

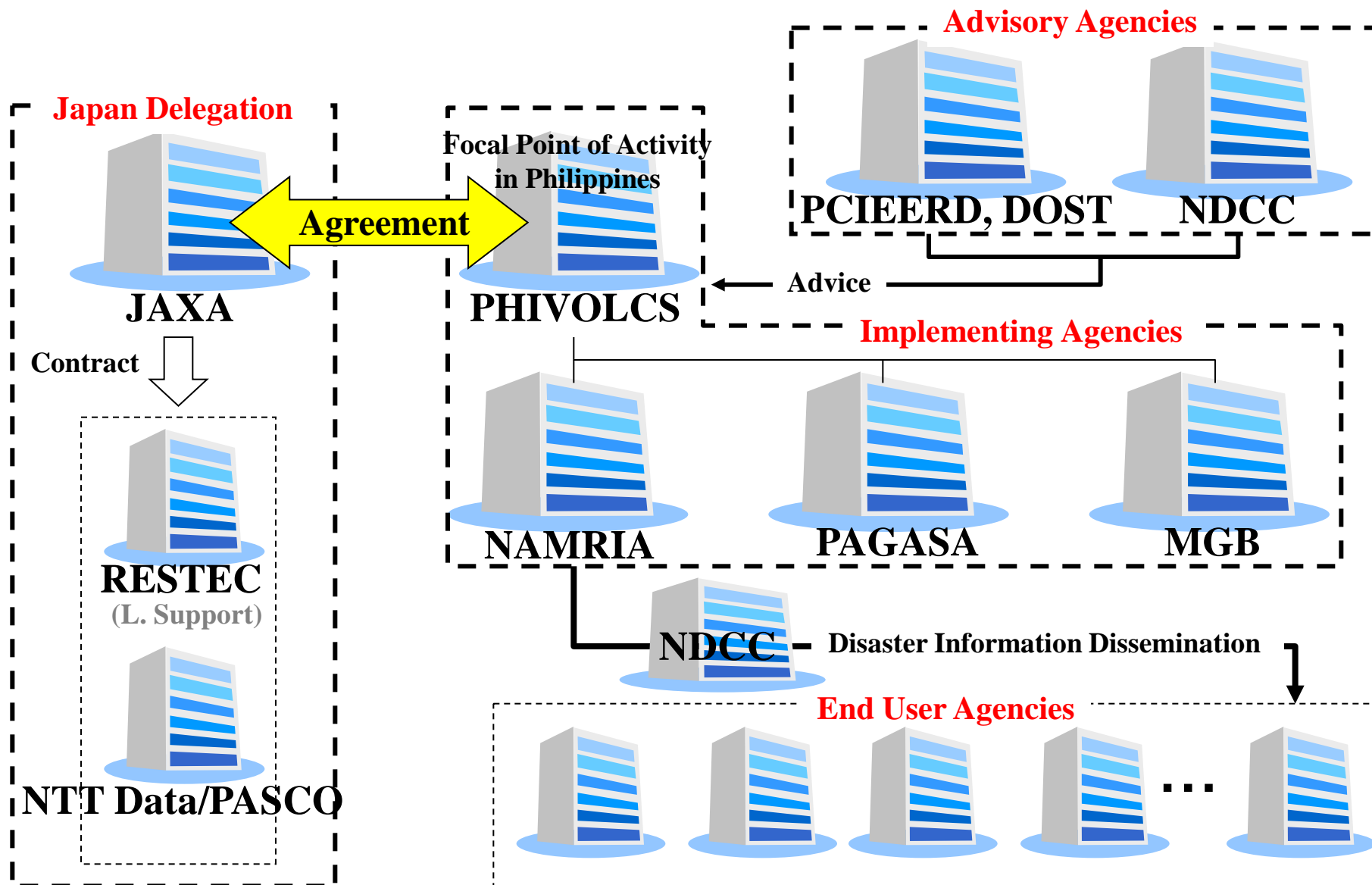
Good Practices Related to Sentinel Asia Success Story in the Philippines

Arturo S. Daag

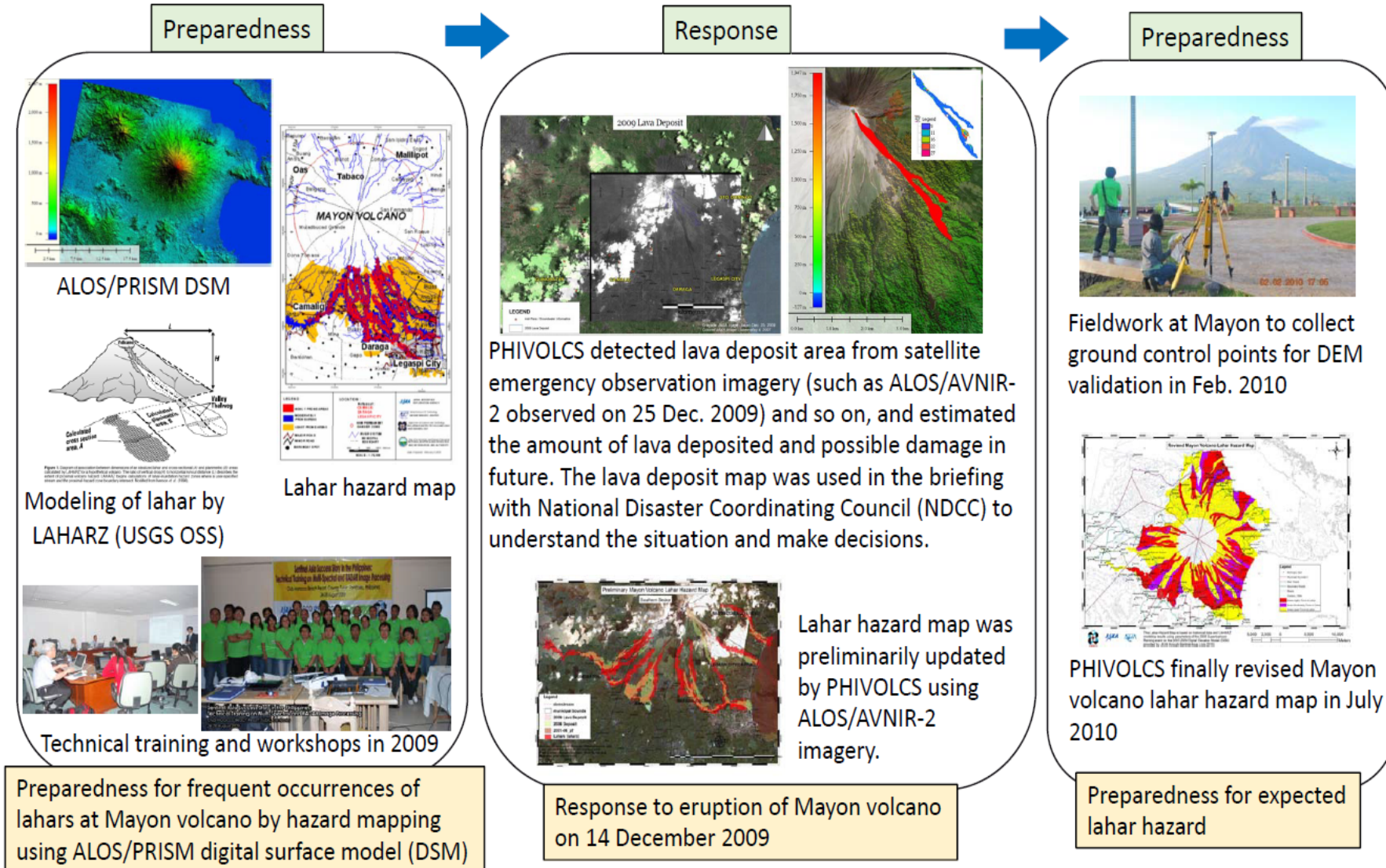
Philippine Institute of Volcanology and Seismology (PHIVOLCS)

Department of Science and Technology (DOST)

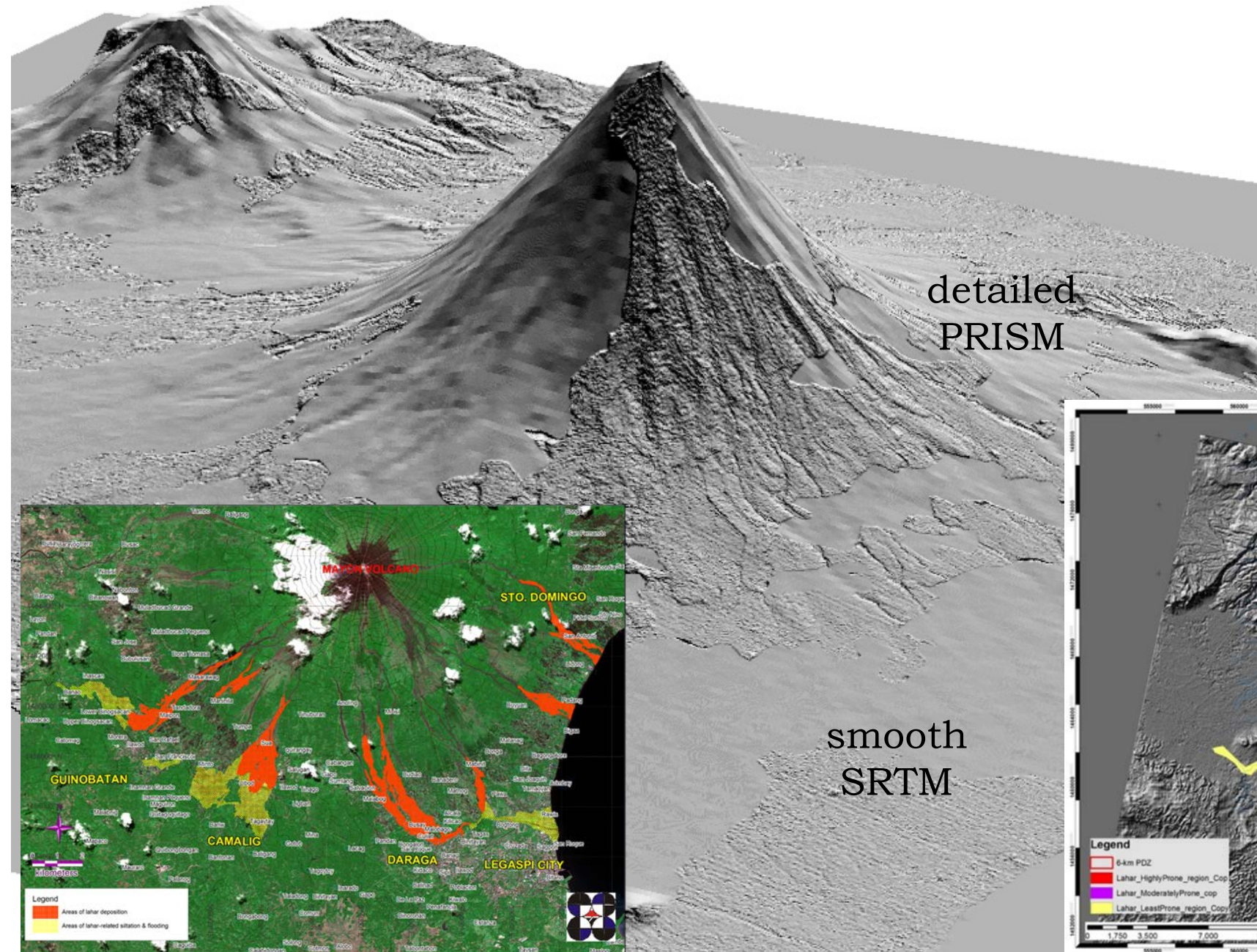
Sentinel Asia Framework in the Philippines



