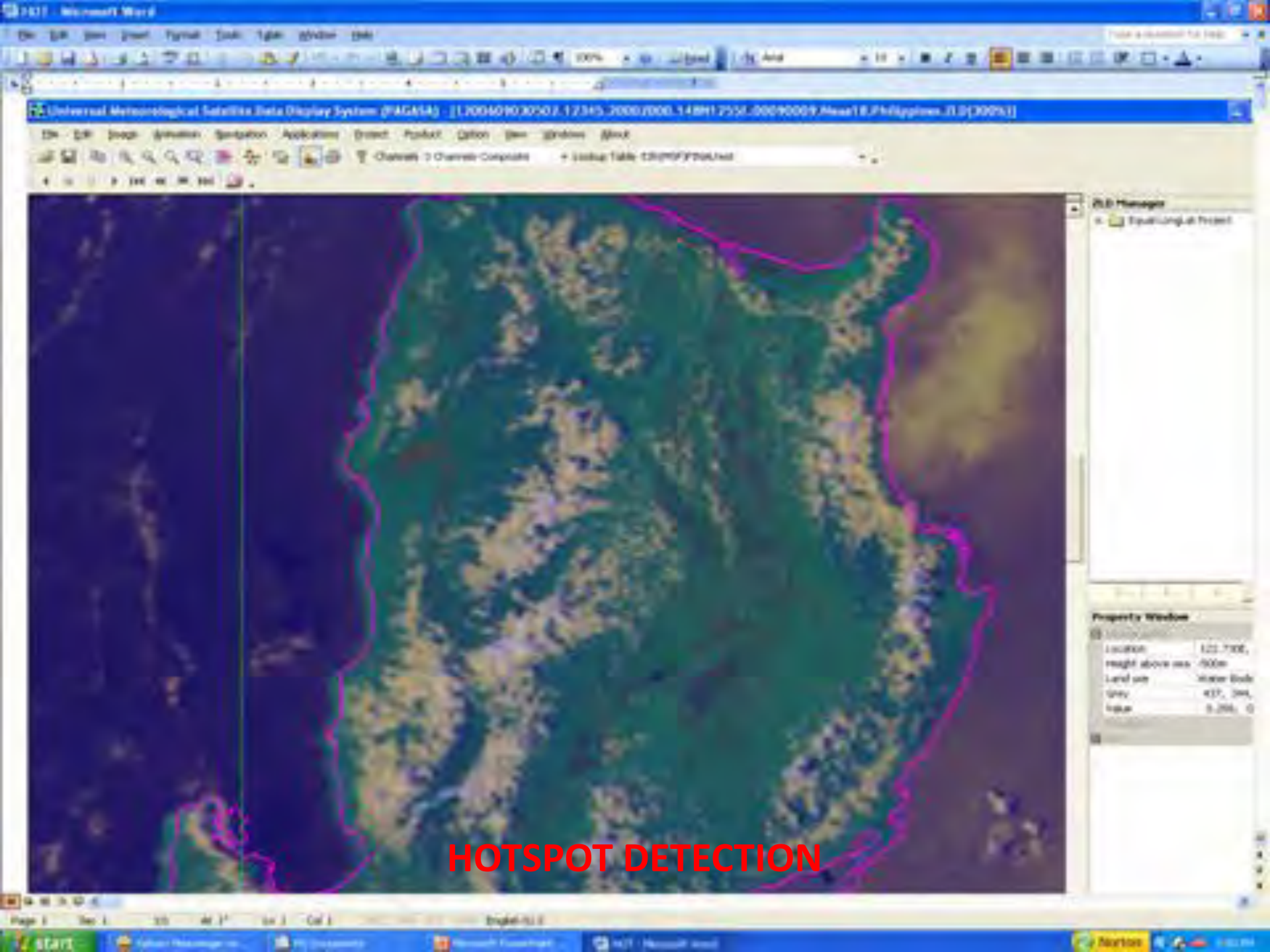

NOAA-18 2006 06 02 05 50 UTC Cloud Classification
CLOUD CLASSIFICATION
Image produced by PAGASA Meteorological Satellite Facility

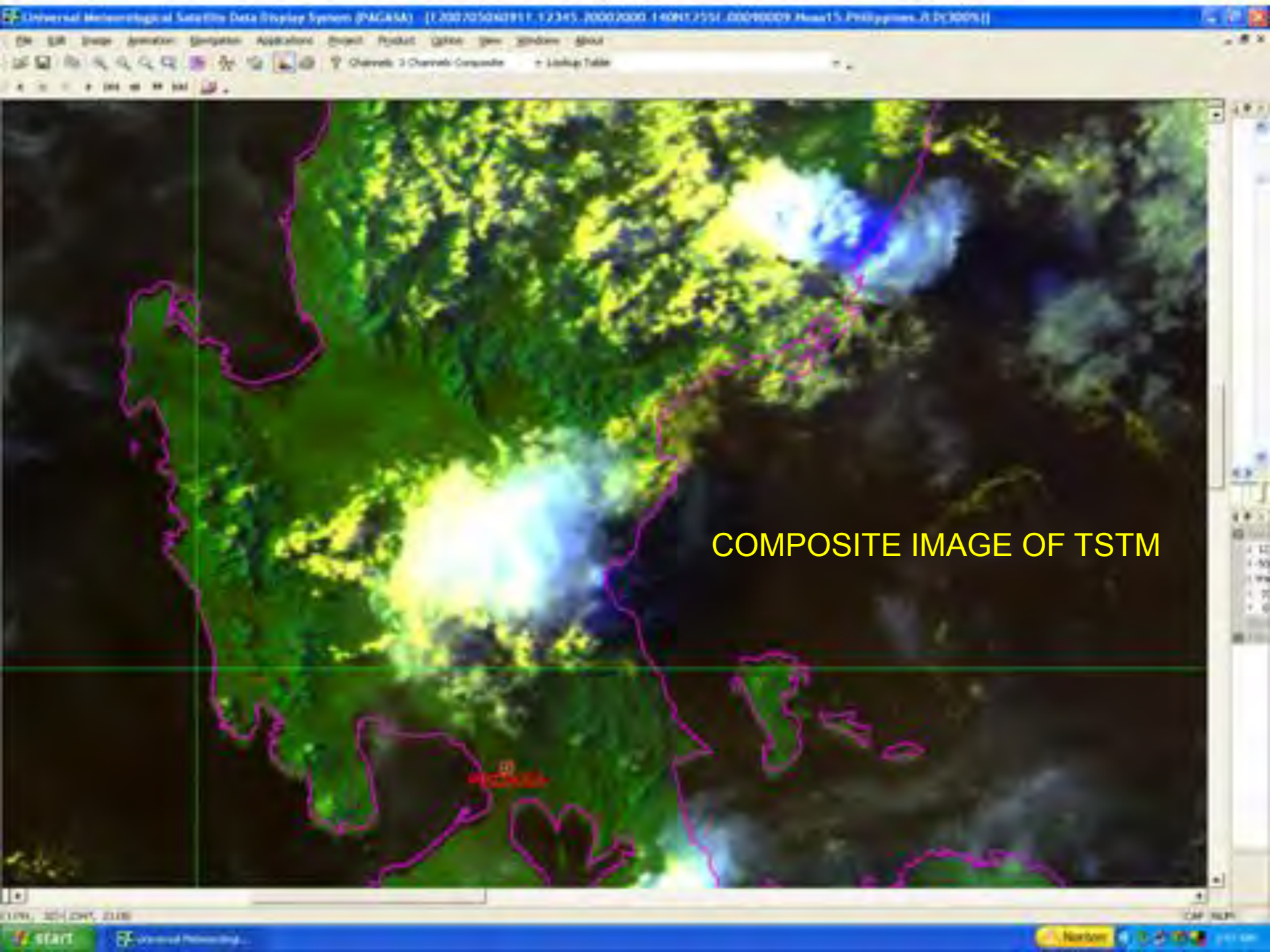

NOAA-15 2006 08 23 21:35 UTC Sea Surface Temperature
SEA SURFACE TEMPERATURE
No Data
Land
Cloud
20
22
24
26
28
30
32
Degree Celsius