CAPACITY BUILDING: Hazard mapping for lahars at Mayon volcano in the Philippines and application to response

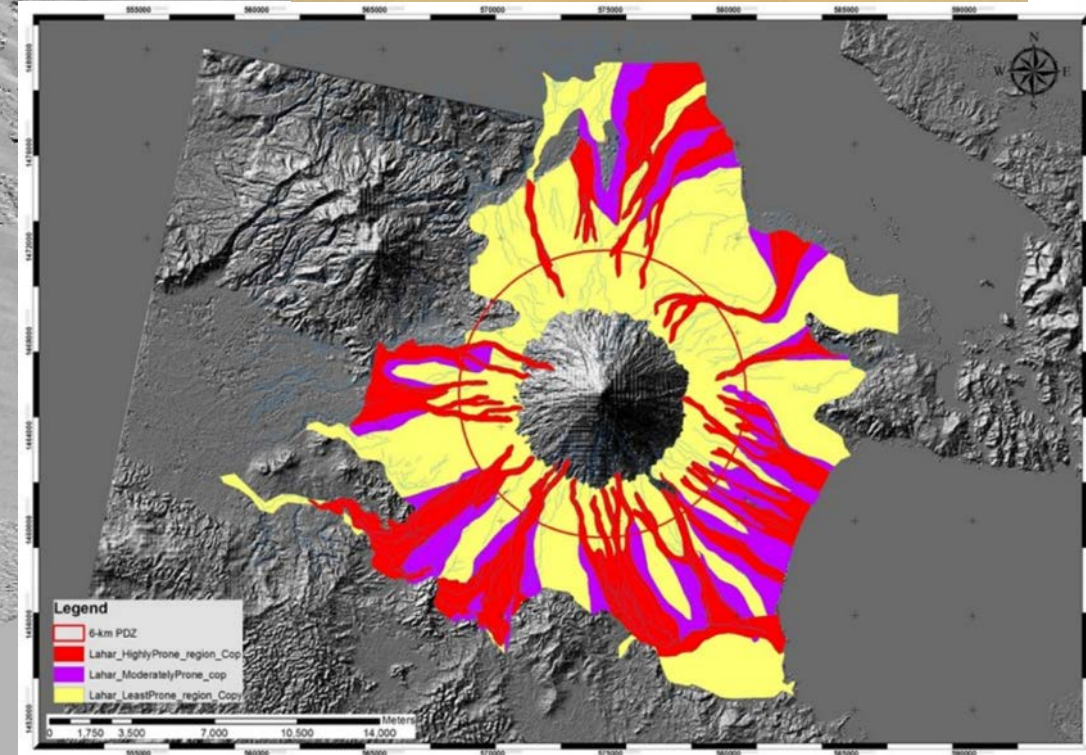
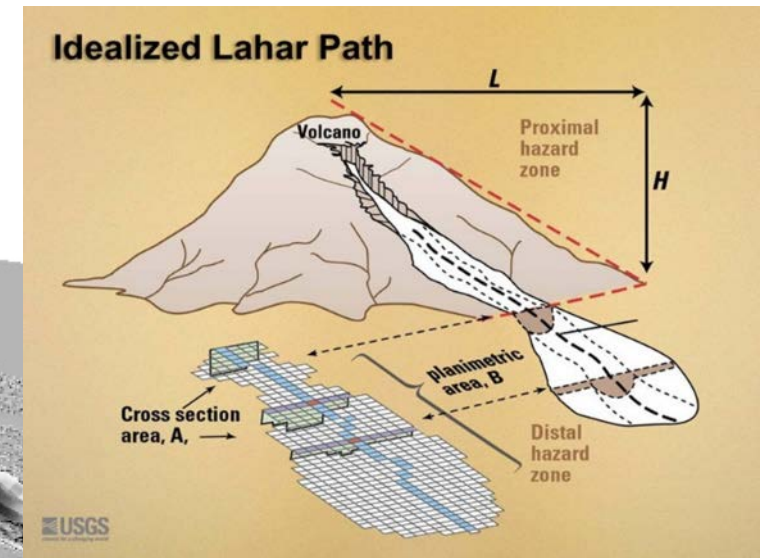


DEM FROM ALOS PRISM (05/04/2007) & SRTM USED IN LAHAR SIMULATION AND LAHAR HAZARD MAPPING



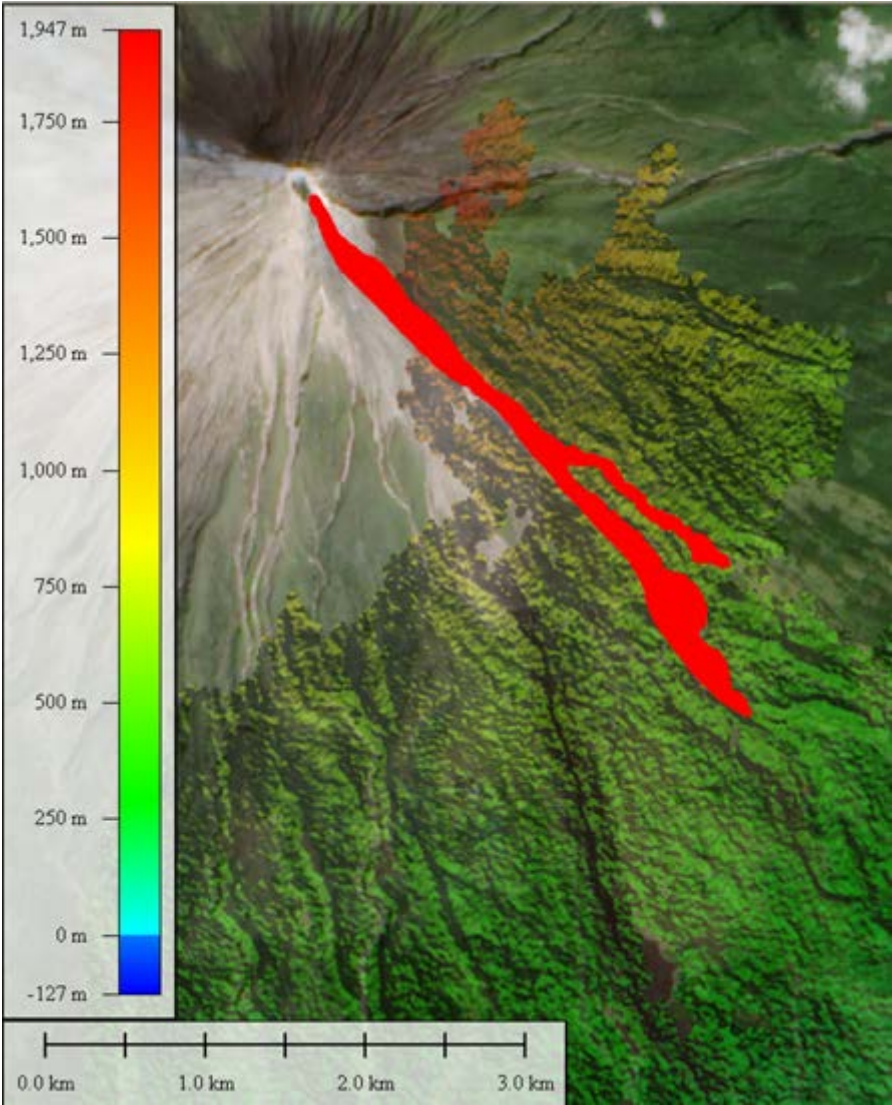
detailed
PRISM

smooth
SRTM

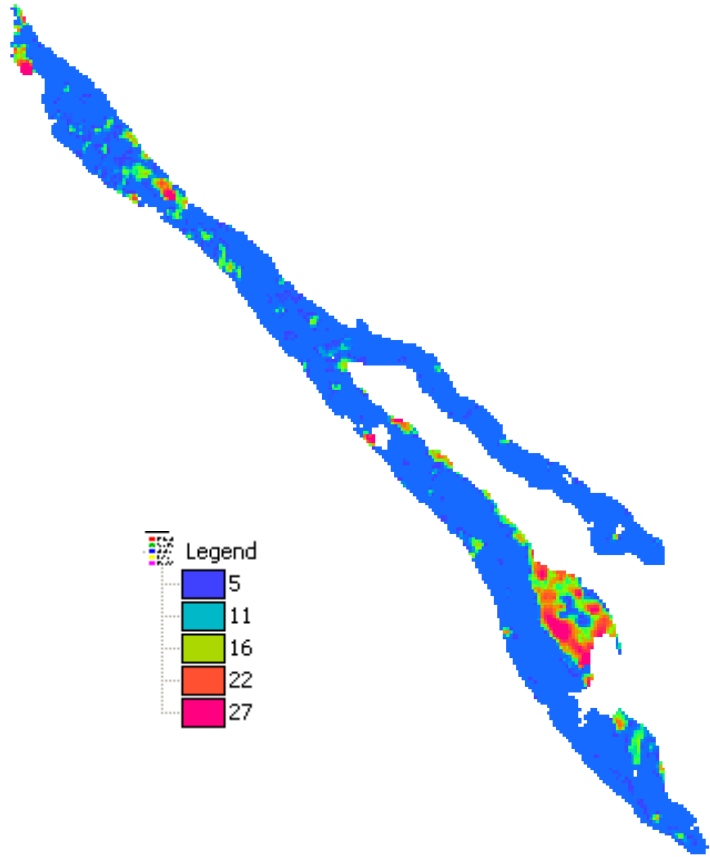


Lava Volume Estimation from October 2009 and Dec 25, 2009 ALOS DEMS, result were used as a basis in lowering the Alert Level.

December 25, 2009 ALOS
PRISM DEM Used in
Calculating the Lava Volume



BASED ON adjusted DEM
Lava flow (Dec 25, 2009)
Length = 4.3km from Summit
Area = 849,000 m²
Volume = 6,209,200 assume neg value are 8m



Success Story in the Philippines (2nd Phase)

Application of **GSMaP** for **Landslide Alert**, and **Interferometry** for monitoring of **Land Subsidence** and **Earthquake/Volcanic Eruption** have been studied.



Volcano & Earthquake Monitoring

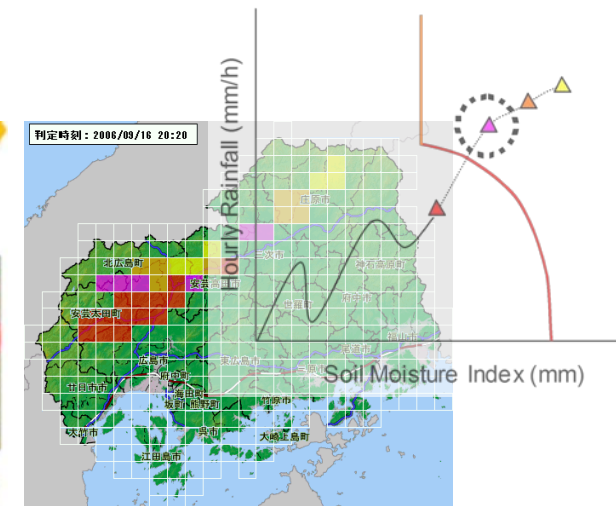
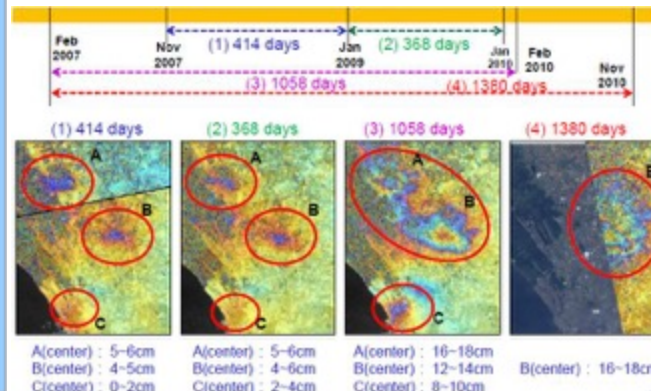
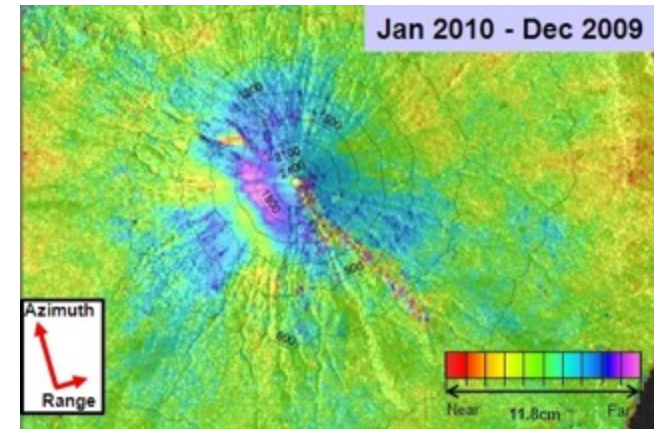
- Mt. Mayon, Mt. Taal & Valley Fault

Landslide Warning

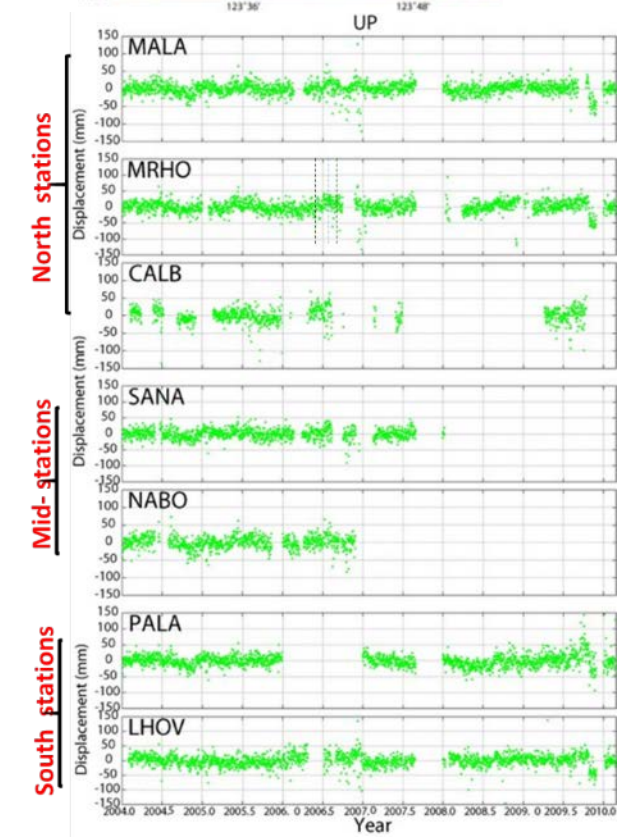
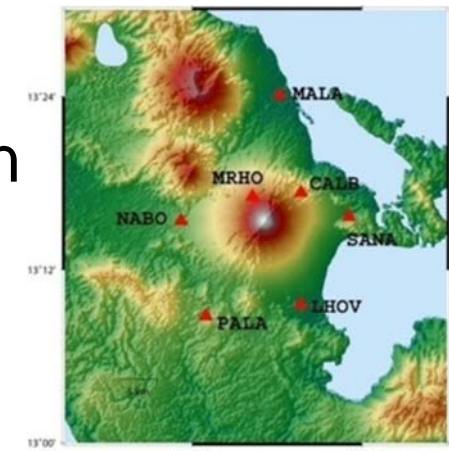
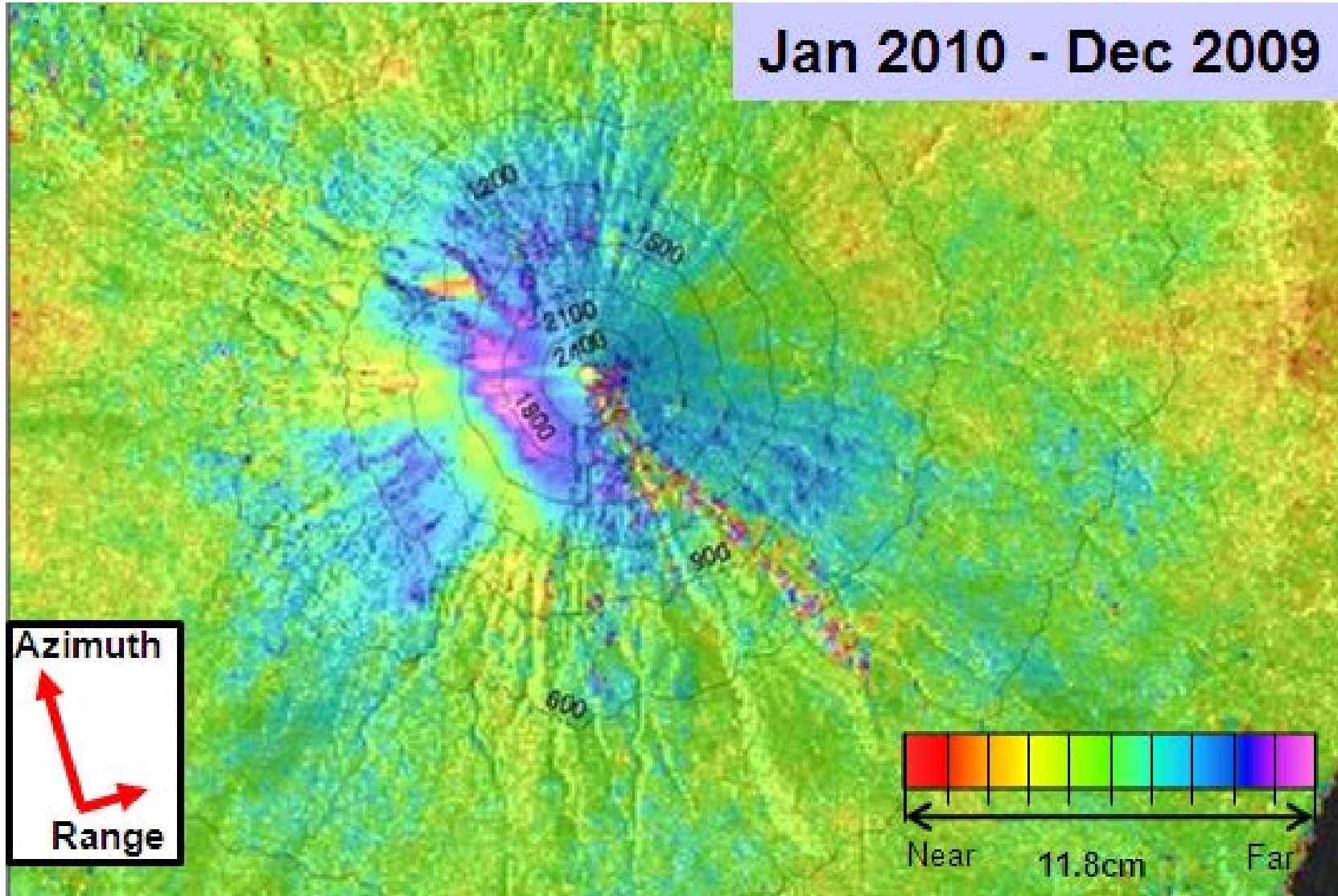
- Albay