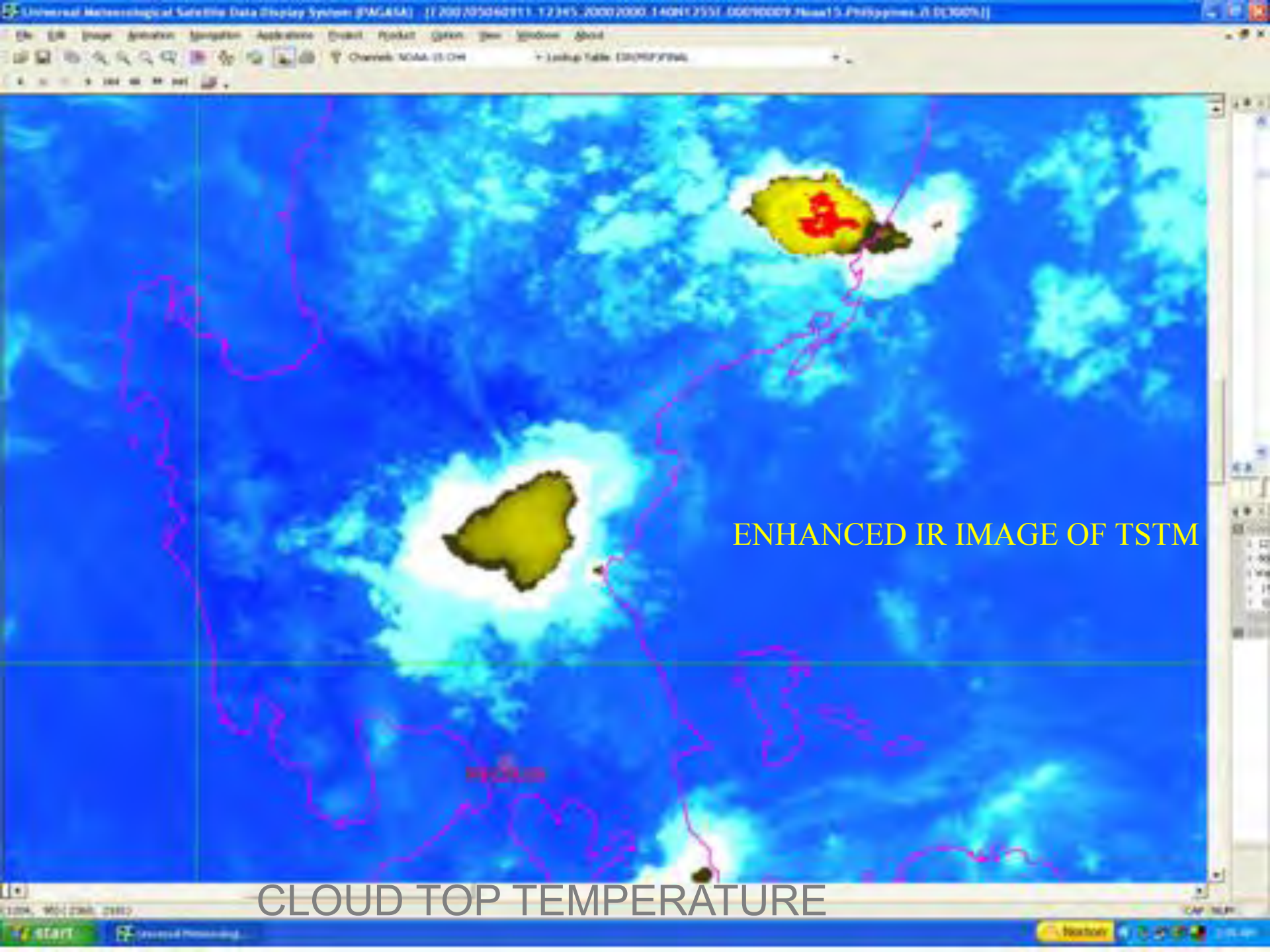

LAND SURFACE
TEMPERATURE

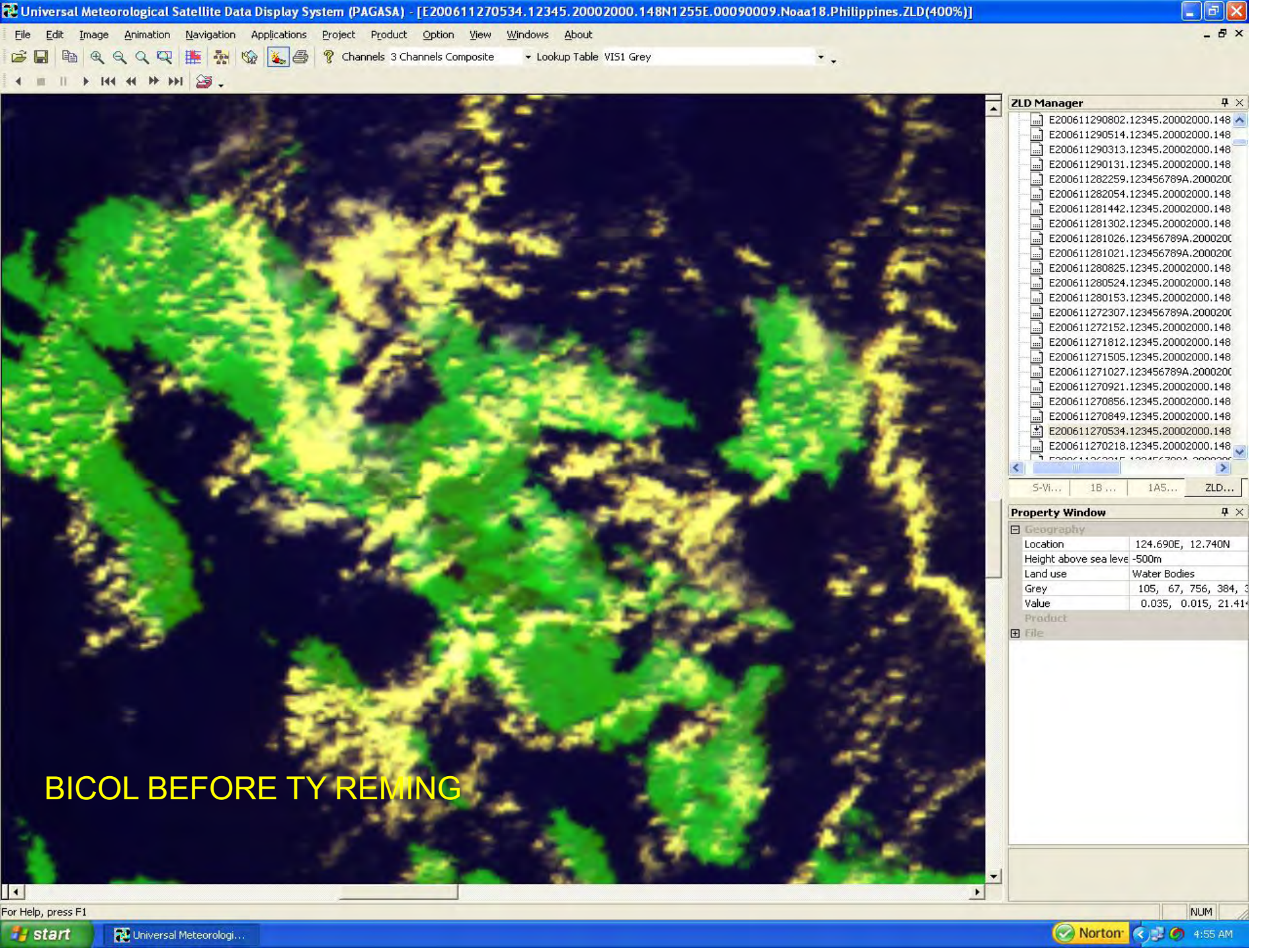

CLOUD TOP HEIGHT


VEGETATION INDEX


HOTSPOT DETECTION


COMPOSITE IMAGE OF TSTM


ENHANCED IR IMAGE OF TSTM
CLOUD TOP TEMPERATURE


Universal Meteorological Satellite Data Display System (PAGASA) - [E200611270534.12345.20002000.148N1255E.00090009.Noaa18.Philippines.ZLD(400%)]
File Edit Image Animation Navigation Applications Project Product Option View Windows About
Channels 3 Channels Composite
Lookup Table VIS1 Grey
ZLD Manager
E200611290802.12345.20002000.148
E200611290514.12345.20002000.148
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E200611282259.123456789A.200020C
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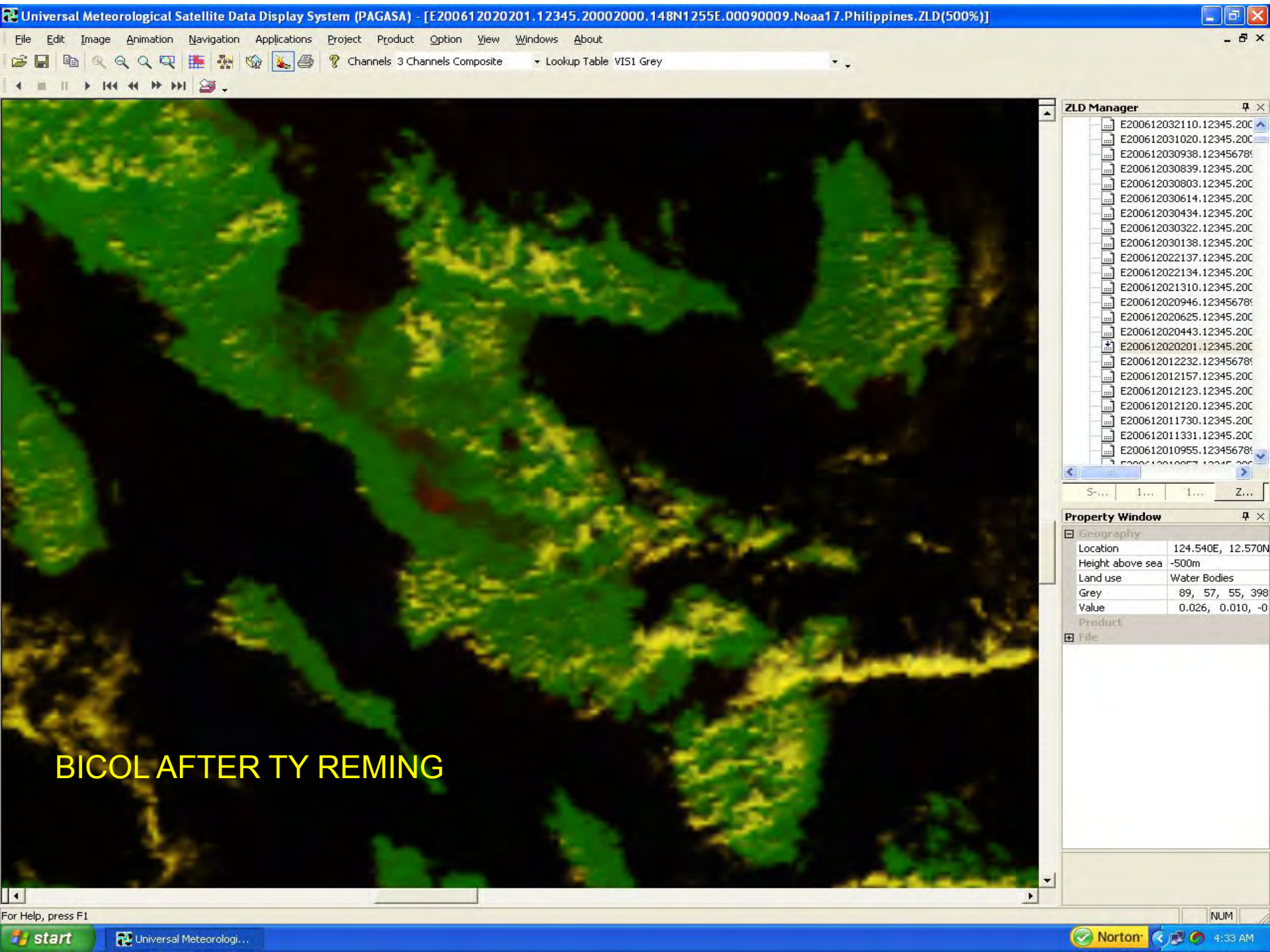
E200611271812.12345.20002000.148
E200611271505.12345.20002000.148
E200611271027.123456789A.200020C
E200611270921.12345.20002000.148
E200611270856.12345.20002000.148
E200611270849.12345.20002000.148
E200611270534.12345.20002000.148
E200611270218.12345.20002000.148
S-Vi... 1B ... 1A5... ZLD...
Property Window
Geography
Location 124.690E, 12.740N
Height above sea leve -500m
Land use Water Bodies
Grey 105, 67, 756, 384,
Value 0.035, 0.015, 21.41
Product
File
BICOL BEFORE TY REMING
For Help, press F1
NUM
start
Universal Meteorologi...
Norton
4:55 AM


Universal Meteorological Satellite Data Display System (PAGASA) - [E200612020201.12345.20002000.148N1255E.00090009.Noaa17.Philippines.ZLD(500%)]
File Edit Image Animation Navigation Applications Project Product Option View Windows About
Channels 3 Channels Composite
Lookup Table VIS1 Grey
ZLD Manager
E200612020201.12345.200
Property Window
Geography
Location 124.540E, 12.570N
Height above sea -500m
Land use Water Bodies
Grey 89, 57, 55, 398
Value 0.026, 0.010, -0
Product
File
BICOL AFTER TY REMING
For Help, press F1
NUM
start
Universal Meteorologi...
Norton
4:33 AM

Environmental Research and Development Satellites

MODIS (Moderate Resolution Imaging Spectroradiometer)