Land Subsidence

- near Manila



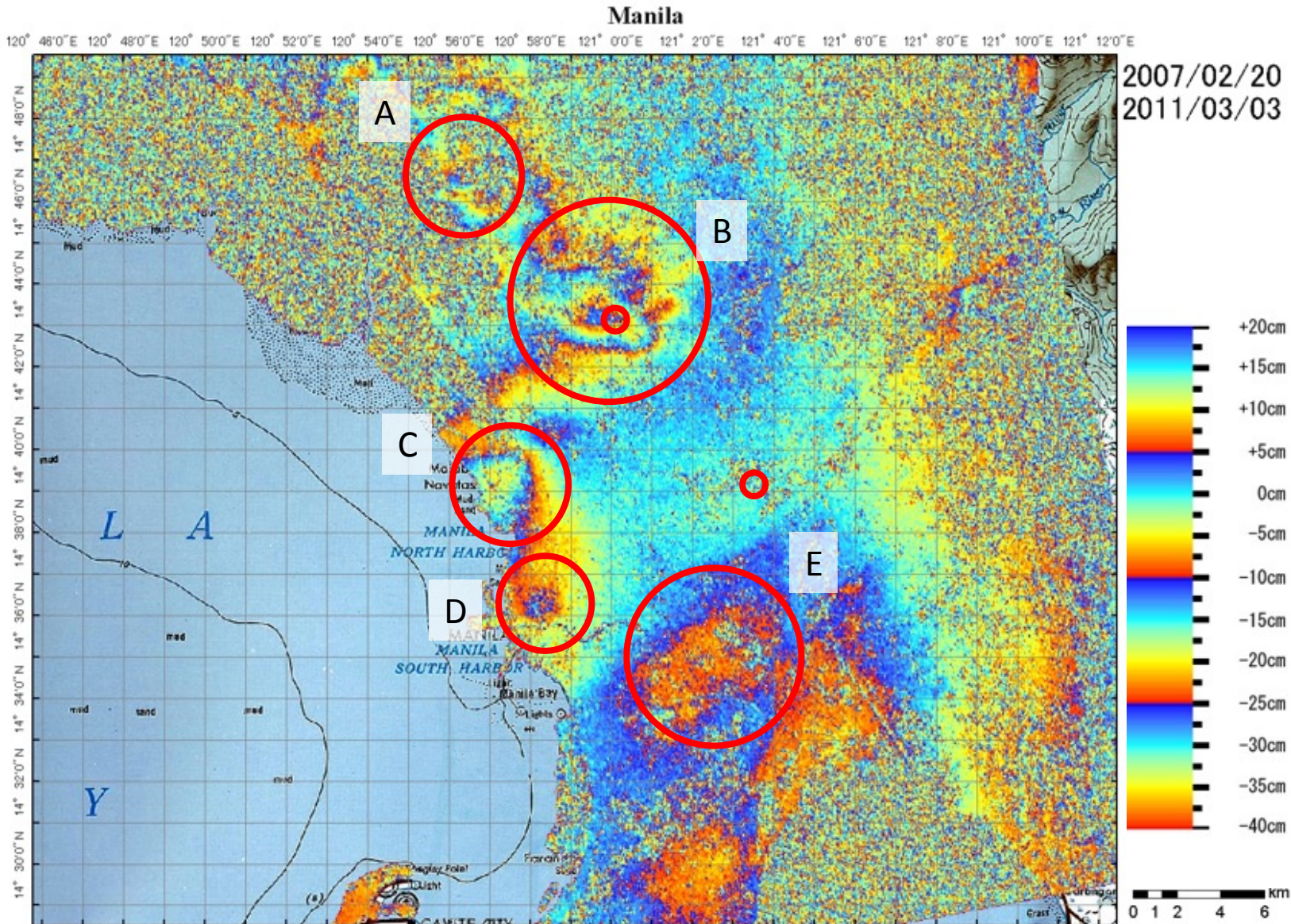
Differential Interferometry with GPS Validation an Application on Volcanic Deformation for Eruption Prediction



-abrupt deflationary signals for the stations in the north and south between October to December 2009 events



Ground Deformation (Subsidence and Uplift) in Metro Manila and Vicinity Using ALOS PALSAR Mar.2011 –Feb.2007 (1472 Days)

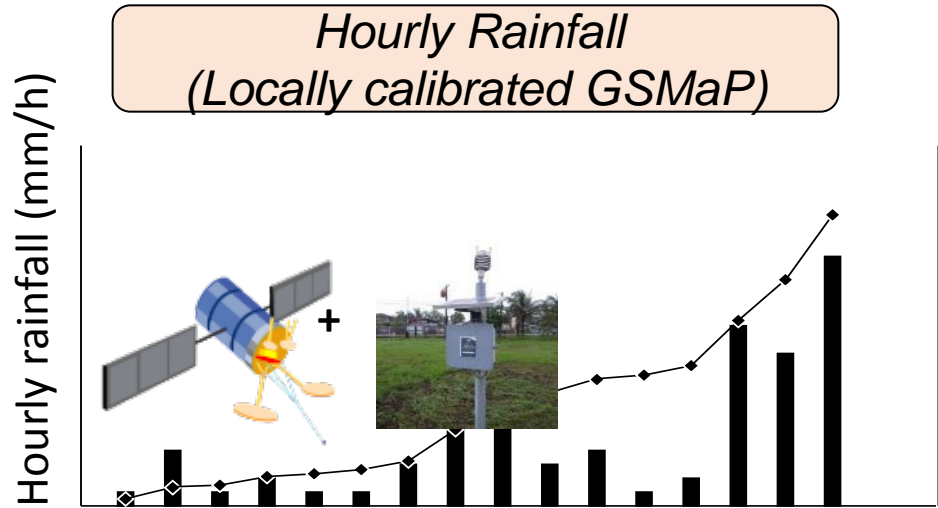


Ground Subsidence is 3 to 9cm per year due to ground water extraction. Uplift of 3cm per year (E) probably due to tectonic deformation ?

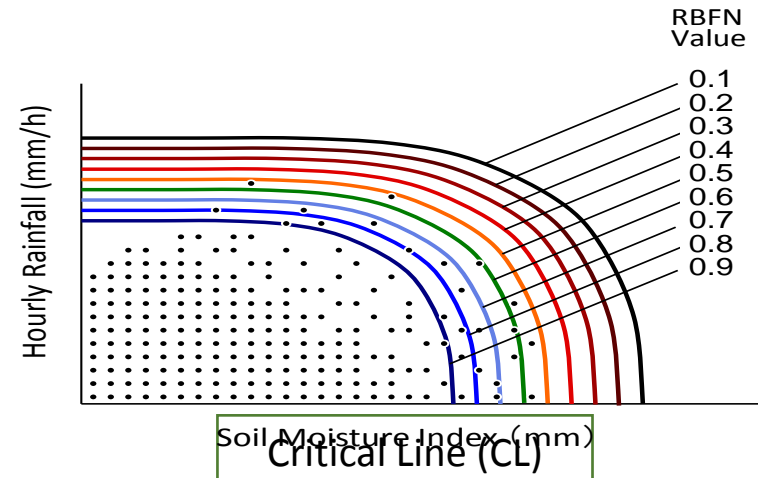
Original		A	B	C	D	E	
2	2010/2/11 2009/2/8	368	-	-10	-	-	5
4	2010/1/13 2009/1/10	368	-12.5	-7	-5	-3	3
6	2009/7/13 2008/7/10	368	-7	-5	-2	-3	2
Conversion							
1	2010/2/11 2009/2/8	365	-	-10	-	-	5
2	2010/1/13 2009/1/10	365	-12	-7	-5	-3	3
3	2009/7/13 2008/7/10	365	-7	-5	-2	-3	2
Average							
1 year			-9.7	-7.3	-3.5	-3.0	3.3



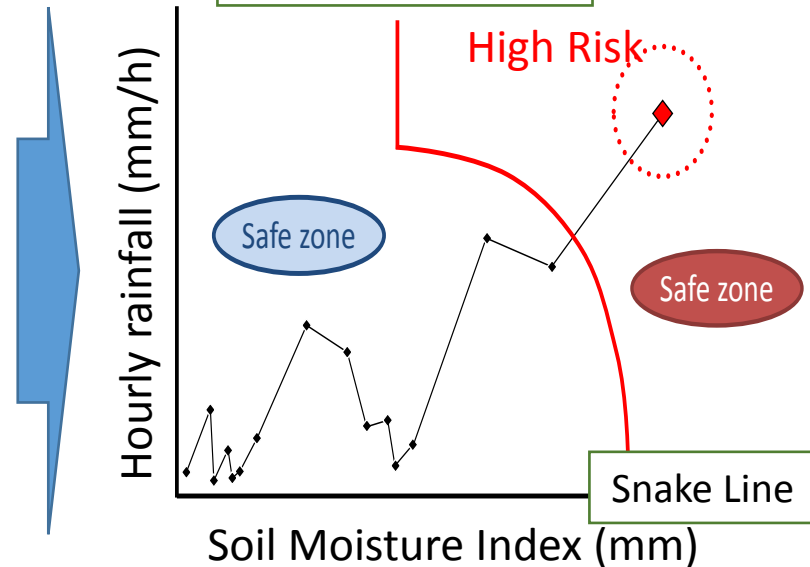
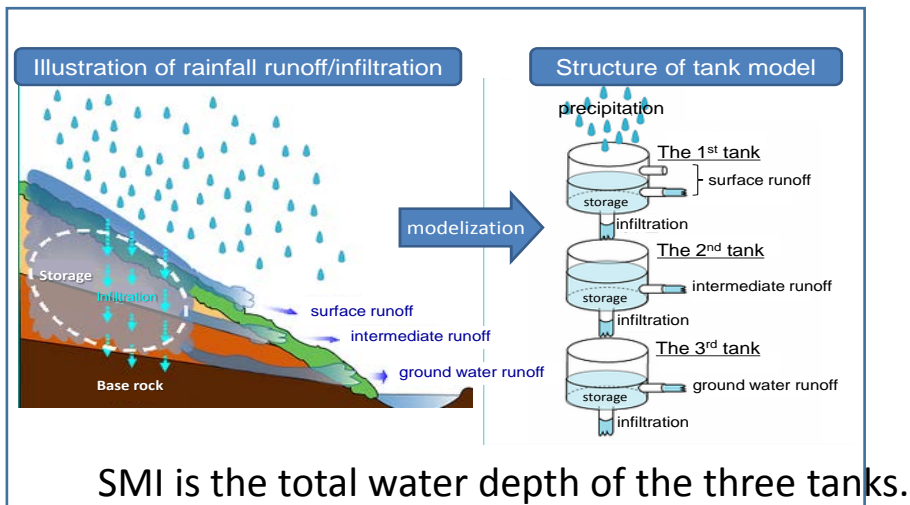
USE OF GSMAP FOR SHALLOW TRANSLATIONAL LANDSLIDE WARNING SYSTEM



Risk Level based on Critical Lines



Soil Moisture Index
(estimated from tank model)



Landslide Early Warning Experimental System Pilot Site in Rizal Province

Landslide Early Warning Prototype System (Rizal) - Windows Internet Explorer

http://60.36.183.126/lsWarning/mapImage/mapImageBL.do?org.apache.struts.taglib.html.TOK

Landslide Early Warning Prototype System (Rizal)

TOP > Rizal

2015-12-19 07:45-08:00 (UTC) Realtime Update

<< Prev Latest Next >> Date(YYYY-MM-DD HH:mm): 2015 - 12 - 19 08 : 00 submit

Warning Map (AWS / GSMaP)

Hourly Rainfall [mm/h]

Legend for Warning Map:

No Data	No Warning	Warning	Evacuation	Critical
---------	------------	---------	------------	----------

Legend for Hourly Rainfall [mm/h]:

0.1	0.5	1.0	2.0	3.0	5.0	10.0	15.0	20.0	25.0	30.0 [mm]
-----	-----	-----	-----	-----	-----	------	------	------	------	-----------

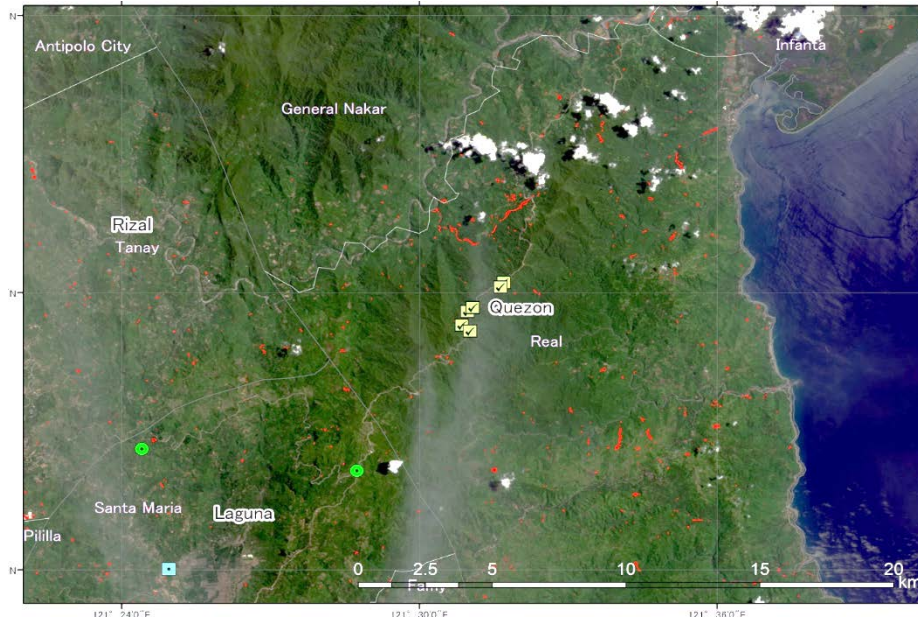
[Lat, Lon, AreaName, Sensor]: - View Graph

Warning Message

Critical	Evacuation	Warning
----------	------------	---------

Pilot Study for Web-based Landslide Warning adopted by Rizal Province

A local calibration and training on the use of WEB-based Landslide Warning System (GLAWS) was conducted in Antipolo City (Barrangay-Level) and Rizal Province (Municipal Level) together with National DRR agencies (MGB,PAGASA,PHIVO LCS).

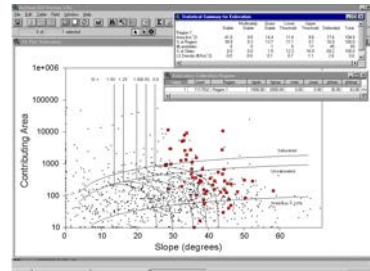
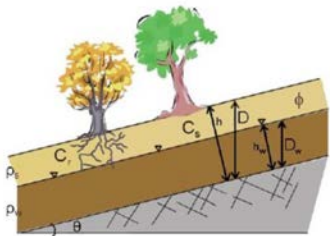


Future Activities

- Expansion of landslide warning system from Rizal province pilot site to expanded selected sites and eventually to nationwide landslide warning incorporating GMAP, local RADAR rainfall estimates, and real-time rainfall stations
- Enhancement of the detailed warning location by integrating a deterministic landslide hazard assessment (SinMAP). From 10km mesh warning to barangay or village-level warning, more useful for community.



Improving warning scale or coverage (barangay level) using SinMAP Model



$$FS = \frac{C + \cos\theta [1 - \min(\frac{R}{T} \frac{a}{\sin\theta}, 1)] r \tan\phi}{\sin\theta}$$

Where:

FS = factor of safety

a = topographic catchment area

C = dimensionless cohesion = $(C_r + C_s)/h\rho_s g$

C_r = root cohesion; C_s = soil cohesion;

h = soil thickness; ρ = soil density; g = gravity constant

h_w = height of water;

R = recharge

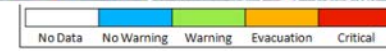
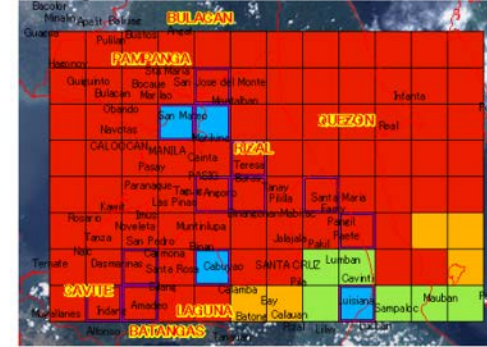
r = water density (ρ_w) to soil density (ρ_s) ratio

T = soil transmissivity = soil hydraulic conductivity x h

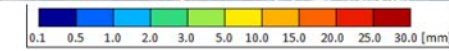
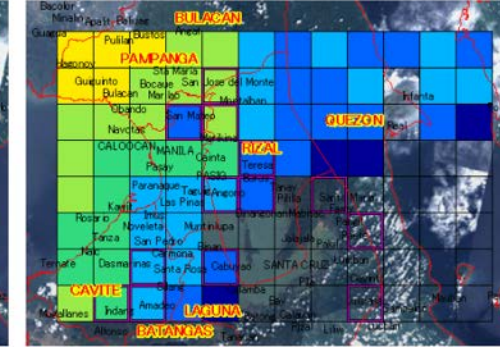
ϕ = soil internal angle of friction

θ = slope

Warning Map (AWS / GSMaP)

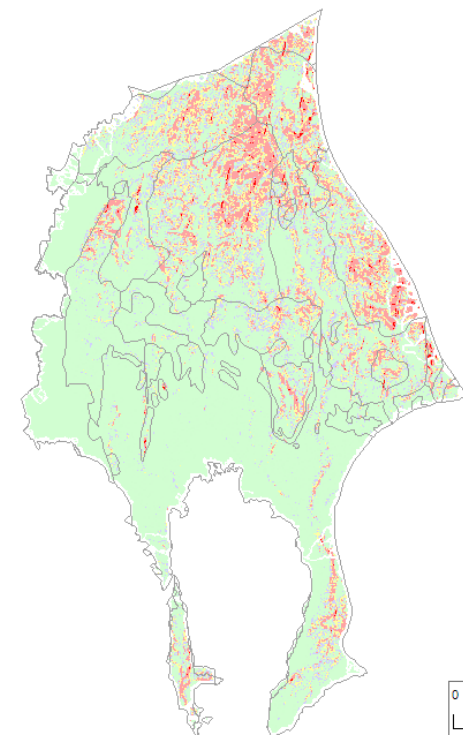
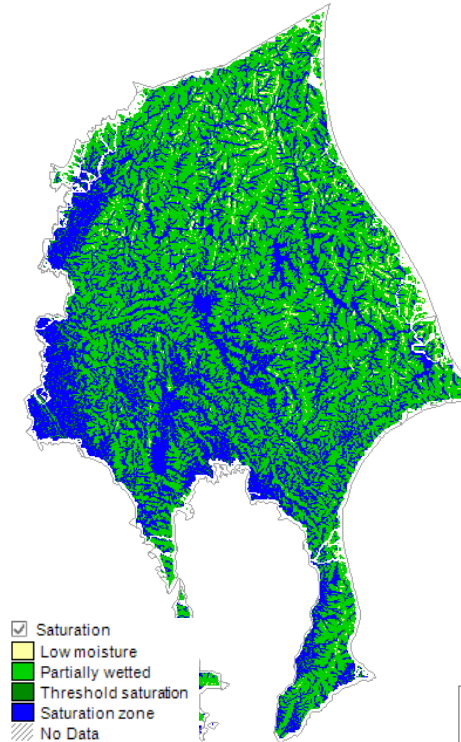


Hourly Rainfall [mm/h]