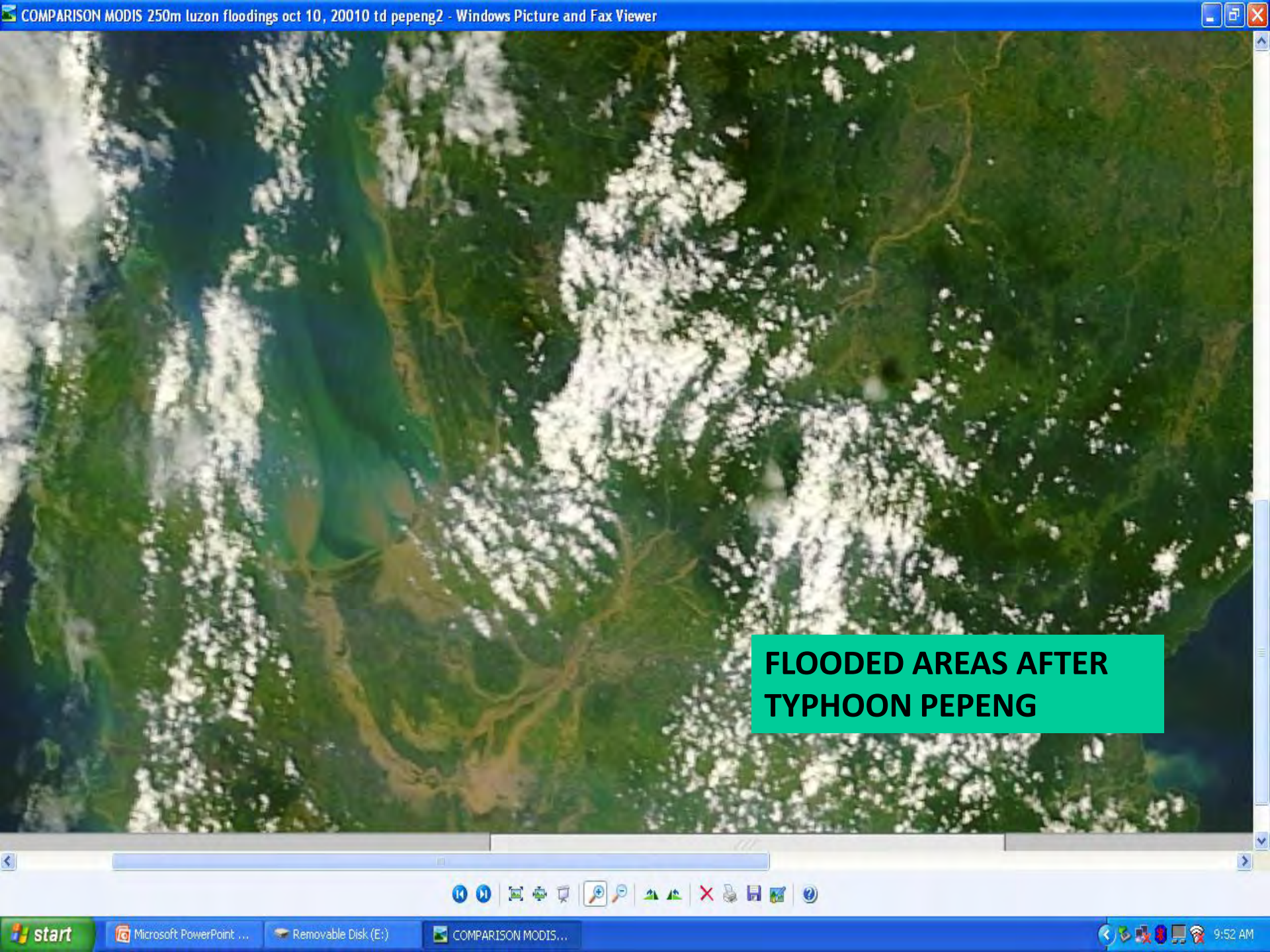
is a key instrument aboard Terra (EOS AM) and Aqua (EOS PM) satellites viewing the Earth's surface every 1 to 2 days.

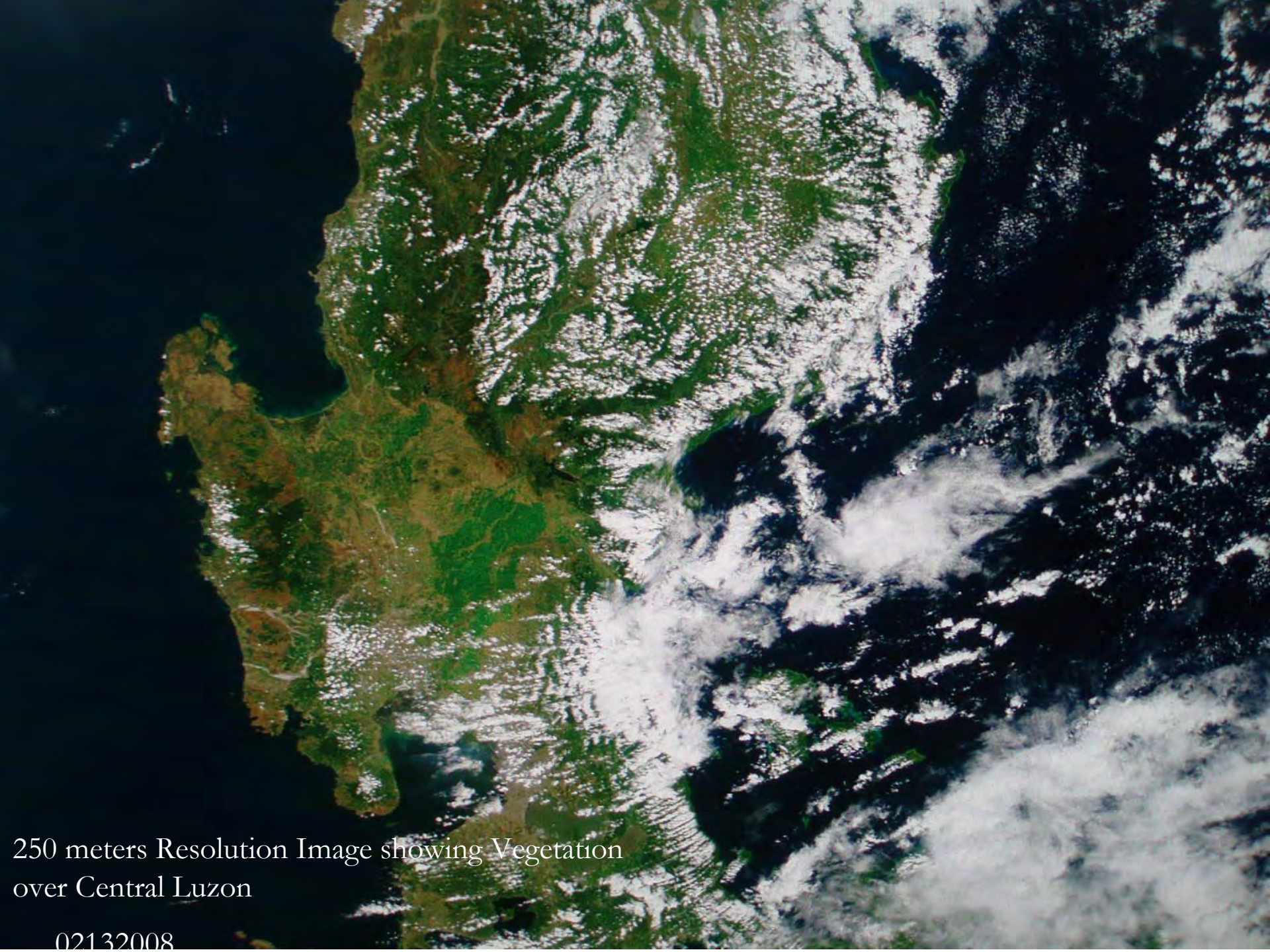
- sun synchronous
- 705 kilometers
- 2330km swath
- 36 spectral bands or groups of wavelengths
- **Spatial resolution (250 meters bands 1-2 , 500 meters bands 3-7, 1000 meters bands 8-36)**

MODIS PRODUCTS

Flooded areas after Ty Karen

08222008

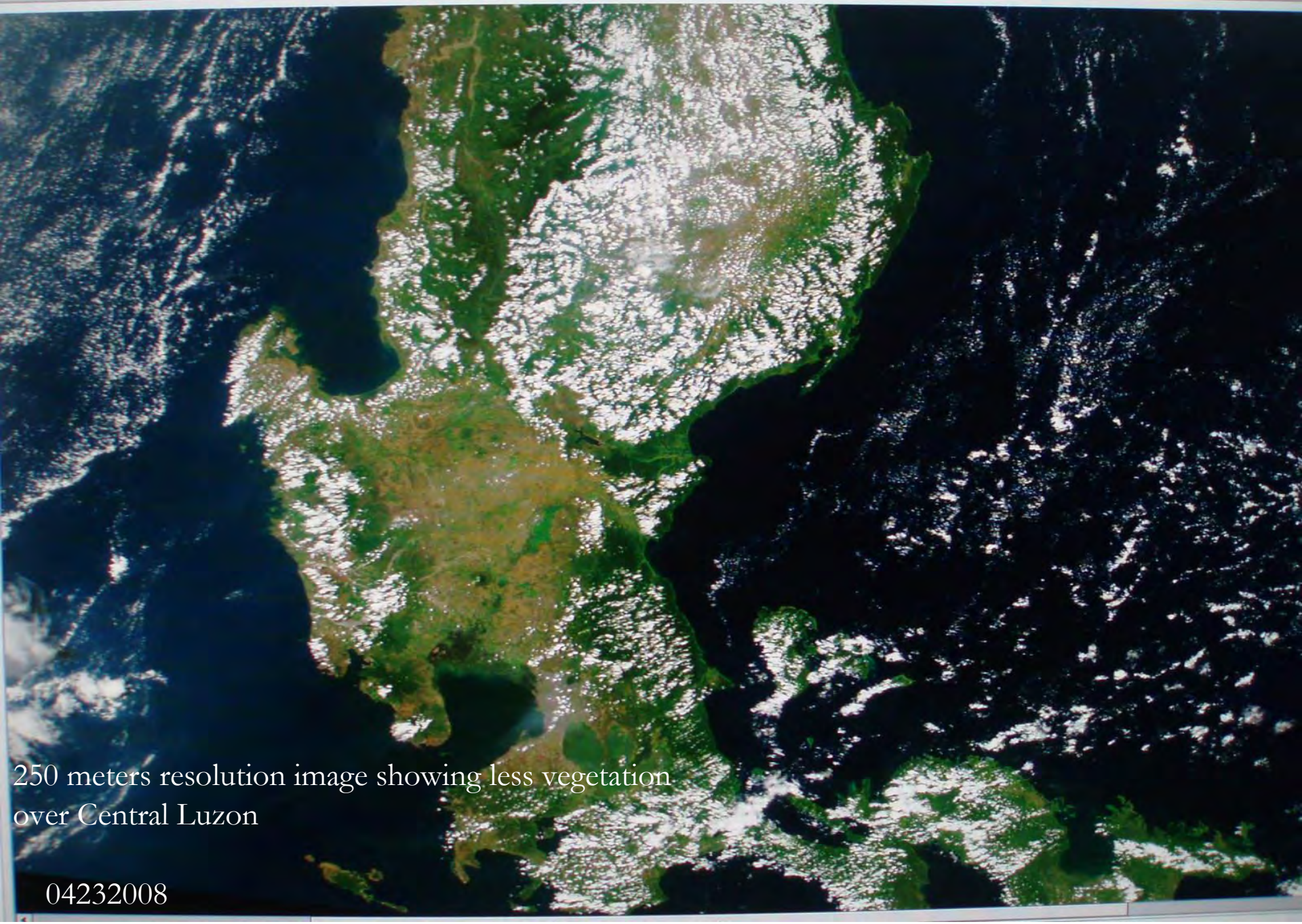

COMPARISON MODIS 250m luzon floodings oct 10, 20010 td pepeng2 - Windows Picture and Fax Viewer
FLOODED AREAS AFTER TYPHOON PEPENG
start
Microsoft PowerPoint ...
Removable Disk (E:)
COMPARISON MODIS...
9:52 AM