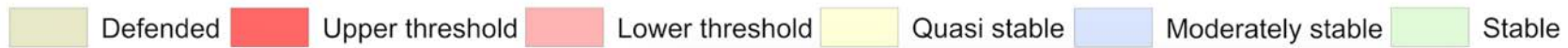
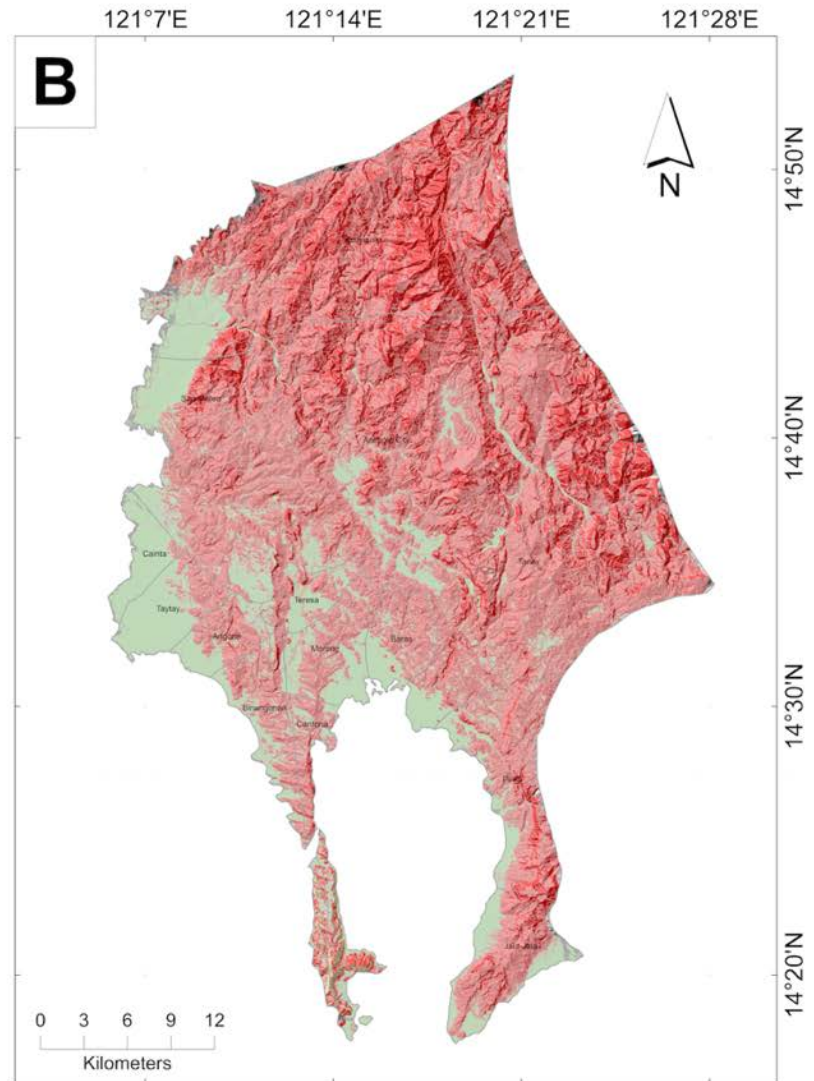
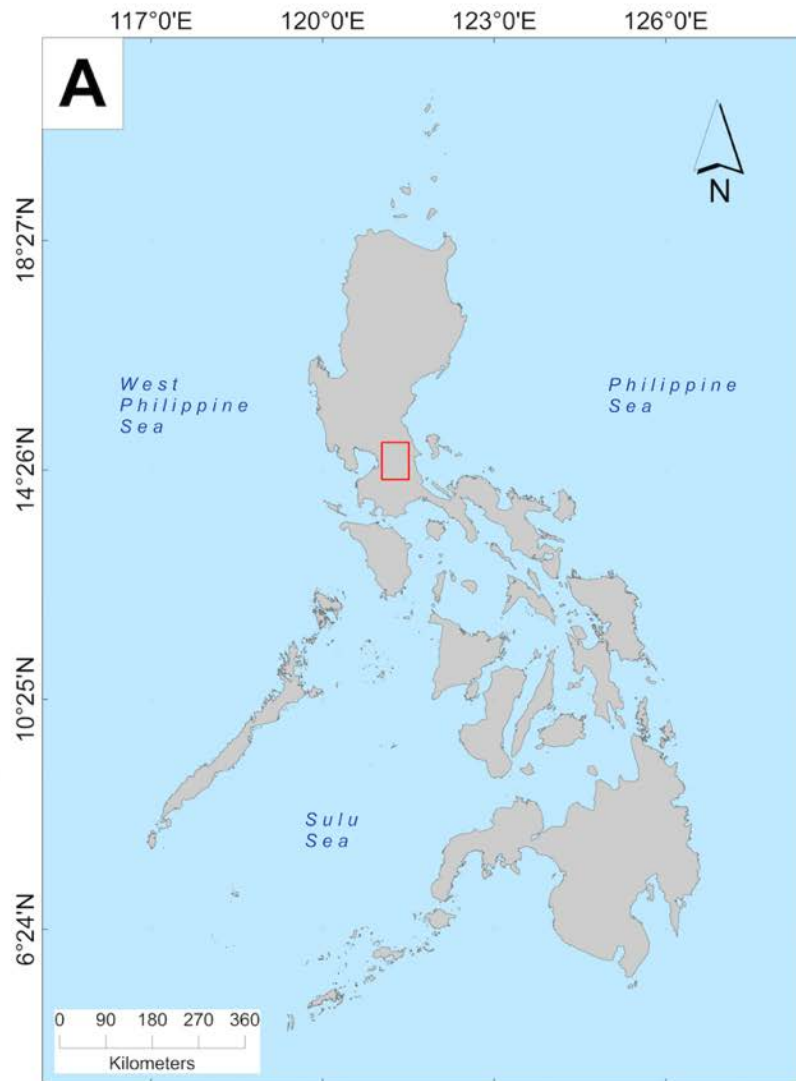


[Lat_Lon_AreaName_Sensor] - View Graph View Warning

Warning Message

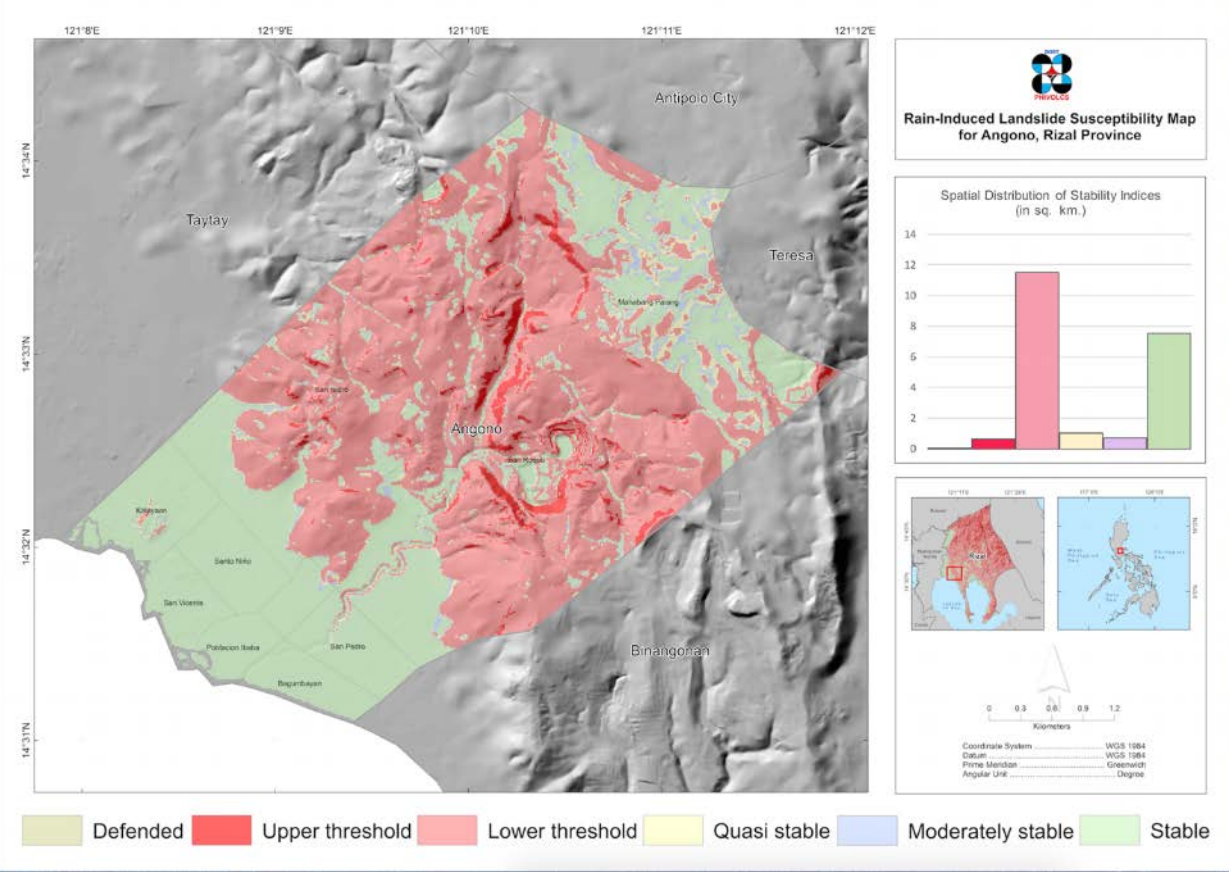


Provincial Level Map

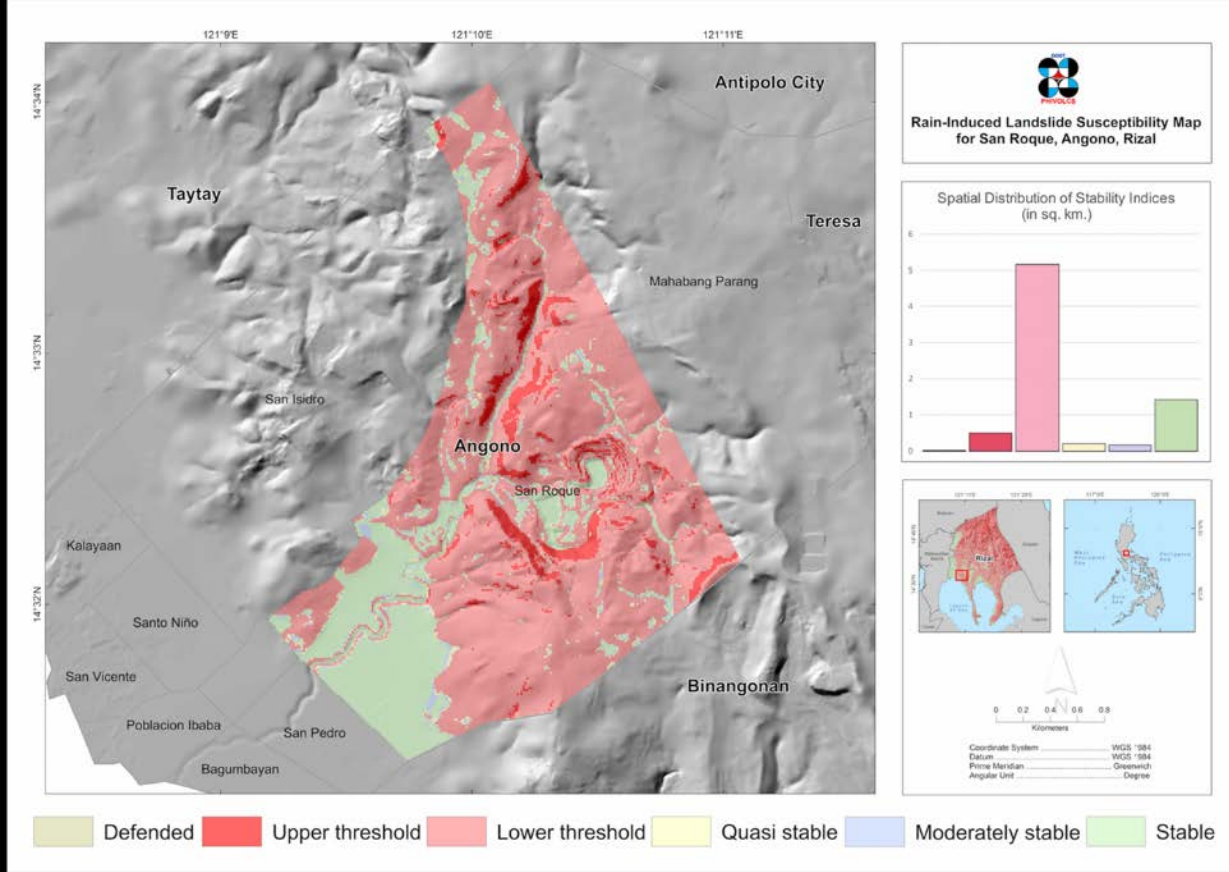


Community-level Landslide Warning using Landslide Hazard Map

Municipal Level Map

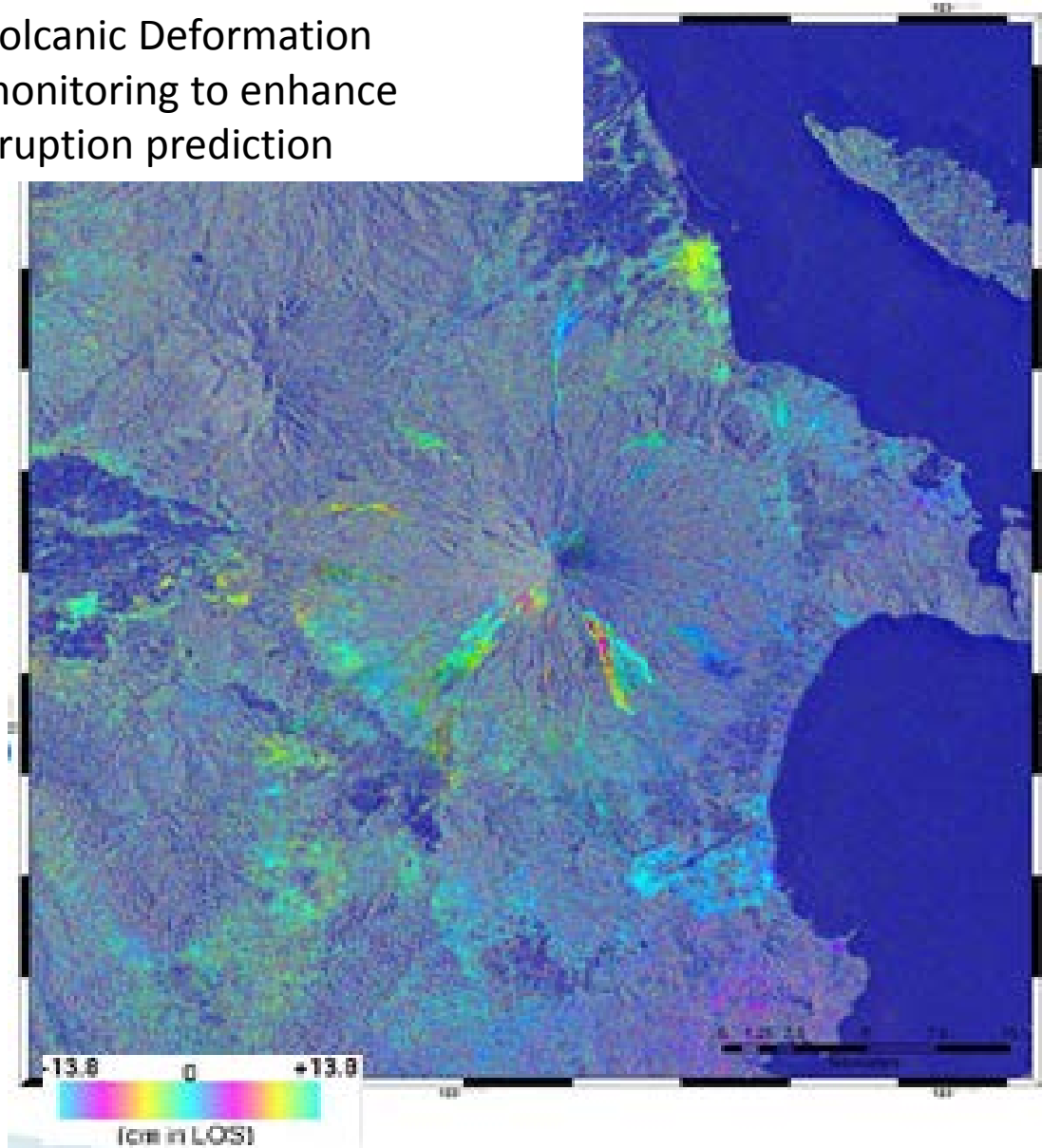


Village / Barangay Level Map

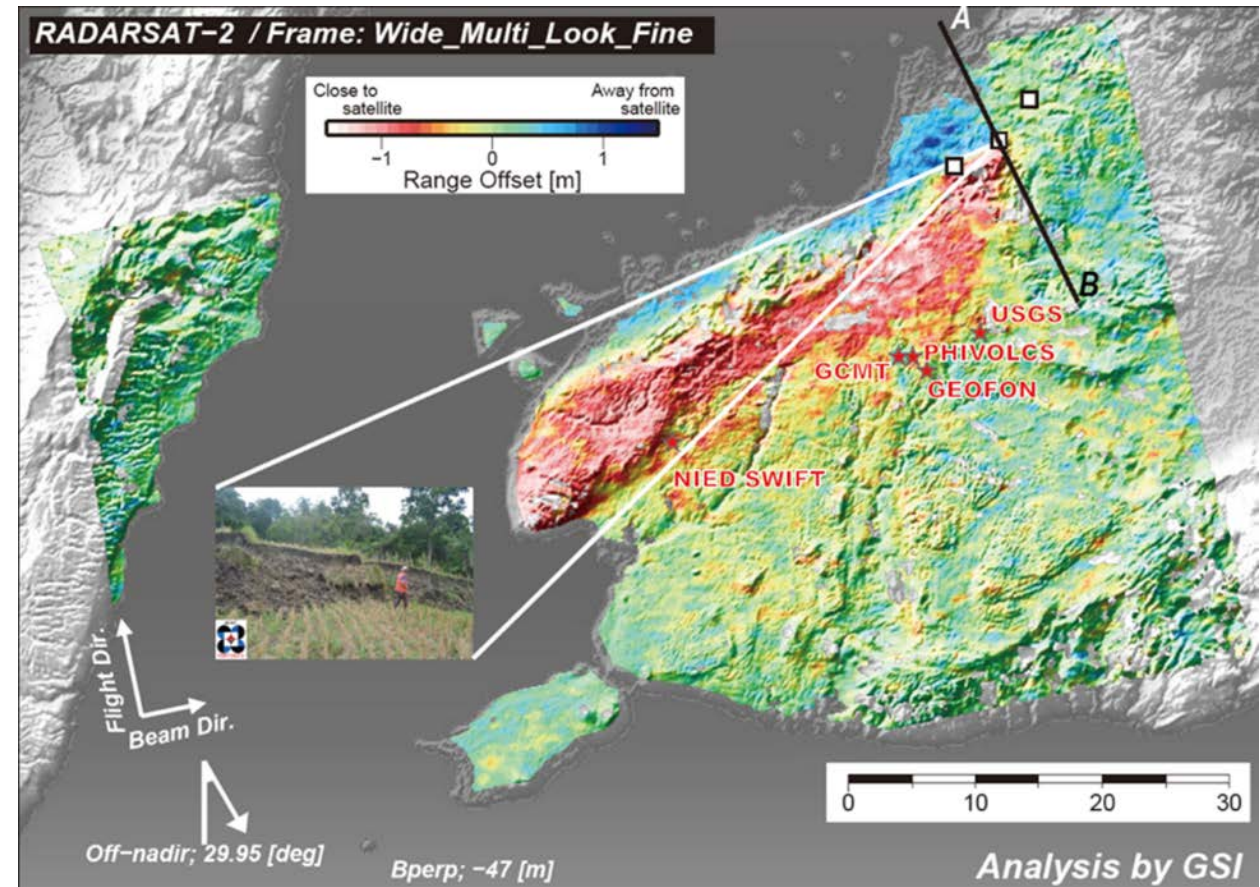


Ongoing Collaboration on ALOS 2 Application on Volcano Deformation, Tectonic Deformation and Fault Monitoring

Volcanic Deformation monitoring to enhance eruption prediction



Creeping fault monitoring or post-EQ tectonic deformation from large magnitude EQs