250 meters Resolution Image showing Vegetation over Central Luzon

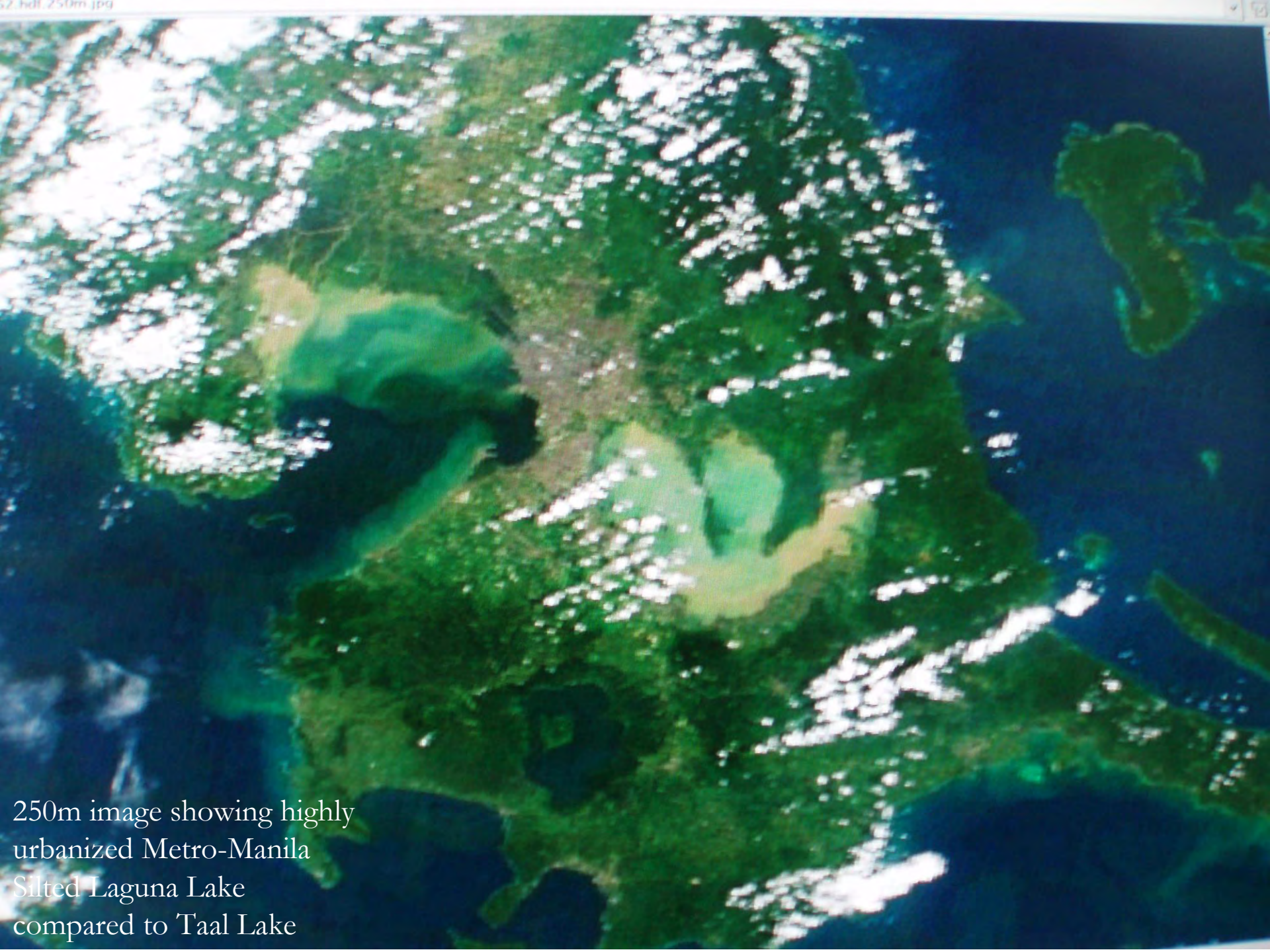
02132008

erated pics/2008.0423.0206.terra-1.1_2.080423021557.hdf.250m.jpg

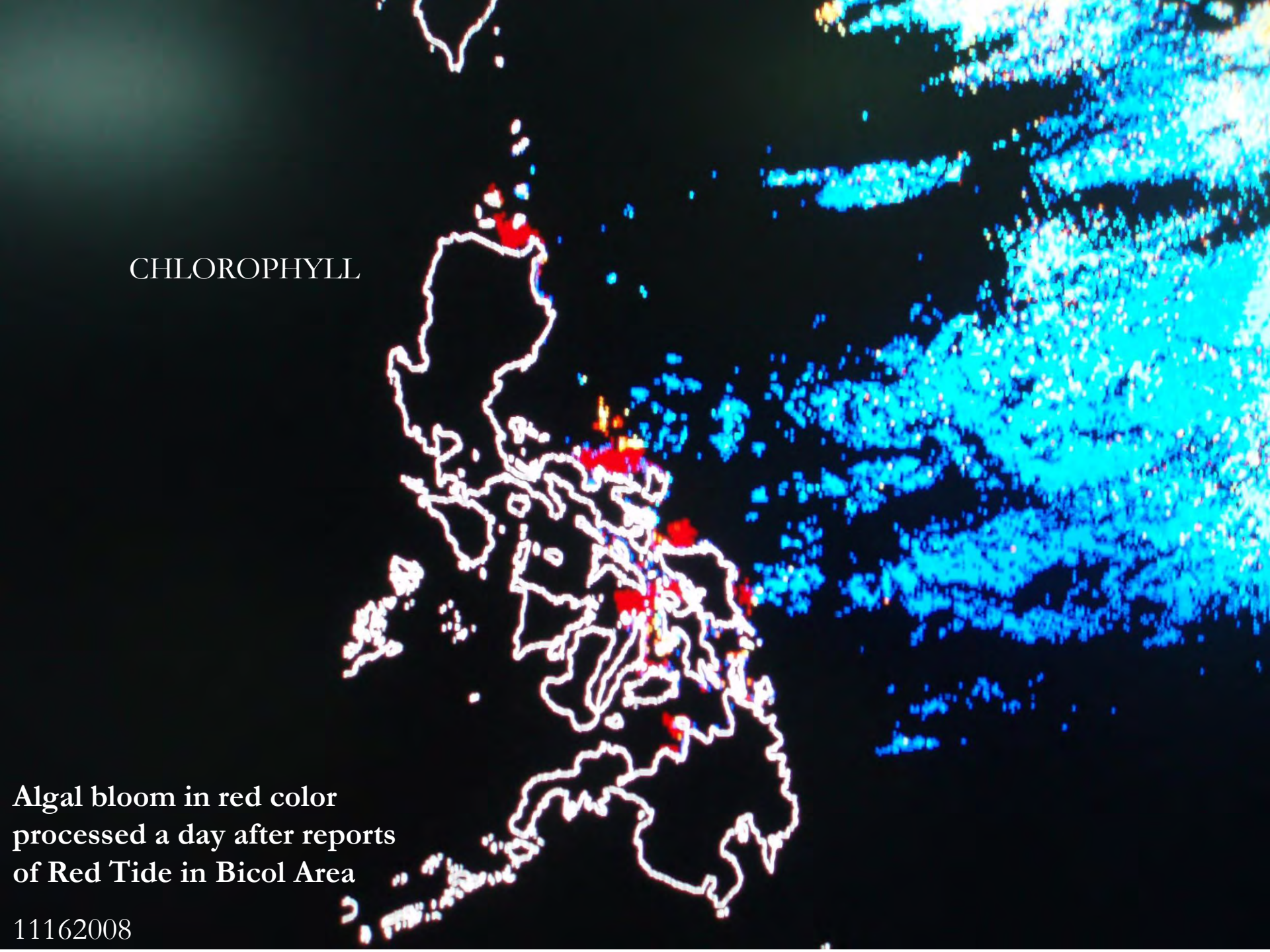


250 meters resolution image showing less vegetation over Central Luzon

04232008



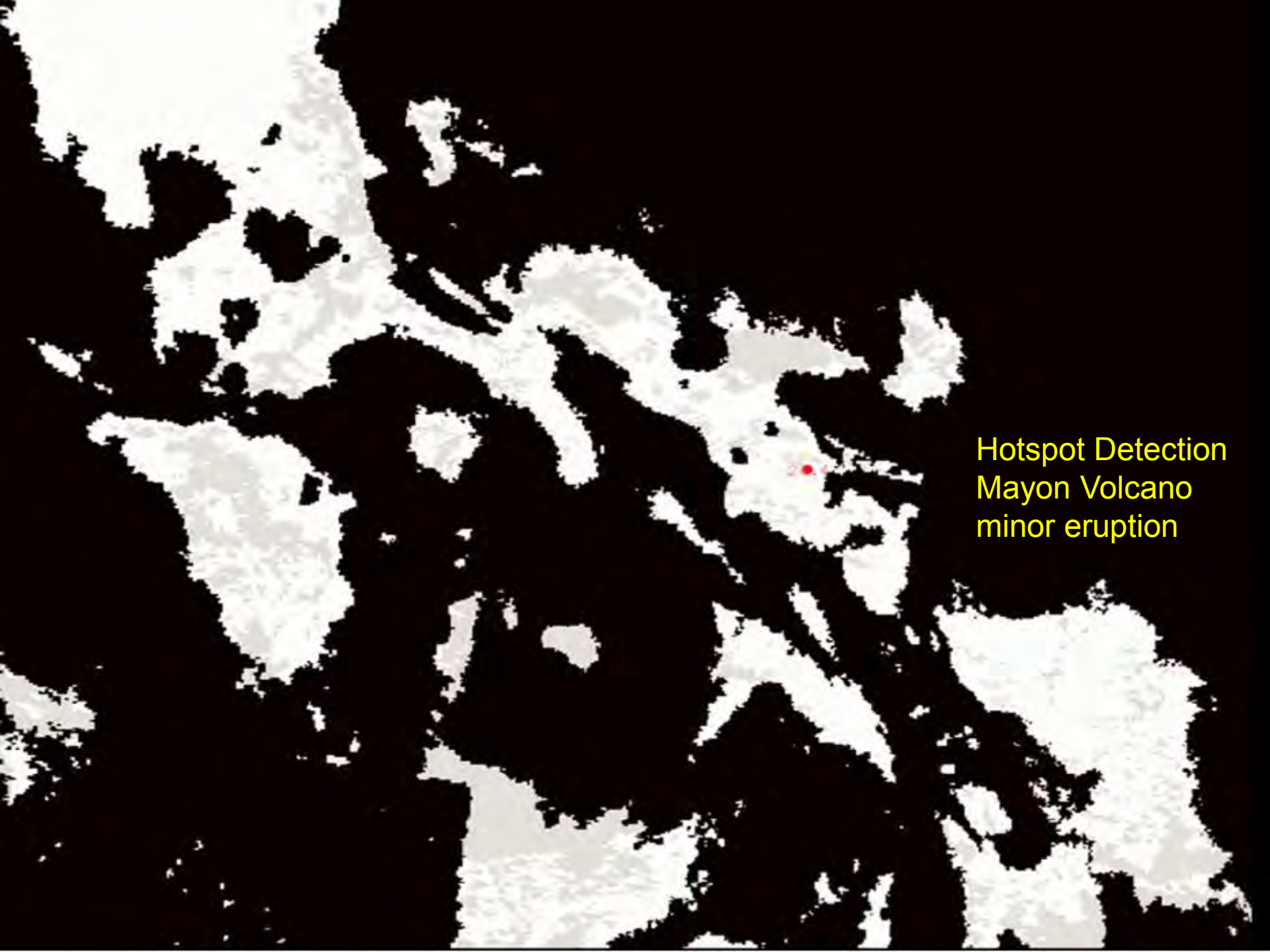
250m image showing highly urbanized Metro-Manila Silted Laguna Lake compared to Taal Lake