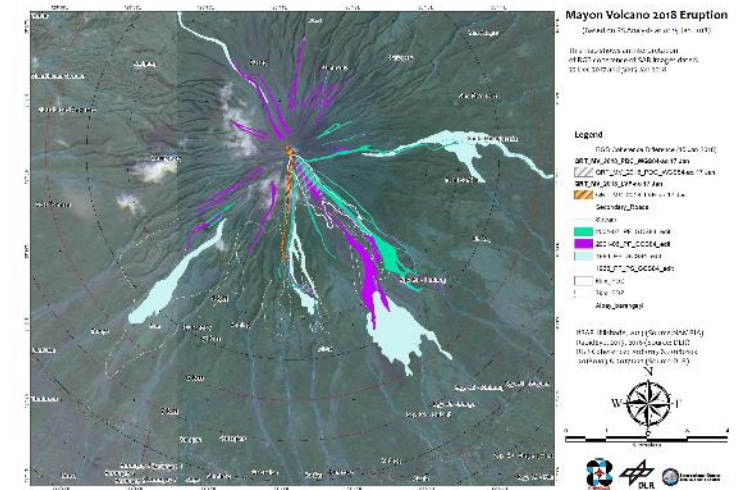
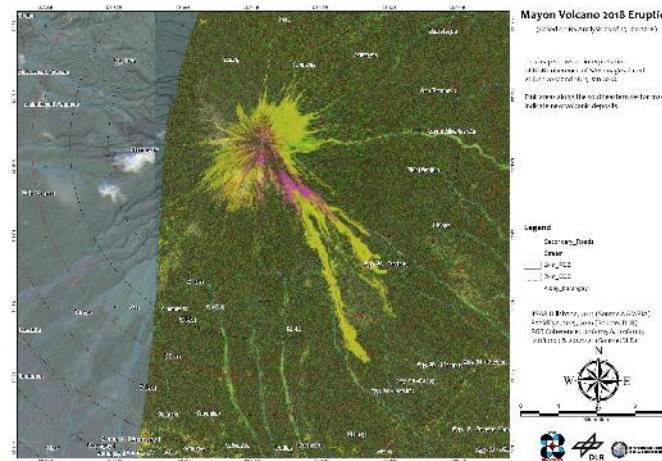
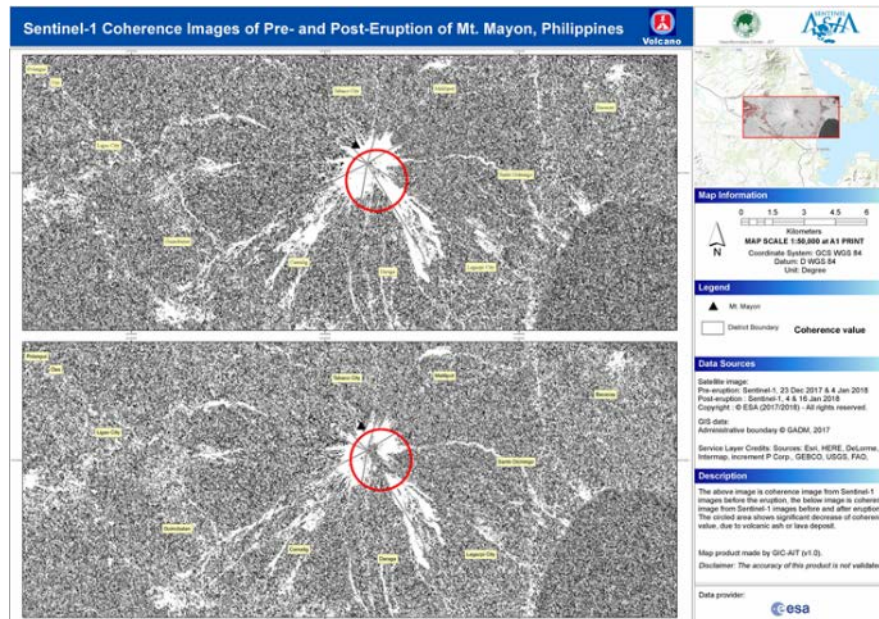


Continuous Engagement during Emergency Observation Request under Sentinel Asia as Data Analysis Node (DAN) and Project Manager on Disaster Charters. January 2018 Mayon Volcano Eruption

Sentinel Asia Emergency Obs. Request List

Country: Philippines Disaster Type: ALL Search

Emergency Obs. ID	Occurrence Date	Country	Disaster Type	Product	WEB-GIS	Detail	Disaster Inf.	Status
ERAIAC000005	15/Sep/2018	Philippines	Typhoon			link	ADRC	Active
ERPHV0000020	15/Jan/2018	Philippines	Volcano eruption			link	ADRC	Active
ERPHM0000005	19/Oct/2017	Philippines	Flood			link	ADRC	Active
ERADRC0000051	10/Jul/2017	Philippines	Training			link	ADRC	Active
ERPHV0000019	06/Jul/2017	Philippines	Earthquake			link	ADRC	Active
ERPHDC0000002	10/Feb/2017	Philippines	Earthquake			link	ADRC	Active
ERPHAC0000008	16/Jan/2017	Philippines	Flood			link	ADRC	Active
ERPHV0000019	25/Dec/2016	Philippines	Others			link	ADRC	Active



Continuous Engagement during Emergency Observation Request under Sentinel Asia as Data Analysis Node (DAN) and Project Manager on Disaster Charters. September 2018 Typhoon Manghut, Philippines

SENTINEL ASIA Sentinel Asia

UserID: phvs0001 password: ***** login

UserID: gues9999

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WEB GIS

- Emergency Observation
- Wildfire Monitoring
- Flood Monitoring
- MTSAT Imagery
- Capacity Building
- Library

Welcome To Sentinel Asia Web Site
Sentinel Asia is a voluntary basis initiative led by the APRSAF (Asia-Pacific Regional Space Agency Forum) to support disaster management activity in the Asia-Pacific region by applying the WEB-GIS technology and space based technology, such as earth observation satellites data.

Emergency Observation

- 12/Oct/2018 Tropical cyclone in United Arab Emirates
- 28/sep/2018 Earthquake in Indonesia
- 17/sep/2018 Typhoon in Vietnam
- 15/sep/2018 Typhoon in Philippines
- 05/sep/2018 Earthquake in Japan
- 29/Aug/2018 Flood in Myanmar
- 27/Aug/2018 Flood in Vietnam
- 25/Aug/2018 Flood in Taiwan
- 09/Aug/2018 Flood in India
- 29/Jul/2018 Flood in Thailand

more...

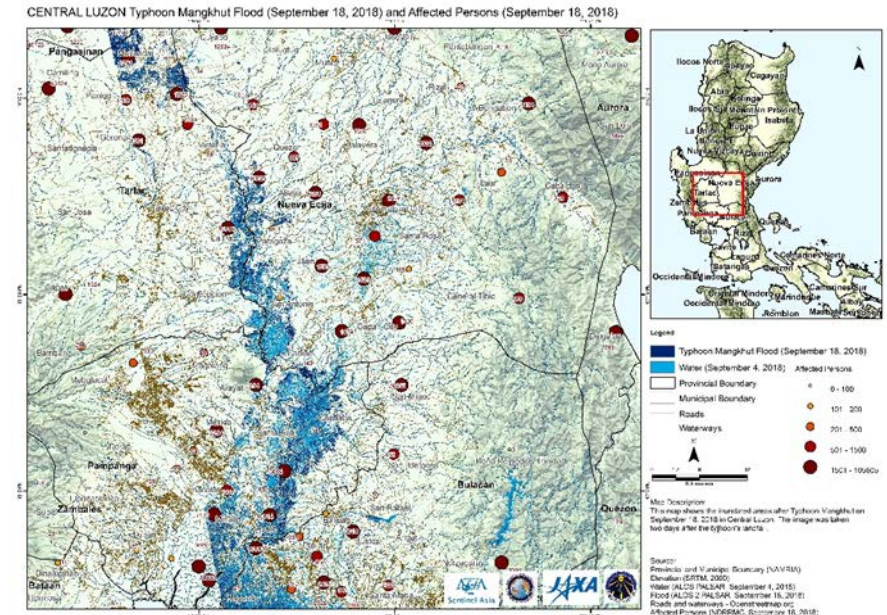
Current Topics

- 27/sep/2018 October 2018 News from Sentinel Asia Project Office link...
- 31/May/2018 Next Sentinel Asia Web (trial version) updated link...

more...

Data Provider Node (DPN)

SENTINEL ASIA Constellation



Home About Activations News Library English Login

Charter activations

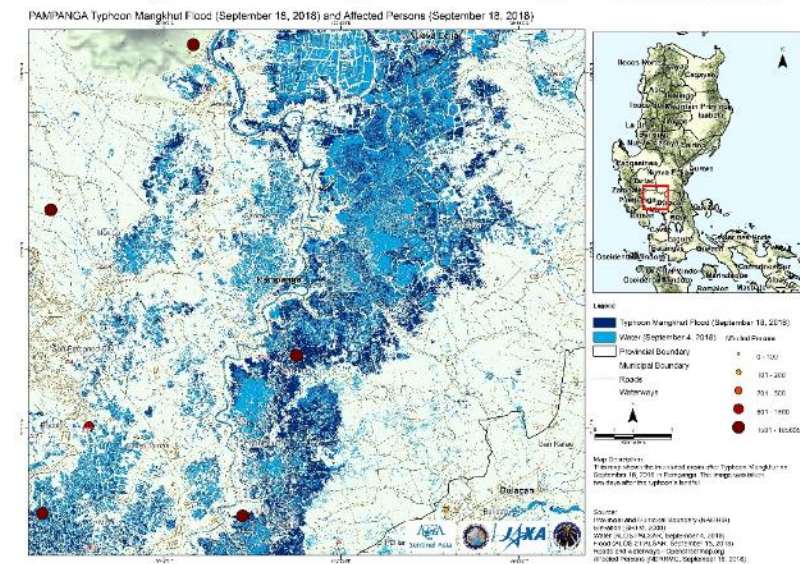
18 SEPTEMBER 2018

Typhoon Mangkhut in Philippines

Browse activations on map ▶

Type of Event:	Ocean Storm, Typhoon and Landslide
Location of Event:	Philippines
Date of Charter Activation:	2018-09-18
Time of Charter Activation:	21:26
Time zone of Charter Activation:	UTC+02:00
Charter Requestor:	ADRC/Sentinel Asia on behalf of Manila observatory / UNITAR - UNOSAT on behalf of UNOCHA ROAP
Activation ID:	586
Project Management:	Philippine Institute of Volcanology and Seismology (PHIVOLCS) - DOST

Map Satellite



Thank you