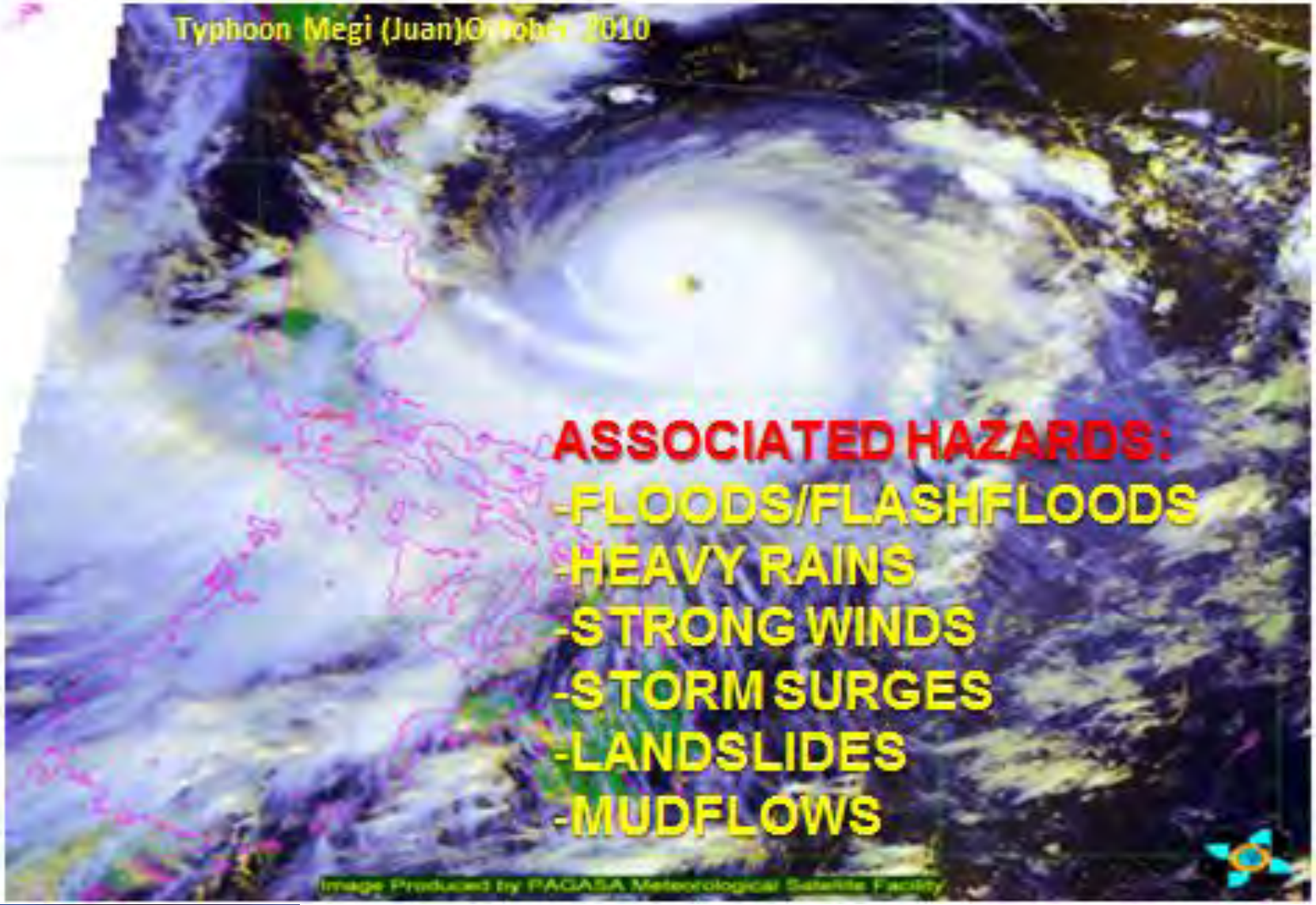
Algal bloom in red color processed a day after reports of Red Tide in Bicol Area

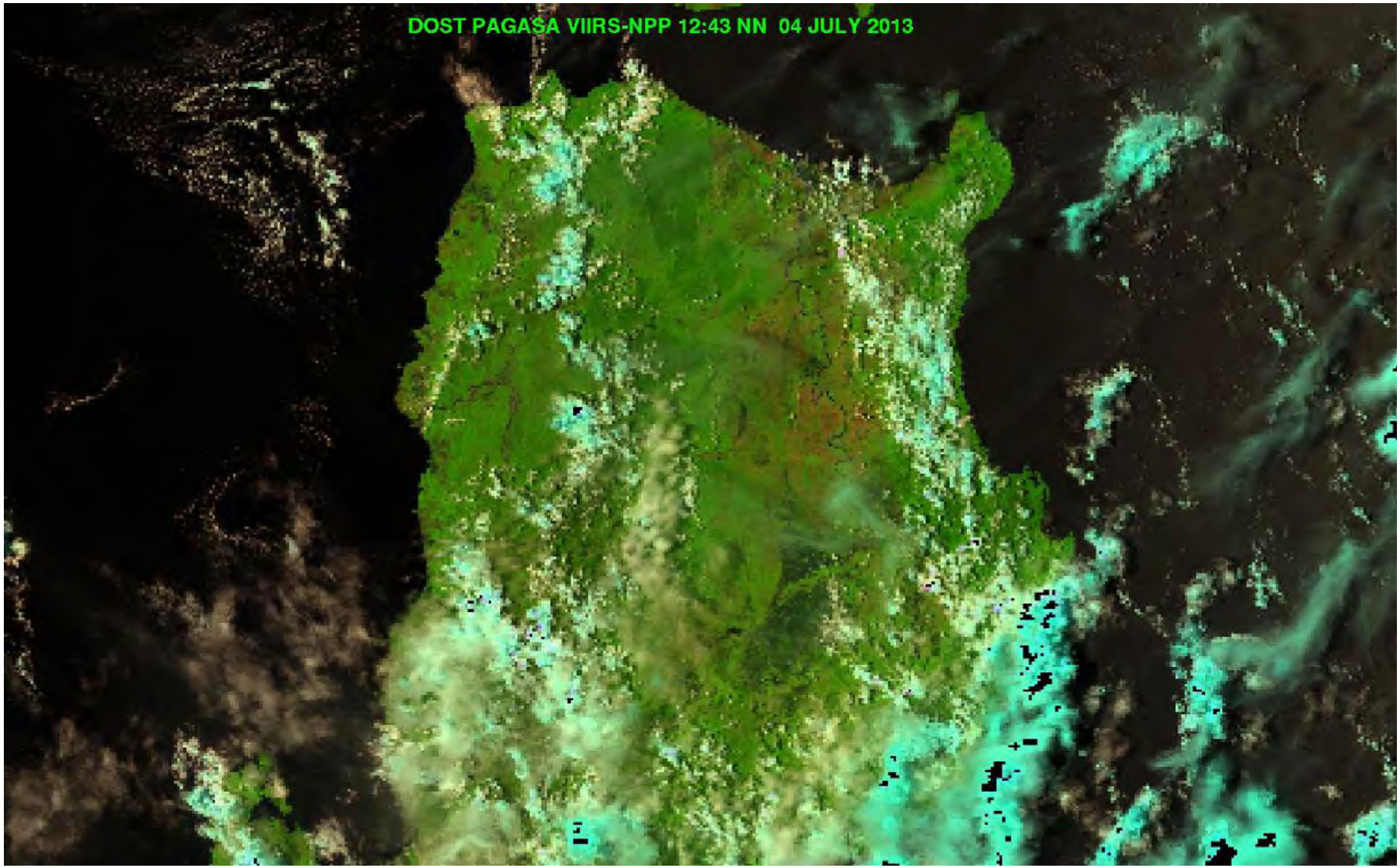
11162008

OTHER USEFUL PRODUCTS


Hotspot Detection
Mayon Volcano
minor eruption

Significant Weather





Over 160 hectares of **cornfields** and palay in northern **Isabela** are left to waste due to lack of **rain** as reported end of june 2013

ROAD MAP TOWARDS A WORLD-CLASS ATMOSPHERIC/METEOROLOGICAL-HYDROLOGICAL AGENCY

"tracking the sky...helping the country"

WORLD CLASS AGENCY ON CLIMATE CHANGE & RELATED HYDROMET SERVICES

2020

2009

TANGIBLE OUTPUTS

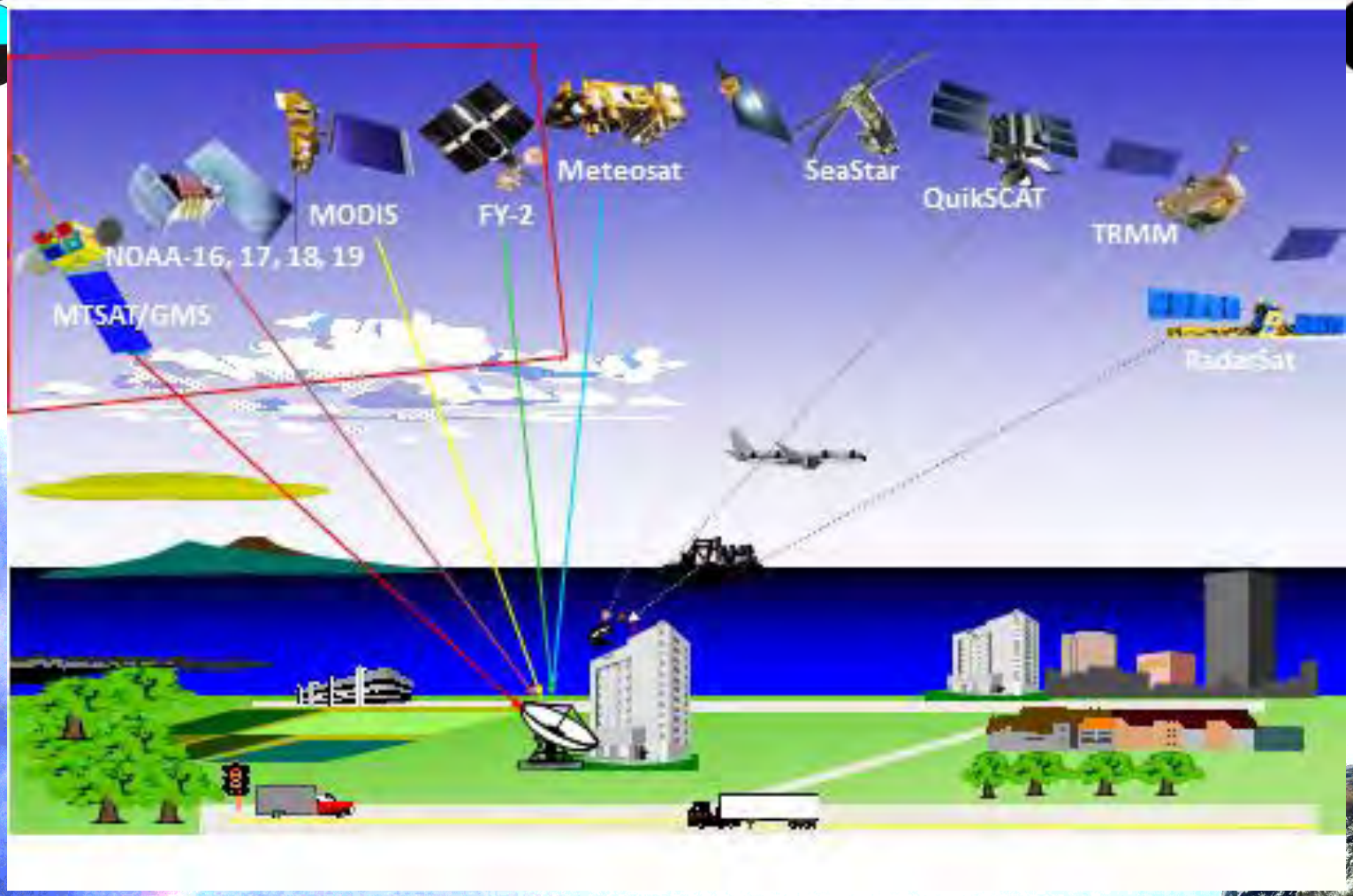
CLIMATE CHANGE, WEATHER & FLOOD FORECASTING SYSTEMS	RESEARCH & DEVELOPMENT	HUMAN RESOURCE DEVELOPMENT	S&T LINKAGES	S&T INFRASTRUCTURE REQUIREMENTS	INFORMATION/ TELECOM-MUNICATION SYSTEM
• LOCALIZED CLIMATE CHANGE SCENARIOS • INCREASED ACCURACY IN TC TRACK FORECAST, WEATHER FORECAST, CLIMATE PREDICTION, AND FLOOD/ FLASHFLOOD FORECAST	• ESTABLISHED NOWCASTING SYSTEM AND EWS FOR RAIN-INDUCED LANSLIDES • IMPROVED DIAGNOSTIC CAPABILITIES (modeling & other tools)	• POOL OF WELL-TRAINED PROFESSIONAL & TECHNICAL PERSONNEL INCLUDING SUPPORT STAFF • TRAINING CENTER AND HYDROMET LABORATORY FACILITY	• STRENGTHENED REGIONAL & GLOBAL COLLABORATION • PARTNERSHIP WITH ACADEME & PRIVATE SECTOR	• ESTABLISHED REGIONAL FORECASTING CENTER • INTEGRATED HYDROMET SATELLITE ANALYSIS SYSTEM • FORECASTER'S WORKSTATIONS & SUPER-COMPUTER SYSTEM • ENHANCED OBSERVATION CAPABILITES (Radars, AWOS, AWS, Upper Air & other modern equipment)	• STATE-OF-THE-ART & ROBUST TELECOMMUNICATION SYSTEM

S&T PROGRAMS

FUNDING SOURCES

JICA	KOICA	AUSAID	USAID	USTDA	ACIAR	ADPC	TECO	NORAD
DOST-GIA	MWSS	OP CALAMITY FUND	LGUs	PRIVATE ORGANIZATIONS	OTHERS			

PAGASA Receiving Satellites



- **Weather Satellites help fill the gaps in observational data, especially over the oceans.**
- **In particular, developing tropical cyclone is frequently spotted long before they are detected by surface observational network.**

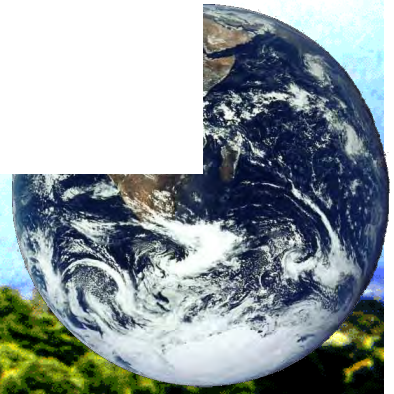
Detection then Monitoring Weather-related Hazards…

- **utilization of other Space-based System for Disaster Monitoring and Assessment** – flood monitoring and others

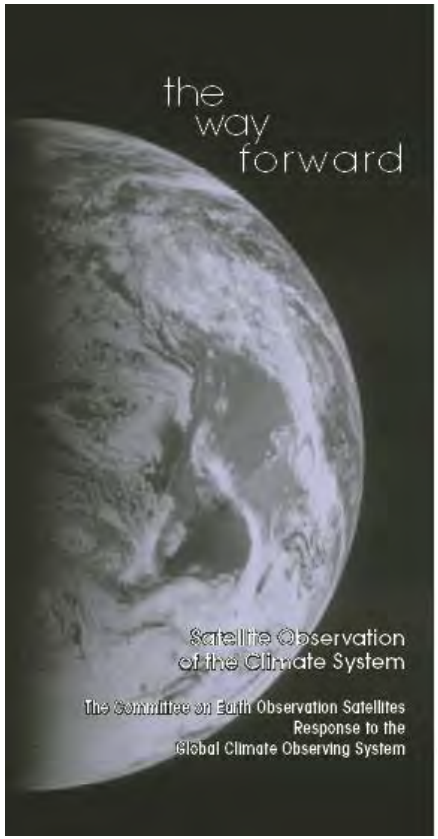
- **Satellite images of areas affected by hydromet hazards (for post-disaster analysis)**

Summary

- PAGASA needs high temporal resolution images and products for severe weather forecasting and warning services to support very-short range forecasting, including nowcasting, through the provision of near-real time products to monitor and track convective development, especially in the absence of operational radar coverage.
- Likewise, PAGASA needs high spatial resolution images of areas affected by hydromet hazards (for post-disaster analysis)



The Way Forward



. . . both satellite and *in situ* data are required to better monitor, characterize, and predict changes in the Earth system. While *in situ* measurements will remain essential and largely measure what cannot be measured from satellites, Earth-observation satellites are the only realistic means to obtain the necessary global coverage, and with well-calibrated measurements will become the single most important contribution to global observations for climate.